THE ROLE OF THE STRUCTURAL FUNDS:

Analysis of Consequences for Ireland in the Context of 1992

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Analysis of Consequences for Ireland

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ISBN 0 7070 0125 0

Acknowledgements

This study was financed by DG XVI of the European Commission as part of their technical aid to Ireland under the revised Structural Funds.

The authors would like to thank the wide range of people who contributed to this study: the authors of the micro-studies, four of which are published in this paper; the officials of the European Commission who aided and abetted the authors in their researches, in particular M. Michael Emerson of DG II who provided the initial impetus for the study; the participants from the EC Commission at a seminar, organised by DG XVI, in Brussels in April who provided many valuable suggestions; the staff of the Departments of Finance and Labour and of the Central Statistics Office who answered many complicated and detailed requests for a wide range of information. Finally, the authors would like to thank their colleagues in the Institute and Frank Barry of University College Dublin for their advice and encouragement. The authors, of course, remain responsible for the results and views expressed in the paper.

Mary McElhone, of the ESRI, took control of the final production of this paper relieving the authors of many important, though tedious, tasks.

CONTENTS

Chapter 1

THE ROLE OF THE STRUCTURAL FUNDS: ANALYSIS OF CONSEQUENCES FOR IRELAND IN THE CONTEXT OF 1992

John Bradley, John Fitz Gerald and Ide Kearney

1: *INTRODUCTION*

Since Ireland joined the European Community (EC) in 1973 the economy has changed radically. While the EC was not the only force effecting change it was clearly of great importance. This record of change has been looked at by many authors. In particular the historical record of the performance of the economy and of the impact of EC membership is reviewed in NESC (1989). However, the EC is itself undergoing major reform at many levels. Old policies are being reviewed and new policies are being developed to deal with new priorities. The purpose of this paper is to consider how the Irish economy is likely to be affected by the changing nature of key aspects of Community policy in the next ten years.

Given the breadth of coverage of EC policy it would be impossible with our resources to attempt a comprehensive review of such policies. Instead we concentrate on a number of key areas which will clearly have major implications for Ireland over the rest of the decade. Particular attention is devoted to the likely impact of the expanded Community Support Framework (CSF) and of the completion of the internal market (*1992*). We also consider, in less detail, the possible effects of the reform of the Common Agricultural Policy (CAP) and of Economic and Monetary Union (EMU).

In this study we are concentrating on the macroeconomic impact of EC policy and it was not possible to provide a detailed microeconomic study of the costs and benefits of different projects. However, in undertaking this project it was clear that there were many gaps in our understanding of how the economy works. To try and fill some of these gaps eight micro-studies were undertaken as part of the project. Four of the eight micro-studies are published as part of this paper. The results of the other micro-studies are

published as part of this paper. The results of the other micro-studies are summarised in Section 5.

A preliminary report, published in 1989 (Bradley and Fitz Gerald, 1989), concentrated on the relatively short-term demand effects of the changes in Community policy. This present study expands the previous analysis and extends it to consider the supply side impact, which is the key to the long-term economic benefits of the CSF and *1992* and other aspects of EC policy. Although the present CSF programmes will be implemented during the years 1989-93, we consider that a comprehensive analysis of their full effects and of the effects of *1992* requires a time horizon of at least the year 2000.

Outline of Paper

In Section 2 we give a brief assessment of the development of the Irish economy over the years preceding and since accession to EC membership in 1973. We show that there was relatively little narrowing of the gap between the standard of living enjoyed by the Irish economy and that of the core regions of the EC. A cursory examination of the reasons for the failure to converge suggests that some of the fault lies with inappropriate domestic policies pursued over much of the period. However, even with more appropriate policies, the gap in living standards would still have been large in 1990.

Underlying the quantification of the effects of the CSF, *1992*, CAP reform and EMU is a *benchmark* projection for the years 1990-2000. As described in our latest *Medium-Term Review* (Bradley, Fitz Gerald and McCoy, 1991), this *benchmark* takes account of likely developments in the rest of the world over the period, the probable stance of domestic economic policy, and the underlying demographic structure of Ireland. This projection, and the assumptions on which it is based, are summarised in Section 2.

The major Community initiatives – *1992* Economic and Monetary Union, and reform of the CAP – form an essential backdrop to the Community Support Framework for Ireland and the other peripheral regions of the EC. In Section 3 we consider the different aspects of 1992, EMU, and CAP reform and discuss how they are likely to affect the Irish economy. The results described here develop and extend the earlier work described in Bradley and Fitz Gerald, 1989.

Section 4 outlines the Community Support Framework agreed between the Irish government and the EC. The objectives of the European Community in establishing this framework are described and we examine in some detail the measures to be funded under the Framework. These

measures are classified according to the likely channels through which they will affect the economy. This categorisation of the measures is an essential prerequisite for the quantification of the likely economic impact of the CSF, described in Section 6.

To carry out the economic analysis of the effects of EC policy we have developed a methodology, implemented in HERMES-Ireland, which concentrates on the long-term implications of the different measures. The channels through which the different changes will affect the supply side of the Irish economy have been identified and, in some cases, the model has been modified to facilitate quantification. The methodology used is summarised in Section 5.

The implications for Ireland of the CSF are analysed by subtracting the effects of these policy changes from the benchmark projection and considering, in a stylised way, what would have happened if EC policy had continued unchanged from the year 1988 to the year 2000. This task is accomplished using the HERMES-Ireland model to provide a consistent framework for quantifying the alternative scenarios. Section 6 describes the results for the Community Support Framework.

Finally, Section 7 summarises our main conclusions and provides an evaluation of the likely impact of all the major Community initiatives, focussing particularly on the CSF. We inquire into how successful the present policies are likely to be in meeting the objectives of the EC, especially the objective of cohesion set out in Article 130 of the Treaty. We make recommendations as to additional policy measures which may be needed to further this objective. We also consider the appropriate stance for domestic policy so that it can underpin the existing Community initiatives. Finally, we discuss the gaps in our knowledge which our analysis has turned up, and suggest how these gaps might be filled in order to make evaluation and monitoring more reliable and comprehensive.

2: *IRISH ECONOMIC DEVELOPMENT IN THE EUROPEAN COMMUNITY*

The imminent arrival of 1992 and movements towards EMU is merely the latest in a continuous sequence of major changes to Ireland's economic environment that have taken place over the last three decades. Ireland did not join the EEC at its inception in 1956. The first post-war strategic policy change, that hastened a process of modernisation and exposure to the world economy, took place in the last years of the 1950s with the dismantling of barriers to multinational investment, and the active courting of foreign direct investment. In 1965 an Anglo-Irish Trade Agreement was concluded, resulting in the systematic dismantling of tariff

barriers between Ireland and the UK.[1] Ireland's eventual entry into the EEC in 1973 (together with the UK and Denmark) represented another stage in the progressive opening up of the economy to world influences, and ushered in profound changes to the important agricultural sector through the Common Agricultural Policy. Entry into the EMS in 1978 represented a switch from a one-for-one Sterling link to a narrow band link to the DM, and further charted Ireland's progressive integration into the wider European and world economy.

By the late 1980s, Ireland's economy had become one of the most open in the EC, where the sum of exports and imports greatly exceeded GDP. In Figure 2.1 we compare the ratio of exports to GDP for Ireland, Belgium, and Denmark and in Figure 2.2 we compare the same ratio for Ireland, Greece and Portugal. A similar pattern applies to the imports/GNP ratio.

FIGURE 2.1
Ratio of Total Exports to GDP

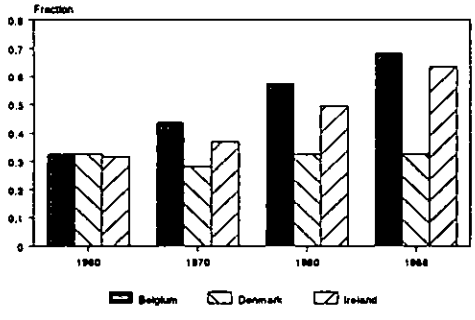
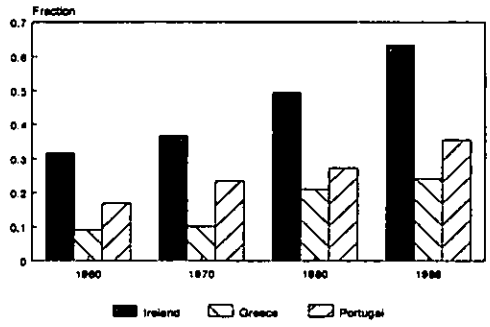


FIGURE 2.2
Ratio of Total Exports to GDP



However, although it underwent a profound process of modernization and opening to world trade and foreign direct investment, per capita income levels (on a purchasing power parity basis) in Ireland remained stubbornly lower than levels in all other EC member states, with the exception of Greece and Portugal (Figure 2.3 and Figure 2.4). The reasons why no convergence took place are complex and not fully understood. Indeed, some economic theories suggest that lagging regions often find it difficult even to maintain their relative position, let alone improve it (Kaldor, 1970, National Economic and Social Council, 1989).

This Section is designed to serve as a brief survey of the main features of the Irish economy. In Section 2.1 we describe some features that served to characterise development over recent decades, in an effort to set the scene

[1] Since over 70 per cent of Irish exports were sold in the UK in the early 1960s, the signing of the Anglo-Irish Free Trade Agreement in 1965 represented a considerable step in the progression towards removal of all tariff barriers, and was a major step towards easing eventual adjustment to entry into the EEC.

FIGURE 2.3

Real Per Capita Gross Domestic Product

Data Source: Summers and Heston, 1988

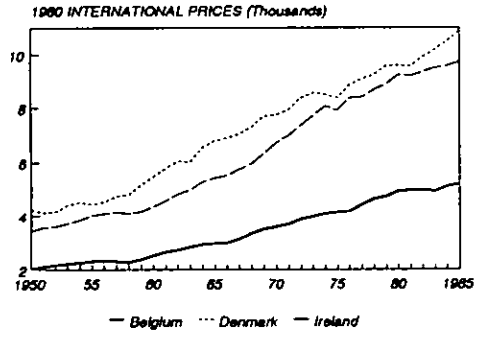
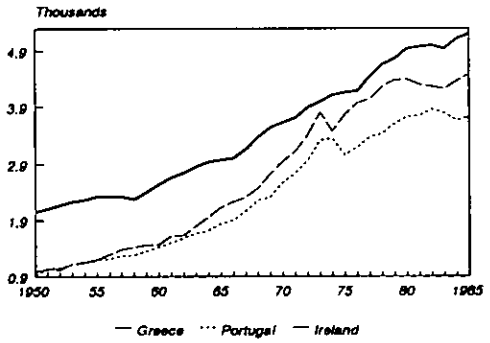


FIGURE 2.4

Real Per Capita Gross Domestic Product

Data Source: Summers and Heston, 1988



for our subsequent use of the Irish economic model, HERMES, to analyse the likely impact of the CSF, a programme whose key aim is to stimulate convergence of the periphery towards average EC income levels. In Section 2.2 we turn to the 1980s, where developments in the world economy, sectoral structures and domestic policy experience have laid the foundations for the future development of the economy. In Section 2.3 we review the present domestic policy stance for fiscal, monetary and incomes policies, the policy context within which the CSF is operating. In Section 2.4 we review the likely prospects for the 1990s and describe the key features of the benchmark projection used later as a background to the analysis of *1992* and the CSF in Sections 4 and 6. Finally, in Section 2.5 we draw together and review the main structural problems of the Irish economy, as a lead-in to our subsequent discussion of the role of the CSF in Section 3.

2.1: *Background on the Irish Economy*

Certain key features distinguish Ireland's economy from other EC and OECD countries. For example, it has a level of income *per capita* in the bottom three of the EC-12 and the bottom 5 of the 24 OECD countries. It has a rate of unemployment which is second highest in the OECD (after Spain) and which shows no immediate prospect of sustained and substantial reduction. It still has a relatively high dependence on agriculture, some of which is of a subsistence character. Also, its industrial sector has a below average share of the economy, and is characterised by duality, i.e., a largely foreign owned, export-oriented, highly productive and profitable modern sector, which has little contact with the more traditional labour-intensive indigenous industries, which are more oriented

towards the domestic and UK markets.

Ireland is a classic example of a small open economy. As shown above, almost all goods and many services produced domestically are traded and exposed to international competition. The traded goods sector is very integrated into the world economy (mainly the EC, USA and Japan) of which Ireland is a small part, so that Irish industrial output prices are largely externally determined (Figure 2.5 and Figure 2.6). Irish financial markets, dominated by the UK up to 1978, are now closely integrated into the EMS, so interest rates are mainly influenced by German rates.

FIGURE 2.5
Irish Exports by Country of Destination
Jan-Dec, 1988

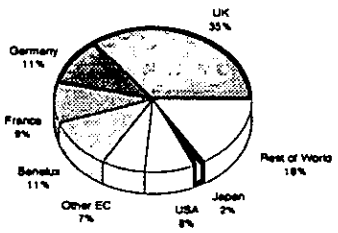
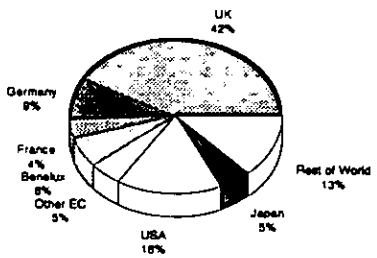


FIGURE 2.6
Irish Imports by Country of Origin
Jan-Dec, 1988



Source: Trade Statistics of Ireland, CSO

Trade Statistics of Ireland, CSO

Although predominantly an underdeveloped agricultural country at Independence (in 1922), in the six following decades the structure of the economy evolved and now more nearly resembles that of other developed countries. As shown in Figure 2.7, agriculture's share of employment has fallen from 54 per cent of the labour force to under 16 per cent between 1926 and 1989, with industry's share rising from 13 per cent to 28 per cent, still, however, below the EC average. Even within manufacturing the composition of industrial production and employment has shifted dramatically. Figure 2.8 shows how the traditional industrial base[2], including food-processing, (labour intensive and largely native owned) has been steadily eroded while the modern base[3] (highly productive and largely foreign owned) has grown steadily.

Whereas agricultural exports dominated trade up to the mid-1960s, manufactured exports now amount to about 66 per cent of the total (Figure 2.9). In addition, the source of imports and, in particular, the destination of exports has broadened. As Figure 2.10 shows, the almost

[2] We define *traditional* industry as comprising food, drink, tobacco, textiles, clothing, footwear, wood and paper.

[3] *Modern* industry consists of chemicals, minerals, metal and engineering products.

complete dependence on the UK market as a destination of exports (92 per cent of total in 1929) had fallen to about 30 per cent by the late 1980s.

FIGURE 2.7
Sectoral Employment 1926-1989

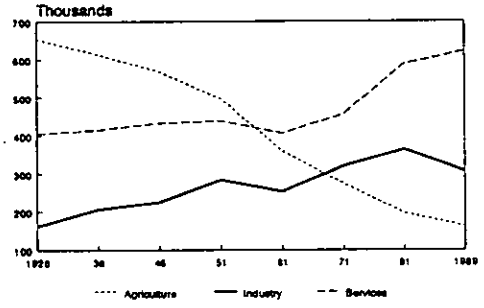


FIGURE 2.8
Shares of Manufacturing Employment
Traditional and Modern

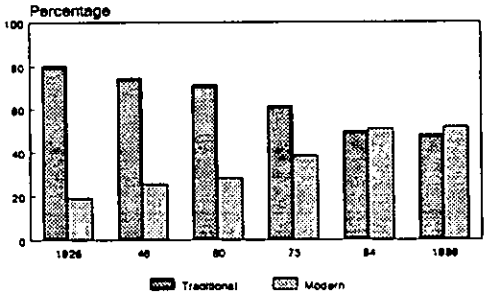


FIGURE 2.9
Composition of Irish Exports
Agricultural and Non-Agricultural

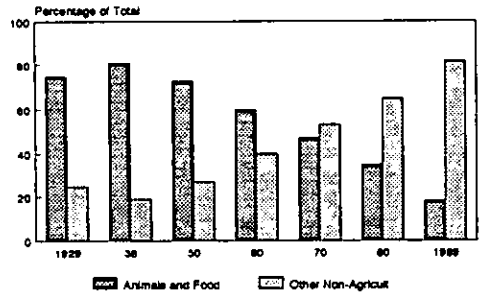
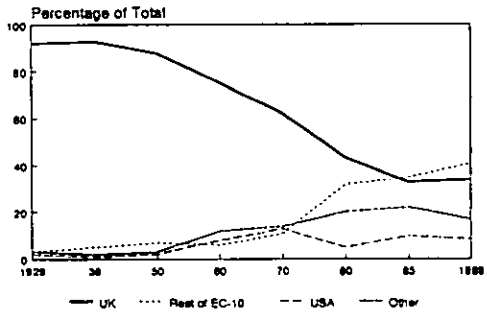


FIGURE 2.10
Exports by Geographical Destination



In recent decades, development of the economy has taken place under an outward-looking policy of free trade (within the EC since 1973) where all previous restrictions on foreign direct investment were removed and replaced by generous grants and subsidies, and full tax remission on profits arising from manufactured exports.[4]

Since Ireland has a relatively high natural rate of population growth, the stimulation of employment has always been central to public policy. Some special features of the Irish labour market are of particular importance. There are high actual and potential net migration flows, mainly to Great Britain and the USA, but increasingly to mainland Europe. There has been massive structural change in the labour market in the last few decades as

[4] The zero rate of corporation tax on profits arising from industrial exports was replaced after EC membership by a low flat rate of 10 per cent on all manufacturing industry.

agricultural employment declined and industry grew. However, this industrial growth, stimulated by an industrial policy whose main instruments consisted of low corporate taxes and generous capital subsidies, was not employment intensive. This problem is further exacerbated by the high rate of repatriation of profits by foreign multinationals (Figure 2.11) resulting in a diminution of the benefits to Ireland of industrial growth. So, in spite of successful industrialisation, an endemically high rate of unemployment (with an increasing proportion of long-term unemployed) has always been, and still remains, one of the most pressing problems facing policy makers in Ireland.

FIGURE 2.11
Profit Repatriation
(Irish Based Foreign Multinationals)

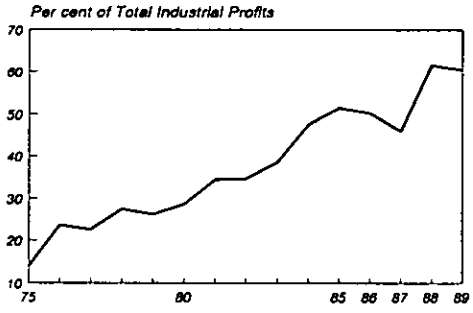
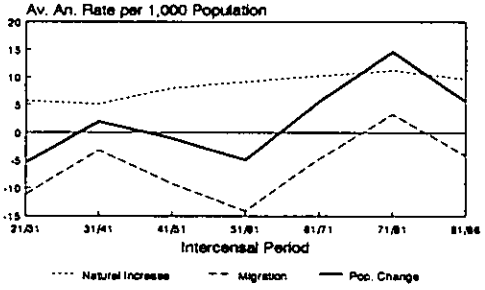


FIGURE 2.12
Demographic Trends
Population and Migration



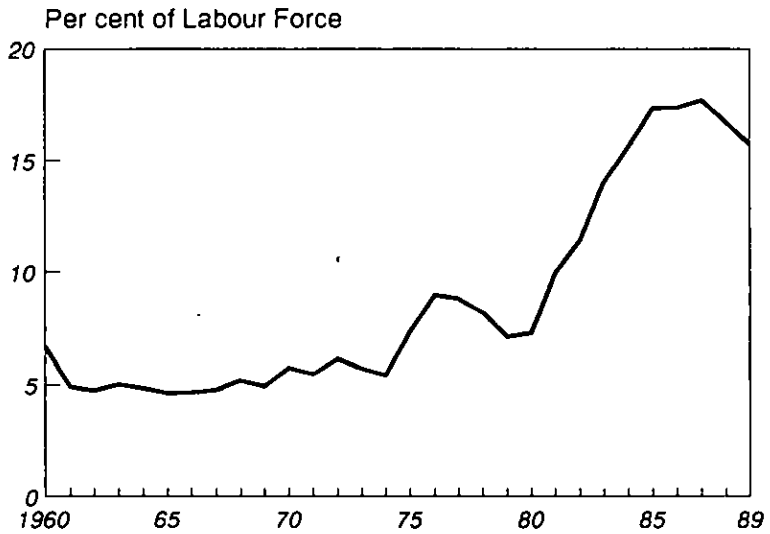
With respect to labour supply, total population levels remained relatively static until the 1970s as a result of two offsetting trends: a relatively high natural rate of increase and a high rate of net migration abroad (Figure 2.12) (driven mainly by push factors due to the lack of jobs in Ireland relative to the UK). The resulting rate of unemployment is shown in Figure 2.13, where it is seen seldom to have fallen below 5 per cent of the labour force and is now (in late 1990) about 15 per cent.

2.2: *Economic Performance in the Recent Past*

The pattern of growth in Ireland (Figure 2.14) tends to track the pattern of growth in the economies of its main trading partners. A strong recovery after 1974-75 peaked in a growth rate of 6.1 per cent in 1978. Growth was further stimulated by a very expansionary fiscal policy in the late 1970s. With the on-set of the OPEC-II oil price rises in 1979 and the subsequent world recession, the economy faltered and a period of

unstable, mainly negative, growth followed for the years 1982 to 1986. Since 1987 growth in Gross National Product (GNP) has recovered.

FIGURE 2.13
Unemployment Rate



However, movements in GNP conceal patterns in its two sub-components, namely Gross *Domestic* Product (GDP) and net factor payments from abroad. The latter moved steadily towards a net outflow, driven by large-scale repatriation of profits by foreign multinational firms and by rapidly escalating foreign debt interest payments (see below). The profit outflow was a natural consequence of the dominant position that the foreign multinationals have come to hold in Irish industry. The foreign debt interest payments were a direct consequence of the large fiscal deficits and foreign borrowing undertaken by the public sector, the results of which have overshadowed economic policy making in Ireland for the last decade.

Living Standards

In many ways the pattern of real household consumption (Figure 2.15) mirrored movements in GNP. After the OPEC-I recession, there followed four years of growth, the highest being the record 8.8 per cent achieved in

FIGURE 2.14
Gross National Product

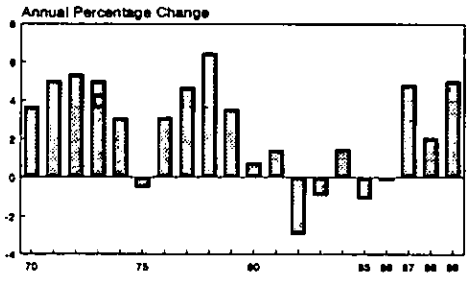
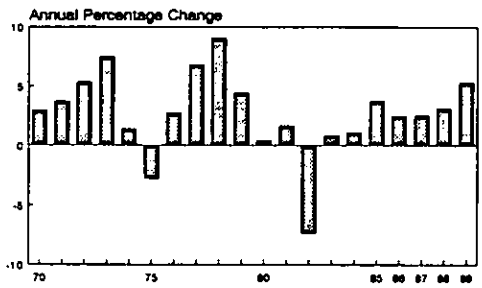


FIGURE 2.15
Personal Consumption



1978. This came to an abrupt halt in 1979 and, thereafter, growth has been at an historically low level. Throughout this period the personal savings rate remained high, between an upper figure of 20 per cent to the present lower value of about 13 per cent, although since much of industrial investment was financed by capital inflows, domestic savings have not constrained growth.

Behind these somewhat anodyne national accounting aggregates there were significant shifts in the distribution of income. A recent study found that the percentage of people below a wide range of relative income poverty lines increased between 1980 and 1987 (Callan, Nolan, and Whelan, Hannan, with Creighton, 1989). The marked rise in unemployment over the period was a key factor in explaining the changes in the incidence and composition of poverty. Thus the low or negative aggregate consumption growth over the 1980s appears to have been distributed in an uneven fashion.

The Role of the Public Sector

In Figure 2.16 and Figure 2.17 we show the pattern of growth in real public consumption (mainly wages and salaries in public administration, health and education) and the share of public consumption in overall GNP. The high growth of the years before 1980 is apparent, when the public sector's share of GNP rose from 13 per cent to a peak of 21 per cent in 1982. The main explanation for this pattern was the rise of public sector employment numbers, from the 1966 level of under 11 per cent of total employment in the economy, to a peak of just under 19.5 per cent in 1985. The subsequent decline after 1985 followed explicit policy decisions to shed labour in the public sector as part of a general package of fiscal cutbacks.

The exchequer borrowing requirement (EBR) moved into deficit in 1969 and this deficit rose to almost 16 per cent of GNP in 1981 (Figure

2.18).[5] It is clear that most of the period was characterised by twin deficits on the public and external accounts. Driven by the burgeoning exchequer borrowing requirement (EBR), the debt/GNP ratio (Figure 2.19) rose inexorably under the influences of high interest rates and exchange rate devaluations. An increasing portion of the national debt was denominated in foreign currencies, the interest payments on which were a direct outflow from the domestic economy (Figure 2.20).

FIGURE 2.16
Public Consumption

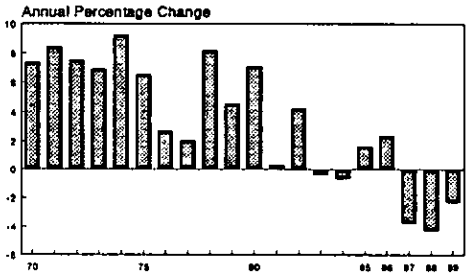


FIGURE 2.17
Public Consumption Share of GNP

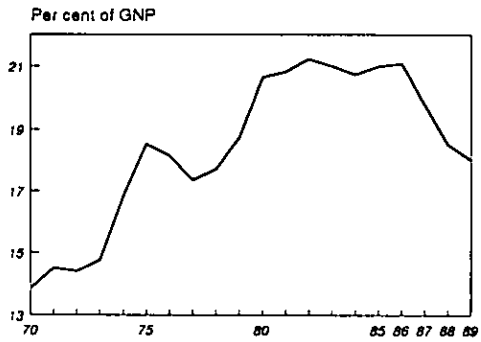
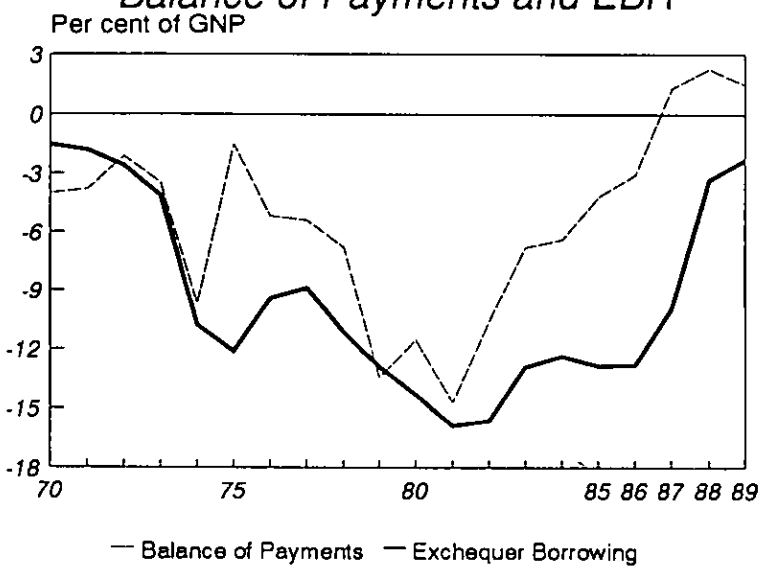


FIGURE 2.18

Balance of Payments and EBR



[5] Both the balance of payments and the EBR are measured as a *surplus*. Hence, a negative sign means *an external and a public sector deficit*.

FIGURE 2.19
National Debt/GNP Ratio

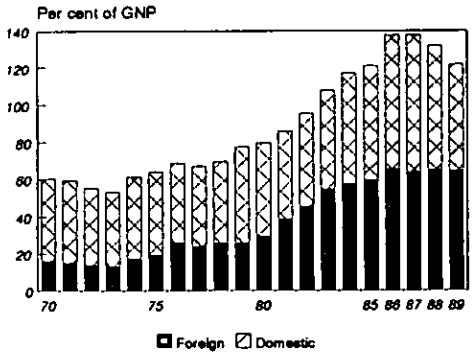
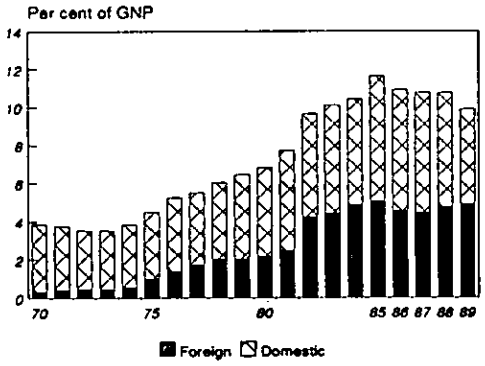
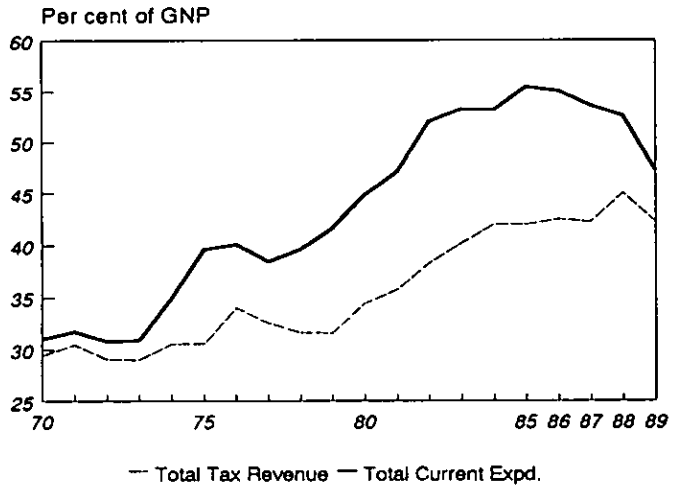


FIGURE 2.20
Debt Interest/GNP Ratio



In addition to expanding the EBR and accumulating debt, the total tax take also rose inexorably as a percentage of GNP. This was a result of explicit increases in direct and indirect tax rates as well as a failure to index the direct tax system when it was buffeted by the high and unstable inflation of the late 1970s and early 1980s. The actual curtailment of tax increases, facilitated by the reduction in total public sector current spending (i.e., public consumption as well as transfer payments) did not come until the mid-1980s, driven by explicit fiscal cuts and assisted by falling world interest rates (Figure 2.21).

FIGURE 2.21
Tax Revenue and Public Expenditure



Inflation

With some differences in timing following on the OPEC price shocks, no significant deviation between Irish and world price inflation has occurred. Given that purchasing power parity (or the "law of one price") holds in the long run for open economies like Ireland, this highlights the fact that it is not price competitiveness but rather cost competitiveness that is important for the Irish trading sector. In Figure 2.22 we compare Irish consumption price inflation with industrial wage inflation.[6]

FIGURE 2.22
Price and Wage Inflation

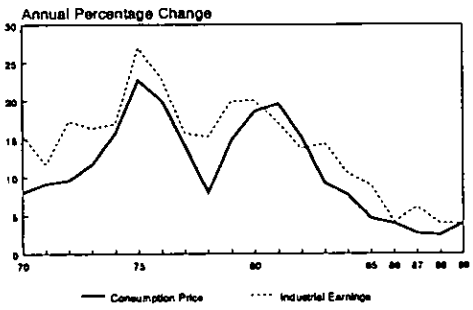
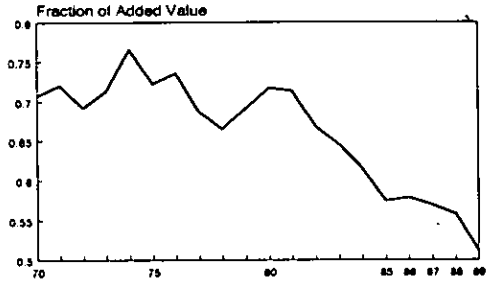


FIGURE 2.23
Labour's Share of Industrial Added-Value



Although wage increases were running higher than price inflation for most of the period since 1966, labour's share of added-value in industry (the exposed trading sector) remained relatively static and has declined steadily since 1980 (Figure 2.23). Part of the explanation lies in the changing composition of the industrial base (as capital and R&D-intensive modern firms displace labour intensive traditional firms). However the low level of pay awards in recent years has contributed as well. Such a decline in labour's share is mirrored by an equivalent rise in the profit share of added-value. This increase in the profit rate accompanied, and partially explains, some of the phenomenally high industrial export growth of recent years.

The External Account

For the period up to 1986 the Irish balance of international payments was in deficit (Figure 2.18 above). The years 1979 to 1982 saw the deficit reach almost 14.5 per cent of GNP, but from 1983 the deficit reduced rapidly and passed into a surplus in 1987, for the first time since 1967. By 1989 this surplus was between 1 and 2 per cent of GNP, driven mainly by a

[6] The most recent study of price transmission into Ireland, substantiating the price-taking behaviour of Irish industry, is Callan and Fitz Gerald (1989).

strongly growing surplus on the balance of trade and growth in transfers from the EC since Ireland became a full member in 1973. This more than offsets the outflows through the balance of payments, i.e., still rising profit repatriations and the foreign debt interest payments abroad. Exports and imports have been growing as a share of GNP, reflecting the increasing openness of the economy. [7]

The Labour Market

For historical reasons, the Irish and UK labour markets are closely linked through migration flows and, at least prior to the break with sterling in 1979, through wage and price inflation transmission. Figure 2.24 shows that the evolution of the Irish and British rates of unemployment followed each other closely prior to 1976. Given the high degree of integration of the Irish and UK labour markets, the difference between these rates should be relatively stable, other things being equal. Advances were made in closing the unemployment "gap" during the period 1975 to 1981 but the "gap" has widened sharply since then, reaching an historical high of over 7.5 percentage points in 1987, but falling to 6.2 points by 1989. The corresponding movements in emigration flows and population growth are shown in Figure 2.25.

FIGURE 2.24
Unemployment Rates
Ireland and the United Kingdom

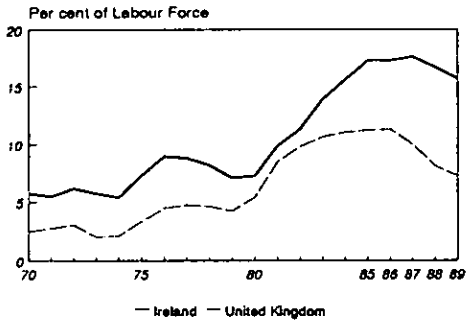
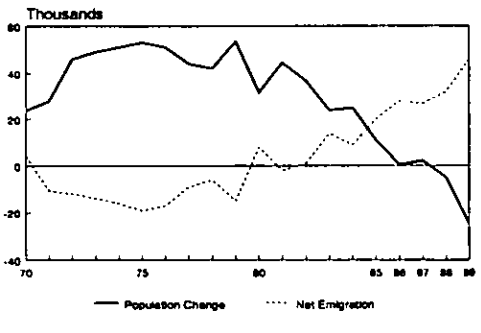


FIGURE 2.25
Population and Emigration



After a period of net inward migration from 1971 to 1979, outward migration resumed in the 1980s and has now reached high levels similar to

[7] The balance of trade statistics have to be interpreted with caution since some multinational companies tend to engage in "transfer pricing", i.e., to undervalue imported raw and semi-processed materials and over-value exports in order to benefit from Ireland's favourable corporate tax regime.

the depressed period of the 1950s and early 1960s. The migration mechanism lies at the centre of any discussion of functioning of the Irish labour market. If outward migration flows to the UK had not been facilitated in recent years by high growth in the UK, then the behaviour of the labour market might have been very different. Many factors contribute to the poor performance of the Irish labour market: a weak domestic demand for labour in industry and marketed services, partially due to high wage and other costs;[8] decline in employment opportunities in agriculture; the cessation (indeed reversal) of employment growth in public services; the relatively high natural growth in population; a rising labour force participation rate for married women. All these factors have combined to keep the rate of unemployment at a high level. A further very serious aspect of the composition of unemployment is the increasing proportion of the long-term unemployed (see below).[9]

2.3: *Present Fiscal, Monetary and Incomes Policies*

2.3.1 : Budgetary and Fiscal Policy

In contrast with previous decades, in Ireland there is something of a political consensus that the openness of the economy, together with the financial constraints being faced in the 1980's and early 1990s as a legacy of past policy experiments, place severe limitations on the scope for discretionary public policies designed to stimulate growth and increase employment. The necessity to operate within these constraints is emphasised in most recent policy documents, and a premium is placed on obtaining "value" for any State or EC expenditure or tax policies in terms of achieving higher employment targets in the private sector. The main thrust of present public policy focuses on the promotion of greater efficiency of *internal* markets within the economy (e.g., labour, transport, communications, energy, agricultural cooperatives) and the promotion of the benefits of Ireland as a production location for both indigenous and foreign firms.

For a considerable part of the 1990s, fiscal policy will be operating in an external economic environment which will be less favourable than in the period 1987-90. Although scope for greater domestic fiscal policy flexibility may increase as the decade progresses, nevertheless Ireland enters the 1990s with a massive overhang of public debt (refer Figure 2.19 above). A

[8] The interrelationship of the Irish and UK labour markets through migration has tended historically to keep Irish wage rates higher than they would otherwise be in the complete absence of a migration outlet.

[9] A recent comprehensive investigation of the "causes" of the 10 percentage point rise in the Irish rate of unemployment during the years 1980-87 is available in Barry and Bradley (1991).

major priority during the coming years will undoubtedly be the progressive reduction of this debt towards a level more typical of other EC members (i.e., to about 50 to 60 per cent of GNP).

Against a background of moderate steady growth and low inflation, the debt reduction programme was tackled in the period 1987-88 mainly by public expenditure cut-backs. The tax burden in Ireland is not excessively high by EC standards.[10] However it rose rapidly over the last decade and the tax base is rather narrowly focussed on personal income tax and non-food expenditure taxes. For the immediate future it is likely that there will be a gradual reduction of direct taxation and some reduction of indirect tax rates.[11]

We have seen that total current public expenditure (including subsidies and transfers) rose sharply in the 1960s and 1970s and such growth was only arrested and reversed in the mid 1980s. Public sector consumption rose due both to rapid public sector employment increases in the late 1970s and to relatively high wage rises in the public sector. For the immediate future there is likely to be little scope for much increase in domestically financed real public expenditure and any further efficiency gains are unlikely to be employment creating within the broad public sector.

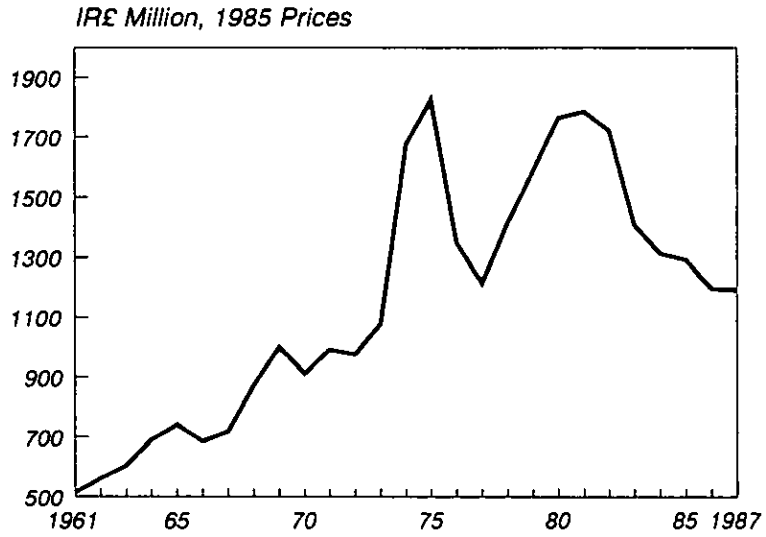
Within the total public sector budget, the public capital programme (PCP) is a key factor in encouraging growth in the wider economy. After operating at a high level in the late 1970s and early 1980s, the PCP suffered large-scale real cuts in the 1980s (Figure 2.26). However, given injection of resources from the EC Structural Funds for infrastructural investment and manpower training purposes, public spending in these areas is set to increase considerably in the early part of the decade, even though the national exchequer's contribution to infrastructural investment under the Structural Funds may remain fixed in real terms.

In summary, the dramatic improvement in the public finances in the period 1987-89 means that in the 1990s the Irish government will be in a less constrained position than it was during the period of deflationary fiscal policy adopted for much of the 1980s. While a return to a policy of massive fiscal stimulation (adopted so disastrously in the 1970s) is neither desirable nor likely, the adoption of a more neutral fiscal policy, with some tax reductions and some increase in infrastructural investment funded by the CSF over the next 3 years, will support growth in the medium term.

[10] Note, however, that Ireland's tax burden relative to GNP *is* high when compared to the other peripheral EC members and to its dominant trading partner, the UK.

[11] The prospect of EC tax harmonisation poses difficult problems for Ireland, particularly in view of its current high rates of excise taxes and VAT.

FIGURE 2.26
Total Real Public Capital Expenditure



2.3.2: The Irish Pound, Interest Rates and the EMS

Ireland joined the EMS at the end of 1978 and participated from the start within the narrow band of the EMS. However, because of the serious domestic financial difficulties and the absence of the UK (Ireland's main trading partner) from the EMS, the financial markets did not see a fixed link between the IR£ and the DM as being credibly sustainable. The failure to adopt suitable public expenditure and taxation policies to support such a fixed link meant that interest rates and the rate of inflation did not initially converge towards DM rates. Successive depreciations of the IR£ against the DM within the EMS confirmed this pattern. However, since the last devaluation of the IR£ within the EMS in 1986, circumstances have changed. The balance of payments has moved into surplus; the exchequer borrowing requirement has been greatly reduced; the rate of wage and price inflation has fallen to the EC average, or less.

The prospect that these circumstances will continue to prevail during the 1990s makes the current IR£-DM rate sustainable. This in turn helps narrow the differential between Irish and DM interest rates, further improving competitiveness. These trends will be reinforced by further movement towards EMU. As a result, there is likely to be continuing convergence of the Irish rate of inflation and Irish interest rates towards

German rates. The final establishment of credibility for the IR£ in the EMS may take some time, particularly in the light of Ireland's exposure to the UK economy (and, of course, the UK's entrance only recently into the EMS), so that the margin between Irish and DM interest rates should narrow slowly over the next few years.

2.3.3: Incomes Policies and National Programmes

A *Promgramme for National Recovery* negotiated between the government and organisations representing employers, trades unions, representatives of industry and agriculture, was published on October 9th, 1987. It covered a period extending to the end of 1990 and dealt with a wide range of issues relating to the creation of an economic climate conducive to growth and social harmony (e.g., tax reform, job creation targets, working time, industrial relations machinery). A special section detailed the proposals for a Pay Agreement between the Irish Congress of Trade Unions (ICTU), the Federated Union of Employers (now the Federation of Irish Employers (FIE)) and the Construction Industry Federation (CIF).[12]

The success of the *Programme* in co-ordinating and moderating wage demands and promoting industrial harmony at a time of rapidly increasing labour productivity was an important factor contributing to the economic turn-round in Ireland and the increasing profitability of Irish industry. However, underpining the "success" of the Pay Agreement was a very high rate of unemployment, particularly the disastrous rise in the years immediately preceding 1987.

A new programme (*Programme for Economic and Social Progress*) was negotiated at the end of 1990 to cover the period 1991-1993. Pay increases of the order not exceeding 4 per cent (1991), 3 per cent (1992) and 3.75 per cent (1993) were agreed. If successful, this programme will set the pace of wage inflation for the next few years.[13] However, since there had been

[12] The central core of the Pay Agreement set out the annual wage rises that were to operate for three years to the end of 1990. These included 3 per cent on the first IR£120 of basic weekly pay and 2 per cent on any amount of basic weekly pay over IR£120. Special pay awards in the public sector were about twice this level. At the time of negotiation (1987), the rate of unemployment had reached almost 18 per cent and the forecast inflation rate for the following year (1988) was 3 per cent.

[13] Towards the end of 1990, the National Economic and Social Council (NESC) published a document *Strategy for the Nineties: Economic Stability and Structural Change*, which set out a broad economic programme of fiscal stability and wage moderation agreed between the government employers, trades unions and farming interests. At the same time, the Irish Congress of Trade Unions (ICTU) issued a discussion document entitled *Ireland 1990-2000: A Decade of Development, Reform and Growth*, where long-term policies for the development of a modern efficient social market economy were outlined.

some improvement in the state of the labour market during the years 1987-90, the terms of this new agreement were less favourable to employers than the previous one. In preparing medium-term forecasts we have assumed that, while moderation continues to be exercised, real wages will rise roughly in line with the trend growth in productivity so that profitability will tend to stabilise. The likelihood that over the foreseeable future tax rates will tend to fall (in contrast to the 1980s) should help underpin wage moderation.

2.4 *Prospects for the Future*

2.4.1: Aggregate Growth

The Irish economy underwent a prolonged recession in the 1980s. This recession initially simply mirrored recession in the rest of the world. However, serious domestic financial imbalances and inappropriate action taken to tackle them, continued to prevent Irish recovery long after the rest of the world had returned to growth. As can be seen in Figure 2.27, a return to growth in Ireland occurred after 1987 in spite of the continued strong deflationary action taken by the government in successive budgets. Thus the underlying pace of growth since 1987 has been quite high, as is normal in the early stages of an economic recovery. It has also been fuelled by the exceptionally high rate of growth in major trading partners since 1987.

FIGURE 2.27

Gross National Product

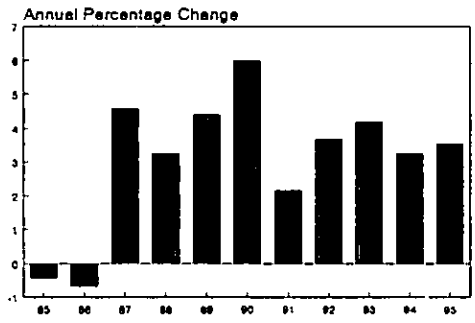
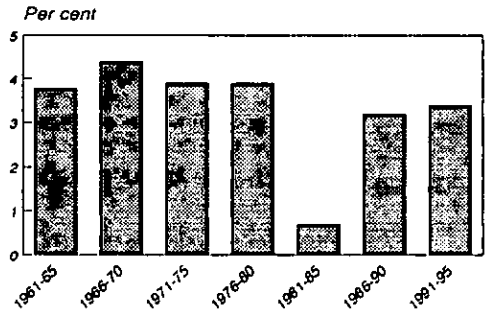


FIGURE 2.28

Growth in Gross National Product
(Five Year Averages)



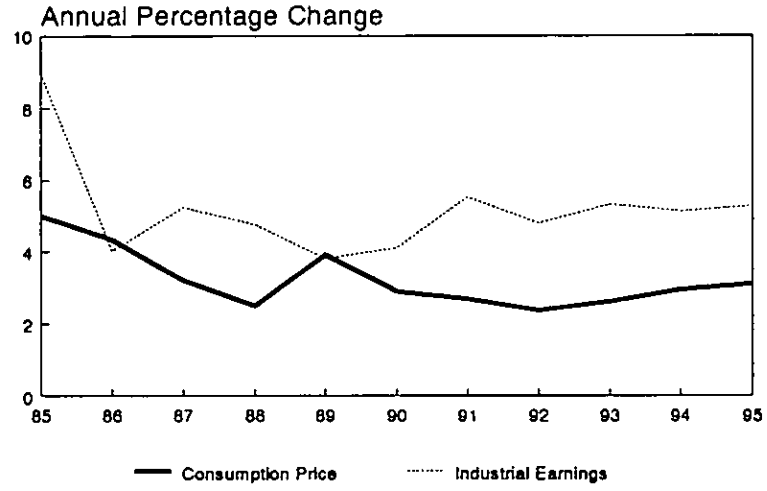
In the medium term, growth is likely to average about 3.5 per cent a year, compared to the 1.5 per cent a year achieved in the 1980s.[11] To some extent in the early 1990s this will reflect the rapid growth normal in the recovery phase of the domestic economic cycle. If achieved, this performance would be roughly in line with the rate of growth of the 1970s, while being well above that achieved in the 1980s (Figure 2.28).

2.4.2: The Inflation Environment

The rate of inflation in consumer prices, which rose to around 4 per cent in 1989 under pressure from a general rise in world inflation, fell to under 3 per cent by end 1991 and is likely to remain at about 3 per cent in the medium term (Figure 2.29). With the assumed fixed link between the IR£ and the DM within the EMS, the major factor determining the rate of inflation in the long run will be the rate of inflation in Germany. Experience indicates that the German authorities have a strong commitment to maintaining low inflation and this will be transmitted to Ireland via the exchange rate and interest rates.

FIGURE 2.29

Price and Wage Inflation



[11] These forecasts were prepared using the Irish national sub-model of the EC HERMES economic model, operated by The Economic and Social Research Institute under contract for DG XII. They reproduce the medium-term forecasts contained in *Medium-Term Review: 1991-96* prepared by J. Bradley, J. Fitz Gerald and D. McCoy (published by the ESRI in June 1991) and also draw on recent issues of the ESRI's *Quarterly Economic Commentary*.

The outlook for domestic wage inflation is less certain than for prices and will be conditioned by the *Programme for Economic and Social Progress* over the period to end 1993. The economy has undergone a major improvement in its competitive position since 1986, an improvement that owes much to the low rate of growth in pay rates. The economy generally, and industry in particular, are currently reaping the benefits of this change. In the immediate future, as shown in Figure 2.29, a continuation of such wage moderation is possible. This will be sustained by the likely moderate reduction in tax rates each year into the foreseeable future and by the projected rise in unemployment. In the longer term, while the continuing high rate of unemployment will act as a brake on excessive growth in wage rates,[15] we anticipate that the pace of growth in *real* wage rates will rise to between 2 and 3 per cent a year, more in line with experience prior to 1986. When combined with tax cuts this will allow a rise in *real* disposable income of between 3 and 3.5 per cent a year from 1992 onwards.

2.4.3: Economic Imbalances

In the absence of a major domestic stimulus from either the public sector or from a fall in the personal savings rate, the balance of payments is likely to remain in surplus for the foreseeable future (Figure 2.30). This surplus will allow a limited repayment of the debts incurred in earlier years and will underpin further steady growth of the 1990s. Net investment abroad, which is the counterpart to the surplus on the current account of the balance of payments, itself feeds the surplus by eventually increasing dividends and interest payments received from abroad.

FIGURE 2.30

Balance of International Payments

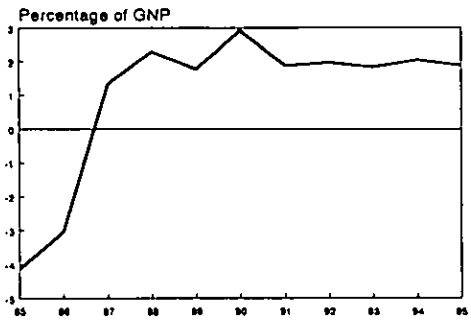
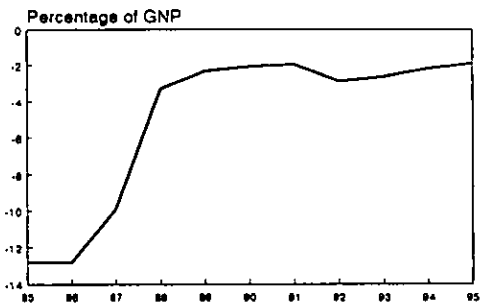


FIGURE 2.31

Exchequer Borrowing Requirement
(Deficit if below Zero line)



[15] However, the increase in the fraction of long-term unemployed (in October 1989 over 51 per cent of unemployed men had been unemployed for more than one year) means that the unemployment rate is more an indication of social inequality than slackness in the labour market.

The exchequer borrowing requirement (EBR) as a percentage of GNP fell steadily until 1990, but is likely to increase next year for business cycle reasons. Thereafter, as the world economy picks up, the EBR is likely to resume its fall, reaching just under 2 per cent of GNP by 1995 (Figure 2.31). This reduction is likely to be sustained in spite of any modest reduction in income tax rates and limited growth in public services and will be necessary in order to reduce the debt/GNP ratio from its current (1991) level of just about 109 per cent towards the average EC level. In the context of EMU it will be necessary to continue reducing Ireland's national debt in the post-1992 period with the objective of achieving a debt-GNP ratio in line with its competitors as quickly as possible.

The forecast of continuing balance of payments surpluses and moderate exchequer borrowing requirements will mean that the pattern of investment of the funds available domestically will be very different in the 1990s compared to the 1980s. The exchequer is likely to be repaying debt and will have less need for the funds. The balance of payments surplus will involve a continuing capital outflow as either the government repays debt or the private sector invests abroad. Most forecasters assume at present that the surplus funds will continue to be predominantly invested in financial assets rather than giving rise to an even more rapid increase in the volume of investment in physical assets. This will, however, maintain downward pressure on domestic interest rates with the DM rates continuing to provide an effective floor.

2.4.4: Social Imbalances

During the recovery period of 1987-1990, there was a gradual rise in numbers employed, the rate of unemployment fell to 14 per cent of the labour force, and emigration, having peaked at 45,000 in 1989, started to decline. (Figures 2.32, 2.33 and 2.34). However, with the deterioration in the world (and in particular the UK) economy in 1990 and 1991, the rate of growth in employment in the Irish industrial sector is likely to slow down if past performance trends are still followed. Against the background of a rapidly growing labour force, the rate of unemployment is likely to rise to about 16 per cent of the labour force and stay at that level into the medium term. It will not be until the first decade of the next century that labour force growth will decrease (based on existing demographic trends) so Ireland risks being caught in a medium-term unemployment "trap". Clearly the functioning of the labour market will remain at the centre of Irish political and economic debate for the foreseeable future.

FIGURE 2.32
Total Numbers Employed

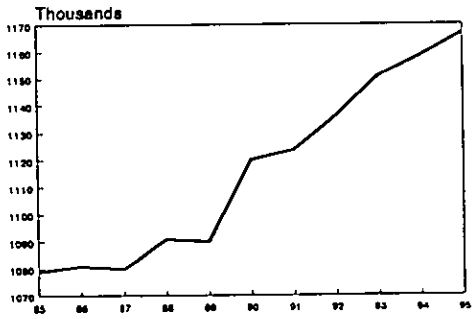


FIGURE 2.33
Unemployment Rate

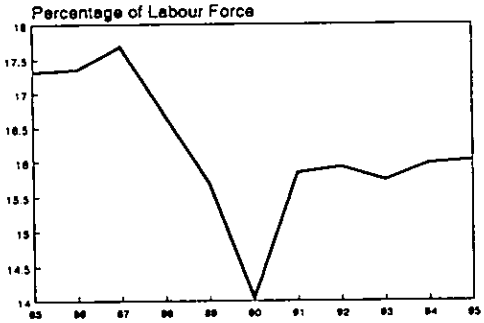
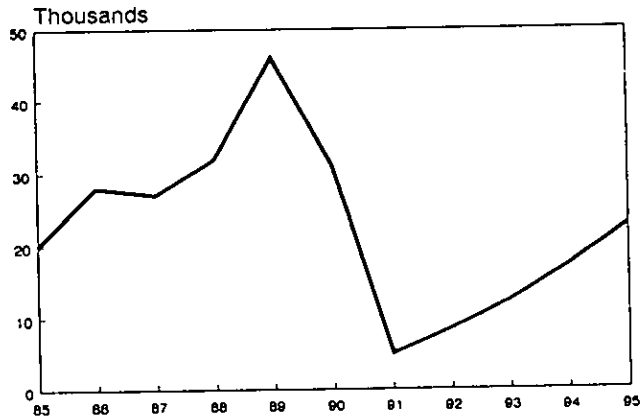


FIGURE 2.34
Net Migration Abroad



2.4.5: Summary

With the current assumptions about the world economy, after the recovery in world growth towards the end of 1991, Ireland is likely to experience an extended period of moderate growth. This will be in stark contrast to the experience of the 1980s, particularly the period 1980-1986.

This growth is likely to be accompanied by low inflation, moderate wage increases, a continuing modest surplus on the balance of payments and moderate exchequer borrowing requirements. Given a continuation of the present policies of cost containment in the public sector, and moderate cuts in tax levels, the massive overhang of public debt will be progressively reduced, the debt/GNP ratio brought down towards present EC norms and a serious potential threat to further recovery lessened.

Most sectors will participate in the growth, and the leading industrial sector will induce growth in the more sheltered services sector. Prospects for agriculture, still a key sector in the economy, are more problematic and will depend on the evolution of change in the CAP. It is likely that continuation of production quotas and the outcome of the GATT negotiations will prevent real increases in agricultural output and low price increases (or price cuts) will constrain income growth. On the other hand, there is some scope for generation of greater added-value in the food sector of manufacturing industry.

The present high rate of unemployment is set to increase further and is likely to remain at unacceptable levels into the medium-term. The main reasons for this are the continuing large annual increases in the labour force, the recent decline in out-migration due to the deteriorating UK labour market position, and the possibility of a failure of demand for labour to show any significant deviation from past sluggish trends.

2.5: *Strategic Problems in Medium-Term Economic Development*

Ireland's future economic environment is now, paradoxically, characterised simultaneously by great certainty and uncertainty. The *certainty* concerns the knowledge that the completion of the internal European market is under way and scheduled to take full effect by end 1992. The Irish economy will by then have emerged, perforce, from behind what little shelter remains from the rigours of international competitive forces and will be contesting for its place in the post-1992 market place of the stronger EC members, the other peripheral members, and possibly the newly liberalised nations of Eastern Europe. The *uncertainty* concerns the future performance of the domestic economy when faced with this new international regime, even though the transition to the new competitive environment will be assisted by transfers to Ireland of investment capital through the expanded CSF.

2.5.1: The National Debt Problem

We have seen that Ireland enters the 1990s with a continuing severe public debt problem. Although state borrowing has been much reduced in recent years there remains a huge overhang of public debt which needs to be reduced if the economy is to be made less vulnerable to future external shocks. The approach adopted in reducing the debt overhang will be a strategic issue in domestic policy making during the first half of the decade. Until now the objective for the public finances was quite straightforward, if highly unpalatable. However, with the EBR likely to remain modest, the need for a longer-term policy on the public finances is

pressing. While it is of considerable importance to cut the level of national debt to reduce the potential exposure to world financial problems, it is becoming important to view the public finances in a wider context. Although there is no immediate prospect that increasing public debt will be a profitable policy, there is an issue as to how rapidly the debt should be repaid.

The debt problem will act on the economy throughout the 1990s as a severe constraint on the discretionary freedom of the public authorities. For the foreseeable future, domestically funded public expenditure programmes will probably have to be frozen in real terms, at best, although some scope still exists for rationalization and efficiency gains between different programmes. The level of the tax burden will have to be broadly sustained in aggregate, although considerable scope exists for tax reform and broadening of the excessively narrow tax base. Thus, potentially useful "supply-side" friendly tax policies may be of limited use in practice due to the debt overhang.

2.5.2: Characteristics of Ireland's Unemployment Problem

While the problem of the public finances is coming under control there is still the primary underlying problems of the high level of unemployment and renewed emigration. Here the solutions are not so obvious and opinions differ as to how public policy should face up to a slow pick-up in demand for labour and a high rate of emigration, not previously encountered since the late 1950s. The *National Development Plan 1989-1993* comments that the Irish labour market is "not particularly encumbered by regulation" and identifies the problem of unemployment as arising from a low demand for labour due to "inadequate output growth and to structural characteristics of the economy". We have illustrated some of these structural problems in Section 2.1 above. Consequently, if in the future the economy is to generate a demand for labour sufficiently great to reduce numbers unemployed to the levels of the 1970s then, in addition to boosting growth, these "structural characteristics" must be altered.

A recent study has shown that three main causes of Irish unemployment can be distinguished (Barry and Bradley, 1991). First, and most important, the level of growth in the world economy has a major influence on activity, demand for labour and unemployment in Ireland. Of the 10.4 percentage points rise in the rate of unemployment between 1980 and 1987 (the peak year), over 5 points of the rise were caused directly by "world" factors, over which Ireland had no control.

Secondly, domestic fiscal policy caused a further 4.7 point rise, due to the pro-cyclical (i.e., contractionary) policies (mainly tax increases) that

had to be adopted if the debt/GNP ratio was not to go out of control. This contractionary policy stance compounded the effects of the world recession of the early 1980s, and both factors explained most of the subsequent disastrous rise in unemployment. The third factor, demographic trends, had little net impact.

The most serious aspect of the rapid rise in unemployment is the accompanying increase in the proportion who remain without jobs in the long term. A study of the October 1989 Live Register (i.e., an entitlements-based measure, to be contrasted with the more economically meaningful Labour Force Survey measure used in the HERMES model) shows that over 51 per cent of unemployed men were unemployed for more than one year (35 per cent of women). Furthermore, half of those 51 per cent had been unemployed for more than *three* years. This suggests that there is a small incidence of unemployment, i.e., that the majority of people are never unemployed but most of those who become unemployed, remain unemployed for a very long time.

Turning to demographic issues, the pattern of the natural increase in Irish population over the present decade is reasonably predictable. On a zero migration assumption, the Irish labour force is likely to continue to increase by over 25,000 per annum out to the end of the decade and the rate of growth will fall off rapidly only after that. Thus, a strategic policy objective must be centred on stimulating long-term sustainable growth in employment.

2.5.3: Peripherality and Economic Growth

A measure of the low income *per capita* in Ireland, relative to the more developed EC members, is the poor quality of its physical infrastructure of roads, ports, railways, airports, etc. In addition, its physical distance from the main EC markets creates some additional cost competitive disadvantage. Although the survey on transport costs, commissioned as part of the micro-studies to be discussed later, showed that the cost disadvantage appears to be slight, this may convey a misleading picture. A process of selection may leave Ireland with only those industries which enjoy a low transport cost element, effectively excluding those which require a high transport cost, and thus constraining growth opportunities (Krugman, 1991).

In addition, the policy of industrialisation over the last decades promoted regional dispersal throughout Ireland, which further exposed the weak road infrastructure as goods were carried to the main ports for export.

2.5.4: Industrial Policy Issues

The stated aim of government industrial policy over the last decade gave priority to the promotion of strong internationally competitive industrial firms integrated into the domestic economy. However, a feature of the medium-term outlook in Ireland is the continuing high level of profit repatriation by multinational industries producing in Ireland. Such outflows are a normal feature associated with foreign direct investment. The multinational high-technology firms that have located in Ireland over the last decade tend to be intensive in terms of capital and research,[16] source most of their inputs abroad, have relatively weak downstream links with the rest of the economy and repatriate the major part of their profits.

Thus the *generation* of added-value has not guaranteed its *retention* within Ireland. The policy dilemma (particularly for incomes policy) is particularly acute here: low wage costs and an adequate supply of trained workers are a key element serving to attract foreign industry to Ireland but the high rate of profit repatriation means that the domestic wage bill is the main benefit to Ireland received from such industrial activity.

The ability of public policy to reconcile all these competing objectives would be limited in even the best of situations. With the constraints on the Irish public finances, an even greater limitation will apply. The strategic policy balance between solving past problems of inherited debt and addressing present and future problems of unemployment and low living standards will be a delicate one, further complicated by Ireland's peripheral location relative to the richer EC members. We take up these issues later in our overall evaluation of the CSF in Section 7.

3: *COMMUNITY POLICY AND IRELAND; 1992, THE CAP AND EMU*

3.1 : Introduction

While this paper pays particular attention to analysing the impact of the Community Support Framework on Irish macroeconomic performance, it is essential to keep in mind that all such CSF policies will be implemented, and will have their effects, over the same period as the EC-wide policies required to complete the internal market (henceforth referred to as the *1992* process). In addition, while progress towards EMU has slowed and the exact details of how it will be implemented are as yet unsettled, its development over the 1990s will be of crucial importance. Finally, the great

[16] The consequential high productivity results in a weak demand for labour, so it is only the large degree of multinational activity in Ireland that has led to employment growth of significance over the last decades.

uncertainty that surrounds the EC Common Agriculture Policy (CAP) and the direction of possible reforms is a further source of major problems for Irish policy makers.

Our objective in this section is to discuss and attempt to quantify the likely impact of *1992*, in order to compare and contrast its effects with our subsequent detailed analysis of the role of the CSF. In the case of EMU and the likely CAP reforms, since the details of the future course of policy are not yet decided, we can at best investigate in broad qualitative terms the current proposals.

In Section 3.1 we examine the impact of *1992* drawing upon our earlier work in this area, but extending the time horizon out to the year 2000, also used as the terminal year in the subsequent CSF analysis.[17] In addition to the extended time horizon, the new sectorally disaggregated version of HERMES-Ireland is used for the quantitative analysis.[18] In Section 3.2 we examine some of the consequences for Ireland of EMU, drawing on the Commission document *One Market, One Money*. In Section 3.3 we review briefly the role and impact of the CAP, and the likely ways in which major CAP reforms may effect the Irish macro-economy. Finally, in Section 3.5 we draw together all three strands of EC policy.

3.2: *The Impact of 1992*

The *1992* process will impact on the Irish economy in two distinct, but obviously interrelated ways. First, Ireland's "world" (or, more precisely, EC) trading environment will change as a result of the *1992* policy changes. Here, given the openness and small size of the Irish economy, causality will be predominantly in one direction: from the world economy to Ireland. A second set of consequences relate to changes that will be necessary *within* Ireland (over and above the consequences for Ireland of the first, "world", set) as a result of the 1992 directives.

In the case of the first set of changes (i.e., effects of *1992* on Ireland's trading environment), a comprehensive qualitative and quantitative analysis has been carried on by the Commission, and published as the Cecchini Report.[19] Focusing on the macroeconomic analysis contained in

[17] The first attempt to quantify the impact of *1992* on the Irish economy was in an article by Liam O'Sullivan, entitled "The Macroeconomic Effects of *1992*", contained in *Medium-Term Review: 1989-1994*, by J. Bradley and J. Fitz Gerald, published in June 1989 by The Economic and Social Research Institute.

[18] Full documentation of the earlier, four sector, version of HERMES-Ireland is given in *HERMES-Ireland: A Model of the Irish Economy: Structure and Performance*, J.Bradley et al.,1989, The Economic and Social Research Institute. Further details of the latest version are given in Bradley and Fitz Gerald (1991).

[19] Paolo Cecchini, 1988: *The European Challenge: 1992: The Benefits of a Single Market*, Wildwood House; Michael Emerson *et al.*, 1988: *The Economics of 1992*, Oxford University Press.

that report, the effects of *1992* were considered under four broad headings:

(i) The abolition of frontier controls in the Community
(ii) The opening up of public procurement
(iii) The liberalisation of financial services
(iv) "Supply effects" consequential and additional to the above

Using both the Commission's own HERMES model system and the OECD's INTERLINK world model, a macro quantification of the above four changes was carried out by the Cecchini team, the summary results of which are reproduced in the appendix to this section.[20] The results showed that the total *1992* policy changes would add about 4.5 per cent to the EC-12 GDP (range 3.2 to 5.7) in the medium term (i.e., six years), and reduce consumer prices by 6.1 per cent (range -4.5 to -7.7). The external balance as a percentage of GDP would improve by 1.0 per cent (range 0.7 to 1.3), while the budgetary balance as a percentage of GDP would improve by 2.2 per cent (range 1.5 to 3.0). Finally, total EC-12 employment would rise by 1.84 million (range 1.35 to 2.30), the job losses being concentrated in the early years of adjustment.[21]

These results for the EC-12 are taken as given with respect to the Irish economy.[22] Hence, we regard the stimulation to EC GDP, quantified by the Cecchini team, as being equivalent to an "exogenous" positive shock to Ireland's trading environment, resulting in more buoyant world economic growth. Similarly, we regard the reduction in EC prices as equivalent to an exogenous cut in all those Irish prices that are determined in world markets.[23]

[20] It should be noted that in 1987-88 HERMES models were only available for five EC member states: Belgium, Germany, France, Italy and the United Kingdom. In effect, the peripheral member states were ignored in the Cecchini analysis and quantification, and results for the above EC-5 were simply "grossed up" to cover the EC-12 (Emerson *et al.*,1988).

[21] The gains were higher if the *1992* policy changes were accompanied by public expenditure and taxation policies that offset the improved budgetary balance (Cecchini, 1988, pp 99-102). There is also a viewpoint that holds that the Cecchini methodology may have greatly understated the long-term dynamic benefits of *1992* (Baldwin, 1989).

[22]. Irish GDP is so small relative to the EC-12 that we ignore the fact that the *1992* impact on Ireland is already included in the Cecchini results for the aggregate EC.

[23] In the context of HERMES-Ireland, this includes world industrial output prices, Irish non-energy import prices and agricultural output and export prices. It is assumed that *1992* will not affect energy prices.

With respect to the second set of changes that will be necessary *within* Ireland as a result of the *1992* directives, over and above the direct consequences of the "world" economic environment effects, these are specific to the four separate categories listed previously and are treated individually below.

The methodology we use is as follows. We have prepared a benchmark projection of the evolution of the Irish economy for the period 1991 to 2000. The details of this projection, elements of which have been discussed in the previous Section 2.4, are available in the ESRI *Medium-Term Review: 1991-1996* but are not themselves of direct relevance to our analysis. For each of the four separate categories of 1992 policy changes listed above, we make the appropriate changes to the assumptions underlying the benchmark projection. By comparing the results of these "variant" simulations to the underlying benchmark we are able to quantify the marginal effects of any specific 1992 policy changes. So, the benchmark represents a probable evolution of the Irish economy *in the absence of 1992* while the "variant" simulations represent the evolution *taking into account specific 1992 changes.*

3.2.1: The Abolition of Border Controls

The direct effect of the removal of customs barriers within the EC will be a reduction in costs caused by border delays and administrative procedures. The Cecchini report estimates the long-run price reduction as 1 per cent over six years and the EC-12 GDP stimulus as 0.4 per cent (refer Appendix to this section). These price reductions and growth stimulus are phased in over the six-year period.

The removal of customs barriers in Ireland will reduce the output of the market services sector, more specifically the distribution sector, as a result of rationalisation of distribution networks currently operating exclusively within the domestic borders. The long-run reduction in output is estimated to be about 0.3 per cent ex ante, with consequential ex ante distribution sector job losses.

Finally, there will be a small reduction in numbers employed in Public Administration (i.e., about 300 in the year 1993), as customs and excise activities are diminished and staff reallocated.

Effects on the Domestic Economy

A summary of the effects of the removal of customs barriers on the Irish macro-economy is given in Figure 3.1 and Table 3.1. We see that the impact on the level of Irish GNP is negative in the short-term but positive (and equal to 0.2 per cent) in the medium term. However, it is only about

one half of the EC-wide stimulus of 0.4 per cent quantified by the Cecchini team (refer Appendix to this section for the actual Cecchini results). The effect on Irish prices generally mirrors the EC-wide effect, but the magnitude of the price drop (-0.9 after six years) is somewhat less than the 1 per cent in Cecchini.

Figure 3.1 : Abolition of Border Controls

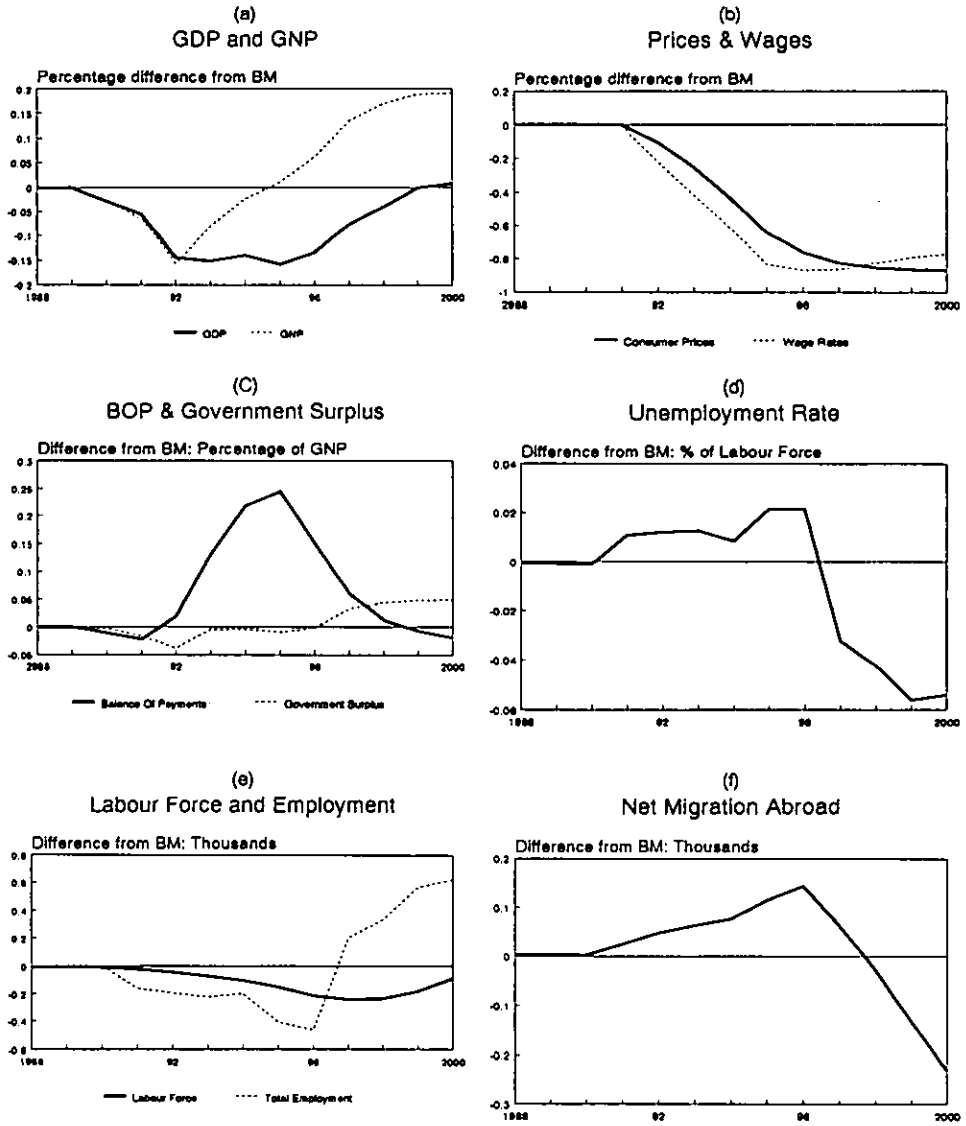


Table 3.1 : *Macroeconomic Consequences for Ireland: Abolition of Border Controls*

	1993	*1994*	*1998*	*2000*
Changes (as %) Relative to Benchmark				
GNP	-0.08	-0.02	0.17	0.19
Consumer Prices	-0.25	-0.43	-0.86	-0.87
GDP Deflator	-0.25	-0.49	-0.84	-0.85
Absolute Changes Relative to Benchmark				
Total Employment (thousands)	-0.220	-0.200	0.340	0.620
Budgetary Balance (as % of GNP)	0.0	0.0	0.04	0.05
External Balance (as % of GNP)	0.13	0.22	-0.01	-0.02

The net effect on the external balance is essentially zero after six years, following initial improvements, and there is only a very small sustained improvement in the budgetary balance. Finally, after some relative drop in total numbers employed in the initial years, there is a modest net rise in employment in the medium term and a slight improvement in the rate of unemployment.

Some of the ways in which most of this and subsequent results for Ireland differ from the EC-wide Cecchini results can be illustrated by the present customs barriers simulation. Essentially, Ireland experiences a drop in its tradable goods prices together with a boost to demand in its export markets. In isolation, the price reduction would be expected to transmit instantaneously and completely to industrial output prices (remember that the industrial sector is a pure price taker on world markets), and eventually to service sector output prices and to the wide range of absorption prices in the model, if the labour market were completely flexible.

In addition to the general downward inflexibility of Irish nominal wages[21] the boost to real EC (and, hence to Irish) activity eventually drives down the rate of unemployment and (through the Phillips curve effect) further prevents downward adjustment of wages into the medium term. The relationship between the Cecchini results for the EC-wide GNP stimulus and price reductions was largely conditioned by the properties of the wage equations contained in the individual national models used in that analysis. From a detailed examination of these wage equations, we feel that the Cecchini analysis may have understated wage responses to any

[21] The HERMES-Ireland wage equations display both hysteresis and sluggishness, a property shared by wage bargaining in Portugal (Modesto and das Neves, 1990).

stimulation of EC real activity. What our Irish model says is that any boost to real domestic activity will, *ceteris paribus,* tighten the Irish labour market and lead to upward pressure on wages. This upward pressure will partially offset the international price reduction effect of *1992* policies and, consequently, lead to some loss of Irish competitiveness. This means that the external balance will tend to suffer or, at best, fail to replicate the benign improvement common to all the Cecchini model simulations.

Although it is more powerfully relevant in both the subsequent "financial services" and "supply-side" simulations, the customs barriers simulation illustrates the points made above. From Table 3.1 and Figure 3.1 we see that the medium-term price reduction in Ireland is somewhat less than for the EC, and there is a tendency for the external balance to deteriorate slightly. From Figure 3.1(b) we see that the reduction in wage rates is less than the price reduction.

3.2.2: The Opening Up of Public Procurement

The liberalisation of public procurement practices within the EC will result in higher EC-12 growth and lower prices. The Cecchini team quantified the long-run price effect (phased over six years) as a reduction of 1.4 per cent (range 0.9 to 1.9), and the increase in real GDP as 0.6 per cent (range 0.4 to 0.8). However, due to the extreme openness of the Irish economy, there is already little or no discrimination against foreign firms in tendering for public contracts in Ireland. Hence, we make the reasonable simplifying assumption that there will be no price effects as a result of EC public procurement liberalisation, save for a very minor reduction in the price of public sector investment and a small reduction in the value of public investment expenditures.

The main effect of EC public procurement liberalisation on the Irish economy will arise from the response of the market sectors (particularly industry) to the increase in external demand. We have assumed that this will result in an *ex ante* increase in industrial gross output of 2 per cent in the medium-term, phased in over six years, and starting in 1993. This will arise mainly from the benefits to Irish export-oriented firms as they are enabled to participate in the EC-wide benefits of liberalisation rather than from the intra-economy benefits, which are negligible.

Effects on the Domestic Economy

A summary of the effects of the opening up of public procurement on the Irish macro-economy is given in Figure 3.2 and Table 3.2.

The stimulus to Irish GNP is quite strong, and after six years the increase

over the benchmark is 1.06 per cent, compared to an increase of 0.6 per cent in Cecchini. By the year 2000, GNP is up by 1.3 per cent. Of course,

Figure 3.2 : Macroeconomic Consequences for Ireland: Public procurement

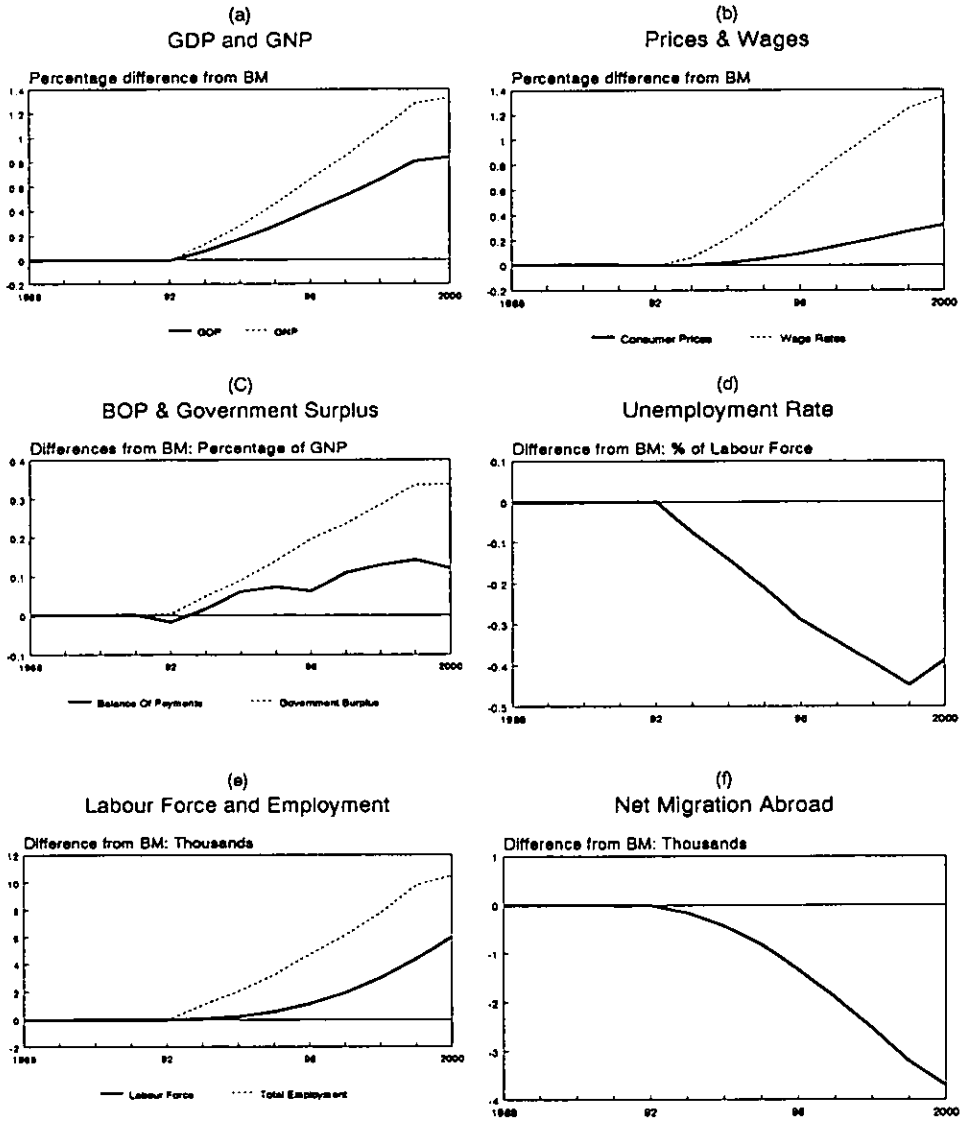


Table 3.2 : *Macroeconomic Consequences for Ireland: Public Procurement*

		1993	*1994*	*1998*	*2000*
Changes (as %) Relative to Benchmark					
GNP		0.13	0.28	1.06	1.33
Consumer Prices	0.0	0.02	0.21	0.32	
GDP Deflator	0.01	0.05	0.33	0.46	
Absolute Changes Relative to Benchmark					
Total Employment (thousands)		1.020	2.040	7.780	10.500
Budgetary Balance (as % of GNP)		0.05	0.09	0.29	0.34
External Balance (as % of GNP)		0.02	0.06	0.13	0.12

this benign situation is merely reflecting the *ex ante* stimulus to industry built in by assumption, as Irish industrial firms reap the benefit of EC-wide public procurement liberalisation. Price effects, on the other hand, are negligible (though positive), once again largely by assumption. However, wage rates are up by 1.4 per cent by the year 2000, thus initiating competitiveness losses which, *ceteris paribus*, will begin to dominate in subsequent years.

The improvement in external and budgetary balances are broadly in line with the EC-wide Cecchini result, and there is a fairly strong stimulus to employment numbers, which are up by 10,500 (or 0.9 per cent) by the year 2000, and a fall in the unemployment rate of almost one-half of one percentage point.

Although this public procurement simulation is apparently quite benign, one should note that the 2 per cent medium-term *ex ante* stimulus to gross output in manufacturing results in a less than 1 per cent medium-term boost to real added value in industry. Also, the small improvement in the external balance is beginning to turn down by the end of the decade.

3.2.3: The Liberalisation of Financial Services

The economic effect of liberalising the financial services sector (i.e., banking, insurance, securities, etc.) will arise from "the competitive shock administered to over-pricing in the wake of market integration" (Cecchini, 1988, pp 95). Moreover, capital market integration will force interest rate equalisation as capital will be free to locate wherever the rate of return is highest.

The Cecchini team estimated that financial services liberalisation would lead to an EC-wide price reduction of 1.4 per cent (range 0.8 to 2.0) and a

rise in GDP of 1.5 per cent (range 0.8 to 2.1). More specifically, it was also estimated that long-term interest rates would fall by about 0.5 percentage points below the levels that would otherwise obtain, with similar reductions to other rates. However, in the Irish case, we felt that the large size of the national debt would restrict the scope for interest rate reductions, so the rates on government debt were not reduced.

The reduction in the indebtedness of the personal sector is reflected in an *ex ante* reduction in the personal savings ratio of 0.1 per cent, which boosts consumer demand above the benchmark level, in addition to the boosts emanating from the price reductions.

In relation to the financial services sector itself, this is not separately disaggregated within HERMES-Ireland, but is a sub-sector of "Professional and Other Services". Increased efficiency is likely to lead to an *ex ante* reduction in employment in professional services, a process assumed to begin in 1991 and to continue to 1994, with a total *ex ante* job loss of 1,000 persons. This rationalisation will also lead to an *ex ante* reduction in the price of financial services (reflected in the deflator for the adjustment for financial services in the national accounts) of 0.5 per cent in the medium term.

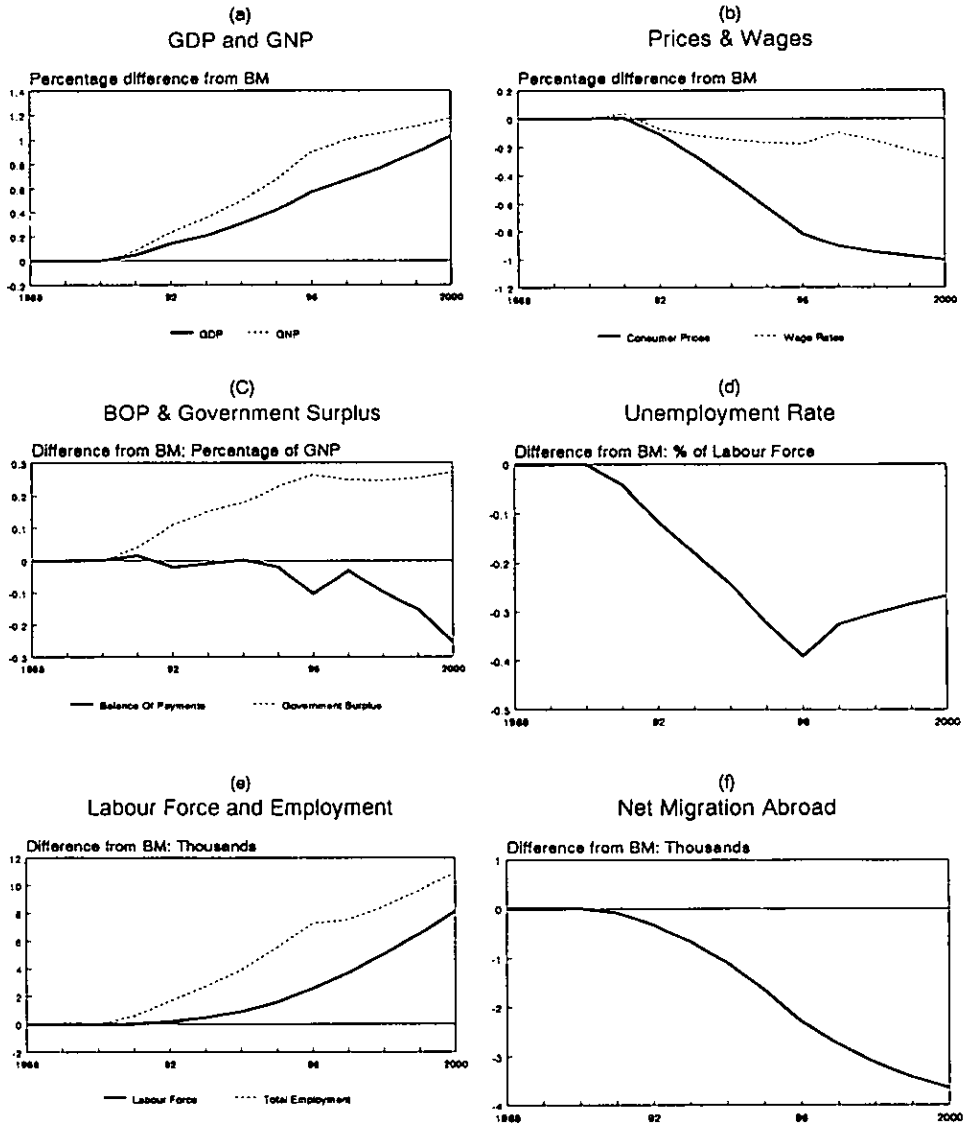
Effects on the Domestic Economy

A summary of the effects of the liberalisation of financial services on the Irish macro-economy is given in Figure 3.3 and Table 3.3.

Table 3.3 : *Macroeconomic Consequences for Ireland: Financial Services*

	1993	*1994*	*1998*	*2000*
Changes (as %) Relative to Benchmark				
GNP	0.36	0.50	1.05	1.17
Consumer Prices	-0.26	-0.44	-0.95	-1.00
GDP Deflator	-0.28	-0.44	-0.93	-0.99
Absolute Changes Relative to Benchmark				
Total Employment (thousands)	2.710	3.910	8.480	10.930
Budgetary Balance (as % of GNP)	0.15	0.18	0.24	0.27
External Balance (as % of GNP)	-0.01	0.0	-0.10	-0.25

Figure 3.3 : Macroeconomic Consequences for Ireland: Financial Services



The short-run impact on GNP (up by 0.4 per cent in the first year after 1992) is similar to the Cecchini figure (0.5 per cent). However, although the medium-term impact remains positive (up 1.05 per cent after six years), it is only two-thirds of the Cecchini impact on the EC-12 (up 1.5 per

cent). Similarly, the medium-term price reductions (of -1.0 per cent) are also only about two-thirds of the EC-wide impact (of -1.4 per cent).

The budgetary balance, as a percentage of GNP, improves initially by 0.15 points, rising to 0.24 points after six years. This is slightly less than half the Cecchini impact. In the early years there is no net change to the external balance as a per cent of GNP, and a deterioration of -0.10 points after six years, in contrast to the EC-wide improvement of 0.4 points. Total employment is improved, initially by 2,700, and rising to an extra 11,000 jobs by the year 2000.

This simulation also illustrates the dilemma caused when the boost to EC real activity induces wage inflation and competitiveness loss through a drop in unemployment (i.e., a tightening of the Irish labour market). Induced inward labour migration works towards attenuating this effect (graph (f)).

3.2.4 : "Supply Effects"

The "supply-side" effects of 1992 relate to the strategic response of firms confronted with the challenges inherent in the completion of the internal market. The way in which this was handled by the Cecchini team was by examining changes in the context of increased market size and the "pure competition" effects of the abolition of protection. The two essential channels taken by supply-side effects were identified as

(i) *price reduction* as a result of lower production costs, arising due to competitive pressures through rationalisation and economies of scale.
(ii) *productivity gains* arising from a more efficient allocation of resources, industrial restructuring and improved internal business organisation.

The Cecchini Report estimated the medium-term benefits of these "supply-side" effects as resulting in an increase in 2.1 per cent in real GDP (range 1.7 to 2.5) and a reduction in the price of GDP of 2.6 per cent (range 2.1 to 3.1). These world growth and world price effects have been applied to the Irish model, and the consequences examined. In addition, the productivity gains arising in Ireland from the "supply-side" shock are implemented by lowering *ex ante* the domestic unit costs of production in the high-technology and traditional manufacturing sectors. In the high-technology sector, the *ex ante* productivity gain is assumed to be about 5 per cent in the long run, while in the traditional sector is assumed to be about 2.5 per cent. These gains are phased in over a period of six years.

Effects on the Domestic Economy

A summary of the effects of the "supply effects" of 1992 on the Irish macro-economy is given in Figure 3.4 and Table 3.4.

Figure 3.4 : Macroeconomic Consequences for Ireland: "Supply-Effects" of *1992*

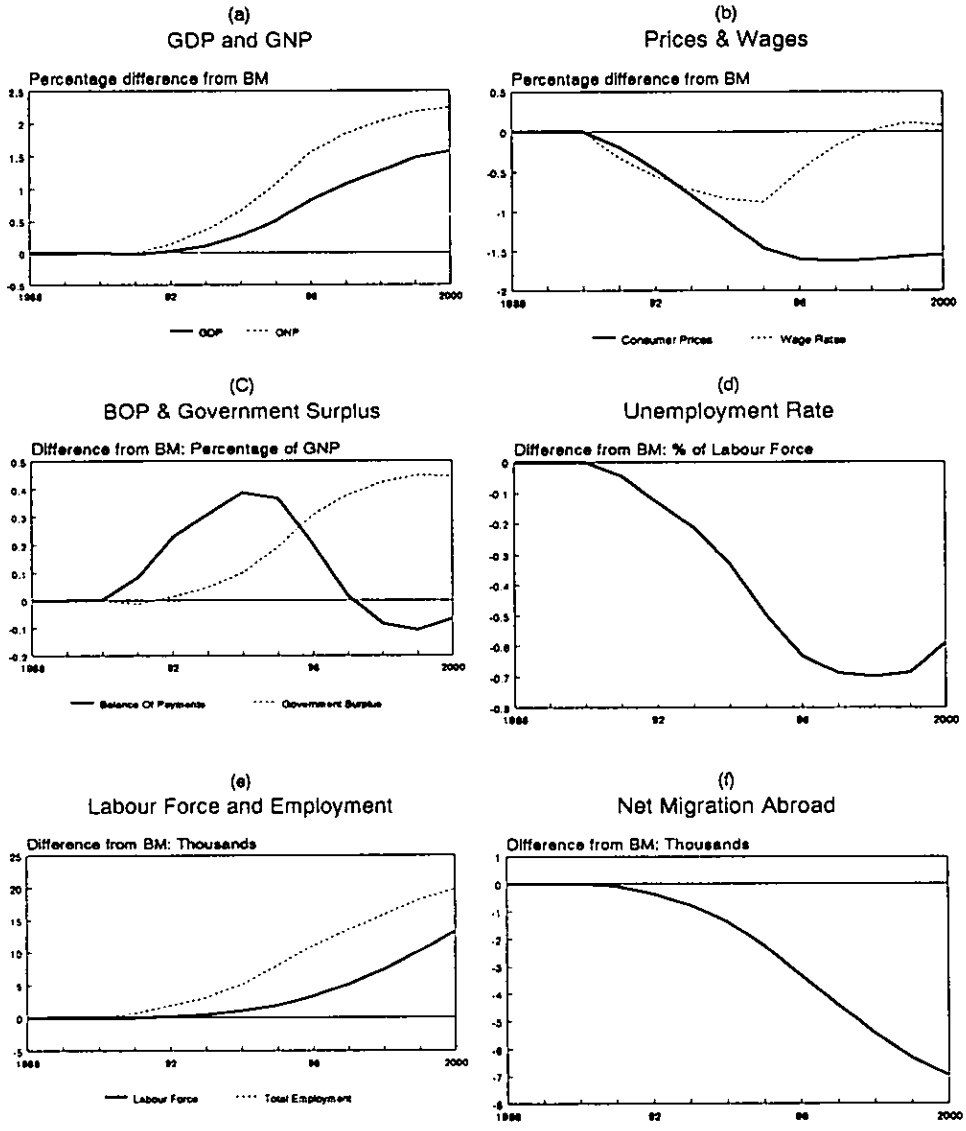


Table 3.4 : *Macroeconomic Consequences for Ireland: "Supply-Effects" of 1992*

	1993	*1994*	*1998*	*2000*
Changes (as %) Relative to Benchmark				
GNP	0.36	0.66	2.04	2.24
Consumer Prices	-0.79	-1.12	-1.60	-1.54
GDP Deflator	-0.93	-1.27	-1.41	-1.43
Absolute Changes Relative to Benchmark				
Total Employment (thousands)	3.160	5.180	15.870	19.860
Budgetary Balance (as % of GNP)	0.05	0.10	0.42	0.45
External Balance (as % of GNP)	0.31	0.39	-0.08	-0.07

As in the Cecchini analysis for the EC, the "supply" stimulus to GNP dominates the other three policy categories. The Irish impacts are similar in magnitude to the EC-wide impacts, the initial rise being 0.4 per cent, rising to 2.0 per cent after six years (the EC-wide effects are 0.5 per cent and 2.1 per cent, respectively). The initial price reductions are also similar (-0.8 per cent in the first year), but the medium-term reductions (at 1.5 per cent) are smaller than the EC-wide reductions of 2.3 per cent, for reasons discussed above.

The budgetary balance improvements also mirror the Cecchini results (the medium-term reduction is about 0.5 points), but there is little sustained improvement in the external balance.

This "supply-side" simulation also illustrates the dilemma caused when the boost to EC real activity induces wage inflation and competitiveness loss through a tightening of the labour market. However, given the sustained *ex ante* productivity boost underpinning the assumed sustained improvement in unit costs of production, the negative effects of the labour market tightening have not yet become serious before the end of the decade.

3.2.5 : The Total Effect of 1992

Our purpose of isolating the individual *1992* effects is mainly pedagogic, since in reality all four processes will overlap and operate simultaneously. In the final model simulation we impose all the above *ex ante* changes together and examine the total effect of *1992* on the Irish economy.

Effects on the Domestic Economy

A summary of the total effects of *1992* on the Irish macroeconomy is given in Figure 3.5 and Table 3.5.

Figure 3.5 : Macroeconomic Consequences for Ireland: Total Effects of *1992*

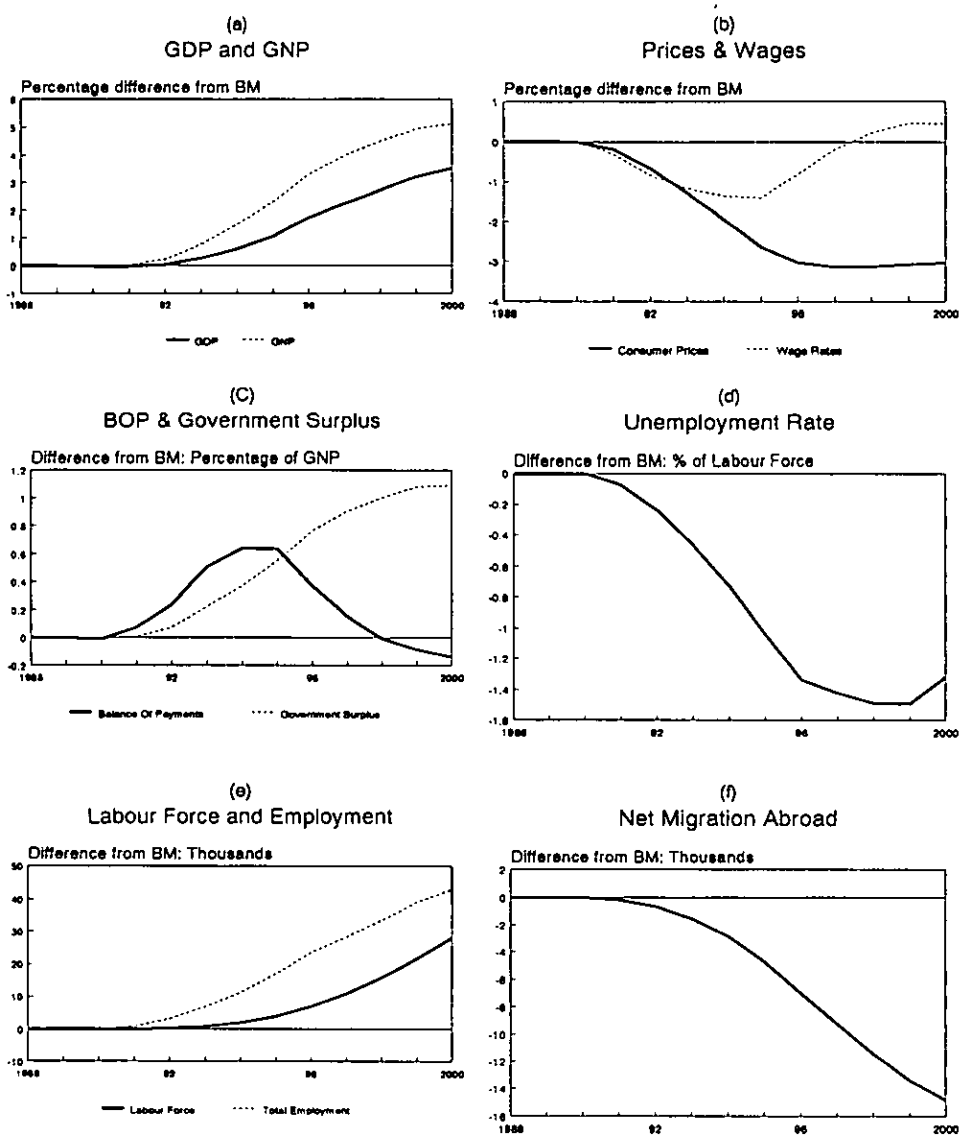


Table 3.5 : *Macroeconomic Consequences for Ireland: Total Effects of 1992*

	1993	*1994*	*1998*	*2000*
Changes (as %) Relative to Benchmark				
GNP	0.78	1.48	4.52	5.13
Consumer Prices	-1.28	-1.95	-3.13	-3.02
GDP Deflator	-1.45	-2.12	-2.75	-2.75
Absolute Changes Relative to Benchmark				
Total Employment (thousands)	6.840	11.260	33.660	43.050
Budgetary Balance (as % of GNP)	0.23	0.37	1.00	1.09
External Balance (as % of GNP)	0.51	0.64	-0.01	-0.14

The Cecchini team's median six-year stimulus to GNP was calculated at 4.5 per cent. We estimate that the impact on Irish GNP will be almost identical, and will rise to 5.1 per cent by the year 2000. The net effect of all the *1992* policies will be to cut prices in Ireland and the EC, relative to a benchmark. Cecchini quantified the medium-term cut as -6.1 per cent. However, for the reasons already examined above, the cut in Ireland is considerably less, at about -3.0 per cent.

In the short term, there is a slight improvement in the external balance, but in the medium term this is not sustained and, after six years, it has reverted to a zero impact, becoming slightly negative by the year 2000. This pattern mirrors the pattern of growth in investment, which has a high import content. When the capital stock has fully adjusted in the early years of the next decade this deficit will be reversed once again. The budgetary balance shows a sustained improvement (of 1.1 points of GNP after six years), almost exactly one half of the EC-wide Cecchini estimate.

There is also a sustained increase in total numbers employed (initially of 6,800, rising to 33,700 after six years), half of which arises from the "supply effects", and the other half divided equally between the public procurement and financial services liberalisations. The rate of unemployment falls by almost one and a half percentage points (graph (d)), and this induces net inward migration (graph (f)), which, together with the loss in competitiveness, cuts off further improvement by 1996. Finally, a summary comparison of the medium-term (six year) growth and price effects is shown in Table 3.6 below.

3.3 : *The Impact of EMU*

Since the inception of the EMS in 1979 Ireland has been a member of the system. The process of convergence of inflation rates was very slow to

Table 3.6 : *Medium-Term Effects of 1992 : Growth and Prices*

	Growth		*Prices*	
	EC	*Ireland*	*EC*	*Ireland*
Customs Barriers	0.4	0.2	-1.0	-0.9
Public Procurement	0.4	1.1	-1.4	+0.2
Financial Services	1.5	1.1	-1.4	-1.0
Supply-Side	2.1	2.0	-2.3	-1.6
Total	4.5	4.5	-6.1	-3.1

occur. However, since the Irish public finances began to come under control in the mid-1980s there have been major changes in domestic financial behaviour. The last realignment of the IR£ within the EMS occurred in 1986. Since then there has been an implicit policy of following the DM within the EMS. The fruits of this policy can be seen in the fact that the Irish rate of price and wage inflation have temporarily fallen below the German level. However Irish interest rates still remain significantly higher than German rates.

The price, in terms of interest rates, of an independent currency was high in the 1980s. Market expectations, reflected in the interest rate differential between Irish and DM interest rates, consistently overestimated the *ex post* depreciation of the pound within the EMS (Fitz Gerald, 1986). From this it would appear that the risk differential attaching to the IR£ has been quite high. By contrast, the Irish experience of monetary union with the UK prior to 1979 led to a regime where Irish interest rates were very close to those in the UK with a very small risk margin.[25] The difference between these two regimes has been that under the EMS there has been some scope, albeit very limited, for Ireland to pursue an independent monetary policy, but at the price of much higher interest rates.

The size of the risk margin is not surprising given the small size of the Irish economy. It is costly for foreigners to gain sufficient information about the Irish economy to assess likely future developments which might affect the return on investments. Thus asymmetries in the availability of information may lead to market distortions. Little trade is conducted in Irish pounds adding to the lack of interest in it as a currency. Perhaps most important, the high Irish debt/GNP ratio (discussed in Section 2 above) is a continuing source of risk.

In the light of this experience it would appear that the loss of an independent monetary policy, consequent on monetary union, would not

[25] See Browne and O'Connell (1978) for an analysis of Irish-UK interest rate differentials in the pre-EMS era.

be serious for a small economy such as Ireland. Independence for a small country with a currency little used in trade is costly. While such a loss of a policy instrument may, as suggested in the EC Commission Report, *One Market One Money,* 1990, weaken the ability to handle country specific shocks, this loss will be more than compensated for by lower interest rates.

One Market, One Money has considered the range of other possible effects of Monetary Union on the EC economy. From the point of view of the Irish economy the two most important effects are likely to be the reduction of interest rates and the reduction in transactions costs on international trade. There will, of course be wider efficiency effects but they are more difficult to predict and quantify.

Up to 1990 Irish short-term interest rates were at least 2 percentage points above German levels. While the margin on medium-term borrowing has been somewhat lower it has still been very substantial. The effect of monetary union would be to virtually eliminate this differential. This would impact on the Irish economy through two main channels. First, it would reduce the amount of interest paid by the government. In so far as the interest was payable to foreign owners of IR£ debt, this would increase GNP. If it was payable to domestic agents, it would improve the government's finances while reducing the transfer income of the private sector. Any cut in interest rates would also provide a stimulus to the private sector through reducing the cost of capital (both working capital and investment).

We have used the HERMES model to examine these effects. Because of uncertainty about the precise timing of any changes and because of the extensive delays that can be expected in the response of the economy, we have examined the effects of a notional one percentage point sustained reduction in domestic real interest rates from 1992. We consider the effects for the twenty years after that date.[26]

The primary effect of the reduction in interest rates will be to improve the government's debt position. Initial simulations, assuming a 1 percentage point cut in real domestic interest rates, reduced the debt/GNP ratio by around 35 per cent after 20 years. Because of the model's specification this improvement has no effect on private sector behaviour. To counter this we have made what we feel is a more realistic assumption: the government is assumed to recycle the benefits of the reduction in interest rates so as to leave its debt/GNP ratio at roughly the level it would otherwise have been at the end of the period. This is

[26] The advent of EMU could be expected to reduce domestic interest rates by between 1 and 2 percentage points below the levels experienced in the recent past, up to double the effects shown here (see *One Market, One Money*).

implemented by assuming that the average rate of direct taxation is cut by 0.5 percentage points each year over the twenty year period.

The impact of the one percentage point cut in domestic real interest rates, accompanied by cuts in direct taxation, is illustrated in Figure 3.6. Graph (a) shows what would be the impact on GDP and GNP. The initial impact after five years on both GNP and GDP is rather similar with both of them increasing by around 1.25 per cent compared to the benchmark. However, after that date the paths of the two aggregates diverges. The volume of GDP rises much more rapidly to over 3 per cent above the benchmark level after 20 years. For GNP the increase after 20 years is just under 2 per cent of GNP.

The main reason for the divergence between GDP and GNP is the growth in profit repatriations. As shown in graph (h), the volume of industrial output rises by 7.4 per cent compared to the benchmark after 20 years. While much of the growth in industrial output comes from the traditional sector, even in that sector a significant share of the new investment is assumed to be foreign.

The very big improvement in industrial output is primarily due to the fall in wage rates of over 8 per cent by 2011, shown in graph (b). While the fall in interest rates does provide a boost to output and investment, this effect is dominated by the improvement in labour costs.

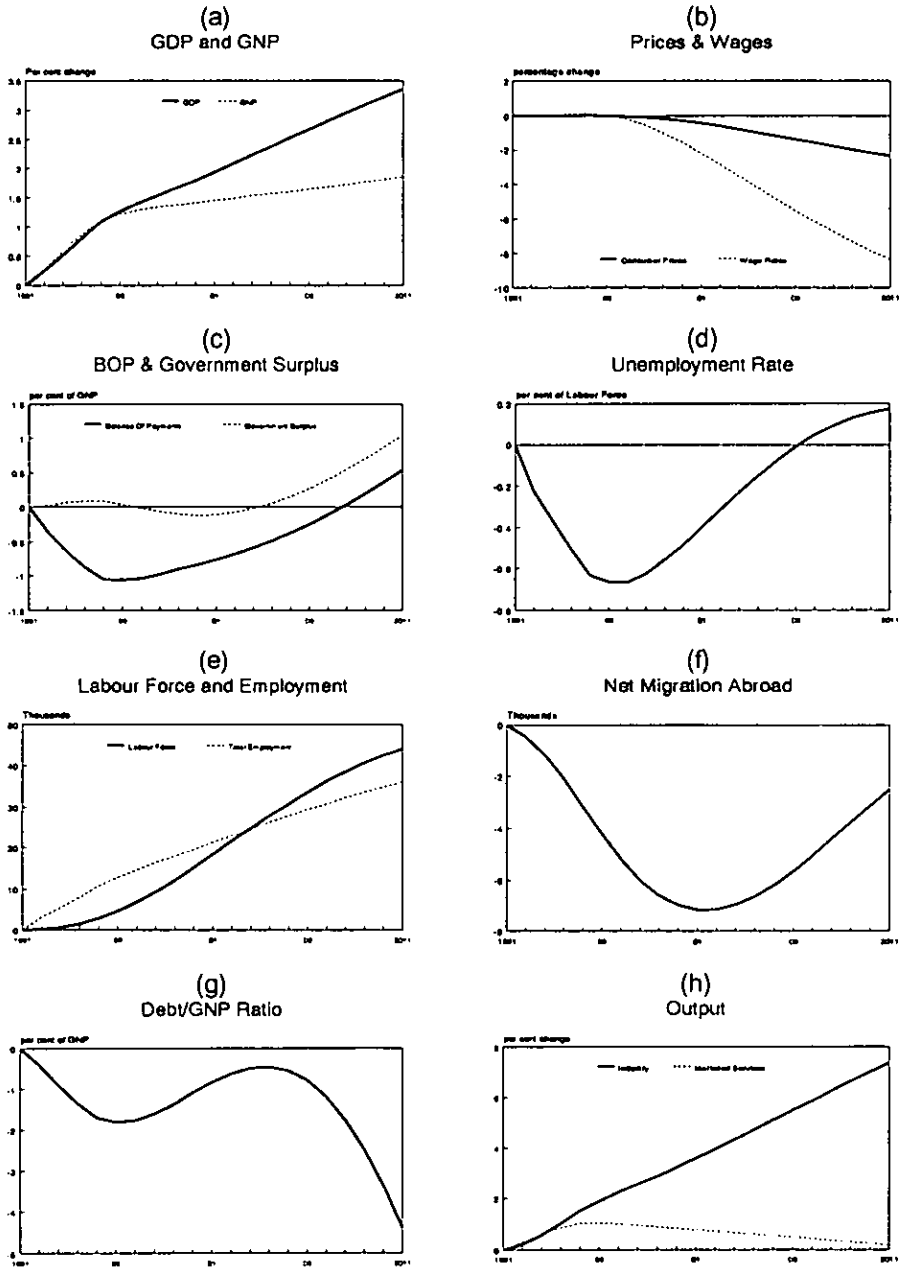
As shown in graph (b) the level of consumer prices is reduced by 2.3 per cent by the end of the twenty years. The big wedge between consumer prices and wage rates is due to the very substantial reduction in income tax, funded by the government's reduced debt interest payments. In bargaining for wage rates employees take account of the increase in their disposable income from tax cuts and moderate their demands.

Because of the rapid growth in industrial output, fuelled by improving competitiveness, employment also grows rapidly. By the end of the period total employment is 36,000 above its benchmark level (graph (e)). The major improvement in the domestic labour market, in turn, results in a continuing reduction in net emigration. This reduction peaks at around 7,000 after 10 years (graph (f)). The result is a substantial increase in the labour force of around 40,000 by the end of the period.

Taking these changes together, the unemployment rate initially falls quite rapidly (graph (d)). However, as emigration falls the unemployment rate in the long run shows relatively little change. The effect of the higher employment is to allow more people to live in Ireland rather than to achieve a major reduction in the unemployment rate. Great uncertainty must attach to this result as it is very difficult to predict how migration will

behave over such a long time period. What is clear is that employment would benefit greatly from such a long-term reduction in interest rates.

Figure 3.6 : Long-Term Effects of EMU



Finally, the debt/GNP ratio, which without the assumed tax cuts would have fallen by around 35 percentage points over the twenty years, shows only a small fall of around 4 percentage points in this simulation (graph (g)). Related to this assumption on recycling government savings, the governments surplus remains roughly unchanged for most of the period (graph (c)). The balance of payments moves initially into deficit as investment increases to build up the industrial capital stock. However, by the end of the period it shows a slightly larger surplus than in the underlying benchmark.

The importance of the reduction in interest rates under EMU, shown in this simulation, goes some way to explaining the problems posed for Ireland in the early 1980s when real interest rates rose drastically. The importance of this channel for the transmission of international shocks to the Irish economy has been underestimated in the past.

The second area in which monetary union will have a positive impact on the Irish economy will be through the reduction in transactions costs. As the value of Ireland's external trade on current account (including gross factor flows) amounts to nearly 160 per cent of GNP this saving could be substantial. *One Market, One Money* gives a range of costs depending on the size of transactions. In the Irish case these would suggest that the cost on Irish foreign transactions is, at a minimum, 0.5 per cent of GNP. When the costs of the uncertainty involved in trade in foreign currencies is taken into account it can be seen that EMU should lead to a perceptible reduction in the cost structure of the Irish economy. To some extent the incidence of the transactions costs may fall on foreign trading partners. However, it seems likely, that the bulk of the costs are borne by Irish firms. Account must also be taken of the fact that what is a cost to the economy as a whole is a benefit to the banking system.

The channels through which the savings in transactions costs under EMU will affect the economy are similar to those through which the opening up of the EC economy after *1992* 1992 will affect it. However, we have not yet attempted to quantify the impact of these effects on the Irish economy.

EMU will pose problems for Ireland in the area of taxation. The pressures imposed on the Irish tax system by *1992* will be aggravated by the possible need to reduce, or otherwise change, the Deposit Interest Retention Tax in Ireland. While this will involve redistribution within the tax system this will certainly impose administrative costs. It will also probably impose real welfare costs as, unlike the case with indirect taxation, the elimination of taxation in this area of the economy may aggravate existing distortions in the tax system.

A possible remedy to this tax problem would be the introduction of an EC wide tax of a similar character (previously proposed by the EC Commission) or else very much increased co-operation between revenue authorities within the EC (and possibly with other neighbouring states).

The timing and magnitude of the possible effects of EMU on the Irish economy must remain very uncertain. The simulation results, described above, only give a rough indication of the order of magnitude of the effects.

The likely time scale for the implementation of monetary union is itself a major matter for debate. The original time scale seems impossible to achieve and it may be the end of the decade before it comes into being. However, the movement towards monetary union and the commitment of the Irish and other governments to achieving it have probably strengthened the existing EMS. As a result, we are probably beginning to see some of the benefits as interest rates converge within the EC. Whether this can be sustained depends, to some extent, on the continuing commitment towards an eventual EMU.

Most of the effects of EMU on the Irish economy are likely to be positive. We have already paid the price for bringing about the convergence of our inflation rate to the EMS norm. The results, described above, show that the fall in interest rates accompanying EMU could provide a major stimulus to the economy. The loss of sovereignty will be more illusory than real. Savings in transactions costs will also provide a stimulus.

The maximisation of the potential benefits for Ireland will depend on the adoption of suitable domestic policies. It is important that inflation is kept under firm control and that the debt/GNP ratio falls to a level which can be sustained in the longer term. The resolution of the problems posed by the need to harmonise taxation is more a short-term problem and should not distract from the potential long-term gains.

3.4 : *The Role of the CAP*

Ireland receives a very substantial sum of money directly from the FEOGA guarantee fund, amounting in 1989 to 4.5 per cent of GNP. In addition, the protected EC market means that Irish farmers receive prices well above the world level for sales on the EC market. Thus the CAP plays a vital role in underpinning not just the agricultural sector of the economy but also of the rest of the economy.

In 1989 around 50 per cent of farmers' incomes came directly from FEOGA and the higher price available in the protected EC market constituted a further important source of income support. Without this

support GNP would have been much lower and the balance of payments would have moved into deficit.

The crisis in the EC budget together with the need to reach agreement on the Uruguay round of negotiations under the General Agreement on Tariffs and Trade (GATT) have imparted great urgency to the process of reforming the CAP. As part of this process, in June of this year, the EC Commission put forward a series of reform proposals. These proposals involve substantial cuts in the prices of many commodities and increased restrictions on production. They also make provision for compensation of farmers for the consequential loss of income.

This latest set of proposals differs from and earlier set, analysed in Fitz Gerald and O'Connor (1991) in providing for somewhat more generous compensation for farmers. However, the proposals are close to those in the earlier package so that the results in Fitz Gerald and O'Connor should give a reasonable indication of their likely effects.

The analysis in Fitz Gerald and O'Connor used the results of the micro-study by Boyle, published in this paper, to examine the possible response of the agriculture sector to the reform package. Using the HERMES-Ireland model the possible effects of the CAP reform package on the economy as a whole were analysed.

The analysis of the economy-wide effects shows that, while the losses would be most serious for the farm community, there would be a cost to other sectors as well. The reform package would adversely affect the public finances and, if the debt/GNP ratio were not to deteriorate, the necessary increase in taxes would aggravate the effects of the initial changes in the CAP. The final long-term effect on the economy would be a reduction of between 1 per cent and 1.5 per cent in GNP.

In the context of the other aspects of EC policy considered in this paper, the possible losses for the Irish economy from a reform of the CAP are quite large.

3.5 : *Summary and Conclusions on EC Policy*

The analysis, described in this Section, suggests that the Irish economy will grow somewhat more rapidly over the 1990s as a result of the completion of the internal market. Much of this additional growth will come from the increased dynamism of the EC economy as a whole. The growth will be added to by the implementation of EMU over the course of the decade. However, while growth will be more rapid there will be problems for certain sectors of the economy and there is no guarantee that the growth will necessarily lead to a narrowing in the gap in living standards between Ireland and the EC as a whole. While the

implementation of EMU may favour Ireland over certain other member states, the effects here will be dominated by the effects of *1992*.

As discussed above, the role of the labour market will be crucial in determining how Ireland benefits from *1992* and EMU. Our analysis suggests that domestic cost pressures may prove stronger than were assumed in the Cecchini report analysis for the EC as a whole. If this proves to be the case, the acceleration in growth arising from the *1992* process may be slowed in Ireland due to some loss of competitiveness. In addition, the sensitivity of migration to economic developments at home and abroad means that even if there is a rapid growth in employment in Ireland, this may not be enough to greatly reduce unemployment. It may provide employment in Ireland for potential emigrants or it may attract back emigrants who left in earlier decades. To the extent that this happens it will reduce the growth in GNP per head.

In considering EC policy and how it will help meet the EC objective of cohesion, a major cause for concern is the future of the CAP. Depending on the nature of the reform of the CAP, the benefits from 1992 and EMU could be partially offset. However, the implications of a restructuring of the CAP for Ireland are not clearcut and they will depend on the nature of the CAP reform finally agreed.

APPENDIX: Summary Macro Result of Cecchini Report for EC 12

Table A.1.: *Macroeconomic consequences of the abolition of frontier controls in the Community.*

	Total Community [1]			
	1 year	2 years	Medium term [2]	
			Simulation	Range [3]
Relative changes (as %)				
GDP	–0,0	0,1	0,4	0,4
Consumer prices	–0,2	–0,4	–1,0	–1,0
GDP price deflator	–0,0	–0,2	–0,9	–0,8 to –0,9
Absolute changes				
Employment (x 1 000)	–75 [4]	–35	215	205 to 225
Budgetary balance as % of GDP	0,0	0,1	0,2	0,2
External balance as % of GDP	0,2	0,2	0,2	0,2

[1] Extrapolation to EUR 12 of the (weighted) average for the six countries analysed (Belgium, Germany, France, Italy, Netherlands, United Kingdom).
[2] Technically speaking, six years.
[3] Reflects the margin of error estimated by Ernst and Whinney. Where only one figure is given, this margin falls withing the rounding of the decimal.
[4] It was assumed that all the job losses (customs officers, forwarding agents etc.) would occur in the first year. In fact, they will probably be spread over a period of time.

Source: Hermes simulation.

Table A.2.: *Macroeconomic consequences for the Community of opening up public procurement.*[1]

	Opening up limited to Community area [2]			
	1 year	2 years	Medium term [3]	
			Simulation	Range [4]
Relative changes (as %)				
GDP	0,2	0,3	0,6	0,4 to 0,8
Consumer prices	–0,3	–0,4	–1,4	–0,9 to –1,9
GDP price deflator	–0,3	–0,6	–1,5	–1,0 to –2,0
Absolute changes				
Employment (x 1 000)	60	145	360	240 to 480
Budgetary balance as % of GDP	0,1	0,2	0,3	0,2 to 0,5
External balance as % of GDP	0,0	0,1	0,1	0,1 to 0,2

[1] Extrapolation to EUR 12 of the (weighted) average for the five countries analysed (Belgium, Germany, France, Italy, and the U.K.).
[2] Opening-up limited to the Community area: the opening-up of Community public procurement remains restricted to Community suppliers.
[3] Technically speaking, six years. [4] Reflects the margin of error estimated by Atkins Planning.
Source: Hermes simulations.

Table A.3.: *Macroeconomic consequences of the liberalization of financial services for the Community.*

	Total Community [1]			
	1 year	2 years	Medium term [2]	
			Simulation	Range [3]
Relative changes (as %)				
GDP	0,4	1,1	1,5	0,8 to 2,1
Consumer prices	– 0,5	– 0,8	– 1,4	– 0,8 to – 2,0
GDP price deflator	– 0,5	– 0,8	– 1,4	– 0,8 to – 2,0
Absolute changes				
Employment (x 1 000)	– 225	– 60	400	230 to 570
Budgetary balance as % of GDP	0,0	0,3	1,1	0,6 to 1,5
External balance as % of GDP	– 0,0	– 0,0	0,3	0,2 to 0,5

[1] Extrapolation to EUR 12 of the (weighted) average for the seven countries analysed (Belgium, Germany, Spain, France, Italy, the Netherlands and the United Kingdom).
[2] Technically speaking, six years. [3] Reflects the margin of error estimated by Price Waterhouse.
Source: Interlink model. The Interlink model simulations were carried out by the Commission's departments; the OECD is in no way responsible for them.

Table A.4.: *Macroeconomic consequences of the 'supply effects' for the Community*

	Total Community [1]			
	1 year	2 years	Medium term [2]	
			Simulation	Range
Relative changes (as %)				
GDP	0,5	0,9	2,1	1,7 to 2,5
Consumer prices	– 0,6	– 0,8	– 2,3	– 1,8 to – 2,7
GDP price deflator	– 0,8	– 1,3	– 2,6	– 2,1 to – 3,1
Absolute changes				
Employment (x 1 000)	– 285	– 85	865	690 to 1 000
Budgetary balance as % of GDP	0,0	0,2	0,6	0,5 to 0,8
External balance as % of GDP	– 0,2	0,2	0,4	0,3 to 0,6

[1] Extrapolation to EUR 12 of the (weighted) average for the four countries analysed (Germany, France, Italy, and the U.K.).
[2] Technically speaking, six years.
Source: Hermes model.

Table A.5.: *Macroeconomic consequences of completion of the internal market*

	Total Community [1]			
	1 year	2 years	Medium term [2]	
			Simulation	Range [3]
Relative changes (as %)				
GDP	1,1	2,3	4,5	3,2 to 5,7
Consumer prices	– 1,5	– 2,4	– 6,1	– 4,5 to – 7,7
GDP price deflator	– 1,6	– 2,8	– 6,3	– 4,7 to – 8,0
Absolute changes				
Employment (x 1 000)	– 525	– 35	1 840	1 350 to 2 300
Budgetary balance as % of GDP	0,2	0,7	2,2	1,5 to 3,0
External balance as % of GDP	0,3	0,4	1,0	0,7 to 1,3

[1] Extrapolation to EUR 12 of the (weighted) average of the countries analysed.
[2] Technically speaking, six years.
[3] Reflects the margin of error estimated by the 'upstream' studies carried out by the external consultants.
Source: Hermes and Interlink models (simulations carried out by the Commission's departments. The OECD is in no way responsible for them).

4: *THE COMMUNITY SUPPORT FRAMEWORK: AN OVERVIEW*

Since its inception, the EC has attached importance to the aim of strengthening economic and social cohesion throughout the Community. As the Single European Act was negotiated, it was recognised that any widening of regional disparities could threaten the successful realisation of market completion.

The principal policy instruments used to address regional inequalities and promote greater growth in the periphery of the Community are contained in the three "structural" funds: the *European Regional Development Fund*; the *European Social Fund*; and the Guidance Section of the *European Guidance and Guarantee Fund*. The Single Act required the overhaul of these policy instruments so that they would operate in a more effective way, and the Community's Heads of State and Government agreed that the resources of the reorganised structural Funds (designated the *Community Support Framework (CSF)*) should be progressively doubled between 1987 and 1993. Starting in 1989, the CSF funding will be about ECU 60 billion (in 1989 prices), and will comprise about 25 per cent of the total EC budget by 1993.

The allocation of the increased funds between the different member states is shown in Table 4.1. Over the five year period Greece and Portugal

both receive about 20 per cent of the total expenditure worth over 5 per cent of their annual GNP. For Ireland the share is just over 10 per cent worth around 3.8 per cent of annual GNP. The sums allocated to Spain and Italy, while together representing almost 50 per cent of the total funds, account for between 1.5 per cent and 2 per cent of the GNP of the eligible regions.

Table 4.1: *Expenditure under the Community Support Framework*

	£M	*% of Total CSF*	*% of Regional GNP**
*Greece	5526	20.2	5.2
Ireland	2820	10.3	3.8
Portugal	5659	20.7	6.6
Spain	7511	27.5	2.0
Italy	5824	21.3	1.5

Source: EC Commission, 1990: "One Market One Money", *European Economy*, No. 44, October.

* For Spain and Italy only part of the country is eligible for CSF funds. For Greece, Ireland and Portugal all of the country is eligible.

Within the CSF, five priority objectives have been identified:

Objective 1 Promoting the development and structural adjustment of the regions whose development is lagging behind.

Objective 2 Converting the regions, frontier regions or parts of regions (including employment areas and urban communities) seriously affected by industrial decline.

Objective 3 Combatting long-term unemployment.

Objective 4 Facilitating the occupational integration of young people.

Objective 5 With a view to reform of the Common Agricultural Policy,

(a) speeding up the adjustment of agricultural structures;

(b) promoting the development of rural areas.

In the case of Ireland, where the entire country is designated an "objective 1" region, the CSF has been designed by the Irish Government and the EC Commission to deal with a range of impediments to economic growth which they have identified. The Framework aims to assist the development of infrastructure and promote productive investments in a way that will have the greatest impact on economic growth.

4.1: *Original Aims of the Structural Funds*

The size and role of the original EC Structural Funds were expanded as part of the amendment to the treaty creating the Single European Market. This expansion reflected the fact that the Community recognised the possibility that the benefits and costs of the single market could be unevenly shared, adversely affecting the position of some of the peripheral regions of the EC. To offset any such disadvantage, it was agreed that positive action would be needed to ensure that all regions shared in the expected acceleration in economic growth.

Experience with the existing Structural Funds over the 1970s and the 1980s had indicated that there was a need for greater co-ordination of the expenditure and a clearer targetting of the different measures. The Community Support Framework (CSF) reflects this change in approach and it spells out the immediate objectives which the different programmes are designed to achieve.

The aim of the CSF is to narrow the gap between the peripheral and the core regions of the EC, thus promoting the Treaty objective of economic cohesion. While income transfers may temporarily achieve such an objective, national and international experience suggests that they can also create a permanently dependent economy, while not necessarily promoting the long-term objective of more rapid growth and convergence of living standards. If they are to effect such a long-term change in the structure and performance of the economies of the peripheral regions, it is important that the funds transferred should be invested so as to increase the long-term output potential of the economies concerned.

4.2 : *The CSF in Summary*

The CSF is structured as a series of operational programmes which are set in the context of a comprehensive framework for tackling the structural problems of the Irish economy (and the economies of the other peripheral regions). Each programme concentrates on a priority - a particular sector or structural problem - and sets out the objectives of the programme.

The programmes represent the culmination of an extended set of negotiations between the Irish government and the EC Commission. Each programme will be partly funded by the EC under the CSF and partly funded by national authorities. For Ireland the proportion of each project to be funded by the EC varies from one programme to another. The indicative aid rates vary between 35 per cent and 75 per cent.

The projects to be funded are specified in considerable detail in the programmes. There is also provision for the monitoring of progress over the course of the five years.

In the CSF for Ireland four specific priorities have been identified:[27]

1. Agriculture, Fisheries, Forestry, Tourism and Rural Development.
2. Industry and Services.
3. Measures to offset the effects of peripherality.
4. Human Resources Measures.

In the case of "priority 1", the programmes developed under the CSF are designed to develop a number of areas of economic activity where Ireland is perceived to have a relative advantage: its natural resources and its clean environment. The programmes will take account of the changing nature of the CAP and they emphasise areas of activity such as forestry where the outputs will meet ready markets without the need for price support under the CAP. These measures also have a regional dimension within Ireland as they are designed to spread the benefits of growth throughout the country, benefiting rural communities.

In the "priority 2" industry and services programme, the focus of support is on tradable goods industries which can be expected to survive and prosper in the post-*1992* environment. Special emphasis is given to measures designed to strengthen existing firms, improving their competence in a range of different areas such as marketing and R&D. This programme is designed to bring about a permanent increase in output and employment in the sector.

In the case of "priority 3", the target of the CSF concerns Ireland's peripheral location. The greater isolation and distance of firms in Ireland from the rapidly growing markets at the EC core is widely acknowledged to be a problem leading to slower growth in Ireland (as in other peripheral locations of the EC). Here the aim is to reduce the costs to Irish business of its peripheral location by a series of infrastructural investment programmes, mainly involving the upgrading of the road network.

Finally, the "priority 4" area concerns a range of measures designed to improve the human capital of the Irish work-force. A series of different programmes are planned under this broad heading which are designed to provide the skilled labour required by the growing economy. Specific programmes are directly related to the other priority areas: e.g., the provision of the training in management, marketing and technical skills which will underpin the "priority 2" programmes in industry and services. It will also support measures to deal with Ireland's major problem of long-term unemployment.

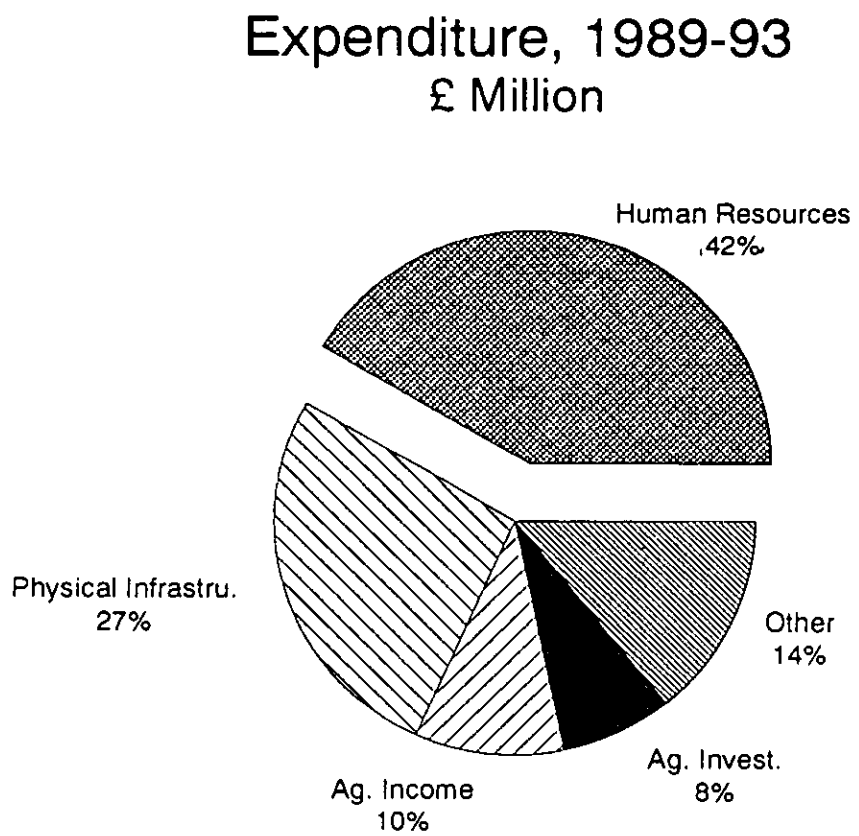
[27] *Community Support Framework 1989-93 for the development and structural adjustment of the regions whose development is lagging behind (Objective 1): Ireland*, Commission of the European Communities, 1989.

While the above four "priority" programmes are useful in an operational and administrative sense, they are not the most appropriate headings under which to carry out a macroeconomic evaluation. For the purposes of our subsequent economic analysis, we reclassify the programmes and their sub-components under five headings:

(i) human resources
(ii) physical infrastructure
(iii) farm income support
(iv) agricultural investment
(v) other: grants to industry and aids to marketing and R & D[28]

The shares of the total expenditure under the CSF accounted for by each of the above five "economic" categories is shown in Figure 4.1.

Figure 4.1



[28] Certain additional items (such as investment under the STAR and the VALOREN programmes) are not considered separately but are taken into account when we examine the aggregate effects of the entire CSF.

The logic behind this grouping derives from the economic channels through which the different types of expenditure will impact on the economy. For example, the increase in training and skills will affect the productivity of labour whether it occurs in the services or the industrial sectors.

4.2.1: Human Resources

The single biggest category of expenditure under the CSF concerns education and training. Over the five years 1989-93 nearly £2200 million will be spent on different training schemes and on the improvement of the educational system.[29] Around £1200 million of this will come from the European Social Fund with the balance being provided by the Irish government.

Approximately a third of human resources expenditure is included in the operational programme for industry and services. The training provided as part of that operational programme is designed to meet the specific needs of the industrial and market services sector for skilled labour over the rest of the decade. The expenditure will be channelled through a number of different agencies including FAS and the Department of Education.[30] The people who will benefit from these programmes will tend to be young labour force entrants. It is not expected that many of the long-term unemployed will benefit from the industry and services training. The sectors of the economy which will benefit most from the provision of an increased supply of skilled labour will be engineering, other manufacturing, hotels and catering, and banking and finance.

Approximately 15 per cent of the total human resources expenditure will go to second level vocational training and apprenticeship schemes which will have rather similar economic effects to the expenditure under the operational programme for industry and services. The beneficiaries are also likely to be labour force entrants and the firms which exploit the increased supply of skilled labour.

The residue of the human resources expenditure will go on a range of different schemes, some of which are targeted at groups with particular labour market problems: the disabled and the long-term unemployed. The beneficiaries will in many cases be drawn from groups which are not actively participating in the labour force, such as the long-term unemployed, and this will have implications for the impact of the

[29] All the figures quoted in this section are approximate as they are at current prices. The figures quoted in the CSF documentation are at constant 1989 or 1990 prices. Thus differences in assumptions concerning deflators may result in some discrepancies between the published data and the data shown here.

[30] FAS is the Irish state organisation with responsibility for manpower training.

expenditure on the economy. The effects of these schemes on the supply of skilled labour may be rather smaller to the schemes in the industry and services operational programme.

4.2.2: Physical Infrastructure

We have included under this heading a number of different elements in the CSF which together account for around £1400 million of total expenditure, approximately £830 million of which will come from the EC. All the expenditure grouped under this broad heading is targeted on the physical infrastructure of the economy, the construction phases of which will affect the demand for building sector services.

The bulk of the expenditure under the peripherality operational programme is included here. It is to be used to upgrade port facilities and to effect a major improvement in the roads infrastructure within Ireland. On the demand side the effects of this expenditure will be quite clearcut leading to a major increase in the demand for the output of the building sector and knock-on benefits from increased demand throughout the economy. However, its longer term aim is to produce a permanent "supply-side" improvement in the competitiveness of the tradable sector of the economy, leading to a permanent increase in activity.

All the expenditure under the operational programme for sanitary services is covered under this heading. The demand effects of this investment are likely to be similar to those of the expenditure under the peripherality operational programme. The supply effects are less clear. While in some cases the provision of new water and sewerage facilities may relax a constraint on growth in industry, in many cases it may only serve to alter the location of industry or to reduce the cost of possible environmental controls on selected firms.[3]

Two other minor items included under the physical infrastructure heading are the provision of advanced factories under the industry programme and the investment to be undertaken in improved tourist facilities as part of the operational programme for tourism.

4.2.3: Farm Income Support

The third major area of expenditure funded under the CSF involves a range of measures designed to boost agricultural incomes. They include compensatory (headage) payments under Objective 5(a) measures. The total expenditure under this heading will amount to around £530 million,

[3] The provision of improved sewerage facilities will have an undoubted beneficial impact on the environment. However, the quantification of this aspect of the CSF is not considered in our report.

approximately £240 million of which will come from the EC. These payments will clearly provide a demand stimulus to the economy, initially through increasing farmers' incomes, but with knock-on demand-side effects. However, in the current world agricultural environment, it is unlikely that these payments will greatly increase the long-run productive potential of the agricultural sector.

4.2.4: Agricultural Investment

The total expenditure under this heading will be about £400 million over the period 1989-93. The support from the EC will amount to £230 million. The payments will arise under three main headings: forestry, farm improvement schemes and the operational programme for environmentally friendly agriculture.

The expenditure under these three headings will serve to increase investment in the agriculture, forestry, and fishing sectors. In the case of the forestry investment, while it will serve to increase the productive potential of the economy, the results will not show up as an increase in measured GNP until the next decade. The investment to eliminate agricultural pollution, while having a significant beneficial effect on the environment, may not increase the productive potential of agriculture. The farm improvement scheme, on the other hand, could result in an increase in the output of agriculture. However, the reform of the CAP could render such an increase impossible.

4.2.5: Grants to Industry

The total expenditure over the period 1989-93 on capital grants to industry will be around £350 million, £210 million of which will come from the EC. The bulk of these payments will be disbursed by the Industrial Development Authority (IDA) to industry.[32] Over three quarters of the expenditure is covered by the operational programme for industry. The remainder, affecting the food-processing industry, is covered under the Objective 5(a) measures for agriculture.

These grants serve to reduce the cost of setting up new installations or expanding existing plants in Ireland. They improve company liquidity, reduce the cost of capital and induce greater investment in Ireland, thus increasing the productive potential of the economy. The initial demand effects derive from the increase in investment induced by the grants.

[32] The Industrial Development Authority (IDA) is a state agency, under the control of the Department of Industry and Commerce, with operational responsibility for administering Ireland's system of state aids to industry.

4.2.6: Marketing and R & D

The total expenditure under this heading will be about £250 million, £160 million of which will come from the Community, primarily as part of the operational programme for industry and services.

The expenditure is designed to promote the marketing potential of existing firms, to increase the level of expenditure on R&D and to help firms to make better use of the benefits of R&D taking place within the country and elsewhere. Some of the expenditure will also be channelled to the third level educational sector to promote R&D of direct use to industry. The savings to firms on the development costs of these new functions will have a long-term effect on their productive capacity.

4.3: *How the CSF Will Influence the Economy*

The CSF covers a major investment programme with funding from the EC of almost £3000 million over the period 1989-93 and will provide a major stimulus to the economy. The framework itself is extremely detailed, involving expenditure in a wide range of different sectors of the economy, and the documents describing the individual programmes go into considerable detail on how the support is to be spent. However, our task is to provide an initial ex ante assessment of the likely impact of the CSF on the Irish economy at a macroeconomic level. Hence, we must abstract from the level of detail that would be normal in a standard project appraisal and look at the broad picture over the next ten years.

Because the CSF involves large-scale *investment* in the economy, the full effects are likely to take some considerable time to come through. The demand effects of the initial increase in investment will all be felt within the 1989-93 period, stimulating in particular the building industry. These demand side effects will persist for as long as the CSF continues at the same level. Thus after 1993 they are dependent on the continuation of the level of EC support under the CSF at an unchanged level.[35]

The supply side impact of the CSF, representing the return on the investment financed by the EC, will take much longer to filter through. For example, due to the "gestation" period of producing a tree, the investment in forestry cannot possibly show a financial return until after 2000. In the case of the improvement in the standard of training and education of the workforce, some effects on the competitiveness of the productive sector may be felt before 1993, but the major benefits could be expected to accrue over a longer time-frame. While these supply-side effects may be

[35] In order to permit our analysis to take into account the long-tailed supply-side effects of the CSF, we make the stylised assumption that the "real" level of CSF policies will be maintained after the termination of the existing programme in 1993.

slow to come through, and may have a smaller initial impact, their persistence over time, even after the investment is completed, is designed to have a major long-term impact on the level of development of the economy.

In this study we examine both the short-term (demand-side) effects and the longer-term (supply-side) effects of the CSF. In the case of the demand effects, the HERMES-Ireland macro-economic model is well developed to provide a comprehensive assessment of their macro-economic impact. However, the channels through which the CSF investment will affect the supply side of the economy are less well understood.[34]

As part of our study we have undertaken a series of "micro-studies", designed to increase our understanding of the potential supply side effects of the CSF. For example, one micro-study on the industrial sector has helped us to quantify the effects of the direct support for industry through the IDA. Another has helped quantify the likely effects of some of the support to the agricultural sector. However, there remain a large number of gaps in our knowledge and the quantification provided here of many of the supply side effects must be seen as exploratory. In Section 7, in our summary and conclusions, we examine ways in which the gaps in our understanding could be filled by further research.

5: *METHODOLOGY FOR MACROECONOMIC ANALYSIS OF THE CSF*

Analysis of the impact of the CSF on the Irish economy could proceed simultaneously at many different levels. In the case of individual projects within the four "priority" areas identified in Section 4 above, a conventional project-by-project cost-benefit analysis could be carried out in isolation from the rest of the CSF. Moving up the scale of aggregation, the totality of projects targeted at any given problem (say, long-term unemployment) could be evaluated in terms of how successful they are in attaining the overall priority objective. Finally, the CSF can be evaluated as an aggregate in terms of how it will influence the evolution of the entire macroeconomy, where economy-wide feed-backs are allowed to take place. Using terminology somewhat loosely, these three stages of analysis could be conveniently called *micro*, *mezzo*, and *macro*.[35]

[34] Similar problems in understanding and modelling fundamental supply-side processes were experienced by the Cecchini team (Catinat and Italianer, 1988). Our approach to handling these issues builds on the Cecchini insights.

[35] For introductory information on different approaches and techniques appropriate for analysis of the CSF, see the *Proceedings of Seminar on Evaluation and Community Support Frameworks*, Ernst and Young/London Economics, DG XXII, Brussels, July 2, 1990. The descriptive terms used in that seminar, equivalent to our *micro-mezzo-macro* evaluation stages, are *micro*, *sectoral/regional*, and *macro/aggregate*.

In theory one should be able to pass up and down the three stages of analysis/evaluation smoothly and costlessly. In practice this is quite difficult given existing knowledge and techniques in economics and business administration. The practitioners of *micro* analysis are usually a discrete subset, isolated by education and techniques from the practitioners of *macro* analysis.[36]

However, even if the three approaches to CSF evaluation cannot be perfectly interleaved and reconciled, it is vital to set out as clearly as possible the crucial assumptions made within each approach, and the scope or limitation of the conclusions drawn. For example, in using *micro* analysis, it is important to avoid the "fallacy of composition", i.e., asserting that if a single isolated project produces a given desirable result, that replicating the project n times will produce n times the original benefit. In the case of *macro* analysis, particularly analysis based on a formal macroeconometric model system, it is important to realise that the model may understate the degree to which the structure of the macroeconomy is flexible (frozen, as it is, in the equations of the model estimated with data extending back over twenty years into the past).

In this paper our brief is to carry out an *ex ante* macro analysis of the impact of the CSF programmes on the Irish economy. It is our strong opinion that any macro-based analysis must be carried out with the assistance of a formal macroeconometric model, aided as far as possible by sectoral input-output models and long-run computable general equilibrium (CGE) models. The macro-model has two important and complementary roles to play in the CSF analysis:

(i) The model is an explicit statement of how one believes the economy functions, where the key mechanisms are isolated, quantified and tested using historical data.

(ii) The model is a tool which permits the simulation of policy "experiments", in order to isolate the importance of given policy decisions.

We have used the Irish national sub-model of the HERMES project (henceforth, HERMES-Ireland) as a basis for our analysis, and drawn on the only recent input-output table (a NACE-CLIO R44 table for the year 1975) to complement the model.[37] No CGE model exists for Ireland, although research is under way in the ESRI. To compensate for the

[36] Even within the set of *macro* analysts, there is a vigorous diversity of approaches and orientations, and little common ground between, say, neo-Keynesians, neo-Classicals, Monetarists, Institutionalists, etc.

[37] For a more general evaluation of the potential for using the EC HERMES model for CSF analysis in the other peripheral countries, see Bradley and Fitz Gerald (1990).

absence of CGE models, we have devoted particular attention to the long-run equilibrium properties of our macro-dynamic model, HERMES-Ireland, as we developed and tested it.

The HERMES-Ireland model, being the only operational model available in Ireland, provides the best starting point for CSF analysis. It is well suited to modelling the demand effects of the CSF and some of the changes arising from the *1992* process, as we have seen in Section 3 above. However, the earlier version (prior to the present CSF project) suffered from a number of limitations on the supply side. There was an obvious need for further work on this aspect of the model before it could be used to analyse the longer-term impact of EC policy with any degree of confidence.

An integral part of this study was a series of micro-studies. These micro-studies were all designed to fill some of our gaps about the structure and behaviour of the productive sector of the economy. Two of these studies involved the collection of new data to allow the more detailed analysis of the behaviour of the supply side of the economy. The other six involved a more detailed analysis of specific sectors of the economy. The results of these studies were used to develop the HERMES-Ireland model so that it could handle both the demand and the supply side effects of the CSF. The results of four of these studies are published in this volume. The results of the other four are summarised below in Section 5.1.

In Section 5.2 we give an outline heuristic description of the revised version of HERMES-Ireland. This revised version is closer to the original specification drawn up by DG XII of the EC Commission (d'Alcantara and Italianer, 1982). There are some areas where special attention was given to facilitate the analysis required in this report: the handling of agriculture and food processing; the dual nature of the Irish industrial sector; the functioning of the labour market; the importance of tourism; and the modelling of interest rates. The results of the micro-studies, commissioned as part of this study, were, in most cases, incorporated directly into the HERMES model. In other cases they were used indirectly as a basis for preparing the essential input into the model for the CSF analysis.

The approach adopted to the analysis of the CSF is described in general terms in Section 5.3, as introductory material to the formal quantitative analysis carried out in Section 6.

5.1 : *Results of Micro-Studies*

In considering the possible effects of *1992* on the Irish industrial sector it was considered important to examine the structure of the sector. The

study *Industrial Structure and Economies of Scale*, by O'Malley, published later in this paper, describes the results of this study.

In the HERMES-Ireland model agriculture is handled in a very summary manner. A study by Boyle, *Modelling The Irish Agricultural and Food Sectors*, included in this Policy Paper, describes the results of the second micro-study designed to fill this gap.

The third study, published in this policy paper, examines evidence on the labour market prospects for early school leavers. This paper, entitled *The Exchequer Costs of Unemployment Among Unqualified Labour Market Participants* by Richard Breen and Sally Shorthall, considers the possible returns to the state from effective intervention to improve the educational attainments of this group.

The final micro-study published in this paper presents estimates, derived from specially commissioned surveys, of the transport costs faced by Irish industry before the CSF programmes could have an effect. This paper by Durkan and Reynolds-Feighan is entitled *A Survey Of Irish Manufacturers' Transport Costs.*

The results of the other four micro-studies, not published as part of this paper, are summarised below for completeness.

5.1.1 : Industrial Competitiveness - Sectoral Data

At the start of this project it was clear that it would be necessary to disaggregate the existing four-sector Irish HERMES model. However, there were serious data deficiencies which made this difficult. A project was undertaken with the purpose of gathering the data necessary for disaggregating the industry and services sectors from a range of different sources. Extensive assistance was received from the Central Statistics Office (CSO) in undertaking this task.

A new databank of statistics has been prepared on the industrial sector, wherein a consistent set of data, based on the Census of Industrial Production, has been derived for a five way disaggregation: high-technology manufacturing, food processing, traditional domestic manufacturing, building, and utilities. Extensive additional data on energy consumption were obtained from International Energy Agency (IEA) and the Department of Energy to permit a breakdown into energy and other materials of total material inputs into the production process. The CSO provided additional, unpublished, data which greatly facilitated the task and has made possible the preparation of a set of accounts which are consistent with the CSO's own aggregate National Income and Expenditure publication.

The data from the CSO also allowed the market services sector to be disaggregated into three subsectors: distribution; transport and communications; and professional and financial services.

These data form the basis for the disaggregation, undertaken in two other micro-studies, of the industrial and services sectors into a number of different sub-sectors in the HERMES-Ireland model. This permitted a much more comprehensive analysis of the effects of the CSF expenditures, EMU and 1992 on the industrial and services sectors.

These data have been mounted in the ESRI/Department of Finance databank and are available to all users of the Department of Finance computer centre. A full report has been prepared: Bradley, Fitz Gerald, and Kearney: Economic Time Series for Irish Industry and Services, ESRI Technical Series No.5.

5.1.2: The Functioning of the Labour Market

A study of the functioning of the Irish labour market was also carried out and is available in Barry and Bradley, 1991. This was done in parallel with the CSF analysis, and was financed by the National Economic and Social Council (NESC). This analysis used the original four-sector HERMES-Ireland model to address the question: why did the rate of unemployment in Ireland rise by over 10 percentage points between 1980 and 1987? The two main causes were identified as "world" economy effects and domestic policy effects, almost in equal proportions. The study highlighted the extreme openness of the Irish economy, stylised properties of wage bargaining in Ireland (characterised by hysteresis and sluggishness), the importance of the migration mechanism, and the strong "crowding-out" of private by public sector activity.

5.1.3: The Market Services Sector

The market services sector is of major importance in the Irish economy, though it has received scant attention in the past from applied economists mainly due to the absence of time-series data. This microeconomic study uses the new sectoral data and develops a model for three different components of the market services sector: distribution; transport and communications; and professional and financial services.

The transport sector is separately identified, permitting (within the complete model) examination of the effects on the economy of infrastructural investment to reduce transport costs.

The CSF support for tourism will directly affect the professional and financial services sector. The separation out of this sector and the detailed treatment of tourism expenditure permits the examination of the wider

effects on the economy of the successful infrastructural investment planned in the operational programme for tourism.

Studies elsewhere (Fitz Gerald, 1989) show that *1992* will have a major impact on some aspects of the behaviour of the distribution sector. The separation out of the distribution sector allows the important changes which *1992* will bring to be examined.

Finally, for the first time, the effects of interest rates on services sector activity are modelled. This allows the effects of 1992 on the financial sector and of monetary union to be considered. This study was published in *The Economic and Social Review* under the title: "The Irish Market Services Sector: An Economic Investigation" (Bradley, Fitz Gerald and Kearney, 1991).

5.1.4 : The Industrial Sector

The final micro-study involved the five way disaggregation of the industrial sector, using the new data made available from the first micro-study, described above. The five sectors modelled are : high-technology manufacturing; food-processing; traditional manufacturing; building; and utilities. The demand for four factors of production are modelled in each sector: capital, labour, energy, and other (non-energy) materials. (In the building and utilities sectors energy and materials are treated as a single aggregate).

Earlier studies had highlighted the need for such a disaggregation (Bradley *et al*, 1989). The high-technology sector, which is primarily foreign owned, behaves very differently to the rest of manufacturing. The food-processing sector is directly tied to the supply of agricultural raw materials. The traditional sector is very sensitive to its competitiveness on the world market. The building industry, unlike the three manufacturing sectors, is effectively non-tradable and is subject to a very different pattern of behaviour, including price-determination.

This micro-study models the determination of output in each sub-sector. For most of manufacturing this is a function of the sector's competitiveness on world markets. If the CSF expenditure achieves a lasting improvement in this competitiveness it will permanently increase the productive potential of the economy. Given the determination of sectoral output in this way, the mix of factors of production (e.g., employment, energy, investment) will depend on the cost of the factors (e.g., wage rates, energy prices, the cost of capital). In so far as the CSF or other aspects of EC policy, such as EMU, changes these prices they will affect domestic employment and investment.

For the first time this study of the industrial sector identifies important effects of interest rates on the economy. This channel is vital in analysing the effects of *1992* and of monetary union.

A detailed description of the results of this study is given in Bradley, Fitz Gerald, and Kearney: *The European Community And The Irish Industrial Sector: A Framework For Analysis*, ESRI mimeo.

5.2 : *The Irish Macroeconomic Model: HERMES*

The HERMES-Ireland macroeconomic model has been developed in a number of ways to facilitate the analysis of the effects of the CSF and of other aspects of EC policy. The new specification takes the model closer to the original specification of HERMES (d'Alcantara and Italianer, 1982) in a number of ways (e.g., sectoral disaggregation, factor inputs). The upgrading of the model uses the results of a number of the micro-studies described above. In particular, the services and industrial sectors (including food-processing) directly incorporate the new specifications developed in the micro-studies. For agriculture the new results have not been directly incorporated into HERMES but the Boyle (1992) model can be simulated in tandem with the full macroeconomic model.

The technical details of an earlier version of the HERMES-Ireland model are available in Bradley *et al.*, 1989. The changes made to the industrial and services sectors to upgrade the model to make it suitable for analysing the effects of the CSF are described in the reports on the micro-studies, summarised above. A detailed description of the behavioural properties of the new version is given in Bradley and Fitz Gerald, 1991. In this section we merely try to convey a non-technical overview of the model as a whole, in order to describe the major channels whereby shocks in key exogenous variables percolate through the economy. We also identify key mechanisms and channels in the model in order to set the background for analysis of the CSF based on use of the model, to be described in Section 6. The aspects discussed here are:

(i) the industrial sector
(ii) the operation of the Keynesian multiplier in the model and its relationship with the determination of market services output
(iii) the determination of prices
(iv) the operation of the labour market
(v) the government sector
(vi) the financial sector

5.2.1: The Industrial Sector

A very important link between the Irish economy and the outside world is through the determination of industrial output. In the high-technology

and traditional manufacturing sectors, in the long run, industrial output is a function of the level of world output and of competitiveness. In this case the competitiveness of the sectors is broadly defined, including all costs, not just the cost of labour. Domestic demand has some additional effect on the traditional sector. This mechanism contrasts with that in many other conventional SOE models, where the volume of output is driven by demand which is, in turn, driven by the volume of exports. In the HERMES model the level of capacity (supply) is a function of world output and the chain of causation in the long term runs from world output, to domestic supply, to exports. In the short term output and exports are influenced directly by variations in world output.

Any shock to the rate of growth in the rest of the world is transmitted to Ireland through its effects on industrial activity. In the short run a rise in world output results in a temporary rise in exports and a rise in capacity utilisation in the industrial sector above its long run norm. If the rise in world growth is sustained, the capacity of the Irish industrial sector rises over a period of years to increase the long run output potential of the economy. This rise in capacity restores the level of capacity utilisation to its normal level while permitting a sustained increase in domestic output.

The food-processing sector is modelled as a profit maximiser which chooses the amount of processing to add to domestic agricultural produce in the light of domestic production costs and the price for its own output. As a result, like the other two sectors of manufacturing, the level of output in the long run is sensitive to changes in competitiveness.

All three manufacturing sectors are price-takers on the world market. As a result, there is no opportunity of passing on changes in domestic costs of production. Such cost changes impact directly on the volume of output through the changes they bring about in Ireland's international competitiveness and the attractiveness of Ireland as a location for production, whether by foreign-owned or domestically-owned firms.

The long-term productive potential of the building sector is assumed to be driven by domestic demand. The mark-up on the price of the output of that sector is a function of the level of capacity utilisation. Thus when demand rises, both output and prices will rise. The rise in prices will tend to choke off some of the increase in demand. These two processes will work together to determine the final equilibrium level of output.

A temporary or unexpected rise in demand (domestic or foreign) will lead to a temporary rise in the rate of capacity utilisation in all industrial sectors. Firms will use their existing factories more intensively. They may work more overtime or increase the number of shifts. The physical plant cannot be changed in the short run. This will result in a more intensive use

of the factors of production which are variable in the short run (labour, materials and energy). Use of some of these factors may show a bigger percentage change than the change in output volume to allow the fixed capital stock to be used more intensively. For example, less sophisticated obsolete machinery requiring a greater labour input may be brought into play. However, as new capital stock is installed, capacity utilisation will tend to return to a more normal level, overtime will be reduced and obsolete machines retired.

Taken together, the key factor driving the industrial sector is the growth in world output. Basically, the Irish market is deemed to be less important than the world market in influencing the production and investment decisions of Irish firms. For the high-technology sector, which exports a very high proportion of its output, the domestic market is quite insignificant.

Within each sub-sector of industry the mix of factors of production is dependent on the prices of the different factors. However, the patterns of substitution differ greatly across the sub-sectors. In food processing there is very little possibility of substituting one factor, such as capital, for labour. In the traditional manufacturing sector in the long term, capital and labour are complements - a rise in the cost of capital reduces the demand for both capital *and* labour, raising the demand for raw materials (primarily imported). The high-technology manufacturing sector shows a greater possibility for the substitution of capital and materials for labour. The building sector shows the greatest sensitivity of factor demand to changes in relative factor prices.

A very important additional channel, which is included in the model, is the repatriation of profits earned by foreign multinationals operating in the Irish industrial sector. As foreign firms accounted for more than 50 per cent of gross output in all manufacturing industries since 1985, this is a vital factor in understanding the performance of the economy. It means that a substantial part of the benefits of an increase in the long-run productive capacity of the industrial sector, induced by the CSF, leaks abroad directly as profit repatriations. This leakage must be viewed alongside the very high import content of the gross output of the manufacturing sector and means that, while the growth of industrial output is the vital factor in driving the long-term growth of the Irish economy, the effects of the growth (including its effects on employment) are much less significant than in other more closed economies.

5.2.2: Keynesian Multiplier and the Services Sector

In the early Irish economic models, the central most important relationships were the consumption function and the Keynesian income

multiplier. In the HERMES model, as in all mainstream macroeconomic models, they still remain as conduits for the transmission of shocks from exogenous variables to the domestic economy. While the precise behaviour of personal consumption and savings in the short run has proved difficult to model (see Moore, 1987; Walsh, 1988; Whelan, 1991) a major part of any increase in domestic income is spent on consumer goods and services. In so far as this expenditure generates additional domestic output and, therefore, increased domestic income, it continues to circulate in the economy.

However, as discussed above, changes in domestic demand are not the primary factor driving the long-run output capacity of the industrial sector. Their main direct impact on the level of output is in the market services sector. Even when consumers buy food, cars, or other goods, a substantial part of that expenditure goes to the marketed services sector due to the existence of a distribution margin on all such products. In addition, purchases of services account for a large part of consumers' expenditure and because the output of market services is demand driven, it changes to meet any alteration in domestic consumption. To the extent that increased consumers' expenditure goes on services, the output of the economy increases. To the extent that it goes on goods, it serves largely to increase imports or reduce exports.

However, much of the demand for the output of the services sector comes through other important channels. The industrial sector uses as an input some of the output of the services sector. For example, the output of the transport and communications sector is affected by the volume of foreign trade. Tourism expenditure also has a major impact on the output, in particular, of the professional and financial sector. Of growing importance more recently is the export demand for the output of the professional and financial services sector.

Output in the services sector is demand determined, while the price of output is marked up on unit labour costs and is, in addition, sensitive to capacity utilisation. Distribution margins tend to rise when the volume of consumption is growing rapidly. The rise in price, in turn, affects demand and thereby directly affects supply.

Within each of the three marketed services sectors the demand for the two factors of production, capital and labour, is affected by their prices. The possibilities for substitution of capital for labour (or vice versa) are more limited in the transport and communications sector than in the other two marketed services sectors.

5.2.3: Price Determination

The determination of prices is broadly in line with that of previous models of the Irish economy. The price of tradable goods is determined externally in line with the standard SOE model and long-run purchasing power parity is assumed to prevail. This means that all world inflationary pressures are very quickly and completely transmitted into the prices of tradables in the Irish economy. Because consumption has a large services sector content it is not a uniformly tradable good and prices can be influenced by domestic wage costs. Changes in the level of capacity utilisation in the economy affect the price level directly through margins in the services sector and in building and, indirectly, through their effects on the labour market, i.e., on wages (through the Phillips curve) and thence on the price of services.

In addition to the effects of foreign prices, the domestic price level is affected by the level of taxes. Part of the incidence of indirect taxation falls on the productive sector of the economy and part on the consumer so that the quantitative effects of changes in indirect taxes and subsidies on consumer prices are not clear-cut *ex ante* but must be examined with full model simulations.

5.2.4 : The Labour Market

The concept of a labour market plays a crucial role in the overall model. The derived demand for labour is determined in the production or supply block and is a function of the level of output, the price of labour and other factor prices, and technical change. The supply of labour is determined by population growth, a migration decision and a participation decision. The level of migration and, therefore, the supply of labour, is affected by domestic and foreign (UK) economic factors.

Wage rates are determined primarily in the industrial sector with rates in other sectors following those of industry. The wage bargaining model makes wage rates a function of prices, a tax wedge, the change in the level of unemployment and the trend growth in productivity. The effect of changes in unemployment on wage rates (i.e., the Phillips curve) plays an important equilibrating role in the model's behaviour. For example, when the economy is deflated by cuts in public sector employment, the level of unemployment tends to rise. This in turn has the effect of reducing wage rates in the economy which leads to some offsetting increase in employment in the private sector (referred to as "crowding in"). On the other hand, the rise in unemployment tends to reduce the labour force by encouraging emigration which, in turn, attenuates the increase in unemployment. This migration mechanism plays a central role in

determining the final equilibrium point reached by the economy after a period of adjustment to any external shock.

The tax wedge effect in the wage bargaining equation means that any attempt to increase taxation implies some knock-on increase in wage rates, which in turn leads to some loss of employment in the private sector.[38] One implication of this specification is that changes in government expenditure (not related to public employment) have little direct effect on wage bargaining in contrast to the effects of tax changes. This dichotomy may be artificial: clearly, if cuts in expenditure affect the level or quality of public services then this too may have a knock-on effect on wage rates.[39]

In our labour market model, the human capital of the labour force is not taken into account directly. In simulating the effects of the human resources element of the CSF the changes in levels of skills in the labour force and the direct effects of the training schemes are taken account of in an ad hoc manner.

5.2.5: The Government Sector

The model incorporates a standard, though fairly detailed, specification for both the revenue and the expenditure sides of the Government sector's accounts.[40] The effects of government investment in changing the productive potential of the economy are not directly modelled.[41] However, the supply side effects of such investment can be imposed on the model based on assumptions or evidence concerning the long-run impact of such measures on the costs and/or profitability of the private sector. When examining the effects of the CSF, care is taken to incorporate such cost effects through altering other variables or parameters in the model.

An innovation in the model, relative to many others, is the detailed treatment of the financing of the government sector's borrowing and its interaction with the level of debt interest payments. The domestic absorption of government securities is determined by the flow of domestic savings while foreign borrowing or debt repayments are residually determined. The effects of increased foreign debt interest payments on the

[38] Obviously if there were an overall ceiling on nominal (or money) public expenditure, the wedge would also affect the level of employment in the public sector.

[39] For example, if privatisation of certain aspects of the health services requires consumers to increase their personal expenditure to maintain the same (desired) level of services, employees will be worse off and could, on past evidence, be expected to look for some compensatory increase in wage rates.

[40] It should be noted that the modelling of public sector activity is considerably more detailed than the rudimentary approach proposed in the original HERMES specification of d'Alcantara and Italianer, 1982.

[41] For example, increased infrastructural investment which reduces transport costs for the private sector is not treated any differently from increased investment on recreational projects.

level of GNP are endogenous and this considerably alters the long-run multipliers of the model. In earlier models this channel of economic causation was not explicitly included. Since no account was taken of the offsetting rise in foreign debt interest payments, the effects of increased government expenditure on the real economy were exaggerated. The corollary is that the EC CSF transfers, in so far as they reduce the national debt, will add to the long-run productive potential of the economy as measured by GNP.

5.2.6: Financial Sector

Interest rates are exogenously determined in the model. Prior to Ireland's entry into the EMS, during the era of monetary union with the UK up to 1979, Irish interest rates were directly linked to UK rates. However, the relationship to world rates of interest became much more complex in the early 1980s. Because of the rapidly growing government debt, the high rate of inflation and the huge balance of payments deficit, the exchange rate of the IR£ *vis a vis* the DM was not seen as being sustainable. As a result Ireland experienced very much higher interest rates than those in Germany in spite of membership of the EMS. This high margin compared to DM rates represented the market's assessment of the risk of future depreciation of the IR£. However, over the last few years the situation has changed, with Irish interest rates becoming progressively more dependent on DM rates and an increasing tendency for the gap between the two to narrow. In the context of EMU these differences will disappear and Irish interest rates will, once again, be wholly externally determined.

In the model interest rates can be set in either nominal or real terms. While the difference may not be that important in using the model for forecasting purposes, it is very important in looking at the effects of shocks which affect the level of prices in the economy. Because interest rates have a big impact on the government sector's financial position, failure to allow for the effects of price changes on nominal interest rates can distort the model's estimate of the effects of such shocks.

The flow of funds within the economy is specified at a fairly general level in the model. The uptake of government securities is then a function of the funds available to the private sector. In the current version of the model the proportion of private sector funds being invested in a range of financial instruments is treated as exogenous, although as more research becomes available it is hoped to endogenise this portfolio behaviour within the model. This channel in the model means that any factor which changes the amount of funds available in the private sector for investment

in financial assets affects the funding of the government sector's borrowing requirement. However, as the residual element in both the private and government sectors' portfolios is foreign assets/liabilities, a shift of private sector funds from investment abroad to lending to the government sector will result in a matching repayment of foreign debt by the government, with no direct effect on Ireland's net foreign indebtedness.

A corollary of the specification of the flow of funds is the symmetrical treatment of interest flows from foreign investment (or borrowing) by the private sector and foreign borrowing of the government sector. In the model changes in foreign investment by the private sector influence the level of net factor income and, therefore, the level of GNP. This has important implications for the treatment of shocks which change the level of the current balance of payments. For example, any shock which increases the current balance of payments surplus would generate some offsetting capital outflow. This outflow will have beneficial effects on GNP in later years as the returns from this outflow accrue to either the public or private sector. This channel of economic causation enhances the effects of measures which change the indebtedness of the government sector.

5.3: *Analysing Ireland's Structural Problems*

The macroeconomic model, described above, provides the essential framework within which we analyse the impact of the CSF and other aspects of EC policy on the Irish economy.[42] The demand side impact of the CSF and of *1992* can be handled in a reasonably straightforward manner using the model. Sufficient detailed information has been provided by the relevant government Departments through the published operational programmes (and limited additional unpublished data) to allow a reasonable estimate to be made of these effects. It is the quantification of the supply side effects, i.e., the impact on the long-term productive potential of the economy, which poses greater problems.

There are three main channels through which the CSF will impact on the Irish economy's long-run supply potential:

(i) through changes in human capital (the skills and education of the labour force)
(ii) through infrastructural investment

[42] As described below in Section 6, there remain many gaps in our knowledge of how particular aspects of the economy operate at a microeconomic level. In some cases these gaps are very important. The approach we have adopted in such cases is to explore the sensitivity of our results to various assumptions and to highlight in Section 7 the areas which need further research.

(iii) through direct assistance to the private sector of the economy reducing their costs or increasing their productivity.

The upgrading of the model goes some distance towards allowing us quantify the effects flowing through the third of these channels. However, considerable uncertainty remains concerning the magnitude of the effects arising through the first two economic mechanisms. Here we discuss the three mechanisms in turn and how we have approached the quantification of each of them within the overall context of the HERMES macro-economic model. Full details of the quantification are given in Section 6 for each group of measures and for the total CSF.

5.3.1: Human Capital

The increase in training and education has a number of objectives. First, it is designed to increase the skills of the labour force. Secondly, it aims to improve the labour market participation of certain disadvantaged groups - e.g., the long-term unemployed and the disabled. It will affect the supply potential of the economy through a range of different mechanisms.

To the extent that the additional people being trained or educated are taken out of the active labour force, the potential labour force will be reduced temporarily . This, in turn, will tend to reduce unemployment and emigration. Because of the Phillips curve effect, the reduction in unemployment will tend to increase wage rates, with knock-on effects on productivity. However, to the extent that those in training or education come from groups which would not have been active in seeking jobs (although in the labour force), there will be no effects on wage rates - e.g., the long-term unemployed.

The second way in which the increase in human capital will impact on the economy will be through the increased supply of skilled labour. In this regard the first issue which will arise will be the extent to which the change in skill composition of the new labour force entrants will affect migration. It is likely that there will be some leakage of skilled labour abroad. The evidence from Sexton, Walsh, Hannan, McMahon, (1991) suggests that, in the past, while emigrants have had fairly diverse educational backgrounds, the incidence of emigration is more concentrated on those with marketable skills. Thus one may expect that, while the CSF will have a positive impact on the domestic supply of skilled labour, there will be losses through migration. For those who emigrate their employment prospects will be enhanced by the higher levels of education or skill.

This increase in supply will reduce pressures in the labour market arising from skill shortages and will tend to reduce the rate of growth in

wages below what it would otherwise have been. For example, in the building industry a shortage of skilled labour can lead to a bidding up of wage rates. The provision of an adequate supply of the skills needed will lessen such pressures.

In addition, in so far as the CSF is successful in giving the long-term unemployed the skills and confidence to participate in the active labour force, it will reduce wage pressures at any given level of unemployment. Walsh (1987) and Bradley (1988) have shown that wage rates are sensitive to numbers in receipt of unemployment benefit (the short-term unemployed) but less affected by numbers in receipt of unemployment assistance (the long-term unemployed). If the CSF expenditures serve to change the composition of the unemployed by reducing the numbers of long-term unemployed, in particular through reducing the inflow into the ranks of the long-term unemployed, it will have a dampening effect on wage rates, increasing employment.

The third and potentially most important effect on the productive capacity of the economy is the increase in efficiency and productivity which will accrue from the greater skill and education of the labour force. The CSF will not only have an effect through reducing skill bottle-necks but will also result in many of the new labour force entrants playing a more effective role in their sectors of the economy. This could reduce the costs of existing firms, increase the quality of output, and lead to new firms setting up to exploit the increased productivity of the labour force.

However, while the possible economic mechanisms whereby increased training and education could increase national productivity are clear, the quantification of these effects remains very uncertain.

The micro-study by Breen and Shorthall has highlighted the potential economic returns from a successful intervention on behalf of the most educationally disadvantaged school leavers. This might reduce the inflow into the ranks of the long-term unemployed. However, their study could not determine how such a successful intervention could be achieved.

In the case of the increased productivity which might arise from a more skilled and educated labour force, the pure human capital effect, there is no evidence for Ireland as to its likely magnitude. Some evidence for the US suggests a rate of return to additional education of 7.5 per cent (Angrist and Krueger, 1990). Since the success or failure of the CSF human resources programme will hinge on the size of this human capital effect the problems faced in quantifying it are serious.

Other research by Breen (1991) suggests that some of the training programmes carried out in the past have not been very successful in increasing the prospects of trainees finding jobs. However, little or no

research has been done in Ireland on the effects of such schemes or education in raising the earning potential of the trainees or in increasing the productivity of the economy as a whole. Thus there is no certainty that the human capital effect will materialise and there is a clear need for the monitoring of the progress of the schemes financed by the CSF.[45] This is an issue to which we will return in Section 7.

To summarise, we are a long way from firm quantification of the benefits of the CSF expenditures on human capital and productivity. Thus in the analysis carried out in the next section the quantification of this effect is very experimental in nature. There could be a wide margin of error in the results, a margin of error which can only be narrowed by further research for both the Irish and other EC economies.

5.3.2 : Infrastructural Investment

Infrastructural investment takes a number of different forms: increased expenditure on roads and ports; increased investment in sanitary services; developments in the telecommunications system; provision of advance factories. Generally these investments will first impact on the economy through an increased demand for building services. The HERMES-Ireland model can handle these effects satisfactorily. In the preliminary assessment of the impact of the CSF Bradley and Fitz Gerald (1989), an *ad hoc* approach was taken to the possible rise in the price of building output due to the rapid increase in the volume of such investment. However, our more recent research has allowed us to incorporate this effect within the upgraded model.

It is on the supply side that this infrastructural investment can be expected to have the biggest impact and it is here that the greatest uncertainty arises. While the latest version of the model, together with the fruits of the micro-study on transport costs, allows us to assess the impact on the industrial sector of a given percentage change in transport costs, it has no mechanism for measuring the potential impact on such costs of any given level of infrastructural investment. Little evidence is available on this latter issue.

Infrastructural investment may have a highly non-linear effect on the economy. For example, a telephone system below a required standard may simply prevent *any* industrial investment of a high technology type. Incremental telecommunication investment may not become effective

[45] O'Farrell, P.N., and D. Hitchins (1989): *Small Firm Competitiveness and Performance*, Dublin: Gill and Macmillan, have carried out comparative studies for the UK, Northern Ireland, and the Republic of Ireland looking at the effects of training and skills on the productivity of selected firms. These studies have indicated for other countries that the training and education of the labour force can have a significant effect on productivity.

until a threshold standard is passed. Thereafter, the provision of an adequate telecommunication system may facilitate such investment but it can not guarantee it. In the case of roads, the provision of improved roads may have little effect if they merely serve to shift traffic jams from one town to another. However, the completion of the final link on a major artery could have a very big effect on travel times and, thus, on industrial costs.

As with the measurement of the supply side effects of investment in human capital, we take an experimental approach to quantifying the effects of the infrastructural investment. We have tested the effects on the economy of different realised rates of return on the infrastructural investment. We implement these effects through a change in the cost of production of the industrial sector. Within the model, a reduction in the cost of production in Ireland increases competitiveness leading to increased output and employment on a long-term basis. The reduction in transport costs will also reduce the costs of imports. However, given the very high level of import penetration already, this is unlikely to have a major effect on the volume of imports.

5.3.3: Aids To The Private Sector

Aids to the private sector take on a wide range of forms. They are generally given in the form of a grant or subsidy designed to encourage the private sector to undertake certain investments which are believed to be highly desirable or of strategic importance. These aids take the form of incentives to expand or develop new industries; incentives for investment in forestry; incentives to agricultural investment; incentives and subsidies to increase the international marketing effort of firms and to encourage the greater use of R & D.

These measures first impact on the economy when the firms benefiting from the grants or subsidies undertake the desired investment expenditures. The crucial first link in assessing the impact of this aspect of the CSF is the quantification of the link between assistance and investment. The micro-studies for the industrial and agricultural sectors have helped fill this gap. The effects of a change in the grant provision of the IDA on industrial investment and output in the long term can be quantified within the HERMES-Ireland model. The same applies to some of the agricultural investment schemes. However, the quantification obtained must still be seen as imprecise because small changes in the terms or eligibility conditions, which might significantly affect behaviour, cannot be identified at a macroeconomic level.

Having quantified the impact on investment behaviour the HERMES-Ireland model provides a good tool for examining the long-term supply

side impact of the resulting increase in the productive potential of the economy. The increase in potential supply results in higher exports and employment in the longer term. The initial impact of the increase in investment is to disimprove the balance of payments as investment (largely imported goods) increases. However, once the new capital stock is in place and productive, the effects on the balance of payments become positive.

5.3.4: Aggregate Effects

The improvement in the balance of payments and government borrowing requirement which will arise as by-products of the CSF, must also be taken into account. The increase in growth and employment financed by the CSF will reduce certain aspects of government spending and increase tax revenue through buoyancy effects. The effects of these indirect changes will, in time, more than offset the cost to the government of financing part of the CSF expenditure. Depending on how these benefits to the balance of payments and the public sector balances are used, they may add to the growth rate in the medium term. For example, if these indirect benefits are used to repay foreign debts then future debt interest payments will be reduced.

The issue of the appropriate stance for domestic fiscal policy over the period to 1993 and beyond is discussed in Section 7. Clearly the government has a major role in enabling the CSF to have the maximum impact on the long-term growth potential of the economy, but without endangering the reduction of the huge public debt overhang.

From Section 2, we have seen how inappropriate fiscal policy in the late 1970s and early 1980s helped crowd out the private sector in a number of ways. By raising the demand for labour through unsustainable increases in public expenditure, wage costs were increased, thereby reducing the private sector demand for labour in the medium term. In addition, the borrowing requirement of the government and the related balance of payments deficit in the first half of the 1980s made the position of the IR£ in the EMS unsustainable, raising real domestic interest rates above the level they would otherwise have been. This in turn reduced the growth rate over a sustained period. For the future it is important that the lessons of the past for domestic fiscal and monetary policy are heeded, and the same mistakes not repeated.

6: *THE IMPACT OF THE CSF ON THE IRISH ECONOMY*

In this Section we analyse and quantify the effects of the CSF on the Irish economy. Initially we carry out the analysis in terms of the classification described in Section 4. We then put all the programmes together and assess the impact of the CSF when taken as a whole.

In the results which we present we initially use the set of assumptions, described in the last Section, concerning the rate of return on certain types of CSF funded investment. The quantification of the supply side effects of the CSF depends crucially on these assumptions. Because of the arbitrariness and uncertainty about the rate of return, we separate out the supply side effects of the CSF so that the sensitivity of our conclusions to alternative assumptions concerning the long-term response of the economy to the CSF can be examined.

We use a stylised projection for the Irish economy to the year 2000 as a basis, or benchmark, for our analysis. This benchmark projection was discussed in Section 2. We then carry out counter-factual experiments where we consider, in turn, the contribution to the growth of the economy from each of the component programmes of the CSF. The results are compared to the benchmark to determine the separate contribution of the CSF expenditure. For example, in the rest of this Section when we talk of the CSF, changing the rate of growth by 1 per cent what we mean is that the rate of growth will be 1 percentage point above the level it would otherwise have been without the CSF. In the graphs all the results are presented as changes compared to the benchmark.

Because we are particularly interested in the long-term impact on potential growth, we do not end our analysis in 1993 but continue it out to the year 2000. While the current programme for the CSF only runs until 1993, we have made the simplifying assumption that it remains unchanged in real terms in all its details after 1993. Since some of the CSF programmes are likely to have very long-tailed impacts, we consider it essential to look well beyond the terminal 1993 date in order to evaluate properly the full economic impacts.

Our study does not try to provide an analysis of all aspects of EC policy in so far as they affect Ireland but rather looks at the implications for the economy of the *changes* in policy which were crystalised in the Single European Act. The CSF proper starts in the year 1989, so the benchmark year used in this study is 1988. We consider the effects of the *increase* in expenditure under the CSF in the 1989-93 period as compared to the level in force in 1988. The albeit limited level of support from the existing structural funds in the years up to 1988 also had a significant effect on the

economy but this support is not at issue here. Thus when we say that the CSF will raise the level of GNP by nearly 3 per cent what we mean is that the increase in funding, pledged as part of the CSF, will have this effect. If all EC funding were to be stopped the negative effects would obviously be much greater than 3 per cent.

In our analysis we have assumed that the composition of the expenditure in 1988 was similar to that in 1989 under the CSF.[44]

Finally, the EC has insisted in the CSF on the principle of additionality: that funding from the EC should lead to an increase in investment, not merely serve as a replacement for national funding. However, this is extremely difficult, if not impossible, to guarantee. In some cases the EC funding has probably replaced domestic funding which would otherwise have taken place. In this study, for simplicity, we have assumed that full additionality has been observed and that all the increase in expenditure, provided for in the CSF, is genuinely additional to what would have taken place without the CSF.

6.1: *Human Resources*

We consider the full impact of the expenditure funded by the EC Social Fund under this heading. Information available from the Department of Labour allows us to break down the flow of expenditure into payments to employ trainers and teachers, and payments made to trainees.

We assume that trainers and teachers are paid at the average rate of pay of employees in the Public Authorities sector and derive an estimate of the number of additional people employed over the period 1989-93 to provide the training and education envisaged under the CSF (see Table 6.1). As outlined above, the numbers in this table do not include those already employed in 1988 but represent the increase funded by the reform of the EC Structural Funds, as outlined in the CSF.

Table 6.1: *Human Resources*

	Change in Numbers Compared to 1988, Thousands				
	1989	*1990*	*1991*	*1992*	*1993*
Trainers	4.8	3.7	3.4	3.1	3.5
Trainees	11.0	16.7	16.8	6.5	6.5

On the basis of information supplied by the Department of Labour we have estimated the average annual amount to be paid to the additional trainees or people in the education system. Given the total expenditure on

[44] The same level of detail is not available on the expenditure funded by the EC prior to 1989 as is available in the CSF and related documents.

payments to trainees, this permits us to derive a rough estimate of the number of full-time equivalents engaged under the wide variety of schemes under the broad heading of human resources (see Table 6.1).[45]

In the model the educational participation rate for the population is increased in order to reflect the increase in the number of trainees over the period 1989-93. However, it is assumed that only half of the trainees come from the active labour force. The rest come from either the long-term unemployed (e.g., into the SES scheme) or would not yet have entered the labour force. Thus the impact of the increase in the number of trainees and consequential reduction in numbers unemployed does not impact fully on either wage rates or migration in the model.

On the supply side we have assumed that there is a long-run rate of return of 7.5 per cent on the sums invested in human resources through the CSF.[46] As discussed in the last Section, there is no evidence for Ireland on what the likely rate of return will be. Very limited evidence for the US (Angrist and Krueger, 1990) suggests that such a rate may be an appropriate target. However, its use here is not intended to provide the basis for a precise forecast. Because of this uncertainty we also examine the implications of assuming a zero rate of return later in this Section.

The assumed rate of return is reflected in an increase in the productivity of the manufacturing and market services sector due to the increase in the skills and education of the labour force. The effects of this increase in productivity on the desired or long-run output occurs with a lag of a year, and builds up over time as the proportion of the labour force which has benefited from the schemes rises. In the manufacturing sector it takes a number of years for the full benefits of the increase in desired long-run output to translate into a rise in actual output or employment. Thus the effects of the increased expenditure under the CSF in the period 1989-93 are still not complete by 2000.

The increased flow of skilled labour and the assumed reduction in the proportion of the unemployed who are in the long-term category also has a small effect on wage rates. Together these two effects will slightly reduce the tension in the labour market reducing wage rates slightly below the

[45] It should be stressed that the numbers given here are necessarily crude as a study such as this cannot consider each of the many schemes separately but must consider them as a complete programme. As a result, because of shifts in emphasis over time between the Special Employment Scheme and other schemes the year by year pattern of expenditure appears rather uneven. However, as we are interested here in the medium- to long-term impact of the CSF this does not pose a problem.

[46] The choice of a 7.5 per cent rate of return was determined by the need to provide a reasonable margin for risk over and above the expected medium-term real rate of interest. The current real rate of interest for government borrowing is exceptionally high at 6 per cent to 7 per cent. At the end of this Section we consider the implications of a zero rate of return.

level they would otherwise have been.

Finally the flow of international transfers from the EC Social Fund and the flow of expenditure by the Government to finance the training and education are taken into account in the model and are shown in Table 6.2. As can be seen from the table, by 1993 the increased EC contribution to these programmes will be greater than the increase in total expenditure, implying an actual drop in national funding. This highlights the issue of just how *additional* the CSF actually proves to be.

Table 6.2: *Human Resources*

	Change in Total Expenditure Compared to 1988, £ Million, Current Prices				
	1989	*1990*	*1991*	*1992*	*1993*
EC	53.6	108.7	124.8	123.6	133.9
Government + EC	126.9	115.5	137.3	102.4	124.5

The effects of the training and education schemes are summarised in Figure 6.1. The effect on real GDP and GNP are shown in graph (a). The impact effect on GDP is around 0.6 per cent. However, from 1990 onwards, the assumed supply side effects begin to build up, so that GDP rises steadily to a level of 0.87 per cent above the benchmark by the year 2000. With the assumption that the CSF will continue unchanged after 1993, the supply side effects continue to cumulate.

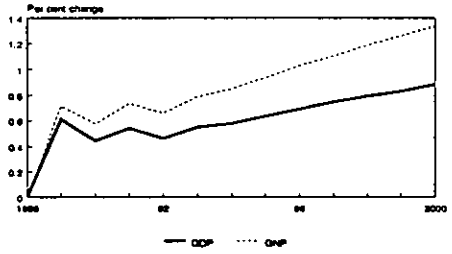
The fact that GNP is shown as rising by 1.3 per cent by the year 2000, almost 0.5 per cent above the GDP effect reflects the major improvement in the exchequer borrowing requirement and the balance of payments deficit as a result of the Social Fund expenditure (graph (c)). This improvement occurs in spite of the fact that the government has to contribute part of the cost of the schemes. National debt interest paid abroad is around £120 million below the benchmark projection by the year 2000 as a result of the training schemes and the debt/GNP ratio is reduced by over 5 percentage points (graph (g)).[47]

The short-term impact on the labour force is particularly large in 1990 and 1991 because of the concentration on the SES scheme in those years (graph (e)). In the longer term the effects are small and the corresponding effects on migration are quite small (graph (f)). The overall impact on the unemployment rate is shown in graph (d). By 2000 it

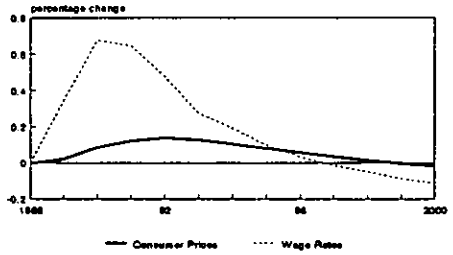
[47] If the improvement in the balance of payments and the exchequer borrowing required were used to promote further growth through cutting taxes, increasing investment, etc., the long-term effects of this aspect of the CSF expenditure would be larger.

Figure 6.1 : Macroeconomic Consequences for Ireland: Human Resources

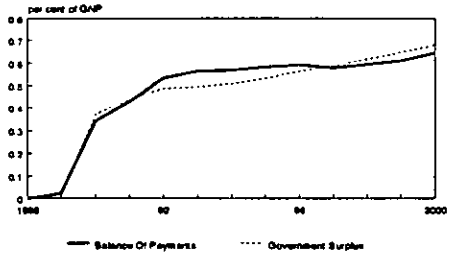
(a)
GDP and GNP



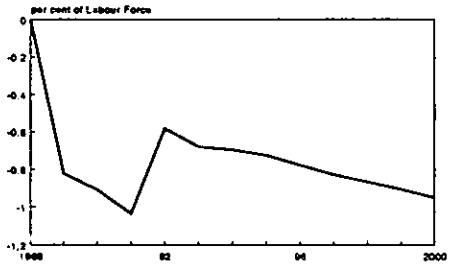
(b)
Prices & Wages



(c)
BOP & Government Surplus

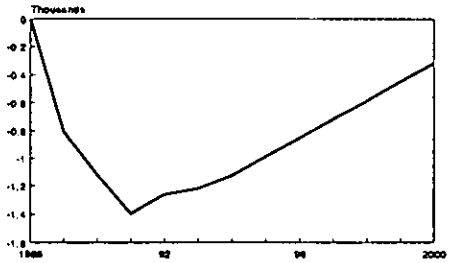


(d)
Unemployment Rate

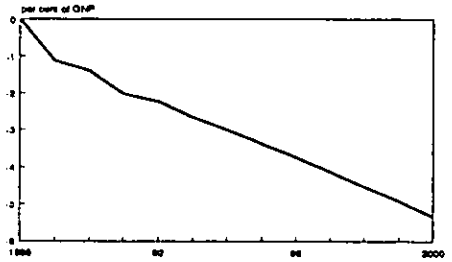


(e)
Labour Force and Employment

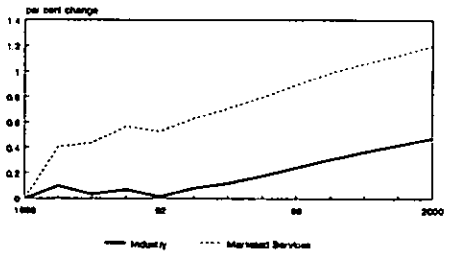
(f)
Net Migration Abroad



(g)
Debt/GNP Ratio



(h)
Output



has fallen by almost one percentage point, chiefly due to the increase in employment (graph (e)).

The supply-side impact in manufacturing takes some time to build up. In 1989 the output of the traditional manufacturing sector is 0.24 per cent above the benchmark. By the year 2000 it is over 0.75 per cent and the long-run impact of the expenditure up to that point would result in a further increase of 0.25 per cent in the following decade. For the high-technology manufacturing sector the effects are slower to materialise and smaller in the long-run, amounting to 0.58 per cent by the year 2000. The effects are even smaller in food-processing because it continues to be constrained by the volume of raw materials available from the agricultural sector.

The effects on the market services sector are somewhat larger (graph (h)). This arises from two sources. Firstly, there are the supply side effects coming from the increased human capital of the labour force. Secondly, there are the multiplier effects arising from the general increase in economic activity.

The effect of this increase in growth on total employment is shown in graph (e). By 2000 industrial employment is up by over 3000, market services by 6000 and public sector employment (trainers and teachers) by 3500. Because the traditional sector has still not fully adjusted output and the capital stock up to its optimal level by 2000, industrial employment could be expected to rise a little more in subsequent years.

Finally, the effects of the change on prices and wages are very small (graph (b)). This is because the increase in labour supply prevents the growth in the economy from tightening the labour market: there is no crowding-out of the stimulus due to higher wage rates.

Most of the growth occurring after 1993 arises from the supply side effects of the CSF expenditure. However, as was indicated at the beginning, the quantification of these effects is extremely uncertain. In this simulation we have posited a 7.5 per cent real rate of return. If the rate of return were zero, the long-term effect of the CSF would be cut by between 0.25 per cent and 0.5 per cent of GDP. Alternatively, if the rate of return from investment in human capital were even higher the long-term impact on GDP would be adjusted accordingly. This highlights the need, discussed in Section 7, for further microeconomic research into the effectiveness of the schemes funded under this heading of the CSF.

6.2: *Physical Infrastructure*

Under the heading physical infrastructure we consider a range of different measures, the bulk involving investment by the government or

government agencies. The demand effects of these investments are handled in a straightforward way in the model. The relevant public investment instruments are raised to reflect the higher investment expenditures. The only exception is the investment in advance factories which increases the industrial capital stock. Here the level of industrial investment must be raised to reflect this government and EC funded intervention. Table 6.3 shows the flow of payments from the EC and the total investment funded each year. The figures are shown as changes compared to the 1988 level of expenditure.

Table 6.3: *Physical Infrastructure*

	Change in Total Expenditure Compared to 1988, £ Million, Current Prices				
	1989	*1990*	*1991*	*1992*	*1993*
EC	21.5	60.5	93.9	120.4	132.4
Government + EC	56.0	84.2	140.1	196.8	231.6

The effects of the provision of advance factories on the supply side of the economy is handled by changing the cost of capital. The model then estimates the response of the industrial sector to its change in competitiveness.

In the case of the investment in tourism infrastructure we have little or no evidence of what will be its marginal effect on tourism expenditure in Ireland. The areas chosen for investment seem sensible. However, we are not in a position to judge its likely effectiveness. The approach we have adopted is to assume that there is a 7.5 per cent real rate of return, in terms of tourism revenue, on the sums invested. The return builds up over time as the capital stock increases. Later in this Section we examine the polar case where the rate of return is zero and the only benefit accrues from the demand effects of the investment.

As part of the micro-studies we have developed the model so that it can examine the effects of marginal changes in tourism revenue. Given the increase in tourism infrastructure and given a 7.5 per cent real rate of return, the volume of tourism receipts is increased progressively over the period so that by 2000 it is over 1.5 per cent above the benchmark level. The model calculates the multiplier effects of this change.

The Peripherality Programme is the single biggest component of the infrastructural investment. Once again we do not have evidence which would allow us to quantify the precise impact of this investment on transport costs. It is quite likely that the effects will be quite non-linear producing high rates of return when major blockages or constraints are

overcome. In other cases, where the investment is inadequate or where bottle-necks are not serious, the rate of return in terms of a reduction in transport costs to industry and services may be low.

In the absence of evidence on the magnitude of the effects from the peripherality programme we have examined the case where it produces a 5 per cent reduction in transport costs over the period 1989-93. The evidence from the micro-study on transport costs suggests that transport costs on sales account for something over 4 per cent of the value of the output of manufacturing industry. However, there is also a transport cost margin on the material inputs used in industry. Overall, we have assumed that transport costs account, directly or indirectly, for 6 per cent of the value of manufacturing industry output.

However, the benefits of a reduction in transport costs will not be confined to manufacturing industry. The distribution sector and consumers will also benefit from it. In the distribution sector transport costs accounted for approximately 8 per cent of gross output in 1975. Here we have reduced consumer prices to reflect the benefits of direct and indirect savings in transport costs. There could also be an increase in imports as transport costs fall.

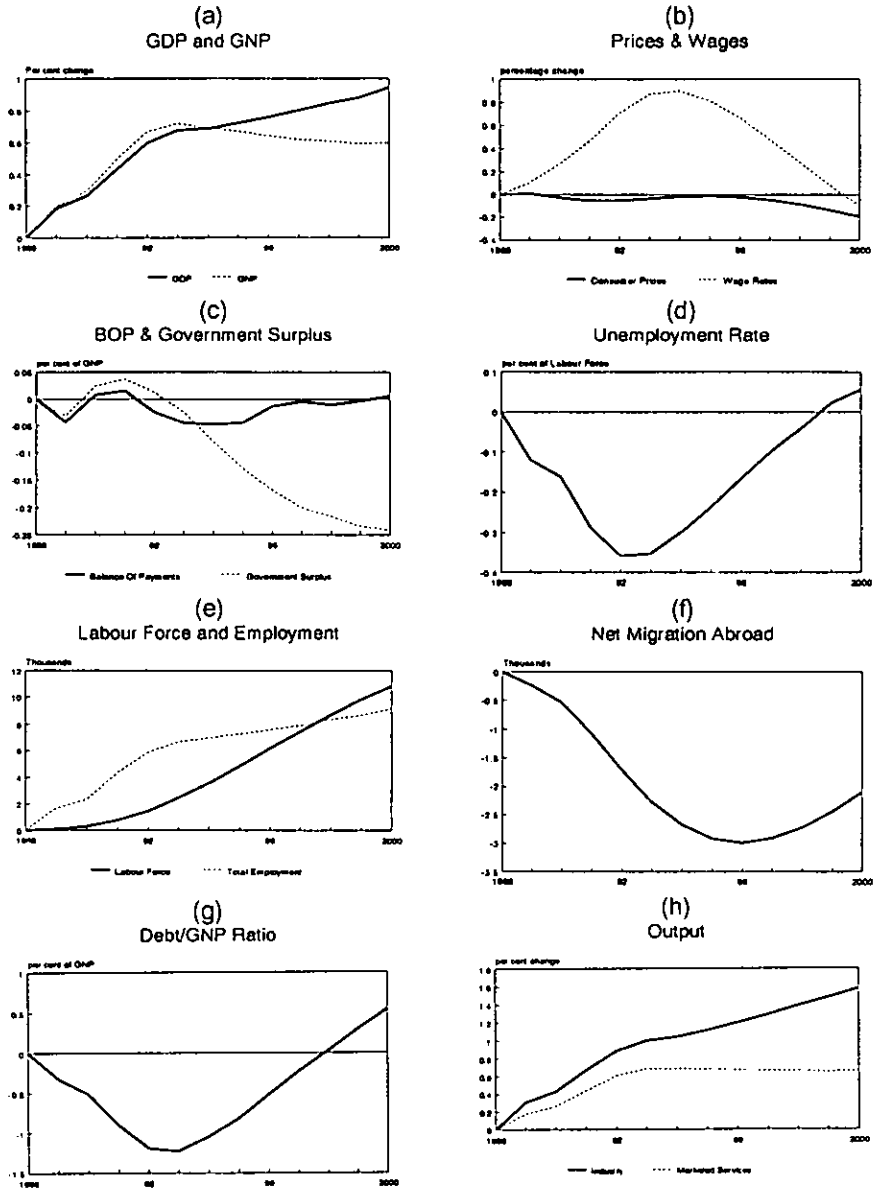
The unit cost of production in manufacturing industry is reduced in line with the assumed reduction in transport costs. This, in turn, improves Ireland's competitiveness and results in an increase in long-term capacity output and employment. The adjustment pattern is quite slow in manufacturing industry as the reduction in transport costs takes time to gain credibility.

As discussed in Section 5, we have assumed that, while achieving a significant improvement in the environment, the sanitary services investment does not increase the productive capacity of the economy.

The effects of the infrastructural investment are summarised in Figure 6.2. The impact on real GDP and GNP are shown in graph (a). The demand effects build up rapidly so that by 1993 GDP is 0.67 per cent above the benchmark. The supply side effects take longer to come through. However, their effects are apparent in the continued rise in GDP to a level 0.94 per cent above the benchmark in 2000. The long-run impact on GNP is somewhat lower at 0.61 per cent because a significant part of the growth comes from foreign-owned manufacturing industry, which repatriates its profits.

The balance of payments effect of this investment is initially very small (graph (c)). The EC transfers to the Irish government are offset by the big increase in investment, some of which has a significant import content. It is only towards the end of the period that the balance of payments begins to

Figure 6.2 : Macroeconomic Consequences for Ireland: Physical Infrastructure



move into surplus as the increase in productive potential in the economy begins to come on stream.

The effects on the borrowing requirement are initially quite small. However, the medium-term effects are less favourable as the supply side

impact is slow to come on stream and as a significant part of the benefits of the stimulus flow abroad through increased imports and profit repatriations. However, because the level of GNP shows a significant increase in the long term, the debt/GNP ratio effectively remains unchanged over the period.

The demand effects of this stimulus on the building industry are very substantial. The increase in the volume of building output peaks at around 9 per cent above the benchmark and is still over 6 per cent up on the benchmark in 2000. This substantial stimulus obviously could pose dangers for the economy. In the peak year of 1992 the price of building output will be almost 1.5 per cent above the level it would otherwise have been as a result of the stimulus. However, the CSF phasing of the infrastructural investment is much more satisfactory than in the *National Development Plan 1989-93* originally announced by the government in 1989. When this rephasing is combined with the temporary down-turn in the building industry this year, it seems likely that inflationary problems may be minimised.

The increase in building output gives rise to a growth in building sector employment above the level which would otherwise have occurred of over 5000. Even with the improvement in the cost competitiveness of the manufacturing sector, there is little change in employment in that sector in the period up to the year 2000. However, the long-run optimal level of output in both the traditional manufacturing and the food-processing sectors is still well above the actual level in the year 2000. This indicates that output and employment in those sectors would continue to rise well into the next decade.

Output in the market services sector is up by over 0.6 per cent (graph (h)) and employment is up by over 4000 by the end of the period. Overall there is a rise in employment of over 9000 (0.75 per cent) by the year 2000 (graph (e)). The improved labour market prospects arising from the infrastructural investment leads to a reduction in emigration of between 2000 and 3000 a year (graph (f)). The net effect is a substantial rise in the labour force (graph (e)) which offsets the increase in employment resulting in no change in unemployment by the year 2000 (graph (d)). However, the impact effect of the measures does result in a sizeable reduction in unemployment in the 1991-95 period. While the major effect of this measure appears to be a reduction in emigration rather than in unemployment, the benefits would probably be more equally shared if the model was used to analyse the early years of the next century. This highlights the uncertainty about the timing of the dynamic effects of this aspect of the CSF.

While, as mentioned earlier, there is a significant potential effect on building prices, the investment has little effect on consumer prices over the period (graph (b)). The tightening in the labour market in the years up to 1993 adds almost 1 per cent to wage rates, adversely affecting the competitiveness of the industrial sector. However, the change in migration reduces tensions in the labour market so that wage rates are back to benchmark levels by the year 2000.

6.3 : *Farm Income Support*

The expenditure under the farm income support heading is expected to have little or no impact on the long-term supply potential of the Irish economy. However, given the sums involved, it will have a significant demand side impact through raising farm incomes. The details of the expenditure are shown in Table 6.4. There is a fairly rapid increase compared to the 1988 benchmark level over the first three years. Thereafter expenditure remains unchanged in real terms.

Table 6.4: *Farm Income Support*

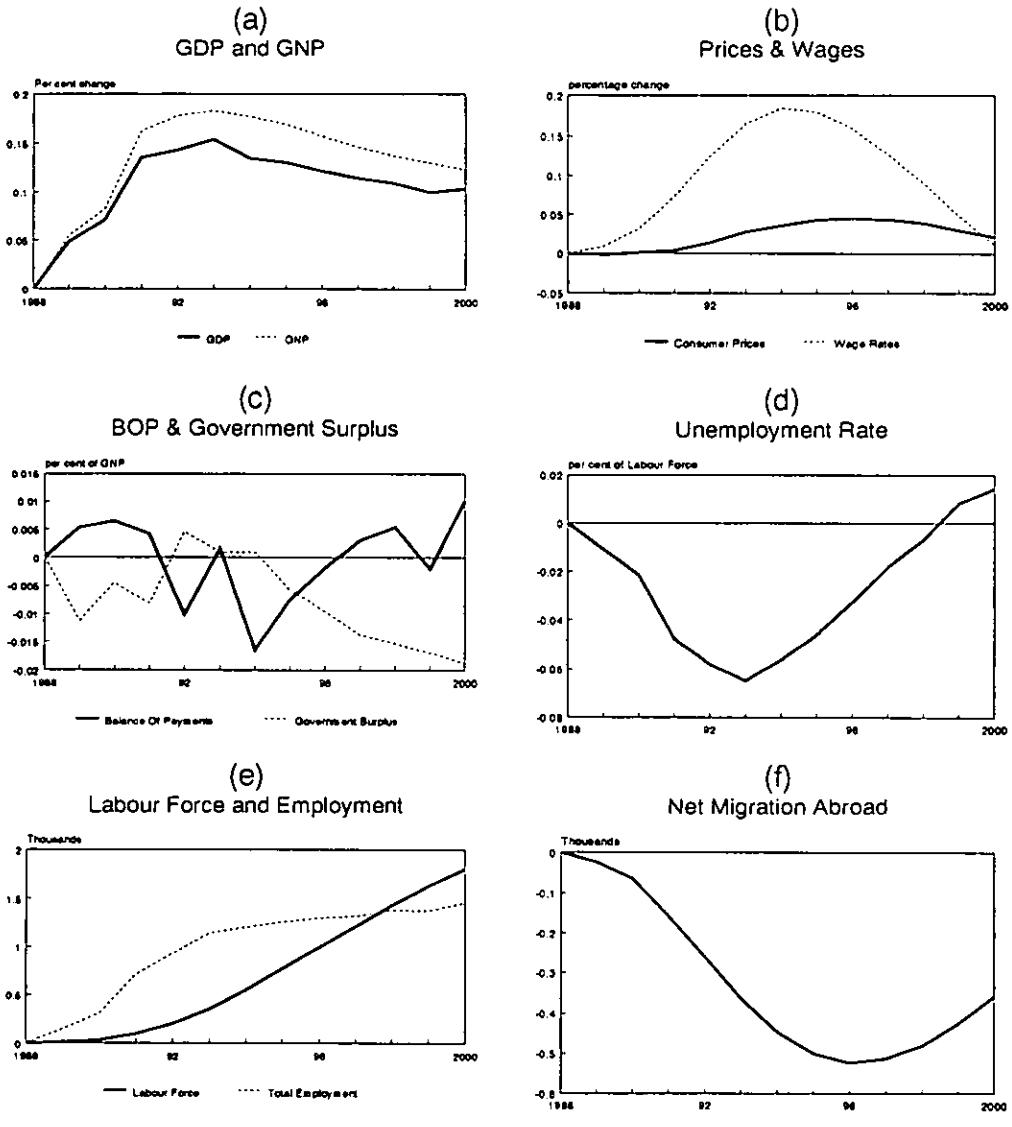
	Change in Total Expenditure Compared to 1988, £ Million, Current Prices				
	1989	*1990*	*1991*	*1992*	*1993*
EC	14.2	21.1	40.7	43.8	46.9
Government + EC	22.1	32.7	63.0	67.7	72.6

The effects of the Farm Income Support expenditures are summarised in Figure 6.3. In line with the increase in expenditure the effect on GDP builds up over the period 1989-91 to 0.14 per cent (graph (a)). It peaks in 1993 at 0.16 per cent and tends to fall off thereafter. The effects on GNP are slightly greater due to the small improvement in the balance of payments (graph (c)) brought about by the injection from the CSF.

The primary mechanism whereby this set of measures affects the wider economy is through the multiplier as farmers spend their increased incomes. This gives rise to an increase in the output of market services of nearly 0.25 per cent at its peak. However, the effects on the industrial sector are very small because output here is primarily supply determined.

The employment effects of the increase in farm income support are quite small reflecting the magnitude of the output changes. Employment in market services rises by about 1500 while the increase in industrial employment is under 500. As might be expected, the inflationary consequences of this stimulus are not significant (graph (b)).

Figure 6.3 : Macroeconomic Consequences for Ireland: Farm Income Support



6.4 : *Grants To Industry*

Grants to industry increase the incentive to invest. It is only when this investment actually takes place that the grants begin to affect the economy, the first impact being the demand effects of the increase in investment. It gives rise to an increase in demand for the output of the building industry. Because of the openness of the Irish economy the investment in machinery and equipment increases imports and has little impact on the demand for the output of domestic industry.

When the investment is in place and the productive potential of the industrial sector is increased, output rises and more people are employed. The results of the industrial micro-study indicate that in the high-technology sector the reduction in the cost of capital arising from increased grants will, for any given level of output, lead to a substitution of machines for labour. This is not true in the traditional manufacturing sector where the capital grants benefit employment, both through increasing output and through the substitution of domestic value added (including employment) for imported inputs.

The mechanisms for handling the increase in grants are in place in the HERMES-Ireland model. As a result, the simulations, described below, give some quantitative indications of the likely effects of the industrial grants on all areas of economic activity.

The details of the pattern of expenditure on industrial grants over the period of the CSF are shown in Table 6.5. The phasing of the expenditure over the period of the CSF is very uneven. Expenditure is highest in the first and last years with expenditure in the intervening years falling below the level assumed for 1988. After 1993 the level of grants is indexed to the 1993 level, giving a significantly higher level of grant in the 1994-2000 than in the benchmark projection.

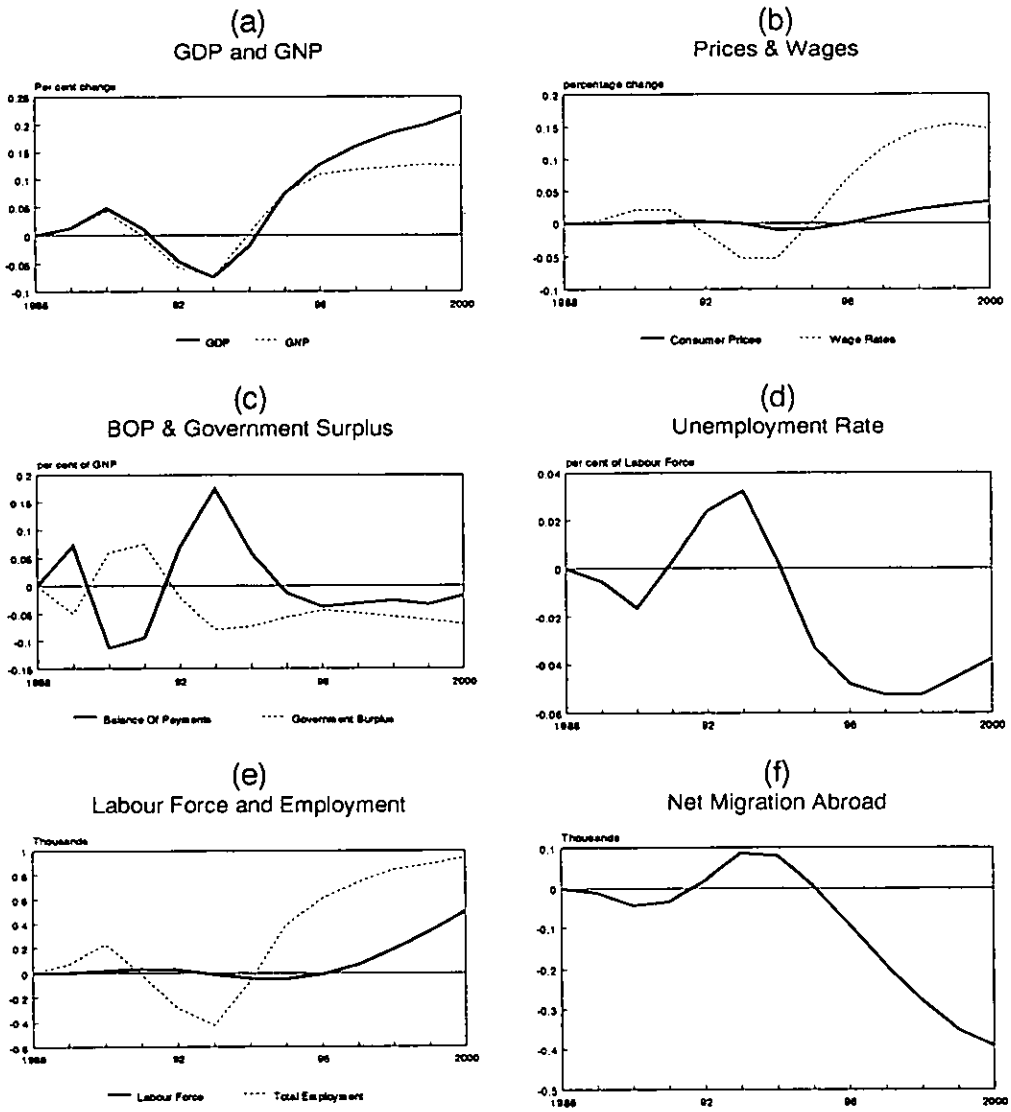
Table 6.5: *Grants To Industry*

	Change in Total Expenditure Compared to 1988, £ Million, Current Prices				
	1989	*1990*	*1991*	*1992*	*1993*
EC	16.8	-16.1	-22.4	3.9	21.2
Government + EC	27.9	-26.8	-37.3	6.5	34.8

The effects of the CSF expenditures on Grants to Industry are summarised in Figure 6.4. Because of the phasing of the expenditure over the 1989-93 period the industrial grants have no real effect on GDP over that period (graph (a)). It is not until 1995 that the initial effects of the 1993 increase in grants begins to appear in higher GDP growth. By the year

2000 GDP is 0.22 per cent above the benchmark level. The positive effects on GNP are much smaller than those on GDP because of the high level of profit repatriations by the manufacturing sector. Many of the firms which set up or expand as a result of the grants will be multinationals which tend to repatriate all their profits.

Figure 6.4 : Macroeconomic Consequences for Ireland: Grants To Industry



By 2000 the output of the traditional manufacturing sector is 0.35 per cent above its benchmark level. In the case of the high-technology sector the increase is almost 0.2 per cent. The effects on food-processing are negligible. However, the growth in the traditional sector output by the year 2000 represents less than half the long-term benefits of the increased grants. The model suggests that at 0.76 per cent the long-run increase in the output of that sector would be more than twice the level achieved by the year 2000.

These changes in output are reflected in the results shown in graph (e) for employment. The combination of the increase in output and the substitution of domestic value added for imports leads to a rise in employment in the traditional sector of over 800 by the year 2000. This employment would rise further in the first years of the next decade. For the high-technology sector employment could actually fall. The effects on food-processing employment are negligible.

Because this growth stems from an increase in the productive potential of the economy rather than from a demand stimulus the effects of these measures on prices are negligible (graph (b)). Even with the limited rise in employment there is a small increase in wage rates. However, this is not sufficient to offset the benefits to the industrial sector of the lower cost of capital due to the grants.

These results strongly suggest that capital grants to the food-processing and high-technology sectors are not very effective at promoting growth. In the case of the food-processing sector competitiveness, which could be improved by capital grants, has not proved the major hindrance to growth in the past. In the case of the high-technology sector it is the low corporate tax rate which is the attraction. Additional grants seem to be wasted on such firms. It is the traditional manufacturing sector which is most sensitive to competitiveness on world markets and which is likely to respond best to assistance. If grants are concentrated on firms with growth potential in that sector they are more likely to promote a lasting increase in employment. However, the benefits of such intervention are likely to take quite a long time to manifest themselves.

6.5 : *Agricultural Investment*

This heading includes a range of different measures affecting agriculture and forestry. Some of the measures, such as those for environmentally friendly farming, are aimed at improving the environment rather than increasing output. Others, such as the farm improvement scheme, could be expected to raise the output potential of the agricultural sector. Finally, the investment in forestry could not be expected to increase

the measured output of the economy before the year 2000. However, the growing value of the forests would be reflected in any national *balance sheet* and would begin to show some return in the following decade.

Thus the range of measures handled here is rather diverse. While the model can handle the demand impact of the incentives to agricultural investment directly, the mechanisms to deal with their supply side effects have not been incorporated into HERMES. However, the results of the micro-study of the agricultural sector allows a tentative quantification of the sensitivity of some agricultural investment to incentives and of the likely impact of changes in the capital stock in agriculture on agricultural output. These effects are introduced into the model by changing the levels of agricultural investment and of agricultural output.

The reform proposals for the CAP, presented by the EC Commission in June, call into question the possibility of increasing agricultural output. The widespread use of quotas, set-asides etc. may render investment, funded by the CSF, ineffective. While we have here assumed that this is not the case, the programme of investment in agriculture, funded by the CSF, needs serious re-examination in the light of the likely development of the CAP in the next five or ten years.

The investment under the programme for environmentally friendly agriculture is assumed not to increase the productive capital stock of the sector.[48] The forestry investment is assumed not to have an impact on the supply side within the time frame of this study. However, in assessing the benefits from the CSF this increase in output potential, suitably discounted, should be included.

The pattern of investment under this heading is shown in Table 6.6. The biggest growth in expenditure occurs in 1989-91. Thereafter, even allowing for inflation, it continues to grow, but at a slower pace.

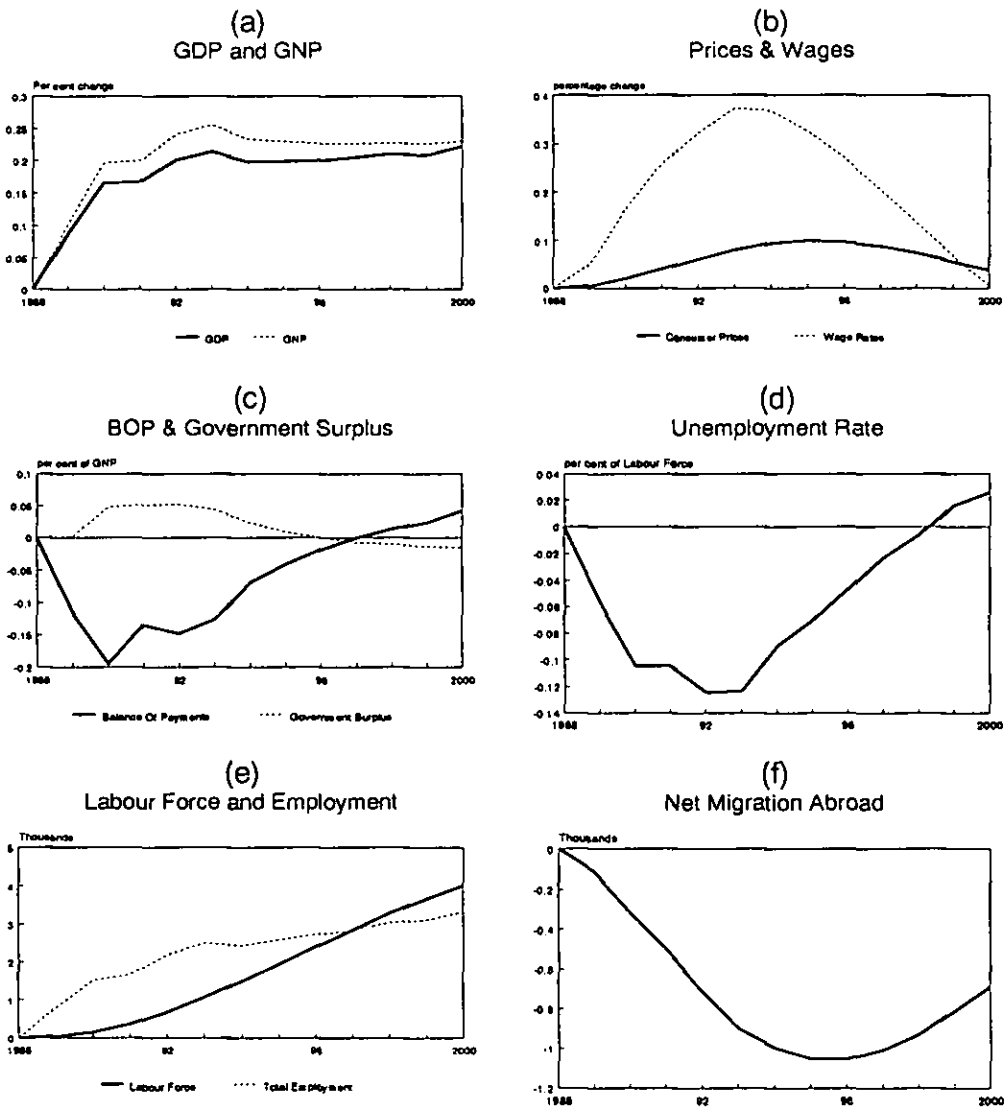
Table 6.6: *Agricultural Investment*

	Change in Total Expenditure Compared to 1988, £ Million, Current Prices				
	1989	*1990*	*1991*	*1992*	*1993*
EC	8.9	19.8	26.9	30.5	35.2
Government + EC	17.6	28.9	37.4	41.9	49.2

[48] If it were assumed that these investments were made mandatory on the agricultural sector in order to meet legally binding environmental standards, then one would have to adopt a different approach. In this case the grants would reduce the opportunity cost of the necessary environmental investment to individual farmers and it could have a supply effect.

The effects of the CSF expenditures on Agricultural Investment are summarised in Figure 6.5. The effect on GDP rises to 0.2 by 1992 and remains at around that level out to the end of the decade (graph (a)). The effect on GNP tends to be slightly larger because of the positive impact of these measures on the borrowing requirement and the balance of payments after 1995 (graph (c)). The initial effect of these measures is to disimprove the balance of payments as the increased investment sucks in

Figure 6.5 : Macroeconomic Consequences for Ireland: Agricultural Investment



more imports. However, when the increase in supply comes on stream this trend is reversed. The combination of a small improvement in the exchequer borrowing requirement and the growth in GNP leads to a very small fall in the debt/GNP ratio over the period.

The cumulative increase in output in the agricultural sector over the period is over 2 per cent. The increase in industry and market services is 0.19 per cent and 0.27 per cent respectively. The growth in agriculture is transmitted to the rest of the economy both through the increase in farmers' incomes, operating through the multiplier, and also through the increased supply of agricultural produce to be processed by the food-processing sector. The growth in the volume of output in food-processing is over 1.6 per cent by the year 2000.

The increase in investment gives a substantial stimulus to the building industry so that employment in that sector is up by between 1200 and 1600 for most of the 1990s. While there is a significant increase in the output of the food-processing sector, the increase in employment there is only around 300 by 2000. However, there will be some further increase in both the output and the employment of that sector in subsequent years as it adjusts to the increased supply of agricultural inputs.

The increase in employment in the services sector is even bigger than the increase in industry. It arises, among other things, from the higher expenditure due to the increase in farmers' incomes.

Finally, account must be taken of the fact that by the end of the 1990s there will be a major area under forest which represents an increase in the output potential of the economy in the next century. This highlights the importance of considering the CSF in a longer time frame than is normally the case with such macroeconomic studies.

6.6 : *Marketing and R & D*

This category of expenditure includes a range of measures proposed in the operational programme for industry and services. They cover aids and grants designed to develop the marketing skills of firms and to help them expand their markets in the context of a wider Europe. There are also a range of schemes aimed at encouraging investment in R & D and at helping industry to exploit the benefits of latest technical developments.

Table 6.7: *Marketing and R&D*

	Change in Total Expenditure Compared to 1988, £ Million, Current Prices				
	1989	*1990*	*1991*	*1992*	*1993*
EC	4.8	9.8	21.0	27.6	39.3
Government + EC	6.4	13.0	28.0	36.7	52.4

These measures will operate primarily on the supply side of the economy. While the increase in infrastructure in the educational field, provided for under this heading, will add a small amount directly to investment, the rest of the expenditure will go to pay for the purchase or expansion of inputs, in particular marketing personnel, employed in industry. The supply potential of the manufacturing sector will be increased through the reduction in the cost of marketing abroad and through the build up of experience and technical knowledge.

The benefits of this expenditure on the supply side of the economy are difficult to quantify. We have assumed that the CSF expenditure reduces the unit cost of production in the traditional manufacturing sector of the economy. This increases the long-run optimal level of output in the sector reflecting the growth in potential markets and the upgrading of product quality. The traditional manufacturing sector was found to be very sensitive to international competitiveness in the micro-study on industry so that this reduction in costs, financed by the CSF, has a significant effect on long-term output.

The effects of the CSF expenditures on Marketing and R&D are summarised in Figure 6.6. The impact on GDP and GNP is shown in graph (a). The rise in GDP builds up to a peak at the end of the period of 0.12 per cent. For GNP the effects are somewhat larger rising to 0.14 per cent by 1995 and 0.18 per cent by 2000. The substantial difference between the two measures reflects the fact that the proportion of the expenditure met by the EC is quite high and the concentration of the benefits in the traditional manufacturing sector, which has much higher Irish ownership, means that a higher proportion of the profits remain in Ireland. As a result, there is a small improvement in the balance of payments over the period to the year 2000 (graph (c)).

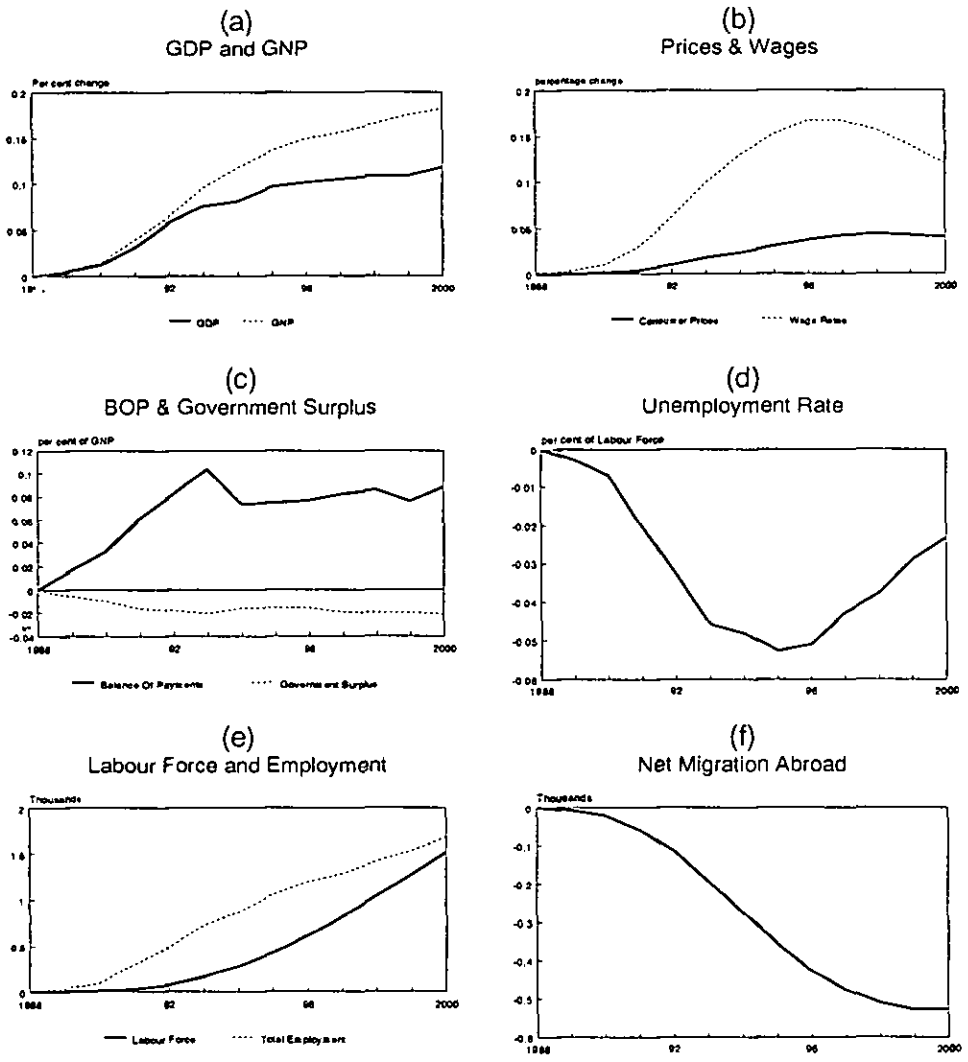
The output of the traditional sector rises as a result of the increased competitiveness of the sector on foreign markets. By 2000 the volume of output is up almost 0.5 per cent. The long-run effects would be even greater. This gives rise to a 0.6 per cent increase in employment in that sector. However, these effects are quite small when considered in the context of the economy as a whole where the rise in employment by the year 2000 will be around 0.14 per cent

6.7 : *The Supply-Side Effects*

The uncertainty concerning the quantification of many of the supply side effects of the CSF has frequently been adverted to above. In some cases we have arbitrarily assumed a 7.5 per cent rate of return on the CSF investment. In other cases, such as agriculture, we have had some empirical

evidence to support our initial quantification. However, the general uncertainty concerning these effects places wide margins of error round our quantification. The sensitivity of our results to these assumptions can be judged by comparing the results obtained omitting the supply side effects with the results obtained using the assumptions set out above. We do not suggest that the truth lies between these two extremes. It is quite

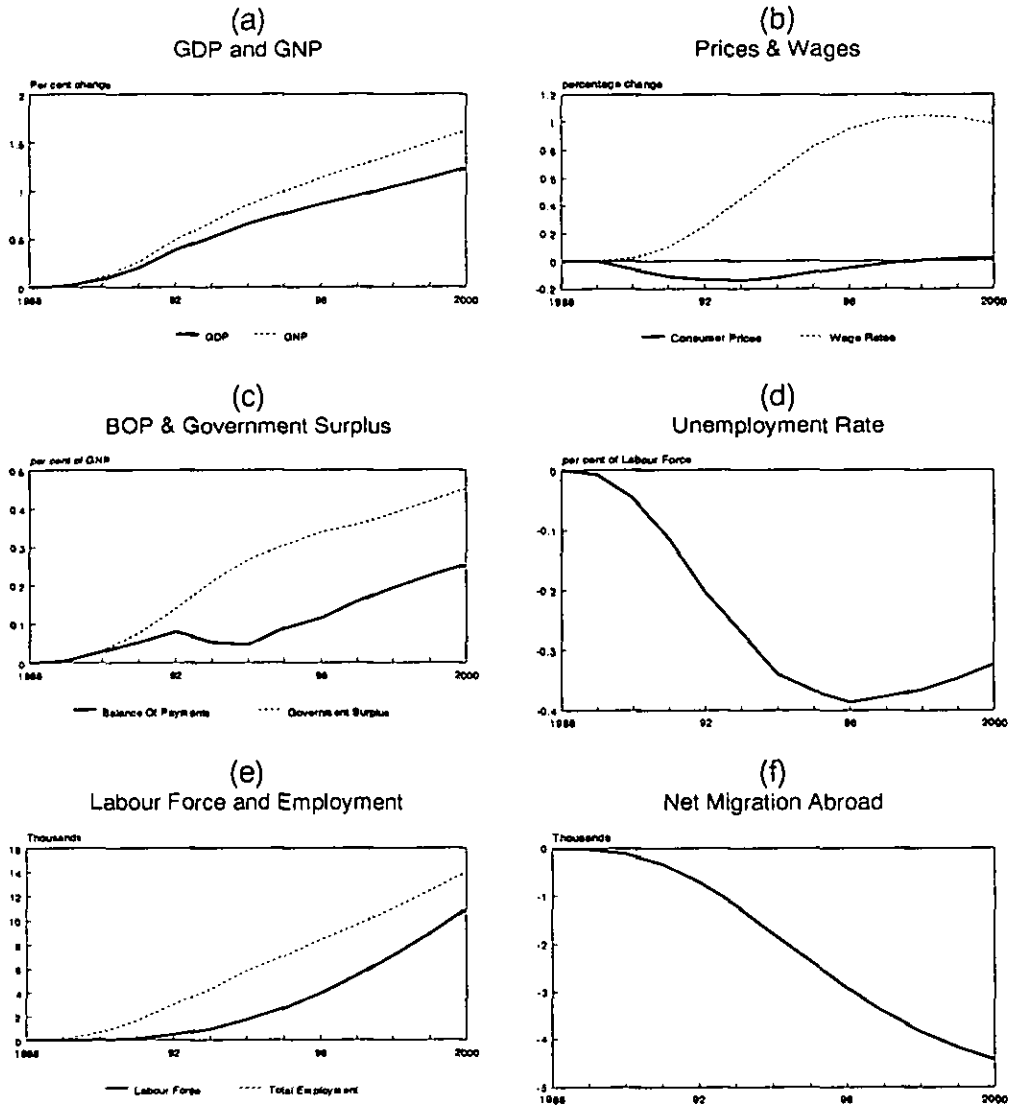
Figure 6.6: Macroeconomic Consequences for Ireland: Marketing And R & D



possible that the effects will be greater than we have assumed. As discussed in Section 7 the objective of any re-evaluation of the CSF should be to ensure that this rate of return is maximised.

The pure supply effects of the total CSF programmes are summarised in Figure 6.7. These supply effects grow steadily over time. On our assumptions, by the end of the current CSF plan in 1993, the supply effects

Figure 6.7 : Macroeconomic Consequences for Ireland: Supply Side Effects



will add 0.5 per cent to the volume of GDP and 0.7 per cent to the volume of GNP (graph (a)). However, by the year 2000 these effects have more than doubled. The level of GDP will be 1.2 per cent above the benchmark in 2000 while the level of GNP will be 1.7 per cent. In the case of GNP over half the benefits from the CSF will, on the maintained assumptions, arise from the supply side effects.

The reason for the big gap between the GNP and the GDP effects is that all the cost of the CSF is included in the demand effects. Thus all the increased growth attributed here to the supply effects results in increased revenue buoyancy without any offsetting cost. This is clearly not meant to imply that these supply side effects are costless but it is, rather, a result of the accounting convention we have adopted.

As discussed later, these supply effects account for the bulk of the rise in GNP by the year 2000. This highlights the importance of improving the quantification in this area. The fact that the actual effects may be substantially greater or less than shown gives considerable uncertainty to the quantification of the total effects of the CSF.

However, the potential importance of these supply side effects and the fact that they will not be complete even by the year 2000 reflects the importance of the strategy adopted. While transfers to Ireland from the EC may increase demand their effects will pass rapidly unless the transfers continue. If, instead, the funds are wisely invested, as assumed here, the potential return from the investment should dominate the initial demand effect and will continue long after the transfers are actually spent.

6.8 : *The Full Effects Of The CSF*

We have already examined the impact of the six major components of the CSF on the economy separately and the supply effects of them all treated as an aggregate. Here we put all the measures together and include certain minor items, not dealt with separately, to consider the total effects of the CSF over the rest of the decade.

The total CSF impacts are summarised in Figure 6.8. As discussed in Section 3, the objective of the CSF is to promote cohesion in the EC through adding to the growth rate in peripheral regions such as Ireland. The single most important measure of the achievement of the CSF must, therefore, be its effects on the level of GDP and GNP. As shown in graph (a), the cumulative effect of the CSF is to raise GDP by 2.6 per cent by the year 2000. The impact in 1989, primarily due to the demand effects, was an increment to the growth rate of almost 1 per cent. Thereafter there is a fairly steady increase in its impact up to and including 2000. The pattern and level of growth in GNP is very similar to that of GDP.

However, the impact on GNP per head is much lower than the impact on total GNP because of a major increase in the population of Ireland over the period to the year 2000. This increase occurs because the CSF reduces emigration or induces immigration because of the improvement in the domestic labour market (graph (f)). The net effect of all these factors is to leave GNP per head 0.8 per cent higher in the year 2000 than it was in the benchmark. This is a relatively small change but it reflects the problems in using any one measure of national welfare. It also leaves out of account the effect on other economies, primarily the UK, of reducing the flow of migration from Ireland.

The single biggest contribution to the growth in GNP comes from the expenditure on human resources. On the assumptions made concerning the rate of return, it accounts for almost 50 per cent of the growth by 2000 while the expenditure on this aspect of the CSF over the period 1989-93 accounted for 42 per cent of the total (Figure 6.9). The second biggest contribution comes from the investment in infrastructure which accounts for 22 per cent of the growth and 27 per cent of the cumulative expenditure up to 1993. The agricultural income support accounts for 4.5 per cent of the growth and 10 per cent of the expenditure while the agricultural investment accounts for 8.5 per cent of the growth and 8 per cent of the investment.

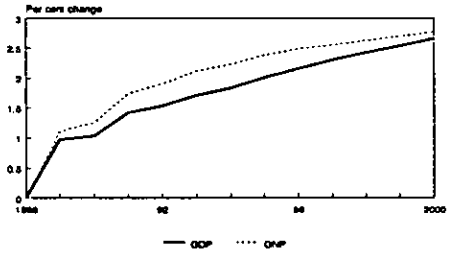
As discussed above when considering the components of the CSF, the demand side effects are felt immediately. The supply side effects take much longer to come through. Up to 1993 the bulk of the growth is due to the demand effects. Thereafter most of the growth must be attributed to the supply side effects as the CSF is assumed to remain unchanged in volume at the 1993 level in the period to 2000.

In the years 1989-91 the CSF has little effect on the balance of payments (graph (c)). The rapid growth in transfers from the EC is offset by the imports sucked in by the rapid increase in investment. However, from 1992 onwards the balance of payments moves into increasing surplus so that by the end of the decade it has achieved a surplus of 0.8 percentage points. The capital outflow balancing this surplus is building up foreign assets or running down foreign liabilities and this will, in the long term, make a further contribution to the growth of GNP.

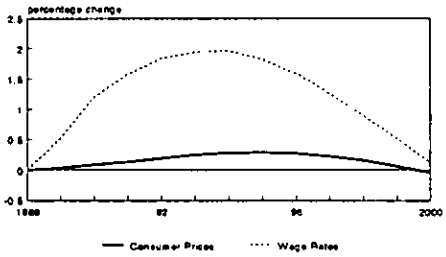
The CSF also adds about 0.4 percentage points to the exchequer surplus (off the deficit) from 1990 onwards. This occurs in spite of the increase in expenditure to match the EC contribution under the CSF. It results from the effects of the increased growth on revenue buoyancy and expenditure on unemployment transfers. The cumulative impact of the increased growth and lower government borrowing reduces the debt/GNP ratio by

Figure 6.8 : Macroeconomic Consequences for Ireland: Total Effects

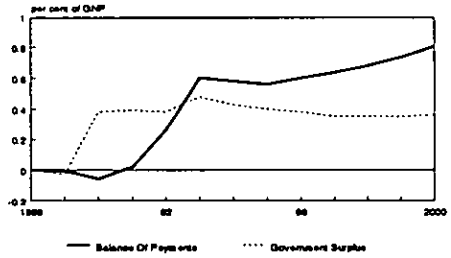
(a)
GDP and GNP



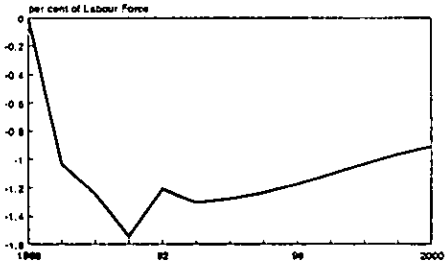
(b)
Prices & Wages



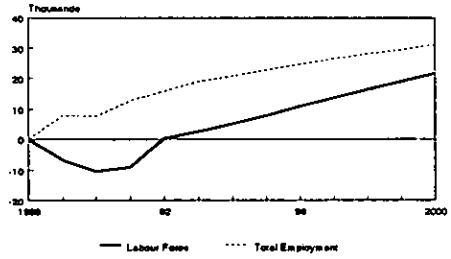
(c)
BOP & Government Surplus



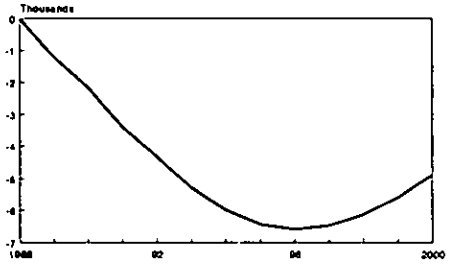
(d)
Unemployment Rate



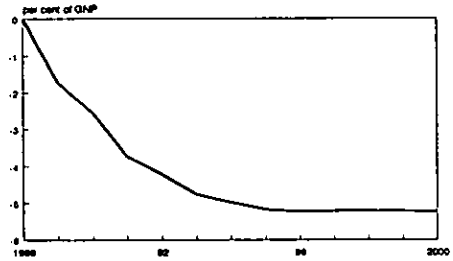
(e)
Labour Force and Employment



(f)
Net Migration Abroad



(g)
Debt/GNP Ratio



(h)
Output

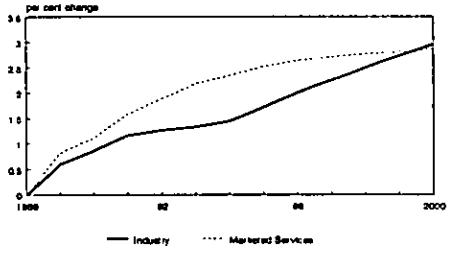
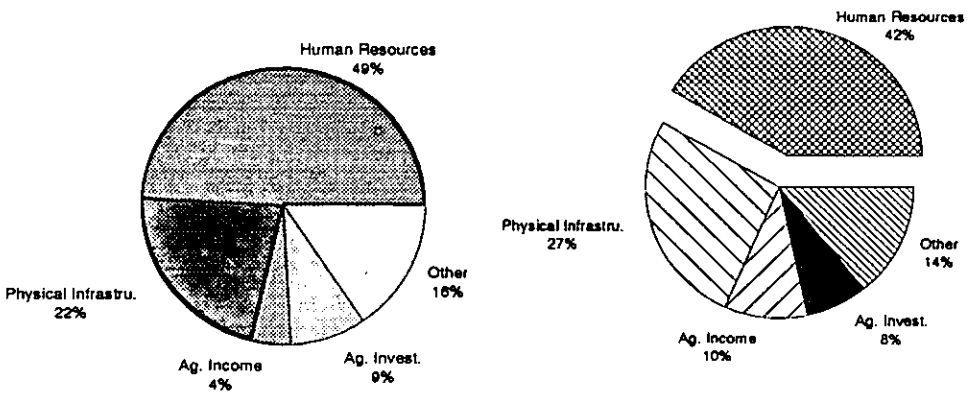


Figure 6.9 : Contribution To Growth And Expenditure Of CSF Components



over 5 percentage points by the end of the decade (graph (g)). This, in turn, reduces debt interest payments.

The employment effects of the CSF build up over time. Initially there is an increase in 1989 and 1990 of around 8000 (graph (e)). This rises to 19000 by the year 1993. The improvement in the productive potential of the economy after that date adds another 12000 by the year 2000 taking the gain in total employment to 31000, a rise of around 2.6 per cent compared to the benchmark.

The effects on unemployment are very different. Initially the effects are somewhat greater than the effects on employment as many potential labour force entrants or long-term unemployed are absorbed into the expanded training or educational systems. This results in a fall in the numbers unemployed by 1993 of 16600 or 1.3 per cent of the labour force (graph (d)). However, the reduction in numbers unemployed deteriorates after 1993, in spite of the continued growth in employment. By the year 2000 the reduction in unemployment is just under 1 per cent of the labour force. This pattern is due to the improved economic situation resulting in a substantial reduction in net emigration below the level it would otherwise have been. Migration tends to react with a lag to changes in economic circumstances in Ireland and elsewhere. The reduction in emigration averages 6000 a year from 1994 to 2000 (graph (f)) so that the

labour force in the year 2000 is 21000 above its benchmark level and the population is 1.9 per cent up.

Because of the nature of the CSF, the inflationary effects, with one exception, are really quite small. Much of its long-term impact occurs through increasing the output potential of the economy rather than by directly increasing demand. Thus the rise in consumer prices peaks at 0.3 per cent in 1995 and falls to zero by 2000 (graph (b)). It is only the price of building output which shows a significant increase above the benchmark level, due to the major demand stimulus applied to that sector. The absolute level of building prices peaks at 2.6 per cent above the benchmark in 1992. Thereafter it falls so that in 2000 prices in that sector are only 0.5 per cent above the benchmark level.

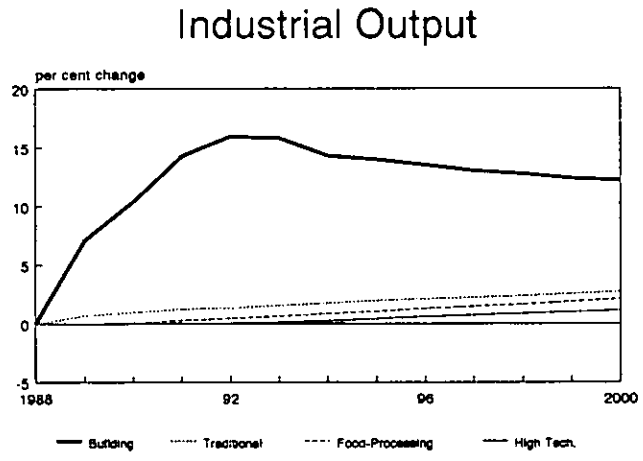
While consumer price inflation is quite low the big increase in employment, and consequential reduction in unemployment, significantly tightens the labour market. In spite of the increased supply of skilled labour there is a tendency for wage rates to rise. They peak at almost 2 per cent above the benchmark level in 1994. With the reduction in emigration there is a fall off in labour market tension after that date so that wage rates in 2000 are little different from their benchmark level.

The increase in wage rates results in some reduction in the competitiveness of the exposed manufacturing sector. However, because of the major increase in the potential output of that sector arising from the CSF, not least through reducing other costs to industry, industrial output is almost 3 per cent above its benchmark level at the end of the period.

The rise in the output of the market services sector is also almost 3 per cent above the benchmark level (graph (h)). In this case, while the CSF will have some direct effect on the sector's productive potential, the bulk of the growth has its origins in the multiplier effects of the other stimuli. The supply response in agriculture results in a volume increase in its output of just over 2 per cent and the non-market services sector also shows substantial increases due to the expansion of training and education activity. Thus the increase in output is spread widely across the economy.

Within the industrial sector the volume increase in building output peaks at almost 14 per cent in 1992 and remains over 10 per cent out to the year 2000 (Figure 6.10). The volume increase in the traditional manufacturing sector is 2.6 per cent by 2000. However, because of the slow adjustment in the capital stock in that sector there is a pent up increase of almost the same magnitude which would occur in the following decade. In the case of the food-processing sector output is also up by just over 2 per cent in 2000 and will rise by a further 1 per cent in the following decade. The smallest increase as a result of the CSF is experienced by the high-

Figure 6.10 : Macroeconomic Consequences for Ireland: Total Effects



technology sector with a growth of 1.1 per cent by the year 2000. The model suggests that, unlike the other two manufacturing sectors, little further growth over and above the benchmark could be expected here after 2000.

With the exception of the high-technology sector the pattern of growth in employment in the industrial sector mirrors that of output. In the high-technology sector employment actually falls. This is due to the substitution of capital for labour due to the industrial grants and also to the crowding out effect of the rise in wage costs, consequent on the tightening in the labour market.

7. *SUMMARY, EVALUATION AND CONCLUSIONS*

In this concluding section we first summarise the results concerning the likely impact of EC policy on the Irish economy and we then consider the implications of this analysis for ways of improving EC or domestic policy.

7.1: *Summary*

The Irish economy faces four major shocks emanating directly from EC policy changes:

(i) the completion of the internal EC market (or *1992*);
(ii) Economic and Monetary Union (EMU);
(iii) reform of the Common Agricultural Policy;
(iv) the impact of the expanded Community Support Framework (CSF).

In this paper we describe a methodology developed to analyse the macroeconomic impact of these different shocks on the Irish economy, centred round the HERMES model. A number of micro-studies were undertaken to deepen our understanding of key sectors of the economy, and the results of these studies were integrated into the model to provide a coherent framework for macro-economic analysis. The micro-studies covered a range of different issues and problems: the functioning of the labour market; the structure of the industrial sector; specific sectoral issues such as the agricultural, the industrial and the marketed services sectors. The detailed analysis contained in these papers played a major role in the quantification of the supply-side effects of the different aspects of EC policy. Four of these micro-studies are published as part of this paper (Boyle (1992); Breen and Shorthall (1992); Durkan and Reynolds-Feighan (1992); and O'Malley (1992).

Using the HERMES-Ireland macro-model, we have been able to carry out analysis and a degree of quantification of the likely macro-economic impact on the Irish economy of the four policy changes. As with all such exercises, the results must be considered very tentative. In particular, some of the assumptions necessary to allow quantification of the supply side effects have limited basis in empirical work. Without extensive further research it is impossible to provide any more precise or certain quantification.

1992

Our analysis of the impact of *1992* uses a methodology similar to that applied by the Cecchini team, and interprets the results of the Cecchini analysis as a given "exogenous" shock to Ireland's external trading and price environments. Hence, Ireland's markets in the EC are likely to grow by between 3.2 and 5.7 percent over a six year period as a direct result of the policy changes associated with the *1992* programme. The external price environment for Ireland is likely to be less inflationary (to the extent of -4.5 to -7.7 percent) over the same period, relative to a situation where the *1992* policies are not implemented.

In addition to changing the external environment, *1992* will bring about some specific intra-economy consequences, such as rationalisation of the Irish distribution network and financial services (with *ex ante* job losses), greater opportunity for Irish firms to benefit from liberalisation of EC public procurement practices, and *ex ante* productivity gains in some sectors of manufacturing industry.

Putting all these effects together, and analysing the impacts with the HERMES-Ireland model, we found that the *ex post* gain from *1992* in terms

of aggregate growth was very similar to the Cecchini results obtained for the six "central" member states analysed in detail (Germany, France, Benelux, Italy and the UK). For Ireland, GNP in 2000 should be just over 5 per cent higher than it would have been without *1992*. However, because of the effects on migration and the population the increase in GNP per head is only 3 per cent by that date.

For Ireland the sources of growth were somewhat different from the Cecchini analysis, with public procurement producing more for Ireland, customs barriers and financial services producing less, and supply-side effects about the same.

The analysis of price transmission produced systematically different results. We found that the positive growth stimulus worked towards a partial negation of the deflationary impact of *1992*. The chain of causation is fairly straightforward: the *1992* growth stimulus induces greater employment growth in Ireland, which in turn induces a fall in the rate of unemployment. This fall in unemployment works through the Phillips curve mechanism. Wage rates are bid up, with knock-on effects on output prices in the sheltered sectors and on consumer prices. The result is a gradual loss in competitiveness, which works towards choking off the original growth stimulus. Given the extreme openness of the Irish labour market, net inward migration tends to remove some of the labour market tightness, and competitiveness is eventually restored.

EMU

Our analysis and quantification of the likely effects of EMU was more speculative. The time-scale for achievement of full union has been extended and the speed of future progress remains very uncertain. The main benefit to the Irish economy will stem from the faster convergence of domestic interest rates to DM rates, with the eventual abolition of the present "risk" differential. Given the high national debt, a considerable portion of which arose from foreign borrowing, any fall in foreign and domestic interest rates would have a considerable effect through reducing public sector debt interest payments. A fall in interest rates would also stimulate private sector investment, through lowering of the cost of capital. Finally EMU would improve the competitiveness of the private sector through reducing the transactions costs inherent in international trade.

The importance of a potential EMU interest rate fall in stimulating the economy and improving the public finances contrasts with the effects of the opposite shock, experienced in the early to mid-1980s and, more recently, as result of the problems posed for Germany by unification.

If domestic real interest rates were to fall by between 1 and 2 percentage points due to EMU, it could add up to 3 percentage points to the level of GNP in the medium term. Its biggest immediate impact would be on the public finances. The reduction in borrowing and debt would allow a substantial reduction in taxation in the medium term (or an increase in expenditure). In this way, by sharing the benefits of the reduction in the public finance constraint with the private sector, it would result in a major increase in industrial output in the long run of 10 per cent to 15 per cent.

CAP

The analysis of the economy wide effects of a reform of the CAP (Fitz Gerald and O'Connor, 1991) showed that, while the losses would be most serious for the farm community, there would be a cost to other sectors as well. The reform package would adversely affect the public finances and, if the debt/GNP ratio were not to deteriorate, the necessary increase in taxes would aggravate the effects of the initial changes in the CAP. The final long-term effect on the economy could be a reduction of over 1 per cent in GNP.

CSF

To allow quantification of the supply side effects of the CSF it was necessary to make strong assumptions about the potential rate of return on different aspects of the investments undertaken. As a result, the quantification of the effects of the CSF must be seen as being particularly tentative. On the basis of these assumptions we found that the medium-term contribution to growth from the CSF would be about 2.7 per cent of GNP, i.e., just over half the estimated effect of the *1992* policy changes. The effects on GNP per head would be somewhat smaller. The creation of around 30,000 additional jobs by the year 2000 would substantially reduce net emigration and increase the population. As a result, by the year 2000 GNP per head would be only 0.8 per cent above the benchmark (*no CSF*) scenario.

Unlike the *1992* shocks, the CSF policies are very "supply-side friendly", in that the international and public finance balances improve unambiguously, wage rates eventually return to their "net of CSF" levels (after a period of demand-led inflation during the implementation phases), unemployment is down (in particular the long-term component), emigration is reduced, and the debt/GNP ratio is improved by about 6 percentage points.

The single most important area of expenditure under the CSF is the range of programmes under the broad human resources heading. These

programmes are designed to improve the human capital of the Irish labour force and to increase labour market participation by marginal groups. Our study shows that, if successful, these policies could raise GNP significantly in the short to medium term. The long-term effects could be even greater. However considerable uncertainty remains about the precise quantification of the supply-side effects of these measures.

A particularly important aspect of the CSF programme is the extent to which it induces a long-run positive supply-side stimulus to the economy, since these effects represent the permanent value of the CSF as distinct from the transitory demand shock which accompanies implementation.

As in the Cecchini report, the exploration of these effects can, at best, be tentative since the techniques involved are at the frontier of economic research. We posited long-run supply effects under all the headings with the exception of the agricultural income transfers. We found that they could be particularly important under two headings: human resources and infrastructure. The supply effects grow steadily over time. On our assumptions, by the end of the current CSF plan in 1993, they would add 0.75 per cent to the volume of GNP. However, by the end of the decade the supply side stimulus would have more than doubled and the level of GNP would be increased by almost 2 per cent.

7.2: *Evaluating the Impact of EC Policies*

7.2.1: Growth and Convergence

Taken together, *1992* and the CSF could raise the level of GNP by between 7 and 8 percentage points above the level it would otherwise be by the year 2000. In other words, the growth rate in the 1990s will be around 0.75 per cent higher than under the unchanged EC policy benchmark. However, if allowance is made for the effects of a possible reform of the CAP the increase in the level of GNP might be between 6 per cent and 6.5 per cent.[49] Thus while *1992* and the CSF must be seen as beneficial to the Irish economy some of the beneficial effects of the CSF could be offset by the effects of reform of the CAP, leaving the net change in the level of GNP from these aspects of EC policy close to the change expected for the EC as whole (from *1992*).

However, when considering the contribution of both *1992* and the CSF to the treaty objective of economic cohesion, the normal measure of progress used is the growth of GNP per head in the peripheral regions compared to that in the core of the Community. As outlined above, the

[49] We have not taken into account here the possible effects of EMU because of uncertainty about its magnitude and timing.

combined effect of *1992*, the CSF and the CAP reform may be to increase GNP per head by only 4 per cent by the year 2000. On this criterion the progress on cohesion over the 1990s is likely to be small. While the effects of *1992* on the growth in total GNP are likely to be similar in Ireland to those in the EC generally, the effects on population in Ireland, through reducing migration, will probably result in GNP per head rising more slowly than in the EC as a whole, although still more rapidly than if *1992* had not occurred.

These results raise the issue as to whether the only measure of welfare should be GNP per head. If this is the case then the CSF and *1992* are unlikely to make a major change in Ireland's relative income position within the EC, while improving it in absolute terms. However, this approach leaves out of account any increase in welfare arising from the fact that more young Irish labour market entrants will be able to find employment in Ireland, rather than elsewhere in the EC, as a result of the CSF and *1992*.

The significance of the migration mechanism in Ireland is probably much greater than for other peripheral regions of the EC and it raises issues concerning externalities arising from the CSF. While the effects are likely to be too small to measure in the context of the EC as a whole, they are likely to be significant when measured against the benefits to Ireland from the CSF. For example, the skill and educational level of those who will continue to emigrate in the 1990s will be increased through the CSF investment. This will obviously prove beneficial in the future, as it has in the past, for the economies where the emigrants finally find employment.

7.2.2: *Sectoral Effects*

Between the CSF, *1992* and CAP reform there should be a major increase in employment in the economy over the 1990s. Taking the three policy changes together they will raise employment in Ireland in the year 2000 by around 55,000 compared to the *non-Europe* benchmark. However, the reduction in unemployment will only be 25,000 or 2.2 per cent of the labour force because of the major reduction in net emigration. The CSF, in particular, plays an important role in this growth through increasing the supply of skilled labour. This provides growth while reducing the pressure on the labour market which would otherwise accrue from the increase in the demand for labour.

The rise in employment will make Ireland a more attractive location for young labour force entrants to live in. The resulting rise in the labour force will go a long way to offsetting the effects of the increased employment on the numbers unemployed. Thus, without special

programmes to deal with the long-term unemployed, their numbers could remain relatively unchanged over the decade.

The industrial sector will do well under the changes in EC policy. The building industry will benefit greatly in the early 1990s from the demand stimulus arising from the CSF infrastructural investment (compared to the situation if there were no CSF). The traditional manufacturing sector, which went through a fairly disastrous period in the 1980s, should fare much better in the 1990s. If it develops its marketing and other management skills, its competitive position should give scope for expansion in both employment and output. The benefits of lower interest rates under EMU could be particularly important in improving the competitiveness of this sector. The growth of the high-technology sector will also benefit, in particular from the *1992* process. The food-processing sector will show the smallest gains in the 1990s from current EC policy. This is due to the fact that its output is heavily constrained by the availability of agricultural output for processing.

The fate of agriculture depends very much on the future of the CAP. The present plans for reform would see a substantial reduction in both the volume and value of agricultural output over the decade.

The market services sector will generally benefit from the developments under the CSF. These benefits, together with the general growth arising from *1992*, should more than offset the adverse sectoral impact of *1992* on the distribution sector. The additional effects of EMU on the financial sector have not yet been quantified. It must be anticipated that, when combined with *1992*, it will bring some rationalisation of that sector.

The CSF and *1992* should effect a significant improvement in the public finances over the 1990s. By the year 2000 the exchequer borrowing requirement, on unchanged domestic policies, should be 1.5 per cent lower than in the benchmark and the debt/GNP ratio should be reduced by over 10 percentage points. These changes are also likely to be reflected in a significant increase in the balance of payments surplus. These effects represent an opportunity for the domestic government. The improvement in the domestic finances could be used to repay debt, increase investment or other expenditure, or reduce tax rates. In the long term the improvement in the public finances will turn into a further increase in GNP.

7.3: *Evaluating the Effectiveness of CSF Programmes*

While the revised treaty objective of cohesion has resulted in a significant increase in the size of the structural funds, they still remain small in terms of the EC economy. The National Economic and Social Council (1989), argued strongly for a very much larger EC budget to adequately fund

measures to achieve this treaty objective. While there are cogent arguments that the achievement of increased cohesion will require such an increase in the EC budget, there are important issues as to how such a budget could be used to further that objective.

Experience in some European countries with national regional policy, designed to reduce internal disparities, has not been very successful. Substantial transfers have been paid by the central administration in the UK to Northern Ireland and in Italy to the mezzogiorno as part of an explicit or implicit regional policy. While these transfers have substantially reduced disparities in living standards, the regional economies remain permanently dependent on such transfers. The transfers have not succeeded in producing a noticeable narrowing in levels of output per head which would free the regions from dependence on transfers.

Thus there is the danger that, if inappropriately applied, the increase in EC funds might fail to produce a lasting improvement in the position of the peripheral economies. As a result, in drawing up the revised Community Support Framework the EC and the member governments have targeted the new expenditure at projects which could increase the productive potential of the regional economies in a permanent way.

Looking at the CSF as a complete programme, the results of this study suggest that its emphasis on financing investment in the Irish economy is likely to pay dividends in the medium to long term. Straight income transfers, while they could temporarily narrow the gap in living standards between Ireland and the average level for the EC, would not make a lasting contribution to the objective of cohesion. It is only through increasing the supply potential of the Irish economy that a permanent change can be effected.

The CSF was developed over a period of two years and represents the fruits of much work in the Commission and in the Irish public administration. In the analysis of its effects on the economy we have so far concentrated on the quantification of the effects of the CSF and have not considered how the allocation of funds could be changed to increase its effectiveness. While in a macro-economic study such as this it is not possible to give precise answers either on the effectiveness of particular programmes or of how the details of programmes could be changed, nevertheless, the results discussed so far do suggest some areas where a change of emphasis might be likely to increase the effectiveness of expenditure.

7.3.1: Human Resources

We have already commented upon the duality of the Irish labour market. A high proportion of those unemployed have been unemployed

for long periods. Simultaneously there is great mobility for young labour market entrants between Ireland and the UK labour market. If they have any skills or qualifications many young labour market entrants have preferred to emigrate than to be unemployed in Ireland, or to accept low paid jobs.

This mobility is not an answer to the problems of the long-term unemployed. Sexton, Walsh, Hannan, McMahon (1991), show that labour market prospects in the UK are no better for those without skills than at home. As indicated by Breen and Shorthall (1992), the long-term unemployed have lower than average skills and education. The bulk of their number are not young labour market entrants. Many of them probably lost jobs in the deep recession of the 1980s and have not been able to find work since. However, their number is being added to each year by the early school leavers with no qualifications and very poor labour market prospects. This problem of long-term unemployment is one of the priority areas for attention under the CSF.

The second aspect of the CSF priority on human resources is the improvement of the human capital of the Irish labour force. The potential returns from successful investment in human capital have been discussed in Section 6. The major question is how best to achieve this objective.

The European Social Fund has been assisting training schemes in Ireland for some fifteen years. While the emphasis of these labour market programmes has changed over time, a considerable body of experience has been built up in this area. This experience has been analysed in a series of different papers by Breen and others (Breen, 1988; Breen with Halpin, 1988; Breen with Halpin, 1989; Breen, 1990; Breen, 1991). In addition, the micro-study by Breen and Shorthall, described above, examines the situation of those who have left school with no qualifications.

This research suggests that many of the labour market interventions in the past have not been very effective in meeting their objectives. For example, the employment incentive scheme had a large element of dead-weight, paying a subsidy for those who would have been employed anyway. In Breen (1991) the effectiveness of training in the mid-1980s is examined for a particular cohort and found not to be very successful at improving the employment prospects of the trainees.

For the long-term unemployed the micro-study by Breen and Shorthall, published later in this paper, indicates that, apart from the social costs, the economic costs to the state of early school leavers are likely to be high. Any effective intervention which increased their skills and education would be likely to significantly improve the position of the individual, reduce the proportion of those who are unemployed for long periods, and save the

exchequer significant sums in unemployment transfers. It would also have obvious social benefits.

It goes beyond our brief to attempt to identify how these specific objectives can best be met. However, what we have identified is that there is a significant return to be obtained from effective intervention. The experience to date also suggests, though does not prove, that while EC policy has emphasised training, more emphasis should in future be given to education in building up the long-term human capital of the work-force. Breen (1991) suggests that "interventions to assist unqualified school leavers once they have entered the labour market, while necessary, are probably insufficient to tackle the problem." This need to concentrate on the broader issue of education, rather than merely on training, suggests the need for a review of the current CSF programmes.

7.3.2: Physical Infrastructure

The assessment in Section 6 of the physical infrastructure expenditure indicates that, if it can reduce transport costs, it could increase economic growth. However, the analysis was not able to identify whether and by how much the proposed investment would reduce transport costs. The whole area of access transport (i.e., ships and aircraft) is left to the market and is not an objective of the CSF investment. This may pose problems in the future and should be considered in any review of the CSF. While investment in the road network is a necessary condition for an efficient transport system for exports, it is not a sufficient condition. In addition to the question of access transport, transit costs and times, especially through the UK, pose problems for Irish firms. The advent of the Channel Tunnel will have important implications for accessibility to continental markets.

However, as shown in the micro-study on transport costs, transport costs account for quite a small part of total costs for Irish firms. However, as another study of the UK market has suggested, the problems of peripherality do not end with transport costs (PEIDA, 1984). For many firms in the UK regions there was evidence that other factors posed similar problems to the cost of transport. This issue merits further examination.

7.3.3: Industrial Grants

The research in the micro-study on industry suggested that the payment of grants to firms in the high-technology and food-processing sectors was not likely, on its own, to produce rapid growth. The position was rather different for the traditional manufacturing sector. Here such grants were likely to produce a better output response and were less likely to lead to a substitution of capital for labour than in the other two sectors. The returns

to growth in this sector are also better because of its closer integration into the domestic economy.

7.3.4: Agriculture

The objective of investment in agriculture needs to be examined in the context of the likely pattern of development in the CAP in the 1990s. The emphasis should clearly be put on investment to produce products for which there will be a long-term profitable market. In this regard, while investment in forestry may have a long payback period, it looks to be a profitable area for investment. In the case of agriculture itself the expenditure should be re-examined to see that it produces a continuing payback to the economy rather than serving as a once off income supplement. The promotion of rural development may be better achieved in the 1990s by directing CSF funds to areas other than a severely constrained agricultural sector.

7.4: *Recommendations*

7.4.1: EC and Public Policy

The detailed recommendations concerning the CSF are given above. The results of our study indicate that in the 1990s the level of support under the CSF will not be sufficient to make major progress towards the Community's policy of cohesion. Further progress will only be obtained through the use of alternative policies and/or additional resources.

Our results highlight the importance of making continuing progress on the reform of the public finances, since such progress will be essential if the benefits of EMU are to be exploited. Bradley, Fitz Gerald, and McCoy (1991) highlight the importance of reducing the debt/GNP ratio in the year 2000 to around 75 per cent of GNP. This requires a more stringent fiscal policy stance next year than that adopted in 1990 and 1991. They also showed that this long-term reduction in the debt/GNP ratio could be achieved with a reasonable world growth environment, some limited reduction in tax rates and some increase in public services over the period.

The advent of the CSF and *1992* makes this objective easier to attain. It will allow the government somewhat greater scope in the mid-1990s to increase investment and to reduce tax rates. As shown by the analysis of the CSF, investment in certain key areas might produce a reasonably good pay-back to the State. Tax cuts could be expected to relieve labour market pressures and improve the competitiveness of the productive sector. Taken together the effects of the changes in EC policy provide a window of opportunity for Ireland in the 1990s.

7.4.2: Research

Our study has developed a framework for analysing the effects of EC policy on the Irish economy in the medium term, and has applied it to a specific set of policy changes. In addition, the same methodology can be used both to *monitor* progress on the CSF and also to evaluate the likely effects of any *changes* which may be made in these present, or any new, policy initiatives. However, the uncertainties in the quantification of the supply side effects indicates that there is a need for an on-going review of structural policies.

Our analysis of the CSF identified quite a number of gaps in our knowledge of the working of the Irish economy. For example, the necessary information is not available to quantify precisely the likely supply-side impact of investment in the area of human resources, transport and tourism infrastructure, and marketing and R&D. Hence, the quantification which we have provided must be seen as exploratory in nature.

In the area of human resources we need research to identify aspects such as the following:

(i) the returns to the individual from different types of training and education;
(ii) the returns to firms;
(iii) the returns to the economy as a whole from an increase in different types of human capital.

As this area of investment accounts for the single biggest share of CSF expenditure and as it seems to be the most promising of the areas tackled by the CSF, such information is urgently needed.

The limited research to date has concentrated on the returns to the individual as measured by the post-training employment experience of the beneficiary. Even this research has been limited in scope and needs to be extended. For example, less attention has been given to the financial returns to the individual which might give a *market* assessment of the value of the additional education or training. Also, while the returns to the individual have been explored for some schemes, very little work has been done on the returns to the firms which employ the individuals whose education or training has been enhanced.[50]

Finally, while human capital has long been recognised as an important factor in the growth and development of economies, no research has been done in this field for Ireland. As the sums to be invested are large and the

[50] Work has been done in this area for Northern Ireland and other countries, O'Farrell and Hitchins (1989).

problems to be tackled by the CSF are very significant, research in this area is vital if domestic and EC resources are to be used effectively.

The transport micro-study makes a number of suggestions on subjects for further research. One obvious area would be an extension and repetition of the survey on a regular basis to measure progress on transport costs, to identify what other problems face firms operating in peripheral locations in Europe, and to compare the position of firms in Ireland with that of firms in other EC regions. However, information for other countries and regions is limited in scope and of doubtful value for comparative purposes due to differences in the way the information is compiled. It would need a proper cross-country study, carried out with a common methodology, to obtain this information.

In the area of marketing and R&D investment one of the problems is that of obtaining suitable controls for comparative purposes: similar firms which have and have not benefited from investment. Without such information it is difficult to identify precisely the effects of the CSF investment.

Finally, this study has not considered the impact of *1992* and the CSF on the environment. As some of the measures included in the CSF have a specific environmental dimension the environmental effects would need to be assessed in a separate study.

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Chapter 2

MODELLING THE IRISH AGRICULTURAL AND FOOD SECTORS

G. E. Boyle

INTRODUCTION

This study is primarily concerned with establishing a methodological basis for analysing the impact of policy shocks to the primary production and food processing sectors of the Irish agricultural industry. Major developments are now in train which will have profound effects on this sector of the economy, such as the pressing requirements of CAP reform, the drive towards greater trade liberalisation in agricultural commodities under the auspices of the Uruguay GATT round and the impact of the EC Structural Funds Programme. The intent of this analysis is thus to provide a framework which may assist in answering some of the issues which arise in these and related areas. The need for a modelling perspective is underlined by the absence of a such a tool up to now. This has been a serious omission and indeed a curious one given the investment in modelling the macro economy which has been underway for many years and when one considers the importance of the agricultural and food sectors to the Irish economy. The work presented in this study is very much viewed as a first step in filling this lacuna.

The study proceeds by outlining in Section 1 a non-technical overview of activity in the agricultural and food sectors. The purpose of this section is to provide an introduction to the uninitiated of key features of the production and processing sectors which inform the later analytical sections. In Section 2 we create our model of the primary or raw material production sector. The approach adopted here is basically simple in that it involves the generation of a set of output supply and input demand elasticities which describe in a systematic way the integrated nature of primary production activity. Having created the model we illustrate the kind of answers it provides in response to specified policy changes. Section 3 sets out our approach to modelling the processing sector which is the purchaser of the raw material produced by the primary industry. Section 4 draws some conclusions and indicates some options for future research.

1: *AN OVERVIEW OF THE IRISH AGRICULTURE AND FOOD SECTORS*[1]

1.1: *Agriculture in the Irish Economy*

Agriculture occupies a key role in the Irish economy as evidenced by its contribution to employment, Gross Domestic Product and exports. The most recent Labour Force Survey indicates that the numbers at work in agriculture, forestry and fishing in 1990 accounted for almost 15 per cent of the total at work in the economy and about 97 per cent of these were in the primary agricultural sector. Furthermore nearly one quarter of the employment in the manufacturing sector is in the food processing industry and taking account of the induced employment in related economic activity it is estimated that about one quarter of the national aggregate at work is engaged in the agri-food sector.

The share of agriculture in GDP at factor cost is approximately 9.5 per cent but when account is taken of value-added in the food industry the total contribution of the agri-food sector to GDP is about 18 per cent. The sector also makes a significant contribution to Ireland's balance of payments. It accounts for about 20 per cent of total merchandise exports and 30 per cent of net exports.

1.2: *Some Features of Irish Agriculture*

Land Use

The pattern of land use for certain years is shown in Table 1.

Table 1: *Land Use in Ireland (M. ha)*

Land Type	*1970*	*1980*	*1989*
Total area	6.89	6.89	6.89
Utilised area	5.71	5.70	5.65
Crops and pasture	4.70	4.70	4.67
Pasture	3.17	2.93	2.98
Hay/silage	1.07	1.21	1.26
Arable crops	0.46	0.55	0.43

Source: CSO, Census of Agriculture

The area devoted to arable crops has been steadily declining from about 12 per cent of the area undercrops and pasture before EC entry to about 9 per cent at the present time. The proportion farmed as arable land varies

[1] The author would like to acknowledge the assistance of Mr. Brendan Kearney of Brendan Kearney and Associates in the preparation of this section.

from 2 per cent in the West to 16 per cent in the South-East, the difference reflecting structural, resource quality and climatic features of the areas concerned.

Land devoted to beef production is over double that in dairy farming and Ireland with the UK is unique in this respect. The decline in arable cropping is mainly in the marginal farming areas where the land thus released from cropping is diverted to the production of beef and sheepmeat. Cereals production is the most important component in the arable sector and with the exception of Italy and the Benelux countries Ireland has recorded the greatest decline in cereal production in the EC in recent times.

1.3: *Production Features*

The pattern of agriculture closely reflects climatic and structural conditions in the country. The dairy, sheep and beef enterprises are grassland-based with less than 10 per cent of total feed coming from purchased concentrates. These features of production lead to the well established seasonality pattern of beef and milk production in Ireland which imposes certain limitations on the market-orientation and diversification of the respective industries. The pattern of production and marketing of cattle is much less organised and structured than for most other enterprises, with considerable inter-regional flows of young and feeder cattle and well defined regions of specialisation. The sheep enterprise displays similar characteristics to those of beef but about one-third of the animals are located on hills and uplands. Milk production is probably the most advanced sector in Irish agriculture, stimulated by high and relatively stable returns and thereby attracting the most skilled and progressive producers. The pig and poultry/egg sectors are relatively small but highly concentrated in a small number of units.

Crop production is, as indicated earlier, relatively small in Ireland, largely occurring on the biggest and best quality farms. Cereals are produced for animal feed and for the brewing and distilling industry and some wheat is also used for bread making when the quality is suitable. The other main crops are potatoes and sugarbeet but their output is static. In recent years the production of mushrooms has grown rapidly for the export market.

1.4: *Agricultural Output and Incomes*

Table 2 shows the distribution of gross output by product and highlights the dominance of milk and beef production in Irish agriculture.

Since the accession of Ireland to the EC the volume of agricultural

output has increased at an annual rate of about 2 per cent despite the retarding influence of the dairy quota introduced in 1984.

Table 2: *Composition of Agricultural Output in Ireland 1989*

Product	*IR£m*	*%*
Cattle	1,208	36
Milk	1,189	35
Pigs	175	5
Sheep	165	5
Poultry/eggs	118	4
Cereals	165	5
Other	338	10
Total	3,358	10

Source: CSO, Agricultural Output.

The value of materials and services used as production inputs is outlined in Table 3. The two dominant current inputs are feeding stuffs and fertiliser. Depreciation is also a large item in the total cost structure of Irish agriculture but significantly less in relative terms than in many other member states of the EC because of the lower level of capital formation in Irish agriculture.

Table 3: *Value of Materials and Services in Irish Agriculture 1989*

Input	*IR£m*	*%*
Feed	541	33
Fertiliser	249	15
Seeds	39	2
Energy	144	9
Maintenance	98	6
Services	83	5
Crop protection products	34	2
Veterinary products	48	3
Other current inputs	106	6
Depreciation	319	19
Total	1,661	10

Source: CSO, Agricultural Output

Farm incomes in Ireland have been quite volatile over the years and highly dependent on the level of market prices for milk and beef cattle in particular, and on weather conditions, which can have a significant impact

on the consumption of inputs and product yields. The level of output, costs, and incomes for recent years is indicated in Table 4.

Table 4: *Farm Output and Incomes in Ireland, 1987-89*

	1987	*1988*	*1989*
		IR£m	
Output	2,874	3,159	3,358
Total inputs/services	1,592	1,655	1,796
Net subsidies	112	140	166
Farm income	1,393	1,653	1,728

Source: CSO, Agricultural Output.

Farm incomes declined appreciably in the late 1970s and early 1980s, then improved, only to be faced with a severe downturn in the terms of trade and adverse weather conditions in the mid-1980s. Thereafter incomes improved sharply up to 1989, but in 1990 a downturn in incomes is estimated to have taken place which would be considerably worse but for a sharp rise in EC subsidies and premia.

1.5: *Linkage with the Food Industry*

The agricultural sector in Ireland is the largest provider of raw materials to the food and drink industry which itself accounts for about 25 per cent of employment in the manufacturing sector. The food industry had a gross output of IR£ 5343m in 1987 while the drink industry (brewing, distilling, etc.) had an output of IR£ 547m. The composition of food industry output and employment by sector is shown in Table 5. The data illustrate the relatively low value added in the dairy and meat processing industries by comparison with other specific sectors such as the bread/biscuit and the chocolate/confectionery industries.

Table 5: *Food Industry Output, 1987*

Sector	*Gross output*	*Net output*	*Employment*
	IR£ m	IR£ m	
Dairy	1,678	293	177,532
Meat	1,659	232	149,578
Bread, biscuits etc	215	100	476,677
Choc.,confectionery etc.	240	73	303,091
Sugar	118	47	401,235
Animal foods	411	77	192,094
Grain milling	107	26	24931
Miscellaneous	704	545	772,188
Other	211	74	353,693
Total	5,343	1,467	2737,019

Source: CSO, Census of Industrial Production

Furthermore little progress has been made in adding value in these indigenous food industries since accession to the EC although live exports of cattle are now much less important than heretofore.

Ireland has a high degree of self-sufficiency for its main agricultural products as the following figures show:

	Beef	Butter	Cheese	Pigmeat	Lamb	Barley
%	692	227	433	118	204	113

These particular levels of self-sufficiency are reflected in the composition of Irish agricultural exports, with the pattern of recent years being well represented in the actual situation in 1988:

Product	*Value of Exports (IR£ m)*[a]
Cattle	151
Beef	566
Dairy products	873
Pigmeat/pigs	60
Sheepmeat/sheep	68
Horses and meat	67
Food preparations	714
Other agricultural exports	500
Total agricultural exports	2,999
% of total exports	24

Source: CSO, Trade Statistics.
Note: [a] the value of the agri-food sector exports to the economy is boosted by the payment of export refunds from CAP amounting to IR£347m in 1988.

The two main food industries based on indigenous raw materials are beef and dairy products which have been the subject of much analysis because of their frequent dependence on intervention and exports to Third Countries with the assistance of export refunds. In consequence there is a lower dependence on the internal EC market and consequently less opportunity for product diversification and job creation. The main impediments to increasing value added in these industries are the small scale of the domestic market and seasonality of production. In Ireland the production of milk is based largely on Spring calving cows giving the following pattern of sales for manufacturing purposes (% by month):

	J	F	M	A	M	J	J	A	S	O	N	D
%	2.1	4.0	7.0	10.	14.	14.	13.	11.	10.0	7.2	3.3	1.9

Arising from this pattern of production it is quite difficult to manufacture certain cheeses and fresh milk products given the small scale of the domestic market and the peripheral location of the country. Therefore Ireland continues to rely on bulk commodity products such as butter (which utilises over two-thirds of milk for manufacturing) skim milk powder, and casein, which have a relatively low value-added. Given further that the beef industry is largely dependent for its raw materials on the dairy cow herd, then that sector also suffers from the seasonality problem. For instance in 1989 the pattern of slaughtering at export premises which accounts for over 85 per cent of beef production was as follows:

Quarter	1	2	3	4
%	17	13	22	48

The acute seasonal pattern of beef production leaves it heavily reliant on exports to Third Countries with the assistance of export refunds and reduces the possibility of having adequate supplies of beef of sufficient quality to meet an all year round demand on the internal EC market.

The scale of the food industry is generally small in Ireland with 314 enterprises in total. The meat and dairy industries had 92 and 94 enterprises respectively in 1987 but quite a considerable degree of rationalisation and merger is taking place at the moment in preparation for the European Single Market.

The processing of agricultural products is largely undertaken by private industry except in the dairy sector where co-operatives dominate and account for about 95 per cent of the produce purchased from farmers. By contrast less than 10 per cent of beef and sheep meat is processed by co-operatives.

Furthermore the bulk of dairy exports are marketed through the Irish Dairy Board which is itself a co-operative. However co-operatives now account for a growing share of pigmeat processing but their involvement in the fruit and vegetable business is virtually non-existent.

In the mid-1980s, a number of phenomena occurred which raised fundamental questions about the long-term survival and relevance of the co-operative structure of organisation in food processing. In the first place a number of co-operatives in dairy processing exchanged their assets for majority shareholding in a public limited company in order to attract outside investment capital. A second development worthy of note was the

decision of the shareholders of a number of smaller dairy co-operatives to accept an offer for their shares in a public limited company. However, the future of such development is by no means clear as two of the biggest co-operatives in the country have amalgamated without becoming a public company.

1.6: *Some Pointers for the Modelling Exercise*

This review has underlined the importance of the agricultural and food sectors to the Irish economy. The nationally important outputs are beef and milk. There is a close relationship between these commodities because the dairy sector is the source of the vast bulk of the beef herd. This interdependency emphasises the importance of capturing the impact of the EC dairy quota mechanism in the model.

On the input side, the important inputs are seen to be fertilisers and feedstuffs. This overview stresses the necessity of taking account of the interdependencies between both outputs and inputs.

A final datum for the modelling exercise is the high levels of self-sufficiency recorded for many products and the consequent dependence on EC intervention and export refunds. These factors justify the presumption of price-taking behaviour and thus considerably lessen the construction of the model in that both output and input prices can be taken as given.

Our review of the food sector identified the importance of dairy and beef processing. A particular problem which was highlighted is the seasonality of milk and beef production. This factor reflects the grass-based regimes of production and the close linkages between the dairy and beef sectors. The existence of the pronounced seasonal pattern of production implies severe limitations on the product portfolio of the processing sector. While the issue of seasonality is an important one in the context of how it might be influenced by changes in policy regimes, especially the dairy quota, the absence of sub-annual data precludes us taking account of it in the creation of the model.

The ownership structure of the processing industries has profound consequences for the modelling of the food sector. The dairy sector is dominated by co-operative ownership. This structure suggests that it would not be unreasonable to assume that the quantity of raw material which is processed is exogenous to the dairy sector. Moreover, the nature of the profit maximisation objective will have consequences for the pricing of the raw material and the employment of other production inputs.

The beef processing sector was observed to have a predominantly private ownership structure. The behaviourial motivation of firms in this

sector is open to some question. The relatively large number of raw material suppliers compared with the relatively small number of processors suggests monopsonistic behaviour in the purchase of raw materials. Whether, like the dairy sector, beef materials should also be considered exogenous to the processing industry is a moot point. The declining importance of live animal exports would suggest they should be but the potential is always there for a resumption of this trade.

2: MODELLING THE PRIMARY PRODUCTION SECTOR

In order to obtain a model suitable for simulating the comparative static effects of policy changes the simplest approach is to generate a set of inter-related output supply and input demand elasticities from arbitrarily specified supply and input demand functions. We have opted to pursue a more rigorous avenue of endeavour. Specifically we assume that producers are short-run profit maximisers, that is, they choose to maximise the returns to resources which can be presumed fixed in the short run. This specification implies an unspecified time frame over which model simulations might be applicable. Given the profit maximisation objective together with the assumption that producers are output and input price takers, the set of output supply and input demand functions can be obtained by partial differentiation of the profit function with respect to all relevant output and input prices (Hotelling's Lemma, see Varian (1978)).

Published data on the output and input consumption of the Irish "National farm" provide information on at least 11 outputs, 7 inputs and about 11 quasi-fixed factors. To render the task of estimating elasticities from this large data set tractable we decided to view the profit maximisation problem as proceeding in a series of stages. The scheme we adopted is shown in Figure 1. The profit maximisation output and input choices were thus arbitrarily assigned to three separate levels or stages.

Thus at Level 1 we estimated the parameters of a translog profit function from the following system

$$\ln \pi = \alpha_o + \sum_i \alpha_i \ln P_i + \sum_i \sum_j \alpha_{ij} (\ln P_i)(\ln P_j) \qquad (1)$$
$$+ \alpha_k \ln K + \alpha_{kk} (\ln K)^2 + \sum_i \alpha_{ki} (\ln K)(\ln P_i)$$
$$+ \alpha_t T + \alpha_{tt} T^2 + \sum_i \alpha_{ti} (T) \ln P_i$$
$$+ \alpha_{tk} (T) \ln K$$

$$S_i = \alpha_i + \sum_i \alpha_{ij} \ln P_j + \alpha_{ki} \ln K + \alpha_{ti} T$$

We adopt the netput convention. Outputs are positively and inputs negatively signed. P is thus the netput price. Profit (π) is defined as gross revenue less the value of variable inputs. The 11 quasi-fixed inputs are aggregated into a Divisia quantity index (K). This index comprises family labour and components of fixed and live capital. Technical change (T) is modelled as a simple linear time trend. The aggregate output price index and the residual inputs price index are obtained using the Divisia formula which is exact for the linearly homogeneous translog function. S is the netput profit share.

FIGURE 1: Explicitly assumed separability structure for the Irish farm economy

	Level 1	**Level 2**	**Level 3**	**Integrated Model**
	Fertiliser Aggregate	Nitrogen		Nitrogen
		Phosphorus		Phosphorus
	Feedstuffs	Potassium		Potassium
Aggregate Profit	Energy Products			Feedstuffs
	Hired Labour			Energy Products
	Residual Inputs (incl. Pesticides)			Hired Labour
				Residual Inputs (incl. Pesticides)
	Fixed Inputs			Fixed Inputs
	Technology			Technology
	Aggregate Output	Milk		Milk
		Cattle and Calves		Cattle and Calves
		Sheep and Lambs		Sheep and Lambs
		Residual Outputs		Residual Outputs
		Tillage Aggregate	Wheat	Wheat
			Malting Barley	Malting Barley
			Feeding Barley	Feeding Barley
			Oats	Oats
			Potatoes	Potatoes
			Sugarbeet	Sugarbeet
			Other Crops	Other Crops

For profit maximisation we require that estimated parameters of the system satisfy the following conditions:

$\sum_i \alpha_i = 1$ (the aggregate output share is omitted in the estimation);

$\sum_j \alpha_{ij} = \sum_i \alpha_{ij} = \sum_i \alpha_{ki} = \sum_i \alpha_{ti} = 0$; $\alpha_{ij} = \alpha_{ji}$.

Elasticities are obtained from (1) with the following expressions (see for

example Binswanger(1974) and Bannante and Sidhu (1981)).

$$\text{Own price netput elasticity} = S_i - 1 + \frac{\alpha_{ii}}{S_i}$$

$$\text{Cross price netput elasticity} = S_j + \frac{\alpha_{ij}}{S_i}$$

$$\text{Netput quasi-fixed factor elasticity} = \alpha_k + \alpha_{kk}\ln K + \sum_i \alpha_{ki}\ln P_i + \frac{\alpha_{ki}}{S_i} + \alpha_{tk}T$$

$$\text{Netput technical change (time trend) response} = \alpha_t + \alpha_{tt}T + \sum_i \alpha_{ti}\ln P_i + \alpha_{tk}\ln K + \frac{\alpha_{ti}}{S_i}$$

At Level 2 we estimated the parameters of a linearly homogeneous translog revenue function for aggregate output and a linearly homogeneous translog cost function for the fertiliser aggregate. In the case of the revenue function, the aggregate crops price is a Divisia index. At Level 3 we estimated a linearly homogeneous translog revenue function for the defined crops aggregate. The price of other crops are aggregated using the Divisia formula.

To obtain the complete set of Marshallian elasticities we must aggregate from Level 3 to 1. This is a relatively straight forward procedure for the assumed separability system and is set out in detail in Boyle and O'Neill(1990).

2.1: *Empirical Results*

Details of the data set employed in the empirical analysis may be found in Boyle (1987). The data span the time period 1960-1982. The estimator employed for all regressions was maximum likelihood. For Level 1 we estimated the system as indicated in (1). For Levels 2 and 3 we only estimated the share relations. In all cases we allowed for contemporaneous error correlation.

Before considering our regression findings some comments on key system equation diagnostics are warranted. The appropriate procedure in assessing parameter stability for a system of equations, no more than the computation of goodness of fit statistics, is open to considerable debate (see Judge *et al* (1980) for a discussion). In this paper we report the R^2 obtained for each individual equation in the system.

We report two sets of regression results corresponding to the periods 1960-82 and 1960-72. These estimation periods were motivated by the changing regime facing Ireland's agricultural sector upon EC accession in

1973. Splitting the estimation period in this way allows us to test for parameter stability using a variant of the Chow test (Chow (1960)[2] and by implication to ascertain how well the model predictions fit with reality over the period 1972-82.

The results for the Level 1 regressions are given in Table 6. The coefficients are generally well determined with approximately two-thirds

Table 6: *Translog Coefficient Estimates of the Aggregate Profit Function (Symmetry and Price Homogeneity)*

	1960-82		*1960-72*	
	Coefficient	*Standard Error*	*Coefficient*	*Standard Error*
α_0	5.08	.05	5.68	.04
α_{01}	-.04	.01	-.02	.01
α_{02}	-.17	.02	-.15	.02
α_{03}	-.06	.00	-.05	.00
α_{04}	-.17	.01	-.16	.01
α_{05}	-.12	.01	-.13	.00
α_{11}	-.13	.02	-.20	.05
α_{22}	-.14	.05	-.10	.11
α_{33}	-.07	.01	-.04	.00
α_{44}	-.05	.01	-.06	.01
α_{55}	-.07	.04	-.07	.02
α_{12}	-.06	.03	-.11	.05
α_{13}	.04	.01	-.00	.01
α_{14}	-.02	.01	.01	.01
α_{15}	-.07	.03	.06	.03
α_{23}	.03	.01	.03	.01
α_{24}	-.02	.02	-.04	.02
α_{25}	-.08	.03	-.09	.04
α_{34}	-.00	.00	-.00	.00
α_{35}	-.05	.01	-.05	.01
α_{45}	-.02	.01	-.02	.00
α_k	-.04	.47	-1.72	.29
α_{kk}	1.88	2.54	9.28	.19
α_{1k}	.01	.06	-.05	.02
α_{2k}	.10	.12	.20	.11
α_{3k}	.01	.02	.01	.00
α_{4k}	-.00	.03	.04	.04
α_{5k}	.02	.06	.00	.02
α_t	.00	.01	-.18	.00
α_{tt}	.00	.01	.03	.00
α_{1t}	-.01	.00	-.01	.00
α_{2t}	-.01	.00	-.01	.00
α_{3t}	.00	.00	.00	.00
α_{4t}	.00	.00	.00	.00
α_{5t}	-.00	.00	-.00	.00
α_{tk}	.04	.04	-.03	.00

Note: 1 = fertilisers; 2 = feedstuffs; 3 = energy products etc.; 4 = hired labour; 5 = residual inputs; t = time trend; k = quasi-fixed factors. The numeraire price was aggregate output.

[2] The detailed implementation of the Chow test is set out in Boyle and O'Neill (1990).

Table 6: *Cont.*

Regression Diagnostics *Equation*	*Chow Values*			R^2	
	Computed	*Critical Values*		*1960-82*	*1960-72*
		5%	1%		
Profit	0.31	3.63	6.62	.99	.97
Fertiliser	34.00	3.63	6.62	.88	.97
Feedstuffs	0.91	3.63	6.62	.76	.67
Energy etc.	8.10	3.63	6.62	.95	.71
Hired Labour	0.10	3.63	6.62	.94	.72
Residual Inputs	5.00	3.63	6.62	.89	.69
System	0.49	1.63	1.98	-.—	-.—

and over 80 per cent respectively of the estimated parameters for the periods 1960-82 and 1960-72 statistically significant. The most appealing feature of the findings is the relative degree of parameter stability as indicated by a comparison of the individual coefficients for the time periods.

The multi-equation Chow value confirms this stability but the individual equation values indicate instability for the fertiliser and energy equations particularly.

The derived elasticity estimates for the ultimate year of our data, 1982, are given in Table 7. The findings are of interest and appear reasonably plausible. Relatively high own price elasticities are obtained for all inputs and the aggregate output elasticity at about 0.7 is a plausible value. With the exception of the terms involving the price of aggregate output, the cross price effects are not large.

Table 7: *Aggregate Profit Function Price, Quasi-Fixed Factor Elasticities, and Trend Effect, 1982a*

Quantity	*Price* W_1	W_2	W_3	W_4	W_5	P_q	*Sum*	*K*	*T*
X_1	-.62	-.13	-.30	.02	-.09	1.12	.00	.45	.08
X_2	-.07	-1.07	-.19	-.02	-.08	1.43	.00	.24	.07
X_3	-.57	-.68	-.49	-.07	.17	1.64	.00	.41	.05
X_4	.07	-.13	-.11	-.37	.01	.53	.00	.50	-.04
X_5	-.07	-.12	.07	.00	-1.02	1.14	.00	.43	.06
Q	-.11	-.28	-.09	-.02	-.15	.65	.00	.57	.07

Note: X_1 - X_5 refer to fertilisers, feedstuffs, energy products, hired labour and residual inputs and W_1 - W_5 are the corresponding prices. Q and P_q refer to aggregate output and price respectively. K and T refer to the fixed factor and time trend respectively.
α: The translog parameter estimates are for 1960-82 (Table 6).

The quasi-fixed inputs yield elasticities with the expected signs and which are of a reasonable magnitude. The trend estimates appear quite strong with the negative sign on hired labour conforming to expectation.

For Level 2 we report two sets of elasticities. Table 8 gives the estimated translog parameters obtained for the aggregate output revenue function. With the exception of the cattle own price quadratic term, the remaining parameters exhibit apparent intertemporal stability. The Chow values, however, reject stability especially for the milk and cattle equations. An implication might be that EC entry caused a structural change.

Table 8: *Translog Coefficient Estimates of the Aggregate Output Revenue Function (Symmetry and Price Homogeneity Imposed)*

	1960 - 82		*1960 - 72*	
	Coefficient	*Standard Error*	*Coefficient*	*Standard Error*
α_{01}	.25	.01	.23	.01
α_{11}	.39	.09	.36	.06
α_{12}	.03	.04	-.06	.03
α_{13}	-.06	.02	-.05	.03
α_{14}	-.12	.03	-.10	.04
α_{02}	.37	.01	.37	.01
α_{22}	.14	.03	.21	.02
α_{23}	-.04	.01	-.05	.02
α_{24}	-.04	.02	-.03	.03
α_{03}	.05	.00	.05	.00
α_{33}	.05	.01	.06	.02
α_{34}	.00	.01	-.01	.02
α_{04}	.15	.00	.16	.01
α_{44}	.09	.03	.08	.05

Note: 1 = milk output; 2 = cattle and calves; 3 = sheep and lambs; 4 = tillage crops. The numeraire price was residual outputs.

Regression Diagnostics

Equation	*Chow Values*			R^2	
	Computed	*Critical Values*		*1960-82*	*1960-72*
		5%	1%		
Milk	8.10	3.10	5.10	.66	.77
Cattle	5.85	3.10	5.10	.47	.82
Sheep	1.35	3.10	5.10	.70	.56
Tillage	1.35	3.10	5.10	.58	.63
System	4.73	1.71	2.14	-.—	-.—

The elasticities evaluated for the 1982 data point are supplied in Table 9. It is evident that implausible signs are obtained for the cattle and tillage own-price elasticities. We should note, first, that the estimates are relatively small in magnitude. As the elasticities are non-linear functions of the estimated parameters, the calculation of standard errors is difficult. If we employ a very simple formula for the standard errors such that, $SE = SE(\alpha_{ij})/S_i$, which is an approximation for the formula suggested by Kulatilaka (1985), we can reject the tillage estimate as not being significantly different from zero but the cattle own price effect is significantly negative.

Table 9: *Aggregate Output Revenue Function Price Elasticities, 1982*[a]

	Price					
Quantity	P_1	P_2	P_3	P_4	P_5	*Sum*
Q_1	.47	.44	-.14	-.21	-.56	.00
Q_2	.43	-.25	-.08	.02	-.12	.00
Q_3	-1.38	-.80	.48	.13	1.57	.00
Q_4	-.57	.05	.04	-.18	.66	.00
Q_5	-1.49	-.33	.42	.67	.73	.00

Note: Q_1 - Q_5 refer to milk, cattle, sheep, tillage and residual outputs and P_1 - P_5 are the corresponding prices.
[a]: The translog parameter estimates are for 1960-82 (Table 8). It should be noted that these elasticities hold aggregate output Q constant.

A number of possible reasons could explain these results. For instance, contrary to our specification, producers may not be in equilibrium in relation to the cattle or tillage variables. This appears a very plausible story as regards cattle output and possibly also for tillage output,which depends on specific pieces of capital, such as harvesting machines. Because of obvious physical constraints optimal adjustment of cattle output would be unlikely to occur within a one-year time period. Thus the finding of a significantly negative own-price elasticity could be aplausible short-run response. In the longer run we would expect optimal adjustment. This possibility could be modelled by assuming cattle to be a quasi-fixed output using the procedures implemented by Kulatilaka (1985) and Squires (1987). Other explanations for the perverse signs may include risk and or income effects, neither of which are incorporated in our model.

The Level 2 fertiliser elasticities were not estimated for this study but are taken from Boyle(1982). These estimates are reproduced in Table 10. The interesting feature of these results is, first, that own price effects are seen to

be important and secondly that substitution between nitrogen and other fertiliser products cannot be rejected. The latter result would apparently contradict experimental findings of complementarity.

Table 10: *Aggregate Fertiliser Cost Function Price Elasticities, 1978/79*[a]

Quantity	*Price* W_{11}	W_{12}	W_{13}	*Sum*
X_{11}	-.76	.54	.21	-.01
X_{12}	.77	-.71	-.05	.01
X_{13}	.61	-.11	-.51	-.01

Note: X_{11} - X_{13} refer to nitrogen, phosphorus and potassium and W_{11} - W_{13} are the corresponding prices.
[a]: The results are taken from Boyle (1982). It should be noted that the elasticities hold the fertiliser aggregate constant.

The translog parameters for the tillage aggregate at Level 3 are given in Table 11. We can report reasonable intertemporal stability for these estimates. The system Chow value is marginally significant and the most unstable equation appears to be that for feeding barley but the Chow value is barely significant at the 10 per cent level. The corresponding compensated elasticities are given in Table 12. The most notable feature of the findings is the high degree of substitutability obtained between the cereal products. The disappointing results in this table are the negative own-price signs for sugar beet and other crops.

Table 11: *Translog Coefficient Estimates of the Aggregate Tillage Revenue Function (Symmetry and Price Homogeneity Imposed)*

	1960-82		*1960-72*	
	Coefficient	*Standard Error*	*Coefficient*	*Standard Error*
α_{01}	.18	.01	.21	.02
α_{11}	.49	.08	.38	.14
α_{12}	-.10	.03	.02	.02
α_{13}	-.43	.08	.39	.10
α_{14}	.01	.01	.02	.02
α_{15}	-.03	.03	.04	.05
α_{16}	.04	.03	.07	.06
α_{02}	.08	.00	.08	.00
α_{22}	.22	.05	.03	.05
α_{23}	.00	.05	.16	.05
α_{24}	-.03	.02	.01	.01
α_{25}	-.04	.02	.06	.03
α_{26}	-.02	.01	.03	.01
α_{03}	.26	.02	.22	.01
α_{33}	.52	.14	.21	.14

Table 11: *Cont.*

Table 11: *Cont.*

	1960-82		*1960-72*	
	Coefficient	*Standard Error*	*Coefficient*	*Standard Error*
α_{34}	-.02	.02	.02	.02
α_{35}	.03	.04	.07	.06
α_{36}	-.04	.06	.02	.06
α_{04}	.02	.00	.02	.00
α_{44}	.03	.01	.04	.01
α_{45}	.00	.01	.03	.02
α_{46}	-.01	.01	.03	.01
α_{05}	.18	.00	.16	.00
α_{55}	.07	.03	.11	.06
α_{56}	-.02	.02	-.08	.02
α_{06}	.20	.01	.24	.01
α_{66}	.08	.04	.13	.04

Note: 1 = wheat; 2 = malting barley; 3 = feeding barley; 4 = oats; 5 sugarbeet; 6 = potatoes. The numeraire price was other crops.

Regression Diagnostics *Equation*	*Chow Values*			R^2	
	Computed	*Critical Values*		*1960-82*	*1960-72*
		5%	1%		
Wheat	.31	3.23	5.54	.56	.14
Malting Barley	3.84	3.23	5.54	.56	.28
Feeding Barley	5.87	3.23	5.54	.53	.54
Oats	3.20	3.23	5.54	.10	.45
Sugarbeet	5.16	3.23	5.54	.32	.66
Potatoes	3.05	3.2	5.54	.44	.55
System	2.38	1.58	1.90	—.—	—.—

Table 12: *Aggregate Tillage Revenue Function Price Elasticities, 1982*[a]

	Price							
Quantity	P_{41}	P_{42}	P_{43}	P_{44}	P_{45}	P_{46}	P_{47}	*Sum*
Q_{41}	2.49	-.62	-2.56	.08	.35	.03	.23	.00
Q_{42}	-1.39	2.57	.38	-.47	-.22	-.42	-.45	.00
Q_{43}	-.99	.06	.76	-.04	-.01	.30	-.08	.00
Q_{44}	1.02	-2.55	-1.37	1.63	-.78	.22	1.83	.00
Q_{45}	.56	-.15	-.04	-.09	-.07	.01	-.22	.00
Q_{46}	.07	-.12	.51	.01	-.07	-.46	.04	.00
Q_{47}	.41	-.24	-.35	.24	-.13	-.03	.10	.00

Note: Q_{41} - Q_{47} refer to wheat, malting barley, feeding barley, oats, potatoes, sugarbeet and other crops and P_{41} - P_{47} are the corresponding prices.
[a]: The translog parameter estimates are for 1960-82 (Table 13). These elasticities are conditional on the tillage aggregate.

Using the aggregation procedure outlined in Boyle and O'Neill (1990) we obtain the matrix of gross elasticities in Table 13. These elasticities are conditional on the levels of the quasi-fixed factor index and technical change.

2.2: *Modelling the Quasi-Fixed Factors*

A major area which requires further development of the model is the treatment of those factors of production which are presumed to be fixed in the short run. The most important of these are fixed capital (buildings and machinery); live capital and family labour. To operationalise the model, these variables must be determined exogenously.

It was considered important to develop an equation for farm buildings in view of the likely impact of EC structural fund expenditure over the period 1990-1995 in this area. Accordingly an investment equation for farm buildings was estimated. Inspired by the specification of Higgins and Collier (1986) the equation expresses investment as a function of the real capital cost of buildings (RPKB); real farm income lagged (RFCINC(-1)); lagged investment (FBINV(-1)); and cattle numbers (CATT). The real cost of capital captures a number of important policy influences, for example, interest rates and farm buildings' grants. It is defined as:

RPKB = RSTRI *(1-GR)*(1-ID*STR)
where,
RSTRI = three month inter-bank rate minus the percentage change in farm output prices,
GR = proportionate grant rate on farm buildings,
ID = initial depreciation allowance rate,
STR = standard tax rate.

Apart from the short-term real rate of interest (RSTRI), the remaining elements of capital costs were almost constant over the study period examined, that is, 1973 to 1988. Thus values for these parameters were as follows:

GR=0.35; ID=0.30; STR=0.35

Given these values, the real cost of farm buildings' capital becomes simply,

RPKB = RSTRI*0.58

These parameters will alter in a predictable way over the period 1990 to 1995. *The Operational Programme for Farmyard Pollution* involves a grant rate of 0.40 in 1989 and 0.45 from 1990 to 1995. Initial depreciation allowances are also set to change: 0.45 in 1989; 0.50 in 1990; 0.30 in 1991; 0.13 in 1992 and 0.0 from 1993 to 1995.

Table 13: *Complete Set of Short-Run Gross Elasticities for the Irish "National Farm", 1982*

Quantity/Price	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	K	T
Milk (1)	0.70	0.68	-0.11	-0.02	-0.01	-0.05	0.00	-0.01	-0.03	-0.01	-0.47	-0.06	-0.04	-0.02	-0.28	-0.09	-0.02	-0.15	0.57	0.05
Cattle (2)	0.66	-0.01	-0.05	0.02	0.01	0.04	0.00	0.01	0.02	0.01	-0.04	-0.06	-0.04	-0.02	-0.28	-0.09	-0.02	-0.15	0.57	0.05
Sheep (3)	-1.15	-0.56	0.51	0.03	0.01	0.08	0.00	0.02	0.05	0.02	1.66	-0.06	-0.04	-0.02	-0.28	-0.09	-0.02	-0.15	0.57	0.05
Wheat (4)	-0.34	0.29	0.07	2.48	-0.63	-0.26	0.08	0.34	0.01	0.22	0.75	-0.06	-0.04	-0.02	-0.28	-0.09	-0.02	-0.15	0.57	0.05
Barley: Malting (5)	-0.34	0.29	0.07	-1.40	2.57	0.34	-0.47	-0.23	-0.44	-0.46	0.75	-0.06	-0.04	-0.02	-0.28	-0.09	-0.02	-0.15	0.57	0.05
Barley: Feed (6)	-0.34	0.29	0.07	-1.00	0.06	0.72	-0.04	-0.02	0.28	-0.09	0.75	-0.06	-0.06	-0.02	-0.28	-0.09	-0.02	-0.15	0.57	0.05
Oats (7)	-0.34	0.29	0.07	1.00	-2.56	-1.40	1.63	-0.79	0.20	1.83	0.75	-0.60	-0.04	-0.02	-0.28	-0.02	-0.09	-0.15	0.57	0.05
Potatoes (8)	-0.34	0.29	0.07	0.55	-0.16	-0.08	-0.09	-0.08	0.01	-0.23	0.75	-0.06	-0.04	-0.02	-0.28	-0.02	-0.09	-0.15	0.57	0.05
Sugarbeet (9)	-0.34	0.29	0.07	0.07	-0.13	0.47	0.01	0.07	-0.48	0.04	0.75	-0.06	-0.04	-0.02	-0.28	-0.02	-0.09	-0.15	0.57	0.05
Other Crops (10)	-0.34	0.29	0.07	0.37	-0.29	-0.36	0.24	-0.14	-0.05	0.09	0.75	-0.06	-0.04	-0.02	-0.28	-0.02	-0.09	-0.15	0.57	0.05
Residual Outputs (11)	-1.27	-0.09	0.45	0.11	0.05	0.29	0.01	0.08	0.17	0.07	0.82	-0.06	-0.04	-0.02	-0.28	-0.02	-0.09	-0.15	0.57	0.05
Nitrogen (12)	0.39	0.40	0.03	0.02	0.01	0.06	0.00	0.02	0.03	0.01	0.15	-1.06	0.33	0.10	-0.13	-0.30	0.02	-0.09	0.45	0.08
Phosphorus (13)	0.39	0.40	0.02	0.02	0.01	0.06	0.00	0.02	0.03	0.01	0.15	0.47	-0.92	-0.15	-0.13	-0.30	0.02	-0.09	0.45	0.08
Potassium (14)	0.39	0.40	0.02	0.02	0.01	0.06	0.00	0.02	0.03	0.01	0.15	0.31	-0.31	-0.62	-0.13	-0.30	0.02	-0.09	0.45	0.08
Feedstuffs (15)	0.50	0.52	0.04	0.03	0.01	0.07	0.00	0.02	0.04	0.02	0.19	-0.03	-0.02	-0.01	-1.07	-0.19	-0.02	-0.08	0.24	0.07
Energy (16)	0.57	0.59	0.05	0.03	0.01	0.08	0.00	0.02	0.05	0.02	0.21	-0.28	-0.19	-0.10	-0.68	-0.50	-0.07	0.17	0.40	0.05
Labour (17)	0.18	0.19	0.02	0.01	0.00	0.03	0.00	0.01	0.02	0.01	0.07	0.03	0.02	0.01	-0.13	-0.11	-0.37	0.01	0.50	-0.04
Residual Inputs (18)	0.40	0.41	0.03	0.02	0.02	0.06	0.00	0.02	0.03	0.01	0.15	-0.03	-0.02	-0.01	-0.12	0.07	0.00	-1.02	0.43	0.06

An investment equation was estimated using OLS for the period 1974 to 1988. It furnished the following results:

FBINV = 457.10 + 0.12*RFCINC(-1) - 3.56*RPKB + 0.68*FBINV(-1) - 0.09*CATT
(250.44) (0.03) (1.06) (0.12) (0.04)

(Standard errors in parentheses. R^2=0.85; DW=2.67).

This equation is quite satisfactory. Real income is an important explanatory variable as are capital costs and the lagged dependent variable. If cattle numbers are considered a proxy for the capital stock then it possesses the correct sign. In other words the closer the actual capital stock is to its desired level the lower investment, *cateris paribus*.

Elasticities at the 1982 datapoint are as follows:

	Short run	*Long run*
RFINC(-1)	1.53	4.78
RPKB	-0.15	-0.47
CATT	-4.80	-15.01

2.3 *Some Examples of Simulations Using the Model*

For any choice of endogenous and exogenous variables we can write the model's solution for the endogenous variables as:

$$Y = -A_1^{-1} A_2 X \qquad (3)$$

where,

Y is an (L x 1) vector of endogenous variables
X is an (M x 1) vector of exogenous variables

and

A_1 is an (L x L) and A_2 an (L x M) matrix of elasticities.

Equation (3) is sometimes referred to as the "Johansen" solution since the model is first linearised in percentage changes before solving.

If the outputs and inputs were the endogenous variables then A_1 would be a diagonal matrix with elements equal to unity while A_2 would be the matrix of price, quasi-fixed factor and trend elasticities (that is, Table 13). The main drawback in (2) is the linearity of the model which limits simulations to small changes in exogenous variables[3]. However, there are

[3] For large changes an iterative solving procedure can apparently give reasonable results (Dixon *et al* (1982)).

advantages, not least of which is the transparency of the model. A major advantage is the facility for readily altering the choice of endogenous and exogenous variables. For example, to analyse the impact of an output or input quota the quantity becomes the endogenous variable and the model solves for the shadow price.

We exploit this facility in the examples which follow. To illustrate how the model works and the kind of answers it provides, we perform the following experiments, the results of which are shown in Table 14:

(i) a 10 per cent reduction in the dairy quota and
(ii) a 20 per cent tax on the price of nitrogen combined with an unchanged (relative to the base) dairy quota.

Table 14: *Some Simulations with the Farm Sector Model*

Item	*A 10% Milk Quota Cut*		*A 20% Nitrogen Tax plus no change in the Milk Quota*	
	Volume %	*Price %*	*Volume %*	*Price %*
Milk output	-10.0	-13.9	0.0	1.56
Cattle output	- 8.9	-	-0.2	-
Sheep output	16.4	-	-3.2	-
Wheat output	4.8	-	-1.8	-
M. Barley output	0.4	-	-0.1	-
F. Barley output	7.4	-	-2.7	-
Oats output	6.7	-	-2.5	-
Potatoes output	6.7	-	-1.7	-
S. Beet output	4.6	-	-3.6	-
Other crops output	9.8	-	-1.2	-
Residual output	3.2	-	-3.8	-
Nitrogen input	- 5.1	-	-20.7	20.0
Phosphorus input	- 5.1	-	9.9	-
Potassium input	- 5.1	-	6.7	-
Feedstuffs input	- 6.5	-	0.0	-
Energy input	- 7.4	-	-4.9	-
Hired labour input	- 2.0	-	0.8	-
Residual input	5.3	-	-0.1	-
Total inputs	- 5.5	-	-1.5	-
Total outputs	- 2.6	-	-0.9	-
Income From Self Employment (% Nominal)	-0.02	-	-2.14	-

To assess the impact of the shocks on a 1989 base we assume constant *all* other exogenous variables other than those specified in (i) and (ii). To expand the usefulness of the model, to users we also report the impact on important sectoral identities, such as: aggregate output volume; aggregate

input volume and Income from Self Employment and Other Trading Income. In the case of the latter variable we assume that depreciation and net subsidies are unchanged from their base levels.

These stylised examples bring out a few very important features of the agricultural sector which will be influential in affecting responses to a more complex set of policy changes than those illustrated in our example. The cut in milk quota implies a complementary reduction in cattle output but a compensating increase in other commodities notably sheep and cereals. Also there is a sizeable response in terms of input consumption. While the effect of reductions in milk and cattle volumes impact adversely on income this effect is offset by expanded production of substitute commodities and by economies in the use of inputs. Moreover, the owners of milk quotas are wealthier since the shadow value is seen to fall. This example serves to illustrate the importance of alternative outlets for production. Frustration in this regard would clearly cause incomes to fall more substantially.

The effect of the nitrogen tax of 20 per cent also leads to interesting results. In the presence of a milk quota all commodities are adversely affected but especially the tillage crops. Nitrogen consumption falls by almost the same extent of the price rise reflecting the unitary own-price elasticity. This result implies that a quota on consumption at 21 per cent below base level usage would be required to effect the same reduction in consumption as a 20 per cent tax. An interesting feature of the simulation results is the compensatory expansion in the use of fertilisers which, in the short term at least, are perceived to be substitutes for nitrogen, namely, phosphorus and potassium. The upshot in income terms is a fall of over 2 per cent.

3: *THE FOOD SECTOR: AN AGGREGATE MODEL*

The sector is treated as an aggregate. This may not be wholly appropriate given the diversity of outputs ranging from milk processing, meat processing to a highly heterogeneous residual category. The strategy adopted was arrived at because of the failure to obtain worthwhile estimates when a more disaggregated estimation structure was attempted.

The analysis departs from the approach used in modelling the other elements of the manufacturing sector in a number of ways. First, we postulate long-run profit maximisation as the sector's behaviourial objective. In the short run the sector is presumed to minimise costs conditional on output and capital stock being short-run quasi-fixed with dairy processing materials assumed fixed.

Long-run profit maximisation is a more general specification than short-run maximisation (Conrad and Ungar (1987) Kulatilaka (1985)). The approach is applied mainly because of its intrinsic reasonableness but also because preliminary results using a similar output determination approach to other manufacturing sectors proved unacceptable (Bradley, Fitz Gerald and Kearney (1990)). The quasi-fixity of the capital stock mirrors the treatment in the non-food sector. The argument for the fixity of dairy processing materials is an attempt to reflect the dominant institutional structural relationship between the primary and processing sectors over the sample period discussed in Section 1. The dairy processing sector has been operated until very recently along co-operatives lines where milk producers form the vast majority of shareholders. In this context the processing sector has no alternative but to accept the bulk of milk produced in the primary sector for processing. Since no significant international trade operates for obvious reasons and the direct sales of milk form a very small fraction of milk production it appears reasonable to postulate fixity of dairy materials to the aggregate food industry. This specification permits a straight forward means of modelling the effects of the quota. A second point of departure from the treatment employed in other sectors is the functional form employed. The results reported below are based on the estimation of a normalised quadratic function (Denny, Fuss and Waverman 1981). The reason this function was adopted over other candidates such as the translog and the Morrison-Leontief forms was because the resulting derivative indicators appeared more plausible. Like the Morrison-Leontief form, the normalised quadratic permits solutions of the long-run capital stock and the output level to be obtained analytically.

3.1 *The Model*

The short-run total profit function is given by

$$P^{s}(w; k, q, t, z) = P_q q - CV^{s}(w; z, k, q, t) - p_k k \qquad (4)$$

where, P^{s} is short-run total profits, w is a vector of variable input prices; k is the capital stock; q is the level of output, t is a time trend to approximate technological change and z is the level of dairy processing materials; CV^{s} is short-run variable cost, p_q is the output price and P_k is the *ex ante* capital price.

$$(dCV^{s}/dw_l) = L(w; z, k, q, t): \text{labour demand} \qquad (5)$$

and

$$(dCV^{s}/dw_m) = M(w; z, k, q, t): \text{non-dairy materials demand} \qquad (6)$$

Long-run optimal output (q*) and capital (k*) are obtained also by Shephard's Lemma

$$(dCV'/dk) = -p_k \qquad (7)$$

$$(dCV'/dq) = p_q \qquad (8)$$

Equations (5) and (6) are estimated jointly as a system and the parameters are then used to derive optimal q* and k* in (7) and (8). If (5) - (8) were estimated as a system this would implicitly violate the assumptions of quasi-fixity of k and q and would imply no short-run disequilibrium in respect of these variables (Conrad and Unger (1987), Kulatilaka (1985).

Equations (7) and (8) can be solved for q* and k* but these variables may be substantially removed from current levels. As for the remaining non-food sectors we estimate the adjustment to the long run via a simple partial adjustment/ECM model. Thus

$$q = dq^* + (e-d)q^*_{(-1)} + (1-e)\, q_{(-1)} \qquad (9)$$

$$k = fk^* + (g-f)k^*_{(-1)} + (1-g)\, k_{(-1)} \qquad (10)$$

where d, e, f, g, are parameters to be estimated.

It remains then to postulate a functional form for CV' enabling (5) and (6) to be estimated and(7), (8) to be derived allowing (9) and (10) to be modelled. We postulate the normalised quadratic function which is a member of the flexible class and as noted allows (7) and (8) to be solved analytically. In the estimation symmetry is imposed and linear homogeneity in input prices is achieved by normalising short-run variable costs by the wage rate.

Thus,

$$\begin{aligned}(CV'/w_l) = L + (w_m/w_l)\, M = {} & a_0+a_{0t}\,t+a_m(w_m/w_l)+a_q q+a_z z+a_k k \\ & +0.5(a_{mm}(w_m/w_l)^2+a_{tt}\,t^2+a_{qq}q^2+a_{zz}z^2+a_{kk}k^2) \\ & +a_{mt}(w_m/w_l)\,t+a_{mq}(w_m/w_l)q \\ & +a_{mz}(w_m/w_l)z+a_{mk}(w_m/w_l)k \\ & +a_{tq}tq+a_{tz}tz+a_{tk}tk+a_{qz}qz+a_{qk}qk+a_{zk}zk \end{aligned} \qquad (11)$$

$$(dCV'/d(w_m/w_l)) = M = a_m+a_{mt}t+a_{mq}q+a_{mm}(w_m/w_l)+a_{mk}k+a_{mz}z \qquad (12)$$

The labour demand equation is got by (11)-(w_m/w_l)(12) and is

$$L = a_0 + a_{0t} + a_{tt} + a_{zz} + a_{qq} + 0.5(a_{tt}t^2 + a_{qq}q^2 - a_{mm}(w_m/w_l)^2 + a_{kk}k^2 + a_{zz}z^2) + a_{tq}tq + a_{tk}tk + a_{tz}tz + a_{qk}qk + a_{qz}qz + a_{kz}zk \quad (13)$$

Equations (12) and (13) are jointly estimated with a maximum likelihood estimator. Note that for consistency with behaviourial assumptions, $a_{mm} < 0$ and $a_{mq} > 0$. Using the estimated parameters we obtain the optimal capital stock (k*) by equating $(dCV'/dk)$with the *ex ante* normalised capital price (p_k/w_l) and solving for k* we get

$$k^* = (-1/a_{kk})(a_k + a_{mk}(w_m/w_l) + a_{qk}q^* + a_{tk}t + a_{zk}z + (p_k/w_l)) \quad (14)$$

and

q* is derived by equating marginal cost to price on the assumptions that market conditions are characterised by perfect competition. Solving for q* we have

$$q^* = (1/a_{qq})((w_m/w_l) - a_{qk}k^* - a_q - a_{qm}(w_m/w_l) - a_{qk}k - a_{qz}z) \quad (15)$$

In order for $(dk^*/d(w_m/w_l)) < 0$ and $(dq^*/d(p_q/w_l)) > 0$ we require that a_{kk} and $a_{qq} > 0$. Also for $(dk^*/dq) > 0$ and $(dq^*/dk) > 0$ it follows that $a_{qk} < 0$.

3.2 *Empirical Results*

The estimation of equations (12) and (13) yielded the parameters shown in Table 15. These estimates are termed the "unrestricted" estimates.

There is evidently a good number of significant coefficients. It is apparent, however, that there are a number of unacceptable features about the findings. The parameters a_{kk} and a_{qq} have incorrect signs and hence violate convexity rendering the derivation of q* and k* impossible. A further notable element of the results is the statistically insignificant albeit negative coefficient for a_{mm} implying negligible input price effects on input choices. The sign of a_{qk} is incorrect implying excess capacity in that $(dk^*/dq) < 0$ and $(dq^*/dk) < 0$.

The principal problem with the estimates then is the violation of sign requirements for a_{qq}, a_{kk} and a_{qk}. In an attempt to resolve this weakness we performed a series of likelihood ratio tests by conducting a grid search on values of a_{qq} and a_{kk} greater than zero. Where significantly different likelihood values were obtained for the given value of a_{qq} and a_{kk} we

Table 15: *Unrestricted Normalised Quadratic Cost Function Estimates for the Food Sector (Period of Estimation: 1961 - 82).*

	Coefficient Estimate	*Standard Error*
a_m	-.205	.168
a_{mt}	-.033	.016
a_{qm}	1.411	.296
a_{mm}	-0.029	.049
a_{mk}	.216	.203
a_{mz}	.085	.084
a_0	.824	.623
a_{0t}	-.033	.096
a_k	-4.189	1.108
a_z	1.904	.789
a_q	2.394	2.662
a_{tt}	-0.061	.015
a_{qq}	-8.460	5.727
a_{kk}	-4.392	2.272
a_{zz}	2.959	.642
a_{qt}	-0.066	.165
a_{tk}	.610	.196
a_{tz}	.053	.085
a_{qk}	8.290	2.473
a_{qz}	-1.308	1.468
a_{kz}	-4.600	1.324

System Statistics

Equation (9) $R^2 = .98$ DW = 2.02
Equation (10) $R^2 = .84$ DW = 1.98

Log L = 115.26

concluded the search and chose those particular values of a_{qq} and a_{kk} as our parameter estimates. The results of the grid search are given in Table 16.

This analysis would reject values of $a_{qq} = 1.50$ at the 10 per cent confidence level but clearly would not reject values equal to one. We also tested the restriction that $a_{qq} = 1$, a_{kk} and $a_{mm} = 0$ which also could not be rejected. We then attempted to establish if non-positive values for a_{qk} would significantly affect the likelihood value but rejected the restriction. We thus opted to base our derivation of q* and k* on the latter restriction. The full set of parameter estimates incorporating the above restrictions are shown in Table 17.

Table 16: *Likelihood Ratio Tests on Values of* a_{qq}, $a_{kk} > 0$

Parameter values	*Log Likelihood*	*Likelihood Ratio*
(Unrestricted Model)	115.26	-.—
0.20	113.72	-3.09
0.30	113.65	-3.23
0.40	113.57	-3.38
0.50	113.49	-3.54
1.00	113.10	-4.32
1.50	112.69	-5.12
($a_{qq} = 1; a_{kk} = 1;$	113.09	-4.31
$a_{mm} = 0$)		

Table 17: *Restricted Normalised Quadratic Cost Function Estimates for the Food Sector (Period of Estimation: 1961 - 82)*

	Coefficient Estimate	*Standard Error*
a_m	-0.239	0.159
a_{mt}	-0.030	0.015
a_{qm}	1.393	0.298
a_{mm}	0.000	-.—
a_{mk}	0.217	0.206
a_{mz}	-0.091	0.085
a_0	1.789	0.221
a_{0t}	0.112	0.057
a_k	-3.563	0.914
a_z	2.290	0.708
a_q	-2.083	0.508
a_{tt}	-0.025	0.010
a_{qq}	1.000	-.—
a_{kk}	1.000	-.—
a_{zz}	2.994	0.553
a_{qt}	-0.264	0.103
a_{tk}	0.202	0.110
a_{tz}	0.139	0.060
a_{qk}	6.639	2.100
a_{qz}	-2.495	1.227
a_{kz}	-4.747	0.912

System Statistics

Equation (12) $R^2 = 0.98$; DW = 2.02
Equation (13) $R^2 = 0.89$; DW = 1.84
Log L = 113.09

Utilising these parameter estimates we solve for q* and k* using (14) and (15). The resulting values are shown in Table 18.

Table 18: *Optimal and Actual Output and Capital Stock for the Irish Food Sector (1970 = 1.00)*

Year	*Actual Output*	*Optimal Output*	*Actual Capital*	*Optimal Capital*
1962	0.69	0.56	0.52	0.40
1963	0.71	0.57	0.58	0.42
1964	0.73	0.58	0.63	0.42
1965	0.76	0.59	0.69	0.43
1966	0.81	0.59	0.75	0.45
1967	0.89	0.62	0.82	0.48
1968	0.92	0.66	0.89	0.50
1969	0.96	0.70	0.95	0.53
1970	1.00	0.68	1.00	0.53
1971	1.05	0.70	1.06	0.54
1972	1.08	1.06	1.13	0.70
1973	1.15	1.19	1.29	0.76
1974	1.19	1.23	1.41	0.80
1975	1.25	1.27	1.50	0.82
1976	1.32	1.34	1.55	0.85
1977	1.43	1.44	1.60	0.91
1978	1.50	1.49	1.72	0.94
1979	1.56	1.62	1.91	1.02
1980	1.54	1.66	2.03	1.06
1981	1.54	1.61	2.09	1.05
1982	1.59	1.73	2.13	1.11

The results imply substantial over capitalisation over most of the period and actual output running below its optimal level.

The ECM regressions in the main proved disappointing, especially in the case of the sector's output. Initial results using OLS for the output and capital stock equations respectively yielded serious autocorrelation problems so the results reported in Table 19 were obtained with a first order autocorrelation correction estimator.

Table 19: *ECM Regression Results*

	Parameter Estimate	*Standard Error*
(R^2 = 0.02; DW = 2.09)		
d	0.06	0.09
e	0.06	0.11
(R^2 = 0.5; DW = 1.45)		
f	0.07	0.23
g	-0.09	0.04

In the case of the output equation it is clear that no relationship is established between the change in actual output and either the change in optimal output or the disequilibrium term. An implication is that output generation in the food sector is only tangentialy, if at all, related to economic factors. The result may, however, simply cast doubt on the behaviourial motivation assumed for the sector.

The story revealed for the capital stock is somewhat better. The disequilibrium term is significantly and positively related to changes in the stock.

3.3: *Elasticity Estimates*

In principle it is possible to compute two sets of response parameters. The first set we term the "short-run" elasticities which are conditional on the quasi-fixed levels of output and the capital stock. An alternative set which could be obtained are the "long-run" elasticities which would correspond to the values evaluated for the optimal levels of capital and output. We feel that given the wide discrepancy between the actual and optimal levels of output and capital it would be inappropriate to report these parameters. It would be merely to build an edifice on a foundation of sand. The short-run elasticities are exhibited in Table 20 for the 1970 datapoint (that is, the point of approximation of the flexible function).

Table 20: *Short-Run Elasticities for the Food Sector, 1970*

	Variable inputs				*Non-variable factors*	
Quantity	Materials-cattle	Labour	Output	Capital	Materials milk	Trend
Materials-cattle	0.00	0.00	.1.39	0.22	-0.09	-0.003
Labour	0.00	0.00	0.43	1.35	-1.96	-0.196

The elasticities elucidate the pattern which has been coming through the econometric results. The production system is basically a Leontief structure as far as the material inputs are concerned. A few features are worth noting. Output is clearly materials-cattle intensive. A glance at equation (15) shows that the elasticity of output with respect to milk materials depends on the negative value of the parameter a_{qm} which is 2.5 from Table 17. Labour appears complementary with capital and this may be possible if the labour input has a high skill component which it would have in the dairy processing industries. An odd sign which is difficult to interpret is the implied substitution between milk materials and labour. It

could be possible that increases in milk materials make the introduction of labour-saving technology more attractive because of scale economies. Thus it is possible to have capital squeezing out unskilled and semi-skilled labour while being complementary with skilled labour. Disaggregation of the labour input into skilled and other components would be required to test this hypothesis. The trend coefficient on the labour input clearly points to a major labour shedding process underway in the food industries.

What does our modelling exercise in the food sector add up to, apart from the intense frustration experienced by this econometrician? Well maybe the lesson to be learned is that the story is very simple. The output of the food sector is driven by the supply of raw materials from the primary sector. This raw material is subject to very basic processing. The output of the sector is exogenously determined either by the EC intervention mechanism or by world export markets. To model the sector we simply need to know the appropriate input output coefficients and their secular trends. The emphasis then in understanding the process driving the sector's activity is to be found by concentrating on the factors determining the primary sector's output.

4: *SOME CONCLUDING REMARKS*

In a study of this nature it is always necessary to draw attention to the deficiencies in the methodology. Some of these deficiencies are by way of omission unlike others arising from the estimation results themselves. An important omissions from our primary sector model, for instance, is the absence of an attempt to endogenise variables like family labour, fixed and live capital. There were good reasons for not incorporating those variables in the present exercise – the principal being the apparent irrationality of some of the estimated responses – but future endeavour needs to address this issue. The assumed fixity of these variables in the current version of the model limits the time horizon to the short term in the Marshallian sense.

Aside from this deficiency there are also some problematical features of the primary sector model as estimated. For one the results for the tillage sector are not satisfactory with a negative aggreagate tillage elasticity being obtained and some implausibly high cross-price elasticities between tillage sub-aggregates and other products. Because of its importance, the findings for the cattle sector need to be appraised cautiously. Cattle are basically a capital type product. When price expectations are favourable rational producers will use more female animals for breeding. The progeny of these animals will add to output some two to three years onwards. Thus it is

rational to expect a negative supply response effect in the short term and a positive effect in the long term. In our model we only reveal the short term effect. This deficiency can in principle be remedied by treating cattle as a quasi-fixed output and encouraging results have been produced recently to add weight to such a specification (see Boyle and Guyomard (1989)). It remains to incorporate this perspective into the overall model.

We must also draw attention to the fact that the model represented here is for the "national farm". This is obviously what is of principal interest in terms of the assessment of economy-wide effects. However, the drift of much of recent agricultural policy changes is for much more targeted intervention. In other words the emphasis is increasingly being placed on regional, farm size and scale effects. Our model is not designed to capture such impacts. The disaggregation of the "national farm" model into various sub-models based on a variety of classifications which are of relevance to policy intervention clearly merits consideration in future research.

In many respects the processing sector modelling exercise proved disappointing. On reflection this may simply underline the nature of activity conducted in this sector. However, further work is needed to understand the behaviourial motivation of firms in the dairy and meat-processing sub-sectors. The dominance of the co-operative structure in the dairy sector and how this affects performance warrants closer attention than we were able to give it in this exercise. In the beef processing sector a different ownership structure applies. Here, issues such as possible monopsonistic behaviour would appear worthy of research endeavour.

On a final note it is worth remarking that it is only through repeated applications of the model that we can learn its strengths and weaknesses. With the pace of change in the agricultural policy horizon gathering momentum there is unlikely to be shortage of simulation experiments in the near future.

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Chapter 3

THE EXCHEQUER COSTS OF UNEMPLOYMENT AMONG UNQUALIFIED LABOUR MARKET PARTICIPANTS

Richard Breen with Sally Shortall

SUMMARY

In Ireland, as in most other industrialised countries, men and women who lack formal educational qualifications experience the greatest degree of difficulty in the labour market. Unemployment rates at all ages are sharply differentiated according to the level of educational qualifications individuals possess: those who lack qualifications having the highest rates. Clearly, if the unqualified are more prone than others to unemployment, they will spend a correspondingly greater proportion of their working lives in unemployment. The consequence of this is that, over an individual's working life, the state will incur a greater level of expenditure per head on unemployment compensation (unemployment assistance (UA) and unemployment benefit (UB)) in respect of the unqualified than it will in respect of other groups. From this perspective, if from no other, the state has an incentive to try to improve the position of the unqualified, if this is not at the expense of others in the labour force. The objective of this report is to provide some estimates of what we might call this "excess cost" of unemployment compensation paid to the unqualified over their working life. We measure this excess cost in respect of a single year of age cohort between ages 15 and 59. It is an estimate of the difference between the lifetime cost of unemployment compensation to the unqualified (under various unemployment and emigration rate regimes) and our estimate of what this cost would be if the unqualified in fact possessed the minimum level of educational qualifications. The methodology employed is outlined in Section 3.

Our estimates are given in Section 4. They range between IR£68 million and IR£23 million (at 1988 values) over the labour market life of our single year of age cohort, depending on the unemployment and emigration assumptions used. The set of assumptions on which our estimates are based are such as to ensure that these are very conservative estimates.

Furthermore, the costs of unemployment compensation are not the only costs which high unemployment places on the state. For example, if, as much research has suggested, prolonged unemployment leads to poorer psychological and physical health, this will, in turn, impose an extra cost on the health services.

In Sections 1 and 4 we discuss the possibility of realising these excess costs of unemployment among the unqualified as savings through intervention to raise educational and skill levels. To the extent that this is possible, the magnitude of the excess costs points both to the need and the scope for policies in education and training which would address the problem of unqualified school leavers.

1: *INTRODUCTION AND AIMS OF STUDY*

1.1: *Introduction*

In Ireland, as in most other industrialised countries, men and women who lack formal educational qualifications experience the greatest degree of difficulty in the labour market. The problems of unqualified labour market participants are perhaps most evident in the youth labour market, where they tend to spend a longer time in search of a first job and are more likely to lose jobs having found them. Notwithstanding this, as we show in Section 2, unemployment rates at all ages are sharply differentiated according to the level of educational qualifications individuals possess: those who lack qualifications having the highest rates.

In recent years a number of training and other labour market interventions have been instituted to try to improve the position of the unqualified. By and large these programmes have mixed training with temporary employment. In Ireland the Social Guarantee Scheme, which operates in the youth labour market, guarantees a training programme place to all who leave school lacking in qualifications and who are unable to find work within six months.

Clearly, if the unqualified are more prone than others to unemployment, they will spend a correspondingly greater proportion of their working lives in unemployment. The consequence of this is that, over an individual's working life, the state will incur a greater level of expenditure per head on unemployment compensation (unemployment assistance (UA) and unemployment benefit (UB)) in respect of the unqualified than it will in respect of other groups.[1] From this perspective

[1] This assumes, of course, that the rate of unemployment assistance and/or benefit paid by the state is independent of the educational qualifications of the unemployed. There is no reason to assume that this is not so.

the state has an incentive to try to improve the position of the unqualified, providing that this is not at the expense of others in the labour force.

The objective of this report is to provide some estimates of what we might call this "excess cost" of unemployment compensation paid to the unqualified over their working life. We measure this excess cost as follows. We first calculate the hypothetical total cost of unemployment compensation to a single year of age cohort as it progresses through the labour force. The exact method used is discussed in Section 3, but, briefly, we calculate, in respect of the cohort aged 14 in 1987, age specific labour force participation and unemployment levels up to age 59. The unemployment estimates are then multiplied by the assumed present value rate of unemployment compensation to arrive at the total lifetime cost of unemployment compensation for this cohort. We make these calculations in respect of four subgroups within the cohort, defined, as follows, in terms of their educational qualifications:

i. those who lack any formal qualifications;
ii. those who possess the Group and/or Intermediate Certificate;
iii. those who possess the Leaving Certificate;
iv. those who possess a third-level qualification.

Thus we arrive at age, sex and educational qualification specific estimates of the labour force participation of this cohort; of the numbers unemployed; and of the costs of this unemployment.

We then ask how these costings would change if the group which lacks educational qualifications, and which has the highest rates of unemployment in our projections, were to have unemployment rates equal to those of the group with the lowest level of qualifications (those who possess the Group or Intermediate Certificate). The result is a hypothetical exchequer saving which could arise if two conditions were met:

CONDITION A: young people who would otherwise have left school without qualifications in fact leave with at least the Group Certificate; and

CONDITION B: such young people's job prospects are enhanced such that, without causing increased unemployment elsewhere in the labour force, their rate of unemployment falls to that observed among young people who possess the Group or Intermediate Certificate.

Condition B asserts that improving the supply of labour will be matched one for one by an increase in the number of jobs: in other words, that there will be no displacement effects. Those who would otherwise have left

school without qualifications will improve their chances of getting a job, but this will not be at the expense of anyone else in the labour market. This is an extreme assumption. The other extreme is to assume total displacement: in other words, improving the supply of labour will have no effect on the level of labour demand.

It is not the purpose of this report to discuss the means by which the demand for labour can be increased. However, we can point to at least two mechanisms by which improvements in the quality of the labour supply may lead to increased demand for labour, and which therefore suggest that total displacement is unlikely. One can argue, for example, that improving the supply of labour by reducing the number of unqualified labour market participants will make the labour market more competitive. At present, those who lack qualifications are unable to compete effectively in the labour market against those with some qualifications. If the stock of qualified labour is increased then increased competition will lead to a lowering of wages so causing firms to become more competitive. This, in turn, will translate into economic growth and increased demand for labour.

One problem with this argument, in the present context, is that it is unlikely that wage levels among those with minimal levels of qualifications can, in fact, be bid down by increased competition because these wage levels may already be very close to the minimum possible. Perhaps a more plausible means by which improving the labour supply leads to greater labour demand is via the effects that better qualified or skilled workers have on productivity. The productivity of firms which can hire "better" workers will increase, making them more competitive, leading to their growth and to increased demand for new workers.

Our hypothetical exchequer saving is our measure of the excess cost of unemployment compensation attributable to the lack of qualifications within a proportion of the cohort. We find that the lifetime excess costs of unemployment compensation for the unqualified are very large, irrespective of the assumptions we make about future unemployment and emigration levels. Thus a considerable incentive exists to tackle the problem. The increased availability of resources from the European Social Fund provides a means of further addressing this issue: the question then becomes how to intervene in the most effective manner. Two broad strategies are possible. The first of these is intervention through the educational system. By this we mean programmes which would seek to ensure that, so far as possible, no one left the educational system without formal qualifications. The second strategy is intervention post-school. This would comprise a continuation of present policies, such as the Youthreach

programme and the Social Guarantee. The balance between these two sorts of interventions ought to be determined on the basis of finding the optimally cost-effective combination of strategies.

In the remainder of this Section we provide a brief outline of the Irish educational system and of the data sources used in this study. In Section 2 we review the evidence concerning the position of the unqualified in the labour market, and we also make some remarks about the relative effectiveness of the two intervention strategies we outlined in the previous paragraph. Section 3 outlines the assumptions and methods employed in our costings. Section 4 contains our estimated costings and concluding remarks.

1.2: *The Irish Educational System*

The Irish educational system has three levels: primary, which is attended by children between the ages of 4 and 12; post-primary or second level, which is attended between 12 and 17 or 18; and third level, which comprises Universities, Technological Institutes, Teacher Training, and so on. The minimum school leaving age is 15 years.

Second-level education takes place in one of three main types of school. The Secondary schools are the most numerous: traditionally they tended to offer a curriculum which concentrated on non-technical subjects. Vocational schools were specifically established to provide a curriculum orientated towards more technical, practically based subjects. Community and Comprehensive schools sought to provide a mixed curriculum. In recent years the curricula of the three types of school have tended to become more similar. Secondary schools have included more practical, technical subjects, while Vocational schools have added non-technical subjects.

Second-level education is divided into two cycles: junior cycle and senior cycle. Within the junior cycle, two public exams could be taken up to 1991. (From 1992 onwards these exams are replaced by a new Junior Certificate exam.) The Group Certificate was usually taken after two years. This was a set of exams in practical, technically orientated subject areas. This exam tended to be taken only by pupils in Vocational and Community or Comprehensive schools. The Intermediate Certificate was usually taken after three years. Here pupils were examined in, on average, eight subjects drawn from a wide range of possible subjects. Some pupils (notably in Vocational, Community or Comprehensive schools) took the Group Certificate and then the Intermediate Certificate.

The senior cycle begins after the Intermediate Certificate. Around 70 per cent of all young people enter the senior cycle which usually lasts for two years and culminates in the Leaving Certificate, the terminal second-level exam. Here pupils are examined in, on average, seven subjects, drawn from

a wide range of possible subjects. After the Leaving Certificate young people may go on to third-level education, or other forms of full time vocational education (such as secretarial colleges and nursing training). The bulk of the remainder enter the labour market.

There is also a programme of within school training called the Vocational Preparation and Training Programme. This provides either a one or two year course for young people who have left school within the previous year and wish to return to learn additional skills, and for young people who would otherwise leave school and enter the labour force.

1.3: *Data Sources*

Two main data sources are used in this report: these are the annual School Leaver Survey; and the 1988 Labour Force Survey.

(i) The School Leaver Survey

The School Leaver Survey has been carried out annually since 1980 by The Economic and Social Research Institute on behalf of the Department of Labour. In May/June of each year approximately 2,000 young people who terminated their post-primary education during the previous school year are interviewed. So, for example, in the 1990 School Leaver Survey, undertaken in May/June 1990, interviews were carried out with young people who had left post-primary schools during the academic year September 1988 to August 1989. Since the great majority of young people leave school in June, the survey is taken approximately one year after school leaving. The sample used in the survey is representative of the entire cohort of school leavers. A set of basic tables is published each year by the Department of Labour, in which the survey numbers are grossed up to the relevant population totals.

A subsidiary data set used in the results presented in Section 2 of this report is the School Leaver Follow-Up Survey. In November 1984, the sample of school leavers first interviewed in the 1983 School Leaver Survey, were re-interviewed. Data were collected on their educational and labour market careers over the entire period from leaving school (in the academic year 1981-82) until the survey date. In December 1987/January 1988 this same sample was re-interviewed again. The results of these three surveys allow us to construct a picture of the educational and labour market careers of post-primary school leavers over a 5½ year period.

(ii) The Labour Force Survey

The Labour Force Survey is undertaken annually by the Central Statistics Office. The target population is all the usually resident population of all private and non-private households in the state. In the 1988 Survey the sample comprised 154,600 persons, roughly 4.4 per cent of the total population. The main thrust of the Labour Force Survey questionnaire

relates, as one might expect, to labour market participation and position. However, the 1988 Survey contained, for the first time, a question relating to educational qualifications. This applied to all persons and asked "What is the highest level of education the person has completed?" The responses were then coded as follows:

0: no formal education
1: primary education
2: Intermediate Certificate/"0"-levels
3: Leaving Certificate
4: Third level, non-university
5: Third level, university
6: higher university degree

The results of this question, together with the usual labour force information collected in this survey, provide us with evidence of the relationship between qualifications and unemployment rates among all age groups. Some of this is reported in Section 2 and we draw upon it extensively in our estimates, as discussed in Section 3.

2: *QUALIFICATIONS AND LABOUR MARKET POSITION*

2.1. *Introduction*

This chapter examines the relationship between educational qualifications and labour market position in Ireland, and discusses the evidence concerning the effectiveness of training in addressing the problems of unqualified labour market participants.

2.2. *Unqualified School Leavers in the Labour Market*

An estimate of the number of young people leaving second-level education each year without qualifications can be obtained from the Department of Labour's School Leaver Surveys. Table 2.1 shows the number of school leavers who have left school each year throughout the 1980s without any qualifications. Despite some fluctuation, there has been an overall decrease in the number of both males and females leaving school at this level. 10.4 per cent of the 1979-80 cohort left school without qualifications, while only 6.0 per cent of the 1987-88 cohort did so. Far more young people are staying in school until they have completed their Leaving Certificate. As we can see from Table 2.1, the decrease in the numbers of males leaving school without any qualifications is greater than the decrease in the number of females. However, there is still a smaller percentage of girls than boys leaving post-primary school with no qualifications.

Table 2.1: *Number of School Leavers by Sex by Educational Qualifications (percentage of total in parentheses)*

	No qualifications		*Group Inter Cert*		*Leaving Cert*		*Total*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
1979-80 Cohort	4061 (12.2)	2652 (8.5)	12,303 (36.8)	6588 (21.1)	17,034 (51.0)	22,026 (70.5)	33,398	31,265
1980-81 Cohort	2256 (7.3)	2307 (7.7)	11,565 (37.2)	5160 (17.3)	17,282 (55.6)	22,342 (75.0)	31,103	29,810
1981-82 Cohort	2640 (8.5)	2298 (7.6)	10,147 (32.6)	5658 (18.6)	18,385 (59.0)	22,422 (73.8)	31,172	30,378
1982-83 Cohort	2786 (8.6)	1988 (6.7)	10,290 (31.8)	5616 (18.6)	19,327 (59.6)	22,603 (74.8)	32,403	30,207
1983-84 Cohort	3113 (9.9)	1953 (6.7)	9678 (30.7)	5477 (18.7)	18,787 (59.5)	21,891 (74.7)	31,579	39,322
1984-85 Cohort	2400 (7.3)	2000 (6.4)	9600 (29.2)	4900 (15.7)	20,800 (63.2)	24,400 (78.0)	32,900	31,300
1985-86 Cohort	3100 (9.2)	1700 (5.3)	8900 (26.5)	6100 (18.9)	21,600 (64.3)	24,400 (75.8)	33,600	32,200
1986-87 Cohort	2500 (7.3)	1900 (5.9)	9600 (28.2)	6000 (18.5)	22,000 (64.5)	24,500 (75.6)	34,100	32,400
1987-88 Cohort	2300 (6.6)	1800 (5.4)	9700 (28.0)	5500 (16.6)	22,700 (65.4)	25,800 (77.7)	34,700	33,200

Source: School Leaver Survey (various)

Table 2.2 shows the unemployment rates of school leavers at a point approximately one year after leaving school. Higher rates of unemployment are experienced by unqualified school leavers. The probability of being unemployed drops significantly if the young person has obtained the Group or Intermediate Certificate, which is the lowest educational qualification. For the 1987-88 cohort, the likelihood of being unemployed fell from 45.8 per cent for unqualified males to 28.7 per cent if they had the Inter or Group, and from 30.7 per cent for unqualified females to 16.1 per cent if they had the Inter or Group. In addition the unqualified group is most affected by an overall increase in the level of youth unemployment. When youth unemployment peaked in 1983-84, the unemployment rate for the unqualified also increased dramatically. No such pronounced jump in the unemployment rate occurred for either those with the Group/Inter, or those with the Leaving Cert. Those school leavers with no qualifications seem to be the most vulnerable to overall increases in rates of youth unemployment.

Table 2.2: *Unemployment Rate of School Leavers by Sex by Educational Qualification*

	No Qualifications		*Group/Inter Cert*		*Leaving Cert*		*Total*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
1979-80	30.6	31.1	18.3	14.4	15.2	11.9	19.1	14.6
1980-81	34.2	41.2	15.3	18.9	13.3	14.4	16.2	18.1
1981-82	46.6	44.8	24.6	26.7	29.2	18.9	29.1	23.2
1982-83	32.8	42.6	28.2	33.3	18.6	19.4	24.3	24.9
1983-84	55.1	60.3	29.3	26.2	24.4	22.3	30.8	26.6
1984-85	38.4	44.0	28.9	36.6	21.7	17.5	26.2	24.5
1985-86	44.2	44.1	27.9	29.2	26.8	20.1	29.5	24.0
1986-87	55.5	52.9	22.9	30.8	18.2	14.8	24.2	22.7
1987-88	45.8	30.7	28.7	16.1	16.2	16.5	24.5	17.6

$$\text{Unemployed rate} = \frac{100 \times (U + SFJ)}{E+U+SFJ+S)}$$

SFJ = Seeking First Job
U = Unemployed
E = Employed
S = On Scheme
Source: As Table 2.1

Table 2.3 traces the unemployment rates of 1981/82 school leavers over a five year period. While the overall percentage unemployment rates declined over this period, the rates for unqualified males and females show little change. Recent research (Breen, 1991) shows that unqualified school

leavers are, over this period, less likely to acquire jobs and more likely to lose jobs than are those with qualifications. FÁS (*Labour Market Monthly*, Issue No. 10, November 1989) identify lack of qualifications as a distinctive feature of the long-term unemployed (see also Whelan *et al.*, 1990 for similar findings). The figures in Table 2.3 suggest that differentials in unemployment rates according to educational qualifications establish themselves within two to three years of labour market entry and change little after that point.

Table 2.3: *The Unemployment Rate of 1981/82 School Leavers Over a Five Year Period by Sex by Educational Qualification*

	No Qualifications		*Group/Inter Cert*		*Leaving Cert*		*Total*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
December 1982	49.0	47.5	35.0	39.2	26.7	28.7	33.3	34.3
December 1983	42.9	48.9	27.2	28.9	15.5	15.0	24.2	22.8
December 1984	42.0	41.3	26.2	23.5	14.1	13.0	22.8	19.0
December 1985	37.0	43.8	23.5	24.5	14.2	11.5	21.1	18.6
December 1986	50.0	43.5	27.5	28.2	14.5	13.7	24.7	20.9
December 1987	41.1	46.5	26.0	27.3	11.8	11.9	21.8	19.5

Source: Five Year Follow Up of 1981-82 School Leavers

2.3: *Labour Market Position and Qualifications*

Table 2.4 presents a breakdown of the educational composition of the 1988 labour force in each age group for each sex using data from the 1988 Labour Force Survey[2] It is clear that many more of the older age groups have no qualifications. Between 63 per cent and 69 per cent of men aged between 55-64 years have no qualifications while this is true of only between 12 per cent and 17 per cent of males aged 20-29 years. Females have always had a higher level of qualification than males, although similar patterns are evident across the age spectrum - between 56 per cent and 62 per cent of women between 55-64 years have no qualifications, while this is the case for between 10 and 16 per cent of females aged 20-29 years. The chief factor accounting for the age differences in qualification levels is the introduction of free secondary education in 1967, together with the raising of the school leaving age to 15 in 1972.

[2] All data relating to the 1988 labour force come from the 1988 Labour Force Survey and were made available to us by the Central Statistics Office. The tables presented here constitute the first published direct evidence of the relationship between educational qualifications and labour market status for the entire Irish labour force.

Table 2.4: *Level of Education by Age by Sex*

	Level of Education									
Age Group	*Not Stated*		*None or Primary*		*Inter/Group Cert*		*Leaving Cert*		*Third Level*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
15-19 years	0.12	0.18	26.7	22.9	52.3	50.8	20.1	24.7	0.93	1.4
20-24 years	0.07	0.30	12.4	10.0	30.8	21.8	43.4	53.3	13.3	14.7
25-29 years	0.48	0.24	17.1	15.6	34.1	25.6	31.1	42.3	17.2	16.2
30-34 years	0.41	0.25	25.3	21.5	31.6	27.6	25.8	34.7	16.9	15.9
35-39 years	0.26	0.35	37.5	32.7	26.3	25.0	19.2	28.2	16.7	13.7
40-44 years	0.57	0.10	45.4	38.6	22.0	24.8	17.3	24.7	14.7	11.9
45-49 years	0.35	0.73	52.1	42.4	20.4	23.6	15.5	17.7	11.7	9.6
50-54 years	0.67	0.27	57.0	48.8	16.2	22.1	15.2	20.2	11.0	8.7
55-59 years	0.43	0.56	63.2	55.8	15.2	18.0	12.0	17.6	9.2	8.0
60-64 years	0.62	0.71	68.9	62.1	10.7	15.4	11.3	15.0	8.4	6.8

Source: 1988 Labour Force Survey

Table 2.5 shows the rates of unemployment by level of qualification for each age group. Older people who are unqualified have a lower rate of unemployment than the younger age groups who are unqualified. However the likelihood of being unemployed decreases for all levels of qualification as we move to the older age groups and decreases more significantly for those who have some level of qualification. Nevertheless, within every age group those who left school without any qualifications maintain the highest rates of unemployment relative to those who attained some level of qualification.

Table 2.5: *Unemployment Rate by Age Group by Level of Qualification by Sex*

	Level of Education							
	No Qualifications		*Group/Inter Cert*		*Leaving Cert*		*Third Level*	
Age Group	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
15-19 years	36.8	39.5	22.9	24.3	14.1	12.7	30.0	12.5
20-24 years	46.2	32.7	27.8	20.1	12.6	9.3	6.3	5.8
25-29 years	39.5	19.6	20.7	12.9	8.2	3.5	4.9	2.9
30-34 years	33.7	8.7	18.3	7.9	7.3	3.1	4.1	2.8
35-39 years	31.1	10.9	14.8	6.6	8.0	2.0	2.1	2.0
40-44 years	25.8	7.8	14.8	3.9	7.0	1.4	1.3	-
45-49 years	24.7	8.8	10.4	4.3	4.8	3.9	-	2.0
50-54 years	19.2	8.6	9.8	5.4	7.6	2.6	2.5	2.3
55-59 years	17.6	10.0	10.1	4.0	4.5	2.9	3.4	-
60-64 years	18.2	3.0	7.1	-	5.0	5.3	2.6	-

Source: As Table 2.4

2.4: *Labour Market Interventions*

In Section 1 we noted two approaches to addressing the question of improving the labour market position of the unqualified. The first of these is intervention through the educational system. By this we mean programmes which would seek to ensure that, so far as possible, no one left the educational system without formal qualifications. The second of these is intervention post-school. The balance between these two sorts of intervention ought to be determined on the basis of finding the optimally cost-effective combination of strategies. In order to do this we require, not least, information on the likely effectiveness of each of the two approaches. By and large, such information is not available. Within the educational system a limited number of relevant programmes have been introduced. Notable among these have been the pre-employment schemes of the 1970s which developed into the Vocational Preparation and Training Programme (VPTP) in the 1980s. Numbers on this programme are substantial: around 20,000 annually. Although the programme is school based it is not unequivocally an educational intervention, in so far as it recruits both directly from school and from among those who have spent some time in the labour market. The purpose of the programme is to equip young people more fully for the task of job seeking. It is not, however, directed solely at those who lack qualifications.

Remedial education was introduced into Irish schools in the late 1970s. However, provision in this area was curtailed during the 1980s. Other interventions have largely taken the form of pilot projects, such as the Home School liaison project run by the Dublin Vocational Educational Committee's Curriculum Development Unit in the early 1980s.

Systematic evaluations of these interventions have rarely been carried out. In some instances - as with the Home School liaison project - the findings of the pilot programmes were very encouraging. In other cases, such as the VPTP, surveys have been carried out to determine what happened to participants once they entered the labour market, but these studies lack any comparison with control group samples who entered the labour market without participating.

Post-school interventions have been more numerous. These are now under the aegis of the state training authority, FÁS. As noted earlier, the Youth Guarantee Scheme is aimed at young people who enter the labour market with few or no qualifications. A number of specific training and temporary work schemes now fall under the umbrella of the Social Guarantee: these have been developed since the mid-1970s. They range from programmes such as the Community Youth Training Programme, which gives experience of work to young people, usually on "community"

type projects, through Community Training Workshops, which provide job skills training aimed particularly at those who lack qualifications, through other training programmes of various levels, from very basic, quasi-remedial through to advanced job related skills.

The problem of determining the effectiveness of such post-school programmes is threefold. First, FÁS does not regularly publish data relating to, for example, the post-programme position of participants in specific schemes. Secondly, although FÁS publishes aggregated figures relating to the percentage of participants who are "placed"[3] following participation in any of its programmes, these data are not broken down according to participants' educational qualifications. Thirdly, placement rates are, by themselves, not good indicators of the effectiveness of schemes and programmes, since they also reflect the composition of the participant group. For example, if programme participants are selected (self selected or selected by the programme administrators) such that those who participate are highly likely to get jobs in any case, then placement rates will reflect this. Thus, to evaluate the effectiveness of FÁS programmes one would require data both on participants and on some comparison group of non-participants. A large literature now exists on carrying out such non-experimental evaluation studies (see, for example, Heckman and Hotz, 1989).

Data sources other than FÁS itself can throw some light on the issue of effectiveness. In a study of the Work Experience Programme (which provided young people with six months' work experience on an employer's premises, the state, rather than the employer, remunerating the young person) Breen (1988) suggested that, although placement rates for WEP were high (of the order of 70 per cent of participants in jobs following participation), the scheme was not particularly effective. Using a comparison group of young people who were unemployed and did not enter WEP, he found that they were no less likely to have acquired jobs within a six-month period than were the WEP participants. Unfortunately, this particular study sheds little or no light on the position of unqualified school leavers, since WEP was largely entered by young people who possessed the Leaving Certificate.

In a later study using the School Leaver follow-up survey data referred to earlier, Breen (1991) found that, aggregating all FÁS non-apprenticeship programmes, the placement rate immediately after participation was of the order of 34 per cent among school leavers who entered such programmes

[3] "Placement" here refers not only to those who obtained jobs after training but those who went into another training or temporary employment scheme or into full-time education.

during their first five years in the labour market. One year after participating, 54 per cent of participants were in jobs. Comparisons with individuals who were unemployed, rather than on a training programme, led to the estimate that about 40 to 45 per cent of those actually acquiring a job post-participation would have done so even in the absence of the programme.

Studies such as these are bedevilled by the problem of small numbers of participants, due to their not having been specifically designed to evaluate training programmes. They do, however, lead one to suspect the existence of a substantial deadweight effect in existing programmes. They point to the urgent need for specifically designed research into the effectiveness of such programmes.

One difficulty with post-school programmes targeted at the unqualified and poorly qualified has been well documented and acknowledged. This is the problem of reaching the target group and of persuading them to participate in programmes. The results of successive annual School Leaver Surveys have shown an under-representation of unqualified job seekers on training schemes, and FÁS, and its predecessors, have sought to overcome this difficulty. Clearly, however, this is one difficulty that would not be shared with programmes of intervention within school that are targeted at pupils in the junior cycle of post-primary school or at the primary level. Indeed, the aim of such programmes would be to intervene at an early enough age to prevent young people leaving school lacking in qualifications and bearing that disillusion with the formal processes of education which is probably the cause of their reluctance to participate in post-school programmes.[4]

3: *ASSUMPTIONS AND METHODOLOGY*

3.1: *Introduction*

As discussed in Section 1, the purpose of this paper is to provide some estimates of the costs, to the Irish exchequer, of unemployment compensation in respect of a given age cohort. In other words, we take a single year's cohort and project its labour force position forward as the

[4] One argument that might be advanced for concentrating resources on post-school interventions is that early school leavers can only be identified once they have, in fact, left school: or, in other words, that individuals at risk of early school leaving cannot be identified with a sufficient degree of accuracy. It is difficult to take such an argument seriously given all that we know about the characteristics of early school leavers, and indeed there are studies using Irish data which have specifically sought to provide predictive models of early school leaving (for example, Breen 1984, Chapter 6).

cohort ages from 15 to 59. Specifically, we calculate the age specific labour force participation and unemployment levels of a given age cohort (cohort aged 14 in 1987) up to age 59. We incorporate into these calculations assumptions concerning, for example, levels of unemployment, rates of labour force participation, emigration, and so on. The unemployment estimates are then multiplied by the assumed present value rate of unemployment compensation to arrive at the total lifetime cost of unemployment compensation for this cohort. Separate calculations are carried out for males and females and for sub-groups of each sex within the cohort defined in terms of their educational qualifications, as discussed earlier. This section sets out the assumptions used in making these calculations, defines the various measures employed, and outlines the estimation methodology. As a result, this section is largely technical in nature. Those who prefer not to work through this material might turn directly to the results, which are given in Tables 3.2 to 3.6 and in Section 4.

3.2: *Assumptions used in Projections*

In order to project the labour force participation of a given age cohort we need the following estimates and/or assumptions.

A. Education:

ASSUMPTION 1: the size of this cohort at the end of compulsory eduction. These data are available from the Department of Education *Statistical Report*. The cohort used in this analysis is 14 year olds in full-time education on January 1st 1987, which comprised 36,052 males and 34,693 females.

ASSUMPTION 2: the distribution of the cohort across the four educational levels at the time of completion of education. Recall that the four educational levels we use are

(i) those who lack any formal qualifications;
(ii) those who possess the Group and/or Intermediate Certificate;
(iii) those who possess the Leaving Certificate;
(iv) those who possess a third-level qualification.

Measures of the distribution of qualifications in an age cohort are not available routinely; hence we had to estimate it in respect of our cohort using the results of the School Leaver Surveys. This led to two problems. The first issue is definitional. We used, as measures of the proportions of the cohort in each category, the following measures taken from the School Leaver Survey, all of which are based on individuals who leave the post-primary system.

1. those who leave without having sat for any public examination. We use this as our measure of the proportion of the age cohort which lacks formal educational qualifications. However, it is certainly an underestimate, since it excludes (a) young people who have sat for either the Group Certificate or Intermediate Certificate but have failed these exams; and (b) a small proportion of young people who terminate their education without ever entering post-primary school.

2. those who leave school after sitting for the Group Certificate and/or Intermediate Certificate. We use this as our measure of the proportion who possess the Group and/or Intermediate Certificate, but this will tend to be overestimated by virtue of the inclusion of young people from (a) above. On the other hand, it will omit members of a further group (c) all those who sit for the Leaving Certificate and fail.

3. those who leave school after sitting for the Leaving Certificate and do not enter one of the Third Level institutions as defined in the appendix to this section. This is our measure of the proportion of the cohort having the Leaving Certificate. As in the previous case, the inclusion of young people who fall into (c) above will upwardly bias this estimate, while the exclusion of (d) young people who enter Third Level colleges but do not obtain a qualification from them will impart some downward bias.

4. those who leave school after sitting for the Leaving Certificate and who enter one of the institutions listed in the appendix to this chapter. We take this as our measure of the proportion of the cohort who possess a Third Level qualification. This is an overestimate of the actual numbers due to the inclusion of young people who fall into (d) above. None of these biases are likely to be severe, with the exception of the overestimate of those with Third Level qualifications and the underestimate of those lacking qualifications. The effect of this will be to bias downward our estimates of the excess cost of unemployment compensation attributable to the lack of qualifications.

Since our projections also use parameters taken from the 1988 Labour Force Survey, it is necessary to link the definitions of educational qualifications used here with those used in the Labour Force Survey. Recall that the education item on the Labour Force Survey provided for the coding of the response into one of seven categories as shown in Section 1. We grouped these into four categories, corresponding to our measure of educational level, as follows:

LFS coding	Categories used here
1	i
2	ii
3	iii
4, 5, 6	iv
0	omitted

A second problem arises in so far as the School Leaver Survey surveys a cohort all of whom left school in the same year, whereas our concern is with a single year of age cohort. As a result, the educational qualification distribution of a single year of age cohort cannot be obtained directly from the School Leaver Surveys. We sought to overcome this problem as follows. We began by making the assumption that the ages at which young people with different levels of qualification leave full-time education are as follows:

those with no qualifications leave education at age 15;
those with the Group or Inter Cert leave education at age 16;
those with the Leaving Cert leave education at age 18;
those with Third Level qualifications leave education at age 21.

We applied these assumptions to both males and females. Using the School Leaver Surveys for a succession of years, we were then able to estimate, on this basis, what proportion of a single year of age cohort fell into each educational category. For example, those who left with no qualifications according to the 1986 SLS would, under our assumptions, have been aged 14 on January 1st 1984(15 when they left school) and would have comprised the total number of unqualified school leavers from that particular age cohort. Those who left after sitting for the Group and/or Intermediate Certificate according to the 1987 SLS would, under our assumptions, have been aged 14 on January 1st 1984, 16 when they left school. Again, they would have comprised the total number of Group/Inter school leavers from that age cohort. Those who left after sitting for the Leaving Certificate according to the 1989 SLS would, by the same argument, also have been aged 14 on January 1st 1984. Since the SLS asks details of those who went on to some further form of full-time education (courses, institutions, etc.), we were able to use this same SLS to determine what percentage of those who left post-Leaving Cert went on to third level as defined in the appendix to this section. In this way we were able to determine (conditional on our assumptions about qualification specific outflow ages) the percentages of the cohort, aged 14 on January 1st 1984, at each of our four levels of educational qualification.

Since our aim is to project forward the labour force experience of the cohort aged 14 on January 1st 1987 we should have liked to make these estimates in respect of them. Unfortunately this would have required that we had the results of the 1990, 1991 and 1992 School Leaver Surveys. We therefore assume that the percentage composition by educational qualification of the 1987 cohort is the same as that of the 1984 cohort.

The resulting estimates are as follows: males: 7 per cent no qualifications; 26 per cent Group and/or Intermediate Certificate; 38 per

cent Leaving Certificate; 28 per cent Third Level; females: 6 per cent no qualifications; 18 per cent Group and/or Intermediate Certificate; 53 per cent Leaving Certificate; 23 per cent Third Level.

ASSUMPTION 3: In order to make the preceding estimates, we made some simple assumptions about the ages at which young people with different levels of qualification leave full-time education. In our estimates of labour force participation and unemployment costs, however, we tried to model the educational level specific outflow in a more realistic fashion. Specifically, we used the 1989 School Leaver Survey to determine the exact ages at which young people with different levels of qualification left school. Although these data do not relate directly to an age cohort, they are likely to provide a reasonably accurate picture of the outflow of an age cohort from education. Table 3.1 shows, for each sex, the resulting educational specific outflow patterns at each age used in our estimation.

Table 3.1: *Age and Qualification Specific Outflows from Full-Time Education Used in This Study*

Table shows the percentage within each educational level group leaving at each single year of age

	Educational Level							
	NQ		*G/IC*		*LC*		*3L*	
Age	*M*	*F*	*M*	*F*	*M*	*F*	*M*	*F*
15	70	66	20	16	08	08	00	00
16	24	19	39	35	46	46	00	00
17	06	12	32	38	40	37	00	00
18	00	03	09	09	05	08	00	00
19	00	00	00	02	01	01	00	00
20	00	00	00	00	00	00	00	00
21	00	00	00	00	00	00	100	100

Key: NQ: No Qualifications; G/IC: Group and or Intermediate Certificate; LC: Leaving Certificate; 3L: Third Level Qualification.

It must be said that our results are robust to any changes in this pattern. They change hardly at all if we assume the educational specific outflow pattern to be that used to derive Assumption 2.

B. Mortality and Emigration

ASSUMPTION 4: the mortality which will affect this cohort as it ages. These data are available in the form of Life Tables (*Irish Statistical Bulletin* Sept./Dec. 1985).

The cohort will be influenced by migration. This leads to three assumptions:

ASSUMPTION 5a: We assume that all emigration occurs at ages 15-29: thereafter there is no emigration nor are there any return flows of previous migrants.

ASSUMPTION 5b: We assume that there are no differences in rates of emigration according to educational qualifications. Relatively little is known about qualification-related differentials in emigration, but some evidence (Sexton *et al* 1991) suggests that, at least during the first few years after entering the labour market, the differentials which do exist lead to a lower rate of emigration among the unqualified than among those who have higher levels of qualifications. If this is indeed the case, then our assumption will bias our estimates of exchequer savings downward.

ASSUMPTION 5c: Since our concern is with the effect of emigration on the size of the labour force and, ultimately, on unemployment levels, we express emigration rates as percentages of the labour force, rather than of the overall cohort. Our assumption is that the rate of emigration is a constant percentage of the rate of labour force participation between ages 15 and 29. In our projections we make estimates for a high emigration scenario, a medium and a low emigration scenario.

C. Participation Rates

ASSUMPTION 6: We assume that age and educational qualification specific participation rates for this cohort, as it ages, will be the same as the age and education specific participation rates observed for the current population (i.e., cross sectional rates) in 1988. The figures we use are therefore based on a crosstabulation from the 1988 LFS of participation rates by educational qualification by 5-year age group by sex. The use of these figures almost certainly underestimates future female participation rates and so biases downward our estimates of possible exchequer savings.

The participation rate figures derived from the LFS could not be applied directly, however, in respect of the five-year age groups 15-19 and 20-24. The reason is that the participation figures in the LFS include, in the denominator, those in full-time education. However, by virtue of making assumptions about the ages at which individuals with different levels of qualifications enter the labour force, our methodology excludes those in full-time education, except in those cases where individuals leave the labour force to return to some form of full-time education. Thus, for the 15-19 age group we used participation rates calculated from the LFS data but excluding those in full-time education from the denominator (note that this is irrelevant in the case of those with Third Level qualifications

whom we assume do not enter the labour force until age 21). In respect of those with the Leaving Certificate and Third Level qualifications we made the same adjustment in the 20-24 age group. Table 3.2 shows the age, sex and education specific participation rates used in this study.

Table 3.2: *Age and Education Specific Labour Force Participation Rates for the Population not in Full-Time Education used in this Study*

		Educational Level		
Age Group	*No Quals*	*C/IC*	*LC*	*3L*
Males				
15-19	90.4	98.8	99.4	100.0
20-24	88.4	98.0	99.4	100.0
25-29	93.0	97.9	94.4	97.2
30-34	94.5	98.7	98.4	98.0
35-39	93.8	97.7	97.7	99.0
40-44	92.4	97.0	98.3	99.4
45-49	91.6	94.2	97.0	99.0
50-54	86.8	94.3	93.0	97.6
55-59	80.5	80.2	81.0	93.8
Females				
15-19	80.2	93.0	98.9	100.0
20-24	44.0	71.1	92.1	96.4
25-29	29.1	45.8	70.9	86.2
30-34	21.8	27.8	47.3	76.2
35-39	15.5	22.4	32.6	65.6
40-44	17.4	22.0	29.2	56.6
45-49	18.1	25.8	27.8	65.8
50-54	17.0	24.7	27.7	70.3
55-59	12.8	20.9	27.8	56.1

D. Unemployment Rates

We define individuals to be unemployed if they appear on the Live Register.

ASSUMPTION 7a: We assume that the differentials in unemployment rates between those with different levels of qualifications at each age will remain as they were in the 1988 population. In other words, we assume that unemployment rate relativities stay constant as between different levels of qualification. The figures used here are taken from a crosstabulation of unemployment rates by age group by sex using the 1988 LFS data. They are shown in Table 3.3. The figures used are calculated as the educational specific unemployment rate expressed as a multiple of the overall unemployment rate for the particular age group and sex. Thus, for

example, among males 15-19, the unemployment rate for those lacking qualifications is 1.6 times the average for all males 15-19, while the rate for those with the Leaving Certificate is only 0.6 times the average.

Table 3.3: *Unemployment Rate Differentials Between Educational Groups in Each Age Group by Sex*

Age Group	*No Quals*	*Educational Level* *G/IC*	*LC*	*3L*
Males				
15-19	1.638	1.0179	0.6266	1.33366
20-24	2.236	1.3456	0.6097	0.30571
25-29	2.333	1.2213	0.4820	0.29127
30-34	2.037	1.1079	0.4432	0.24540
35-39	1.831	0.8701	0.4718	0.12585
40-44	1.619	0.9316	0.4387	0.08441
45-49	1.622	0.6813	0.3173	0.00000
50-54	1.416	0.7252	0.5626	0.18693
55-59	1.335	0.7676	0.3394	0.25694
Females				
15-19	1.992	1.2276	0.6388	0.63086
20-24	2.668	1.6408	0.7562	0.47385
25-29	3.341	1.9915	0.5487	0.45557
30-34	1.942	1.7566	0.7016	0.62471
35-39	2.478	1.4895	0.4454	0.45429
40-44	2.461	1.2115	0.4437	0.00000
45-49	1.798	0.8723	0.7885	0.41837
50-54	1.705	1.0691	0.5071	0.44949
55-59	2.000	0.8000	0.5882	0.00000

ASSUMPTION 7b: We make the further assumption that age group differentials in unemployment rates will remain as they were in the 1988 population. However, we allow the overall level of unemployment to vary. We make three specific assumptions about this level, corresponding to a high, medium and low unemployment rate scenario, respectively.

ASSUMPTION 7c: We assume that the ratio of male to female unemployment rates is 3:2. This differential is largely due to differences in participation rates, and is in line with the results of the 1988 LFS which reports a ratio of 3.09:2.

E. Unemployment Compensation

ASSUMPTION 8: Using data from the LFS we can determine what percentage of the unemployed in each age x sex x educational qualification category fall into each of the following groups:

(i) receiving Unemployment Assistance;
(ii) receiving Unemployment Benefit;
(iii) signing for credits.

Those signing for credits receive no unemployment compensation. We assume that those in the other two groups receive the average rates of compensation at their 1988 levels. The average rates of payment were calculated by taking the total amounts paid, in 1988, in UA and UB (taken from *National Income and Expenditure* 1989) and dividing these figures by the number of claimant weeks of those on, respectively, UA and UB in 1988 (calculated from data in *Statistical Bulletin,* December 1990). This yielded a rate for UA of IR£52.34 per week and for UB IR£52.59 per week.

Our interest lies in calculating the present value of future payments of UA and UB. To do this we should want to estimate both the future rates of payment and the appropriate discount factors. In this case, however, we have simplified matters somewhat by assuming that the rates of growth of UA and UB levels will equal the discount rates.

3.3: *Projection Methodology*

All data from the 1988 LFS used in these projections relate to 5 year age groups, rather than to single years of age. Hence, although all projections are presented here on a single year basis, they should be interpreted as disaggregated 5 year age group estimates. The projections of labour force statistics in respect of the cohort were carried out as follows. Given the cohort of males and females aged 14 years and in full-time education in 1987, we first estimated the educational composition and size of the labour force in each single year as this cohort aged. This set of distributions was calculated using Assumptions 1 (cohort size), 2 (distribution of qualifications), 3 (qualification specific school leaving ages), 4 (mortality) and 6 (participation rates). The results are aggregated for males and females and shown in Table 3.4.

The estimates shown in Table 3.4 can be seen as a projection based on an assumption of no emigration. Table 3.5 shows the age and educational specific projections under assumptions 5a, b and c. The figures in Table 3.5 relate to our medium emigration scenario.

Given projections of the labour force, projections of the average number unemployed per annum in each age group/educational qualification category were arrived at using an assumed overall level of unemployment (high, medium or low) and assumptions 7a, 7b and 7c, concerning unemployment rate relativities according to age group, educational category and sex. Table 3.6 shows the average annual numbers unemployed under our high unemployment assumption together with our medium emigration assumption. Given estimates of the numbers unemployed, we use Assumption 8 to arrive at an exchequer costing.

Table 3.4: *Projected Numbers in Labour Force Assuming No Emigration*

	Educational Qualifications				
Age	*NQ*	*G/IC*	*LC*	*3L*	*All*
15	2700	2782		0	5482
16	3563	8424	2542	0	14529
17	3898	13585	17152	0	34635
18	3946	14930	29295	0	48170
19	3943	15035	31408	0	50385
20	3134	13574	30454	0	47162
21	3132	13561	30433	17713	64837
22	3128	13549	30409	17698	64785
23	3125	13535	30386	17682	64729
24	3123	13523	30362	17667	64674
25	2925	11927	25779	16558	57189
26	2922	11916	25760	16544	57143
27	2920	11905	25742	16532	57097
28	2917	11894	25723	16518	57053
29	2915	11884	25705	16505	57009
30	2798	10829	21911	15779	51316
31	2795	10818	21892	15765	51271
32	2793	10808	21873	15751	51225
33	2789	10796	21853	15737	51175
34	2786	10785	21831	15722	51124
35	2636	10346	19036	14965	46983
36	2633	10333	19014	14948	46928
37	2628	10318	18990	14930	46867
38	2625	10303	18964	14910	46800
39	2621	10286	18934	14886	46727
40	2620	10178	18364	14192	45355
41	2615	10157	18328	14164	45263
42	2608	10133	18287	14133	45161
43	2602	10105	18242	14099	45049
44	2594	10077	18193	14061	44925
45	2581	10026	17717	14700	45023
46	2572	9992	17659	14653	44876
47	2562	9954	17597	14602	44715
48	2552	9912	17525	14545	44533
49	2539	9864	17444	14479	44327
50	2389	9752	16822	14619	43581
51	2374	9689	16720	14534	43316
52	2357	9622	16611	14441	43031
53	2336	9538	16477	14330	42683
54	2316	9451	16336	14212	42315
55	2067	7950	14728	12675	37420
56	2044	7861	14576	12545	37025
57	2018	7763	14411	12403	36596
58	1990	7658	14231	12248	36127
59	1960	7543	14035	12080	35618

Table 3.5: *Projected Numbers in Labour Force Assuming Medium Emigration*

	Educational Qualifications				
Age	*NQ*	*G/IC*	*LC*	*3L*	*All*
15	2695	2776	0	0	5470
16	3536	8357	2524	0	14416
17	3818	13303	16807	0	33928
18	3795	14356	28186	0	46336
19	3721	14185	29645	0	47550
20	2904	12575	28237	0	43715
21	2828	12251	27533	16013	58626
22	2755	11936	26847	15607	57144
23	2684	11627	26177	15210	55699
24	2615	11328	25525	14824	54290
25	2388	9743	21189	13582	46903
26	2330	9507	20720	13271	45826
27	2272	9276	20261	12967	44776
28	2217	9051	19813	12671	43751
29	2162	8831	19375	12382	42750
30	2070	8013	16419	11817	38320
31	2069	8005	16406	11807	38286
32	2067	7998	16391	11797	38252
33	2064	7990	16376	11786	38215
34	2062	7981	16360	11774	38177
35	1946	7645	14202	11186	34980
36	1944	7636	14186	11173	34940
37	1941	7626	14168	11160	34895
38	1939	7614	14148	11144	34845
39	1935	7601	14127	11127	34790
40	1936	7521	13684	10590	33731
41	1932	7505	13657	10569	33663
42	1928	7487	13627	10546	33587
43	1923	7468	13594	10520	33504
44	1918	7447	13557	10492	33412
45	1908	7418	13197	10988	33512
46	1901	7393	13154	10954	33403
47	1895	7365	13107	10916	33284
48	1886	7335	13055	10874	33149
49	1877	7299	12995	10825	32996
50	1767	7213	12537	10940	32457
51	1755	7167	12462	10877	32261
52	1743	7117	12380	10808	32049
53	1728	7056	12281	10726	31792
54	1712	6992	12176	10638	31518
55	1527	5882	10996	9466	27871
56	1509	5815	10883	9370	27579
57	1490	5743	10761	9264	27260
58	1469	5666	10628	9150	26913
59	1448	5581	10482	9025	26535

Table 3.6: *Projected Numbers Unemployed Under High Unemployment/Medium Emigration Assumptions*

	Educational Qualifications				
Age	*NQ*	*G/IC*	*LC*	*3L*	*All*
15	937.2	604.2	0.0	0.0	1542
16	1493.1	2188.8	369.1	0.0	4051
17	2016.1	4338.3	3110.4	0.0	9465
18	2172.6	5069.9	5664.0	0.0	12907
19	2152.2	5062.5	6019.0	0.0	13233
20	1567.0	4068.1	3923.4	0.0	9559
21	1877.5	4861.8	4612.4	1524.9	12876
22	1828.4	4735.2	4496.0	1486.1	12546
23	1780.5	4611.7	4382.4	1448.1	12223
24	1733.8	4491.6	4271.8	1411.2	11908
25	1470.4	3154.1	2124.9	960.6	7711
26	1433.3	3075.4	2074.4	937.7	7521
27	1397.1	2998.9	2025.2	915.4	7337
28	1361.9	2924.4	1977.2	893.7	7158
29	1327.7	2851.7	1930.4	872.4	6982
30	1169.6	2535.0	1722.4	774.4	6202
31	1168.3	2532.5	1720.7	773.8	6195
32	1167.1	2529.9	1719.0	773.1	6189
33	1165.9	2527.1	1717.3	772.3	6182
34	1164.4	2524.1	1715.4	771.5	6176
35	1262.3	2366.0	1950.3	524.8	6104
36	1260.7	2362.9	1947.8	524.2	6095
37	1258.8	2359.6	1945.0	523.5	6087
38	1256.9	2355.9	1942.1	522.8	6077
39	1254.6	2351.8	1938.8	522.0	6068
40	1085.9	2410.8	1774.8	228.3	5500
41	1083.5	2405.6	1770.9	227.8	5488
42	1080.9	2399.7	1766.8	227.3	5474
43	1078.0	2393.2	1762.0	226.6	5460
44	1074.7	2386.0	1756.9	226.0	5444
45	1330.5	2158.1	1736.4	161.4	5387
46	1325.8	2150.4	1730.5	161.0	5368
47	1320.5	2142.0	1724.0	160.6	5348
48	1314.7	2132.6	1716.8	160.2	5324
49	1308.0	2121.7	1708.5	159.6	5298
50	730.0	1543.3	1789.7	620.5	4683
51	725.1	1533.1	1778.1	616.9	4654
52	719.9	1522.3	1765.5	612.9	4621
53	713.5	1508.8	1750.1	608.2	4581
54	706.7	1494.6	1733.9	603.1	4538
55	687.2	1451.5	1223.0	559.8	3921
56	679.2	1434.6	1210.1	553.0	3877
57	670.6	1416.3	1196.2	545.7	3829
58	661.2	1396.4	1181.0	537.7	3777
59	650.9	1374.7	1164.4	529.0	3719

Appendix to Section 3

Third-Level Institutions

For the purposes of our analysis, we considered any respondent to the School Leaver Survey to be in a Third-Level institution if he or she left school after sitting for the Leaving Certificate and reported being in full-time education at one of the following institutions:

University College Cork;
University College Dublin;
University College Galway;
Trinity College, Dublin;
Dublin City University;
University of Limerick;
St. Patrick's College Maynooth, or any seminary;
College of Surgeons;
College of Technology, Bolton Street;
College of Technology, Kevin Street;
Regional Technical Colleges
- Cork;
- Tralee;
- Waterford;
- Carlow;
- Sligo;
- Letterkenny;
- Athlone;
- Galway;
- Dundalk;

Limerick Technical College;
Dublin Institute of Technology Colleges;
Art Colleges;
Teacher Training Colleges;
Agricultural or Horticultural College.

4: *RESULTS AND CONCLUSIONS*

4.1: *Introduction*

In this section we present the results of our simulations in terms of the estimated excess cost to the exchequer of lifetime unemployment compensation in respect of those who lack qualifications. We conclude by discussing the possible import of these findings for policy.

4.2: *Results*

Recall that we define the excess cost to the exchequer of lifetime unemployment compensation in respect of those members of a single year of age cohort who lack educational qualifications as follows. We first calculate the total lifetime unemployment compensation payments in respect of those who lack qualifications. We then recalculate the total lifetime unemployment compensation to these same individuals assuming the following two conditions hold:

CONDITION A: young people who would otherwise have left school without qualifications in fact leave with at least the Group Certificate; and

CONDITION B: such young people's job prospects are enhanced such that, without causing increased unemployment elsewhere in the labour force, their rate of unemployment falls to that observed among young people who possess the Group or Intermediate Certificate.

The difference between these two calculations is our measure of the excess cost of unemployment compensation attributable to the lack of qualifications within a proportion of the cohort. Equally, it is our measure of the potential exchequer saving if conditions A and B were met.

Given this definition of possible exchequer savings and the methodology outlined in Section 3, it is a straightforward matter to generate our results. In generating our results we employ three emigration and three unemployment rate assumptions. We present seven sets of results, in respect of

high unemployment, high emigration assumptions;
high unemployment, medium emigration assumptions;
medium unemployment, high emigration assumptions;
medium unemployment, medium emigration assumptions;
medium unemployment, low emigration assumptions;
low unemployment, medium emigration assumptions;
low unemployment, low emigration assumptions.

Our unemployment rate assumptions can be interpreted as follows:

high: the cohort will, during the period in which some or all of its

members are in the labour force (ages 15-59), experience an average unemployment rate of 18 per cent;

medium; an average unemployment rate, over the cohort's labour market "lifetime", of 12 per cent;

low: an average rate of 6 per cent.

Our emigration assumptions can be interpreted as follows:

high: the labour force at age 30 will be depleted by approximately 40 per cent as a result of emigration between the ages of 15 and 29 (i.e., the labour force will be 40 per cent smaller than under the no-emigration assumption);

medium: the labour force at age 30 will be depleted by approximately 25 per cent as a result of emigration between the ages of 15 and 29;

low: the labour force at age 30 will be depleted by approximately 5 per cent as a result of emigration between the ages of 15 and 29.

Our high emigration scenario results in an overall loss from the cohort of one third between the ages 15 and 29. The medium and low emigration scenarios result in overall losses of 20 per cent and 4 per cent respectively. These figures translate into annual net emigration of between 22,000 and 24,000 under the high emigration scenario; 12,000 to 14,000 under the medium emigration scenario; and 2,500 to 3,000 under the low emigration scenario.

Under Assumption 8 our estimates of the exchequer costs are shown in Table 4.1. Table 4.1 shows the total cost of unemployment compensation in respect of that part of the cohort which lacks educational qualifications. It then shows the cost in respect of this same group given that conditions A and B are met. The difference between these figures is the excess cost of unemployment as defined above, or, in other words, the potential exchequer saving given that conditions A and B were met. The application of conditions A and B also affects the overall level of unemployment: this is shown in the final line of Table 4.1[5]

[5] The calculation of the excess costs is as follows. Given our estimates of the costs of unemployment, derived as explained in Section 3, we can write the total number unemployed as the identity:

$$\mu \sum_i \sum_j \sum_k n_{ijk}\, \phi_{ijk}$$

where i,j,k, index age groups, educational qualification groups, and sex, respectively. n is the total in each such group and ϕ is the relative unemployment rate for that group. Relative rates within each age group are shown in Table 3.3. μ is thus a constant or baseline rate of unemployment around which the relative rates, the ϕs, are deviations. In order to calculate what would happen if the unemployment rate for those with no qualifications were made equal to that for those with the Group or Intermediate Certificate, we apply, to the former, the ϕ values for the latter. However, we keep μ constant. The effect is thus both to reduce the level of unemployment among those who lack qualifications (by virtue of replacing their ϕ values with lower ones) and, by virtue of the constant μ, to transmit this reduction into a lowering of the total numbers unemployed and thus of the overall unemployment rate.

These figures suggest substantial potential exchequer savings, ranging from IR£22.6 million to IR£67.7 million. Naturally, high future rates of unemployment increase this figure, while high rates of emigration decrease it. These figures can also be expressed on a "per unqualified school leaver" basis. This yields potential exchequer savings with a 1988 value of between IR£4,900 (low unemployment/medium emigration) and IR£14,700 (high unemployment/medium emigration) per unqualified school leaver.

4.3: *Robustness of Results*

Leaving aside, for the moment, the question of the degree of plausibility that can be attached to conditions A and B, we turn now to the effects of our assumptions on our estimates. As noted in Section 3, our results are relatively insensitive to certain assumptions, such as the age specific

Table 4.1: *Costs (in £million at 1988 values) of Unemployment and Excess Cost Under Various Unemployment and Emigration Assumptions*

*Assumptions** *Unemployment* *Emigration*	*High* *High*	*High* *Medium*	*Medium* *High*	*Medium* *Medium*	*Medium* *Low*	*Low* *Medium*	*Low* *Low*
(1) Total Cost of Unemployment Compensation for those with no Qualifications	124.4	149.6	83.0	99.8	121.9	49.8	61.0
(2) Total cost to above assuming same unemployment rate as those with Group/Inter	68.6	81.9	45.8	54.6	66.2	27.3	33.2
(3) Total Exchequer Savings (i.e., (1)-(2) or "Excess Cost"	55.8	67.7	37.2	45.2	55.7	22.6	27.9
(4) Overall % age unemployment rate under (2)	16.5	16.5	11.0	11.0	11.0	5.5	5.5

**Assumptions:* Unemployment: High = 18%; Medium = 12%; Low = 6%
Emigration: High = 40%; Medium = 25%; Low = 5%

outflow from education of those with different levels of qualification. More generally, we have made assumptions which will, if anything, bias downward our estimates of exchequer costs. Notable here are our assumptions concerning future levels of female labour force participation and qualification specific rates of emigration.

4.4: *Conclusions*

Our estimates of the excess cost to the exchequer of lifetime unemployment compensation in respect of those members of a single year of age cohort who lack educational qualifications depend crucially upon the fulfilment of conditions A and B, given above. Condition A relates to providing qualifications for those young people who would otherwise have none. It is phrased in terms of educational qualifications, but, clearly, the same objective might be reached in other ways. For example, it might be possible to provide unqualified school leavers with other qualifications - obtained through participation in training programmes - which would be equivalent to the possession of a Group or Intermediate Certificate in their effects on subsequent labour market position. It is important, however, that these should be genuine qualifications in the sense that, in order to achieve them, these young people should have acquired levels of literacy and numeracy (for example) which, had they left without qualifications, they would not have attained. We are concerned with changing the substance, not simply the form. This returns us to the issue discussed in Section 2: given that it is possible to improve the labour market position of school leavers who would otherwise fare very poorly, is this most effectively accomplished by measures undertaken within the educational system, within post-school training, or through some combination of these? As noted earlier, the Irish evidence here is equivocal, though arguments can be made that educational interventions have been somewhat neglected in favour of post-school training. It is widely acknowledged that the roots of educational failure are to be found at the primary level and earlier, and that intervention in the educational system is unlikely to be effective unless it is broadened to include home/school liaison of the type referred to in Section 2 and, possibly, extended to the pre-school environment also (see, for example, O'Brien, 1990; and Breen, 1990). A wholesale reliance on post-school intervention also raises the question of what unqualified school leavers obtain from their ten or more years in the educational system. One is forced to conclude that they must have obtained very little - with the obvious corollary that this represents a substantial waste of resources. It is not unreasonable to suggest that a programme of interventions might, as a first step, address this issue.

Condition B is crucial to our estimates of excess cost and thus of possible exchequer savings. This condition relates to the "displacement" effects of the kind of interventions discussed above. The plausibility of our simulations rests on whether or not one believes that the demand for labour is linked to the quality of the labour supply or is independent of it. The position taken here is extreme: condition B asserts that improving the

supply of labour will be matched one for one by an increase in the number of jobs, in other words, that there will be no displacement effects. Those who would otherwise have left school without qualifications will improve their chances of getting a job, but this will not be at the expense of anyone else in the labour market. The other extreme is to assume that there is no response: that is, improving the supply of labour will have no influence on labour demand and thus displacement will be total. In Section 1 of this report we outlined, very briefly, some mechanisms by which we might expect an improvement in the supply of labour to encourage increased labour demand. It is reasonable to assume that the true level of displacement will lie somewhere between the extremes of zero and one. If this is so then some proportion of the exchequer saving might be realised (providing condition A or its equivalent could be met), though, clearly, we cannot say how much. It is, however, easy to adjust our estimates to take account of any hypothesised level of displacement. This can be done by multiplying the estimated total exchequer savings shown in row 3 of Table 4.1 by 1 minus the assumed displacement level. Hence a displacement level of 1 (total displacement) would lead to no savings; a level of 0.5 would halve the estimated savings; and so on.

Even if we were able to assert with confidence that the demand for labour was independent of the quality of the labour supply among those with few qualifications, intervening to reduce the outflow of young people lacking qualifications may have other beneficial effects. First, given better qualifications young people who would otherwise spend a good deal of their careers in unemployment would find it easier to obtain jobs elsewhere, even if they could not do so in Ireland. In other words, they could compete more effectively in the labour markets of Europe and elsewhere. This would be in contrast to the fate of unqualified emigrants in the late 1980s, who appear to enjoy as little success in overseas labour markets as they do in Ireland (Sexton *et al.*, 1991). We might also add that the successful integration of such emigrants overseas would reduce the burden of unemployment compensation on the Irish exchequer.

Secondly, young people who formerly would have lacked qualifications would compete more effectively in the Irish labour market. Even if the available number of jobs remained fixed, and thus the unemployment rate was unchanged, this should have the effect of sharing unemployment more widely. In particular the average duration of unemployment ought to be reduced for those who would otherwise have lacked qualifications. This could have important effects in both the long and short term, not least through ameliorating the social and economic disadvantages associated with long-term unemployment.

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Chapter 4

IRISH MANUFACTURERS' TRANSPORT COSTS – RESULTS OF TWO SURVEYS

J. Durkan and A. Reynolds-Feighan

This paper looks at Irish manufacturers' transport costs in 1990 and proposes that further description and analysis of costs for Ireland is necessary, since little is known about costs in general, or in relative terms compared with our EC partners. This paper summarises results from a lengthy report submitted to the EC in October 1990 in which the detailed results of two surveys on transport costs were presented. The paper is set out in five sections. In the first section descriptions of Irish industrial production and of trade patterns are given along with a brief overview of the transport sector. In the second section, the results of a Manufacturers' Transport Cost Survey, undertaken in May 1990, are presented and discussed. The results of a second survey (of shipping agents) are reported in Section 3. The implications of the results of the two surveys, and the design of further research in this area, are discussed in Section 4. The last section presents the key conclusions and recommendations from the research.

1: *BACKGROUND TO THE STUDY*
IRISH MANUFACTURING AND EXPORT TRADE

The importance of Irish transport costs is dependent on the type of goods being traded and the scale of production of these goods. In this section we sketch a very general picture of Irish industrial structure and the Irish export trade market in order to point out regional patterns of production within Ireland and the principal routes of export for produce.

The main data source on manufacturing industry in Ireland is the annual Census of Industrial Production. The Census data provide information on the structure of production, employment, inputs, and outputs. The Census data do not cover all manufacturing, as firms below a certain size are excluded. However when allowance is made for this, and

updating the data using available indicators, it can be seen that manufacturing industry as a whole had a total turnover in 1990 of about £18bn and employed approximately 200,000 people in 1,600 enterprises spread throughout the country in 5000 different locations. In terms of net output, the two principal sectors are (a) the metals and engineering industries (35 per cent of total indutrial output) and (b) the food sector, accounting for 22 per cent of total output. These sectors also account for roughly one half of total industrial employment in Ireland. The third major group of industries consists of non-metallic mineral products and chemicals (accounting for 18 per cent of total industrial output and just under 13 per cent of total industrial employment).

Table 1 shows the regional distribution of industrial net output and employment in the 8 planning regions. In 1987, about 30 per cent of net output was produced in the East region, with 18.6 per cent produced in the Southwest and roughly 10 per cent in each of the Northeast, Southeast and West regions. The table shows the average employment and average output per establishment.

Table 1: *Regional Industrial Production and Employment in Ireland in 1987*

Region	*Percentage of Total Net Output*	*Net Output per Establishment (£'000)*	*No. Persons Employed per Establishment*
East	(29.3)	1191	38
Nth-East	(9.7)	1820	37
Sth-East	(10.2)	1449	45
West	(9.2)	1905	37
Sth-West	(18.6)	2002	40
Mid-West	(7.9)	1337	44
Nth-West	(2.3)	615	36
Midlands	(3.4)	761	36
Not attributable	(9.6)	4422	118
State	(100)	1487	42

Source: Census of Industrial Production, 1987, CSO, Dublin.

Irish manufactured produce is the key component in our export trade, accounting for 80 per cent of the total value of exports. The structure of industry has been heavily influenced by the resource base of the economy, and by the industrial promotion policies of governments since the late 1950s. The Food subsector is characterised by commodity production, e.g., butter, cheese, beef with the domestic market accounting for about one-third of sales. For technical reasons relating to the seasonality of production and for historical reasons, both before and after EEC entry

and, given overproduction relative to demand at current prices along with the system of intervention purchasing, a significant proportion of production has tended to be bulk production of commodities, rather than specialist high valued products. The Drink and Tobacco subsectors are primarily geared to the home market, though both have important export sales. The Food, Drink and Tobacco sector as a whole is dominated by a small number of enterprises, accounting for the bulk of turnover. The Modern sector, comprising Chemicals (including Pharmaceuticals) Office and Data Processing Equipment and Electrical Engineering, accounts for one-third of turnover of manufacturing, and just under 20 per cent of the number of enterprises.

The Modern sector owes its existence in Ireland primarily to the industrial promotion policies pursued by Governments since the late 1950s when industrial policy became more outward looking. Industrial policy uses as its instruments, grant and tax incentives. These incentives, plus the targeting of certain sectors (pharmaceuticals and electronics) have resulted in a rapid growth in the modern sector of the economy. This sector is characterised by:

- foreign ownership
- reliance on export markets for sales
- purchase of material inputs from abroad
- transfer pricing to limits permitted by tax authorities to maximise Irish based profits
- high gross profits relative to sales

The rest of manufacturing accounts for one-quarter of turnover, 60 per cent of the number of enterprises and the greater part of total employment. Output is varied and much less homogeneous than in the Food and Modern sectors, i.e., much less bulk production and less standardised commodoties. Turnover per enterprise in this sector, at IR£3.7 million in 1987 compares with IR£21.5 million in the Food, Drink and Tobacco sector and IR£17.4 million in the Modern sector.

In examining the patterns of Irish exports, it is noted that the Central Statistics Office (CSO) use a different aggregate classification of produce compared with the NACE classification used to present industrial production. Accordingly, some primary produce is included in the trade figures reported in the tables below. Irish exports consist in large measure of (i) metals and engineering produce (ii) food, drink and tobacco products (iii) non-metallic mineral and chemical products.

Most of the produce for export is moved to foreign markets by sea (73 per cent of the total volume; 66 per cent of the total value) with 27 per

cent of the volume being moved through "land frontier stations" (i.e., to Northern Ireland and Northern Ireland ports) and less than 1 per cent of the total volume being moved by air. Table 2 shows the significance of air transport however in terms of the value of exports shipped abroad (14 per cent of total export value). This table also shows the average value per tonne of Irish exports in 1989 by CSO commodity category and major port of exit. Comparing the mean Irish value per tonne with that for other EC countries (Table 3) would on face value indicate a great success for Irish industrial policy, since Ireland has the highest value of all EC12 countries. The data are distorted by transfer payments (such as the over-valuation of value-added on intermediate goods produced in Ireland, see Kennedy, Giblin and McHugh, 1988). It was not possible to obtain more realistic estimates..

The bulk of export produce leaves Ireland through ports (including airports) in Leinster (77 per cent of value; 48 per cent of volume) or ports in Munster (21 per cent of value; 48 per cent of volume) reflecting the pattern of location in the country. For producers in the West, parts of the Southwest, the Midlands and the Northwest, we would expect that they incur greater transport cost penalties in accessing foreign markets because they must first access Irish ports of export. We note that manufacturing establishments in these regions are also smaller in scale in terms of employment levels. In Section 3 of this paper, we present the costs for producers in different regions of getting loads to ports in Ireland and to foreign destinations.

In 1989 the percentage value of total exports going to foreign markets was as follows: 28 per cent of exports go to Great Britain, 5.4 per cent to Northern Ireland and 48 per cent to other EC countries. In terms of volume, 35 per cent of exports are destined for Great Britain, 20 per cent for Northern Ireland and 36 per cent for other EC countries.

1.1: *The Irish Transport System*

As an island nation, international transport to and from Ireland is obviously dominated by air and sea modes. Within Ireland, 90 per cent of freight movements are by road. The high dependency on road transport occurs because of the dispersed nature of the population in a country with a generally low population density. Rail transport has declined continually in the last 50 years and is not a viable alternative for two main reasons: (1) the small size of the island makes road transport more efficient since distances are relatively short; the possibility of rail connections into other networks does not arise for an island country while it is possible for other small

Table 2: *1989 Value of Average Tonne of Irish Exports (IR£)*

Type of commodity	*Seaports*							*Land stations*	*Airport*	*Total*
	Cork	*Dublin*	*Dun Laoire*	*Rosslare*	*Waterford*	*Other seaports*	*All seaports*			
TOTAL	482	2719	7719	5203	2168	201	1459	1128	105050	1605
Agricultural products & live animals	212	916	1840	977	478	181	599	423	58000	545
Foodstuffs & animal fodder	1692	1987	1971	2288	2103	796	1766	1096	6500	1567
Solid mineral fuels	0	71	167	65	61	111	71	74	0	72
Petroleum products	80	2000	0	0	0	0	86	375	0	95
Ores & metal waste	600	323	1000	1000	400	400	334	97	0	320
Metal products	280	1471	3000	1875	3500	500	459	852	0	543
Crude & manuf. minerals, building materials	417	238	200	231	417	16	49	76	0	58
Fertilisers	94	0	0	83	0	67	81	103	0	85
Chemicals	679	5531	12625	17917	6514	197	1121	2344	322500	1678
Machinery, transport equip., manuf. articles & miscellaneous articles	1636	9642	22156	14453	4333	543	9011	4056	91214	8336
Not classified	900	857	500	1000	923	266	500	1077	99000	1145

Source: CSO *Statistical Bulletin.*

Table 3: *1987 Value of Average Tonne of Exports and Imports for All EC Countries (in current Irish £)*

EC States	*1987 Average Value of Exports*	*1987 Average Value of Imports*	*1988 Average Value of Exports*
EUR12	686.42	399.44	742.92
Belgium-Luxembourg	544.57	347.51	570.31
Denmark	926.25	426.46	868.54
Germany	1131.82	453.19	1158.20
Greece	222.41	330.63	252.68
Spain	411.25	288.91	457.47
France	671.53	425.38	742.51
Ireland	1335.20	495.98	1393.71
Italy	1199.05	348.87	1239.53
Netherlands	348.37	274.12	360.35
Portugal	762.09	381.21	771.02
UK	580.57	618.35	733.91

Source: Eurostat Trade Statistics

countries like Belgium and Luxembourg, (2) the dispersed nature of the population acts against rail being an economically viable mode. While a range of different grades of road may be designed to suit varying population and traffic levels, the basic costs associated with single rail lines can be hard to justify on low-volume routes.

While Ireland has the highest road mileage per capita in the EC, it has one of the lowest motorway/dual carriageway mileages per capita. The quality and condition of the road network is poor and undermaintained. The main routes of the network comprise the national road network (national primary and secondary routes) which accounts for 6 per cent of the total network mileage and carries 34 per cent of the total volume of traffic. The regional road network accounts for a further 11 per cent of the network length with the remaining 83 per cent being made up of county and urban roads.

Government expenditure on road maintenance has been lacking by international standards for the last 10-15 years, as has been expenditure on new road construction and improvements. The Government's *Operational Programme for Road Development* published in 1989 outlined a wide-ranging series of new projects and improvements to be made to the road network in the next 3-4 years. These projects are heavily funded by the EC structural funds in an effort to improve Irish manufacturers' and consumers' cost disadvantages as a peripheral region in Europe. One of

the main motivations for undertaking the two surveys reported below was to try to establish benchmark costs for Irish manufacturers transporting goods to the EC and other foreign markets. Very little research has been undertaken in this area. In order to be in a position to evaluate the economic impacts of the EC and Irish government's investments in infrastructure, it is necessary to have an idea of transport costs before the new projects come on stream.

In this brief sketch of the Irish industrial sector and pattern of export trade, we have seen that the main products produced and exported are metals and engineering produce, food, drink and tobacco and chemical and mineral products. The average value of exports is relatively high by EC standards, suggesting that Irish manufacturers have been moving towards producing goods with a relatively low transport cost component. The scale of production varies in the planning regions, with the West, Northeast, Northwest and Midlands regions having the lowest mean employment levels per establishment. The single biggest destination for our produce is still the UK, though the proportion of our total exports going to the UK has been declining gradually over the last 20 years. As we shall see in the next sections, this fact has important implications for the overall scale of our total transport costs.

2: *SURVEY OF MANUFACTURERS' TRANSPORT COSTS*

Irish manufacturers were surveyed in May/June 1990 and questioned on their transport costs, typical load shipments and destinations. Manufacturers were also asked to identify factors which they considered added to their transport costs, such as delays at ports, road congestion, etc.. The manufacturers survey was undertaken by The Economic and Social Research Institute and consisted of a postal questionnaire of firms on the Institute's investment survey register. In designing the survey, no previous questionnaires could be consulted as a published study of this kind had not been undertaken before. 74 per cent of respondents exported to the EC countries, of which 56 per cent exported to Great Britain and 24 per cent exported to Northern Ireland. The number of firms replying to the survey and exporting to the remaining 10 EC countries was small and details on specific costs and arrangements were scarce.

In the manufacturers survey 154 survey forms were completed and returned: some of those surveyed did not answer all of the questions asked and accordingly the sample size is quite small for some of the detailed

enquiries on distances travelled, costs and logistics of transporting produce. In the summary review presented below, only the principal findings are reported. Table 4 shows some general characteristics of the sample firms.

Table 4: *Description of Firms in the Survey by Sector*

Sector	*Food*	*Modern*	*Other*	*Total*
No. firms	34	55	58	147
% firms in survey	23.1	37.4	39.4	100
Average sales revenue (£m)	32.0m	37.0m	13.4m	26.5m
Total sales revenue (£m)	1086.3m	2032.3m	777.0m	3895.6m

The survey of manufacturers distinguished between costs incurred in the domestic and in foreign markets. The main findings are summarised in Table 5. Overall, the direct transport costs associated with shipping goods incurred by manufacturing firms were 4 per cent of sales revenue.

There are differences between sectors and between domestic and foreign transport costs relative to sales revenues. Transport costs in the Food, Drink and Tobacco sector are higher than in the Modern and other sectors for both domestic and foreign sales. Transport costs are lowest relative to sales revenue in the Modern sector.

Table 5: *Manufacturers' Transport Costs by Sector*

	Food	*Modern*	*Other*	*Total*
% of sales to domestic market	65	35	50	47.5
Domestic transport costs as % domestic sales revenue	5.5	3.3	3.4	4.0
Foreign transport costs as % foreign sales revenue	4.8	2.6	4.3	3.8
Overall transport costs as % of sales revenue	5.3	2.8	3.8	3.9

An interesting result is that in both the Food, Drink and Tobacco sector and in the Modern sector the ratio of transport costs to sales was lower in foreign markets than in the domestic market. As noted earlier, bulk food exports are the norm, while in the domestic market shipments are typically smaller and sent to many destinations. The costs of shipping bulk foodstuffs abroad, relative to their value is low, because of the standardisation of product and load. Similarly in the Modern subsectors (e.g., computers and pharmaceuticals) some would sell trivial amounts on the domestic market, so that there is a lack of direct comparability between products. More important is that firms in this sector are generally engaged in inter-company trade, where goods are shipped, not to final customers, but to other subsidiaries of parent companies. Transfer pricing, where sales revenue figures are artificially high, can also lead to an understatement of relative transport costs. Finally, and this applies to all sectors, VAT is charged at a zero rate on transport services provided to exporters – this reduces the cost of moving goods abroad relative to the cost of internal trade.

While these explanations are reasonable and must be taken on board, it would be quite mistaken to deduce that transport costs of goods ex-factory to consumers are lower on export than on domestic sales. What these explanations offer are insights into why the differences in Table 5 appear in the first place. Products are not standardised, i.e., "food" on the domestic market is not the same as "food" on foreign markets. Nor is the concept of customer clear. On the domestic market the transport cost may be the cost of delivery to a retail outlet, while the foreign cost may be the cost to a storage point abroad, and there could well be many stages thereafter before the goods reach a final retail outlet or final customer.

It would also be mistaken to assume that these figures represent total transport costs. No estimate is available on the direct and indirect transport costs of inputs, some manufacturers have no direct transport costs on sales as goods are sold ex-factory, and finally, no estimates are available on the transport costs of the final purchaser (e.g., households, other enterprises).

There is very little research available in this area with which to compare the findings of this survey. The Irish government's *Operational Programme for Road Development* estimated that the ratio of transport costs to value of export sales was in the region of 9 per cent to 10 per cent. This figure was based on estimates from two unpublished studies which estimated the additional costs to major trade centres in Europe from Irish origins compared to locations on the European mainland in Belgium and Holland. The results given in Table 4 based on our survey give a considerably lower figure for firms exporting from Ireland.

2.1: *Comparison with Other Studies*

Two UK studies provide comparative data at national and regional levels. A 1984 study "Transport Costs in a Peripheral Region" carried out by PEIDA, Planning and Economic Consultants, for the European Commission, the Industry Department for Scotland, and the Department of Economic Development, Northern Ireland, produced results for regions within the UK that are somewhat similar to those given above. The PIEDA study, presented total domestic and foreign transport costs as a percentage of total domestic and foreign turnover and also standardised for industrial structure estimating costs on the basis that the structure of production was similar in the relevant regions. The results are shown below in Table 6. The "crude" results refer to the actual costs and the standardised costs are adjusted to take account of industrial structure.

Table 6: *Transport Costs per cent Turnover in UK*

Region	*Crude %*	*Standardised %*
Scotland, Central	3.5	3.3
Scotland, Peripheral	4.0	3.6
Northern Ireland, Central	3.3	3.8
Northern Ireland, Peripheral	5.5	3.1
South East England	3.3	2.9

These order of magnitude of costs results are very similiar to those of our survey, though our results are higher, suggesting a cost disadvantage relative to Britain and Northern Ireland.

Diamond and Spence (1988) examined expenditure on transport relative to operating costs. The results are not directly comparable with those of our surveys. However, since operating costs for all manufacturing in Ireland represents 75 per cent of sales revenue it is possible to make a general comparison of the results. Transport costs for all manufacturing were estimated at 4.7 per cent of operating costs by Diamond and Spence.

When our results are adjusted at an aggregate level to represent transport costs relative to operating costs, the proportion is 5.2 per cent compared with 4.7 per cent in Britain. At a disaggregated level, the British results are significantly higher in pharmaceuticals where British industry is primarily involved in the production of finished products, while Irish industry is primarily involved in the production of fine chemicals. In the fine chemicals sector, transport costs are lower relative to sales and operating revenue. The British results are also higher in food, but they refer to selected food processing whereas our results are for all food, drink

and tobacco sectors. The effect of standardising by product would thus be to accentuate the differences between Irish and British costs.

What general conclusions can we draw from the two surveys relative to our survey and other Irish data? First, transport costs are higher relative to turnover in Ireland than in the UK, being 3.3 per cent in the UK and 4 per cent in Ireland. Second, when operating costs rather than turnover are considered, then this result is confirmed, the relative position being 5.2 per cent as compared with 4.7 per cent. When allowance is made for differences in industrial structure (particularly with regard to food and pharmaceuticals) the differences are greater with the gap widening between Irish and British costs. Third, when transport services are purchased rather than provided "in house" transport is significantly less in Ireland (2 per cent of operating costs) than in Britain (3.1 per cent of operating costs). There is also evidence of much greater reliance in Britain on air transport.

3: *SURVEY OF IRISH SHIPPING AGENTS*

The shippers survey was aimed at finding out the precise costs of movement of standard loads from various locations in Ireland to a series of EC and other destinations. Eleven shipping agents gave detailed cost information for 20ft and 40ft containers moved from Ireland through the ports of Dublin, Cork, Waterford, Rosslare, Belfast and Warrenpoint. The questionnaire asked shippers to provide information on the cost of transport from several Irish origins to three destinations for a typical load. The destinations varied from firm to firm as shippers specialise in providing service to a limited number of foreign ports. The aim was to obtain information on the following items: (1) internal cost differentials in Ireland (2) cost savings associated with larger loads (3) realistic costs of transport to European and other foreign destinations.

Table 7 shows the transport costs to the various origins and destinations from the port used by the shippers. The indexed cost is given to maintain the confidential rates quoted by the shippers. The base index of 100 is for Dundalk-Newcastle (via Warrenpoint). Most shippers operated from two or three ports. The results of the survey are of a high quality being consistent with respect to distance travelled. Table 8 gives the proportional increase in costs of shipments for origins in different regions of Ireland (this essentially captures the additional cost of internal road transport en route for the main Irish ports). The average percentage of internal Irish transport costs to total transport costs to European destinations is also

Table 7: *All Prices in IR£ 40 Ft Containers Cost from Locations in Ireland*

Destination	*Dublin*	*Cork*	*Galway*	*Limerick*	*Sligo*	*Letterkenny*	*Dundalk*	*Athlone*	*Waterford*
London	150	200	192	200	208	208	133	150	200
Birmingham	133	183	142	183	158	158	117	133	183
Newcastle	117	167	158	167	142	142	100	117	167
East Coast USA	669	669	756	723	760	766	719	733	669
Gulf Coast USA	690	690	777	666	781	787	740	754	690
West Coast USA	711	711	798	765	802	808	761	775	711
Frankfurt	283	283	350	317	350	383	300	317	317
Lyons	350	383	417	367	417	450	367	383	400
Milan	450	433	517	467	517	550	467	483	483
Tokyo	460	455	517	487	480	550	488	498	491
Sapporo	779	774	836	869	799	869	807	817	810
Rotterdam	150	176	231	203	231	256	204	213	209
Amsterdam	169	196	250	223	250	276	224	233	229
Antwerp	172	199	253	226	253	279	227	236	232
Madrid	408	494	489	480	451	439	399	430	454
Bilbao	347	433	428	419	391	379	338	370	394
Barcelona	444	529	524	515	487	474	434	465	490
Paris	267	267	267	267	300	333	300	300	250
Strasbourg	317	317	317	317	350	383	350	350	300
Hamburg	215	225	292	258	292	334	248	258	251
Hanover	236	245	312	267	312	305	268	279	272
Berlin	345	342	421	376	421	414	378	388	381
Lisbon	321	401	392	384	384	401	347	358	375
Rome	540	620	611	603	460	620	566	577	594

given for several EC countries. Table 9 shows the average percentage of total transport costs to EC destinations incurred within Ireland. Finally, Table 10 shows the average percentage increase in costs for a 40ft container compared to a 20ft container.

From the tables, it can be observed that there are considerable variations in the costs of transport from the different origins in Ireland to EC

Table 8: *Cost Variations in Ireland*

	Major Port	
Origin	*Dublin or Cork*	*Warrenpoint*
Dublin	100	113
Cork	100	150
Limerick	108	150
Galway	123	144
Sligo	123	156
Letterkenny	138	156
Dundalk	108	100
Athlone	115	113
Waterford	109	150

Table 9: *Average Percentage of Total Transport Costs Paid on Transport Within Ireland en Route to European Destinations*

Destination	*Average % Transport Costs*
UK	37.0
Italy	18.6
Holland	36.8
Belgium	33.8
Spain	13.1
Portugal	16.4
France	12.2
Germany	16.6

Table 10: *Percentage Increase in Costs for 40 Foot Containers over 20 Foot Containers*

Origin	*Destinations*			
	W. Germany	*France*	*Italy*	*Average*
Dublin	31	11	50	31
Cork	31	15	63	36
Limerick	36	10	47	31
Galway	31	14	48	31
Sligo	17	14	48	26
Letterkenny	28	13	43	28
Dundalk	29	10	47	29
Athlone	27	15	53	32
Waterford	34	14	53	34

destinations. Large increases from Irish origins to central European cities, compared to costs from mainland European ports to central European cities can be observed. For example Dublin-Amsterdam has an indexed cost of 169 units. This increases by only 27 per cent to continue to Hamburg and by 67 per cent to Frankfurt. Moving goods from Ireland to the larger European markets is considerably more costly for Irish manufacturers, even when use is made of larger containers.

Looking at the internal costs, the average cost from origins in each province to the nearest port offering service were computed as a percentage of total transport costs to all EC destinations. The East coast of Ireland has the lowest internal costs (9 per cent of total costs to Europe). The average costs to ports in Ireland from the South is 23.6 per cent, it is 26.6 per cent from the West and 38 per cent from the Northwest. Obviously for manufacturers in the Northwest, shipment via Larne is a more viable option, because of its geographical proximity, superior road conditions and more flexible working hours.

While government documents like the *Operational Programme on Peripherality* generally present the country as suffering from considerable disadvantages due to her peripherality, this analysis highlights the regional disparities within Ireland and the heightened cost disadvantage to those exporting from the West, Northwest and parts of the South.

In looking at costs for 20 ft containers versus 40 ft containers, it may be noted that clients of shipping agents on average pay an additional 31 per cent, highlighting the considerable scale economies associated with larger loads. This additional charge however varies by both origin and destination. For the more remote origins, the increase in cost for 40 ft containers is quite low. The quotations given are for clients using these containers regularly, and it must be remembered that the costs are considerably higher when groupage rates are given. The shippers indicated that the typical load was a 20 foot container.

Shippers were also asked to indicate any measures that they felt could be introduced to reduce costs of transport. Firms highlighted the high levels of VAT and excise duty as this effected vehicle ownership levels. In addition insurance, maintenance and spare parts, road tax and fuel prices were also mentioned by a couple of respondents. Customs clearance charges, port charges, and delays in loading cargo at Dublin port as well as the limited opening hours were seen as factors reducing the potential flows of traffic at Dublin particularly and contributing to increased costs. Several shippers suggested that better use of container space and better co-ordination of import and export activities would reduce costs, as per unit costs would then be minimised.

4: *IMPLICATIONS AND DISCUSSION*

There are considerable variations in the value of commodities being exported from Ireland: most goods are shipped by sea and the relative costs of getting produce to the Irish ports in the first place can be very high for manufacturers located in peripheral regions of Ireland. The ports with the heaviest traffic are located on the East coast and firms located in Leinster have considerable advantages over firms located in the West, Northwest and parts of the South.

Taking one example, it costs 42 per cent more to ship goods from Sligo to Newcastle compared to the costs of shipping from Dundalk to Newcastle. The cost from Galway is 58 per cent higher. While differentials of this order of magnitude have serious implications for export trade, they also have serious implications for domestic markets. Manufacturers in peripheral regions in Ireland are competing with British manufacturers in

the largest domestic market at Dublin. Taking account of the costs of importing raw materials to peripheral regions, these regions suffer competitive disadvantages within Ireland as well as externally.

Considerable economies of scale exist when larger containers are used for shipping produce abroad. The charges are generally invariant to weight. However the structure of Irish industry, particularly indigenous manufacturing, does not allow full advantage to be taken of these savings, so costs remain higher for movement of goods internally and internationally.

Transport costs in Ireland in general are high by EC standards: VAT and duty paid on vehicle and transport equipment are at higher levels than elsewhere in the EC. In combination with this, the tax and duty paid on spare parts makes the fixed cost of transport services very high. The running costs are above average: a 1987 comparison of petrol prices showed that Irish excise duty was 362 ecu/1000 litres, the EC average being 338 ecu/1000 litres. VAT paid on petrol is between 5 per cent and 10 per cent higher in Ireland than in other EC countries. Insurance costs and road taxes further increase the running costs associated with transport services.

The EC proposals aim to harmonise VAT and excise duty rates, so that internal Irish transport costs should be reduced in the medium term. Currently, transport services associated with the export of produce from Ireland are charged a zero VAT rate: EC proposals on VAT will extend to include these services. The introduction of cabotage in the European freight market will provide increased service to Irish manufacturers for exporting produce: it will also bring increased competition to domestic markets.

A major component in the effort to reduce transport costs to and from Ireland and within Ireland is the investment in improvements to the road network. There is urgent need for substantial repairs to (and in many cases reconstruction of) many hundreds of kilometres of road. The network is in poor condition generally and in order to gain any real advantages, road infrastructure investment particularly must be proportionally higher in Ireland than elsewhere in Europe.

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Chapter 5

INDUSTRIAL STRUCTURE AND ECONOMIES OF SCALE IN THE CONTEXT OF 1992

Eoin O'Malley

1: *INTRODUCTION*

The creation of a single EC market by the end of 1992 is an ambitious undertaking which will have important implications for manufacturing industry. The single market legislative programme is intended to create an integrated internal market free of restrictions on the movement of goods, as well as people, capital and services, within the EC as a whole. This will change considerably the competitive environment for many industrial companies.

Although tariff and quota restrictions on internal trade within the Community have mostly been removed for some time past, other impediments to free trade have remained and these are due to be removed by the end of 1992. These other impediments to trade include, for example, customs delays at frontiers, differences in indirect taxes in different countries, differences in technical standards and regulations, and preferential public sector purchasing from each country's own domestic suppliers.

The removal of such "non-tariff" barriers to free trade will affect all manufacturing sectors to some extent, but for many sectors the change will be of relatively minor importance. Clearly some sectors, such as those subject to substantial public sector purchasing or major differences in technical regulations, will be affected much more than others, which already operate in a situation of virtually free trade, apart from the nuisance of customs formalities.

This paper focuses on the implications of the single European market for those manufacturing sectors which seem likely to be *most* affected, either for better or for worse. Thus, in Section 2, it starts by specifying the sectors which are likely to be most affected by the removal of non-tariff barriers to free trade. It then goes on to consider the structure of industry in Ireland in order to see to what extent is Irish industry actually involved

in those sectors. It also attempts to assess the competitive strength or weakness of Irish industry in the sectors concerned.

Sections 3 to 6 of this paper then focus on the particular issue of the implications of economies of scale, in the context of the single EC market. This issue arises because the removal of the non-tariff barriers to free trade will lead to increased opportunities for trade in manufactured goods within the EC. This will provide scope for the stronger and more competitive companies in the Community to increase the size of their operations. In those sectors where there are important economies of scale, i.e., reductions in unit costs as the scale of production increases, companies which expand successfully will be able to take greater advantage of economies of scale. In such activities, there is likely to be appreciable structural change, involving a process of concentration of EC industries into smaller numbers of larger and more competitive companies.

For EC industries in general, such a process would have the benefit of raising productivity and making EC companies more competitive relative to the rest of the world, as a result of taking greater advantage of economies of scale. However, the benefits of this process would not necessarily accrue to each industrial sector in every member state. For these benefits would only arise to a significant degree in those sectors in which there is substantial scope to take greater advantage of economies of scale as a result of the single EC market. These benefits could tend to accrue mainly to certain countries whose industries prove to be most competitive, while the less competitive industries of other countries could be threatened as a result of meeting stronger competition.

Thus, in Sections 3 to 6, this paper considers the extent to which Irish industry will be affected by companies taking greater advantage of economies of scale in the single EC market. It examines the structure of Irish industry in order to assess to what extent is it actually involved in sectors where there are very substantial economies of scale. Then it considers whether the sectors of Irish industry concerned will be in a position to expand and take increased advantage of economies of scale, or whether they will suffer from the expansion of industry in other member states of the EC exploiting such scale economies.

2: *IRISH INDUSTRY IN SECTORS MOST AFFECTED BY REMOVAL OF NON-TARIFF BARRIERS*

The sectors of industry which are likely to be most affected by the changes brought about by the single EC market are those which have hitherto been characterised by significant non-tariff barriers to trade,

which the single market programme will remove. For, if there were negligible barriers to trade to begin with, for a particular sector, the single market programme would have little impact on its opportunities for trade and hence would make for rather little change. If, on the other hand, a sector were initially characterised by substantial trade barriers, the removal of such barriers in the single market should create significant new opportunities for intra-EC trade.

Buigues *et al.* (1990) have examined the implications of the single EC market for individual manufacturing sectors, at the NACE 3-digit level, identifying those sectors which are likely to be most affected by it. They identified the sectors which are likely to be most affected by the single market by examining the incidence of non-tariff barriers, as well as their effects on trade as seen in low levels of intra-EC trade and/or substantial price differences between EC countries. It is presumed that sectors with high non-tariff barriers, together with low levels of intra-EC trade and/or large price differences between member states, will be most affected by the single EC market since the removal of non-tariff barriers will have significant implications for them.

There are some non-tariff barriers, such as the costs and delays associated with customs formalities, which apply widely to all manufacturing sectors; but these represent rather minor impediments to trade. The more serious barriers to trade, which Buigues *et al.* (1990) focus on in identifying sectors most affected by the single EC market, include discriminatory public sector purchasing and differences in technical regulations and standards. In sectors affected by these types of non-tariff barriers, the effects on trade patterns and price differentials can be quite substantial.

Based on this approach, Buigues *et al.* (1990) identified 40 NACE 3-digit sectors (out of a total of some 120 NACE 3-digit manufacturing sectors), which are likely to be most significantly affected by the removal of non-tariff barriers. The 40 sectors concerned, which they also refer to as the "sensitive" sectors, account for approximately 50 per cent of the EC's manufacturing employment and value-added.

In order to identify the Irish manufacturing sectors which are likely to be most affected by the removal of non-tariff barriers, we can depend largely on the list of 40 "sensitive" sectors drawn up by Buigues *et al.* (1990) for the EC as a whole. But a few revisions to their list are needed to obtain a listing of sensitive[1] sectors that is relevant for Ireland. After making these

[1] Note that the term "sensitive" is *not* necessarily meant to imply "vulnerable" or "threatened", since such sectors may encounter either new opportunities or new threats, or both.

revisions (as explained in O'Malley, 1990), we obtain a list of 39 manufacturing sectors which are likely to be most affected by the removal of non-tariff barriers.[2] This list is shown in Table 2.1.

The industries in Table 2.1 are listed in two groupings. Group 1 includes the sectors which initially have the greatest non-tariff barriers to trade, while the sectors in Group 2 have more moderate non-tariff barriers - although these are nevertheless more significant than in the case of the approximately 80 manufacturing sectors which are not included at all in Table 2.1.

The 39 sectors in Table 2.1 employed a total of 94,300 people in Ireland in 1987, which was 46.7 per cent of total manufacturing employment. This breaks down into 28,800, or 14.3 per cent of total manufacturing employment, in the Group 1 sectors, and 65,500 or 32.4 per cent of total manufacturing employment, in the Group 2 sectors.

Since the impact of the single EC market on Irish manufacturing will depend very largely on its impact on the sectors listed in Table 2.1, it is important to attempt to assess the competitive position of these industries in Ireland.

As background to this assessment, it is worth noting that until the early 1960s there was a policy in Ireland of strong protection against imports and most industries concentrated on selling to the protected home market. There was little development of manufactured exports before the 1960s. However, new policies were introduced in the late 1950s to promote industrial exports by means of grant assistance and tax concessions, and export-oriented investment from abroad was actively sought as a means of contributing to export growth. Complementary to this more "outward-looking" approach, it was subsequently decided to introduce free trade policies by removing tariff and quota protection.

As the new "outward-looking" policies were applied, there was a marked increase both in import penetration and in export orientation. Competing imports of manufactured products gained a 1.2 per cent increase in market share per annum during the period 1967-79. On the export side, manufactured exports increased from 19 per cent of manufacturing gross output in .1960 to 33 per cent in 1973 and 59 per cent by 1987. It is clear, however, that the growth of manufactured exports was largely a result of the establishment of new foreign-owned, highly export-oriented firms, rather than a result of a major switch from domestic to export markets by Irish indigenous firms. The formerly protected indigenous firms bore the

[2] The revisions to the list drawn up by Buigues *et al.*, include, for example, leaving out certain industries, such as champagne and sparkling wines, which are of no significance for Ireland.

Table 2.1: *List of Sectors Likely to be Most Affected by the Removal of Non-Tariff Barriers*

	NACE Code	*Industry*
Group 1	330	Office and data processing machinery
	341	Insulated wires and cables
	342	Electrical machinery
	344	Telecommunications equipment
	361	Shipbuilding
	362	Railway rolling-stock (including repairs)
	372	Medical and surgical equipment
	417	Spaghetti, macaroni, etc.
	421	Cocoa, chocolate and sugar confectionery
Group 2	247	Glass and glassware
	248	Ceramic goods
	251	Basic industrial chemicals
	256	Other chemical products, mainly for industrial and agricultural purposes
	257	Pharmaceutical products
	321	Agricultural machinery
	322	Machine-tools for working metal
	323	Textile machinery
	324	Machinery for food, chemical and related industries
	325	Plant for mines, iron and steel industry
	326	Transmission equipment for motive power
	327	Other machinery for specific branches
	345	Radios, televisions, consumer electronics
	346	Domestic electric appliances
	347	Electric lamps and other electric lighting
	351	Motor vehicles
	364	Aerospace equipment (including repairs)
	413	Dairy products
	427	Brewing and malting
	428	Soft drinks
	431	Wool industry
	432	Cotton industry
	438	Carpets and floor coverings
	451	Footwear
	453	Clothing
	455	Household textiles
	481	Rubber products
	491	Jewellery
	493	Photographic and cinematographic laboratories
	494	Toys and sports goods

brunt of increased competition from imports and, for the most part, they did not attain a sufficient increase in exports to compensate for this (O'Malley, 1989).

By now, therefore, manufacturing industry in Ireland consists, on the one hand, of foreign-owned companies which are mostly highly export-

oriented and experienced in international markets; on the other hand, there are Irish indigenous companies which are mostly much less export-oriented and have had a poorer record in international competition. It is likely, however, that a high proportion of what were the least competitive indigenous firms have already closed, so that those existing now should be better able to withstand free trade than was the case 10 or 20 years ago.

Table 2.2 shows the relative importance of foreign-owned and indigenous industry and their export-orientation, within the overall structure of Irish manufacturing. Given this "dualistic" industry structure - as reflected in the marked difference in the performance of foreign-owned and indigenous industry in international markets - the question of nationality of ownership has a bearing on the competitive position of the "sensitive" sectors. Taking the whole group of 39 sensitive sectors, foreign-owned firms account for 56 per cent of their employment, which is substantially greater than the 42.8 per cent share of foreign firms in total manufacturing employment. Thus foreign firms are disproportionately concentrated in the sensitive sectors, which would be likely to make many of them stronger than the average Irish manufacturing sector when it comes to international competition.

Table 2.2: *Relative Importance and Export Performance of Foreign-Owned and Indigenous Industry, 1987*

	Percentage of Manufacturing Employment	*Percentage of Manufacturing Gross Output*	*Percentage of Manfactured Exports*	*Exports as Percentage of Gross Output*
Foreign	42.8	52.2	74.4	84.7
Indigenous	57.2	47.8	25.6	31.9
Total	100	100	100	59.4

Source: Census of Industrial Production, 1987, Table 11.

2.1: *Indicators of International Trade Performance of the Sensitive Sectors*

To assess the competitive position of the sensitive sectors relative to the rest of the EC, we use three indicators of their international trade performance; the ratio of their exports bound for other EC countries to imports from other EC countries, the rate of change of this intra-EC export-import ratio, and their total exports as a percentage of gross output.

Judged on the basis of the intra-EC export-import ratios alone, the overall position of Irish industry in the sensitive sectors looks quite good. The 15 industries for which the intra-EC export-import ratios are relatively high, at more than 1.1, are more important, in terms of employment or

value-added, than the 23 industries with relatively low ratios of below .9, as shown in Table 2.3. The 15 sectors with high export-import ratios account for 26.5 per cent of manufacturing employment, compared with 18.9 per cent for the 23 sectors with low export-import ratios.

Table 2.3: *Number and Importance of Sensitive Sectors with High, Average and Low Intra-EC Export-Import Ratios*

	Number of Industries	*Percentage of Manufacturing Employment, 1987*	*Percentage of Manufacturing Value-Added 1985*
Export-import ratio-above 1.1	15	26.5	50.4
Export-import ratio .9-1.1	1	1.3	0.8
Export-import ratio below .9	23	18.9	9.7

Source: Data supplied by Statistical Office of the European Community for columns 1 and 3. IDA employment survey for Column 2.

As Table 2.3 also shows, the share of value-added in the sectors with high export-import ratios exceeds the share of value-added in those with low ratios by a far greater margin. It should be pointed out, however, that value-added figures can overstate the real importance of certain industries for the Irish economy, in cases where a substantial proportion of value-added consists of profits made by foreign-owned companies which habitually withdraw most of their profits from the country. This is particularly the case for many of the sectors with high export-import ratios in Table 2.3. The employment figures in Table 2.3, however, give a much more realistic measure of the importance of the different categories of industry for the Irish economy, and they do clearly indicate that the industries with high export-import ratios are more important than those with low ratios.

The sectors included in Table 2.4 are those which have relatively high intra-EC export-import ratios, and this suggests that they have quite a strong competitive position relative to other member states. For the most part, the impression given by this indicator is supported by one or both of the other two indicators in Table 2.4. These show that most of the industries in the table have not only high but also rising export-import ratios, while many of them also have a high proportion of their output going to export markets.

One exception is Brewing and Malting, with a declining export-import ratio and a low level of export-orientation. The situation here, however, is that there is a generally low level of international trade. Imports have been

Table 2.4: *International Trade Indicators for Sensitive Sectors with Relatively Strong Trade Performance*

Group	*NACE Code*	*Sector*	*Intra-EC Export/Import Ratio 1985-87*	*Percentage Change in Export/Import Ratio 1980-87*	*Exports as Percentage of Gross Output*	*Employment as Percentage of Total Manufacturing 1987*
Group 1	330	Office and data processing machinery	6.43	91	98[1]	3.8
	341	Insulated wires and cables	2.65	632	70[3]	2.1
	344	Telecommunications equipment	2.1	52	87[2]	2.6
	372	Medical and surgical equipment	5.2	-2	99[2]	2.3
	421	Cocoa, chocolate, confectionery	1.37	24	62[2]	1.2
Group 2	251	Basic industrial chemicals	1.69	9	49[1]	1.2
	257	Pharmaceuticals	1.15	71	96[1]	2.8
	345	Radios, TVs, etc.	1.17	59	38[3]	1.1
	413	Dairy products	17.46	64	37[1]*	3.8
	427	Brewing and malting	2.38	-91	13[3]	1.6
	428	Soft drinks	1.85	27	13[3]	1.3
	432	Cotton industry	1.35	-17	84[3]	.4
	481	Rubber products	1.15	36	c.88[1]	1.0
	491	Jewellery	2.76	29	high[3]	.9
	494	Toys and sports goods	1.53	7	85[2]	.3
Employment of above industries as a percentage of total manufacturing:						26.5

Source: Data supplied by Statistical Office of the European Communities, for columns 1 and 2. Various sources for column 3, as outlined in the Appendix; superscript numbers on data in column 3 indicate which of the three sources referred to in the Appendix is used. IDA employment survey for column 4.

**Note:* Exports of Dairy products as a percentage of gross output may not be accurate because of varying interpretation by firms of sales to EC Intervention and to An Bord Bainne Co-op Ltd. in the context of exports.

increasing from an extremely low base level in 1980 - hence the falling export-import ratio; but imports still amount to less than 5 per cent of the domestic market so that this trend is not of great significance. The high export-import ratio can still be taken to indicate a position of relative competitive strength. The cotton industry, too, has a declining export-import ratio, but since the vast majority of its output is nevertheless sold in export markets, the indicators for this industry are rather ambiguous.

In general, then, all or nearly all of the industries in Table 2.4 can probably be regarded as quite competitive. They should mostly be in quite

a good position to take advantage of improved export opportunities under freer trade, and even if they do not do so in a major way, they generally do not look vulnerable to the effects of freer trade.

It was pointed out above that highly export-oriented branches of foreign multinational companies constitute the major part of the 39 sensitive sectors in general. This feature is even more marked in the 15 sectors in Table 2.4 which have had a relatively strong trade performance. In these 15 sectors as a group, foreign-owned companies account for 68.9 per cent of employment, compared with 56 per cent of employment in all 39 sensitive sectors and 42.8 per cent in total manufacturing. In view of the strong export record of the foreign firms in general, this tends to strengthen the view that the 15 sectors considered here have a relatively strong competitive position in international trade.

Only one of the "sensitive" sectors, domestic electric appliances, has an export-import ratio falling in the "average" range of .9 to 1.1, as seen in Table 2.5. Although the export-import ratio for this industry is on the low side, at .92, the other indicators of its trade performance look quite strong. Thus its export-import ratio has been rising quite rapidly and it exports a large majority of its output.

Table 2.5: *International Trade Indicators for Sensitive Sector with "Average" Export-Import Ratio*

Group	*NACE Code*	*Sector*	*Intra-EC Export/Import Ratio 1985-87*	*Percentage Change in Export/Import Ratio 1980-87*	*Exports as Percentage of Gross Output*	*Employment as Percentage of Total Manufacturing 1987*
Group 2	346	Domestic electric appliances	.92	34	78[a]	1.3

Source: Data supplied by Statistical Office of the European Communities, for columns 1 and 2. Column 3 as outlined in the Appendix. IDA employment survey for column 4.

The explanation for this situation is that this industry in Ireland concentrates almost exclusively on producing the smaller electrical appliances such as electric heaters, shavers, food mixers, vacuum cleaners and hair dryers. The larger appliances such as washing machines, refrigerators and dishwashers are scarcely made in Ireland at all, and hence they have to be imported. But such imports do not really reflect on the competitive position of the industry in Ireland since they generally do not represent competition for Irish firms. Thus this industry is, in fact, quite competitive and successful in export markets within its own particular areas of specialisation.

The sectors included in Table 2.6 are those with relatively low export-import ratios. This would appear to indicate that these industries have a rather weak competitive position and are vulnerable to the effects of freer trade, but further consideration suggests that this is not necessarily so in every case. As in the case of electrical appliances, a number of the industries in Table 2.6 are not very fully developed in Ireland and do not produce the full range of products covered by the official industry definition. Hence, imports can be quite high, resulting in a low export-import ratio, without necessarily reflecting a weak competitive position in the particular areas of specialisation of the firms which do exist. The other indicators of international trade performance in Table 2.6 can help to warn us where a low export-import ratio may be misleading for this reason.

If we look at the mechanical engineering group of industries (NACE 321-327), for example, we find that all seven of them have low export-import ratios. But in most of them the export-import ratio has been rising, or at least holding fairly steady, while these seven industries as a group export as much as 75 per cent of their output. There is no doubt that many types of machinery are simply not produced in Ireland and hence imports have to be rather high, without necessarily reflecting on the competitiveness of the existing firms. The high proportion of mechanical engineering output which is exported suggests that many firms in this group of industries must be internationally competitive in their own particular areas of specialisation.

In the aerospace equipment industry, aircraft are not actually produced in the Republic of Ireland, so that if aircraft are in demand they have to be imported, and this results in a low export-import ratio. The industry in Ireland is almost entirely engaged in overhaul, repair and maintenance of aircraft and aircraft engines. This activity, carried out by Aer Lingus and its subsidiaries, is partly work for Aer Lingus itself but also partly for foreign airlines. Given the substantial amount of work done for foreign customers, and the satisfactory profitability of these activities within Aer Lingus, this industry seems to be quite competitive and not particularly vulnerable to free trade, despite the low export-import ratio. Furthermore, expansion plans for this sector, which are already well advanced, both within and outside Aer Lingus, should result in significant future growth.

The railway equipment industry is also something of a special case, although for somewhat different reasons. All the indicators of international trade performance for this sector look extremely poor, and this reflects the fact that there are very little exports. The industry consists almost entirely of part of Iarnrod Eireann; in 1987, over two-thirds of the industry's output was repair and maintenance work and less than one-third

Table 2.6: *International Trade Indicators for Sensitive Sectors with Relatively Low Export-Import Ratios*

Group	*NACE Code*	*Sector*	*Intra-EC Export/Import Ratio 1985-87*	*Percentage Change in Export/Import Ratio 1980-87*	*Exports as Percentage of Gross Output*	*Employment as Percentage of Total Manufacturing 1987*
Group 1	342	Electrical machinery	.74	7	n.a.	1.1
	361	Shipbuilding	.60	236	93[3]	.3
	362	Railway equipment	.02	-90	4[3]	.8
	417	Spaghetti, macaroni, etc.	.37	-79	n.a.	.02
Group 2	247	Glass and glassware	.86	61	55[2]	1.9
	248	Ceramic goods	.56	9	91[2]	.4
	256	Other chemical products	.69	34	high[3]	.7
	321	Agricultural machinery	.13	-21		.6
	322	Machine-tools	.60	77		.6
	323	Textile machinery	.18	-8		.05
	324	Food, chemical machinery	.21	-3	75[1]	.2
	325	Plant for mines, steel industry	.55	46		.6
	326	Transmission equipment	.22	54		.1
	327	Other machinery	.41	179		.04
	347	Electric lamps	.14	-3	n.a.	.1
	351	Motor vehicles	.15	-57	n.a.	.4
	364	Aerospace equipment	.78	7	>40	1.1
	431	Wool industry	.84	-8	76[1]	1.9
	438	Carpets, floor coverings	.67	-21	65[2]	.4
	451	Footwear	.15	-45	38[1]	.6
	453	Clothing	.56	18	54[2]	6.5
	455	Household textiles	.70	-46	74[2]	.5
	493	Photographic laboratories	.41	-65	n.a.	.1
Employment of above industries as a percentage of total manufacturing						18.9

Source: Data supplied by Statistical Office of the European Communities, for column 1 and 2. Various sources for column 3, as outlined in Appendix; superscript numbers on data in column 3 indicate which of the three sources referred to in the Appendix is used. (In the case of Aerospace, the source is annual reports of Aer Lingus, which dominates this sector). IDA employment survey for column 4..

was manufacture of rolling stock or parts of rolling stock. Virtually all "sales" are intra-firm sales within Iarnrod Eireann. Thus although there is little indication that this industry could take much advantage of new export opportunities, it does not appear to be particularly vulnerable to competition under freer trade since it is part of a vertically integrated company which itself constitutes its market.

In the 23 sectors with low export-import ratios taken as a group, foreign firms account for only 36.5 per cent of employment, compared with 68.9

per cent of employment in the 15 sectors with a strong international trade performance. Given the strong export record of most foreign firms and the weaker record of indigenous industry in general in international trade, this would tend to strengthen the impression that many firms in the 23 sectors in Table 2.6 could tend to be somewhat more vulnerable to stronger competition under freer trade than would be the case for the 15 sectors in Table 2.4.

Finally, the sectors in each of these tables are listed in two groupings, Group 1 consisting of those which have been characterised by the greatest non-tariff barriers to intra-EC trade, while non-tariff barriers for the Group 2 sectors have been more moderate, although still significant. Thus the Group 1 sectors are those which face the greatest change in their competitive environment as the single EC market becomes a reality. It is therefore encouraging to note that the Group 1 sectors with a relatively strong trade performance, in Table 2.4, are considerably more important in Ireland than the Group 1 sectors with a more dubious trade record, in Table 2.6. Those in Table 2.4 account for 12 per cent of total Irish manufacturing employment, compared to 2.2 per cent of total manufacturing employment in those in Table 2.6. Thus the indications are that Irish industry is, for the most part, relatively well placed to benefit from freer trade in the Group 1 sectors where the most significant non-tariff barriers to trade have prevailed.

2.2: *The Role of Foreign-Owned Multinational Companies*

It is worth referring again to the fact that foreign-owned multinational companies generally play a major part in the sectors identified as being relatively strong. It is necessary to consider whether this feature will have an influence on the prospects of the industries concerned in the single European market.

It should be recognised that if an industry is mainly composed of branches of foreign multinational companies, indicators of the trade performance or competitiveness of the industry in Ireland do not necessarily tell the full story about its competitive position. For the competitive strength of the establishments in Ireland is likely to be dependent to some degree on the overall strength of the enterprises concerned. For instance, the quality of top management, R & D and overseas marketing, much of which would be carried out in other countries, would influence the overall competitiveness of the companies concerned, and ultimately the prospects for their subsidiaries in Ireland. Thus, for example, a company that is in a relatively weak position internationally would not necessarily be willing or able to expand its Irish

operations even if the Irish branch has a very satisfactory record. Consequently, there is an element of uncertainty about whether industries of this type are necessarily as strong as they may appear to be from the Irish indicators.

A related point is that even a strong multinational enterprise with a very satisfactory operation in Ireland may not necessarily respond to new opportunities in EC markets by expanding production in Ireland. Instead, it might expand production in other satisfactory European establishments, or it might set up a new establishment elsewhere in the EC, perhaps with newer, more advanced technology. The range of such options which are available means that one cannot be certain that expansion in Ireland will necessarily result from a strong performance in existing Irish operations.

It has also been pointed out that large multinational companies in some sectors, such as electronics and electrical engineering, often have more plants in Europe than would be efficient, due to the market-fragmenting effects of non-tariff barriers which cause them to locate plants in each target national market (NESC, 1989). The indirect effects of the removal of non-tariff barriers in such situations would often involve rationalisation, with closures of some plants and concentration of production in a smaller number of larger establishments. Thus, even though a multinational company might be expanding its overall production, this could occur together with closures of some of its branches.

For the reasons mentioned above, one would need to be somewhat cautious about concluding that companies in the relatively strong sensitive sectors will generally undertake significant new expansions in Ireland in response to the new opportunities presented by the single European market. There are, however, good grounds for expecting that firms in these sectors will tend to respond positively more often than negatively.

For one thing, the point mentioned above concerning possible rationalisation with closures of plants as an indirect effect of the removal of non-tariff barriers would probably not have a very significant negative impact in Ireland. This is because most of the branches of multinational companies now in Ireland are here to produce primarily for export markets - *despite* any non-tariff barriers. Few of them are located in Ireland to produce primarily for the Irish market as a result of Irish non-tariff barriers. Hence the removal of barriers to trade, in itself, would seldom create a new motivation to close the Irish plants.

In considering the response of multinational companies generally, it is also important to bear in mind that a major consideration for many foreign companies when deciding to invest in Ireland in the first place was the fact that, as an EC member since 1973, Ireland had attained

guaranteed tariff-free access to EC markets. There was a considerable increase in new foreign investment in Ireland after the early 1970s. Most of this new investment was by firms selecting a site in which to produce goods for sale primarily in EC markets.

If the removal of tariff barriers to exports to EC countries after 1973 increased the motivation for foreign investment in Ireland, it seems reasonable to expect that the removal of non-tariff barriers by 1992 should further enhance the motivation for new foreign investment in industries which now face non-tariff barriers to trade.

One indication of foreign-owned companies' response to the single EC market comes from a recent Investment Survey by the Confederation of Irish Industry and The Economic and Social Research Institute. Companies were asked what impact they expected the completion of the internal market to have on their sales, investment and employment, and Table 2.7 shows the responses from those in office and data processing machinery, electrical engineering and instrument engineering, which are very largely foreign-owned sectors. It can be seen that most of these companies expect the single EC market to result in an increase in their sales to the other EC countries, entailing an increase in the volume of their fixed investment in Ireland. A smaller proportion - but still a majority - expect that this will also mean an increase in their employment in Ireland. Scarcely any of the companies foresee a reduction in their sales in Ireland as a result of the liberalisation of trade. This would reflect the fact that most of the companies concerned export the vast majority of their output at present, so that they have little to lose in the Irish market.

Table 2.7, however, refers only to the expectations of existing companies in Ireland. But investment by new arrivals in Ireland can be at least as important for growth as expansion of the existing firms.

It is not so easy, however, to ascertain the expectations and intentions of potential, but largely unknown, new foreign investors in Ireland. It would be reasonable to expect that the completion of the internal market will increase non-European foreign direct investment in the EC generally. And indeed, there is already evidence that both US and Japanese direct investment in Europe has increased in recent years (O'Donnell, 1989).

Other things being equal, this trend would result in increased foreign investment in Ireland. Ireland's share of the available mobile investment coming into Europe might tend to be reduced somewhat by competition from the newest EC member states, Spain and Portugal or by competition from Eastern European countries for mobile international investment. But Ireland's share of such investment coming into the EC could also tend to be increased by a curtailment of state incentives offered by the richer

Table 2.7: *Response of Companies in Office and Data Processing Machinery, Electrical Engineering and Instrument Engineering to "What Impact Do you Expect the Completion of the Internal Market by 1992 to Have on the Following?"*

(Percentage of Respondents)

	In 1989-1992				*In 1993-1996*			
	Increase	*No Change*	*Decrease*	*Don't know*	*Increase*	*No Change*	*Decrease*	*Don't know*
Your Sales:								
in Ireland	17.2	75.9	3.4	3.4	13.8	69.0	6.9	10.3
to other EC	75.9	24.1	0.0	0.0	75.9	17.2	6.9	0.0
Your Investment:								
in Ireland	65.5	35.5	0.0	0.0	55.2	31.0	3.4	10.3
in other EC	34.5	41.4	0.0	24.1	31.0	34.5	0.0	34.5
Your Firm's Employment:								
in Ireland	51.7	37.9	10.3	0.0	55.2	34.5	6.9	3.4
in other EC	24.1	41.4	3.4	31.0	24.1	37.9	3.4	34.5

Source: Unpublished data from the Confederation of Irish Industry/The Economic and Social Research Institute joint Investment Survey, April 1989.

Note: The number of companies surveyed in these sectors was 29, including most of the largest firms.

member countries, by the availability of skills which are required or by other factors.

Recent data on US foreign manufacturing investment suggest that, on balance, the outlook is quite favourable for Ireland, at least as regards American investment. Table 2.8 shows a substantial rise in US manufacturing investment in Ireland from 1987 to 1991, with an increase occurring in most sectors. Ireland's share of US manufacturing investment in the EC also shows an increase, which suggests that Ireland could reasonably expect to gain from any further growth in such investment in the future.

2.3: *Conclusions*

There are 39 manufacturing sectors in Ireland which are likely to be relatively strongly affected by the removal of non-tariff barriers in the single EC market. Taken together, these "sensitive" sectors account for 47 per cent of Irish manufacturing employment. The sensitive sectors which appear to be in a relatively strong competitive position are more important, in terms of employment or value-added, than those which may be vulnerable to increased international competition in the single EC market. About 28 per cent, or more, of manufacturing employment is in

Table 2.8: *Capital Expenditure by US Manufacturing Firms in Ireland ($ million)*

	1987	*1988*	*1989*	*1990*[1]	*1991*[1]
Food and kindred products	20	28	25	25	29
Chemicals and allied products	37	57	140	203	233
Primary and fabricated metals	6	8	7	10	7
Machinery, except electrical [2]	45	53	55	75	131
Electrical and electronic equipment	33	37	37	40	46
Transportation equipment	6	1	7	15	7
Other manufacturing	46	59	78	95	66
Total manufacturing	195	243	349	462	518
Total as percentage of EC 12	2.0	2.2	2.7	2.9	3.1

Source: US Department of Commerce, Survey of Current Business, September 1990 and previous issues.

Notes: [1] Forecasts.
[2] Includes computers.

sensitive sectors which seem to be relatively strong, as compared with 19 per cent, or less, in potentially vulnerable sectors.

Irish industry, therefore, looks to be in a relatively favourable position, on balance, to face the single European market. This conclusion is somewhat strengthened by the fact that Irish industry mostly looks relatively strong in the smaller group of 9 sensitive sectors (the Group 1 sectors) which have hitherto been characterised by the greatest non-tariff barriers to intra-EC trade.

Many of the stronger sensitive sectors, however, are largely composed of branches of foreign-owned multinational companies. Such companies might not always respond to the new opportunities of the single EC market by expanding production in Ireland, since they would often have other options to expand production elsewhere. But the indications to date are that the effect of the single EC market should generally tend to motivate expansion of the predominantly foreign-owned sectors.

It should be noted, however, that these conclusions refer only to the likely influence or effect of the removal of non-tariff barriers in the single EC market. Since many other factors will also be at work in the international and domestic economies, the future of industry in Ireland will clearly not be ultimately determined by the single market effects alone.

It is also worth stressing that, even though Irish industry may be in a relatively favourable position, on balance, to face the single EC market, this does not in itself guarantee expansion. The process of competition is continuously changing in a dynamic fashion. Thus it will be necessary for companies to keep themselves informed about international developments

and about the strategies of their competitors. Individual companies will need to take positive steps to prepare for the single EC market and to respond to international developments if Irish industry is to take real advantage of the potential opportunities.

3: *THE INFLUENCE OF ECONOMIES OF SCALE IN DIFFERENT INDUSTRIES*

It was noted in the introduction to this paper that the removal of non-tariff barriers, by creating increased opportunities for intra-EC trade, will provide scope for the stronger and more competitive companies in the Community to increase the size of their operations. In sectors where there are important economies of scale (meaning reductions in costs per unit of output as the scale of production increases), companies which expand successfully will be able to take greater advantage of economies of scale and to become more competitive relative to smaller companies (other things being equal). Thus, in sectors of this type, with significant economies of scale, there are likely to be structural changes involving a process of concentration into a smaller number of larger and more competitive companies.

Since such a process would have the effect of raising productivity and making EC companies more competitive relative to the rest of the world, as a result of taking greater advantage of economies of scale, this is seen as one of the main benefits to be gained from the creation of a single EC market (see Emerson et al., 1988). But the benefits for individual member states could vary significantly.

The remainder of this paper considers how will Irish industry be affected by the process of companies taking greater advantage of economies of scale as a result of the creation of a single European market. We examine the structure of Irish industry in order to assess to what extent is it actually involved in sectors where there are significant increasing returns to scale. We also consider whether the sectors of Irish industry concerned will be in a position to expand and take increased advantage of economies of scale, or whether they will suffer from the expansion of industry in other member states of the EC exploiting such scale economies.

3.1: *The Relative Importance of Economies of Scale by Sector*

The importance of economies of scale varies considerably between different types of industry. In some industries, economies of scale exist up to very high levels of output and give substantial advantages to large firms

over small competitors. Consequently, such industries have generally become highly concentrated into a relatively small number of large companies which together account for a very large proportion of the industry's output. Prominent examples of such oligopolistic industries, as a result of the importance of economies of scale, include the production of cars, commercial aircraft and steel.

At the other extreme, in some sectors economies of scale are of little or negligible importance, or cease to apply beyond a rather moderate level of output, giving no significant advantage to large firms over small or medium-size competitors. Such industries tend to be more fragmented in structure, consisting of a relatively large number of small to medium-size firms, each of which accounts for a rather small proportion of output. Examples of this type of industry include clothing, furniture, footwear and other leather products.

In order to assess the extent to which Irish industry will be affected by companies taking greater advantage of economies of scale in the single European market, it is necessary first to identify which sectors are most and least influenced by economies of scale, and then to compare the findings with the sectoral distribution of Irish industry.

There is a considerable literature on the importance of economies of scale in various industries and products. Different studies have used different measures and methodologies, causing some problems in comparing the results for different industries and presenting a summary of the relative importance of economies of scale for each sector. However, Pratten (1988) has drawn together many of the available findings from the USA, the UK and some other large European economies and has devised a ranking of manufacturing industry classes (at the NACE 2 digit level) according to the importance of economies of scale in each industry class. (Pratten's work was used as an input for the estimates in the Cecchini report of the benefits for the EC economy as a whole arising from taking increased advantage of economies of scale in the single European market.)

Pratten's ranking of industry classes by economies of scale is shown in Table 3.1. This ranking is based on a survey of "engineering" estimates of economies of scale in the principal types of activity in each class of industry. Engineering estimates of economies of scale are based on estimates of the unit costs, at different scales of production, for hypothetical production runs, plants and firms where the production facilities, staffing, etc., are adapted to the scale of output so as to minimise costs at that scale. The estimates are for *hypothetical* plants and firms of various sizes, with best-practice technology and equipment, since actual existing enterprises of differing sizes also differ in other respects such as

technology and equipment, which makes it difficult to isolate the effects of differences in scale using real empirical data. Also, of course, it is not practical to build and operate comparable production facilities ranging over various sizes simply for the purpose of experimenting to measure economies of scale.

Table 3.1: *Ranking of Manufacturing Industry Classes by Economies of Scale*

Rank	*NACE* Code	*Industry*
1	35	Motor vehicles, including parts and accessories
2	36	Other means of transport
3	25	Chemical industry
4	26	Man-made fibres industry
5	22	Production and preliminary processing of metals
6	33	Office and data processing machinery
7	32	Mechanical engineering
8	34	Electrical engineering
9	37	Instrument engineering
10	47	Paper, paper products, printing & publishing
11	24	Non-metallic mineral products
12	31	Metal articles
13	48	Processing of rubber and plastics
14	424-429	Drink and tobacco
15	411-423	Food
16	49	Other manufacturing industries
17	43	Textile industry
18	46	Timber and wooden furniture
19	45	Footwear and clothing
20	44	Leather and leather goods

Source: Pratten (1988, Table 5.3b).

The engineering estimates generally measure two aspects of economies of scale - the minimum efficient scale (MES) and the increase in unit costs when operating at some level below the MES. The MES, strictly speaking, is the scale of production above which unit costs cease to fall; but in practice it is often defined as the scale above which unit costs cease to fall rapidly since some minor reductions in costs can continue almost indefinitely.

As examples of what these estimates indicate, consider the Motor Vehicles industry which is ranked number 1 in Table 3.1. It is estimated that a firm making a range of four car models would have a MES of two million cars per year and that unit costs would be 15 per cent higher at one-third of the MES than at the MES itself. This indicates that economies of scale are substantial up to very high levels of output and this is the basis for ranking Motor Vehicles at the top of Table 3.1. Close to the opposite

extreme is the footwear industry in which the MES is estimated to be 4,000 pairs of shoes, with unit costs only 1.5 per cent higher at one-third of the MES. Clearly, the value of output at the MES in footwear is only a small fraction of that in motor vehicles, and the rate of increase in unit costs when operating below the MES is also much less.

Table 3.2 shows the sectoral distribution of manufacturing employment in the EC (column 1) and in Ireland (column 2), with the sectors again listed in order of Pratten's ranking by economies of scale. Column 3 of Table 3.2 is derived by dividing the percentage of employment in each industry in Ireland by the percentage of employment in the same industry in the EC. It thus provides an index of industrial specialisation or concentration in Ireland relative to the EC, with values greater than 1 showing that Irish industry is relatively concentrated in the sector concerned compared with the EC, and conversely for values less than 1.

Table 3.2: *Comparative Distribution of Manufacturing Employment, EC and Ireland.*

Industries Ranked by Economies of Scale		*Percentage Manufacturing Employment EUR 9*	*Percentage Manufacturing Employment Ireland*	*Irish % EUR 9 %*
35	Motor vehicles	8.6	1.5	.17
36	Other means of transport	3.8	2.2	.58
25	Chemical industry	7.8	6.4	.8
26	Man-made fibres industry	0.2		
22	Metals	4.6	.9	.2
33	Office & data processing machinery	1.2	3.2	2.67
32	Mechanical engineering	11.0	4.2	.38
34	Electrical engineering	12.7	9.5	.75
37	Instrument engineering	1.6	3.7	2.31
47	Paper, printing, publishing	6.1	7.2	1.18
24	Non-metallic mineral products	4.3	6.6	1.53
31	Metal articles	8.9	6.2	.7
48	Processing of rubber and plastics	4.3	4.3	1.0
424-429	Drink and tobacco	1.9	4.1	2.16
411-423	Food	7.9	20.7	2.62
49	Other manufacturing industries	1.0	1.5	1.5
43	Textile industry	5.0	5.7	1.14
46	Timber and wooden furniture	3.4	4.0	1.18
45	Footwear and clothing	5.2	8.3	1.46
44	Leather and leather goods	.5		
Total		100	100	1.0

Sources: Ranking of sectors from Pratten (1988, Table 5.3b). Column 1 from Eurostat, *Structure and Activity of Industry-Main Results 1984/85.* Column 2 from *Census of Industrial Production 1986.* Column 3 derived by dividing column 2 by column 1.

It can be seen that Irish industry is relatively under-represented in the sectors in the top half of the table - in which economies of scale are most important - with the prominent exceptions of Office and Data Processing Machinery and Instrument Engineering. Conversely, Irish industry is relatively highly concentrated in the sectors where economies of scale are less important - in the bottom half of the table. This suggests that the issue of the role and influence of economies of scale probably has less significant implications for Irish industry (as structured at present) than for the EC as a whole.

This is only a preliminary finding, however, and it is necessary to consider the matter in greater detail. But first it is important to make two qualifications about Pratten's ranking of industries by economies of scale based on engineering estimates. First, the estimates are based on development costs and production costs alone and do not take account of the potential for economies of scale in marketing and distribution. So long as the economies of scale in development and production are greater than those in marketing and distribution, this would not result in a misleading estimate of the overall potential for economies of scale. But if the potential for economies of scale in marketing and distribution in an industry is greater than in development and production, its overall economies of scale would be greater than the engineering estimates indicate. In Food, Drink and Tobacco, for example, as Pratten acknowledges, there can be substantial economies of scale in marketing and distribution so that these industries, or parts of them, could rank somewhat higher than is suggested in Table 3.1.

The second qualification is that Pratten's ranking of industries by economies of scale deals with quite large categories of industry (NACE 2 digit classes). In practice, most of them contain some diversity of activities, in which the economies of scale can differ quite substantially. For example, the Motor Vehicles industry (NACE 35) includes not only mass-produced standardised cars, vans and lorries, but also customised or special-purpose vehicles, trailers, caravans, parts and accessories. Economies of scale in these latter activities can be a good deal less than in cars, vans and standardised lorries. For the purpose of drawing up the ranking shown in Table 3.1, Pratten naturally had to base it on the most important or mainstream products within each industry class, but it should be remembered that there are exceptional products or activities within industry classes.

Pratten's (1988) report contains a certain amount of detailed information which is helpful in indicating where such qualifications can be

of relevance. To supplement this information, it is also useful to consider another indicator of the relative importance of economies of scale in different industries,namely the size structure of existing industries.

Where one finds that an industry is highly concentrated in large enterprises or establishments, this would usually suggest that there are significant economies of scale in that industry. For the process of competition over time has produced a size structure that is dominated by large producers, with small firms squeezed out or taken over, indicating that large firms or establishments probably have significant competitive advantages over smaller ones. If, on the other hand, an industry is highly fragmented among many small-scale producers, this indicates that there can scarcely be extensive economies of scale in that industry; if there were, larger firms would have emerged and gained competitive advantages over smaller ones.

The engineering data on economies of scale used by Pratten can be seen as measures of *causes* which should result in particular types of industrial size structures as the *effects* of the influence of economies of scale. Hence the ranking of industries by economies of scale based on engineering estimates should be broadly reflected in the degree to which the different industries are concentrated in large enterprises; however, there are some reasons why the precise ranking of industries by these two types of indicator could differ somewhat.

Table 3.3 shows the percentage of each industry's employment in the four major EC economies which is in large enterprises employing over 500 people, with the industries again listed in order of Pratten's ranking by economies of scale. It can be seen that the industries towards the top of the list are generally considerably more highly concentrated in large enterprises than those nearer the bottom of the list, as would be expected. The ranking of sectors by Pratten's engineering estimates is not quite the same as the ranking by concentration in large enterprises, but neither do the two rankings differ very greatly; in two industries, the two rank orders differ by four places, while all the rest differ by three places or less. It is also noticeable that seven of the sectors have a large majority of over 70 per cent of their employment in large enterprises, and these seven highly concentrated sectors are all among the top eight ranked by economies of scale according to the engineering estimates.

It seems, therefore, that the degree of concentration in large enterprises can be used (with some care) as an additional indicator of the importance of economies of scale in an industry. This is useful because the data on industry size structures are available for more highly disaggregated industry categories, at the NACE 3 digit level. Thus these data can help to

Table 3.3: *Percentage of Each Sector's Employment in Large Enterprises Employing Over 500 People, in Germany, France, UK and Italy.*[1]

Pratten's Ranking by Economies of Scale		*Percentage of Employment in Large Enterprises*	*Ranking by Concentration in Large Enterprises*
1.	Motor vehicles	88.0	2
2.	Other means of transport	79.2	5
3.	Chemical industry	70.7	7
4.	Man-made fibres industry	88.1	1
5.	Metals	82.8	4
6.	Office & data processing machinery	86.8	3
7.	Mechanical engineering	46.7	8
8.	Electrical engineering	70.8	6
9.	Instrument engineering	36.0	12
10.	Paper, printing, publishing	34.3	13
11.	Non-metallic mineral products	42.9	10
12.	Metal articles	30.0	15
13.	Processing of rubber and plastics	43.5	9
14.	Drink and tobacco Food	41.9	11
15.	Other manufacturing industries	20.7	17
16.	Textile industry	32.0	14
17.	Timber and wooden furniture	14.9	18
18.	Footwear and clothing	22.6	16
19.	Leather and leather goods	9.1	19
Total		53.1	–

Source: Eurostat, *Structure and Activity of Industry: Data by Size of Enterprises - 1984.*
Note: [1] The data are calculated for the four countries combined where data are available for all four. For some sectors, however, the data are only available for three of the countries.

identify activities within the NACE 2 digit classes in which the importance of economies of scale differs from the class as a whole.

Before proceeding, however, it is worth noting that Mechanical Engineering in particular, and Instrument Engineering to a lesser extent, show a rather low degree of concentration in large firms in relation to their ranking by economies of scale according to the engineering estimates. This basically reflects the great diversity of specialised products in these industries, with limited demand for many of the individual products. There *are* important economies of scale in developing and producing these products according to the engineering estimates, so that it is important for firms to have a substantial output relative to competitors, i.e., a substantial share of their own particular market segment. But

because many of the specialised market segments are quite limited in size, firms can and do have substantial market shares without necessarily being very large. Thus in these cases the engineering estimates point to the existence of significant economies of scale which the enterprise size data would have understated.

With this point in mind, the combination of engineering estimates and enterprise size data in Table 3.3 suggest that the sectors at the NACE 2 digit level fall naturally into *two broad groupings*. The nine sectors from the top of the table down as far as Instrument Engineering have significant economies of scale, with at least 70 per cent of their employment in large enterprises as a result (except in Mechanical and Instrument Engineering for the reason given above). The remaining sectors have less significant economies of scale, with no more than 44 per cent of their employment in large enterprises, indicating that there is considerable scope for small or medium-size firms in these sectors. The first grouping of nine large-scale sectors at the top of the list accounts for 51.5 per cent of manufacturing employment in the EUR 9 group of countries, but only 31.6 per cent in Ireland.

With the help of enterprise size data at the NACE 3 digit level of classification and the more detailed information in Pratten (1988), it is possible to refine this analysis somewhat further, at a more disaggregated level of industrial classification. Rather than simply classifying all of the nine NACE 2 digit classes from the top of Table 3.3 down to Instrument Engineering as those with substantial economies of scale, we can exclude some NACE 3 digit industries from this grouping and include some other NACE 3 digit industries from the remaining NACE 2 digit classes. These adjustments are outlined in Table 3.4, with the final column listing the industries with substantial economies of scale. The reasons for making these adjustments are as follows.

Subtraction of NACE 352, Manufacture of bodies for motor vehicles and of motor-drawn trailers and caravans.

Only 27 per cent of employment in this industry is in large enterprises in the major EC economies. Pratten's ranking of NACE 35 as a whole is apparently based only on the situation in NACE 351, the manufacture and assembly of vehicles and vehicle engines.

Subtraction of NACE 255, Manufacture of paint, painter's fillings, varnish and printing ink.

Only 41 per cent of employment in this industry is in large enterprises in the major EC economies. Pratten comments that there is scope for small firms to be competitive in some products.

Table 3.4: *Industries with the Most Significant Economies of Scale*

Pratten's Ranking by Economies of Scale		*Adjustment*	*Industries with Large Economies of Scale*
35.	Motor vehicles	Subtract NACE 352	NACE 35 less 352
36.	Other means of transport		NACE 36
25.	Chemical industry	Subtract NACE 255	NACE 25 less 255
26.	Man-made fibres		NACE 26
22.	Metals	Subtract NACE 223	NACE 22 less 223
33.	Office machinery		NACE 33
32.	Mechanical engineering		NACE 32
34.	Electrical engineering		NACE 34
37.	Instrument engineering		NACE 37
47.	Paper, printing, publishing	Add NACE 471	NACE 471
24.	Non-metallic mineral products	Add NACE 241,242,247	NACE 241, 242, 247
31.	Metal articles		
48.	Rubber, plastic products	Add NACE 481	NACE 481
424-429	Drink & tobacco	Add NACE 427,429	NACE 427,429
411-423	Food	Add NACE 421,423	NACE 421,423
49.	Other manufacturing		
43.	Textiles		
46.	Timber, wooden furniture		
45.	Footwear & clothing		
44.	Leather, leather goods		

Subtraction of NACE 223, Drawing, cold rolling and cold folding of steel.

Only 41 per cent of employment in this industry is in large enterprises in the major EC economies. Pratten comments that for some simple products, like barbed wire, economies of scale are rather limited, while for others like wire netting there are moderate economies of scale.

Addition of NACE 471, Manufacture of pulp, paper and board.

Pratten says there are large economies of scale for paper mills. In the major EC economies, 54 per cent of employment is in large enterprises.

Addition of NACE 241, Manufacture of clay products for constructional purposes.

As much as 56 per cent of employment is in large enterprises. There are significant economies of scale, but trade over long distances (and hence international trade) is very limited because of heavy transport costs in relation to product values.

Addition of NACE 242, Manufacture of cement, lime and plaster.

Almost two-thirds of employment is in large-scale enterprises. There are large economies of scale in producing cement, but again international trade is constrained by heavy transport costs in relation to product values.

Addition of NACE 247, Manufacture of glass and glassware.

There are large economies of scale for producing flat glass (Pratten, 1988). As much as 64 per cent of employment is in large enterprises in the major EC economies.

Addition of NACE 481, Manufacture of rubber products.

Almost three-quarters of employment is in large firms in the major EC economies. Economies of scale arise primarily in manufacture of tyres which is a large part of this industry.

Addition of NACE 427, Brewing and malting.

Sixty per cent of employment in the major EC countries is in large firms. Economies of scale in marketing can be substantial, depending on strategy.

Addition of NACE 429, Manufacture of tobacco products.

Over 80 per cent of employment is in large enterprises. Economies of scale in production are slight to moderate, but are more significant in marketing.

Addition of NACE 421, Manufacture of cocoa, chocolate and sugar confectionery.

Pratten reports that there are large economies of scale in chocolate confectionery. In the major EC economies, almost three-quarters of employment is in large enterprises.

Addition of NACE 423, Manufacture of other food products.

In the large EC countries, 59 per cent of employment is in large firms. Pratten reports substantial economies of scale in breakfast cereals and potato crisps. Economies of scale in marketing due to advertising costs probably apply for these and other such products.

Taking the industries listed in the right-hand column of Table 3.4 as those with the most significant economies of scale, this group of industries accounts for 57 per cent of manufacturing employment in the EC (EUR 9), compared with 40 per cent of manufacturing employment in Ireland. Thus Irish industry is engaged in sectors with significant economies of scale to a noticeably smaller extent than EC industry as a whole. There is a further noticeable distinction in this respect between Irish indigenous and foreign-owned industry in Ireland, and it is worth exploring the implications of this distinction. The next section examines the situation of Irish indigenous industry.

4: *ECONOMIES OF SCALE AND IRISH INDIGENOUS INDUSTRY*

As was mentioned at the end of the last section, 40 per cent of manufacturing employment in Ireland is in the industries with the most significant economies of scale. When a distinction is made between Irish indigenous and foreign-owned manufacturing companies, however, 63 per cent of employment in the foreign-owned firms is in these large-scale industries compared with just 23 per cent of employment in indigenous firms.

Table 4.1 shows the distribution of indigenous employment in the industries with the most significant economies of scale, compared with the situation in the EC (EUR 9). As the table shows, Irish indigenous industry has a smaller proportion of its employment in these sectors than EC industry has, in all cases except Constructional Clay Products, Cement, Lime and Plaster, Glass and Glassware, Tobacco Products and Other Foods.

Table 4.1: *Percentage Distribution of Employment in Industries with the Most Significant Economies of Scale; Irish Indigenous and EC*

NACE Code	*Industry*	*% of Total Indigenous Manufacturing Employment*	*% of Total Manufacturing Employment EUR 9*	*Irish % / EUR 9 %*
35 less 352	Motor vehicles excl. bodies	.8	8.1	.1
36	Other means of transport	3.6	3.8	.95
25 less 255	Chemicals excl. paint etc.	2.7	7.2	.38
26	Man-made fibres	.03	.2	.15
22 less 223	Metals excl. drawing etc.of steel	.7	4.1	.17
33	Office machinery	.9	1.2	.75
32	Mechanical engineering	3.1	11.0	.28
34	Electrical engineering	3.4	12.7	.27
37	Instrument engineering	.6	1.6	.38
471	Pulp, paper and board	.5	.8	.63
241	Constructional clay products	.8	.3	2.67
242	Cement, lime, plaster	.5	.4	1.25
247	Glass, glassware	3.0	1.1	2.73
481	Rubber, products	.1	1.6	.06
427	Brewing and malting	.2	.7	.29
429	Tobacco products	.6	.5	1.2
421	Cocoa, chocolate, etc.	.5	.8	.63
423	Other foods	1.5	.7	2.14
Total		23.4	56.8	.41

Sources: IDA employment survey,1987, for Irish indigenous industry.Eurostat, *Structure and Activity of Industry - Main Results 1984/1985*, for EUR 9 data.

The fact that Irish indigenous industry is for the most part relatively under-represented in the sectors with significant economies of scale is not really surprising, since there are reasons why one would expect to find such a pattern. One effect of economies of scale is to create barriers to entry for potential newcomers to an industry because, where such economies exist, it would be necessary for new entrants to produce and sell on a large scale if they are to be competitive with the established large producers. But it is difficult for new entrants to an industry to come in on a large scale *ab initio*, because this requires very large capital resources and an ability to sustain initial losses until an adequate market share is gained to support production of a competitive scale. Large existing firms based in other sectors may be able to enter such an industry as newcomers if they can mobilise the necessary resources, but entry by relatively small or new firms is unlikely.

This consideration would have had the general effect of impeding or preventing Irish indigenous development in the large-scale industries, because native Irish companies tend to be relatively small and because Ireland is a relative latecomer to industrialisation. Large established firms were already in existence in the large-scale industries in competing countries when Irish industrialisation was getting under way.

However, there are, as noted above, five exceptional cases of industries with significant economies of scale in which Irish indigenous industry is relatively well developed compared with EC industry. These can generally be explained in a way that is consistent with the existence of barriers to entry for newcomers in large-scale industries. For example, in Constructional Clay Products (mainly bricks) and Cement, Lime and Plaster, there are significant economies of scale but there are also exceptionally heavy transport costs in relation to product values. The transport costs give significant natural protection against distant established competitors, thereby facilitating the indigenous development of these industries producing for the domestic market in Ireland.

In Tobacco Products, the one dominant Irish firm was established in the early nineteenth century and therefore did not have to enter a large-scale industry as a latecomer. In Glass and Glassware, Irish firms are mainly engaged in production of ornamental glassware and glass bottles, and not flat glass which is the activity where substantial economies of scale arise. In Other Foods, it could also be the case that Irish firms are engaged in activities other than those where economies of scale mainly occur.

Considerations such as these are relevant to the question of the extent to which Irish firms are engaged in activities which will be affected by growing economies of scale in the single EC market. For it can be seen that

more detailed examination sometimes reveals that even the Irish firms in the sectors in Table 4.1 are not really engaged in the activities which have significant economies of scale and are open to international competition. To identify how much of Irish indigenous industry is in activities with substantial economies of scale and which are open to international competition, we can begin with the sectors in Table 4.1, with 23.4 per cent of indigenous manufacturing employment, and then exclude a number of them as follows.

Motor vehicles, excluding vehicle bodies, trailers (NACE 35 less 352).

The Irish companies in this sector are small firms making special-purpose vehicles such as fire tenders (and, until recently, ambulances), as well as vehicle parts and accessories. In such specialised niches, no company can take much advantage of economies of scale because of limitations of market size. Irish firms are not engaged in mass production of standardised cars, vans and lorries, which constitutes the bulk of the industry internationally and is the area where large economies of scale arise.

Other means of transport (NACE 36).

This indigenous industry consists very largely of Aer Lingus and its subsidiaries and Iarnrod Eireann, engaged in the repair, maintenance and overhaul of aircraft, aircraft engines and railway equipment. There is little actual production of such products, which would be subject to substantial economies of scale. Other Irish companies are involved in small boat building, which can be done competitively on a small scale.

Metals excluding drawing, cold rolling and cold folding of steel (NACE 22 less 223).

This sector consists very largely of Irish Steel Ltd. This company operates a "mini-steelworks", reprocessing scrap metal using electricity as an energy source, rather than processing ore using a coke-fired blast furnace on a very large scale as is done in the mainstream of the steel industry internationally. The economies of scale are very different for mini-steelworks and not typical of the industry in general.

Office and data processing machinery (NACE 33).

The Irish firms in this sector are generally small producers in narrow or specialised "niche" markets (Department of Industry and Commerce, 1989, p.15). They are not really competing directly with large firms in the product areas with very significant economies of scale, such as computers, calculators and typewriters.

Manufacture of clay products for constructional purposes (NACE 241).

This sector is sheltered to a significant degree against foreign competition in the domestic market because of heavy transport costs relative to product values. For this reason competing imports are very limited while, for the same reason, exports are also low in relation to output. In fact, for NACE industries 241-246 combined (i.e. Non-metallic mineral products excluding ceramics and glass), exports were less than 7 per cent of gross output in 1986, while imports supplied just 7 per cent of the domestic market. Given this sheltered or close to non-traded position, the effects in Ireland of increased competition and economies of scale in the single European market should be limited.

Manufacture of cement, lime and plaster (NACE 242).

This sector would also be relatively little affected by increased competition and economies of scale in the single European market, for the same reason that applies for Constructional Clay Products.

Manufacture of glass and glassware (NACE 247).

As was mentioned above, Irish firms in this industry are mainly engaged in production of ornamental glassware and glass bottles, rather than flat glass which is the activity where the most substantial economies of scale arise. Production of glass bottles would also be sheltered in the domestic market by transport costs.

Manufacture of rubber products (NACE 481).

Economies of scale in this sector arise mainly in the manufacture of tyres, which are not made by Irish indigenous firms. In most other rubber products, economies of scale are slight and small firms can be competitive.

Brewing and malting (NACE 427).

This industry is sheltered to a significant degree against foreign competition in the domestic market because of high transport costs relative to product values. Thus imports supply just 5 per cent of the home market, while less than 14 per cent of output is exported. (Many of the "foreign" brands sold in Ireland are brewed locally under license, just as brands originating in Ireland are brewed in the UK). Given this sheltered situation, the effects in Ireland of increased competition and economies of scale in the single European market are likely to be quite limited.

4.1: *Impact of Removal of Non-Tariff Barriers*

Taken together, the above-mentioned indigenous industries – which are either not really engaged in the activities with the most substantial

economies of scale or else are sheltered from foreign competition – employ 12,000 people, or 10.5 per cent of indigenous manufacturing employment. Subtracting this number from indigenous employment in the sectors listed in Table 4.1 leaves just 12.9 per cent of indigenous manufacturing employment in sectors with substantial economies of scale.

A further consideration here is that the sectors listed in Table 4.1 are simply those which were identified in Section 3 as having the most substantial economies of scale. However, as was discussed in Section 2, if there is really to be significant scope for firms to take greater advantage of international trade opportunities and economies of scale *as a result* of the single EC market, it would also have to be the case that the sectors concerned have hitherto been characterised by significant non-tariff barriers to trade which the single market programme will remove. If there were negligible barriers to trade to begin with, for a particular sector, the single market programme would have little impact on its opportunities for trade, and hence would create little additional scope for it to take greater advantage of economies of scale.

A relevant question, therefore, is to what extent do the industries with significant economies of scale (as listed in Table 4.1) coincide with the "sensitive" sectors which are likely to be most affected by the removal of non-tariff barriers (as identified in Section 2). It is really only in the sectors where both of these factors apply that one would expect to see companies taking increasing advantage of economies of scale to a significant degree *as a result* of the single market.

In fact, many of the sectors with significant economies of scale are included among those likely to be most affected by the removal of non-tariff barriers, but this is not true of all of them. Thus among the sectors which account for the above-mentioned figure of 12.9 per cent of indigenous manufacturing employment being in industries with substantial economies of scale, several of them do not seem likely to be affected much by the removal of non-tariff barriers. These sectors are Man-made Fibres (NACE 26), Pulp, Paper and Board (NACE 471), Tobacco Products (NACE 429), Other Foods (NACE 423) and the branches of Instrument Engineering (NACE 37) other than Medical and Surgical Equipment (NACE 372). Taken together, these sectors account for 3.1 per cent of total indigenous manufacturing employment.

Subtracting this number from the 12.9 per cent of indigenous manufacturing employment which is in industries with substantial economies of scale leaves just 9.8 per cent of indigenous manufacturing employment in sectors which *both* have substantial economies of scale *and* are likely to be significantly affected by the removal of non-tariff barriers.

Even this low figure would overstate to some degree the extent of indigenous involvement in "sensitive" activities with large economies of scale, since many of the Irish firms in the generally large-scale sectors concerned would in fact be engaged in exceptional or marginal "niches" within those sectors. In Mechanical or Electrical Engineering, for example, there are many such niches in which small firms can survive, and the fact that very few indigenous firms in these sectors employ over 100 people suggests that they would often be engaged in this type of activity.

4.2: *Conclusion*

It may be concluded that very little of Irish indigenous industry is engaged in activities which have substantial economies of scale and which are likely to be significantly affected by the removal of non-tariff barriers. The implications of this conclusion are both favourable and unfavourable. On the positive side, it means that there is rather little danger of Irish firms being squeezed out of the market as a result of larger foreign competitors taking greater advantage of economies of scale in the integrated EC market. The unfavourable implication, however, is that Irish indigenous firms do not stand to gain much from attaining greater benefits of economies of scale in the single EC market. Thus they are likely to miss out on one of the major expected benefits of market integration for the EC as a whole. Furthermore, to the extent that other EC firms do attain greater advantages of economies of scale in the sectors where this really matters, this would tend to increase the "barriers to entry" effect, which could make it more difficult for Irish firms to develop in these sectors in the future. On balance, it would be reasonable to conclude that Irish indigenous industry is not in a position either to gain or lose very much from growing economies of scale in the single EC market.

5: *ECONOMIES OF SCALE AND FOREIGN-OWNED INDUSTRY IN IRELAND*

Whereas only a small proportion of Irish indigenous industry is in the sectors with the most significant economies of scale, this is not the case with foreign-owned industries operating in Ireland. Some 63 per cent of employment in the foreign-owned manufacturing firms is in the sectors identified as having the most significant economies of scale, which is actually a little higher than the figure of 57 per cent of manufacturing employment for the EC (EUR 9).

As was mentioned in Section 4, there are good reasons why one would have expected Irish indigenous industry to be relatively under-represented

in sectors with significant economies of scale; and there are also reasons why one might have expected to find a large proportion of the foreign-owned firms operating in these sectors. Foreign-owned companies in Ireland are, of course, multinational companies, and companies usually are fairly large when they expand into multinational operations. Thus the foreign companies which have operations in Ireland would typically be quite large. And since large companies are found most commonly in sectors with significant economies of scale, it is scarcely surprising that many of the multinational companies in Ireland are in such sectors.

Table 5.1 shows the distribution of employment in foreign-owned companies in Ireland in the sectors with the most significant economies of scale, compared with the situation in the EC (EUR 9). It can be seen that the main concentrations of these firms in Ireland are in Chemicals, Office and Data Processing Machinery, Electrical Engineering and Instrument Engineering. Between them, these four sectors account for 43 per cent of total employment in foreign-owned manufacturing companies, or 68 per cent of employment in those in the group of sectors with the most significant economies of scale. Each of these four sectors also accounts for a noticeably larger share of foreign industry in Ireland than of EC industry.

5.1: *Impact of the Single EC Market*

The sectors listed in Table 5.1 are those which were identified earlier as having the most substantial economies of scale. However, if there is really to be significant scope for firms in these sectors to take greater advantage of economies of scale *as a consequence* of the single EC market, it would also have to be the case that the sectors concerned have hitherto been characterised by significant non-tariff barriers to trade which the single market programme will remove.

A relevant question, therefore, is to what extent do the industries with significant economies of scale (as listed in Table 5.1), coincide with the "sensitive" sectors which are likely to be most affected by the removal of non-tariff barriers (as identified in Section 2). It is really only in the sectors where both of these factors apply that one would expect to see companies taking increasing advantage of economies of scale to a significant degree as a *result* of the single market.

Starting with the list of sectors with substantial economies of scale, in Table 5.1, it turns out that many - but not all - of them are included in the list of sectors which are likely to be significantly affected by the removal of non-tariff barriers. The sectors in Table 5.1 which are excluded from that list and therefore do not seem likely to be affected much by the single market are: Man-made Fibres (NACE 26), Metals (NACE 22), Pulp, Paper

and Board (NACE 471), Constructional Clay Products (NACE 241), Cement, Lime and Plaster (NACE 242), Tobacco Products (NACE 429) and Other Foods (NACE 423); in addition, the branches of Instrument Engineering (NACE 37) other than Medical and Surgical Instruments and Equipment (NACE 372) do not appear in the list of "sensitive" sectors shown in Section 2.

Table 5.1: *Percentage Distribution of Employment in Sectors with the Most Significant Economies of Scale, in Foreign-Owned Manufacturing Firms in Ireland and in Total EC Manufacturing.*

NACE Code	*Industry*	*% of Total Foreign Owned Manufacturing Employment in Ireland*	*% of Total Manufacturing Employment, EUR 9*	*Foreign-Owned % EUR 9 %*
35 less 352	Motor vehicles, excl. bodies	.9	8.1	.11
36	Other means of transport	.3	3.8	.08
25 less 255	Chemicals, excl. paint, etc.	10.3	7.2	1.43
26	Man made fibres	1.5	.2	7.5
22 less 223	Metals, excl. drawing, etc., of steel	.02	4.1	.005
33	Office machinery	8.3	1.2	6.92
32	Mechanical engineering	4.7	11.0	.43
34	Electrical engineering	16.6	12.7	1.31
37	Instrument engineering	7.9	1.6	4.94
471	Pulp, paper and board	.3	.8	.38
241	Constructional clay products	.2	.3	.67
242	Cement, lime, plaster	0.0	.4	0.00
247	Glass, glassware	.7	1.1	.64
481	Rubber products	2.3	1.6	1.44
427	Brewing and malting	3.7	.7	5.29
429	Tobacco products	1.2	.5	2.4
421	Cocoa, chocolate, etc.	2.3	.8	2.88
423	Other foods	1.9	.7	2.71
Total		63.1	56.8	1.11

Sources: IDA employment survey, 1987, for foreign-owned industry in Ireland.
EUROSTAT, *Structure and Activity of Industry - Main Results, 1984/1985*, for EUR 9 data.

As it happens, these sectors which are excluded from that list are generally not very important areas of activity for foreign-owned industry in Ireland. (Note, incidentally, that while Instrument Engineering is an important sector in Ireland, most of this is, in fact, in Medical and Surgical Instruments and Equipment.) In other words, the bulk of foreign industry in Ireland which is in sectors with substantial economies of scale (as listed in Table 5.1) is also likely to be significantly affected by the removal of non-tariff barriers.

Table 5.2 shows employment in foreign industry in Ireland, in the sectors where both of these factors apply. These sectors account for 55 per cent of employment in all foreign-owned manufacturing, and foreign-owned firms in these sectors account for 23 per cent of total manufacturing employment in Ireland. These are the branches of manufacturing industry in Ireland for which the issue of economies of scale in the single EC market is of real significance.

Table 5.2: *Employment in Foreign-Owned Industry in Ireland in Sectors with Both Significant Economies of Scale and a Substantial Single Market Impact*

NACE Code	*Industry*	*Foreign Industry Employment*	*% of Total Foreign Manufacturing Employment*
35 less 352	Motor vehicles, excl. bodies	710	.9
36	Other means of transport	236	.3
25 less 255	Chemicals, excl. paint, etc.	8,371	10.3
33	Office machinery	6,703	8.3
32	Mechanical engineering	3,766	4.7
34	Electrical engineering	13,427	16.6
372	Medical & surgical instruments	4,340	5.4
247	Glass, glassware	536	.7
481	Rubber products	1,896	2.3
427	Brewing & malting	2,960	3.7
421	Cocoa, chocolate, etc.	1,871	2.3
Total		44,816	55.4

Sources: IDA employment survey, 1987.

5.2: *Size of Firms and Competitive Position*

As was mentioned above, it may be expected that the removal of non-tariff barriers to trade in the single EC market will create new opportunities for intra-EC trade. Particularly for the sectors included in Table 5.2, this should allow the more competitive companies in the EC to expand and take greater advantage of economies of scale, to the disadvantage of weaker companies. This process should be beneficial for the efficiency and productivity of EC industries taken as a whole, but the industries of some individual countries may well lose market shares. The question for Ireland, therefore, is whether the Irish industries concerned are in a position to expand and take advantage of scale economies, or whether they will suffer from the expansion of industry in other member states of the EC exploiting such scale economies.

Emerson *et al* (1988), in the document known as the "Cecchini Report", present estimates of the benefits expected to accrue to EC industries as a result of taking greater advantage of economies of scale in the single EC market. But they do not attempt to estimate the gains (or losses) for different regions or countries within the EC. Nevertheless this report says that smaller and newer member states (which would presumably include Ireland) "have proportionately the biggest opportunities for gain from market integration" and it is implied that the distribution of gains, if uneven, is likely to favour these states.

However, the recent report of the National Economic and Social Council (1989) questioned this conclusion, describing it as no more than an assertion which is not based on sound arguments. The NESC's arguments on this point are, in fact, quite convincing. The NESC (1989, p. 343) concludes that:

> ... the long-run benefits of market completion are likely to be unevenly distributed – with the greatest benefits accruing to regions in which industries with economies of scale and highly innovative sectors are most prevalent. Ireland is not such a region.

It is worth noting, however, that the NESC report does not necessarily mean to say that Ireland will actually lose from market integration; what it does say is that there is no clear justification for the confidence expressed in the Cecchini Report that regions such as Ireland will gain more than most. The NESC report does not include quantitative estimates of the likely gains or losses for Ireland arising from companies taking greater advantage of economies of scale, although it does suggest that the gains will tend to accrue to those with initial advantages of scale.

Smith and Venables (1988) do present estimates of the gains (and losses) accruing to individual countries in specific sectors as a result of integration of the EC market, using a formal model which incorporates the effects of economies of scale. Their results, however, refer to the four largest EC national economies and the "rest of the EC", without distinguishing Ireland as a separate entity. In fact, some of the data which would be required to apply their approach with Ireland distinguished separately are not available. It is worth noting, however, that their model provides that, other things being equal, gains accrue to those with initial advantages of scale, while their results indicate a reinforcement of existing differences in trade patterns, with the positions of net exporter countries in particular sectors being strengthened in those sectors.

In normal circumstances, it would seem reasonable to take it that, other things being equal, advantages arising from economies of scale would generally tend to accrue to the larger-scale producers. This means that it is

relevant to ask how does the scale of companies in Ireland compare with the scale of competitors in the same sectors in other EC member states. In considering this question, however, it is important to bear in mind that most of the relevant sectors in Ireland are largely composed of establishments which are branches of larger multinational companies. Thus looking at Irish industry data does not necessarily show the full picture of the scale of the enterprises involved. With this caveat in mind (and we return to consider it below), Table 5.3 shows one indicator of the comparative size of enterprises in Ireland and other EC countries. The table shows average employment per enterprise, in Ireland and the four largest EC economies, in the sectors where this issue matters most (as identified above in Table 5.2).

Table 5.3: *Average Employment per Enterprise,[1] Ireland and the Four Largest EC Economies, 1985*

NACE Code	*Industry*	*Ireland*	*W. Germany France, Italy and UK*
35	Motor vehicles	82	722
36	Other means of transport	85	497
25	Chemical industry	95	315
33	Office & data processing machinery	201	612
32	Mechanical engineering	79	148
34	Electrical engineering	135	291
372	Medical & surgical instruments	151[2]	79
247	Glass, glassware	318	220
481	Rubber products	123	324
427	Brewing & malting	295	304[3]
421	Cocoa, chocolate, etc.	398	312

Source: Derived from EUROSTAT, *Structure and Activity of Industry - Main Results 1984/85.*

Notes: [1] The data refer to enterprises which employ over 20 people.

[2] The figure shown for Medical & surgical instruments for Ireland is actually that for all Instrument engineering, which in Ireland largely consists of Medical & surgical instruments.

[3] The figure for Brewing & malting in column 2 excludes West Germany where average firm size in this sector is exceptionally small.

As the table shows, the average size of enterprises in Ireland is about the same as in the four large EC economies in Brewing and Malting, and it is larger in Medical and Surgical Instruments, Glass and Glassware, and Cocoa, Chocolate and Sugar Confectionery. In the other seven sectors in the table, however, the average size of enterprises in the other EC countries is considerably larger than in Ireland.

Another way of comparing the size structure of industries in Ireland with other countries is to compare the proportion of each industry which is in large establishments greater than a particular size. Table 5.4 shows

such comparisons for those sectors for which the necessary data are available. While the relevant data are not available for many of the sectors concerned, those which are available tend to confirm the impression given in Table 5.3. Thus the Instrument Engineering sector is more highly concentrated in large establishments in Ireland than it is in the other countries, while the other sectors in the table are characterised more by smaller scale establishments in Ireland than in the other countries.

Table 5.4: *Percentage of Each Sector's Employment Which is in Establishments Employing More Than 200 People*

NACE Code	*Industry*	*Ireland*	*West Germany*	*France*	*United Kingdom*	*Italy*
25	Chemical industry	48	86	65	72	68
33	Office machinery	80	91	84	68	96
32	Mechanical engineering	31	67	43	56	50
34	Electrical engineering	52	84	70	73	77
37	Instrument engineering	61	48	33	n.a.	48

Sources: Derived from *Census of Industrial Production 1987* for Ireland. Other countries from EUROSTAT, *Labour Costs 1984, Vol. 2: Results by Size Classes and by Regions.*

The overall impression from these two tables, therefore, is that the scale of companies in Ireland is smaller than in the major EC countries in seven of the eleven sectors concerned, although it is as large or larger in the other four. On the face of it, this could appear to give cause for concern that companies in Ireland in most of these industries could lose ground to larger foreign competitors gaining greater advantages from economies of scale.

However, as was mentioned above, the structure of most of these industries in Ireland differs from most EC countries in consisting predominantly of branches of larger foreign multinational companies. Consequently, functions such as top management, R & D and marketing, as well as various stages of the production process, are commonly carried out by branches of these firms in other countries. This means that the firms concerned could well be achieving substantial economies of scale at the level of the enterprise as a whole, so that the relatively small size of their establishments in Ireland would not necessarily reflect any disadvantage. For example, economies of scale advantages for a whole enterprise can be gained by spreading the costs of R & D, marketing and headquarters management over a high volume of total sales, quite independently of the size of the firm's individual production establishments. Given that the establishments in Ireland are commonly engaged in only certain stages of a longer production process, they may not necessarily be involved in those

stages which have the greatest potential for economies of scale in production; consequently they may not need to be as large as some other establishments in the same sector.

In these particular circumstances, one would have to conclude that the relatively small size of companies in Ireland (where this occurs) does not necessarily mean that they are at a disadvantage to competitors elsewhere arising from economies of scale. They might be quite competitive in scale in the particular activities which they actually undertake.

A more convincing approach to assessing the ability of industries in Ireland to compete internationally and take advantage of the integrated EC market is to consider their performance in international trade. Following a similar approach to that adopted in Section 2, Table 5.5 shows a number of indicators of the international trade performance of the Irish industries for which the issue of economies of scale in the single EC market is significant.

Table 5.5: *International Trade Indicators for Irish Industries*

NACE Code	*Industry*	*Intra-EC export/ import ratio, 1987*	*Percentage change in export/ import ratio, 1980-1987*	*Exports as percentage of gross output*
35	Motor vehicles	.2	-36	31.3
36	Other means of transport	.6	50	32.1
25	Chemical industry	1.2	71	79.8
33	Office machinery	7.2	91	98.0
32	Mechanical engineering	.6	80	74.9
34	Electrical engineering	1.3	72	89.6
372	Medical & surgical instruments	4.7	-2	)95.0
247	Glass, glassware	.7	61	55.0
481	Rubber products	1.2	36	c 88.0
427	Brewing & Malting	1.5	-91	c 13.0
421	Cocoa, chocolate, etc.	1.5	24	62.0

Sources: Data supplied by the Statistical Office of the European Communities for columns 1 and 2. Column 3 is derived from the *Census of Industrial Production 1987*, Table 10, where data are available for the required sectoral classifications; otherwise, data in column 3 are from Industrial Development Authority (1985), Appendix V.

Column 1 of Table 5.5 shows the ratio of exports bound for other EC countries to imports coming from those countries. Most of these ratios are greater than 1, indicating a positive balance of trade with the rest of the EC in the industries concerned, and hence presumably a reasonably good competitive position relative to the rest of the EC. Column 2 of the table

shows the percentage change in these intra-EC export/import ratios since 1980. For most of the sectors, the ratios have been rising, often quite rapidly, supporting the impression of a relatively strong competitive position. Finally, column 3 of Table 5.5 shows the percentage of each sector's output which is exported (to all countries, not just the rest of the EC). Most of the sectors export a majority of their output, again suggesting that they can compete in international markets quite successfully.

Looking at the international trade indicators sector by sector, six of the eleven sectors are in a strong (or at least satisfactory) position on all three indicators; these six sectors are Chemicals, Office and Data Processing Machinery, Electrical Engineering, Medical and Surgical Instruments, Rubber Products and Cocoa, Chocolate and Sugar Confectionery. It seems reasonably clear that these industries should be in a strong position to gain from freer international trade within the EC, despite the fact that four of them have smaller firms than in other EC countries. These six sectors account for the bulk of employment in the eleven sectors in Table 5.5, with 71 per cent of employment in all firms in those eleven sectors and 82 per cent of employment in the foreign-owned firms in those sectors.

Of the remaining five sectors, Brewing and Malting has quite a strongly positive balance of intra-EC trade, but this has been declining and its exports are low in relation to output. As was mentioned in Section 2, the position here is that both exports *and* imports are exceptionally low relative to output or market demand, so that the industry has much of the appearance of a "non-traded" industry. The export-import ratio has been declining because imports have risen from an extremely low base level a decade ago, but the actual amount of imports remains small and is still less than exports. Given the close to non-traded character of the industry in Ireland, it is doubtful whether the single EC market will result in a major boost to trade in either direction, but the industry still looks reasonably strong if it does so, with no disadvantage in terms of size of companies.

As regards the remaining four sectors, namely Motor Vehicles, Other Means of Transport, Mechanical Engineering and Glass and Glassware, all of these have low intra-EC export-import ratios. In each of these cases, however, the industries in Ireland are rather specialised in scope and do not produce some of the principal products which are made elsewhere, so that these have to be imported. For example, companies in Ireland do not produce cars, aircraft, mainline locomotives, many types of productive machinery, or flat glass. Since such products, therefore, have to be imported, this automatically tends to reduce the export-import ratios, and this does not necessarily mean that the firms in Ireland are uncompetitive in their own specialised areas of activity.

In Mechanical Engineering and Glass and Glassware, it can be seen that the export-import ratios have been rising rapidly, while most of output is exported. These observations suggest that those two industries are, in fact, competing quite successfully in international markets.

In Other Means of Transport, the export-import ratio has also been rising, a little more slowly, while just one-third of output is exported. The maintenance and repair of railway equipment accounts for about one-fifth of output in this sector. This is an effectively sheltered activity within Iarnrod Eireann, which cannot be hurt much by competing imports and also does not give rise to exports. The remainder of the sector actually exports over 40 per cent of its output. Most of the rest of the sector is accounted for by overhaul and maintenance of aircraft and aircraft engines, which has been a quite rapidly growing activity gaining a good deal of business from foreign airlines. Overall, this sector does not look particularly vulnerable to foreign competition.

Finally, the Motor Vehicles industry in Ireland is a rather special case. Cars are no longer assembled in Ireland which means that there are substantial car imports, contributing to the low export-import ratio for Motor Vehicles but not necessarily reflecting adversely on the competitive position of Irish producers of vehicle parts, accessories and special-purpose vehicles. Cars were still being assembled in Ireland in the early 1980s and the decline of this industry, with a corresponding build-up of imports, accounts for the declining export-import ratio for Motor Vehicles seen in Table 5.5. Again this does not necessarily reflect on the competitiveness of the remaining Irish companies in the Motor Vehicles sector. The decline of car assembly was, in fact, one of the clearest examples of formerly protected Irish companies being too small in a very large-scale industry, and consequently being squeezed out by larger competitors under freer trade after Ireland joined the EEC. However, the demise of car assembly is now completed and therefore it cannot be repeated after 1992.

The decline of car assembly in the 1980s resulted in an overall decline in the Motor Vehicles sector during much of that decade. However, as the decline of car assembly is now over, and other parts of the Motor Vehicles sector have been growing, the sector as a whole has returned to growth over the past few years with particularly rapid growth of exports. The ratio of exports to gross output would now certainly be higher than the figure for 1987 shown in column 3 of Table 5.5. It therefore seems likely that this sector should be able to perform reasonably well in the single EC market.

To sum up, the indications are that the firms in Ireland which are in the sectors which have significant economies of scale, and which are likely to be significantly affected by the single EC market, are generally operating

quite successfully in international markets and should therefore be able to take advantage of the single EC market. These firms are mostly branches of foreign-owned multinational companies, which actually already use Ireland mainly as a base for exporting, primarily to EC markets, despite any existing non-tariff barriers to trade. The removal of such barriers in the single EC market should have the effect of enhancing their motivation and ability to expand sales in EC markets.

6: *POTENTIAL BENEFITS OF INCREASING ECONOMIES OF SCALE*

Given that firms in Ireland in the sectors with significant economies of scale should generally be able to expand and take advantage of the integrated EC market, they should also be able to take greater advantage of economies of scale as a result of expanding. This would give them higher productivity through lower costs per unit of output, resulting in gains in economic welfare. The extent of such welfare gains, however, is difficult to quantify.

Emerson, *et al* (1988, Annex A) have presented estimates of the welfare gains likely to be attained by the EC economy as a whole as a result of increasing economies of scale in the single EC market. Their estimates (in their Table A.7) show gains of 60.3-61.5 billion ECUs for the whole EC economy, or 43.9-44.6 billion ECUs for EC manufacturing industry alone, as a result of increased economies of scale. A possible approach to estimating such gains for Irish industry would be to take it that Ireland can share in some proportion of the gains for the EC as a whole.

If one simply calculates Ireland's share of EC manufacturing production, and takes this as Ireland's share in the gains for EC manufacturing due to increasing economies of scale, the gains for Irish industry would amount to about 460 million ECUs. This would be a considerable overestimate, however, because the structure of Irish industry is quite different from that of the EC. It was concluded in Section 4 that Irish indigenous industry is involved to only a very limited extent in sectors with significant economies of scale, and consequently is likely to benefit very little from achieving greater economies of scale. Foreign-owned industries in Ireland, on the other hand, are engaged to a large extent in the sectors with significant economies of scale, indeed to about the same extent as EC industry. Consequently, it would be more realistic to take the foreign-owned sector's share of EC manufacturing as Ireland's share in the gains for EC manufacturing due to economies of scale.

In calculating the foreign-owned sector's share of EC manufacturing, it would also be preferable to use its share of EC manufacturing employment

rather than production. This is because quite a substantial proportion of the value of production of foreign companies in Ireland does not accrue to the Irish economy, so that the scale of their employment is a more realistic indicator of their relative importance for the Irish economy.

If one calculates the Irish foreign-owned sector's share of EC manufacturing employment, and takes this as Ireland's share in the gains for EC manufacturing due to economies of scale, the gains for Ireland amount to some 177 million ECUs, at 1985 values since all the data used are for 1985. This is equivalent to £127 million, at 1985 exchange rates. To put this figure in perspective, it amounts to 0.9 per cent of Irish manufacturing gross output, or 2.3 per cent of net output, in 1985. While this is obviously a rather crude estimate,it probably gives at least an approximate indication of the order of magnitude involved.

Since any gains due to greater economies of scale would be attained over quite a number of years rather than immediately, the impact of this effect on Irish industry would scarcely be dramatic. It seems likely that the benefits of increased exports and production as a consequence of the single EC market could have a more important impact on Irish industry than the gains arising from economies of scale *per se*.

7: *CONCLUSION*

This paper has focused on the implications of the single European market for those manufacturing sectors which seem likely to be most affected by it.

7.1: *Sectors Most Affected by Non-tariff Barriers*

First, we considered the sectors which are likely to be most affected by the removal of non-tariff barriers to trade because of the fact that they have hitherto been characterised by relatively substantial non-tariff barriers. In Ireland, these "sensitive" sectors account for a little less than half of total manufacturing employment.

The Irish sensitive sectors which appear to be in a relatively strong competitive position are more important, in terms of employment or value-added, than those which may be vulnerable to increased international competition in the single European market. Irish industry, therefore, looks to be in a relatively favourable position, on balance, to face freer trade within the EC.

Many of the stronger sensitive sectors are largely composed of branches of foreign-owned multinational companies. Such companies might not

always respond to the new opportunities of the single EC market by expanding production in Ireland, since they would commonly have other options to expand production elsewhere. But the indications to date are that the effect of the single market should generally tend to motivate expansion of the predominantly foreign-owned sectors.

These conclusions, however, refer only to the effect of the removal of non-tariff barriers in the single EC market. Since many other factors will also be at work in the international and domestic economies, the future of industry in Ireland will not be determined by the single market effects alone. It is also worth noting that, even though Irish industry may now be in a relatively favourable position, on balance, to face the single EC market, this does not necessarily mean that it will automatically gain from the process. For the nature of competition is continuously changing and companies will need to react appropriately and to take positive steps to prepare for the single market if Irish industry is to take real advantage of the potential opportunities.

7.2: *The Implications of Economies of Scale*

As a result of creating increased opportunities for intra-EC trade, the removal of non-tariff barriers will provide scope for the stronger and more competitive EC companies to grow in size. In sectors where there are substantial economies of scale, companies which expand successfully will therefore be able to take greater advantage of economies of scale and to become more competitive relative to smaller companies (other things being equal). This, in turn, is likely to result in structural changes involving a process of concentration into larger companies, often at the expense of smaller companies.

Thus in the sectors concerned, with significant economies of scale, there is potential for companies not only to gain or lose from the freeing of trade *per se*, but also to gain from the additional effects of taking greater advantage of economies of scale or to lose from the effects of others doing so more successfully. Such sectors, therefore, are likely to experience particularly significant changes as a result of the single EC market.

Industry in Ireland, however, is engaged in sectors with substantial economies of scale to a noticeably smaller extent than EC industry as a whole. In particular, very little of Irish *indigenous* industry is engaged in such activities. This means, on the positive side, that there is rather little danger of Irish indigenous firms being squeezed out of the market specifically as a result of larger foreign competitors taking greater advantage of economies of scale in the integrated EC market. The unfavourable implication, however, is that Irish indigenous firms do not

stand to gain much from attaining greater benefits of economies of scale, so that they are likely to miss out on one of the main expected benefits of market integration for the EC as a whole. Irish indigenous industry is not in a position either to gain or lose very much from growing economies of scale in the single EC market.

The foreign-owned multinational companies in Ireland, however, are engaged to a considerable degree in industries with substantial economies of scale. As they are generally quite successful already in international markets, they should mostly be able to benefit not only from the freeing of trade *per se* but also from the additional effects of taking greater advantage of economies of scale.

But overall, with Irish indigenous firms not being involved much in sectors with substantial economies of scale, industry as a whole in Ireland is likely to benefit proportionately less from greater advantages of economies of scale than will be the case for EC industry in general. The economies of scale benefits for Irish industry as a whole are likely to be positive but relatively limited.

In conclusion, Irish industry appears to be in a relatively favourable position, on balance, to benefit from the direct effects of the freeing of intra-EC trade, since for the most part it is relatively strong in the sectors likely to be most affected by the removal of non-tariff barriers to trade. Irish industry, primarily the foreign-owned portion of it, also stands to gain to some extent from the additional benefits of taking greater advantage of economies of scale, but these benefits are likely to be proportionately less than for EC industry in general.

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APPENDIX

Sources Used For The Indicator Of The Share of Exports in Gross Output

"Exports as % of Gross Output" is total Irish exports, to all countries, of the industry concerned as a percentage of its gross output. The data are from three different sources. Source 1 is the Census of Industrial Production (CIP) 1987, Table 10; this is the preferred source when data are available at the required NACE 3-digit level. Source 2 is IDA (1985), Appendix V. Data from this source cover enterprises employing over 30 people. This is the preferred source for sectors which are not distinguished separately in the CIP. Source 3 is export data from the SOEC combined with gross output data from the CIP, where available, or SOEC (covering only enterprises employing over 20 people) if CIP data are not available. These sources are used for sectors for which data are not available from the other sources.

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