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**Industrial Subsidies
in the OECD Economies**

**Robert Ford,
Wim Suyker**

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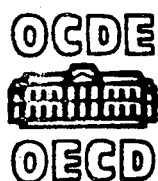
No. 74: INDUSTRIAL SUBSIDIES IN THE OECD ECONOMIES

by

Robert Ford and Wim Suyker

Growth Studies Division

January 1990



ECONOMICS AND STATISTICS DEPARTMENT

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Subsidisation of industrial activities distorts the allocation of scarce resources, is a burden on government finances and generates friction in international trade. This paper draws on a wide range of data sources to examine industrial subsidisation in OECD countries. The sectoral distribution of subsidies and the relative importance of the different instruments of subsidisation are highlighted. The final section of the paper evaluates, to the extent possible, the economic effects of subsidy policy.

Les subventions aux industries introduisent des distorsions dans l'allocation de ressources rares, représentent une charge pour les finances publiques et créent des frictions dans le commerce international. Cet article s'appuie sur un large éventail de données pour examiner les subventions industrielles dans les pays de l'OCDE. La répartition sectorielle et l'importance relative des différentes formes de subventions sont décrites. La dernière section du papier évalue, dans la mesure du possible, les effets économiques des politiques de subvention.

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by

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December 1989

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INDUSTRIAL SUBSIDIES IN THE OECD ECONOMIES

TABLE OF CONTENTS

	<u>Page</u>
I. Summary and conclusions	1
II. Introduction	4
III. An overview of subsidies in OECD countries	6
A. Measurement issues	6
B. Overall subsidy rates	7
1. National accounts sources	8
2. The CEC study	9
3. The EFTA Secretariat study	9
C. The sectoral distribution of subsidies	9
D. Instruments	10
1. Grants	10
2. Tax concessions	11
3. Soft loans	12
4. Equity participation	13
E. The budgetary effects of subsidies	14
IV. The impact of subsidies	15
A. The effects of subsidies on targeted sectors	15
1. The economic rationale for subsidies	15
2. The effects of policies in practice	19
B. The economy-wide effects of subsidies	27
1. General-equilibrium analysis of an output subsidy	27
2. Overall subsidy costs	28
C. Meeting so-called "non-economic" goals	29
Notes	31
Appendix: Data sources	36
References	43

INDUSTRIAL SUBSIDIES IN THE OECD ECONOMIES

I. SUMMARY AND CONCLUSIONS

1. The degree to which industrial subsidies, and their control, is a serious policy problem depends on how large they actually are and the size of the associated welfare effects. The available evidence, based largely on the narrow definition of subsidies embodied in national accounts data (tax concessions are excluded as well as equity participation and soft loans), suggests that average industrial subsidy rates in most countries rose through the 1970s, but then tended to stabilise, and have even declined in some countries in the 1980s.
2. Estimates of the level of subsidies vary considerably, and depend on what instruments and programmes are considered to be "subsidies", the definition of "industry", and the methods used to estimate the size of subsidies. Taking a broad definition of industry, national accounts data imply subsidy rates (calculated as a fraction of sectoral value added), of between 0.5 per cent (for the United States) and 7.4 per cent (for Sweden) in 1986. Most countries for which these data are available have subsidy rates in the 2 to 3.5 per cent range.
3. Studies covering a broader range of subsidy instruments (such as soft loans, equity infusions, tax concessions, and others) imply much higher numbers. For example, a recent survey carried out by the EC Commission shows that industrial subsidies for the EEC as a whole (except Spain and Portugal) averaged 8.6 per cent of industrial value added over the period 1981-86. The average subsidy rate to manufacturing was almost 6 per cent in 1986: it ranged from less than 3 per cent in Luxembourg, Denmark, the United Kingdom and Germany to 12 per cent in Ireland and 17 per cent in Greece and Italy.
4. Subsidy rates are much higher for agriculture than for industry (or for manufacturing) as a whole. On the other hand, total subsidies to industry exceed those to agriculture. They thus represent a larger drain on government

finances and probably generate greater social costs indirectly through the deadweight cost of the taxes which must be raised to finance them, and the diversion of resources into rent seeking activity.

5. While industrial subsidy rates in OECD countries have apparently stabilised at levels significantly below those in agriculture, there are several compelling reasons for concern about them:

- i) Certain industrial sectors have subsidy rates far in excess of the industrial average: transport, and especially railways; and declining industries, such as steel, coal mining and shipbuilding. For these industries, the budgetary and deadweight costs could be substantial.
- ii) While the recent declines in subsidy rates are due in part to changes in policy (most obviously in the United Kingdom and New Zealand), the current economic upswing in the OECD area has reduced the pressures on governments to step in and support industries in difficulty. An economic downturn could create renewed pressures from declining industries for aid, and governments would again be tempted to provide support.
- iii) The very success of international negotiations in reducing tariff barriers has increased the importance of subsidies, often buttressed by other non-tariff measures, as tools of industrial policy. The incentive for governments to use subsidies to solve economic and political problems has therefore increased. Given the lack of internationally standardised methods of defining and reporting subsidies, they remain far less transparent than tariffs.
- iv) The argument that subsidies can improve international competitiveness has taken on new life, particularly in regard to certain high-tech industries. The rationale for such policies rests on a substantial beggar-thy-neighbour component -- the major potential gain arises from shifting excess profits from

foreign to domestic residents -- and would therefore invite retaliation. The probable result would be higher production costs and lower welfare for everyone.

- v) Horizontal subsidy policies -- those that do not directly target specific sectors or activities -- also threaten to become larger. For example, regional aids are likely to grow in importance, particularly in the EEC, as a result of the continuing movement towards greater economic integration among the member states. Although horizontal subsidies need not explicitly support particular sectors, in practice they generate deadweight costs by shifting resources (across both sectors and geographical regions) and they are a burden on government finances.

6. These concerns all point to the need for increased multilateral surveillance of subsidies, both to reduce the prospects of competitive subsidisation and possible trade wars, and to promote the careful analysis of proposed subsidy programmes -- even if they do not affect international trade -- to assess whether they really do increase output and welfare, as their proponents claim.

7. If this process of multilateral surveillance is to be effective, both the analysis and the data on which it is based must be of high quality. A theme underlying this paper is the poor state of the data on industrial subsidies, as compared, for example, with data on tariffs or on agricultural support policies. While each government has the data needed to construct subsidy estimates that would be useful for surveillance and policy analysis, often it is not in a useful form, and there is no widespread agreement on how to calculate the relevant subsidy rates. Nevertheless, the work of the EC Commission and the EFTA Secretariat shows that data can be constructed that are reasonably consistent across both subsidy instruments and countries.

II. INTRODUCTION

8. OECD governments have employed many means to support industrial activity in the pursuit of a variety of policy goals, including encouraging new industries, propping up declining ones, encouraging specific economic activities such as R&D, attempting to equalise economic advantage in different geographical regions of a country, correcting current-account imbalances, increasing employment and transferring income. In recent years it has become increasingly apparent that many such programmes have not achieved their goals and, worse, have drained government finances while actually aggravating allocative inefficiencies. As a result, governments have developed a greater awareness of the limitations and hazards of industrial support.

9. Subsidies are of concern primarily because of their structural effects: they reallocate resources and reduce economic welfare by changing the relative prices that businesses and households use to make their economic decisions (although this conclusion must be qualified if competition is imperfect or market failures are significant). An indirect, but non-negligible, additional allocative effect stems from the extra tax revenues that must be raised to pay for the subsidies. Finally, because subsidies transfer income they encourage unproductive rent-seeking behaviour, which generally implies a further waste of economic resources.

10. This paper examines the theory and practice of industrial subsidisation in the OECD countries. The conclusions are necessarily somewhat qualified and impressionistic because the available data are inadequate in many respects. In particular, methods of calculation of the instruments and the coverage of sectors differ from source to source, and therefore it is difficult to make useful cross-country comparisons.

11. The definition of industry used in this study is quite broad, embracing in principle manufacturing and most services. In particular, transportation and housing services are both included on the grounds that subsidies attract resources to these sectors just as they do in the case of, say, steel. Excluded, however, are agriculture (1), food processing (largely because it is often difficult to distinguish it from agriculture in the statistics), and public services. In practice, however, each data source uses a different definition; there is, for example, more information on subsidies to manufacturing than to the service sector.

12. The paper focuses on subsidy instruments that have the potential to reallocate resources and have a budgetary cost. This definition, although not rigorous, avoids the pitfalls of defining subsidies too narrowly -- direct cash grants, for example, account for only part of state support to industry -- and of defining support so broadly as to include virtually all public sector activity. The paper considers grants for the use of factors of production such as labour and capital, tax concessions, subsidised loans, loan guarantees, government equity participation, preferential and government procurement policies, as well as subsidies in the narrow sense of output grants. Broad social programmes, such as unemployment insurance and social security, are not included even though they may cause resource re-allocations (2).

13. Although trade-distorting subsidies are a policy concern of special importance, this study does not focus specifically on them. On the one hand, such a focus would be too narrow, since subsidies affect economic performance even if they have no clear links with international trade. On the other hand, a full discussion of trade issues and protectionism would broaden the study to include various border measures not usually thought of as subsidies. Nevertheless, the tensions that subsidies have created in the international trading system are an important reason to pay close attention to them and to their effects.

14. Nor does this paper deal with industrial policy in any comprehensive manner. While subsidies are often used to pursue industrial policy, so are many other instruments. Examples are trade barriers, regulations and "administrative guidance". Nevertheless, many of the issues that arise in the broader context of industrial policy, particularly relating to structural adjustment and to "sunrise" industries, also arise naturally in the discussion of subsidies.

15. Section III draws on a wide variety of data sources to quantify the scale and pattern of subsidisation in OECD countries. An assessment of the economic consequences of industrial subsidies follows in Section IV. The Appendix provides detailed information on the data sources used for the various subsidy measures presented in the paper.

III. AN OVERVIEW OF SUBSIDIES IN OECD COUNTRIES

A. Measurement issues

16. The adequacy of subsidy data can be judged by the extent to which they permit an analysis of the allocative and distributive effects of subsidisation in a manner that is comprehensive and comparable both through time and between countries (3). Such an analysis is the key to multilateral surveillance of trade-distorting subsidies and as a guide to policy-makers in the context of domestic economic performance.

17. Therefore, subsidy measures should be comparable across countries, implying both the use of a common definition of a subsidy and standardisation of the methods used to calculate subsidies. Subsidy rates should also be calculated by sector, since those sectors with relatively high subsidy rates will tend to attract resources. Output subsidies, which encourage production, and input subsidies, which also encourage the use of specific factor inputs (such as capital or labour) should be distinguished. Finally, subsidies paid to both producers and consumers should be captured, since their economic effects are similar.

18. The measure that best captures the direct economic effects of a subsidy is the marginal subsidy rate, since this is the rate that influences the economic behaviour of firms and households. It is the analogue of the familiar marginal tax rate. However, the calculation of marginal rates can be demanding in terms of detailed knowledge of individual subsidy programmes. As a result, the average subsidy rate, which is much easier to calculate, is typically used instead. All the figures reported in this paper are average rates, generally calculated by dividing the total amount of the subsidy by an output base (typically nominal value added of the subsidised sector). The total subsidy paid out is relevant to questions concerning the budgetary burden of subsidies and the indirect distortions arising from taxation.

19. To measure the scale of subsidisation, the instruments must be reduced to a common basis. Ideally, all instruments should be expressed in terms of a grant equivalent, reflecting the marginal benefit to the recipient. Unfortunately, this is often difficult to do in practice because of data requirements. An alternative measure is the net cost of a subsidy, which is calculated by subtracting repayments to the government from the cost (including the disbursement and administrative costs) of the subsidy program. Compared with the grant-equivalent approach, the net cost calculation requires less information, but since the net cost is based on subsidies provided in the past it may not reflect either the current stance of policy or the incentives facing producers (4).

B. Overall subsidy rates

20. This paper relies most heavily on three data sources: national accounts, the study of state aids prepared by the Commission of the European Communities (CEC, 1989) and the reports of the secretariat of the European Free Trade Association (EFTA, 1986, 1987, 1988). Several other sources are used as well -- Table 1 provides a synopsis of the data for each OECD country, using figures for 1986 where available. However, differences in definition of a subsidy, in coverage of the "industrial sector" and in methods of calculation imply that figures produced by different sources are not comparable. More detailed information on the sources of data used in the paper can be found in the appendix.

21. Work on internationally comparable subsidy data is currently being carried out by the Industry Committee of the OECD. Figures are being collected from OECD governments on grants, loans, guarantees, equity infusions and tax concessions. The policy areas covered are sectoral aids to enterprises in difficulty, research and development (R&D), regional policy, investment aid, aid to small- and medium-sized enterprises (SMEs), employment aids, and export and trade-related assistance. The data collected to date are on a gross budget basis, which does not permit the identification of the subsidy component of government aid programmes, except in the case of grants. Unfortunately, these data were not ready in time to be included in this paper.

1. National accounts sources

22. Subsidy figures from national accounts sources, including both income and expenditure accounts and input-output (IO) tables, are in general more comparable from country to country than measures drawn from other sources. However, the national accounts definition of subsidies covers only direct payments to producers for current operations (5). As is shown below, some countries rely more heavily than others on direct grants and, as a result, comparing levels of direct grants across countries can yield a distorted picture of relative overall subsidy levels.

23. Average subsidy rates for the OECD as a whole, calculated by dividing subsidies to all sectors (including agriculture) by nominal GDP, have stabilised at about 1.5 per cent in the 1980s, after rising somewhat through the previous decade (Table 2). There are marked differences in the degree of subsidisation on a national accounts basis across countries, ranging from a low of 0.7 per cent in the United States over the period 1985-88 to a high of 5-7 per cent in Norway, Greece and Ireland over the same period.

24. Two notable exceptions to the OECD-wide evolution of subsidy rates are the United Kingdom and New Zealand, where an upward trend during the 1970s was completely reversed in the 1980s. Governments in both countries have espoused the explicit policy goal of reducing government interference in the economy (6). Two other exceptions are Greece and the Netherlands, where the rates continued to rise through the 1980s.

25. The broad patterns evident in the aggregate figures carry over to national accounts measures of subsidy rates for the industrial sector (7) (Table 3). For several countries the data do not exist, or are sporadic, or are very out of date. In most countries for which data exist the subsidy rate increased through the 1970s and then stabilised in the 1980s. However, in New Zealand, and to a lesser extent the United Kingdom and Norway, subsidy rates fell through the 1980s. The United States (about 0.5 per cent of industrial value added) and Japan (1 per cent) had relatively low rates, while Sweden (7.5 per cent), Ireland (6 per cent in 1975) and Norway (5 per cent) had high rates of industrial subsidisation.

2. The CEC study

26. As measured by the CEC study, Italy had the highest overall industrial subsidy rate during the 1981-86 period, followed by Luxembourg, Ireland and Belgium (Table 4): subsidy rates in these countries were substantially above the Community average of 8.6 per cent of industry value added. At the other end of the spectrum, subsidy rates in Denmark, the United Kingdom and the Netherlands of 4 to 5 per cent were below the average (8).

27. Owing to very high rates of support to transport and mining in several countries, the pattern of support rates to manufacturing over the same period was somewhat different (Table 4). Italy, Greece and Ireland had rates exceeding twice the Community average of 6.2 per cent, while in Denmark, Germany and the United Kingdom the rates were about half the average. Substantial and steady declines in rates have occurred during the 1980s in both the United Kingdom and Denmark, and the subsidy rate fell sharply in Belgium and France in 1986 (Table 5). In Greece, the rate rose through the first half of the 1980s to levels matching or exceeding those in Italy.

3. The EFTA Secretariat study

28. Within EFTA, Iceland, Switzerland and Finland stand out as having consistently low subsidy rates to manufacturing over the 1984-87 period (Table 5). The Austrian rate has been among the highest, and rose somewhat during the period. Subsidy rates in Sweden, which had been the highest in EFTA in the mid-1980s, fell sharply in 1987 as the last major state-owned shipyard was closed.

C. The sectoral distribution of subsidies

29. Subsidy rates to industry as a whole are generally substantially lower than rates accorded to agriculture, although, of course, the total amount devoted to industry is larger (Tables 4 and 6). However, industry-average figures mask substantial differences in subsidisation rates across more narrowly defined sectors. While there are marked differences in the sectoral emphasis of subsidies from country to country, certain regularities stand out.

30. The major area of concentrated support has been "declining" industries, such as mining, shipbuilding, steel and coal (9). Steel and shipbuilding have had rates of support well in excess of the industrial average in all EEC countries (except for the Netherlands in the case of steel), although more recently steel subsidies have fallen substantially in the EEC (Table 4) (10). Finer breakdowns show high rates of support to coal mining in Germany (Table 7) and France [Dutailly (1984)]. These sources also confirm the relatively high rates of support to steel. In the United States, smelting and refining, shipbuilding and mining, have also been relatively highly subsidised [Kaminow (1989)]. In Canada, mining (except metal mining) and shipbuilding enjoyed relatively high rates of support, and in 1981 the petroleum and gas producing sector received by far the largest amount of money [Moroz and Brown (1988)].

31. Rail transport has also been highly subsidised in most countries, with rates of support often exceeding a third of sectoral value added (11). Moroz and Brown (1988) estimate that rail transport had one of the highest subsidy rates of any sector in Canada. On the other hand, transport has received almost no subsidies in the United States [Kaminow (1989)].

32. Among the "high-tech" sectors, the aerospace sector stands out as receiving subsidy rates substantially larger than the industrial average in those countries for which there are detailed sectoral data -- Germany [(Jüttemeier (1987))], France [Dutailly (1984)], the United States [Kaminow (1989)] and Canada [Moroz and Brown (1988)].

D. Instruments

1. Grants

33. Grants are on the whole the most important component of total subsidisation, according to the figures provided by both the CEC and EFTA. For the countries covered in these studies, grants accounted for roughly half of total manufacturing subsidies (Table 8). There is, however, considerable variation across countries. Italy, the United Kingdom, the Netherlands, Luxembourg, Finland, Norway, Sweden and Switzerland all rely relatively

heavily on direct grants. In contrast, Germany and Ireland use tax concessions extensively (recall that the EFTA data do not include tax expenditures), and France, Belgium, Denmark, Austria, and Iceland use capital market instruments -- equity participation, soft loans, and loan guarantees -- heavily (12). These sharp differences illustrate the danger of concentrating on a narrow set of instruments when making international comparisons of overall subsidisation.

34. A significant fraction of grants subsidise capital formation rather than current output. Although neither the CEC nor the EFTA reports distinguish capital from current aid, Jüttemeier (1987) reports that capital transfers accounted for 24 per cent of all grants (including those to agriculture) in Germany in 1984. Data provided in Moroz and Brown (1988) imply that capital grants were also 24 per cent of all federal and provincial grants to industry in Canada in 1981.

2. Tax concessions

35. Tax concessions are tax-code provisions that favour some sectors or economic activities (such as capital formation) over others, and they have essentially the same allocative effects as grants. Many countries report tax concessions, although they do not normally appear as a government expenditure item -- a summary of current reporting practice is provided in Table 9. However, significant differences in underlying assumptions and methods of calculation limit the international comparability of such data. For example, tax concessions are typically measured as deviations relative to a "benchmark", or "normal" tax system. But the choice of the benchmark is to a large extent arbitrary and varies widely from country to country (13).

36. Taking figures from the CEC study, tax concessions are the second most important subsidy instrument, representing about one-fourth of total support in the EEC as a whole (Table 8). As indicated above, they are more important in some countries than in others, and, indeed, are insignificant in the United Kingdom, Belgium, Denmark and Luxembourg.

37. For the United States, a comparison of grants as defined by the national accounts and Federal tax concessions as defined in budget documents, suggests that tax expenditures for the industrial sector are about three times as large as current grants (Table 10). The tax concessions covered in Table 10 include only those received by businesses and so do not include the huge deduction for home mortgage interest, which was estimated in the budget document [U.S. Government (1989), Table 42] to have been \$33.7 billion in 1988.

38. Although, in theory, tax concessions that are available to all sectors may not seriously affect resource allocation, in fact there appear to be wide variations in implicit subsidy rates across sectors. Fritzsche *et al.* (1988) report estimates of the value of tax concessions for 49 sectors for Germany, some of which are presented in Table 11. Rates of support have been particularly high in certain service sectors and, of course, in agriculture. On a less systematic basis, data published by the Canadian Department of Finance (1985) also illustrate the sector-specific nature of tax concessions. Before the recent 1988 tax reform, exceptional depreciation allowances were used to support *inter alia* grain storage, manufacturing, shipbuilding, mining, railways, communications, offshore drilling, and film production. Other concessions were granted for frontier oil and gas exploration, small businesses, and fishing (14).

3. Soft loans

39. Soft loans involve loans from government to the private sector at terms more favourable than could have been obtained in the capital market. For the EEC as a whole, about 14 per cent of total subsidies to manufacturing are in the form of soft loans, although Denmark, at over 50 per cent, and France, at nearly 40 per cent, are well above this average (Table 8). The data presented in the EFTA study suggests they amount to about a fifth of total support to manufacturing in the EFTA countries.

40. Direct and indirect loan obligations of the U.S. federal government are substantial. The outstanding stock of direct loan obligations was \$220 billion, and the stock of guarantee commitments was \$550 billion in 1988 (Table 12). However, budget estimates of the subsidy component of these soft

loans amount to only about \$9 billion in FY 1990, most of which are related to the housing sector.

41. Total government loans to the industrial sector (excluding housing) are more important in Japan than in the United States, although the flow of loans has diminished substantially in recent years (Table 13). Most loans went to small and medium-sized enterprises. In 1987, the average interest rate on government loans was 0.5 per cent below the prime rate, although a calculation based on this differential would presumably underestimate the subsidy component as most recipients of government loans could not have borrowed at prime rates.

42. Governments also offer various sorts of guarantees on loans. The state may undertake to repay creditors in the event of a default. In export contracts it is common for governments to guarantee payment to the (domestic) exporting firm and also to guarantee against exchange rate fluctuations. The CEC estimates that the subsidy equivalent of such guarantees accounted for only 2 per cent of total subsidisation, while the EFTA data suggest a higher figure of 8 per cent (Table 8).

4. Equity participation

43. The subsidy component of a government equity position depends on the extent to which the rate of return demanded by the government falls below that which would have been demanded by private capital markets. If equity infusions are used to recover recurring losses -- so there is little prospect of any dividends or of selling the equity position -- they amount to cash grants.

44. The equity participation is on average about as important as soft loans, accounting for about 15 per cent of the total subsidisation in both the EC and EFTA countries (Table 8). However, governments in a number of countries have reduced their stakes in the market economy, suggesting that, for them, the subsidies implicit in such ownership positions could decline in coming years (15).

45. Among the EEC countries, France and Belgium channel a relatively large proportion of their subsidies through equity participation. Two EFTA countries, Finland and Austria (mainly through the state-holding company, ÖIAG), have substantial state ownership of commercial enterprises, which account for 12 per cent of the industrial labour force and 3.5 per cent of dependent employment, respectively, in these countries [see OECD (1988b) and OECD (1989d)]. While Finnish state-owned companies are normally profitable, dividends paid to the government in 1986 were only 7 per cent of share capital, well below the private-sector rate of 13 per cent. In Austria, state ownership has been concentrated in declining sectors, such as iron and steel, and mining, and losses have forced substantial reductions in capacity and employment in recent years.

E. The Budgetary Effects of Subsidies

46. The overall amount of money spent on subsidies is an indication of the gross amount of tax revenue that must be raised, or, alternatively, it is an indication of the scale of other government programmes that cannot be funded at existing taxation levels. At levels of taxation common in OECD countries, the cost of raising extra revenue is substantial -- see the literature survey in Hagemann *et al.* (1988). Estimates of the marginal welfare cost of raising an extra dollar of revenue in the United States range from \$1.15 to \$1.50. That is, if this dollar is used as a subsidy, the rate of return -- the increment to net social welfare arising from the subsidy -- must be at least 15 per cent, and perhaps as high as 50 per cent, just to pay for the excess cost of raising the funds. As the marginal cost of revenue tends to rise with the tax rate, European countries, which generally have higher tax rates than the United States, probably incur a higher marginal cost of revenue. For example, studies for Sweden report very high maximum estimates [\$7.20 for each dollar raised is the largest cost cited in Hagemann *et al.* (1988), Table 4]. On the other hand, recent policy changes in many countries, which have lowered maximum tax rates and widened the tax base, may have reduced the marginal cost of raising funds.

47. One measure of the importance of industrial subsidies in public finances is the ratio of subsidy expenditure to total government outlays. As

used here, outlays do not include tax concessions, subsidies implicit in loan guarantees, and so forth. Using subsidy data from the national accounts, this ratio follows the same pattern as overall subsidy rates: subsidies generally absorbed an increasing fraction of outlays through the 1970s, but the ratio stabilised in the 1980s (Table 14 -- compare with Table 3). As a percentage of total outlays, government subsidisation ranges from a low of 1.2 per cent in the United States to a substantial 12 per cent (in 1980) in Portugal. However, the relatively conservative definition of subsidies used for national accounting purposes understates the true drain on government resources. This is illustrated with data drawn from the CEC study (Table 15), which show that subsidies in the EEC were 9 per cent of government outlays on average during the period 1981 to 1986.

IV. THE IMPACT OF SUBSIDIES

A. The effects of subsidies on targeted sectors

1. The economic rationale for subsidies

48. As is well-known, standard welfare analysis implies that subsidies reduce overall economic welfare by driving a wedge between what consumers pay for a product and what producers receive for it. The optimal subsidy is therefore no subsidy at all. However, this analysis assumes that the market supply curve captures all the social costs of production, and the demand curve all the social benefits. If markets are imperfect, this will not be the case and the policy conclusion that all subsidies reduce economic welfare must be modified. By carefully choosing the correct form of intervention, it is theoretically possible for governments to offset market imperfections, thereby raising economic welfare.

49. The practical scope for such welfare-improving policy intervention is limited, however, because successfully offsetting market distortions typically requires a capacity for almost surgical policy implementation and a great deal of detailed knowledge about the structure of the economy and the nature of the

distortion. Most of the required knowledge is not, in fact, at hand; and even if it were, political institutions might not be able to use it effectively.

50. Three market imperfections have most often been invoked to justify the second-best use of subsidisation: externalities, particularly those flowing from research and development activities, increasing returns to scale and informational asymmetries. Each is discussed in detail in the survey paper by Grossman (1990), especially as it applies to support for new, or "sunrise" industries.

51. Externalities -- the production of a good (or a bad, in the case of pollution, for example) for which the producer cannot capture the full return (or is not charged the full cost) -- provides a case for second-best policy because the producer's inability to appropriate all the marginal benefits implies an insufficient incentive to produce. An important example of such an externality, especially in the context of the subsidisation of high-tech industries, is the knowledge generated by R&D. Knowledge, once exploited, is hard to keep secret, and the fact that competitors can get a "free ride" weakens the incentive for undertaking R&D. Therefore, there is a theoretical presumption that the private market will produce too little knowledge. Patent protection and other methods of enforcing intellectual property rights, while strengthening incentives to undertake research, are not likely to be optimal policy tools to the extent they restrict the application of new techniques. Subsidies, by contrast, could in principle solve the problem by underwriting research while allowing free diffusion of the results. Much university-based research, for example, is carried out on this basis.

52. A second market imperfection, returns to scale, has also played an important role in the debate over subsidies to high-tech and "sunrise" industries. Static returns to scale reflect substantial "up-front" investments which are required to begin production. These are often in the form of fixed capital formation, but may also be investments in R&D or even in marketing (or "reputation"). Dynamic returns to scale arise when firms are able to lower their costs through time by learning more efficient techniques of production through the experience of production itself -- "learning by

doing". Thus, costs fall with the accumulated volume of output. In both cases, costs fall with the amount of output produced and, as a result, new firms which are small or which have not accumulated much production experience, will find it difficult to compete with established rivals.

53. Significant returns to scale result in oligopolistic (or, in the extreme, monopolistic) market behaviour, which generates rents to producers. In a closed economy these are paid by consumers, and so represent a transfer to the oligopolists rather than a net social gain. In addition, since oligopolists raise prices above marginal cost, there is a net cost to society from resource misallocation. If, however, the good is exported, some rents can be collected from foreign consumers, and these may exceed the losses to domestic consumers from the oligopolistic resource misallocation. This observation suggests a policy of "strategic entry". From a national viewpoint it could make sense to encourage domestic firms to increase their production and so lower their costs relative to foreign competitors, and then to extract rents from the rest of the world. Thus, there may be an economic case for subsidising domestic producers, if the required subsidy is not too large, if it does not encourage excessive rent-dissipating entry (leading to higher costs of production all around), if the rents shifted from foreigners are not offset by declines in the terms-of-trade, and if other governments do not retaliate. Indirect empirical evidence based on simulation models, some of which are described below, suggests that such beggar-thy-neighbour strategic entry policy has not been economically worthwhile in certain highly-publicised cases.

54. Apart from the possibility of international rent shifting, returns to scale do not in themselves justify subsidisation because, in the presence of well-functioning capital markets, a firm should be able to finance its fixed costs (or, in the case of dynamic returns to scale, losses on its initial high-cost output) in much the same way as it would finance any other investment. If the discounted present value of future net revenues is positive, investors will provide such finance, and if it is negative there is no economic case to be made for subsidisation. Therefore, a key market from the point of view of industrial policy is the capital market. Imperfections here could lead to interest rates in excess of the true social cost of funds.

and, as a result, socially profitable firms may be unable to borrow profitably in private capital markets.

55. Informational asymmetries between borrowers and lenders can give rise to just such imperfections. One model of capital market imperfections, developed by Stiglitz and Weiss (1981), assumes that borrowers (firms) know how risky their projects are, but lenders (banks) do not. This asymmetry, plus the assumption that firms have limited liability in the event of bankruptcy, results in an "adverse selection" problem, and interest rates that are too high from a social point of view (Flam and Staiger (1989)). One solution is an interest-rate subsidy, since this differentially attracts projects that would have gone ahead if interest rates had been at the socially optimal level.

56. Unfortunately, the conclusion that an interest-rate subsidy will improve social welfare is fragile, and it does not survive small changes to the specification of the credit-market imperfection. DeMeza and Webb (1987) and Sen (1989) change the nature of the informational asymmetry slightly and conclude that an interest rate tax, rather than a subsidy, would improve social welfare (16). Moreover, recent developments in financial liberalisation may have reduced such capital-market imperfections.

57. The capital-market policies suggested by these models do not generally require the government to have superior information to the private sector. In the presence of a capital-market failure, interest-rate subsidies (or taxes, depending, as the discussion above illustrates, on the nature of the market failure) can improve welfare even if offered to all firms. There is, for example, no need for governments to screen out particularly risky firms. This is an appealing feature, because it seems unlikely that governments are able systematically to assess either risk or the promise of new techniques better than private market participants.

58. Yet much industrial policy has been framed in terms of "picking winners", often on the grounds that capital markets overlook promising ventures. The long-term success of such a policy depends on the government having an edge over private markets and systematically making better choices.

Not surprisingly, winners have proved difficult to pick in practice, and government decision-making has often been further hampered by a tendency to emphasise political and social over commercial considerations. As a result, it has often proved difficult for governments to back out of projects that have turned out to be economically unsound.

2. The effects of policies in practice

a) Support for new industries

59. There is no shortage of recent examples of subsidies designed specifically for the development of new industries, even if the precise magnitudes of the payments involved are difficult to pin down. Airbus Industrie is estimated to have absorbed some \$12 billion in unpaid loans and guarantees, although official figures are unavailable (17). The Joint European Submicron Silicon (JESSI) project is designed to promote the manufacture of semiconductor chips, and about half its funding is to come from European governments or, indirectly, through the EC. The SEMATECH consortium in the United States, which is to promote research into semiconductors, is a private/public venture with an annual budget of \$225 million, of which \$100 million is to come from the federal government through defence funds. There is also a subsidised competition to develop high-definition television (18).

60. Past experience with such programmes has been, at best, mixed. The Concorde was never a commercially viable proposition. The Japanese government subsidised the development of a small airliner (the Asuka) that never flew commercially, and the German federal government abandoned support for a failed attempt to establish a computer manufacturing industry [Weiss *et al.* (1988, p. 36)]. But there have also been successes. The French high-speed train, the TGV, appears to be one. Also, the Dutch government stepped in to support Fokker at a time when the private sector was unwilling to do so, a decision that has paid off with recent sales of two new lines of commercial passenger aircraft. However, even in the last two cases it is not clear that the subsidies have been socially justifiable in a discounted present-value sense.

61. State holding companies have often been used to deliver aid to new industries that had been "overlooked" by the private sector. However, in general, their commercial performance has been poor. Aside from an inability to out-judge the private sector, a common reason for failure (found in Italy, the Netherlands, and probably the United Kingdom) was the side-tracking of these agencies into non-commercial objectives [Hindley (1984)]. These have included employment creation, regional development and "rescue operations" of failing enterprises.

62. Several systematic studies have been undertaken to assess the results of government intervention based on the presumed existence of economic rents due to returns to scale.

63. Baldwin and Krugman (1987b) studied the costs and benefits of the substantial subsidies provided by European governments, principally Germany and France, to the Airbus consortium. This support has allowed Airbus to compete with Boeing in the market for medium-range, wide-bodied airliners, a market dominated by large economies of scale. Indeed, these are assumed to be so large that it is conceivable that Boeing could be the sole producer and so collect substantial monopoly rents (19). In this circumstance, it is possible that entry by Airbus into this market, even if subsidised, could improve the welfare of everyone, except Boeing and European taxpayers, by causing a reduction in the prices of aircraft.

64. Their model implies an interest-rate subsidy of about \$1.5 billion, in 1974 constant dollars (actual subsidy figures are not publicly available). The study concludes that the policy has not been successful from a European viewpoint. The authors estimate that Airbus has a negative discounted net present value even if the discount rate is zero, and this calculation does not take account of the marginal cost of raising the tax money to cover the subsidies. There are, of course, other losers and winners. The U.S. loses, as Boeing's losses are far greater than the gains of American airlines, and the rest of the world gains through lower aircraft prices.

65. More recently, Klepper (1989) carried out a similar analysis of the Boeing-Airbus competition, but he included small and long-range commercial

aircraft as well as the medium-range aircraft analysed by Baldwin and Krugman. The results are similar to those of Baldwin and Krugman. Compared with the situation in which Boeing has a monopoly, the gain in world-wide consumer surplus is much less than the decline in U.S. producer surplus, even ignoring the deadweight cost of the extra taxation. The entry of Airbus reduces Boeing's market share from 100 to about 66 per cent, and the lost economies of scale increase average costs of both firms to the point where the benefits to consumers from lower aircraft prices are overwhelmed.

66. Baldwin and Krugman (1987a) applied a similar methodology to 16K random-access memory chips, which were sold in large numbers between 1978 and 1985, until superseded by 64K chips. The Japanese government was assumed to have supported their domestic manufacturing industry by protecting the domestic market through fairly low tariffs. The production technology for memory chips was assumed to be dominated by strong learning-by-doing, or dynamic economies of scale, effects. If so, even modest protection may stimulate considerable entry, since learning-by-doing effects would drive down marginal costs as cumulative output rises. Clearly, this mechanism could operate equally well through modest subsidisation. The authors concluded that protection was critical to the entry of Japanese firms, but also that the policy reduced welfare in both the United States and Japan. From a Japanese viewpoint, the rents not paid to American firms fell short of the higher costs stemming from shorter production runs and the costs of the tariffs to Japanese chip consumers.

67. The evidence from these three studies suggests that subsidisation can indeed promote entry into markets characterised by large returns to scale, but that the costs tend to outweigh the benefits, even when these are calculated on a narrowly nationalistic basis. However, none of the three models reviewed here consider spillover, or external, effects that might be captured by related industries in the subsidising country. For example, the losses on 16K chips may have been more than offset by process knowledge applicable to the manufacture of 64K chips, and Airbus technology may be applicable to other European manufactures. An unanswered question is the size of such spillovers. Their importance is often asserted in the debate, but there has been little quantitative substantiation.

b) Support for declining industries

68. Analysis of support for industries in decline depends to some extent on the underlying cause of the decline. If it is temporary -- a matter of waiting for exchange rates to return to "realistic" levels, or of giving an industry "breathing room" to install new technologies that will make it competitive again -- support could allow the industry to maintain employment and production levels (20). However, the value of such support hinges on the question of why firms in temporary difficulty cannot find bridge financing in capital markets. Those firms that are viable in the longer-run should be able to borrow in difficult times and repay after the recovery. Thus, as in the case of new industries, the justification of subsidisation is ultimately an appeal to capital-market imperfections.

69. Such market imperfections are less germane to the case of industries facing long-term difficulties, often due to the rise of low-cost foreign producers. As was noted above, it has been such declining industries that have tended to receive the highest support rates, and to a large extent the pattern of subsidisation in most OECD countries can be interpreted as an attempt to protect declining industries, rather than to bridge short-term difficulties (21).

70. Since such a development almost always requires a substantial reduction in the size of the affected industries, the economic justification for support is usually couched in terms of easing adjustment costs. However, in the absence of specific measures of such costs, and of stated goals in terms of their reduction, it is difficult to assess the effectiveness of such support. Certainly, it has typically not been successful in preventing large employment losses in industries facing long-term adjustment problems [see, for example, OECD (1987a), p. 236], nor in restoring their competitiveness. It seems more likely that they have hampered necessary structural adjustment by retaining resources in the declining industries by supporting uncompetitively high wage and profit rates.

c) Research and development

71. Support for R&D is not a policy goal in itself. Rather, by encouraging R&D governments seek among other things both to stimulate the industries of the future and to breathe new life into established industries. Tables 16 and 17 illustrate the importance of government-supported R&D. These figures cover only direct government support that is paid to the private sector. University funding and government laboratories, for example, are not included. Support varies widely across both countries and sectors. Among the seven largest OECD countries (Table 16), the U.S. government finances a substantially higher fraction of R&D than the other countries, and the electrical and aerospace industries receive relatively high rates of support in all these countries.

72. Many studies have shown that R&D carried out in the private sector has significant private returns, that the social returns exceed the private returns, often by a factor of two or more, and that spillovers, or externalities, exist between firms in the same industry and across industries. These findings, which are based mainly on U.S. studies, but are also confirmed with Canadian and French data, support the theoretical argument that not all the returns to R&D are appropriated by the firm carrying it out. This, coupled with the very high estimated social rates of return, suggests that R&D production in the market place is below socially optimal levels (22).

73. The results of these studies imply that government subsidisation of R&D has potentially large social returns. There are, however, a number of pitfalls in using subsidies to capture such returns. It seems likely that governments are generally less adept than the private sector at choosing appropriate technologies to develop, if only because they are further removed from both the technology and the needs of the market. As a result, concentrating support narrowly is an unnecessarily risky policy, and a better approach would be to offer broad support for "generic" research and let market forces decide which specific technologies are to be developed. A second pitfall is the possibility that government finance will "crowd out" privately financed R&D. In this case, the fraction of R&D notionally financed by the

government may have the same return as the privately-financed part, but the goal of raising overall R&D might not be met.

74. The results of Griliches (1986) and Lichtenberg and Siegel (1989) suggest that these concerns may be well founded. They found that the private returns to government-supported R&D were zero. This need not imply that such R&D is unproductive. Neither study measured the social return to R&D, and this could have been positive even if the private return was not. Nonetheless, it seems clear that attention must be paid to the implementation of R&D subsidies if government-financed R&D is to earn the high rates of return that appear to characterise privately-financed R&D.

d) Regional development

75. Regional economic development, like R&D, is to some extent an intermediate goal. The ultimate goal may be employment creation, income redistribution, or equity across regions. Subsidies can attract enterprises to underdeveloped or poor regions and so, it is hoped, encourage economic growth. Regional subsidies are substantial in OECD countries, and there are pressures to increase them. The success of regional policy is difficult to judge. On the one hand, poor regions tend to remain so, despite large development expenditures. On the other hand, indirect evidence suggest that subsidy policy can improve regional economic welfare.

76. Regional support accounted for about 14 per cent of total support in the EC in 1981-86 and 22 per cent in the EFTA countries in 1984-87 (Table 18). Finland, Norway, Italy, Switzerland and Ireland all devoted more than 20 per cent of total support to regional aid (23). The data also suggest that regional support rates have been stable, except in Ireland, where they have fallen in the 1980s. Italy's regional support programmes are expected to expand significantly in the coming years [Bucaille and Costa de Beauregard (1988)], and EC expenditures for regional aids are set to expand substantially as part of the 1992 single market programme.

77. As is the case with other "horizontal" subsidy goals, regional subsidies are likely to have sectoral effects even if sectoral support is not

an explicit goal. For example, regional industrial development programmes often support manufacturing rather than services. Indeed, in some countries, particularly Germany and the United Kingdom, regional problems have stemmed from the decline of geographically concentrated industries such as shipbuilding, steel and coal. As a result, a common policy response has been to support the declining industries themselves, rather than to encourage geographical labour mobility or to attempt to attract new industries into the regions.

78. Evaluating the effectiveness of regional subsidies hinges on estimating what would have happened if government support had been absent. An example is the analysis of tariff protection using the ORANI general equilibrium model of the Australian economy [Dixon et al. (1982) and EPAC (1986)]. ORANI has regional detail based on the regional distribution of sectoral activity and intra-regional multipliers. The study concluded that all the benefits went to one state (Victoria), while three other states bore the costs imposed by the tariff. As it is possible to replace the tariff system with an equivalent tax-subsidy scheme, these results suggest that income can be transferred between regions through subsidisation of industries. However, they provide no information about the costs and benefits of policies directed specifically at poor regions.

e) Support for small and medium-sized enterprises (SMEs)

79. Both the CEC and EFTA studies indicate that only a small fraction of total industrial subsidies goes to support for SMEs -- 2.6 per cent on average in the EEC in 1981-86 and 1.8 per cent in the EFTA in 1984-87 (Table 18). Data are not provided on the valued added of SMEs, so subsidy rates were not calculated.

f) Export promotion

80. Export assistance comprises subsidised loans, guarantees (generally against non-payment and exchange rate fluctuations) and even guarantees against unanticipated cost increases. Assistance programmes are administered by government or government-owned agencies, by quasi-government agencies

created especially for the task, or by private-sector institutions whose losses under government-sponsored export aid programmes are covered by the government.

81. In connection with an agreement -- the so-called "Consensus" -- designed to limit the export subsidies, 22 OECD countries report export credits to the Trade Directorate. Between 1979 and 1985, official finance for capital-goods exports exceeded \$25 billion, although the amounts fell significantly in 1983 and 1984, due in part to declines in the value of total capital-goods exports [OECD (1984b, 1987b)]. The Trade Directorate has also prepared estimates of the interest-rate subsidy to capital-goods exports for those credits for which interest rates were reported. These data indicate that subsidies have been about 10 per cent of total export credits, and 1 per cent of total exports (24). France accounted for 64 per cent of export credit subsidies in 1985, but more recently the emphasis on export assistance has been reduced considerably -- see OECD (1989a) for a description of the export credit performance of the French government.

82. The Trade Directorate also provides a sectoral breakdown of export credit subsidies for the OECD as a whole. These data, which are reproduced in Table 19, illustrate that transport and energy exports have received large shares of the total subsidy, although this does not necessarily mean that these sectors enjoyed the largest subsidy rates (25).

83. Both the CEC and the EFTA studies isolate export aid, and these data are summarised in Table 20. Subsidies are generally small, if measured as a fraction of exports, except perhaps in the case of Greece and, to a lesser extent, Ireland.

84. Export subsidies can serve several policy goals. In the presence of economies of scale an export subsidy could allow domestic firms to capture rents from foreigners. If the economy is large, the subsidy equivalent of the optimal tariff would improve domestic welfare at the expense of the rest of the world (26). Countries may also use subsidies in retaliation against foreign export subsidies, in the hope of forcing a "level playing field". Since such a policy may result in a trade war and lower welfare for everyone.

another, potentially more beneficial, outcome could be an agreement to eliminate export subsidies on both sides.

85. Often, however, export subsidies (along with tariffs and other border measures) are directed towards the macroeconomic goal of improving the current account by encouraging exports (and discouraging imports). While there can be little doubt that export subsidies increase exports of the subsidised goods, all else equal, the current account as a whole can improve only if national saving less investment increases. An export subsidy amounts to a decrease in the real exchange rate, which will, all else equal, generate excess demand for tradeables. If the nominal exchange rate is flexible, it will appreciate. If it is fixed, the domestic price level will rise (27). In either case, the competitive edge generated by the export subsidy will vanish over time, and its ultimate effect on the current account is uncertain. The subsidy will tend to lower the relative price of exportables, but it is difficult to say how this will affect national saving and investment (28).

B. The economy-wide effects of subsidies

1. General-equilibrium analysis of an output subsidy

86. The partial-equilibrium analysis sketched at the beginning of the previous subsection is only approximate because: i) the increase in supply and demand in the subsidised market affects supplies and demands in other markets; ii) if the subsidised sector is large, changes in its demands for factor inputs, such as capital and labour, will change the prices of those factors and therefore costs of production in other sectors; and iii) the government will have to raise revenues to pay for the subsidy, which generates costs in the taxed markets similar in nature to the "triangle" cost of the subsidy. Nevertheless, the presumption that a subsidy reduces overall welfare is true in a general-equilibrium context as well.

87. A general-equilibrium approach highlights the fact that subsidies shift resources across sectors, so subsidising one sector can be seen to be equivalent to taxing the others. The market-failure arguments for subsidisation may still hold good in a general-equilibrium context, although

the problem of the appropriate design of second-best policies is aggravated considerably when viewed in a general-equilibrium context.

2. Overall subsidy costs

88. Economy-wide "subsidy rates", and the importance of subsidies in total government outlays were documented in the previous chapter. The appropriate model for estimating the structural effects of subsidisation is an applied general equilibrium model. Although models of this sort have been used extensively in the evaluation of taxes, tariffs and development issues [see the surveys in Borges (1986), Hagemann *et al.* (1988) and Richardson (1989)], little work along these lines has been carried out for industrial subsidies.

89. However, the OECD recently completed a major project quantifying the scale and the social costs of agricultural subsidies. An applied general equilibrium model (WALRAS) was constructed and, using detailed estimates of subsidy rates to a wide range of agricultural products, simulated to estimate the benefit of eliminating all such support. On aggregate, this benefit would be 1 per cent of OECD-wide GDP.

90. In the case of industrial subsidies, the principal barrier to such an analysis has been lack of suitable data. Comprehensive sectoral (average) subsidy rates have been published for Germany [Jüttemeier (1987)], and these data, along with estimates of border protection, have been used in a general equilibrium model by Weiss *et al.* (1988) to calculate the deadweight cost of subsidies (including agricultural subsidies) in Germany. Their study is geared to the international trade aspects of government support and does not report separate results for eliminating industrial subsidisation alone. The estimated subsidy rate used in their study is 6.8 per cent of total GDP, roughly comparable to the CEC estimate. Under one version of the model, elimination of all border measures and subsidies (including those to agriculture) is estimated to raise total GDP by 0.9 per cent. The sectors that would be most hurt are aerospace, agriculture, coal mining, and food processing.

C. Meeting so-called "non-economic" goals

91. Although this paper has concentrated on the economic aspects of, and justifications for, subsidies, much government policy is not explicitly designed to improve economic efficiency by offsetting market failures. Rather, it is meant to meet goals that, it is felt, will not be adequately addressed by market mechanisms. Since these goals usually involve benefits that are difficult to measure in monetary terms, they are often termed "non-economic". However, as pointed out by Winters (1988), this term is misleading because the achievement of such goals involves economic costs and benefits. As a result, the same sorts of trade-off that exist between competing economic goals also exist between "economic" and "non-economic" goals. Moreover, society benefits when either sort of goal is achieved in the least costly way.

92. Although numerous "non-economic" goals could be pursued by subsidy policy, preserving or changing the distribution of income is often the central purpose of a subsidy, even if this feature is not explicitly acknowledged. For example, support for declining industries is largely motivated by the loss of income experienced by workers who either lose their jobs or who, in the case of high-wage industries, must take substantial pay cuts if the industry is to be competitive. As a result, governments find it difficult to withdraw support, even after the lack of economic viability has become evident.

93. As a rule, economics has little prescriptive to say about the distribution of income itself -- this lies in the domain of value judgements. This in no way implies that income redistribution is illegitimate, merely that economics provides only limited tools for judging whether one distribution of income is better than another.

94. If the goal of income distribution is taken at face value, the success of the policy depends on the incidence of the subsidy, and this is often difficult to determine. It need not correspond to notions of equity, as the well-known example of the effect of housing subsidies on the price of land shows. Although housing subsidies are not typically intended to increase the wealth of landowners, this may be their ultimate redistributive effect.

Another example is the concentration of subsidies in declining heavy industries, which in many cases allows the owners of capital to recoup some of their losses, although the subsidy may have been intended to ease the adjustment for workers.

95. Moreover, the potential that subsidies have for redistributing income generates an incentive to influence political decision-making for private gain, and this can give rise to economic costs in addition to those already discussed. Those who have a prospect of influencing government decisions to their own benefit have an incentive to devote resources to such activity. This has been dubbed "rent-seeking" [Krueger (1974), for example], to emphasise the fact that qualification for a subsidy is economically similar to a property right that permits the collection of rent from a scarce resource. It has also been called "directly unproductive activity" [Baghwati (1982)], to emphasise the fact that the resources devoted to securing subsidy money -- lobbying, finding and learning about subsidy programmes, manoeuvring applications through relevant bureaucracies, and those bureaucracies themselves -- do not contribute to output, and indeed are diverted from productive activity. As in the case of tariffs, the pattern of subsidies can to some extent be explained by the ability of powerful interests to protect their incomes. An economic assessment of subsidies should account for the cost of the resources devoted to rent-seeking, as well as the extra allocative inefficiencies that will arise if rent-seekers are successful in raising the overall scale of subsidies.

NOTES

1. Agriculture is an important sector enjoying substantial government support. It has largely been excluded from this study because the OECD already publishes much data on agricultural aid in terms of producer and consumer subsidy equivalent measures. Volume No. 13 of OECD Economic Studies (forthcoming) is devoted to the measurement and the economic impact of agricultural subsidies in the OECD.
2. For example, in the absence of risk-based premiums unemployment insurance subsidises sectors with above-average labour turnover, such as seasonal or highly cyclical industries. Premiums in the United States are adjusted for risk through the practice of "experience rating".
3. See Bruce (1989) for a detailed discussion of some major conceptual problems in measuring subsidies.
4. A couple of examples may help to clarify the distinction between grant-equivalent and net-cost measures. A cash grant is the same under either measure because there is no repayment. A subsidised loan, on the other hand, is viewed in the grant-equivalent framework as a sequence of grants in the future, each of which is equal to the remaining principal multiplied by the difference between the market interest rate and the rate demanded by the government. The present value of this stream of "grants" is commonly used as an indication of current policy stance. If, as an approximation, it is assumed that the principal is never repaid (as in a perpetuity), the present value is simply the principal multiplied by the difference between the two interest rates. This formula is often used in practical work. The net cost of a subsidised loan program is the outstanding principal multiplied by a "reference" interest rate less the interest payments on those outstanding loans. The government borrowing rate is often used as a reference rate, although it underestimates the benefit to the recipient, because the market rate generally exceeds the government rate. It does not even accurately reflect the cost to government finances because the government could, in principle, have lent the money at commercial rates.
5. National accounts also measure "net capital transfers" from the government to the private sector. Although these are unrequited transfers, the fact that they are net figures obscures the subsidy component. Thus, in Germany and Italy net capital transfers exceeded 1 per cent of GDP in 1986, while in others, such as the United States and France, net transfers were negative.
6. The U.S. federal administration also espoused a similar policy, but it is not reflected in these figures because federal grants are insignificant in the United States.
7. The industrial sector is calculated as the total economy less government, agriculture and food processing.

8. However, even within the EC there are potential difficulties with international comparisons due to differing institutional arrangements. For example, Italy has an unusually high social security tax rate, which is reduced for firms locating in the Mezzogiorno. This reduction is considered to be a subsidy by the CEC, since it favours some firms over others. However, if Italy had a lower social security tax and imposed an extra tax on firms not locating in the Mezzogiorno, the same firms would be favoured but no subsidy would be recorded.
9. Coal production is not only subsidised directly with financial aid to producers, but also indirectly through agreements between coal producers and large consumers, usually publicly-owned electric utilities. These agreements involve prices fixed above those prevailing in world markets and are coupled with restrictions on coal imports. The International Energy Agency has estimated producer subsidy equivalents (PSEs) of coal production for a number of OECD countries (IEA, 1988), which include virtually all forms of protection, and not only subsidies. As the table shows, PSEs per ton coal produced have generally been increasing in the eighties, except in the United Kingdom.

Support for coal production in high-cost coal producing IEA countries:
 Producer Subsidy Equivalent (PSE) values

Value and Country	Year					
	1982	1983	1984	1985	1986	1987
PSE Per Metric Ton Produced (in U.S. dollars)						
Belgium	26	23	27	28	54	96
Germany	19	24	30	24	43	71
Japan (a)	17	33	36	49	74	93
Spain	na	na	na	na	na	19
United Kingdom (a)	9	19	75 (b)	6	16	na

Source: International Energy Agency (1988).

- a) For United Kingdom and Japan years refer to fiscal years beginning 1st April.
- b) Includes additional support to cover costs arising from the year-long miners' strike.

10. The CEC study distinguishes between-sector specific support, horizontal support (for example, R&D subsidies, or programmes to combat unemployment) that cannot be allocated to specific industries, and regional aids (which also cannot be allocated to sectors). The sectoral support levels cited in this paragraph are only the first type, and therefore are underestimates of the full support enjoyed by the sectors. For a detailed description of state support to shipbuilding in fourteen OECD countries, see OECD (1987c).

11. Government expenditures on road and airport construction are not included in transportation subsidies. The extremely high rate of support for railways in Luxembourg in the CEC study (Table 4) is due to pension arrangements.
12. However, Jüttemeier's (1987) estimates suggest a much larger role for grants in Germany (about 45 per cent of subsidies, with capital grants accounting for an additional 16 per cent). For France, the data presented by Dutailly (1984) also suggest a relatively larger role for grants than do the CEC data, but he does not estimate the grant equivalent of state equity infusions. However, these figures (from both Jüttemeier and Dutailly) do not have the same sectoral coverage as those in the CEC and EFTA reports, and, in particular, they include agriculture.
13. A particular problem arises in regard to the tax treatment of owner-occupied housing. One point of view is to treat this sector as a business, with the owner notionally charging rent to himself. The normal tax treatment in this case would be to tax the (imputed) rent and allow deductions of mortgage interest cost. Actual practice varies widely -- see Dean et al. (1989), Table 10, for a summary of the tax treatment of housing in OECD countries. However, many countries provide tax relief by not taxing imputed rent or by vastly undervaluing imputed rent for tax purposes. In many cases there is no offset, in that mortgage interest deduction is also allowed. These sorts of concessions are not captured in the data sources used in this paper. The U.S. federal budget documents estimate the outlay equivalent of the mortgage interest deduction, rather than of the absence of taxation of imputed rent.
14. In 1983, the last year for which data are available, the estimated revenue loss from tax concessions was C\$2.3 billion [see OECD (1988a), Table 24]. This can be compared to total grants on a national accounts basis for the same year of about C\$10 billion. Both these figures include agricultural support.
15. See OECD country reports [for example, OECD (1989b, 1989c and 1989e)] for recent developments in privatisation.
16. Grossman (1990) describes another informational asymmetry related to uncertainty about product quality, which gives rise to barriers to entry. Again, the correct policy response turns on the fine details of the market.
17. See The Economist, 16th April 1988. Lipschitz et al. (1989) report that the German federal government had provided DM 4.9 billion to Deutsche Airbus GmbH through 1986, with promises of significantly more money to come. Much of this is in loans, some of which has already been written off, and others whose repayment depends on future profits from Airbus sales.
18. The American Electronics Association is reported to have asked for \$1.3 billion (The Economist, 26th May 1989) but the American federal government has so far refused to provide support. The French

government recently announced that it will double its support for high definition television to 240 million francs in 1990.

19. Both Baldwin and Krugman (1987b) and Klepper (1989) assume that the only producers that count for the world market are Boeing and Airbus, on the grounds that other firms, such as McDonnell Douglas, are likely to disappear or are too small to matter.
20. However, seasonal industries face annual declines and recoveries, often of substantial proportions, without any apparent need for subsidisation to ease the burden of the off-season.
21. Border measures, which are not covered by this study, are also high in these sectors. For example, the U.S. has quotas on steel imports, and many European countries have restrictions on coal imports.
22. Substantial returns to R&D in the United States have been found by Mansfield et al. (1977), and Griliches (1986) using firm-level data, by Mansfield (1980) using industry-level data, and by Lichtenberg and Siegel (1989) using product-level data. Griliches and Mairesse (1986) report similar findings using French data, and Bernstein (1988) with Canadian firm-level data. Mansfield et al. (1977) and Griliches (1986) found that the social rate of return substantially exceeded the private rate of return to innovations. Bresnahan (1986), Jaffe (1986), Bernstein (1988), and Bernstein and Nadiri (1988, 1989) find spillovers from R&D, implying also that the social exceeds the private return. A surprising result that emerges from this literature is that basic research has a higher return than applied research [see Mansfield (1980), and Lichtenberg and Siegel (1989)].
23. See also the figures produced annually by the European Regional Policy Monitoring Unit at the University of Strathclyde [Yuill (1988)]. As these figures and those of the European Commission are computed differently, the two are not directly comparable.
24. The estimates were made by computing the present value of the difference between the credit rate and a commercial reference rate, and are therefore grant equivalents.
25. The transport figures are affected significantly by French subsidies for the export of transportation systems (for urban transit, for example) and infrastructure.
26. A large country can improve its terms of trade by reducing its exports; that is, by taxing the exported good. The same ultimate effect can be achieved by subsidising other goods, and thereby drawing resources from the export industry.
27. This argument assumes resources are fully employed, and so focuses on the structural aspects of the subsidy. If they are not, an export subsidy -- like any other government outlay -- gives rise to an increase in aggregate demand which, in a standard Keynesian model, will worsen the trade account by increasing import demand.

28. See Melitz and Messerlin (1987) for a more formal argument. As they point out, to the extent the export subsidy favours some industries over others, the composition of exports will change, which could give rise to second-order effects.

Appendix

DATA SOURCES

A. National accounts and input-output data

1. OECD's Annual National Accounts (ANA) has been used as the primary source for total subsidies. The data on subsidies by kind of activity have been used to separate industrial subsidies from the total unless otherwise stated. In other cases, a functional breakdown is used, but this limits the possible degree of disaggregation. For example, the functional breakdown does not allow the manufacturing sector to be isolated. The sectoral breakdown for the United States, Germany (subsidies by function rather than by kind of activity have been used), France (with one exception noted below), the United Kingdom (subsidies by function), Australia (subsidies by function), Austria (subsidies by function), Denmark (subsidies by function), Portugal, Sweden, Norway, the Netherlands, New Zealand, and Iceland are all from ANA.

2. Subsidies are defined in ANA as all grants on current account by government to private industries and public corporations, plus grants made by the public authorities to government enterprises in compensation for operating losses when these losses are clearly the consequence of the policy of the government to maintain prices at a level below costs of production. Industrial subsidies are defined as total subsidies less subsidies to agriculture and food processing.

3. In the case of the United States all subsidies to government enterprises are included. The industrial subsidy data for Sweden include all subsidies not otherwise allocated. The ANA data for both Sweden and Norway include large subsidies to education and health care, and since these sectors are not part of the industrial sector for the purposes of this study, the data were adjusted to remove these subsidies. The same problem may exist for other countries, but may be hidden because education and health care are not distinguished separately.

4. For a number of countries, the ANA data were incomplete or unavailable on a sectorally disaggregated basis. Where available, data derived from the Eurostat input-output (IO) tables were used instead, although the total subsidies as reported in these tables do not always agree with the ANA total. For Italy, the ratio of the ANA total to the Eurostat total is 1.31 in both 1975 and 1980. For Belgium, the ratio is 0.36 in both 1975 and 1980. For Ireland, it is 1.03 in 1975. For Spain, the ratio is 0.62 for 1980.

5. For Japan, France and Finland, the ANA data have been augmented by data from national sources. The Japanese national IO tables provide the sectoral breakdown, and there are only minor discrepancies between the ANA total and the sum of the sectoral subsidies (the ratio of ANA to the national total is 1.02 for 1970, 1.04 for 1975, and 1.01 for 1980 and 1985). For France, ANA does not break out finance, insurance, real estate, and business services. The French IO tables have been used for data on housing subsidies ("subventions des locations immobilières"). Data on industrial subsidies in Finland were provided by national authorities.

6. For Greece, Luxembourg, Switzerland, and Turkey, there are no national accounts data on subsidies by sector.

B. The EC survey of state aids (CEC)

7. Estimates of government support are presented for ten of the twelve member countries. No figures are presented for Spain and Portugal. The figures for Greece and Italy are provisional, as they have not been verified by national authorities. Support to industry is included even if the aid programme is not specifically sectoral in nature. In particular, regional support (that part of it paid to industry) is included.

8. The data presented in CEC are estimates of the grant equivalent of the assistance provided. Grants, for which no calculation is required, are based on actual expenditures or, where this was not possible, on budget appropriations. The aid element of soft loans in any year is defined as the difference between the "reference rate", the rate at which companies can borrow under normal conditions, and the interest rate at which the State

accords loans, multiplied by the value of loans made in that year. The impact of delayed payments are taken into account for major loans. The aid element of new equity injected to state holding companies is defined as the amount required to cover recurring losses. The aid element of loan guarantees is primarily the net cost on a year-by-year basis. However, for export guarantees that insure against exchange rate changes a methodology more akin to the grant-equivalent approach on soft loans is used and for large individual cases and for certain sectors the value to the recipient is taken. All aid equivalents are calculated on a before-tax basis. As a consequence, the types of support are still not fully comparable.

9. Not all of the industrial (i.e. non-agricultural) sector is covered. The following sectors are excluded:

- the energy sector, except coal mining;
- the transport sector, except railways and inland waterways;
- press and media;
- banks and credit institutions;
- buildings and public works;
- public utilities;
- cultural and leisure activities;
- housing.

10. Aid granted by the EEC is not covered. Some information on supranational aid is given in the survey showing that about 80 per cent of the Community intervention goes to agriculture.

11. A wide range of forms of aid is covered:

- grants;
- tax expenditures (but the coverage is incomplete);
- equity participation;
- soft loans;
- loan guarantees.

12. However, CEC does not deal with below-cost or free-of-charge government services to the business sector and public procurement on terms favourable to domestic suppliers. Moreover, some forms of government support for research and development have not yet been included. Government financing of R&D by private and nationalised industries is included, but research by public research institutions, institutes of higher education and research made under contract are excluded due to methodological problems. Furthermore, training measures, even when they are sector-specific, are not included.

C. The EFTA reviews on government aid

13. The data prepared by the EFTA Secretariat are estimates of the net cost to government of the assistance provided (and therefore are not comparable to the EC estimates). For grants, this is the amount actually paid out in any year less any grants paid back. For soft loans, it is the difference between the government borrowing rate multiplied by the value of all outstanding loans, less interest payments and plus any write-offs. For equity, it is the difference between the cost of government borrowing and any dividends and repayments received. Write-offs, losses and gains on sales of shares are taken into account. For loan guarantees, it is guarantees actually paid in a year less any fees and repayments. All aid equivalents are calculated on a before-tax basis, hence different types of support are not fully comparable since not all are taxable.

14. Until the 1987 review, only aids to the manufacturing sector were covered. The 1987 review provides some information on support to the mining, quarrying, gas and electricity sectors, but not to services. The reviews cover four forms of aid to enterprises: direct grants, loans, guarantees and equity. They do not deal with tax expenditures, below-cost or free-of-charge government services (except some services in Norway) and public procurement.

15. Government support is not classified by sector but rather by objective:

1. general aids;
2. regional aids;
3. research and development aids;

4. employment aids;
5. sectoral aids;
6. structural adaptation and rescue aids;
7. small firm aids;
8. firm-specific subsidies;
9. export promotion other than export credits;
10. export credits (not included in total).

16. Aids are not broken down by instrument. However, considerable detail is presented on individual programmes, and a classification by instrument was estimated based on programme descriptions.

D. Data on government support in Germany

17. For Germany, there are two comprehensive sources of data on subsidies. The first is the official biannual report of the government on federal support programmes, which also has an annex with some data on subsidies of the eleven Länder. The reports describe developments in recent years and list about 300 different programmes with their published goals, their legal grounds and their perceived effects. Subsidies are broadly defined and include capital transfers and tax expenditures.

18. An especially rich source of subsidy data for Germany has been assembled by five German research institutes [Jüttemeier (1987), Fritzsche et al. (1988), and Rosenschon (1989)]. The grant-equivalents of some 10 000 budgetary measures at both the federal and Länder levels were calculated, and subsidies provided through several instruments, such as tax concessions and soft loans (including those administered by para-governmental organisations) were covered. In addition to the support covered in the official government report, these data include subsidies to public enterprises such as the Federal Railways and the Federal Post Office, subsidies to the domestic coal production, subsidies of the state and local governments and subsidies of the European Community. The key strength of these data is the breakdown of subsidies into 49 sectors, including 31 manufacturing sub-sectors. This detailed disaggregation makes refined estimates of the allocative effects of the German subsidy system possible.

19. Due to differences in coverage, methodology and definitions, official government estimates of subsidies differ substantially from the institutes' estimates. As Table A1 illustrates, differences in coverage and assumptions can give rise to sharply different estimates of subsidies:

Table A1
Total government support to enterprises in Germany
according to different sources, 1981-1987
(DM billions)

	1981	1982	1983	1984	1985	1986	1987
Subsidies according to National accounts	29.1	29.4	31.8	36.2	37.8	41.3	44.0
Support according to subsidy reports of the Federal Government	65.5	..	..	74.5	..	..	..
Support according to economic institutes:							
Total	96.0	..	..	116.3	..	117.9	..
Excluding housing	75.3	..	..	93.3	..	95.8	..
Support according to EEC Commission (a)	38.5	41.5	41.9	43.9	47.6	48.3	..

a) Excluding supranational support.

Source: OECD Annual National Accounts, Jüttemeier (1987), Rosenschon (1989), Commission of the European Communities (1989).

E. Other data sources

20. At the federal level for the United States, information on loan subsidies, loan guarantee commitments, and tax expenditures can be found in the federal budget document, particularly, Special Analysis F and G. Sectoral information is not available, although subsidies to the corporate sector are broken out. Bucaille and de Beauregard (1988) make extensive use of these data.

21. The Institute for Research on Public Policy has published extensive information on federal and provincial grant programmes in Canada [Moroz and Brown (1987)], and on subsidies in the United States [Michel et al. (1988) and Kaminow (1989)]. In general, the coverage of these studies is very broad in terms of sectors (although generally narrower in terms of instruments than those of, for example, the CEC and the German institutes). Moroz and Brown and Kaminow provide subsidy estimates for 111 and 86 sectors, respectively. The definition of "industry" used in this paper is total output less sectors 1-to-3 and 12-to-27 in Moroz and Brown, and sectors 1-to-3 and 7-to-18 in Kaminow.

22. For the United States, Kaminow's estimates fall far short of those provided by Bucaille and Costa de Beauregard (see Table 1 in the main text). The difference is principally in the treatment of tax concessions. Kaminow includes only five programmes (Possessions Tax Credit, Jobs Credit, Non-conventional Fuels Credit, Alcohol Fuels Credit and Percentage Depletion Tax Provision) worth a total of \$5.5 billion, while the latter use U.S. budget data to estimate tax concessions at \$53.6 billion in 1984.

23. Contrary to common practice, the IRPP studies calculate subsidies as a percentage of sales (or shipments), rather than value-added. Shipments correspond more closely to the concept of "sales" used in standard theoretical treatments of subsidies [see, for example, Bruce (1989)], but value-added figures are typically used because they are more widely available.

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Table 1

Synopsis of industrial subsidy rates, 1986
(subsidy as a percentage of sectoral GDP)

	National Accounts (j)	EC manufacturing (a)	EC industry (a) (b)	EFTA manufacturing (i)	EFTA industry (c)	Other
United States	0.5					0.4 (1984) (Kaminow, 1989) (d) 2.6 (Bucaille and Costa de Beauregard, 1988)
Japan	1.0 (1985) (e)					5.9 (Rosenchon, 1989) (f)
Germany	1.9	2.7	6.2			3.9 (1982) (Dutailly, 1984) (f)
France	3.3 (1984)	3.8	7.8			11.9 (1984) (Ranci, 1987)
Italy	2.6 (1980) (e)	16.8	17.4			
United Kingdom	1.6	2.6	4.6			1.5 (1981) (Moroz and Brown, 1988) (g)
Canada	2.6 (1985)					
Austria	2.8			3.5	3.2	
Belgium	4.4 (1980) (e)	3.8	12.7			
Denmark	2.6	1.2	3.8			
Finland	1.5			1.4	1.2	
Greece	..	17.7	9.8			
Iceland	2.6				0.5 (1985)	
Ireland	5.9 (1975) (e)	12.4	13.6			
Luxembourg	..	1.6	16.0			
Netherlands	2.9 (1985)	3.4	4.8			
Norway	4.1			4.9	2.4	
Portugal	6.5 (1981)					
Spain	3.8 (1980) (e)					
Sweden	7.4			3.6	3.5 (h)	
Switzerland	..			0.1	0.1	
Australia	1.6 (1985)					
New Zealand	0.6 (1985)					

a) Excluding supranational support.

b) 1981-1986 average.

c) Excluding tax concessions. Support to manufacturing sector including mining, quarrying and gas and electricity sectors.

d) As a percentage of domestic shipments. Excluding agricultural sectors (sectors 1-3) and food-processing sectors (sectors 7-14).

e) Input-output data.

f) Total subsidies excluding subsidies to the agricultural and food processing sectors.

g) As a percentage of value of domestic production plus subsidies.

h) Excluding coal mining and crude petroleum sectors.

i) Excluding tax concessions.

j) Total subsidies less subsidies to agriculture and food processing.

Source: OECD Annual National Accounts; Commission of the European Communities (1989); EFTA Secretariat (1988).

Table 2

Total subsidies (national accounts definition), 1970-1988
(as a percentage of GDP at market prices)

	Total OECD	Major seven countries	OECD Europe	United States	Japan	Germany	France	Italy	United Kingdom	Canada	Austria	Belgium	Denmark	Finland
1970-74	1.2	1.1	1.9	0.5	1.2	1.8	2.1	2.2	2.2	1.1	1.8	1.3	3.0	2.7
1975-79	1.5	1.4	2.5	0.4	1.3	2.1	2.5	3.2	2.7	2.0	3.0	1.4	3.1	3.6
1980-84	1.6	1.4	2.7	0.5	1.4	2.0	2.8	3.6	2.3	2.6	2.9	1.4	3.2	3.2
1985-88	1.6	1.4	2.7	0.7	1.1	2.2	3.0	3.3	1.7	2.2	3.0	1.3	3.1	2.9
1970	1.1	1.0	1.8	0.5	1.1	1.7	2.0	1.7	1.7	0.9	1.7	1.3	2.7	2.8
1971	1.1	1.0	1.8	0.5	1.1	1.7	2.0	2.1	1.6	0.9	1.8	1.2	2.8	2.7
1972	1.2	1.1	1.9	0.6	1.2	1.9	2.0	2.6	1.8	0.9	1.6	1.3	2.9	2.7
1973	1.2	1.1	2.0	0.4	1.0	2.0	2.2	2.3	2.0	1.0	1.7	1.4	3.1	2.3
1974	1.3	1.2	2.2	0.3	1.6	1.9	2.1	2.1	3.7	1.9	2.1	1.2	3.5	3.1
1975	1.5	1.4	2.5	0.3	1.5	2.0	2.4	3.0	3.6	2.5	2.9	1.2	2.8	3.8
1976	1.4	1.3	2.5	0.3	1.3	2.0	2.5	3.0	2.8	1.9	2.9	1.4	3.1	3.8
1977	1.5	1.3	2.5	0.4	1.3	2.1	2.6	3.1	2.3	1.8	2.9	1.4	3.1	3.6
1978	1.6	1.4	2.6	0.4	1.3	2.3	2.5	3.3	2.3	1.7	3.2	1.5	3.4	3.3
1979	1.6	1.4	2.6	0.4	1.3	2.2	2.6	3.5	2.4	2.0	2.9	1.7	3.2	3.5
1980	1.7	1.5	2.7	0.4	1.5	2.1	2.6	3.4	2.5	2.7	3.0	1.4	3.2	3.2
1981	1.6	1.4	2.7	0.4	1.5	1.9	2.8	3.4	2.5	2.7	3.0	1.5	3.0	3.3
1982	1.6	1.4	2.7	0.5	1.4	1.8	2.7	3.7	2.1	2.5	3.0	1.3	3.2	3.2
1983	1.8	1.4	2.7	0.7	1.4	1.9	2.8	3.6	2.1	2.5	2.9	1.4	3.3	3.2
1984	1.6	1.4	2.9	0.6	1.3	2.1	3.1	3.8	2.4	2.8	2.8	1.5	3.3	3.2
1985	1.5	1.3	2.8	0.6	1.2	2.1	3.0	3.4	2.1	2.5	2.9	1.5	3.0	3.1
1986	1.6	1.4	2.8	0.7	1.1	2.1	3.1	3.5	1.7	2.0	3.2	1.5	3.0	3.1
1987	1.6	1.4	2.7	0.7	1.0	2.2	3.2	3.2	1.5	2.3	3.1	1.0	3.2	3.0
1988	1.5	1.3	2.5	0.6	0.9	2.3	2.5	3.0	1.3	2.0	2.8	..	3.1	2.5

Source: OECD Annual National Accounts, OECD Secretariat estimates.

Table 2 (Continued)

	Greece	Iceland	Ireland	Luxembourg	Netherlands	Norway	Portugal	Spain	Sweden	Switzerland	Turkey	Australia	New Zealand
1970-74	1.5	3.8	4.7	1.5	1.6	5.4	1.7	0.9	1.9	0.9	0.8	1.1	1.6
1975-79	2.7	3.6	8.0	3.7	2.4	7.0	3.8	1.5	3.9	1.2	1.1	1.3	2.3
1980-84	4.1	3.2	7.1	4.6	2.8	6.4	4.6	2.4	4.8	1.3	1.7	1.7	1.9
1985-88	6.2	2.6	7.3	4.3	3.7	5.6	3.3	2.2	4.7	1.4	1.0	1.5	0.6
1970	0.8	3.0	4.9	1.3	1.7	5.2	1.7	0.9	1.7	0.8	1.1	1.0	0.7
1971	1.2	4.3	4.7	1.3	1.3	5.3	1.6	1.0	1.8	0.9	0.9	1.1	1.6
1972	1.3	3.7	4.2	1.5	1.5	5.3	1.3	1.0	1.9	1.0	0.7	1.0	1.6
1973	1.8	3.6	4.4	1.6	1.8	5.3	1.4	0.9	1.9	0.9	0.6	1.1	1.8
1974	2.6	4.3	5.2	1.9	1.8	5.8	2.5	0.9	2.4	1.0	0.5	1.2	2.4
1975	2.5	4.6	6.8	2.9	1.8	6.2	2.3	1.1	3.1	0.9	0.5	1.1	3.4
1976	2.8	3.3	6.4	3.4	2.4	6.8	4.0	1.3	3.9	1.2	0.8	1.1	1.7
1977	3.0	2.9	8.5	4.1	2.5	7.4	3.8	1.4	4.1	1.2	1.5	1.3	1.9
1978	2.9	3.4	9.4	4.0	2.6	7.7	4.6	1.9	4.2	1.3	1.4	1.4	2.5
1979	2.3	3.9	8.9	3.9	2.8	7.0	4.5	1.7	4.3	1.4	1.1	1.5	1.8
1980	2.4	3.2	7.9	3.8	2.7	7.0	5.2	2.1	4.3	1.4	1.8	1.6	1.5
1981	4.2	3.1	6.7	4.7	2.5	6.7	5.4	2.0	4.7	1.3	1.7	1.6	2.1
1982	4.7	3.6	6.4	4.8	2.7	6.5	4.3	2.5	5.0	1.2	1.3	1.8	2.4
1983	4.7	3.3	6.9	5.4	2.9	6.1	4.0	2.6	5.2	1.3	1.7	1.7	1.9
1984	4.3	2.7	7.5	4.5	3.2	5.7	4.3	2.8	5.0	1.4	1.9	1.7	1.5
1985	5.7	2.9	8.2	4.3	3.2	5.4	3.6	2.6	4.9	1.4	1.6	1.7	0.8
1986	6.5	2.7	7.9	4.3	3.2	5.7	3.4	2.2	4.8	1.4	0.9	1.6	0.6
1987	5.8	2.3	7.7	4.4	3.9	5.5	3.0	2.1	4.6	1.4	0.8	1.3	0.5
1988	6.6	2.3	5.3	..	4.3	5.6	3.0	2.0	4.4	1.4	0.8	1.2	0.5

Source: OECD Annual National Accounts, OECD Secretariat estimates.

Table 3

Industrial subsidies (national accounts definition), 1970-1986 (a) (b)
(as a percentage of sectoral GDP at market prices)

	United States (c)	Japan (c)	Germany (c)	France (c)	Italy (c)	United Kingdom (c)	Canada (c)	Austria (c)	Belgium (c)	Denmark (c)	Finland (c)	Iceland (c)	Ireland (c)	Netherlands (c)	Norway (c)	Portugal (c)	Spain (c)	Sweden (c)	Australia (c)	New Zealand (c)
1970-76 (d)	0.3	0.5	1.6	..	..	..	1.1	..	..	3.2	1.4	1.7	..	1.2	4.2	..	..	2.8	1.0	1.6
1975-79 (d)	0.4	0.8	1.9	2.7	2.3	2.4	2.1	..	3.9	2.5	1.9	2.2	5.9	2.1	4.7	5.1	..	5.7	1.2	2.1
1980-84 (d)	0.5	1.1	1.8	2.9	2.6	2.4	3.1	2.7	4.4	3.2	1.7	2.5	..	2.6	4.4	6.4	3.8	7.5	1.6	1.2
1985-86 (d)	0.5	1.0	1.8	..	..	1.9	2.6	2.7	..	2.8	1.5	2.6	..	2.9	3.9	..	..	7.5	1.6	0.8
1970	0.2	0.5	1.2	..	..	..	0.9	..	..	2.9	1.3	..	..	1.2	4.0	..	..	2.4	..	..
1971	0.2	..	1.3	..	..	..	0.9	..	..	3.2	1.3	..	..	1.1	4.3	..	..	2.7	..	1.1
1972	0.3	..	1.7	..	..	..	0.9	..	..	3.2	1.3	..	..	1.2	4.3	..	..	2.9	..	1.4
1973	0.3	..	1.8	..	..	..	1.0	..	..	2.7	1.2	1.3	..	1.2	4.3	..	..	2.9	0.9	1.5
1974	0.3	..	1.8	..	..	..	2.0	..	..	3.8	1.9	2.1	..	1.2	4.2	..	..	3.1	1.1	2.2
1975	0.3	0.8	1.6	..	2.3	..	2.7	..	3.9	2.5	1.7	3.2	3.9	1.6	4.5	..	..	4.2	1.0	3.1
1976	0.3	..	1.8	..	..	..	2.0	..	..	2.8	2.1	1.7	..	2.2	4.7	..	..	5.6	1.1	1.6
1977	0.4	..	1.8	2.6	..	2.3	1.9	..	..	2.2	1.9	1.6	..	2.3	4.8	4.6	..	6.1	1.1	1.9
1978	0.4	..	2.1	2.7	..	2.4	1.8	..	..	2.4	1.8	2.3	..	2.3	5.2	5.3	..	6.3	1.3	2.2
1979	0.4	..	2.1	2.8	..	2.5	2.2	..	..	2.5	2.1	2.0	..	2.3	4.5	5.4	..	6.3	1.4	1.8
1980	0.4	1.1	1.9	2.6	2.6	2.7	3.2	..	4.4	2.9	1.8	2.1	..	2.4	4.6	6.2	3.8	6.5	1.5	1.7
1981	0.4	..	1.8	2.9	..	2.7	3.1	2.8	..	3.1	1.7	2.2	..	2.4	4.6	6.5	..	7.2	1.6	1.3
1982	0.5	..	1.8	2.9	..	2.3	3.0	2.8	..	3.5	1.6	2.7	..	2.5	4.5	..	..	7.8	1.8	1.2
1983	0.5	..	1.7	3.0	..	2.1	2.9	2.6	..	3.4	1.7	2.8	..	2.7	4.2	..	..	8.3	1.7	1.1
1984	0.5	..	1.8	3.3	..	2.4	3.1	2.4	..	3.1	1.6	2.7	..	2.8	4.0	..	..	7.7	1.6	0.9
1985	0.5	1.0	1.7	..	..	2.1	2.6	2.5	..	2.9	1.5	2.5	..	2.9	3.7	..	..	7.6	1.6	0.8
1986	0.5	..	1.9	..	..	1.6	..	2.6	..	2.6	1.4	2.6	..	..	4.1	..	..	7.4	..	..

a) Total subsidies excluding subsidies to agriculture and food processing.

b) No data available for Greece, Luxembourg, Switzerland and Turkey.

c) Based on input-output data.

d) Average of available years.

e) Sectoral GDP at market prices based on average value-added tax rates.

f) At factor cost.

Source: OECD Annual National Accounts and additional information (see Appendix II.A).

Table 4

Government support in the EC by sector (a). 1981-1986
(as a percentage of sectoral GDP)

	Total industry (b)	Manufacturing	Manufacturing excluding steel and shipbuilding	Steel	Shipbuilding	Railways	Agriculture
Germany	6.2	3.0	2.9	8.6	12.3	37	9.8
France	7.8	4.9	3.6	58.3	56.6	38	12.1
Italy	17.4	16.7	15.8	71.4	34.2	49	8.6
United Kingdom	4.6	3.8	2.9	57.6	21.6	18	14.1
Belgium	12.7	6.4	4.5	40.4	27.7	70	7.3
Denmark	3.8	2.8	1.7	18.0	33.8	15	8.0
Greece	9.8	12.9	13.9	..	..	..	..
Ireland	13.6	12.9	12.3	107.2	..	..	13.2
Luxembourg	16.0	7.3	3.5	14.6	0.0	181	12.0
Netherlands	4.8	4.1	4.1	4.3	10.7	22	7.2
EC-10	8.6	6.2	5.5	..	..	..	..

a) Excluding supranational support.

b) Calculated as the ratio of industrial subsidies to industrial GDP, where the latter comprises manufacturing, coal mining, transport and communications. For the United Kingdom total mining value-added is used instead of coal.

Source: Commission of the European Communities (1989): OECD Secretariat estimates.

Table 5
Support to manufacturing in the EC and EFTA (a)
(as a percentage of sectoral GDP)

	1981	1982	1983	1984	1985	1986	1987	Average
Germany	3.1	3.2	3.0	3.3	3.1	2.7	..	3.0
France	4.9	4.3	5.3	5.4	5.8	3.8	..	4.9
Italy	11.9	15.2	20.7	18.2	16.6	16.8	..	16.7
United Kingdom	5.2	4.5	3.8	3.9	3.1	2.6	..	3.8
Belgium	8.0	7.4	6.7	5.7	7.6	3.8	..	6.4
Denmark	4.5	4.6	3.8	2.3	2.0	1.2	..	2.8
Greece	10.0	9.6	11.3	13.0	15.3	17.7	..	12.9
Ireland	11.4	10.7	15.0	12.2	15.1	12.4	..	12.9
Luxembourg	7.1	2.8	11.7	5.1	15.5	1.6	..	7.3
Netherlands	4.8	4.8	3.9	4.8	3.6	3.4	..	4.1
EC-10	5.8	6.1	7.0	6.7	6.4	5.6	..	6.2
Austria	..	..	..	2.5	2.5	3.2	3.6	3.0
Finland	..	..	..	1.2	1.2	1.2	1.1	1.2
Iceland	..	..	..	0.8	0.5	..	..	0.7
Norway	..	..	..	2.0	1.4	2.4	2.0	2.0
Sweden (b)	..	..	..	2.9	4.0	3.5	1.9	3.1
Switzerland	..	..	..	0.1	0.1	0.1	0.1	0.1
EFTA	..	..	..	1.7	1.9	2.0	1.6	1.8

a) EC countries: supranational support excluded. EFTA countries: tax concessions excluded; mining, quarrying, gas and electricity sectors included.

b) Excluding coal mining and crude petroleum production.

Source: Commission of the European Communities (1989), European Free Trade Association Secretariat, (1988).

Table 6

Subsidies by sector (national accounts definition)
(as a percentage of sectoral GDP at market prices)

	Year	Industry, of which:				Agriculture (c)	Total (e)
		Total (a)	Transport (b)	Housing (b)	Other (h)		
United States	1986	0.5	0.7	1.2	0.4	5.5	0.7
Japan (d)	1985	1.0	4.5	..	0.7	5.1	1.2
Germany	1986	1.9	6.5	2.7	1.2	12.7	2.1
France (f)	1984	3.3	7.5	..	2.5	6.4	3.1
Italy (d)	1980	2.6	29.7	..	0.7	6.7	2.6
United Kingdom (f)	1986	1.6	6.1	..	0.7	25.2 (g)	1.7
Canada	1985	2.6	7.1	1.1	2.0	10.8	2.5
Austria (f)	1986	2.8	17.3	..	1.5	12.4	3.2
Belgium (d)	1980	4.4	23.6	..	1.8	5.5	4.0
Denmark	1986	2.6	9.1	5.4	1.0	17.7	3.1
Finland (i)	1987	1.4	..	..	..	..	3.0
Greece	1987	..	..	..	..	..	5.8
Iceland	1986	2.6	2.7	..	2.6	7.8	2.7
Ireland (d)	1975	5.9	19.1	..	2.8	14.8	6.8
Luxembourg	1987	..	..	..	..	..	4.4
Netherlands	1985	2.9	13.3	15.2	0.7	13.9	3.2
Norway (f)	1986	4.1	4.5	3.4	3.8	28.8	5.7
Portugal	1981	6.5	8.1	11.5	6.1	3.5	5.4
Spain (d)	1980	3.8	16.8	..	2.8	2.8	3.3
Sweden	1986	7.4	12.6	18.4	4.2	2.1	4.8
Switzerland	1987	..	..	..	..	..	1.4
Turkey	1987	..	..	..	..	..	0.8
Australia	1985	1.6	9.7	..	0.8	4.7 (g)	1.7
New Zealand	1985	0.8	5.1	..	0.2	1.6	0.8

- a) Including communications.
b) Excluding mortgage interest deductibility
c) Including food processing.
d) Based on input-output data.
e) As a percentage of total GDP.
f) Sectoral GDP at market prices based on average value-added tax rates.
g) Sectoral GDP excluding food processing. These figures are substantial overestimates.
h) Sectoral GDP including housing.
i) At factor cost.

Source: OECD Annual National Accounts and additional information (see Appendix II.A).

Table 7
Support by sector in Germany

	Rates (as a percentage of sectoral GDP at market prices)		Per employed person (DM thousands)	
	1981	1986	1981	1986
Total	7.5	7.3	4.4	5.6
Total excluding housing	6.4	6.4	3.6	4.7
Sub-sectors with support rate of 10 per cent or more in 1986:				
Railways	92.0	96.5	34.9	44.7
Agriculture	47.8	68.1	10.8	17.3
Coal mining	44.7	54.3	25.5	35.0
Shipbuilding	33.7	20.0	14.7	11.0
Health and veterinary services	17.9	19.3	12.3	13.8
Navigation	13.1	14.4	10.8	11.3
Insurance	20.2	12.7	15.3	14.1
Aircraft, aerospace	18.5	11.4	12.1	9.3
Other transport	11.3	10.6	7.5	8.9

Source: Rosenschon (1989), Statistisches Bundesamt (1988).

Table 8

Support to manufacturing in the EC and EFTA countries by instrument (a)(b)
(as a percentage of total support)

	Grants	Tax concessions	Equity participation	Soft loans	Guarantees
Germany	35	58	0 (c)	6	1
France	20	11	26	38	5
Italy	68	11	18	3	0
United Kingdom	69	4	18	6	1
Belgium	47	2	28	10	13
Denmark	43	0	1	52	3
Greece	95 (d)	0 (d)	0	0	5
Ireland	39	49	8	2	1
Luxembourg	57	4	35	4	0
Netherlands	60	25	1	13	0
EC-10	47	23	14	14	2
Austria	21	..	68 (e)	11	0
Finland	72	..	15	12	1
Iceland	27	..	0	33	40
Norway	61	..	11	27	1
Sweden	55	..	0	27	18
Switzerland	77	..	0	14	9
EFTA	58	..	16	18	8

- a) EC countries: excluding supranational support. EFTA countries: including mining, quarrying, gas and electricity sectors. Data for EFTA countries do not include tax concessions.
- b) EC countries: 1981-1986; EFTA countries: 1984-1987.
- c) Support considered to be negligible. No figures available.
- d) Tax expenditures included in grants.
- e) Mainly support to State holdings companies.

Source: Commission of the European Communities (1989), OECD Secretariat estimates based on programme information in EFTA (1986, 1988).

Table 9
A brief overview of tax relief and tax expenditure accounts in selected countries

	Australia	Austria	Belgium	Canada	Finland	France	Germany
1st application	1981-82 budget statement	1979 annual subsidy report	1985	1979 Budget presentation. Regular updates	1988	1981 law; annual report appears in "Keys and Means" Annex to project law to Parliament	1959 first publication. 1967 law required biennial reports on direct and tax subsidies
Statutory Obligation	No	Yes	No	No	No	Yes	Yes
Coverage	Federal income, sales and payroll taxes	Federal government taxes	Central government	Federal individual and corporate income taxes and sales and excise taxes	Federal, municipal, churches	Direct and indirect taxes of the State	All Federal taxes and some Länder taxes
Contents	150 tax expenditures and description of objectives	Detailed analysis of main tax subsidies and link with expenditures	300	220 tax expenditures. Data plus description of major provisions	234 tax expenditures + 7 tax penalties	350 tax expenditures. Analytical data plus description of major provisions	Detailed analysis of 127 tax expenditures and link with direct expenditures
Classification	By functional category	By type of tax, function and beneficiary	Type of tax	By objective, beneficiary and type of tax	Functional categories	By objective, beneficiary and type of tax	By objective, beneficiary and type of tax
Qualification	Periodic evaluation. No aggregation	Annual evaluation and aggregation	Annual evaluation. No aggregation	Periodic evaluation. No aggregation	Periodic (to become annual). With aggregation	Annual evaluation. No aggregation	Biennial evaluation. Aggregation by sector of overall economy
Measurement Concept	Mixed: revenue forgone and revenue gain, accrual figures	Revenue forgone, accrual figures	Revenue forgone, accrual	Revenue forgone, accrual figures	Revenue forgone	Revenue gain, cash figure	Revenue forgone, accrual figures

Table 9 (continued)

A brief overview of tax relief and tax expenditure accounts in selected countries

	Ireland	Netherlands	Portugal	Spain	United Kingdom	United States
1st application	1981 Annual Revenue Commissioners Report	1987	1980	1978 lev. Annual submission to Parliament	1979 first report in this area. Listing of all tax relief in annual White Paper	1968 annual expenditure budget. 1974 law required annual report in the Federal Budget
Statutory Obligation	No	No	No	Yes	No	Yes
Coverage	Central government personal and corporate income tax	Central government	Income taxes only	Direct and indirect taxes of Central Government	Direct taxes of Central Government	Federal personal and corporate income tax
Contents	Listing and evaluation of main tax reliefs	37 items + 12 aggregates	Listing and evaluation of certain reliefs	Listing of main tax expenditures	Analysis of over 100 tax reliefs. Data plus description of major provisions	Analysis of 87 tax expenditures. Data plus description of major provisions
Classification	By type of tax	Type of tax	By type of relief and tax	By type of tax and function	By type of tax	By type of tax and by functional areas
Qualification	Annual evaluation. No aggregation	Periodic, no aggregation	Annual evaluation. No aggregation	Annual evaluation. Aggregation	Annual evaluation where data available. No aggregation	Annual evaluation of individual items. Aggregation
Measurement Concept	Revenue forgone, accrual figures.	Revenue foregone	Revenue forgone, accrual figures	Revenue gain, cash figure	Revenue forgone, accrual figures	Outley equivalence, and revenue forgone. Accrual figures

Source: OECD (1981), Submissions by National authorities.

Table 10

Tax concessions and grants in the United States (a)

	1983	1984	1985	1986	1987	1988
	\$ billion					
Economy-wide						
Tax concessions (b)	51.0	54.6	53.7	60.4	47.6	38.5
Grants (c)	22.2	22.7	22.9	27.3	31.8	..
Industrial sector						
Tax concessions (b, d)	44.7	47.9	45.8	52.3	36.6	27.8
Grants (c)	14.3	15.7	16.6	17.7	..	..
	as a percentage of total GDP					
Economy-wide						
Tax concessions (b)	1.5	1.5	1.4	1.4	1.1	..
Grants (c)	0.7	0.6	0.6	0.7	0.7	..
Industrial sector						
Tax concessions (b, d)	1.3	1.3	1.2	1.2	.8	..
Grants (c)	0.4	0.4	0.4	0.4	..	..

a) Fiscal years.

b) Sum of outlay-equivalent estimates for tax concessions to corporations in the income tax.

c) National accounts definition.

d) Excluding tax concessions to agriculture, transport, housing, education, health and international affairs.

Source: OECD Annual National Accounts, Budget of the United States Government, various issues.

Table 11

Tax concessions in Germany by sub-sector, 1985

Sub-sectors with the highest tax expenditure rates:	As a percentage of sectoral GDP	As a percentage of sectoral gross operating surplus	Share in GDP total industries
Health and veterinary services	17.7	25.5	2.6
Insurances	14.4	63.7	1.5
Agriculture	13.0	15.7	2.1
Navigation	9.9	24.0	.4
Iron and steel	5.8	23.8	1.1
Educational and cultural services	5.4	9.5	1.9
Post	4.9	10.7	2.7
Clothing	3.3	12.0	.6
Food processing	3.1	6.4	2.4
Electricity	3.1	5.7	2.7
Total industries	3.2	6.9	100.0

Source: B. Fritzsche et al., (1988); Statistisches Bundesamt, Volkswirtschaftliche Gesamtrechnungen, Reihe 1.3, 1987.

Table 12

Federal government loans in the United States (a)

	1981	1985	1988
	in billions of dollars		
Total direct loan obligations (flow)	40.3	52.8	27.2
of which:			
agriculture	15.7	16.6	17.4
business	13.6	14.2	5.8
education	1.1	1.3	.1
housing	9.6	18.9	3.8
other	.3	1.8	.0
Guaranteed loan commitments (flow)	83.5	84.7	100.7
of which:			
agriculture	2.9	3.9	6.4
business	20.7	12.0	14.3
education	5.8	9.2	12.0
housing	54.0	59.6	67.8
other	.1	.1	.2
GSE loan obligations (b) (flow)	114.2	260.0	378.1
of which:			
agriculture	53.6	44.1	80.6
business	0.0	0.0	0.0
education	0.0	3.1	5.9
housing	60.6	212.8	291.6
Total direct loan obligations (stock)			222.0
Guaranteed loan commitments (stock)			550.0
Loan subsidy estimate (1990):			
direct			1.0
guaranteed			8.3
	as a percentage of GDP		
Total direct loan obligations (flow)	1.3	1.3	0.6
Guaranteed loan commitments (flow)	2.8	2.1	2.1
GSE loan obligations (b) (flow)	3.8	6.6	7.9
Total loans to industry (flow) (c)	1.2	0.7	0.4
Total direct loan obligations (stock)			4.6
Guaranteed loan commitments (stock) (c)			11.6

- a) Fiscal years.
b) Government Sponsored Enterprises.
c) Defined as business plus other.

Source: Budget of the United States Government, Fiscal Year 1990.

Table 13

Flow of government loans to the industrial sector in Japan

	1975	1980	1985	1987
	as a percentage of GNP			
Total loans to industrial sector	5.2	5.2	3.6	2.8
	as a percentage of total			
Small and medium-sized enterprises	36.6	47.3	44.5	40.3
Road	18.8	14.3	21.6	23.9
Transport and communication	29.9	24.2	20.8	22.9
Regional development	7.7	6.5	6.0	6.6
Industry and technical development	7.0	7.6	7.1	6.4
Average interest rate on government loans (a)				5.2
Prime rate (a)				5.7
Difference (interest rate subsidy)				.5
Memorandum Item:				
Subsidies as a percentage of GDP	1.5	1.5	1.2	1.0

a) December, 1987.

Source: Department of Finance, Fiscal Investment and Loan Program, 1988: OECD Secretariat estimates.

Table 14

Industrial subsidies (national accounts definition), 1970-1986 (a) (b)
(as a percentage of total government outlays)

	United States	Japan	Germany	France	Italy	United Kingdom	Canada	Austria	Belgium	Denmark	Iceland	Ireland	Nether-lands	Norway	Portugal	Spain	Sweden	Australia
	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)
1970-74 (d)	0.7	2.1	3.0	..	..	..	2.2	..	..	4.7	2.4	..	2.0	7.2	..	..	4.0	3.5
1975-79 (d)	0.9	2.6	3.2	4.8	4.8	4.9	3.8	..	6.9	3.1	2.9	7.0	3.1	7.2	10.8	..	6.4	3.4
1980-84 (d)	1.1	3.1	2.9	4.7	5.0	4.4	5.1	4.5	7.0	3.1	3.5	..	3.4	7.2	12.5	9.6	6.9	4.5
1985-86 (d)	1.2	2.7	3.1	..	..	3.3	4.1	4.3	..	2.9	3.5	..	4.0	6.4	..	..	7.0	4.1
1970	0.5	2.1	2.4	..	..	..	1.8	..	..	..	..	..	2.1	7.4	..	..	3.6	..
1971	0.6	..	2.6	..	..	..	1.8	..	..	4.7	..	..	1.9	7.4	..	..	3.9	..
1972	0.9	..	3.3	..	..	..	1.8	..	..	4.7	..	..	2.0	7.1	..	..	4.0	..
1973	0.8	..	3.4	..	..	..	2.0	..	..	4.0	1.9	..	2.0	7.2	..	..	4.1	3.3
1974	0.7	..	3.2	..	..	..	3.8	..	..	5.4	2.8	..	2.0	7.1	..	..	4.3	3.6
1975	0.8	2.6	2.9	..	4.8	..	4.8	..	6.9	3.4	4.2	7.0	2.3	7.4	..	..	5.6	3.1
1976	0.8	..	3.0	..	..	..	3.6	..	..	3.8	2.5	..	3.3	7.2	..	..	6.9	3.1
1977	0.9	..	3.1	4.8	..	4.7	3.4	..	..	2.8	2.2	..	3.3	7.1	9.8	..	6.5	3.1
1978	1.0	..	3.4	4.7	..	4.8	3.2	..	..	2.9	3.1	..	3.3	7.5	11.3	..	6.5	3.6
1979	1.1	..	3.4	4.9	..	5.1	4.1	..	..	2.8	2.7	..	3.2	6.8	11.4	..	6.4	3.9
1980	1.1	3.1	3.1	4.6	5.0	5.1	5.8	..	7.0	3.0	2.9	..	3.3	7.4	13.0	9.6	6.3	4.3
1981	1.0	..	3.0	4.8	..	4.9	5.5	4.7	..	3.1	2.9	..	3.2	7.6	12.0	..	6.6	4.5
1982	1.2	..	2.8	4.6	..	4.0	4.7	4.7	..	3.3	3.5	..	3.3	7.4	..	..	6.9	4.8
1983	1.2	..	2.8	4.7	..	3.8	4.6	4.3	..	3.2	3.9	..	3.5	6.9	..	..	7.4	4.5
1984	1.2	..	3.0	5.0	..	4.2	5.0	4.1	..	3.1	4.2	..	3.7	6.9	..	..	7.2	4.2
1985	1.2	2.7	2.9	..	..	3.8	4.1	4.1	..	2.9	3.6	..	4.0	6.4	..	..	7.0	4.1
1986	1.2	..	3.2	..	..	2.8	..	4.5	..	2.8	3.4	..	..	6.3	..	..	6.9	..

a) Total subsidies excluding subsidies to agriculture and food processing.
 b) No data available for Finland, Greece, Luxembourg, Switzerland and Turkey.
 c) Based on input-output data.
 d) Average of available years.

Source: OECD Annual National Accounts and additional information (see Appendix II.A).

Table 15

**Industrial support in the
EC countries, 1981-1986 (a)****(as a percentage of total government outlays)**

Germany	9
France	9
Italy	14
United Kingdom	4
Belgium	10
Denmark	2
Greece	6
Ireland	9
Luxembourg	17
Netherlands	3
EC-10	9

a) Excluding supranational support.**Source: Commission of the European Communities (1989).**

Table 16

Government-financed expenditure on research and development in the enterprise sector by industry group, 1985 (as a percentage of total R&D expenditure)

	Electrical	Chemical	Machinery	Aerospace	Other Transport	Chemical Linked	Basic Metal	Services	Total
United States	40.3	8.5 (a)	13.8	76.2	14.3 (e)	11.1 (h)	26.4 (j)	52.1	33.9
Japan	1.0	0.8	0.6	9.3	4.4	0.7	1.3	3.8	1.6
Germany	15.6	3.3	7.9	62.0 (c)	2.5	9.1	19.0	43.5	15.3
France	32.6	5.2	14.2	62.0	3.2	2.3	3.9	11.8	23.8
Italy	18.9	6.7	19.6	42.2	15.0	2.9	10.9	12.4	16.9
United Kingdom	29.6	0.8	21.0	62.7	3.8	4.7	6.2	11.0	23.0
Canada	7.2	1.8	2.4	29.9	8.1 (f)	5.5	2.8	18.1	10.9
OECD	26.8	2.5 (b)	11.4	73.3 (d)	5.4 (g)	2.8 (i)	5.7 (k)	29.8	23.7

(a) 1980.

(b) Excluding the United States. Approximately 5.5 per cent inclusive of the United States.

(c) 1983.

(d) Excluding Germany.

(e) 1980.

(f) 1971.

(g) Excluding the United States and Canada. Approximately 9.8 per cent inclusive of the United States and Canada.

(h) 1980.

(i) Excluding the United States. Approximately 7.1 inclusive of the United States.

(j) 1983.

(k) Excluding the United States. Approximately 14.0 per cent inclusive of the United States.

Source: OECD/STIID data bank.

Table 17

Government-financed expenditure on research and development in the enterprise sector, 1970-1985
(as a percentage of total R&D expenditure)

	United States	Japan	Germany	France	Italy	United Kingdom	Canada	Austria	Belgium	Denmark	Finland	Greece	Iceland	Ireland	Netherlands	Norway	Portugal	Spain	Sweden	Australia
1970	43.0	1.3	..	..	4.7	..	..	..	..	5.0	..	..	..	..	16.3	..	..	4.0	..	..
1971	41.8	2.0	16.2	27.7	4.5	..	12.6	..	9.6	..	6.0	..	1.1	..	21.5	2.0	..	4.1	16.2	..
1972	41.0	2.0	..	..	5.2	33.1	11.0	8.8	..	..	..	..	..	..	24.3	1.8	..	4.0	..	..
1973	38.3	2.0	19.2	26.5	5.3	..	15.3	..	8.4	4.4	8.5	..	..	..	..	..	..	2.3	18.5	..
1974	35.9	1.5	..	..	5.3	..	11.4	..	..	..	..	..	..	5.3	..	23.0	..	1.1	..	..
1975	35.6	1.7	17.9	25.4	6.5	30.9	12.1	9.0	..	6.6	6.0	..	..	4.7	..	21.1	..	..	19.9	..
1976	35.4	1.5	..	..	8.1	..	10.2	..	..	..	..	..	..	..	..	..	5.1	2.2	..	4.8
1977	35.2	1.9	15.8	21.1	11.0	..	10.1	..	..	8.4	4.8	..	..	5.6	..	23.8	..	..	15.3	..
1978	33.6	1.5	..	..	..	29.2	7.8	7.1	..	..	..	..	..	..	..	..	4.0	..	..	10.9
1979	32.7	1.4	16.2	22.1	5.8	..	8.5	..	4.8	11.5	7.7	..	49.0	9.0	5.6	23.8	..	2.8	12.8	..
1980	31.5	1.9	..	..	9.3	..	6.6	7.4	..	..	..	..	..	..	5.8	..	..	2.9	..	..
1981	31.6	1.9	16.9	24.6	8.8	30.0	8.8	..	5.1	12.5	9.0	30.6	38.3	13.1	7.4	24.9	..	4.1	13.6	8.8
1982	31.9	..	..	24.2	11.7	..	10.7	..	..	..	..	..	..	13.1	7.2	21.4	1.6	4.8	..	..
1983	32.4	1.7	16.1	22.4	18.1	..	10.8	..	4.2	12.0	6.6	..	6.9	10.6	8.3	19.8	..	4.0	10.5	..
1984	32.4	1.7	..	..	18.0	..	11.1	..	..	10.8	..	..	..	10.4	14.3	20.1	2.2	..	..	9.4
1985	33.9	1.6	15.3	23.8	16.9	23.0	10.9	7.1	5.0	9.9	7.7	..	2.2	12.4	12.5	19.3	..	7.7	11.6	..

Source: OECD/STIID data bank.

Table 18

Industrial support in the EC and EFTA by type (a)(b)

	Research and Development (c)	Small and medium-sized enterprises	Other General support	Sub-sector- specific	Region- specific
(as a percentage of total industrial subsidies)					
Germany	7.5	2.2	4.3	66.7	19.3
France	1.2	0.5	22.6	73.3	2.4
Italy	3.2	3.2	28.0	43.0	22.6
United Kingdom	6.8	1.1	11.4	63.7	17.0
Belgium	3.1	3.1	8.3	80.3	5.2
Denmark	12.2	0.4	14.9	71.1	1.4
Greece	6.0	3.0	46.6	27.3	17.1
Ireland	1.2	1.6	42.0	34.7	20.5
Luxembourg	0.2	1.1	2.0	91.2	5.5
Netherlands	6.3	16.5	8.8	58.2	10.2
EC-10	5.0	2.6	15.5	62.6	14.3
Austria	2.5	0.4	13.6	75.6	7.9
Finland	12.8	1.1	22.4	19.0	44.7
Iceland	16.4	0.0	26.0	57.6	0.0
Norway	6.5	0.0	8.1	61.9	23.5
Sweden	8.0	2.7	22.6	49.3	17.4
Switzerland	33.9	3.1	26.5	14.9	21.6
EFTA	14.7	1.8	20.0	42.0	21.5

a) EC countries: excluding supranational support; EFTA countries: manufacturing plus mining, quarrying, gas and electricity sectors.

b) EC countries: 1981-1986; EFTA countries: 1984-1987.

c) Limited coverage EC countries (see Appendix II).

Source: Commission of the European Communities (1989); EFTA Secretariat (1988).

Table 19
 Industrial sector share of export credit subsidies
 (per cent)

	1979	1980	1981	1982	1983	1984	1985
Energy	24.8	22.3	12.5	22.8	23.6	31.2	10.3
Transport	27.3	28.8	28.6	29.6	30.6	28.2	43.1
Chemical	7.3	5.7	11.3	19.0	7.7	8.2	6.6
Telecom	5.7	17.0	9.7	5.6	9.7	6.7	4.1
Construction	24.5	16.8	20.1	12.3	12.2	5.0	12.5
Other (a)	10.4	9.4	17.8	10.7	16.2	20.7	23.4

a) Includes light manufactures, agricultural equipment and social infrastructure.

Source: OECD Secretariat (1987b).

Table 20

Export subsidies in the EC and EFTA countries, 1981-1986 (a) (b)

	as a percentage of total subsidies	as a percentage of exports
Germany	1	0.1
France	13	1.5
Italy	5	1.4
United Kingdom	8	0.5
Belgium	2	0.1
Denmark	6	0.2
Greece	46	5.6
Ireland	32	2.9
Luxembourg	0	0.0
Netherlands	2	0.1
EC-10	7	0.5
Austria	..	..
Finland	11	0.1
Iceland	6	0.0
Norway	1	0.0
Sweden	0	0.0
Switzerland	21	0.0
EFTA (c)	9	0.0

- a) EC countries: excluding supranational support.
 b) EC countries: 1981-1986; EFTA countries: 1984-1987.
 c) Excluding Austria.

Source: Commission of the European Communities (1989), EFTA Secretariat (1988),
 OECD Annual National Accounts.

16.11.89

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