

Essays on the Political Economy
of Industrial Policy



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Essays on the Political Economy
of Industrial Policy

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1. INTRODUCTION AND SUMMARY OF THE THESIS

1.1 INTRODUCTION

Unemployment and/or slow economic growth nationally and in poorer regions are two problems which political decision makers often refer to when they argue for the need to grant different producer subsidies to firms. Moreover, it is often asserted that the problems are due to different market failures. However, as Stiglitz (1988, p. 83) has argued: "The popularity of the market-failure approach has caused many programs to be justified in terms of market failures. But this may simply be the rhetoric. There is often a significant difference between the stated objective of a program (to remedy some market failure) and the design of the program. ... One may gain more insight into the political forces at work and the true objectives of the programs by looking at how the programs are designed and implemented than by looking at the stated objectives of the legislation". In this thesis I will empirically examine the effects of various government interventions in Sweden during the last decades.

Although the general question of interest is the role of government in a market economy, the focus of the thesis has been narrowed to an in-depth study of Swedish industrial and regional policy subsidies, in order to make the research problem

more manageable. Industrial and regional policies are examples of government interventions which are normally justified by market-failure arguments, and a detailed study of these policy areas can give valuable information about other government interventions as well. However, it is interesting to examine, industrial and regional policies for other reasons as well. One is of course that these types of supports to the corporate sector have become increasingly important in many countries, not least in the EU, over time.¹ A second reason is the growing literature on the economics of location, which directly or indirectly suggests different policy measures based on market failure arguments. Our study might also be relevant for the development literature and the discussion about the effects of foreign aid.²

The thesis consists of four essays which examine different aspects of interventionistic policy and political decision making from the perspective of market failure vs. government failure. The first essay analyses how Swedish regional policy, which was introduced in the late 1960s, has affected economic growth in supported areas. The second essay examines the support-granting process and the allocation of subsidies from an interest-group perspective by asking the question: Are public subsidies granted to firms in a way which might be justified from a market-failure perspective, or are subsidies granted to politically influential firms? The last two essays study the effects of public capital subsidies on productivity growth and employment creation respectively. All four essays are

¹ See EU (1995) and OECD (1996) for overviews of the use of producer subsidies internationally, and e.g. Eriksson (1993) and Barkman & Fölster (1995) for overviews of the use of producer subsidies in Sweden.

² See e.g. Chapter 3 in Johansson (1998) for a discussion on the effects of foreign aid.

written in such a way that it should be possible to read them separately. This means that there will be some repetition.

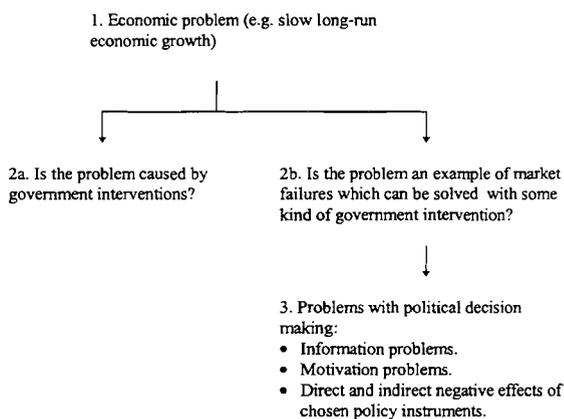
1.2 THE THEORETICAL FRAMEWORK

Government intervention might be Pareto sanctioned if market failures exist. A textbook example of this view is given by Boadway & Bruce (1991, p. 136) who argue that, "Public sector allocative policies can yield Pareto improvements in the presence of market failure, because of the government's power to extract involuntary payments from private agents. This permits the government to finance productive activities which would not break even at Pareto optimal prices and/or levy corrective taxes and subsidies. The government can also regulate economic activities directly." However, because political decision making is not unproblematic it is, for several reasons, uncertain if government interventions will lead to improvements.

Figure 1 illustrates some of the basic problems which are related to political decision making. An important industrial policy objective in most countries is to increase economic growth nationally, as well as in backward regions, so let us use this variable to exemplify the approach of this thesis (1). If economic growth is slow this might have several explanations. It might, on the one hand, have to do with different forms of government intervention (2a). For example, long-run growth might be affected negatively by government consumption which crowds out more productive private consumption and investments, by taxation of human capital

investments, regulations which constrain competition, and political instability. If any of these factors are important, then the policy implication is to decrease government intervention rather than increase it. On the other hand, slow economic growth might also have to do with externalities, public goods, and other market failures (2b). If this is the case, some kind of intervention might be motivated.

Figure 1: Market failure and government failure



Government intervention is not unproblematic however. One critique that has been raised against the market failure government intervention paradigm is that it is incorrect to suggest different types of government interventions in order to correct market failures when the suggestions are based on a comparison of real world markets with an idealised and unattainable neo-classical perfect market.³

³Dahlman (1979, reprinted in Cowen, 1988, p. 223) argues, “The point is that it is a logical fallacy to use as a frame of reference a world in which transaction costs are zero, for that world is unattainable, it is clearly incorrect to use it as a frame of reference in judging the welfare implications of actions in our own world with its inherent and unavoidable transaction costs”.

Another critique is that several well known examples of market failures do not exist. For example, Cheung (1973) shows that the market handles positive externalities between apple growers and bee-keepers very efficiently. Both explicit and implicit contractual arrangements compensate the bee-keepers so that the externality problems are largely overcome. Similarly, Coase (1974) has argued that the lighthouse, which is often seen as a public good which the market will not be able to produce, can be privately financed and efficiently run, as the private British lighthouses in the eighteenth century illustrate.⁴

Given that a market failure exists and that some kind of intervention might be motivated, another problem is that it is assumed that the political decision makers and the bureaucrats are well informed maximisers of a social welfare function and that their only interest is to correct market failures in the best possible way. This view of political decision making is, for several reasons, unrealistic (3).⁵

First, policy makers might not have enough information to correct a market failure optimally. Hayek (1945) has argued that central decision making is inefficient compared with decentralised decision making on the market, due to a lack of information. Therefore, attempts by political decision makers to e.g. create growth by steering the economy into one or the other direction will probably not succeed,

⁴ See also Cowen (1988), Liebowitz & Margolis (1990), and Foldvary (1994) for essays on the theme that markets can often handle "market failures".

⁵ For a general critique of this approach, see Dahlman (1979). He argues that it is incorrect to assert that government should intervene when markets seem to fail, because this policy recommendation

because the relevant information needed centrally to make good decisions is difficult to collect. And problems with asymmetric information are not only relevant between buyers and sellers on the market, but also between e.g. political decision makers and support seeking firms. Firms may overstate the need for support and they may not reveal all relevant information, which means that the support-granting authorities will base their decisions on incomplete and perhaps false information.

Second, political decisions might be sub-optimal, from an economic point of view, because the actors involved in the political decision process maximise other objectives than a social welfare function. Politicians and political parties might be more interested in maximising the number of votes and favouring influential interest groups, and bureaucrats might be more interested in maximising their budgets (see Mueller, 1997 for an overview of public choice theories).

Third, chosen policy instruments may give rise to several negative side-effects. Three producer subsidy examples are: (i) tax-financing of the subsidies gives rise to dead-weight losses, (ii) the possibility of being granted a subsidy might give potential recipients an incentive to invest in lobbying and other costly rent-seeking activities instead of other more productive activities (see e.g. Baumol, 1990), and (iii) subsidies, which ease the competitive pressure on the favoured firms and which make it less likely that a firm will be liquidated, might lead to a rise in technical (X-) inefficiencies (see Leibenstein, 1966, and Schmidt, 1991).

implicitly rests on the assumption that the government can handle the failure better than the

In sum, because governments might fail and because producer subsidies and other policy instruments might give rise to negative side-effects, government intervention in the market process might not lead to an improvement, even if market failures exist.

This thesis focuses on Swedish industrial policy, and especially on an important part of this type of policy, namely regional policy. Both regional policy and industrial policy are policy areas which are partly motivated by market failure arguments. However, the focus of the study is not on whether market failures, which are often motivating different policies, exist or not. Likewise, it does not examine whether the economic problems experienced by some regions and firms in the targeted regions are caused by other government interventions. Instead, the emphasis is on the allocation and effects of industrial and regional policy subsidies. In other words, are subsidies allocated to firms in a way which might be justified from a market failure perspective and are the subsidies effective in the sense that important objectives are realised, such as increased economic growth in targeted areas, increased productivity growth and increased employment in firms which have been granted subsidies?

1.3 OUTLINE OF THE THESIS

A more active regional and industrial policy was introduced in Sweden in the late 1960s, a period when the demand for labour was very high in the south of Sweden, due to a rapid expansion of both industry and the public sector. In the northern regions, however, rationalisation primarily in agriculture and in the forestry industry led to a surplus of labour. As a consequence, thousands of people migrated annually from the north to the south. To create more jobs and higher economic growth in the north, i.e. to create a better regional balance, the government decided to introduce a regional policy program. The main objective of Swedish regional policy since then has been to maintain and increase employment and growth in the northern regions, especially in the so called support areas.⁶

Basically, two types of support have been granted: the general ones (e.g. lowered employer fees and employment support) which are granted to all firms that operate in the support areas, and the selective ones (e.g. localisation subsidies and loans, different types of development support, support to sparsely populated areas, and loans to investment firms), which the firms must apply for.⁷ Totally about 1.7 billion SEK have been granted annually in the 1980s and early 1990s, see Table 1.⁸

⁶ It should be noted that the relative importance of the two objectives have changed over time. In the 1970s unemployment was the number one objective. Since the middle of the 1980s economic growth has become increasingly important. See NUTEK 1993:43 for a description of the support areas or Figure A1 in Appendix 1 in essay 2.

⁷ See SOU 1996:69, NUTEK 1993:43 and essays 1-4 for more detailed descriptions of the different types of support that are granted to industry in the support areas.

⁸ The emphasis in the thesis is on the regional policy supports. However, other government expenditures are also important from a regional perspective. In Essay 1 the allocations of all government expenditures are examined.

Table 1. Regional policy support to industry 1975-1991. M.SEK (1994 prices)

	Selective supports			General supports			Total ^a	Annually ^a
	Localisation loan	Localisation support	Developm. support	Empl. support	Lowered employer fees	Transport support		
1975-81	10,596	2,718	84	1,230	0	2,132	6,164	881
1982-91	2,894	6,552	1,056	2,104	4,381	3,044	17,136	1,714
Sum	13,490	9,270	1,140	3,334	4,381	5,176	23,299	1,371

^a Localisation loans excluded.

Source: NUTEK 1993:43

To examine different aspects of Swedish regional policy, two questions are addressed: (i) What would have happened if no regional policy supports had been granted? and (ii) What characterises firms which are granted subsidies compared with randomly chosen non-supported firms? To answer these questions, two datasets have been created. In the first essay, which examines whether average per capita income, at the county level, between 1945 and 1990, has been significantly affected by different regional policy supports, data on average per capita income at the county level have been collected from the tax authorities. The analysis in this chapter focuses on selective subsidies that have been granted since 1970 and the allocation across counties of all government expenditures. The data on the allocation of selective regional policy subsidies among counties have been provided by NUTEK (The Swedish Industrial Board for Industrial and Technical Development), which is the authority that monitors regional policy. The data on the allocation of all government expenditures come from an official investigation. Other information used in this chapter has been collected from Statistics Sweden.

In the last three essays, the focus is on selective subsidies. We compare the performance of supported and non-supported firms. Information from NUTEK

has helped us to identify a large group of Swedish firms which received selective subsidies. A control group has then been drawn from UC AB, a credit report firm that collects annual reports from every Swedish firm. The firms in the control group, which have been randomly collected from the entire population of firms in Sweden, have not received any regional policy subsidies between 1980 and 1995.

Essay 1: Regional policy and convergence of real per capita income among Swedish counties

Proponents of regional policy often argue that an important role for the government is to hinder divergence in per capita income among regions. According to the agglomeration argument, more populated regions with larger markets tend to grow faster because of location advantages such as the availability of skilled workers, more technological knowledge, the possibility for firms to specialise to a larger extent, and because of migration of the most highly skilled workers of the labour force from lagging regions. To hinder this process, it is suggested that different types of subsidies should be granted to firms located in the lagging regions or to firms which move to such regions.

However, it is not certain that regions automatically diverge in per capita income. In the growth literature, several forces that work in the opposite direction have been suggested. Some important ones include: (i) the neo-classical prediction that poorer and less capital intensive regions will attract more capital, (ii) increased demand for imports from richer regions, (iii) diffusion of technology, (iv) and

diseconomies of location associated with over-congestion in rapidly growing centres. Empirically, it seems (in the industrialised countries) as if per capita incomes between regions tend to converge over time: poorer regions seem to grow faster than rich ones.

The fact that per capita incomes among regions tend to converge suggests that forces which lead to convergence have been more important than forces which lead to divergence in per capita income. It also possibly suggests that different types of regional policies have contributed to the process of convergence. However, for several reasons, it is not certain that political interventions will lead to a long-run improvement in the growth of regional per capita income. Theoretically, it is not certain that resources will be allocated such that long-run growth improves, and empirically a number of studies suggest that regional policy initiatives and other government interventions have not significantly affected the process of convergence (see e.g. Sala-i-Martin, 1996).

The purpose of Essay 1 is to study whether Swedish regional policy, which was introduced around 1970, has significantly affected the process of growth of per capita income in Swedish counties. The analysis examines four questions: Do Swedish counties diverge or converge in per capita income after 1945? Do the so called support areas grow faster after 1970 compared with the preceding period, 1945-1970? Does the selective regional policy support affect regional growth rates? How does the overall allocation of *all* government expenditures affect the process of economic growth? The main results of the study are: (a) Swedish counties have

converged in per capita income after 1945, (b) Per capita income in the support areas has not grown significantly faster than in other regions after 1970, and (c) Neither selective regional policy support, which constitutes an important part of regional policy, nor the allocation of other government expenditures, has a significant effect on the regional growth rates in per capita income.

Essay 2: Characteristics of Government supported firms

Although the Swedish government argues that the regional policy support (as well as other subsidies to industry) should primarily be transferred to firms which have problems in financing profitable investments privately, it is unclear whether or not the support is in fact allocated to this type of firms. One reason for this is that the support-granting authorities might lack relevant information. Another reason is the motivation problem. Politicians and lower level administrators may not be interested in granting subsidies to firms which, from an economic point of view, are the ones who should receive the subsidies. Because it is rational for voters to be ignorant about the details of politics various interest groups, both firms and trade unions, might have incentives to try to influence the outcome of the political decision process to their own benefit. Hence, subsidies might be transferred to the most politically influential firms and not to the firms which are really in need of subsidies.

To examine how regional policy subsidies are allocated and to examine the characteristics of recipient firms, we contrast firms that received subsidies in 1989

or 1992 with firms that did not. The comparison (logit-models are estimated and interpreted) shows that larger firms are more likely to receive support than smaller ones. Supported firms also tend to belong to industries that are important to a region, and to declining industries. Compared with the non-supported firms, the supported ones did not have any severe economic problems in the year when the subsidies were granted. Moreover, because the two types of firms have equal amounts of debt, it seems as if historically the supported firms have managed to finance investments externally. The results suggest that subsidies are not allocated to firms that lack capital. Thus, to some extent, the allocation of subsidies seems to be explained by lobbying activities.

Essay 3: Capital subsidies and the performance of firms

An important long-run objective of regional policy is to increase economic growth in backward areas. Policy instruments used in Sweden for this purpose include different types of selective subsidy, either to firms located in the support areas or to firms that relocate their production to such areas. Although support of this kind can lead to capital investments and hence growth in backward regions, it is questionable whether or not it affects productivity. Productivity is important, because of its implications for long-run economic growth of the whole economy. From a productivity perspective, subsidisation may be justified for at least two reasons. One is, if the subsidy helps to advance the technological development of the recipient firms. Another is, if a subsidy can help firms to better utilise economies of scale, and in that way to increase productivity.

However, the use of producer subsidies is not unproblematic. Due to lack of information, it might be difficult for the support-granting authorities to select the best projects. Moreover, special-interest groups might reduce the rate at which resources are reallocated from one activity to another and thereby delay the process of structural transformation (Olson, 1982). In addition to this, subsidies can provide entrepreneurs with incentives to invest more of their time, talent and resources in unproductive activities such as lobbying (see Baumol, 1991, and Tollison, 1997). Finally, producer subsidies might give rise to inefficiencies, not only because the recipient firms might choose a sub-optimal mix of labour and capital, but also because such support might help firms to avoid bankruptcy, which in turn might make the management less motivated to minimise costs (see e.g. Schmidt, 1991).

How government subsidies affect total factor productivity (TFP) growth is studied in the third essay. We compare TFP growth during seven years in supported and non-supported firms, using a production function approach. The results suggest that subsidisation increases investments and total output, but lowers productivity. That is, growth through subsidies has been achieved simply by using more inputs, but not by improving on their usage.

Essay 4. Do capital subsidies to firms increase employment?⁹

Another important objective of Swedish regional policy is to increase employment in backward regions, and the fourth essay examines whether capital subsidies to firms constitute an efficient way to reach this goal. For many reasons, it is not certain that capital subsidies represent the correct approach. If, for instance, the subsidies are financed via increased corporate taxes, the financing of the support might destroy jobs in other firms, with none or negative effects on total employment. That could also happen if subsidised firms use the subsidy to lower prices and outcompete other firms.

We examine the employment effects of capital subsidies in Sweden by comparing the performance of manufacturing firms that have been granted regional policy subsidies with a sample of firms that have not. The result of the study shows that no direct employment effects can be observed.

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⁹ This essay should be treated as an appendix to Essay 3, rather than a separate study, since there is a lot of overlap. However, since it has been accepted for publication in a conference volume (see

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2. REGIONAL POLICY AND CONVERGENCE OF REAL PER CAPITA INCOME AMONG SWEDISH COUNTIES

2.1 INTRODUCTION

To increase growth of real per capita income in poorer regions, governments all over the world grant different types of support to industry in backward regions.¹⁰

To motivate the subsidies, it is often argued that the government must intervene, because in a market economy, firms tend to invest more in central regions than in the periphery, and as a consequence, regional inequalities tend to increase over time.¹¹

The purpose of this paper is to examine regional growth in Sweden and the role of regional policy there. We are interested both in whether this government policy has been motivated or not (does per capita income per capita among Swedish regions

¹⁰ In 1994 the EU granted 26 Billion ECU via the structural funds (see EU, 1995a, and Jones, 1996). In addition to the structural funds, the European Commission reports that in 12 European countries in 1992 about 94 Billion ECU were transferred nationally to industry (see EU, 1995b). These supports can to a large extent be considered as regional policy aid.

¹¹ For example, the European Investment Bank claims, "At times of weak economic performance there would, without corrective mechanisms, be a tendency for capital investment and hence growth and employment within a unified economic area to gravitate largely towards the most prosperous regions. This is relevant to Europe, where two thirds of the regions accounting for 50% of its population still have a below-average per capita product. ... That is why, in accordance with its primary remit, the EIB devotes on average more than two thirds of its financing to the development of regions facing structural or industrial redevelopment problems. Such operations interlink with grants from the Structural Funds managed by the European Commission in a

really tend to diverge over time?) and in the effects of regional policy. We focus on Sweden for two reasons. Detailed studies of the effects of Swedish regional policy subsidies indicate that these instruments have been relatively inefficient¹², and therefore a study that examines whether or not an important long-term objective of regional policy has been reached, seems to be motivated. Second, because different regional policies that have been employed in Sweden for a long time are now also becoming increasingly important in the EU, studies of the Swedish experiences can yield some information that might be useful for EU policy makers.

Our empirical analysis focuses on both gross convergence (or σ -convergence) and explained convergence (or β -convergence) of average real per capita income across Swedish counties (see Baumol, Nelson & Wolff, 1994, Sala-i-Martin, 1996, and Section 3 below for methods). To examine what role regional policy has played in this process, we first check for other factors that might affect the process of convergence, and then test whether real per capita income in the supported counties has grown faster than real per capita income in the non-supported counties. In addition, we evaluate how selective regional policy instruments, which constitute an important part of Swedish regional policy, and the regional allocation of general public expenditures have affected the rate of convergence among counties.

mutually reinforcing way.” (From the homepage of the European Investment Bank, <http://www.eib.org/obj/dev.htm>, 1 August, 1997).

¹² Bohm & Lind (1988) find that regional policy subsidies do not affect employment in the targeted regions and firms. Similar results are presented below in Chapter 5. Chapter 4 finds that firms which are granted regional policy capital subsidies become less productive over time compared with non-subsidised firms.

The remainder of the paper is organised as follows. Section 2 gives a background of the idea of convergence of real per capita income among regions and the role of regional policy, along with a short presentation of Swedish regional policy. The data set, how to examine convergence, and how to assess the role of regional policy are discussed in Section 3. Section 4 presents the empirical results, and Section 5 summarises and concludes.

2.2 BACKGROUND

2.2.1 Convergence and regional policy

In the literature on regional economics, one line of research argues that various forms of market failure give rise to persistent (and even increasing) differences in per capita income (and output) between regions (see e.g. Krugman, 1991). For example, economies of scale and location advantages associated with easy access to large markets, skilled labour and technological knowledge, in combination with migration of the most highly skilled members of the labour force from the lagging regions, might lead to growing polarisation between different regions. By granting e.g. subsidies to firms located in the backward regions or to firms which relocate to the backward regions, the government can affect regional growth rates in two ways. First, via an increase of investments and/or an increase of labour, and second, via an increase of productivity. The latter effect might occur if the subsidies, for example, help the firms to advance their technological development and/or help them to better utilise economies of scale.

However, it is not clear whether regions tend to diverge in per capita income over time. The neo-classical prediction is that poorer countries and regions, per capita income should grow faster than richer in areas (the so called convergence hypothesis). Migration of labour with low human capital from poor to rich regions tends to increase wages in regions of departure, and vice versa in regions of destination.¹³ Furthermore, increased demand for imports, the diffusion of technology, and diseconomies of location associated with over-congestion in rapidly growing centres might give rise to spread effects which peripheral regions might benefit from. That is to say, regions would then tend to converge over time.¹⁴

Empirically, it looks as though poorer regions grow faster than richer ones. Several studies have found that in the industrialised part of the world, GDPs per capita tend to converge, i.e. dispersion among economies decreases over time. For example, Sala-i-Martin (1996) found that in the US, the dispersion of real per capita income between states dropped during the 20th century. Similar results have been reported for European regions and for Japanese regions (see Sala-i-Martin, 1996, Armstrong, 1995, and Neven & Gouyette, 1995). Persson (1997) also found that real per capita income in Swedish counties has converged since the 1910s.

The fact that regions seem to converge, rather than diverge, suggests that forces which lead to convergence are stronger than forces that lead to divergence. But it

¹³ See e.g. Barro & Sala-i-Martin (1995, Chs. 1 and 9).

¹⁴ See e.g. Tsoukalis (1993) for a further discussion about divergence and convergence among regions.

might also suggest that different regional policies have been successful in the sense that, for example, they have hindered the migration of highly productive workers, improved the human capital of the workforce, and led to an increase of productive investments in the targeted regions. A study of the impact of the European regional development fund (ERDF) and of public investment in infrastructure and education on income levels across Spanish regions by de la Fuente and Vives (1995) gives some support for this idea. However, several other studies conclude that regional policies are inefficient. For example, Faini argues that despite massive regional policy supports, Mezzogiorno in the south of Italy is still a relatively backward region of Europe.¹⁵ Sala-i-Martin (1996) finds that government expenditures are not correlated with the overall process of regional convergence either in Europe or in the US. Fagerberg & Verspagen (1996) find that EU support for R&D in the 1980s seems to be ineffective in the sense that the policies do not explain the rate of regional growth. In a study by the EU, firms in declining regions and in control regions in six Member States were asked to rank the importance of regional policy as a factor affecting a region's competitiveness for the location of firms. The study showed that the firms (in most regions) considered the regional incentives to be relatively unimportant compared to other factors (see Armstrong et al, 1997).

There are several possible explanations for why regional policies might turn out to be ineffective. Resources might be allocated sub-optimally, because bureaucrats as well as political decision makers do not have enough information to allocate resources efficiently (see Lavoie, 1985). Hillman (1982), Burton (1983), and Magee

¹⁵ See discussion in de la Fuente & Vives (1995).

(1997) argue that firms with economic problems are more likely to be successful in the political decision process, and as a consequence, public interventions (regulations and different types of subsidy) tend to slow down the process of structural adjustment.¹⁶ Moreover, because the existence of directly unproductive activities, such as lobbying, are positively related to the size of the government transfers, potential recipients of subsidies will have an incentive to invest in unproductive rent-seeking activities instead of more productive activities like R&D (see e.g. Baumol, 1990, and Tollison, 1997). A related problem with subsidisation is that it might make firms less productive in the sense that given inputs become less efficiently used, i.e. technical (X-) inefficiencies occur. One possible explanation for why X-inefficiencies might occur is if the subsidies help the supported firms to avoid bankruptcy. Because the subsidies give the firms extra “breathing-space”, they are not forced to re-organise their activities and improve their performance to the same extent as non-supported firms, which have severe economic problems.¹⁷

Different types of support might also counteract each other. For example, in Sweden different types of employment support give firms in the support areas an incentive to substitute labour for capital, while the localisation support, which is above all a capital support, gives the firms an incentive to substitute capital for

¹⁶ Olson (1982, pp. 63) argues: “Special-interest groups also slow growth by reducing the rate at which resources are reallocated from one activity or industry to another in response to new technologies or conditions. One obvious way in which they do so is by lobbying for bail-outs of failing firms, thereby delaying or preventing the shift of resources to areas where they would have a greater productivity”

¹⁷ Schmidt (1991) shows, among other things, that the managements of firms that are more likely to be liquidated have an incentive to work harder for cost reductions in order to avoid liquidation. See also Burton (1983, p.44) for a discussion along these lines. Similarly Dahmén (1998) argues that if a firm’s profits and liquidity improve “It cannot be ruled out that efforts expended on finding ways to

labour. The supports might also be too small to affect the overall development in a targeted region. Finally, direct regional policy supports might be relatively small compared with total government expenditures, and total government expenditures might affect regional growth negatively.¹⁸

2.2.2 Regional policy in Sweden

In the 1960s, a lot of people migrated from the northern parts of Sweden to the south. To mitigate this development to some extent and to make it possible for more people to live and work in the northern regions, the Social Democratic government decided to try to create new jobs more actively and to modernise industry in the northern regions.¹⁹ To reach this objective, a regional policy program was introduced in the second half of the 1960s. Since then, an important part of regional policy has consisted of different types of support that have been granted to industry in the support areas.²⁰

Basically, two types of support are granted. The general ones (e.g. lowered employer fees, employment supports, and transport support) are granted to all firms in the support areas. The other types of support are the selective ones (e.g.

something new can seem less urgent, and those measures which the transformation pressure calls forth are postponed", (p.70).

¹⁸ Government expenditures might have growth enhancing effects if they help to correct market failure problems such as collective goods and externalities. However, the distortionary effects of taxation and the risk that public low-productive activities crowd out more productive private investments might affect growth negatively. Empirically, it seems as if government consumption, especially among rich countries, influences economic growth negatively, see e.g. Barro (1996) and Fölster & Henrekson (1998).

localisation subsidies and loans, and different types of development support) which firms must apply for.²¹ In order to receive several of these supports, firms must invest in machines and buildings and promise to increase the number of employees.²²

The support areas are divided into three types. Support areas 1 and 2 basically consist of counties in the north and north-west of Sweden, while the third category, the temporary support areas, primarily consists of some areas along the coast of Norrland in the north and some areas in the south of Sweden. In addition to this there is the so called transport-support area, which covers the northern parts of Sweden (see NUTEK 1993:43).

Table 1 reports the use of regional policy support between 1975 and 1991. Since 1975, about 23.3 billion SEK (1994 prices) have been transferred as direct grants to firms and an additional 13.5 billion as favourable loans. The table also suggests that regional policy has become increasingly important since the 1970s. Table 2 reports the allocation of supports across the support areas. Most direct grants have been granted to support area 1.

¹⁹ This section is based primarily on SOU 1984:74, SOU 1996:69, SFS 1990:642 and NUTEK 1993:43 and 44.

²⁰ See NUTEK 1993:43 for a description of the support areas, and Figure A1 in the Appendix.

²¹ See SOU 1996:69 and NUTEK 1993:43 for more detailed descriptions of the different types of support that are granted to industry in the support areas.

²² See NUTEK 1993:43.

Table 1. Regional policy support to industry 1975-1991. M.SEK (1994 prices)

	Selective supports			General supports			Total ^a	Annually ^a
	Localisation loan	Localisation support	Developm. support	Empl. support	Lowered employer fees	Transport support		
1975-81	10,596	2,718	84	1,230	0	2,132	6,164	881
1982-91	2,894	6,552	1,056	2,104	4,381	3,044	17,136	1,714
Sum	13,490	9,270	1,140	3,334	4,381	5,176	23,299	1,371

^a Localisation loans excluded.

Source: NUTEK 1993:43

Table 2. Geographical dispersion of regional supports. M.SEK (1994 prices)^a

	Support area 1	Support area 2	Temporary support area	Outside	Total	Annual
1975-81	1,709	1,664	758	2,032	6,164	881
1982-91	5,970	3,787	1,428	5,950	17,136	1,714
sum	7,680	5,451	2,186	7,982	23,299	1,371

^a Localisation loans excluded.

Source: NUTEK 1993:43.

In addition to the regional policy supports, the allocation of central government expenditures is re-distributive between support areas and non-support areas. Table 3 reports the allocation of *all* central government expenditures between support areas and non-support areas for one fiscal year. Per capita expenditures are higher in support area 1 than in the other areas. For support areas 2 and 3, per capita expenditures are less than in the non-support areas and in support area 1.²³

Table 3. Allocation of all government expenditures in 1985 (1994 Prices)

Area ^a	Total (M.SEK)	Per capita (SEK)
Non-support areas	382,412	66,092
Support area 1	52,575	81,924
Support area 2	93,383	60,589
Support area 3	24,332	62,527
Total	552,702	66,127

Source: SOU 1989:65, Encl. 1. Table 3 and own calculations.

^a Support area 1 consists of the the following counties: Jämtland, Norrbotten and Västerbotten. Support area 2 consists of Älvsborg, Gävleborg, Kopparberg, Värmland and Västernorrland. Support area 3 consists of the counties of Blekinge and Kalmar (see NUTEK 1993:43 for a detailed description of the support areas).

²³ See also NUTEK (1994) for a similar description of the overall allocation of government expenditures among counties for the fiscal year of 1991-92.

2.3 DOES REGIONAL POLICY IN SWEDEN WORK?

2.3.1 The empirical framework

As Baumol, Nelson & Wolff (1994) discuss, the concept of convergence has been used to mean different things. The focus of this paper is on two concepts: gross convergence and explained convergence. Gross (or unconditional) convergence means that if the coefficient of variation for some variable (e.g. real per capita income) decreases over time, then the studied regions have converged. If per capita income in all regions has increased, then convergence, in this sense, means that the poorer ones have grown faster than the initially richer ones. In effect, this concept describes how the income dispersion among regions evolves over time.

To study gross convergence of real per capita income among regions empirically, the standard deviation of the log of real per capita income among regions for various years can be used (see Sala-i-Martin, 1996). If the standard deviation is used, gross convergence is also called σ -convergence.

Because gross convergence is the result of several factors, it is not an especially good measure to use if one wants to examine the regional growth effects of specific policies. The policies examined might have led to faster gross convergence, but might also have hindered gross convergence. Therefore, a better concept for this

purpose is β -convergence (or explained convergence or conditional convergence). β -convergence measures if poor regions grow faster than richer ones, keeping all other relevant variables constant. That is to say, one tries to isolate the influence that different factors might have on the process of convergence among regions. To examine β -convergence, Sala-i-Martin (1996) suggests that the following non-linear model should be estimated,²⁴

$$\frac{1}{T} \log\left(\frac{y_{i,t}}{y_{i,t-T}}\right) = a - \left(\frac{1 - e^{-\beta T}}{T}\right) \cdot \log(y_{i,t-T}) + \text{"other variables"} + u_i$$

where $y_{i,t}$ is real per capita income in region i at time t , T is the length of the interval, a is the intercept, β is the rate of convergence parameter, and u_i is the disturbance term. If regions with initially lower real per capita income, $y_{i,t-T}$, grow faster than regions with higher real per capita income, then $\beta > 0$. The non-linear expression reflects the fact that if there is convergence, poorer regions grow faster than richer ones.

The inclusion of "other variables" in the expression above recognises that variables other than the relative backwardness of regions can help to explain the process of convergence. Several studies include measures of the relative proportion of employees in agriculture and in industry to control for sectoral shocks that affect

²⁴ The model that we use and similar ones have been used in several studies to examine convergence across countries and regions and to examine factors that affect the process of convergence. An advantage of this model is that it can be related to the transitional growth process in a neoclassical model, see e.g. Barro & Sala-i-Martin (1991, 1995). However, other models are also possible. For

the process of growth (see e.g. Sala-i-Martin, 1996, Fagerberg & Verspagen, 1996, and Armstrong, 1995). If labour is mobile, migration of labour with low human capital from poor to rich counties, and vice versa, tends to speed up the process of convergence. To control for this effect several studies include measures of net migration (see e.g. Persson, 1997, and Barro & Sala-i-Martin, 1991).

The inclusion of other variables can also be used to examine whether different policy variables influence the process of convergence. For example, Fagerberg & Verspagen (1996) include measures of EU-sponsored R&D projects. Others include, for example, measures of public spending on education, foreign exchange distortions and measures of political stability (see Barro & Sala-i-Martin, 1995).

2.3.2 Convergence of real per capita income among Swedish counties

To examine income convergence among Swedish regions, data on real per capita income for 24 Swedish counties for the years 1945, 1970, and 1990 are used. The development during the whole post-war period is examined because income convergence is a relatively slow process. The period examined has been split into two sub-periods, because we want to examine if active regional policy, which was introduced at the end of the 1960s and in the early 1970s, affects the process of convergence after 1970 (see below for a further discussion). Because the income data

example, given that countries and regions do not have a steady state growth path, an alternative approach is to estimate convergence as a Markov process, see Neven & Gouyette (1995).

that are used do not include taxable transfers for 1945 and 1970, but include taxable transfers for the 1990 observation, the 1990 observation is biased. An important part of the taxable transfers consists of unemployment benefits. In 1990 unemployment was low in the whole country and consequently the taxable transfers did not have any major effect on the income measure. Although the choice of 1990 as the final year to a large extent solves the problem with unemployment benefits, the measure is not perfect, because pension benefits are included. If the support counties, for example, get more pensioners over time, then the measure will be biased. The national consumer price index has been employed to deflate GDP/capita.²⁵ See Appendix Table A1 for a detailed description of the data.

To control for sectoral shocks that affect growth in the short run, we follow Sala-i-Martin (1996) and include measures of the relative proportions of employees in agriculture and in industry for various years (AGR45, AGR70, IND45, and IND70). Another variable which might affect the process of convergence and which has been discussed in the literature is migration across regions (see Barro & Sala-i-Martin, 1995, Ch. 9). To control for effects of migration, measures of the average annual net migration rate into county i between time $t-T$ and t are included (MIGR4570 and MIGR7090).

To test if the support counties have grown faster than they would have done if they had not been defined as support areas is a counterfactual problem. To solve this

²⁵ Persson (1997), who has examined convergence among Swedish counties between 1906 and 1993, has employed both national and regional consumer price indices. His choice of price index does not affect his results.

problem one would, ideally, have liked to construct an experiment where similar supported and non-supported counties were compared. Unfortunately, this type of experiment is almost impossible to set up, and instead another approach has been chosen.

First, to examine whether support areas have grown faster after regional policy became an important policy instrument around 1970, and also to test whether other types of measures that the government has used to affect regional growth rates have had an effect, a dummy variable has been included. The dummy takes on the value one for counties which belong to a support area and zero otherwise. The counties which have been defined as support counties are shown in Figure A1 in the Appendix.²⁶

To test if the support counties have grown faster or slower than other counties after an active regional policy program was introduced, i.e. after about 1970, one model is estimated for the period 1945 to 1970, model 1a, and one model for the period 1970 to 1990, model 1b.²⁷

²⁶ Because the support areas do not perfectly overlap the counties, some areas which do not belong to any of the support areas have been defined as support areas and vice versa, see Figure A1 in the Appendix. Counties which belong or have belonged to the temporary support areas are considered as non-support counties. Defining them as support counties would not alter the qualitative results of the present study.

²⁷ Because the error terms of the regressions might be related (a long lasting shock in the first period might affect growth in the following period), the regressions are estimated using the SUR technique. The SUR estimator is more efficient, because it takes account of the entire matrix of correlations of all of the equations, see e.g. Johnston (1984).

$$\frac{1}{25} \log\left(\frac{\text{INC70}_i}{\text{INC45}_i}\right) = a - \left(\frac{1 - e^{-\beta \cdot 25}}{25}\right) \cdot \log(\text{INC45}_i) + \delta_1 \cdot \text{AGR45}_i + \delta_2 \cdot \text{IND45}_i + \delta_3 \cdot \text{MIGR4570} + \gamma_1 \cdot \text{AREA}_i + u_i \quad (1a)$$

$$\frac{1}{20} \log\left(\frac{\text{INC90}_i}{\text{INC70}_i}\right) = a - \left(\frac{1 - e^{-\beta \cdot 20}}{20}\right) \cdot \log(\text{INC70}_i) + \delta_1 \cdot \text{AGR70}_i + \delta_2 \cdot \text{IND70}_i + \delta_3 \cdot \text{MIGR7090} + \phi_1 \cdot \text{AREA}_i + u_i \quad (1b)$$

If the AREA stability hypothesis, $H_0: \phi_1 = \gamma_1$, is rejected this implies that the support counties have, *ceteris paribus*, followed a different growth path than the non-support counties. For instance, if $\phi_1 > \gamma_1$ this implies that support counties have grown faster than other counties after 1970 and that it is probable that regional policies have had a positive effect. A potential problem with the hypothesis is that it tests if there are any changes in the absolute rate of economic growth between support and non-support counties before and after the regional policy program was introduced. If the average rate of growth is 15 percent in the first period and only 1 percent in the second period, then the hypothesis will not be rejected if e.g. the support counties grow 3% faster than the non-support counties both between 1945 and 1970 and between 1970 and 1990, although a 3% higher rate of economic growth is a relatively much higher growth rate in the latter period. However, as the results of the estimations will show, this is probably a minor problem.

Second, to assess whether the selective capital supports (direct subsidies and subsidised loans), which constitute an important part of regional policy, have had any effect on regional growth rates of real per capita income between 1970 and 1990 and to test how the regional allocation of total public expenditures affects regional growth rates, the following model is estimated.

$$\frac{1}{20} \log\left(\frac{INC90_i}{INC70_i}\right) = a - \left(\frac{1 - e^{-\beta \cdot 20}}{20}\right) \cdot \log(INC70_i) + \delta_1 \cdot AGR70_i + \delta_2 \cdot IND70_i + \delta_3 \cdot MIGR7090 + \delta_4 \cdot GVTEXP85_i + \delta_5 \cdot SUPPORT_i + u_i \quad (2)$$

where SUPPORT is real total selective regional policy support between 1970 and 1990 per capita and per county (1994 prices). If regions which have been granted supports have experienced a growth effect due to these supports, then $H_0: \delta_3 = 0$ will be rejected. To test how other government expenditures affect the regional growth rates, a variable which measures the allocation of all government expenditures for one fiscal year (1985) has also been included (GVTEXP85). Information about the allocation among counties of all government expenditures is not available before 1985; therefore we have to assume that the fiscal year of 1985 is a relatively good approximation of the allocation of all government expenditures among counties in the 1970s and 1980s. Consequently, the results must be interpreted carefully.

A problem with both the above approaches is that it is indirectly assumed that if the support counties had not been defined as support counties, then they would have followed the same process of convergence as non-support counties. However,

it might be the case that the support counties were defined as support areas because in the late 1960s, they experienced lower growth rates of per capita income than other areas, as well as other economic problems. If this was the case, then the tests that are used to examine the effects of regional policy would falsely reject the hypothesis that regional policy has had any effect on the growth of per capita income. To examine whether this is a problem or not, we compare different characteristics of the support counties and the non-support counties in the late 1960s using t-tests.

2.4 RESULTS

2.4.1 Sigma-convergence

Table 4 reports average real per capita income and the standard deviation of the log of real per capita income (σ -convergence). The table suggests that since 1945 real per capita income has increased in all counties (average income has increased from 25.9 thousand SEK to 152.4 thousand SEK). Furthermore, all counties have σ -converged (standard deviation has fallen from 0.187 to 0.054). For the support counties this means that average real per capita income has come closer to the income levels in the non-support areas. In 1945, the income level in the support counties was 84% of the income level in the non-support counties, and in 1990 it was about 98%. Figure 2 also illustrates the process of convergence. Counties with low average real per

capita income in 1945 and 1970 respectively have grown faster than counties with higher average real per capita income.

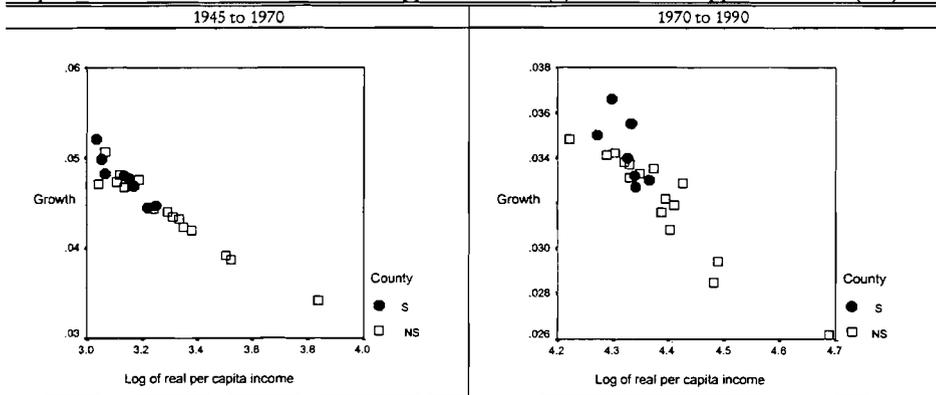
Table 4. Mean and dispersion among support- and non-support counties of real (1994 prices) per capita income in thousands of SEK

YEAR	All regions		Non supp. counties ^b	Support counties ^b
	Mean	σ -convergence ^a	Mean	Mean
1945	25.9	0.187	27.3	23.0
1970	79.2	0.092	80.9	75.7
1990	152.4	0.054	153.3	150.8

^a Standard deviation of log of real per capita income.

^b See Table A1 and Figure A1 in the Appendix for a definition of the support and the non-support counties.

Figure 2. Average annual real per capita income growth rate and log real (1994 prices) per capita income in thousands of SEK in support counties (S) and in non-support counties (NS)



2.4.2 Beta-convergence

If the support counties were defined as support areas because of low growth rates of per capita income in the late 1960s compared with other counties, then there is a risk that our tests of the effects of regional policy falsely reject the hypothesis that regional policy has affected the growth rates in the targeted counties. To examine whether this is a severe problem or not, Table 5 reports some t-tests of equality of

means for different characteristics of the support counties and for the non-support counties.

The table suggests that the per capita income grew faster in the support counties than in the non-support counties between 1965 and 1970, and that the average per capita income, in 1970, was slightly higher in the non-support counties. Compared with the non-support counties, the proportion of employees in agriculture fell more in the support counties. Finally, the change of population between 1965 and 1970 was negative in the support counties and positive in the non-support counties, that is to say, people moved from the support counties to the non-support counties. To summarise, it seems that growth of per capita income in the support counties is not lower (in fact higher) than in non-support counties. This means that there is little risk that we falsely reject the hypothesis that regional policy has not affected the regional growth rates in the support counties.

Table 5. T-tests for equality of means

Variables ^a	Description	Non-support counties Mean	Support counties Mean	t-value
INC70	Real per capita income, 1970 (K.SEK)	80.9	75.7	1.55
INC6570	Change of real per capita income, 1965-70 (%)	3.44	3.99	-2.16 ^b
AGR70	Proportion of employees in agriculture, 1970 (%)	8.96	9.95	-0.51
AGR6570	Change of Proportion of employees in agriculture, 1965-70 (%)	-3.58	-6.56	3.28 ^a
IND70	Proportion of employees in the industry, 1970 (%)	33.05	28.56	1.38
IND6570	Change of proportion of employees in the industry, 1965-70 (%)	1.35	1.29	0.07
POP6570	Change of population, 1965-70 (%)	4.83	-0.64	3.29 ^a

Note: ^a, ^b and ^c indicate significance at 1, 5 and 10 % respectively, using a two-tailed t-test.

* The variables are described in detail in Table A1 in the Appendix.

Table 6 reports the results of the regressions. Columns 1 and 2 present the results from model 1a, columns 3 and 4 the results from model 1b, and column 5 the results from the estimation of model 2. The table suggests that both the basic model

(Cols. 1 and 3) and the extended model (Cols. 2 and 4) explain the process of convergence relatively well (R^2_{adj} about 0.8-0.9). All Swedish counties have β -converged both between 1945 and 1970 and between 1970 and 1990. The speed of convergence is 3-3.5% per year in the basic model. The test of stability of the β -coefficients for the basic model suggests that there has been no changes in the process of convergence between the period 1945-1970 and 1970-1990.

Table 6. Real per capita income convergence and regional policy

Dependent variable: Average annual real per capita income growth rate.					
Model	1a		1b		2
Period	1945-70		1970-90		1970-90
Col.	1	2	3	4	5
Constant	0.113 ^a <i>31.81</i>	0.141 ^a <i>12.28</i>	0.141 ^a <i>14.53</i>	0.187 ^a <i>11.44</i>	0.190 ^a <i>8.04</i>
β	0.030 ^a <i>12.88</i>	0.047 ^a <i>4.95</i>	0.034 ^a <i>7.76</i>	0.057 ^a <i>5.21</i>	0.055 ^a <i>3.85</i>
AGR	-	-0.0001 ^b <i>-2.66</i>	-	-0.0003 ^a <i>-3.77</i>	-0.0003 ^a <i>-3.25</i>
IND	-	-0.0001 ^b <i>-2.71</i>	-	-8.88E-05 ^a <i>-3.65</i>	-0.0001 ^b <i>-2.29</i>
MIGRATION	-	0.146 ^c <i>1.72</i>	-	0.130 ^b <i>2.16</i>	0.057 <i>0.61</i>
AREA	-	0.001 ^b <i>2.15</i>	-	0.0002 <i>0.40</i>	-
GVTEXP85	-	-	-	-	-5.68E-05 <i>-1.60</i>
SUPPORT	-	-	-	-	2.49E-08 <i>0.59</i>
R^2 (R^2_{adj})	0.94 (0.93)	0.95 (0.94)	0.81 (0.80)	0.90 (0.87)	0.91 (0.88)
n	24	24	24	24	24
Test of β -stability	$\chi^2 = 1.51$	$\chi^2 = 0.77$			
Test of AREA-stability		$\chi^2 = 3.19$			

Note: t-statistics in italics. ^a, ^b and ^c indicate significance at 1, 5 and 10 % respectively, using a two-tailed test.

The regressions use non-linear regression to estimate the models. For models 1a and 1b the estimation method is SUR (see Johnston, 1984, pp. 337).

The test of β -stability tests (using a Wald-test) the hypothesis that the β in model 1a equals the β in model 1b. The test of AREA stability tests (using a Wald-test) whether the support counties follow a different convergence process after 1970, i.e. the hypothesis $H_0: \phi_1 = \gamma_1$ for model 1a and 1b.

Measures of the proportion of employees in agriculture and in industry to control for sectoral shocks, measures of net migration into county i to control for effects of labour mobility, and support county dummies to test if per capita income in the support counties grows faster after 1970, are included in the models in columns 2 and 4. Inclusion of the control variables in model 1a affects R^2_{adj} marginally. That is to say, convergence among counties before 1970 is, to a large extent, a function of the counties' initial per capita income. For the period after 1970, inclusion of the control variables is more important (R^2_{adj} increases from 0.80 to 0.87). Real per capita income in counties which are more dependent on agriculture and industry grows more slowly.

The results give no support for the idea, which was discussed in section 2.1 and which is often put forward in official motivations for different types of regional policy support, that regional per capita income tends to diverge over time. Instead, it seems as if regions converge, and that factors which lead to convergence of per capita income are more important than factors which lead to divergence.

Do regional policies work? Table 6 suggests that the support counties do not grow faster than other counties after 1970 (AREA is insignificant). The test of the AREA stability hypothesis, that is to say the test of the hypothesis $H_0: \phi = \gamma_1$, is not rejected at the 10 % level. The result indicates that, compared with the preceding period, support counties grow more slow after the introduction of a regional policy program.

In model 2 the role of selective regional policy supports granted to the industry and the role of government expenditures are tested. The result of the estimations suggests that counties which get more support per capita and where government expenditures are relatively more important do not converge faster than other counties (both SUPPORT and GVTEXP85 are insignificant).²⁸

The fact that targeted areas have not converged faster than non-support counties and selective regional policy support does not affect regional growth rates of per capita income suggests that regional policy has been ineffective in this sense.²⁹ As we argued in section 2.1, there are several possible explanations for why regional policy support may not affect the regional growth rates of per capita income. One explanation is probably that the supports are relatively small compared with other sources of financing and that it is only a minor number of firms that are granted support.

Does this mean that the government should increase the regional policy supports? That is not evident, but at least, the following costs should be seriously taken into consideration. First, more supports mean higher taxes, which give rise to dead-weight losses and which have a negative effect on the functioning of the market economy. That is to say, if convergence is reached at the price of lower overall long-term growth of per capita income, then regions might become more equal, but average per capita income for all inhabitants (even the ones living in the targeted

²⁸ Sala-i-Martin (1996) refers to similar results for the United States.

regions) will fall behind that of nations which experience higher growth of per capita income.³⁰ Second, more supports give potential recipients an incentive to invest more resources in unproductive activities such as lobbying. Third, subsidisation might also, as the results in Chapter 4 suggest, make the supported firms less productive over time.

2.5 SUMMARY

The purpose of this paper has been to examine if average per capita income in Swedish counties diverges or converges after 1945, and whether Swedish regional policy has affected the process of divergence/convergence of real per capita income among counties. By examining the divergence/convergence process before and after the point in time when regional policy was introduced, and by comparing targeted support areas with non-support areas, we have found that: (a) real per capita income for Swedish counties has converged since 1945, (b) targeted support counties have not grown faster than other counties after the introduction of the regional policy support program around 1970, (c) selective regional policy supports, which constitute an important part of Swedish regional policy, and government expenditures, do not affect the regional growth rates.

²⁹ However, the supports might have attained other objectives. They might for example have hindered migration from the support areas. Whether or not this and other objectives of regional policy have been reached are interesting questions for future research.

³⁰ An indication of the importance for all regions of the overall growth of per capita incomes in a country can be illustrated by the case of Sweden. In 1970 Sweden was the third richest country in the world. Since about 1970 Sweden has developed less well; in 1991 Sweden was the twelfth richest country and in 1993 Sweden ranked as number seventeen, see Henrekson (1996). That is to say, in 1970 Swedish counties belonged to the richest regions of the world but today, although they are more equal, they do not belong to the richest ones anymore.

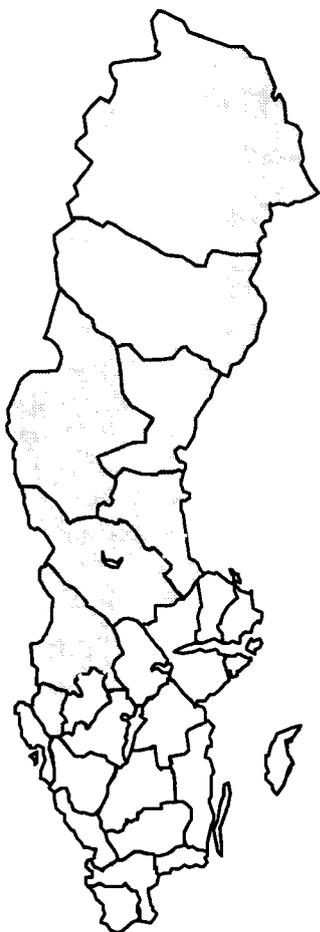
2.6 APPENDIX 1

Table A1. Description of variables

Variable	Description	Source
INC45	Average real (1994 prices) per capita income per county, 1945.	Tax Assessments 1946, Tab. 10, p. 79. ^a
INC70	Average real (1994 prices) per capita income per county, 1970.	Income and Wealth Statistics 1970, Tab. 18, p. 118. ^a
INC90	Average real (1994 prices) per capita income per county, 1979.	Statistical Abstract of Sweden, 1992, Tab. 229, p. 202. ^a
AGR45	Number of employees in agriculture as proportion of all employees, per county in 1945.	Tax Assessments 1946, Tab. 10. ^a
AGR70	Number of employees in agriculture as proportion of all employees, per county in 1970.	Income and Wealth Statistics 1970, Tab. 24. ^a
IND45	Number of employees in industry as proportion of all employees, per county in 1945.	Tax Assessments 1946, Tab. 10. ^a
IND70	Number of employees in industry as proportion of all employees, per county in 1970.	Income and Wealth Statistics 1970, Tab. 24. ^a
MIGR4570	Average annual net migration into county <i>i</i> between 1945 and 1970.	Vital statistics, various issues. ^a
MIGR7090	Average annual net migration into county <i>i</i> between 1970 and 1990.	Vital statistics, various issues. ^a
AREA	Dummy, 1 for the counties that largely belong to a support area (Jämtland, Norrbotten, Västerbotten, Älvsborg, Gävleborg, Kopparberg, Värmland, Västernorrland), 0 otherwise.	See NUTEK 1993:43 or Figure A1 below for a description of the support areas.
SUPPORT	Allocation among counties of selective regional policy supports between 1970 and 1990.	NUTEK
GVTEXP85	Allocation of all government expenditures among regions for the fiscal year of 1985/86.	SOU 1989:65, Encl. 1, Tab. 3.
Table 5 data		
INC6570	Change of real per capita income between 1965 and 1970 (%). (= ((INC70-INC65)/INC65)*100). INC65 is average real (1994 prices) per capita income per county in 1965.	INC70: see above. INC65: Tax Assessments and distribution of income and property, 1966. Tab. 18 Col. 10-11. ^a
AGR6570	Change of proportion of employees in agriculture between 1965 and 1970 (%). (= ((AGR70-AGR65)/AGR65)*100). AGR65 is number of employees in agriculture as proportion of all employees, per county in 1965.	AGR70: see above. AGR65: Tax Assessments and distribution of income and property, 1966. Tab. 17 Col. 5, 39. ^a
IND6570	Change of proportion of employees in the industry between 1965 and 1970 (%). (= ((IND70-IND65)/IND65)*100). IND65 is number of employees in the industry as proportion of all employees, per county in 1965.	IND70: see above. IND65: Tax Assessments and distribution of income and property, 1966. Tab. 17 Col. 13, 39. ^a
POP6570	Change of population, (%), 1965-1970.	Statistics Sweden.

^a Statistics Sweden

Figure A1. Support counties and support areas



Note: Shaded counties have been defined as support areas (Jämtland, Norrbotten, Västerbotten, Ålvsborg, Gävleborg, Kopparberg, Värmland, Västernorrland). Shaded areas below dotted lines in the southern part of the support area do not belong to support areas 1, 2 and/or the transport support area (see NUTEK 1993:43 for a more detailed description of the support areas).

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3. CHARACTERISTICS OF GOVERNMENT SUPPORTED FIRMS

3.1 INTRODUCTION

In Sweden as well as in other countries and in the EU, public subsidies have been granted to firms in order to increase or uphold growth and employment in regions which are lagging behind. To motivate the subsidies in Sweden, basically two arguments have been used. The first one is a social argument which says that the government should help firms with economic problems in order to uphold the level of employment in backward regions. This argument was especially important in Sweden during the economic crisis in the 1970s and early 1980s. The second argument, which is more important nowadays, says that it is the role of the government to reduce different market failures and especially to mitigate lack-of-capital problems that hinder profitable firms from investing in profitable projects (for a further discussion, see e.g. SOU 1996:69 and section 2 below).

Although the lack-of-capital argument might justify government interventions in industry, yet from the point of view of economic efficiency it is not clear, for at least two reasons, whether public resources will in fact be allocated to firms that have problems in raising enough capital via the private capital markets.

If capital markets are functioning imperfectly, above all due to informational asymmetries between lenders and borrowers, then different forms of government intervention might be justified (see Grossman, 1991). However, because it is difficult or even impossible for the governments to know which firms to favour Grossman concludes (p. 115), "... a cautious policy response to alleged capital market imperfections seems advisable". In addition to this, interest group theories assert that, irrespective of the information problems governments have, politicians allocate subsidies (as well as other political favours) optimally from a political point of view, in the sense that they try to maximise votes and at the same time to give interest groups what they want. See e.g. Peltzman (1976), Olson (1982), Mitchell & Munger (1991) and Magee (1997). If the interest group approach to politics correctly describes political decision making, then this implies that subsidies might not be used to correct market failures and might consequently not be allocated optimally from the point of view of economic efficiency. For example, tariffs, regulations and subsidies might to a larger extent favour inefficient firms with economic problems because this type of firm has a stronger incentive to seek some type of public protection/support (see e.g. Hillman, 1982, and Magee, 1997).³¹ The possibility of receiving some kind of public protection/support gives industries and other interest groups an incentive to also invest large resources in unproductive rent-seeking activities such as lobbying (see e.g. Tollison, 1997).

³¹ Empirically it has been found that e.g. most industrial policy supports (tariffs, direct grants and loans and tax exemptions) in Korea and in Japan have primarily favoured declining industries (see Lee, 1996, and Beason & Weinstein, 1996).

An important line of research in the interest group literature has been to empirically test interest group theories in order to assess their relevance.³² However, relatively few empirical results exist for the influence of interest groups on public policy for countries outside the USA (see Potters & Sloof, 1996). To fill this gap, the purpose here is to look at the politics behind Swedish regional producer subsidies and try to understand why some firms are granted subsidies while others are not. Or more specifically, what characterises firms that apply and are granted supports compared with randomly selected non-supported firms?

We have chosen to look at regional producer subsidies for several reasons. First, regional policy subsidies are relatively important in Sweden as well as in other countries and increasingly important for the EU.³³ Second, there has been very little empirical research on the political determinants of the allocation of regional supports. This is true for Sweden as well as internationally.³⁴ Third, we have a data set which allows us to examine characteristics of supported and non-supported firms in detail.

³² A number of studies have examined how interest groups act (e.g. via lobbying and political contributions) and what has characterised politically successful interest groups. The results of the studies suggest that interest groups are important in the political decision process and that some groups tend to be more successful than others (see Potters & Sloof, 1996, for a survey and also sections 3 and 4 below).

³³ In 1994 the EU granted 26 Billion ECU via the structural funds (see EU, 1995a, and Jones, 1996). In addition to this, the European Commission reports that in twelve European countries in 1992 about 94 Billion ECU were transferred nationally to industry (see EU, 1995b). These supports can to a large extent be considered as regional policy aid.

³⁴ For example, Jones (1996, p. 159) discusses the lack of evaluations of the Union's regional policy programs. Except for a non-quantitative study by Henning (1983), which examines/describes the implementation of regional development programs in the early 1980s, no earlier studies of the political determinants of the allocation of regional supports in Sweden have been found.

To study the politics behind the allocation of regional producer subsidies, we test if hypotheses about structural attributes derived from economic models of political behaviour are useful when one tries to predict the allocation of subsidies among firms. The reason why we compare structural attributes of supported and non-supported firms is because no data of interest group activity are available, so that the only route open is to try to relate public policy variables to structural characteristics of the examined firms. One reason why we examine individual firms and not, as in many other studies, characteristics of larger interest groups (such as industries and unions), is because we examine selective regional subsidies that are granted to individual firms. About half of all Swedish regional policy supports are selective. Another reason is that we have created a unique data set which consists of supported firms which have been granted selective regional policy supports and a large number of non-supported firms which have been drawn randomly from the whole population of firms. Finally, the fact that we can identify individual supported and non-supported firms makes it possible to examine differences between supported and non-supported firms in detail.

The paper is structured as follows. Section 2 examines the Swedish regional policy supports in detail. In section 3, the decision process of regional policy is discussed, and in section 4, a number of hypotheses about structural attributes of supported firms are presented and discussed. Section 5 discusses the data and the choice of variables. In section 6, an econometric model and the results of the estimations are presented and discussed. In section 7, a summary and some concluding remarks are offered.

3.2 REGIONAL POLICY IN SWEDEN

In the 1960s, a period during which the Swedish economy experienced high growth rates, the demand for labour was very high in the south of Sweden, due to the expansion of industry and the public sector.³⁵ In the northern regions, however, rationalisation in primarily agriculture and in the forestry industry led to a surplus of labour, and as a consequence about 10,000 persons left the northern regions for the southern regions annually. To create a better “regional balance”, the Social Democratic government decided to try to make it easier for people to move from the northern regions to the southern ones, but also to create new jobs and to modernise industry in the northern regions. To reach the last two objectives a regional policy program was introduced, which primarily consisted of different financial supports to industry and of investments in the infrastructure.

Since it was introduced, the main objective of Swedish regional policy has been to create a better regional balance. More specifically it has meant that the government has tried in different ways to uphold and increase employment and growth in the northern regions, and especially in the so called support areas.³⁶ To reach the objectives an important part of regional policy has been the different types of support that have been granted to industry in the support areas. Basically two types of supports are granted: the general ones (e.g. lowered employer fees and

³⁵ This section is based primarily on SOU 1984:74, SOU 1996:69, SFS 1990:642 and NUTEK 1993:43 and 44.

employment support) which are granted to all firms that belong to the support areas, and the selective ones (e.g. localisation subsidies and loans, different types of development support, support to sparsely populated areas and loans to investment firms), which the firms must apply for.³⁷ Totally about 1.7 billion SEK has been granted annually in the 1980s and early 1990s.³⁸

In this study, only the selective supports (both subsidies and loans) are examined. The selective subsidies constitute about half of all subsidies and if one includes the loans, the selective part of regional policy is even more important (see NUTEK 1993:43). The selective supports are largely capital supports, in that for some of them the total capital cost for the investment is subsidised by up to 70 %. To be eligible for the support some general requirements are that the supports are to be used primarily for investments in machinery and buildings, that the firms are relatively profitable and that they promise to increase their number of employees. The supports are administrated primarily by local officials. Larger supports are granted either by NUTEK, which is the support-granting authority that monitors the supports, or the government.

Because the requirements which the firms must fulfil to be eligible for a support are relatively imprecise, it is difficult *ex ante* to predict the characteristics of subsidised firms. An additional problem is that the objectives of the supports are conflicting.

³⁶ See NUTEK 1993:43 for a description of the support areas.

³⁷ See SOU 1996:69 and NUTEK 1993:43 for more detailed descriptions of the different types of support that are granted to industry in the support areas.

On the one hand the subsidies are supposed to reduce potential unemployment problems by helping firms that have economic problems. On the other hand, the subsidies should be granted to firms, preferably future "winners", which might have problems in fully financing investments by themselves or via the private capital markets. In the 1970s and in the early 1980s, during the economic downturn, the first of the two objectives was the more important of the two. However, since the middle of the 1980s regional policy has become much more offensive and it has been emphasised that subsidies to a larger extent should be used to create growth and to increase employment.³⁹ The requirement that subsidised firms should be relatively profitable does to some extent reflect this change of policy.

Along with these more offensive ambitions it is argued, in the general motivations for why public subsidies should be granted, that some firms may under-invest because the market fails to supply the firms with enough capital (see e.g. SOU 1996:69, NUTEK, 1994, and SFS 1990:642). By granting public subsidies, the firms' lack-of-capital problem can be reduced. Small firms and new/young firms should be subsidised to a larger extent because these firms may find it more difficult to fully finance investments without subsidies. It is costly for the banks to handle loans to small firms and small firms may have fewer assets to raise loans on. New and young firms may have problems raising external capital because, for example, they may

³⁸ Totally the industry was granted about 46 Billion SEK, 1994 prices, in 1989 (see Barkman & Fölster, 1995). Support to agriculture (22 Billion SEK) and subsidised interest rates for the construction sector (14 Billion SEK) were the most important.

³⁹ In the middle of the 1980s the Social Democratic government put forward the so called ten-point program, prop. 1986/87:74. In the program it is emphasised that industrial policy in general must be much more offensive in the sense that the government should put more effort into trying to create industrial expansion, and a smaller effort into supporting firms and industries with economic

not have been able to establish relations with the banks and other financiers. In the official motivations it is also argued that subsidies should not be granted, irrespective of the size and age of firms, if firms can raise funds by themselves or via the private capital markets. That is to say, the subsidies should supplement, and not replace, private financing. Finally, it is argued that subsidies should not be granted to unprofitable firms for long periods, that is, care should be taken not to let the supported firms become dependent on the supports.

3.3 THEORETICAL FRAMEWORK

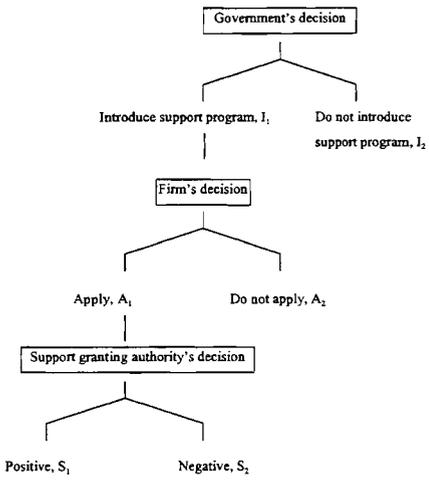
Even though the Swedish government claims that supports should be granted to profitable small and new/young firms which have problems in fully financing profitable investments by themselves or via the private capital markets, it is not clear if supports will be allocated to these firms. One reason, as Grossman (1991) argues, is that the support-granting authorities do not have enough information to know which firms to favour. Another reason is that, as has been emphasised in the interest group literature, the outcome of the political decision making process reflects the influence which firms, unions and other interest groups have on the political decision makers and on the support-granting authorities.⁴⁰

problems. The importance of growth and industrial expansion was also emphasised in the 1990s (see e.g. SOU 1996:69, section 3.4).

⁴⁰ See e.g. Peltzman (1976), Olson (1982), Mitchell & Munger (1991) and Magee (1997) for a general discussion about the role of interest groups in the political decision process.

From this perspective the introduction of regional policy support programs and the allocation of selective regional policy supports among Swedish firms can be seen as the result of a three-stage decision process, as shown in Figure 1 below. First, the government must decide to introduce a regional policy support program, I_1 , or not to introduce a support program, I_2 .⁴¹ Second, given that a support program exists, firms have an incentive to apply for support, A_1 , if it is considered to be a better source of financing than other alternatives. However, some firms might, for example, find it too costly to apply for support, they might be unaware of the support, they might not be interested in new investments or they might think that it is unlikely that they will be granted support; for whatever reason, they will decide not to apply, A_2 .

Figure 1. Decision-tree



⁴¹ Because we study the allocation of supports among firms for a given support program we do not explicitly discuss why support programs are introduced. However, the influence that interest groups (especially regional interests such as firms, unions that represent workers in the firms and regional politicians) have had on the decision process has been discussed by Henning (1983).

Some firms decide, however, to apply for support, and the support-granting authorities decide whether or not a firm is granted a support, S_1 or S_2 . In order to increase the probability of being granted a support, the support-seeking firms may try to affect the support-granting authorities. By investing in rent-seeking activities (e.g. lobbying) the firm can increase the probability of being granted support (see e.g. Tollison, 1997). That is, the probability of being granted a subsidy or a subsidised loan can be expected to be a positive function of rent-seeking activities. However, other factors might be important as well. The support-granting authorities might have different directives to follow and may e.g. not be allowed to grant supports to some firms (e.g. unprofitable firms), or they are supposed to try to target firms with special characteristics (e.g. small and new firms that have problems with fully financing investments privately).

Thus, whether a firm is granted a subsidy or not is the result of three decisions. First, the government must introduce a support program. Second, the firm must decide to apply and third, the support-granting authority must grant a subsidy. That is, the probability that a firm is granted a support is $\Pr(I_1 \cap A_1 \cap S_1)$. Given that a support program already exists, i.e. $\Pr(I_1) = 1$, then whether or not a firm is granted a support can be seen as a function of a vector of factors that affect the firm's decision to apply for a subsidy, (a_1, a_2, \dots, a_m) , a vector of factors that affect the support-granting authorities' decision to grant a support, (s_1, s_2, \dots, s_n) and lobbying, L . That is, $\Pr(A_1 \cap S_1) = f(a_1, a_2, \dots, a_m, s_1, s_2, \dots, s_n, L)$.

Unfortunately, detailed information about lobbying and other rent-seeking activities is, typically either difficult to measure or not available, and instead another approach has to be chosen. Several theoretical models and empirical studies of political influence emphasise structural attributes of interest groups (such as size, homogeneity of members in an interest group and degree of concentration in an industry) as the basis for their success (or lack of success) in the political decision process. For example, Olson (1982) argues that it is more difficult for large groups, such as the tax-payers, to control the free-rider problem, and therefore that large groups tend to be less efficient lobbyists and consequently less successful in the political decision process. Empirically, Potters & Sloof (1996), who have summarised the results of several empirical studies that have examined structural attributes of politically successful interest groups, conclude that "... being in need, having a strong bargaining position and being of high social status help to get favourable government intervention" (p. 420). That is, to test whether an unobservable variable such as lobbying is important or not one can instead test the importance of different structural variables, i.e. $L = g(p_1, p_2, \dots, p_v)$.

Thus, the probability that a firm applies for support and is granted one can be seen as a function of variables which increase the probability that a firm applies for and is granted a support, and structural variables that indirectly measure whether or not lobbying is important in the decision process. That is, $\Pr(A_1 \cap S_i) = h(a_1, a_2, \dots, a_m, s_1, s_2, \dots, s_n, p_1, p_2, \dots, p_v)$. Note that some of the variables might be the same. For example, a variable such as the size of a firm might be important both when a firm decides to apply, when the support-granting authorities decide to grant a support

and in determining whether or not a firm will be able to lobby successfully or not; for a further discussion see the next section.

3.4 SOME HYPOTHESES ABOUT STRUCTURAL ATTRIBUTES OF SUPPORTED FIRMS

In this section testable hypotheses are derived about how some attributes (size, age, regional importance and economic performance of firms) might affect the probability that a firm applies for and is granted a selective regional policy support. The attributes that are discussed below have been chosen because they have been considered as important by the government, because it is possible to derive testable interest group hypotheses about them and because it is possible to construct reasonable proxies for them. The first attribute is size.

Size: If interest group explanations are important, one would expect larger firms to be more likely to apply for support because the costs, of applying for support are relatively greater for smaller firms than for larger firms. Larger firms should also be more likely to become supported because they have more lobbying resources, i.e. they can lobby more effectively for subsidies. For example, Becker (1983, p. 395) argues that "... small groups may not be able to take advantage of scale economies in the production of pressure", i.e. too small firms might be less likely to become subsidised. If size is important the following hypothesis should not be rejected.

Hypothesis 1. Larger firms should be more likely to be granted supports.

However, if the Swedish government and the support-granting authorities try to a larger extent to support smaller firms, which may have problems with fully financing profitable investments by themselves, then *hypothesis 1* should be rejected.

Age: From an interest-group perspective, one would also expect that supports should be biased towards older firms. Older firms may have had better opportunities new and young firms to establish contacts with and influence the support-granting authorities, contacts which may be advantageous when the support-granting authorities grant supports. If age is important then the following hypothesis should not be rejected.

Hypothesis 2. Older firms should be more likely to become supported.

On the other hand if the support-granting authorities try to a larger extent to favour new and young firms, which may have problems with fully financing investments privately, then younger firms should be more likely to be granted supports and *hypothesis 2* should be rejected.

Vital industries: Several empirical studies have found that interest groups which are politically successful often encounter support from other (influential) groups (see Potters & Sloof, 1996). In Sweden, the allocation of industrial subsidies in general gives some additional support for these results. Historically, most industrial

subsidies in Sweden, both regional and other industrial subsidies, have been granted to the basic industries. For example, in the 1970s and early 1980s large subsidies were granted to the shipbuilding, mining, steel, forestry and textile industries and in the 1980s large subsidies were granted e.g. to the car industry (see Eriksson, 1994). That is to say, subsidies have to a large extent favoured firms and industries which historically have been major employers and which have been important for the development of the Swedish economy. A possible explanation for why the basic industries have been granted most industrial supports might be that these industries have had support from influential and active interest groups, such as the unions that represented the workers in the basic industries and organisations that represented the firms.⁴²

One would expect a similar bias when it comes to the selective regional policy support that we are studying, because firms that belong to regionally important industries are to a larger degree backed up by local unions (which tend to represent workers in regionally important industries) and organisations which represent the firms in the regions. If firms which belong to regionally important industries are more likely to get a subsidy then the following hypothesis should not be rejected.

Hypothesis 3. Firms that belong to regionally important industries should be more likely to be granted supports than firms that do not belong to regionally important industries.

⁴²See e.g. Stråth (1987) for a discussion about the interaction between the shipbuilding industry, the unions and the government during the economic crisis in the 1970s. See also Henning (1983), who has studied the interaction between regions and the government when regional subsidies were allocated in the beginning of the 1980s. He concludes that regions which managed to capture large

Given that the support-granting authorities are primarily interested in supporting relatively profitable, small and new/young firms that have problems with fully financing their investments privately, then the factor of or not a firm belongs to a regionally important industry should probably not affect the decision to grant support. As a consequence one would expect supports to be evenly distributed among industries, and if this is the case then *hypothesis 3* should be rejected.

Performance of firms: Firms and industries with economic problems should be more likely to get different political favours because firms which have economic problems have, together with e.g. the unions and industry organisations, an incentive to apply and lobby for political favours. One reason is because “... the lowered rate of return from economic activity makes political activity a more attractive investment” (Magee, 1997, p. 537). Furthermore, in a political milieu where low unemployment is an important objective, which has been the case in Sweden, political decision makers as well as support-granting authorities have an incentive to grant subsidies to firms with economic problems and to declining industries in order to show that they try to “save jobs” (see Burton, 1983, for a similar discussion and Hillman, 1982, for a formal study that analyses why declining industries tend to be successful in the political decision process).

regional subsidies were represented by coalitions that consisted of local firms, unions and local politicians.

If firms which belong to declining industries and firms which have economic problems are more likely to be granted supports, then the following hypotheses should not be rejected.

Hypothesis 4. Firms that belong to declining industries should more likely to be granted supports.

Hypothesis 5. Firms with economic problems should be more likely to be granted supports.

However, as was discussed in section 2, the Swedish industrial policy in general, as well as regional policy, became more growth oriented in the middle of the 1980s, and consequently the support-granting authorities might have become less willing to grant regional policy supports to firms that belonged to declining industries or to firms with economic problems. If this is the case then *hypotheses 4 and 5* should be rejected.

3.5 DATA

In order to examine what characterises firms that apply for support compared with firms that do not apply for a support, and what characterises firms that are granted support compared with firms that that have applied for but have not been granted support, we would have liked to have information about three types of firms: randomly chosen non-supported firms that have not applied for support, non-

supported firms that have applied but have not been granted support, and supported firms. However, information about firms that have applied but have not been granted support is not available. Instead a data set is used which consists of information about supported and randomly chosen non-supported firms (which might have applied for support). This means that we only examine differences between supported firms and randomly chosen non-supported firms.

Information from NUTEK has made it possible to identify all firms which received selective regional policy support in 1989 and in 1992.⁴³ These two years are chosen because we wish to examine the stability of the results and to determine any differences can be found over the business cycle. 1989 was a year with relatively high GDP growth (2.4%), while in 1992 GDP fell with about 1.2%. The supported firms have applied for and have been granted either an investment subsidy, localisation subsidy, localisation loan, a subsidy for “soft investments” or an educational subsidy. For more details about the supports see section 2 above or NUTEK 1993:44. Table 1 reports some characteristics of the data set.

Table 1. Size of samples and distribution of support.

	<i>1989-sample</i>		<i>1992-sample</i>	
	<i>Non-supported</i>	<i>Supported</i>	<i>Non-supported</i>	<i>Supported</i>
Total No. of firms	924	454	803	306
Total support, M.SEK, 1994 prices		750		261
Average support per firm, M.SEK, 1994 prices		1.65		0.85

In order to be able to compare the supported firms with non-supported normal firms we obtained a sample of non-supported firms that have been randomly

collected from the whole population of firms; this sample was provided by UC AB, a credit report firm that collects annual reports from every Swedish firm.⁴⁴ None of the firms in this sample have been granted any selective regional policy supports between 1980 and 1995. UC AB has also provided us with financial and some non-financial information for both the supported and non-supported firms. Table 2 reports the variables that we use to examine the firms.

Table 2. Description of variables

Variables	Description
SIZE	No. of employees per firm.
AGE	Year firm was founded.
IMP_IND	Importance of the industry which a firm belongs to. Importance is measured as each industry's (ISIC 2-digit level) share of total employment in the support areas in 1989. To calculate this measure the distribution of the industries' share of employment for a random sample of 675 firms located in the support area in 1989 is used. The sample has been provided by UC AB.
IND_PERF	Long-run performance of the industry to which a firm belongs. The variable is defined as the percentage change of total value added for each industry between 1970 and 1989. For all industries except the manufacturing industry the ISIC one-digit level has been used. For the manufacturing industry the change of total value added has been measured at the 3-digit level.
PROFIT	(Value added - Total wages)/Total assets.
CASHLIQUID	(Current assets - Inventories)/Current liabilities
LIABILITIES	Long-term liabilities/Turnover
SOLVENCY	Equity/Total assets
AREA	Dummy: 1 if firm belongs to a support area, 0 otherwise.

To test if size is important (*hypothesis 1*) the variable SIZE has been included. It is defined as the number of employees per firm.⁴⁵

⁴³ Individuals and public enterprises that have been granted selective regional policy supports are not included in the study because data on exogenous variables were not available. However, most supports are granted to private firms.

⁴⁴ The sample we got from UC AB initially consisted of 927 and 808 firms respectively. Three firms in the 1989 sample and one firm in the 1992 sample were observed twice in each sample. For these firms only the first of the two observations has been used.

⁴⁵ A critique that can be raised against the number of employees as a proxy for size is that if, say, several of the non-supported firms have a large number of employees who do not work full time, then the choice of the number of employees as a proxy for size incorrectly reflects the size distribution between the supported and non-supported firms. We cannot say whether or not the employees in the supported firms work full time to a larger or lesser extent, because that kind of information is not available. However, it seems unlikely that there are systematic differences between the groups with regard to part-time workers.

To test if older firms are more likely to be granted subsidies (*hypothesis 2*) and whether firms that belong to regionally important industries are more likely to become subsidised (*hypothesis 3*) the variables AGE and IMP_IND have been included. The variable AGE is measured as the year a firm was founded. The variable IMP_IND is measured as each industry's (ISIC 2-digit level) share of total employment in the support areas. Because we only have about 160 non-supported firms located in the support area and because we want to have a good measure of the distribution of industries in the support areas, we obtained another larger random sample of 675 non-supported firms located in the support areas in 1989 from UC AB. Because the industrial structure changes relatively slowly, the 1989 distribution of industries is used for both the 1989 and 1992 samples.

To test if firms which belong to declining industries are more likely to become supported (*hypothesis 4*), the variable IND_PERF is included to measure whether a firm belongs to an industry which has performed less well in the long run or not. To measure the performance of an industry, an index for change of total value added between 1970 and 1989 has been calculated. For all industries except the manufacturing industry, the ISIC one-digit level has been used. For the manufacturing industry, which has received most of the supports, the change of total value added has been measured at the 3-digit level. Firms that could not be classified were assumed to belong to an industry which has performed like the average industry.

To study if firms with economic problems are more likely to receive subsidies (*hypothesis 5*) several key figures have been included. PROFIT, CASHLIQUID and SOLVENCY measure the profitability, the cash-liquidity and the equities' share of total assets for the firms. The variable LIABILITIES, which is defined as long-term liabilities' share of turnover, measures the degree of indebtedness.

Finally, most of the supports are granted to firms which are located in the support areas, and because the non-supported firms are located outside the support areas to a larger extent, the dummy variable AREA is included to control for differences in location. The dummy takes on the value one for firms that are located in the support areas and zero otherwise.

Table 3 reports some descriptive statistics. The tables suggest that for both the 1989 sample and the 1992 sample, the non-supported firms have slightly better cash-liquidity, are less indebted, are more solvent, to a larger extent belong to industries that have performed less well, and to industries which to a larger extent belong to industries which are less important in the support areas. Finally, the non-supported firms are to a larger extent located outside the support areas.

Table 3. Descriptive statistics for the 1989 and 1992 samples.

	Non-supported firms			Supported firms		
	Median	Mean	Std.dev	Median	Mean	Std.dev
1989 sample						
SIZE	3.00	5.28*	99.62	12.00	21.46*	175.11
AGE	82	77	13.41	82	76	14.90
IMP_IND	3.70	5.52	6.05	10.7	10.18	7.91
IND_PERF	174	164.20	40.94	144	153.22	46.16
PROFIT	0.06	0.07*	8.21	0.09	0.09*	0.20
CASHLIQUID	1.00	1.23*	16.31	0.90	0.99*	2.13
LIABILITIES	0.07	0.28*	53.69	0.24	0.51*	12.09
SOLVENCY	0.11	0.16*	20.59	0.07	0.09*	0.11
AREA	0	0.16	0.37	1	0.69	0.46
1992 sample						
SIZE	3.00	5.35*	135.81	7	14.23*	57.74
AGE	82	75	13.99	86	80.20	14.78
IMP_IND	8.10	6.76	5.27	8.40	10.20	7.90
IND_PERF	174	168.00	42.31	144	154.96	42.33
PROFIT	0.04	0.04*	24,246.30	0.04	0.03*	0.19
CASHLIQUID	1.16	1.45*	8.72	0.81	0.82*	3.67
LIABILITIES	0.07	0.25*	55.44	0.26	0.44*	83.62
SOLVENCY	0.14	0.20*	220.21	0.09	0.13*	0.16
AREA	0	0.17	0.38	1	0.71	0.46

* Because some extreme values distort the mean, a 5% trimmed mean is reported.

3.6 ECONOMETRIC ANALYSIS

To test empirically if the interest group theories are useful, an econometric model is typically set up which has as the dependent variable one which measures whether or not an industry, a firm or some other actor of interest has been politically successful. To test different hypotheses and to explain why some groups are successful in the political decision process and others are not, different independent variables which describe different attributes of the studied groups are chosen.⁴⁶

⁴⁶ Examples of some studies are Pincus (1975) who tries to explain size of tariffs, Hunter & Nelson (1989) who try to explain the structure of tax systems and Svensson (1997) who tries to explain the allocation of R&D subsidies. See also Potters & Sloof, 1996, for a discussion about how econometric models have been used to test interest-group theories.

In this study a similar approach is used. To test the hypotheses formulated in section 3, the two samples are pooled and a standard logit model is estimated which examines if different firm characteristics can be used to discriminate between supported and non-supported firms. The 1989 sample and the 1992 sample are pooled in order to use all the information in the data set and in order to be able to explicitly test for the stability of the regression coefficients in the two samples. To test for the stability of the regression coefficients, interaction variables are included. The logit model approach is chosen because it is an econometric technique designed to discriminate between binary dependent variables and because it allows one to estimate and test the importance of different explanatory variables (see Maddala, 1989, and Menard, 1995).⁴⁷ The dependent variable is the binary variable TYPE, which is defined as.

$$\text{TYPE}_i = \begin{cases} 1 & \text{Supported firm} \\ 0 & \text{Non-supported firm} \end{cases}$$

The probability that a firm i is granted support is estimated as a function of the k variables, x_{ij} , that were presented in the previous section and k interaction variables ($D_i * x_{ij}$). D_i is a time-dummy which takes on the value 0 for firms that belong to the 1989 sample and 1 for firms that belong to the 1992 sample.

⁴⁷ An alternative to the logit model is the probit model (see Maddala, 1989). Probit models have also been estimated in this study. The estimated parameters differed slightly but the qualitative results did not change. Because we have information about how large subsidies and loans the supported firms have been granted, an alternative to the logit and probit models is the Tobit model (see Maddala, 1989). The Tobit model is a better alternative if the dependent variable consists of several observations that take the value zero and several observations that are larger than zero. However, because we do not know if firms that have been granted loans have repaid them, and because it is

$$\text{Pr}_i = \text{Probability} (\text{TYPE}_i = 1) = F(\beta_0 + \sum_{j=1}^k \beta_j x_{ij} + \sum_{j=1}^k \delta_j (D_i * x_{ij}))$$

where the cumulative distribution F is assumed to be logistic,

$$F(Z_i) = \frac{\exp(Z_i)}{1 + \exp(Z_i)}, \quad \text{where } Z_i = \beta_0 + \sum_{j=1}^k \beta_j x_{ij} + \sum_{j=1}^k \delta_j (D_i * x_{ij})$$

Table 4 Column 1 reports the result of the estimation of the logit model for the entire sample. 413 observations were excluded because of missing data on various exogenous variables. The likelihood-ratio statistic is significant at the 1% level, which means that the estimated model is better than the naïve model that only has the constant as an explanatory variable.

Because most supported firms are located in the support areas the variable AREA is, as one would expect, positive and significant. The interaction variable D*AREA is insignificant, i.e. the probability of a firm that is located in the support area being granted a support does not change over time.

difficult to assess to what extent the interest on the loans is subsidised or not, we have decided to define the studied firms as non-supported or supported firms and not to estimate Tobit models.

Table 4. Coefficient estimates for the logit model. Dependent variable: TYPE.

	1.	2.	3.
	All industries (ISIC 1-9)	Manufacturing (ISIC 3)	Service (ISIC 6-9)
SIZE	0.003 ^a (2.735)	0.001 (0.877)	0.011 ^a (4.287)
AGE	0.021 ^a (4.325)	0.016 ^b (2.202)	0.031 ^a (3.314)
IMP_IND	0.096 ^a (9.019)	-0.030 (-1.519)	0.189 ^a (5.881)
IND_PERF	-0.002 (-0.924)	0.010 ^a (2.595)	-0.008 ^a (-2.600)
PROFIT	0.138 (0.773)	1.467 ^b (2.009)	0.084 (0.357)
CASHLIQUID	-0.024 (-0.968)	-0.307 ^c (-1.906)	0.036 (1.271)
LIABILITIES	0.0003 (0.171)	0.183 (1.090)	0.0003 (0.113)
SOLVENCY	0.060 (0.816)	-2.195 ^b (-2.018)	0.040 (0.396)
AREA	2.481 ^a (16.135)	2.211 ^a (7.906)	2.843 ^a (10.878)
D*SIZE	-0.003 ^c (-1.937)	-0.001 (-0.765)	-0.006 (-1.088)
D*AGE	0.005 (0.866)	-0.006 (-0.625)	0.013 (1.308)
D*IMP_IND	-0.022 (-1.377)	0.023 (0.761)	-0.204 ^a (-4.433)
D*IND_PERF	-0.002 (-0.916)	-0.003 (-0.624)	0.0001 (0.023)
D*PROFIT	-1.139 (-0.774)	-1.926 ^c (-1.760)	-0.086 (-0.362)
D*CASHLIQUID	0.008 (0.286)	0.131 (0.671)	-0.054 ^c (-1.673)
D*LIABILITIES	0.002 (0.890)	0.447 (0.724)	0.05 ^b (2.127)
D*SOLVENCY	-0.024 (-0.169)	2.046 (1.353)	0.101 (0.495)
D*AREA	-0.133 (-0.582)	0.432 (0.967)	-0.71 ^c (-1.958)
Constant	-3.740 ^a (-8.683)	-2.046 ^a (-3.302)	-4.216 ^a (-4.826)
LR statistic (18 df)	759.10	216.76	328.81
Total No. of obs. (No. of supp. firms)	2,487 (716)	624 (428)	1113 (244)
Missing observations	413	43	111

Notes: t-statistics in parentheses. ^a, ^b and ^c indicate significance at 1, 5 and 10 percent respectively, using a two-tailed test.

Hypothesis 1 (larger firms should be more likely to become supported) cannot be rejected for the 1989 sample. The variable SIZE is positive and significant at the 1% level, which means that in 1989 larger firms were more likely to become supported than smaller firms. The result lends some support to the hypothesis that size matters when the support-granting authorities grant supports. Two implications are not only that may small firms have problems with raising funds via e.g. the banks

(which is one of the motivations that is used for the support, see section 2), but also it is difficult for small firms to be granted supports.

However, the importance of size should be interpreted carefully because the interaction variable $D*SIZE$ is negative and significant, which means that the size of a firm is less important in 1992. A Wald-test of the hypothesis $H_0: \beta_{SIZE} + \delta_{D*SIZE} = 0$ cannot be rejected (p -value = 0.28), which means that in 1992 the size of supported firms and non-supported firms does not differ significantly.⁴⁸ Why the size of firms seems to be less important in 1992 than in 1989 is difficult to say. A possibility is that the importance of small- and medium-sized firms became more stressed in the political debate in the 1990s, and that as a consequence, the support-granting authorities might have tried to target smaller firms to a larger extent.⁴⁹

AGE is positive and significant at the 1% level, the interaction variable $D*AGE$ is insignificant and the hypothesis $H_0: \beta_{AGE} + \delta_{D*AGE} = 0$ is rejected at the 1% level (p -value < 0.01). The results indicate that older firms are less likely to become supported both in 1989 and in 1992 (note that we have defined AGE as the year a firm was founded, which means that a positive sign implies that a younger firm is more likely to become supported). Consequently *hypothesis 2* (older firms should be more likely to become supported) is rejected. The result indicates that the support-granting authorities might try to favour younger firms which might have problems with fully financing investments privately. However, as we discuss below, it is not

⁴⁸ For a discussion of tests of joint hypotheses see Maddala, 1989.

certain that firms which have been supported, even if they are younger, are the ones that may have problems with fully financing investments privately.

IMP_IND is positive and significant at the 1% level, the interaction variable D*IMP_IND is insignificant and the hypothesis $H_0: \beta_{IMP_IND} + \delta_{D*IMP_IND} = 0$ is rejected at the 1% level (p-value < 0.01). The results give support for *hypothesis 3* (firms that belong to regionally important industries are more likely to be granted supports than firms that belong to less important industries). An interpretation of this result is that firms which belong to regionally important industries are more likely to be granted regional policy supports, because they get more support from local unions (which represent workers who belong to locally important industries) and local industry organisations. If this interpretation is correct, the result is in line with the results of other studies that have emphasised the importance in the political decision process of obtaining support from other (influential) groups and the importance of not encountering opposition (see Potters & Sloof, 1996).

For *hypothesis 4* (firms that belong to a declining industry are more likely to be granted supports) the results are ambiguous. The variables IND_PERF and D*IND_PERF are negative but insignificant. However, the joint hypothesis $H_0: \beta_{IND_PERF} + \delta_{D*IND_PERF} = 0$ is rejected at the 10% level (p-value = 0.06). This means that, in 1992, the support-granting authorities targeted firms which belonged to industries that had performed less well since 1970.

⁴⁹ An indication of the importance of small- and medium-sized firms in the 1990s is the introduction of start-up supports and different supports directed to small- and medium-sized firms (see SOU 1996:69).

The performance of individual firms is more important than whether or not firms belong to declining industries. The insignificance of the financial key figures (PROFIT, CASHLIQUIDITY, LIABILITIES and SOLVENCY) and the insignificance of the interaction variables (D*PROFIT, D*CASHLIQUIDITY, D*LIABILITIES and D*SOLVENCY) indicate that the supported firms and the non-supported firms do not differ from each other for either of the two years. The joint Wald-tests confirm this conclusion for all variables except for liabilities. The hypothesis $H_0: \beta_{\text{LIABILITIES}} + \delta_{\text{D*LIABILITIES}} = 0$ is rejected at the 5%-level (p-value = 0.03), which means that in 1992 the supported firms were significantly more indebted than the non-supported firms.⁵⁰ Thus it seems, although it is not a clear-cut result, as if *hypothesis 5* (firms with economic problems should be more likely to be granted supports) should be rejected and instead it seems as if it is relatively normal firms, from a financial point of view, that are granted supports. This result might reflect the fact that the motivations for regional policy supports in the 1980s became more growth oriented and that subsidisation of firms with economic problems became less important, see section 2 above.

Because there might be differences between industries, Columns 2 and 3 report the estimation results for two subsamples. The first subsample (Col. 2) includes only firms which belong to the manufacturing industry (i.e. ISIC 3) and the second subsample (Col. 3) includes only firms which belong to the service industries (ISIC 6-9).

The estimations show that there are some differences between how subsidies are allocated between industries. The most important differences are the following: (i) Larger firms in the service industries are more likely to be granted a subsidy in 1989 (however, in the 1992 sample no significant differences can be observed). But, in the manufacturing industry, size of firms cannot be used to predict whether or not a firm will be granted a subsidy. (ii) Firms which belong to the manufacturing industry are more likely to be granted a subsidy if they belong to a sub-industry of the manufacturing industry which has performed better than the average manufacturing sub-industry. The opposite is true for firms which belong to the service industries. (iii) Firms in the manufacturing industry are more likely to be granted a subsidy if they are more profitable, if they have a low cash liquidity, and if they are less solvent.

An overall assessment of the results gives a mixed picture. To some extent the interest group hypotheses are accepted. Larger firms which belong to regionally important industries that have performed less well since 1970 are more likely to be granted supports (particularly in the case of firms which belong to the service industry). But the fact that it is more likely that a younger firm will be granted a support indicates that the support-granting authorities try to favour firms which might have a lack-of-capital problem. However, an implication of the fact that the supported and the non-supported firms (especially firms in the service industry) are, from a financial point of view, relatively similar is that one might ask whether or

⁵⁰ $H_0: \beta_{\text{PROFIT}} + \delta_{D^* \text{PROFIT}} = 0$, (p-value = 0.78). $H_0: \beta_{\text{CASHLIQUIDITY}} + \delta_{D^* \text{CASHLIQUIDITY}} = 0$, (p-value

not the supported firms, even if they are younger, would have been able to finance their investments privately. That is, are supports granted to firms which cannot fully finance their investments privately? Historically, it seems as if the supported firms have managed to finance investments by themselves or via the private capital markets because they are equally or even more indebted than the non-supported ones; see LIABILITIES in Table 3. If the firms could have managed to finance their investments privately then the supports can be seen as pure transfers to the supported firms.

But if the firms have not been able to fully finance their investments privately, this might also reflect the fact that e.g. the banks have considered the investments unprofitable. If this is the case, then if the government had not interfered, e.g. by increasing taxes in order to finance the supports, other non-supported firms and individuals would have used the means to invest in profit-promising projects. Such investments may have been cancelled because means have instead been employed to subsidise the supported firms' unprofitable investments.

3.7 SUMMARY AND CONCLUDING REMARKS

Justifications for the use of subsidies that are offered by economists, e.g. that some firms might have a lack-of-capital problem due to informational asymmetries, are often picked up by politicians and interest groups in order to justify the supply and demand for different types of support. However, as we have argued in this paper,

=0.21). $H_0: \beta_{\text{SOLVENCY}} + \delta_{\text{D}^*\text{SOLVENCY}} = 0$, (p-value = 0.77).

politicians and support-granting authorities might not act as benevolent welfare maximisers because they do not have incentives to allocate supports optimally from an economic point of view. Instead, supports might be transferred to politically influential firms and industries. Furthermore, the political decision makers and the support-granting authorities might not have enough information to allocate the supports optimally. That is to say, even if a lack-of-capital problem exists, the implementation problems mean that it is not certain that subsidies will be allocated to firms which find it difficult to finance profitable investments via the private capital markets.

To examine the types of firm to which supports are allocated, and to test to what extent the allocation of supports reflects political considerations, we have compared different characteristics of Swedish firms that have been granted regional policy supports and non-supported randomly chosen Swedish firms. The results of the study show, although they are not clear cut and therefore should be interpreted with care, that in Sweden in 1989 and in 1992, some firms were more likely to be granted subsidised loans and direct supports than other firms. Larger firms that were located in the support areas and which belonged to regionally important industries were more successful than other firms. The results render some support for the idea that larger firms, which have more lobbying resources and for which the costs of applying for a support are relatively smaller, are more likely to be granted supports. The results also give some support for the idea that firms which belong to regionally important industries, and which therefore might to a larger extent be backed up by local unions (which tend to represent workers in regionally

important industries) and organisations which represent the firms in the regions, are more likely to be granted supports. The hypothesis that firms which have economic problems are more likely to be granted supports has to be rejected because the financial key figures do not differ between supported and non-supported firms. Because younger firms are more likely to become supported, the hypothesis that older firms, which might have established better contacts with the support-granting authorities, should be more likely to be granted supports has to be rejected too. However, the fact that the supported firms historically have been able to finance investments via the private capital markets - they are more indebted than the non-supported ones - indicates that it is not certain that the firms which have been granted supports, even if they are younger, are the ones that have problems with financing investments via the private capital markets.

Finally, the supports which we study represent a type of support that has become increasingly important in the EU since the 1970s. And if Poland, Hungary and other former communist countries become new member states of the EU, the demand for more public supports to the industry will probably increase.⁵¹ Given this scenario, some important questions for future research arise.

To know more about the politics behind the allocation of supports we need to know more about what drives firms to apply for supports - do firms that apply for support have a lack-of-capital problem in the sense that they cannot finance profitable investments via the private capital markets? And if a lack-of-capital

problem exists, is this a market failure - in the sense that asymmetric information between borrowers and lenders lead to a less than optimal supply of capital? Or is it a government failure, in the sense that firms' lack-of-capital is caused by taxation of firms and individuals and by financial regulations of capital markets? Another question is whether the support areas are motivated or if the definition of support areas rather reflects the political influence that some regions have on the political decision makers in the Parliament. That is, are the support areas significantly poorer and do they have more economic problems than other regions? Finally, it is important to examine the effects of the supports. Do the supports achieve the two most important objectives of regional policy, namely increased employment and increased growth in the subsidised firms and in the support areas? The answers to these questions can teach us more about how politics work, and whether an important and increasingly important part of the EU's policies is economically efficient or not.

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4. CAPITAL SUBSIDIES AND THE PERFORMANCE OF FIRMS

4.1 INTRODUCTION

De Long & Summers (1991) assert that investment in machinery and equipment has a positive influence on productivity growth and that the private return from equipment investment is below the social return. If their conclusions are correct, one implication would be that investment subsidies, which several governments, as well as the EU, have granted to the business sector, may have contributed to increased economic growth.⁵² However, even if market failures exist which might justify government interventions, subsidisation of investments is not unproblematic. Financing the subsidies gives rise to deadweight losses, and because politicians and bureaucrats might be more interested in maximising political objectives than in economic efficiency, resources might be suboptimally allocated. Moreover, because subsidisation might give rise to both allocative and technical (X-) inefficiencies, it is far from clear whether subsidisation of investments is good or bad for long-term growth. Empirically, an earlier study of Korea (Lee, 1996) and another of Japan (Beason and Weinstein, 1996) both suggest that government intervention have negative effects on productivity growth.

⁵² See OECD (1993, 1996) and EU (1996) for an international overview of the use of producer subsidies. See Blomström, Lipsey and Zejan (1996) for a general critique of De Long and Summers.

The purpose of this study is to examine the effects on productivity, at the firm level, of capital subsidies that have been used in Sweden. Even though there are theoretical and some empirical indications that producer subsidies do not have a positive effect on productivity growth, there are several reasons why there is a need for more empirical studies in general and particularly in Sweden. First, the use of different types of investment subsidy has been much more important in Sweden than in Japan and Korea, and since Sweden became a member of the EU, the role of different types of producer subsidy will continue to be important in the foreseeable future. Second, although Sweden also has a long tradition of this type of “industrial policy” and although there are, to the best of our knowledge, no earlier systematic studies of productivity effects of subsidies, policy-makers in Sweden have for a long time asserted that different types of producer subsidy are growth enhancing. But are they? Finally, because Beason and Weinstein (1996) and Lee (1996) used aggregated data in their studies, a detailed study at the firm level can give some additional information about the effects of government intervention.

To study the effects of Swedish industrial policy, we have collected a set of data of subsidised and non-subsidised manufacturing firms for the period 1987-1993. By comparing the two types of firm and by estimating production functions, where we control for different factors that might affect productivity, we examine if there are any differences in productivity performance between the firms in the years after the subsidies were granted.

Many types of subsidy have been used in Sweden to support industry. In this study, we concentrate on regional policy subsidies. The subsidies that are examined are regional policy subsidies, whose main objectives have been to uphold and increase employment and growth in the northern regions of the country, and especially in the so called support areas. Basically, two types of support have been granted: general ones (e.g. lowered employer fees and employment support), which are granted to all firms that belong to the support areas, and selective ones (e.g. localisation subsidies and loans, different types of development support, support to sparsely populated areas and loans to investment firms), which the firms must apply for. Totally, about 1.7 billion SEK⁵³ have been granted annually in the 1980s and early 1990s.⁵⁴

In this study we examine only the selective subsidies. These subsidies constitute about half of all regional policy subsidies (see NUTEK 1993:43). They are largely capital subsidies, where the total capital cost for the investment is subsidised by up to 40 %. For a firm to be eligible for a subsidy, it must be used primarily for investments in machinery and buildings. Moreover, if a firm is to be granted a subsidy it must be relatively profitable, and it must promise to increase the number of employees. The supports are administrated primarily by local officials. Larger supports are granted either by NUTEK (the Swedish Industrial Board for Industrial and Technical Development), which is the support-granting authority that monitors the supports, or the government.

⁵³ \$1 = 8 SEK, in February 1998.

⁵⁴ See SOU 1996:69 and NUTEK 1993:43 for more detailed descriptions of the different types of support that are granted to industry in the support areas.

The remainder of the paper is organised as follows. In section 2, a theoretical framework is presented. In section 3, we discuss how we can test the effects of the subsidies empirically. In section 4, the data and some characteristics of the firms are presented. Section 5 presents the results and finally, section 6 concludes.

4.2 CAPITAL SUBSIDIES AND PRODUCTIVITY

Why should the government grant subsidies to firms located in backward regions? In the literature on regional economics one line of research argues that various forms of market failure give rise to agglomeration effects. For example, economies of scale and location advantages associated with easy access to large markets, skilled labour and technological knowledge, in combination with migration of the most highly skilled members of the labour force from the lagging regions, might lead to growing polarisation between different regions.⁵⁵ To soften this development the government can grant different types of support (e.g. direct subsidies and subsidised loans) and/or reduce taxes to firms located in the backward regions or to firms that decide to relocate in the backward regions.⁵⁶

⁵⁵ Note, however, that the results of several studies suggest that per capita incomes across regions converge rather than diverge (see e.g. Sala-i-Martin, 1996, and Persson, 1997).

⁵⁶ See Begg (1989) and Tsoukalis (1997) for a discussion about why regional disparities might arise and why government interventions are important. In the official motivations for regional policy subsidies, market failure arguments are often used. For example, the European Investment Bank (EIB) claims: "At times of weak economic performance there would, without corrective mechanisms, be a tendency for capital investment and hence growth and employment within a unified economic area to gravitate largely towards the most prosperous regions. This is relevant to Europe, where two thirds of the regions accounting for 50% of its population still have a below-average per capita product. ... That is why, in accordance with its primary remit, the EIB devotes on average more than two thirds of its financing to the development of regions facing structural or industrial redevelopment problems. Such operations interlink with grants from the Structural Funds

Although subsidisation of the business sector in the backward regions can lead to an increase of employment and capital investments, the main question is whether it can affect productivity. Productivity is important because of its implications for long-term growth. There are at least two reasons to suspect a positive connection between subsidisation and productivity. First, if the subsidies help to advance the technological development of the recipient firms then productivity increases. Second, if the subsidies can help the firms to better utilise economies of scale, productivity might increase as well.

However the use of producer subsidies is not unproblematic. Although governments argue that subsidies are growth enhancing and that they will allocate the resources efficiently, the “true” intentions might be to gain votes and/or to favour politically influential groups.⁵⁷ A consequence of this view is that resources might be transferred to less productive firms, or as Olson (1982, p. 63) argues: “Special-interest groups also slow growth by reducing the rate at which resources are reallocated from one activity or industry to another in response to new technologies or conditions. One obvious way in which they do so is by lobbying for bail-outs of failing firms, thereby delaying or preventing the shift of resources to areas where they would have a greater productivity”.

managed by the European Commission in a mutually reinforcing way.” (From the homepage of the European Investment Bank, <http://www.eib.org/obj/dev.htm>, 1 August, 1997).

⁵⁷ See e.g. Mitchell & Munger (1991) for a survey of interest group theories.

Another problem with subsidisation, which we examine in more detail in the empirical part of this paper, is that it might make firms less productive for at least two reasons. First, because a subsidy gives the recipient firms an incentive to change the mix of capital and labour, it can give rise to allocative inefficiencies in the sense that a firm which, for example, is granted an investment subsidy might over-invest in capital. Second, subsidisation can give rise to technical (X-) inefficiencies. If the subsidy is captured by the firms as higher profits, then it gives the company stakeholders, in particular managers and workers, the potential to capture these profits in the form of slack or lack of effort. Leibenstein (1966, p. 408) has argued that monopolies which earn supernatural profits tend to be less efficient (i.e. more X-inefficient) because: "... where the motivation is weak, firm management will permit a considerable degree of slack in their operations and will not seek cost-improving methods". Similarly, if the subsidies help the supported firms to avoid bankruptcy then these firms are not forced to re-organise their activities and improve their performance to the same extent as non-supported firms, which are facing potential bankruptcy.⁵⁸ Finally, firms which are potential recipients of subsidies might, if the pay-off is high enough, become more interested

⁵⁸ See Burton (1983, p.44) for a discussion along these lines. Schmidt (1991) shows, among other things, that the managements of firms that are more likely to be liquidated have an incentive to work harder for cost reductions in order to avoid liquidation. A similar argument has been put forward by Dahmén (1998). He argues that it is important to distinguish between competitiveness and development potential. The former is related to prices and costs of production while the latter, which is most important for long term growth, has to do with the possibilities and the ability to bring in something new and more productive. If a firm's profits and liquidity improve, due to e.g. a devaluation or a subsidy which eases the transformation pressure that the firm is exposed to, "It cannot be ruled out that efforts expended on finding ways to something new can seem less urgent, and those measures which the transformation pressure calls forth are postponed", (p.70). That is to say, the firm might not fully utilise its development potential.

in investing in subsidy-seeking activities (e.g. lobbying) than other more productive activities (e.g. R&D investments).⁵⁹

Empirically, some studies have systematically examined industrial policy targeting and industry performance. A recent study by Lee (1996), for example, finds that the South Korean government has primarily targeted low-productivity industries since the 1960s. Furthermore, it is found that Korean industrial policies have not been successful in promoting productivity growth. As a plausible explanation for the results Lee suggests that targeted industries might have become less productive because targeting, which can be seen as a form of protection, decreases competition, which in turn might make firms less efficient. See also Beason & Weinstein (1996), who report similar results for Japanese industrial policy.

4.3 AN EMPIRICAL FRAMEWORK

On the basis of the discussion in the preceding section, there is a possibility that subsidised firms might become less productive over time. To examine the effects of subsidies (as well as other industrial policy measures) on productivity a standard approach in the literature on industrial policy is to examine if a vector of policy

⁵⁹ See Baumol (1990), who argues that the allocation of productive entrepreneurial activity is heavily influenced by the relative payoffs that society offers to such activities compared with unproductive activities. Similarly, Kornai (1986, p.10) argues that subsidisation might give rise to soft budget constraints which might lead to inefficient use of resources: "The most important issue is dynamic adjustment. If the budget constraint is hard, the firm has no other option but to adjust to unfavourable external circumstances by improving quality, cutting costs, introducing new products or new processes, i.e. it must behave in an entrepreneurial manner. If however the budget constraint is soft such productive efforts are no longer imperative. Instead the firm is likely to seek external assistance asking compensation for unfavourable external circumstances. The state is acting like an

variables can be used after controlling for various differences between the examined industries, to explain some industry performance variable.⁶⁰ In this paper a similar approach is chosen to evaluate the performance of the firms that have been granted regional policy supports. Because the subsidies basically are capital subsidies the analysis focuses on a capital-augmenting production function model.⁶¹ This model consists of four variables: output (Y), capital (K), labour (L) and “effectiveness” of capital (A). The production function is defined as follows:

$$Y(t) = F(K(t)A(t), L(t)), \quad (1)$$

where t denotes time. The growth rate of Y is a function of the growth rate of K, L and A:

$$\dot{Y}(t) = \frac{\partial Y(t)}{\partial K(t)} \dot{K}(t) + \frac{\partial Y(t)}{\partial A(t)} \dot{A}(t) + \frac{\partial Y(t)}{\partial L(t)} \dot{L}(t), \quad (2)$$

where a dot denotes a time derivative, and $\partial Y / \partial K$ and $\partial Y / \partial A$ denote $[\partial Y / \partial (AK)]A$ and $[\partial Y / \partial (AK)]K$, respectively. Dividing both sides by Y(t) and rewriting yields

overall insurance company taking over all the moral hazards with the usual well known consequences: the insured will be less careful in protecting his wealth”.

⁶⁰ See e.g. Beason & Weinstein (1996) and Lee (1996).

⁶¹ Alternatives to the capital-augmenting definition of technological progress are either a Hicks neutral definition, $Y = AF(K, L)$, or a labour-augmenting definition, $Y = F(K, AL)$. If one uses Cobb-Douglas production functions then the definition of the type of technological process is essentially the same.

$$\begin{aligned} \frac{\dot{Y}(t)}{Y(t)} &= \frac{K(t)}{Y(t)} \frac{\partial Y(t)}{\partial K(t)} \frac{\dot{K}(t)}{K(t)} + \frac{A(t)}{Y(t)} \frac{\partial Y(t)}{\partial A(t)} \frac{\dot{A}(t)}{A(t)} + \frac{L(t)}{Y(t)} \frac{\partial Y(t)}{\partial L(t)} \frac{\dot{L}(t)}{L(t)} \\ &\equiv \alpha_K(t) \frac{\dot{K}(t)}{K(t)} + R(t) + \alpha_L(t) \frac{\dot{L}(t)}{L(t)} \end{aligned} \quad (3)$$

where $\alpha_K(t)$ and $\alpha_L(t)$ are the elasticities of output with respect to K and L, respectively. $R(t)$ reflects all sources of growth other than the contribution of capital and labour. If output is measured as value added then $R(t)$ measures total factor productivity growth (TFP-growth).⁶²

Because the firms which are granted a capital subsidy must promise to hire more employees, the subsidies can lead to an increase of total output in three ways: either through an increase in K and/or L or through $R(t)$. If $R(t)$ is positive the firm can produce more over time with given inputs, i.e. productivity growth is positive. To examine how subsidies affect productivity growth we assume that $R(t)$ can be expressed as a function of subsidies and a vector X. The X vector consists of various factors that might affect productivity growth. That is to say $R(t)$ can be expressed as follows:

$$R(t) = h(\text{SUBSIDY}, X) \quad (4)$$

⁶² Like most other studies of productivity growth, our analysis focuses on the growth of value added and not on growth of output (total real sales). Output and value added are related to each other in the following way: $Q = F(AK, L, I)$, where Q is total real output, I is intermediate goods and A, K and L are as in the text. Change of total output can be written as $dQ = (F_{AK}K)dK + (F_{AK}A)dA + F_LdL + F_I dI$, where F_h denotes the partial derivative. Rearranging gives $dQ - F_I dI = \text{change of (real) value added} = (F_{AK}K)dK + (F_{AK}A)dA + F_LdL$.

To test if the subsidies affect productivity growth positively or negatively, a panel data set which consists of a large number of subsidised and randomly chosen non-subsidised manufacturing firms is examined and a variable is included which measures how large subsidies a firm has been granted. To be able to isolate the effects of the subsidies the X vector should, ideally, consist of all factors that affect productivity growth and which differ between the two types of firms. For example, variables which measure competitive conditions, organisational influences and labour relations might be important.⁶³ However, due to data limitations at the firm level many variables which it might be relevant to include have been excluded. The X vector consists of three variables: the age of the firm, a location factor, and industry dummies.

An effect which might affect productivity is related to learning by doing, which is supposed to be related to the age of a firm. An older firm is expected to become more productive over time if for instance it has improved its organisation and learned how to utilise the workers and the capital in the best possible way.⁶⁴ On the other hand, an older firm might have become petrified in some sense or might not have as strong an incentive as a younger firm to invest in new technology.⁶⁵

⁶³ See Caves & Barton (1990, Ch. 5) for a further discussion about various variables which might affect performance of firms.

⁶⁴ An example of this process is the so called Horndahl-effect, see Lundberg (1961) or Ohlin (1962).

⁶⁵ In the endogenous growth literature on leapfrogging a similar argument has been put forward. Nations (as well as regions and firms) that have a great deal of experience with an old technology may not be able to take advantage of new technologies because they do not have such strong incentives as nations which are not as dependent of old technology to implement the new technology, see e.g. Brezis et al (1993) for a discussion.

Moreover, due to vintage effects a younger firm might be more productive if its capital stock is more modern than the capital stock of an older firm.⁶⁶

In the official motivations for the support it is also argued that regional policy subsidies are motivated because it is more troublesome to run a business in the sparsely populated areas (the so called support areas) in the north of Sweden. Similarly, in the growth literature, and as we discussed in section 2, it has been argued that firms which are located closer to larger markets are more productive than firms located in the periphery. Because some firms are located inside the support areas and some firms outside the support areas (about 80% of the non-supported firms) and because we like to control for the effect of localisation, an area dummy variable has been included.

Finally, to control for differences across industries ISIC 2-digit level industry dummies are included. The industry dummies pick up the influence of factors that are common to all firms that belong to the same industry. The statistical model which is finally estimated is specified as follows:

$$\begin{aligned}
 GROWTHY_{i,t-t_0} = & b_0 + b_1 GROWTHK_{i,t-t_0} + b_2 GROWTHL_{i,t-t_0} + \\
 & + b_3 AGE_{i,t-t_0} + b_4 AREA_{i,t-t_0} + b_5 SUBSIDY_{i,t-t_0} + \\
 & + \text{Industry dummies} + e_{i,t-t_0}
 \end{aligned}
 \tag{5}$$

⁶⁶ Wolff (1996) finds that the vintage effect is an important determinant of the post-1973 productivity slowdown among OECD countries.

where $GROWTHY_{i,t-t_0}$ is firm i 's growth of value added for various periods.⁶⁷ Value added is defined as operating profits after depreciation plus wages. $GROWTHK_{i,t-t_0}$ and $GROWTHL_{i,t-t_0}$ are growth of the capital stock and the number of employees, respectively. The capital stock is defined as the book value of total assets. The number of employees is used because data do not allow us to use a more precise measure (e.g. total working hours). AGE_{i,t_0} is defined as the year firm i was founded. $AREA_{i,t_0}$ is a dummy variable which takes on the value one for firms located in the support areas and zero otherwise.⁶⁸ $SUBSIDY_{i,t_0}$ measures the total value of all subsidies (in M.SEK) firm i has been granted between 1989 and 1993 divided by the number of employees in 1989. $e_{i,t-t_0}$ is the error term. To examine if the effects of the subsidies change over time the model is re-estimated for four periods: 1989-90, 1989-91, 1989-92, and 1989-93, respectively.

4.4 DATA

To estimate (5) a data set which consists of subsidised and non-subsidised manufacturing firms has been constructed. Information from NUTEK has helped us to identify a group of firms which received their first capital subsidy in 1989. Both financial and some non-financial information for all firms has been collected from UC AB, a credit report firm that collects annual reports from every Swedish firm,. The firms in the control group, which have been randomly selected from the

⁶⁷ All variables are in 1994 prices.

⁶⁸ The support areas are defined in SOU 1996:69.

whole population of firms, have not received any subsidies between 1980 and 1995.⁶⁹

Several selection criteria have been used. The first problem is to decide how long one should follow the firms after the subsidies have been granted. If one uses a period that is too short, there is a risk the the evaluation will misrepresent the success/failure of the subsidies. Having too long a time span might make it difficult to isolate the effects of the support. What is too short and too long is difficult to say. We follow the firms from 1987 until 1993. Information for 1987 and 1988 has been collected so as to be able to examine the historical performance of the firms. Due to data limitations, 1993 is chosen as the terminal year. A problem with our data set is the missing observations. In 1989 there are 832 non-subsidised firms and 72 subsidised. In 1993 the numbers of firms have dropped to 634 and 56 respectively. Firms are missing for at least three reasons: they have been liquidated, they have merged with other firms or the lack of observations for some years has made it impossible to calculate the measures of change that we utilise in the estimations. Missing observations might be a problem if e.g. low productivity firms to a larger extent are missing for one group; then the estimations might overestimate the performance for this group. However, this is probably not a severe problem because the proportions of missing observations are about the same for both groups.

⁶⁹ Note that both types of firm might have received other subsidies. Unfortunately data do not allow us to control for this problem.

Because the capital subsidies that are studied in this paper are primarily granted to the manufacturing industry (see Table 1) another selection criterion is that only manufacturing firms are examined. Moreover, all firms have between 1 and 75 employees and none had an operating income of zero in 1989. These criteria were used in order to remove very small and inactive firms, and large firms. Finally, only joint-stock companies are studied.

Table 1. Distribution of support between 1983 and 1994. 1994 prices.

ISIC	1	2	3	4	5	6	7	8	9	Total support
Share of support, %	<1	5	52	<1	<1	9	3	22	7	11 B.SEK

^a ISIC is ISIC 68 which is called SNI 69 in Sweden. 1 = Agriculture, forestry, hunting and fishing; 2 = Mining and quarrying; 3 = Manufacturing industry; 4 = Electricity and water services; 5 = Construction; 6 = Wholesale and retail trade, restaurants and hotels; 7 = Transport and communication; 8 = Finance, insurance, real estate and business services; 9 = Community, social and personal services.

Source: NUTEK and own calculations.

In Table 2 some characteristics of the supports are summarised. In 1989 there were 832 non-supported firms and 72 supported firms. Between 1989 and 1993 the supported firms were granted about 73.4 M.SEK, which corresponds to about 1.02 M.SEK per firm or 70.5 T.SEK per employee.

Table 2. Size of samples and distribution of support in 1989.

	Non-supported firms	Supported firms
No. of obs. per sample in 1989	832	72
Total support 1989-1993, M.SEK ^a	0	73.4
Avg. supp./firm., M.SEK	0	1.02
Avg. supp./employee, T.SEK	0	70.5

^a 1994 prices.

4.5 RESULTS

A problem when one tries to evaluate the effects of subsidies is to assess to what extent the historical performance of subsidised firms affects their future performance. If they performed worse than the non-subsidised ones prior to the year the subsidies were granted, and if this development continues after the subsidies have been granted, then it is difficult to assess how the subsidies have affected the firms' development. To examine if there are any historical differences between the firms a standard logit model is estimated, which examines if different firm characteristics can be used to discriminate between the two types of firm.⁷⁰ The dependent variable is the binary variable TYPE, which is defined as.

$$\text{TYPE}_i = \begin{cases} 1 & \text{Subsidised firm} \\ 0 & \text{Non - subsidised firm} \end{cases}$$

and the probability that a firm i is granted a subsidy is estimated as a function of k explanatory variables.

Table 3 displays the result of the estimation. Column 1 reports the results for 1989. The only significant differences between the firms are that the subsidised firms to a larger extent are located in the support areas, that they are younger and that they are less labour productive. The capital intensity coefficient has a positive sign but is

⁷⁰ See Maddala (1989) for a discussion about logit models. An alternative to the logit model is the probit model. Probit models have also been estimated in this study. The estimated parameters differed slightly but the qualitative results did not change.

insignificant at the 10% level (p-value = 11%). In column 2 a group of variables which measure change between 1987 and 1989 are included (change of value added, number of employees, capital, labour productivity and capital intensity). The coefficients should be carefully interpreted because 37 out of 72 non-supported firms were missing. None of the included variables are significant, i.e. it seems as if the firms have performed equally well before the subsidies were granted.

Table 3. Coefficient estimates for the logit model.

Dependent variable: Type of firm (TYPE)		
	1	2
Variables		
Y (Value added)	3.2E-09 <i>0.04</i>	6.6E-08 <i>0.47</i>
K (Capital stock)	1.5E-08 <i>0.73</i>	2.3E-08 <i>0.85</i>
L (Number of employees)	0.02 <i>1.05</i>	-0.005 <i>-0.17</i>
AGE (Year firm was founded)	0.05 <i>3.75^a</i>	0.006 <i>0.42</i>
AREA (Support area dummy)	2.12 <i>7.58^a</i>	2.18 <i>5.43^a</i>
Y/L (Labour productivity)	-2.2E-06 <i>-1.73^c</i>	-2.3E-06 <i>-0.98</i>
K/L (Capital intensity)	3.7E-07 <i>1.63</i>	4.5E-07 <i>1.45</i>
\dot{Y}_{87-89}	-	0.01 <i>0.09</i>
\dot{K}_{87-89}	-	0.46 <i>1.02</i>
\dot{L}_{87-89}	-	-0.12 <i>-0.31</i>
\dot{VL}_{87-89}	-	-0.11 <i>-0.38</i>
\dot{KL}_{87-89}	-	-0.40 <i>-0.76</i>
Constant	-7.50 <i>-6.47^a</i>	-4.43 <i>-3.50^a</i>
Log Likelihood	199.25	114.28
N (No. of supp. firms)	896 (72)	659 (35)

Notes: t-statistics in italics. ^a, ^b and ^c indicate significance at 1, 5 and 10 percent respectively, using a two-tailed test. \dot{Y}_{87-89} , \dot{K}_{87-89} , \dot{L}_{87-89} , \dot{VL}_{87-89} and \dot{KL}_{87-89} measure change of value added, capital, labour, labour productivity, and capital intensity between 1987 and 1989, respectively.

Does subsidisation affect the firms' productivity performance? The growth accounting framework, presented in section 3, says that any correlation between a policy variable and output growth could come from two effects. First, the subsidies may influence capital accumulation and thus output growth. And second, they could affect the output growth by influencing TFP growth. To answer the question we begin by examining Table 4 which displays the correlation between SUBSIDY and change of value added, capital and labour for various periods. The table suggests that there is a positive correlation between subsidisation and the three variables.

By estimating (5) the effects of subsidisation on TFP growth can be isolated. Table 5 displays the results of the estimations for the period 1989 to 1993. Pre-testing revealed heteroskedasticity so the estimates for all regressions have been corrected, using White's (1980) method. The table suggests that during the first year after the subsidies were granted subsidised firms seem to be more productive (Col. 1). However, by extending the period of evaluation it seems as if after the first year productivity growth decreases compared with that of the non-subsidised firms (Cols. 2-4).

Examination of different influence statistics revealed that outliers might have affected the results. To control to what extent this was a problem the regressions were reestimated using a bounded influence estimation technique which minimises the influence of influential outliers.⁷¹ The results of the estimations are displayed in Columns 5-8. The most important changes are that the coefficient values for the

capital and labour elasticities drop considerably. The result, that the more subsidies a firm is granted the more inefficient it becomes, is relatively robust. The SUBSIDY variable follows the same pattern as in the OLS estimations. In the short run productivity growth increases but after the first year it begins to drop and after three years the subsidised firms are significantly less efficient than the non-subsidised firms.

Table 4. Correlation matrix for support per employee (SUBSIDY) and growth of value added (GROWTHY), labour (GROWTHL) and capital (GROWTHK) for various years.

	1989-90	1989-91	1989-92	1989-93
<i>GROWTHY</i>	0.10	0.14	0.05	0.08
<i>GROWTHL</i>	0.28	0.23	0.24	0.23
<i>GROWTHK</i>	0.12	0.15	0.12	0.12

Table 5. Subsidisation and productivity growth.

Dependent variable: Growth of value added (<i>GROWTHY</i>)								
Year	OLS				Bounded influence estimation			
	1	2	3	4	5	6	7	8
	1989-90	1989-91	1989-92	1989-93	1989-90	1989-91	1989-92	1989-93
Variables								
Constant	-0.44	-2.02	7.33	7.96	0.03	0.14	0.79	0.72
	<i>-0.73</i>	<i>-0.62</i>	<i>1.47</i>	<i>1.46</i>	<i>0.22</i>	<i>0.73</i>	<i>1.47</i>	<i>1.29</i>
<i>GROWTHK</i>	0.07	-0.78	2.62	2.77	0.26	0.31	0.46	0.43
	<i>0.27</i>	<i>-0.47</i>	<i>1.81^c</i>	<i>1.82^c</i>	<i>4.34^a</i>	<i>2.81^a</i>	<i>2.88^a</i>	<i>2.72^a</i>
<i>GROWTHL</i>	-0.80	2.42	2.67	2.26	0.66	1.03	1.15	1.33
	<i>-0.89</i>	<i>5.26^a</i>	<i>5.09^a</i>	<i>4.44^a</i>	<i>5.94^a</i>	<i>2.89^a</i>	<i>4.07^a</i>	<i>3.99^a</i>
<i>AGE</i>	0.009	0.04	-0.10	-0.10	-0.001	-0.003	-0.01	-0.01
	<i>1.02</i>	<i>0.80</i>	<i>-1.28</i>	<i>-1.25</i>	<i>-0.44</i>	<i>-1.15</i>	<i>-1.38</i>	<i>-1.37</i>
<i>AREA</i>	-0.14	-0.44	1.32	1.54	0.01	0.08	0.07	0.08
	<i>-1.18</i>	<i>-0.60</i>	<i>1.30</i>	<i>1.37</i>	<i>0.30</i>	<i>0.91</i>	<i>0.83</i>	<i>0.85</i>
<i>SUBSIDY</i>	1.93	-1.66	-8.14	-4.57	0.29	-0.71	-1.53	-0.84
	<i>1.71^c</i>	<i>-0.76</i>	<i>-2.61^a</i>	<i>-2.30^b</i>	<i>1.07</i>	<i>-1.02</i>	<i>-1.98^b</i>	<i>-1.09</i>
R^2_{adj}	0.09	0.51	0.48	0.43	0.15	0.23	0.24	0.31
F	7.01	62.27	50.34	38.61	10.77	19.26	18.89	24.56
N	829	780	724	690	829	780	724	690
No. of Sup. firms	63	63	59	56	63	63	59	56

Note: The OLS estimations in Cols. 1-4 are based on White's (1980) adjustment for heteroskedasticity. The bounded influence estimations in Cols. 5-8 minimise the influence outliers have on the estimated coefficients, see Maddala (1989, pp. 417) for a description of the technique. t-statistics in italics. ^a, ^b and ^c indicate significance at 1, 5 and 10 percent respectively, using a two-tailed test. Industry dummies at the two-digit industry level (ISIC 31-39) are estimated and available upon request from the author.

⁷¹ The influence of outliers is minimised using DFFITS as weights. See Maddala (1989, pp. 417) for a further discussion

One explanation for the lower TFP growth of subsidised firms might be that it was firms with economic problems that applied for and were granted the supports. However, the fact that no larger differences in performance could be found between the firms prior to 1989 indicates that it was relatively normal firms which were subsidised. Therefore it seems, instead, as if effects of subsidisation which give rise to allocative inefficiencies (a suboptimal mix of labour and capital) and/or technical (X-) inefficiencies (the management has captured the subsidies in the form of slack or lack of effort and/or they have become more interested in subsidy-seeking activities than productive activities) were more important than the positive effects (e.g. investment in new technologies which help firms to advance their technological development). That is to say, the results suggest that subsidisation can influence growth, but there seems to be little evidence that the subsidies have affected productivity and hence competitiveness. Or, in the spirit of Dahmén, one could argue that subsidisation seems to have hindered rather than helped the firms to utilise their full development potential.⁷² Growth through subsidisation seems to have been achieved simply by using more inputs but not by improving on their usage.⁷³ Moreover, by transferring resources to firms which become less productive, the subsidies have also disfavoured non-subsidised firms because they have been forced to partly finance the subsidies. A strategy which, if it was used on a much larger scale, would have had negative effects on regional as well as national growth.

⁷² See footnote 58.

⁷³ Because it is impossible to examine what would have happened if no supports had been granted we cannot with certainty say that it was subsidisation that led to a lower productivity growth for the subsidised firms. It might be the case that these firms for some other reasons, which we have not been able to control for, have developed less well. To examine if other factors than the ones we have controlled for affect productivity growth Ramsey RESET tests of omitted variables have been calculated. The tests are significant. One should therefore be aware of the possibility of bias in our estimated coefficients.

From a regional policy perspective the estimated coefficient for the AREA variable is also interesting. In the official motivations for the support it is argued that it is more troublesome to run a business in the sparsely populated support areas. However, because the coefficient is insignificant it seems as if no differences can be observed between firms located in the support areas and firms located outside the support areas. This holds for both the OLS estimations and the bounded influence estimations. Although positive agglomeration effects might make firms located in more populated areas more productive, congestion effects can have a negative effect on productivity. It should be noted, however, that we only test if firms located in the support areas are more or less productive than firms located outside the support areas. Agglomeration effects might be more important if one explicitly compares firms located in less populated areas with firms located in larger cities, where the population density is much higher.

4.6 CONCLUDING REMARKS

Because investment subsidies are seen by many politicians in Sweden as well as in the EU as an efficient instrument to increase growth in firms located in backward regions, and because it is unclear how government subsidies influence the growth of firms' productivity, the purpose of this study has been to examine differences in productivity performance between Swedish non-subsidised firms and firms which have been granted capital subsidies. By comparing the firms and by controlling for

different factors that might affect total factor productivity growth we have tried to isolate the effects of subsidisation.

The study shows that subsidisation is positively correlated with growth of value added and that productivity of the subsidised firms seems to increase the first year after the subsidies were granted. But, after the first year it seems that the more subsidies a firm has been granted, the worse TFP growth develops. An implication of this study, as well as of the results from e.g. Beason & Weinstein's (1996) and Lee's (1996) studies of industrial policy in Japan and Korea, is that even if there might be market failure justifications for subsidies, it is not certain that resources will be efficiently allocated. The influence of important pressure groups can lead to subsidisation of less productive firms, which implies that industrial policy prevents or delays the structural transformation of the industry. Moreover, subsidisation can also make firms less efficient.

In official evaluations of the effects of producer subsidies, the number of (gross) jobs a support program creates is often used as a measure of its effectiveness.⁷⁴ This measure is, however, insufficient for several reasons. For example, by neglecting indirect negative effects (such as the number of jobs lost due to the financing of the supports), the evaluations tend to overestimate the employment effects of the subsidies. But perhaps more importantly, most evaluations do not take into account any growth effects. Therefore, an important task for future research and

⁷⁴ For example, the 8th Annual report on the Structural funds of the EU claims that the result of Objective 2 assistance (the conversion of regions in industrial decline) is that more than 870 000

for future public evaluations of support programs is to examine, to a larger extent, the effects of subsidisation on productivity.

4.7 REFERENCES

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5. DO CAPITAL SUBSIDIES TO FIRMS INCREASE EMPLOYMENT?⁵

5.1 INTRODUCTION

In many countries the government has subsidised the business sector to increase employment in regions which are lagging behind. Such supports have become increasingly popular in the EU as well.⁷⁵ To motivate the supports, market-failure arguments are often used and a common theme of these arguments is that the politicians and the bureaucracy have to soften the problems caused by the market forces. It is then implied that the government has the intention, and all the information and competence needed, to solve the same problems.

This view has, however, been criticised. One critique states that politicians use market-failure arguments to motivate the decisions while the “true” intentions are to gain votes and/or to favour politically influential groups.⁷⁶ A consequence of this view is that suboptimal decisions might be taken, e g projects which are extremely

⁵ This paper has been published in Eliasson, G & Karlson, N, (ed.), (1998), *The limits of government: On policy competence and economic growth*. City University Press, Stockholm.

⁷⁵ Until the creation of the European Regional Development Fund in 1975 regional policy was relatively unimportant in the EU. Since then the role of regional policy within the Union has become much more important and in 1994 the EU granted 26 Billion ECU via the structural fund (see EU, 1995a, and Jones, 1996). In addition to this, the European Commission reports that in twelve European countries in 1992 about 94 Billion ECU were transferred nationally to the industry (see EU, 1995b). These supports can to a large extent be considered as regional policy aid.

costly might be realised if the projects are politically attractive. It has also been argued that even if market failures exist and even if the government is interested in correcting them, it is not certain that the government has sufficient information or competence to solve the same problems. Efficient policy decisions require knowledge about locally dispersed and changing information. Typically, however, relevant information about local conditions is missed, ignored, extremely costly to collect or potentially false and misleading.⁷⁷ Politicians and bureaucrats, furthermore, lack the relevant competence to understand and implement many decisions efficiently. He or she normally lacks the competence to assess which firms will perform well and which firms are more likely to become losers.⁷⁸ A final problem is that politicians and bureaucrats are not working under the “laws of profit and loss,” i.e. they do not have the competence to pick “winners” and they lack the incentives of private investors to avoid “losers”.⁷⁹ Thus an ambition to correct perceived market failure might easily turn into a Government failure.

In addition to this general critique of the State’s competence to successfully intervene in the market process, there are several other reasons why politicians and bureaucrats might fail to create new jobs by using different types of subsidies. At the macro level, subsidisation of some firms might crowd out jobs in other unsubsidised firms, and if resources are transferred to declining industries then lock-in effects might occur. By granting subsidies to declining industries, the government can only

⁷⁶ For a discussion about political decision-making (see e.g. Peltzman, 1976).

⁷⁷ For a discussion about the importance of efficient use of locally dispersed information (see e.g. Hayek, 1948, Lavoie, 1985, and Burton, 1983).

uphold the level of employment as long as they continue to grant subsidies and the potential unemployment effects are only postponed to a later date, see Carlsson (1981) and Carlsson et al (1983). Lock-in effects might also affect growth negatively, or as Olson (1982, pp 63) argues: "Special-interest groups also slow growth by reducing the rate at which resources are reallocated from one activity or industry to another in response to new technologies or conditions. One obvious way in which they do so is by lobbying for bail-outs of failing firms, thereby delaying or preventing the shift of resources to areas where they would have a greater productivity."⁸⁰ Since the regional supports examined in this study are predominantly investment subsidies, it may be of interest to recall Eliasson & Lindberg's (1981) observation for simulation experiments of various Government support programs: The macro economy can absorb fairly significant investment mistakes at the micro firm level, but the large macroeconomic effects occur when production is carried on, supported by subsidies, in the failed investments, tying in scarce resources, notably labour.

At the firm level, the outcome is also less clear. First, even if the firm must promise to hire new workers to get a subsidy this does not necessarily mean that new jobs will be created. The support-granting authorities do not know whether the employer would have hired a new worker irrespective of the support. Second, because the support-granting authorities cannot force the firm to uphold a certain

⁷⁸ According to Eliasson (1998) the lack of relevant competence is one important reason why the government should not carry out ambitious industrial policy programs.

⁷⁹ See Burton (1983).

level of employment over time, the firm can, after a while, reduce the number of employees. Finally, if the recipient uses the subsidy in order to lower the prices, then unsubsidised firms might be outcompeted and forced to reduce the number of employees.

Empirically, a number of government evaluations have reported that different types of producer subsidy have given rise to relatively large employment effects. For example, in the 8th Annual report on the Structural funds of the EU it is estimated that the result of Objective 2 assistance (the conversion of regions in industrial decline) is that more than 870,000 gross jobs will be either created, saved or redistributed as a result of the assistance over the period 1997-99. A problem with this study is that it does not take account of the problems with subsidisation, discussed above into account. Meanwhile other studies, on the other hand, that try to take these problems into account, often report that the employment effects of various industrial policy supports are small or non-existent. An example of the latter type of study is described in Carlsson (1981) and Carlsson et al (1983); he examines the large selective supports that were granted to firms with severe economic problems in the Swedish basic industries at the end of the 1970s and in the early 1980s, using a dynamic, firm-based simulation model of the entire Swedish economy. The studies, which are very critical of the use of selective subsidies to solve employment problems in declining industries, come up with several conclusions. In the short term unemployment was lowered, but at the cost of

⁸⁰ See Beason & Weinstein (1996) and Lee (1996) for two empirical studies which show that the industrial policies of Japan and Korea have primarily targeted low productivity industries and

delayed reorganisation of the industry. In the long term, the effects of the supports to industry were negative, because the unemployment problems were postponed until the day the support programs ended. Another effect was that non-supported firms were negatively affected, because lower unemployment led to higher wages which increased the labour costs and consequently hindered the expansion of these firms. On the whole, the Swedish industrial subsidies program of the 1970s amounted to granting enormous subsidies to the most mismanaged and hopeless firms. For this reason Carlsson (1981) and Carlsson et al (1983) simulate different allocations of support money, holding the Government budget approximately unchanged, and distributing the subsidies, for instance, evenly on all as a general reduction in the payroll tax, or allocating the subsidies to the most profitable firms with the fastest growing exports. In that comparison, except for a temporary period of about 3-5 years, where the failing firms lay off labour, the subsidy program significantly lowers growth and long term employment.

Another type of study compares the employment development for supported firms, with a control group of non-supported firms. The control group is assumed to represent what would have happened if the supported firms had not been granted any supports. Although these studies do not take into account indirect effects, e.g. the effects of the financing of the supports, these studies often report that the job creation effects of subsidies are relatively small. One such study is Bohm & Lind (1988, 1989). They report that in 1984-1986, a general reduction of the employer fees in the north of Sweden had no direct effects on the level of employment. See also

consequently have not had a positive effect on long-term growth

Hart & Scott (1994) and Krmenc (1990) for two similar studies of employment effects of assistance programs in Northern Ireland and in the USA, respectively.

Because different types of job-creating support programs are high on the political agenda in several countries (and especially in the EU and in the member states of the EU), and because it is far from clear that politicians can successfully intervene in the market process, the purpose of this paper is to evaluate the employment effects of two Swedish regional policy supports granted to firms (the localisation support and the investment support). The supports are primarily granted (selectively) to firms which are located in areas with economic problems, notably unemployment. The support programs are discussed in more detail in section 2.

To examine the employment effects of the supports, one would have liked to know what would have happened if no supports had been granted. Because this counterfactual problem is impossible to answer if one does not have a complete and appropriately defined simulation model of the Swedish economy (cf. the studies by Carlsson 1981 and Carlsson et al 1983), a different approach has been chosen. The employment effects of the subsidies are studied by comparing the development of employment for a large number of similar supported and non-supported manufacturing firms located in the same area during the period 1988 to 1993. A limitation of our study is that only the partial effects of the subsidies are studied and that we do not take into account several of the indirect effects on the macro level

which were discussed above. However, some of them are discussed at the end of the paper.

The paper is organised as follows. In section 2, the subsidies that are examined are briefly described and the data-set is presented. In section 3, an econometric model and the results of the estimations are presented. The paper ends with some concluding remarks.

5.2 DATA

Since regional policy was introduced in Sweden at the end of the 1960s, the main objectives have been to uphold and increase employment and growth in the northern regions and especially in the so-called support areas.^{81 82} To reach these objectives of regional policy, different types of subsidy have been granted to firms in the support areas. Basically two types of support have been granted: the general ones which are granted to all firms that belong to the support areas, and the selective ones, which the firms must apply for.⁸³ In the 1980s and early 1990s totally about 1.7 billion SEK have been granted annually.⁸⁴

⁸¹ This section is based primarily on SOU 1984:74, SOU 1996:69, SFS 1990:642 and NUTEK 1993:43 and 44.

⁸² See NUTEK 1993:43 for a description of the support areas.

⁸³ See SOU 1996:69 and NUTEK 1993:43 for more detailed descriptions of the different types of support that are granted to the industry in the support areas.

⁸⁴ These supports constitute a minor part of all supports to the corporate sector. Taking into account other types of support Barkman & Fölster (1995) have calculated that about 50 to 80 billion SEK, 1994 prices, have been transferred annually in the 1980s and 1990s to the business sector.

In this study the focus is on the selective subsidies. They constitute about half of all subsidies (see NUTEK 1993:43) and they are largely capital supports because the total capital cost for the investment is subsidised by up to 40%. The supports are to be used primarily for investments in machinery and buildings. Moreover, to be eligible for the supports two additional requirements are that the firms are relatively profitable and that they promise to increase their number of employees. The supports are administrated primarily by local officials. Larger supports are granted either by NUTEK (the Swedish Industrial Board for Industrial and Technical Development), which is the support-granting authority that monitors the supports, or the government.

To examine the employment effects, a data-set which consists of supported and non-supported manufacturing firms has been constructed. Information from NUTEK has helped us to identify a large number of firms which received their first support in 1988. Financial as well as some non-financial information for both the supported and non-supported firms between 1988 and 1993 has been collected from UC AB, a credit-report firm that collects annual reports from every Swedish firm. To compare the development of the supported firms with a control group of non-supported firms, the firms in the control groups have been randomly selected from the whole population of firms and have not received any support between 1980 and 1995.⁸⁵ Several selection criteria have been used. Because the capital subsidy is primarily

⁸⁵ Note that both supported and non-supported firms might have received other supports. Unfortunately, data do not allow us to control for this problem.

granted to the manufacturing industry, only data for manufacturing firms are used; see Table 1.

Table 1. Distribution of the support between 1983-1994. 1994 prices.

ISIC	1	2	3	4	5	6	7	8	9	Total support ^b
Share of support, %	<1	5	52	<1	<1	9	3	22	7	11 B.SEK

^a ISIC is ISIC 68 which is called SNI 69 in Sweden. 1 = Agriculture, forestry, hunting and fishing; 2 = Mining and quarrying; 3 = Manufacturing industry; 4 = Electricity and water services; 5 = Construction; 6 = Wholesale and retail trade, restaurants and hotels; 7 = Transport and communication; 8 = Finance, insurance, real estate and business services; 9 = Community, social and personal services

^b 1994 prices

Source: NUTEK, Statistics Sweden and own calculations.

To exclude geographical factors that might affect the development of employment, only firms which are located in the so-called support areas are studied.⁸⁶ Two other criteria are that all firms have between 1 and 75 employees and that none of the firms had an operating income of zero in 1988. These criteria were used to remove small and inactive firms and large firms. Another selection criteria is that only joint-stock companies are included in the study. Due to data limitations, a problem which we have not been able to control for is the historical performance of the examined firms. If the supported firms had various economic problems and performed less well prior to the year when the supports were granted, then the employment effects of the subsidies might be underestimated, and vice versa.⁸⁷

⁸⁶ Most of them are in the north of Sweden (see NUTEK 1993:43, and SOU 1996:69 for a detailed description of the support areas).

⁸⁷ However, the results in Chapter 3, where a similar data-set is used, indicate that the supported firms do not differ, from a financial point of view, from randomly chosen firms.

The first group consists of 136 non-supported firms (NS-firms), which had 1067 employees in 1988. The second group consists of 81 firms which received a subsidy in 1988 (S-firms), and which had 1392 workers employed in 1988; see Table 2. Several of the supported firms received additional supports after the first one (53%). Between 1988 and 1993 175 million SEK were transferred to the supported firms (average support per firm was 2.2 million SEK).⁸⁸ This corresponds to 234 thousand SEK per employee. Both groups also have a similar distribution among the industries; see Table 3.

Table 2. Size of samples and support, 1994 prices.

	<i>Non-supported</i>	<i>Supported</i>
Total no. of employees	1,067	1,392
No. of firms	136	81
Total support 1988-1993, M.SEK	0	175
Avg. supp./firm in 1988, M.SEK	0	2.2
Avg. supp./employee, T.SEK	0	234
% of all firms which received more than 1 supp 1988-1993.	0	53%

Table 3. Distribution among industries in 1988.

<i>ISIC*</i>	<i>Non-supported</i>		<i>Supported</i>	
	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>
31	9	6.6	5	6.2
32	8	5.9	6	7.4
33	22	16.2	24	29.6
34	12	8.8	2	2.5
35	14	10.3	6	7.4
36	7	5.1	1	1.2
37	1	0.7	3	3.7
38	60	44.1	32	39.5
39	3	2.2	2	2.5
Total	136	100	81	100

* ISIC is ISIC 68 which corresponds to SNI 69 in Sweden. 31 = Manufacture of food, beverages and tobacco; 32 = Textile, wearing apparel and leather industries; 33 = Manufacture of wood and wood products; 34 = Manufacture of paper and paper products, printing and publishing; 35 = Manufacture of chemicals, petroleum, coal, rubber and plastic products; 36 = Manufacture of non-metallic mineral products; 37 = Basic metal industries; 38 = Manufacture of fabricated metal products, machinery and equipment. 39 = Other manufacturing industries.

⁸⁸ 1\$ = 8 SEK in February 1998.

The supported firms are larger than the non-supported in the sense that they have more employees and a greater turnover per firm; see Table 4. The supported firms pay higher wages, which might indicate that they have more skilled workers than the non-supported firms. They have also been established slightly later than the non-supported firms. No significant differences could be found for capital intensity (= total assets/no of employees), labour productivity (= value added/no of employees) and level of profit (= (value added - total wages)/total assets)).

Table 4. Descriptive statistics for the whole period, 1994 prices.

	<i>Non-supported</i>		<i>Supported</i>		<i>T-test</i>
	<i>Mean</i>	<i>Std D.</i>	<i>Mean</i>	<i>Std D.</i>	
Capital intensity, T.SEK	589	1469	706	607	-1.56
Profit, %	0	88	5	12	-1.12
Labour productivity, T.SEK	184	197	200	117	-1.46
Wage, T.SEK	151	66	164	39	-3.52 ^a
Age ¹	1,972	14	1,974	12	-3.21 ^a
Turnover, T.SEK	7,153	14,064	18,244	21,283	-10.62 ^a
Avg. No. of employees.	8	9	18	16	-14.35 ^a

Note. ^a, ^b and ^c indicate significance at 1, 5 and 10 percent respectively, using a two-tailed test.
¹Average year firms were founded.

To conclude, most subsidies are granted to the manufacturing industry, an industry which has performed less well since the 1970s. Moreover, it seems as if the supported firms are larger, established slightly later and pay out higher wages than the non-supported ones. The situation is thus a mini-variation on the famous shipyard subsidy debacle in Sweden in the 1970s (see Carlsson et al 1981 and section 2) which generated two-dimensional negative dynamics: (i) through the diversification of resources to inferior performers and (ii) through pegging wages at new recruitment to a higher level than would have been the case if these low-

performing high-wage producers had laid off people. In both ways investment and growth in other industries would have been lowered, to judge from the results Carlson et al. These indirect effects are important to keep in mind in the following section because the statistical model that is used is linear and dynamic and cumulative allocation effects, notably negative side-effects, are not taken into account. That is to say, the result underestimates the employment effects of the subsidies.

5.3 EMPLOYMENT EFFECTS OF THE SUBSIDIES

The development of total employment between 1988 and 1993 shows that the supported firms seem to have had a slightly better development; see Table 5. On an aggregated level (ISIC = 3) the total number of jobs fell by 35% for the non-supported firms and by 28% for the supported firms. The supported firms had a better development in the beginning of the studied period. However, from 1989 employment dropped slightly more in the supported firms, about 34% compared with 30% for the non-supported ones.

At the two-digit level there were large differences between the industries. In industry 38 (manufacture of fabricated metal products, machinery and equipment), which received most of the support, the supported firms performed worse than the non-supported. On the other hand, in industry 33 (manufacture of wood and wood products), which was the second largest recipient of subsidies, the supported ones

had a better development than the non-supported ones. Both types of firm also experienced about the same proportion of bankruptcies; see Table 6.

Table 5. Total number of employees. 1988-1993.

		1988	1989	1990	1991	1992	1993	Change 1988-93, %
<i>Index for the whole industry (ISIC=3)</i>		100	99 ^a	103	95	85	77	-23
3	NS	1,067	983	1,009	880	782	690	-35
	S	1,392	1,518	1,377	1,261	1,083	1,005	-28
31	NS	55	58	60	61	58	64	16
	S	56	76	73	68	48	49	-13
32	NS	74	66	34	32	12	9	-88
	S	135	112	112	110	102	90	-33
33	NS	268	272	280	253	213	161	-40
	S	447	472	400	398	390	378	-15
34	NS	107	84	95	85	65	66	-38
	S	21	21	20	18	17	17	-19
35	NS	73	72	66	53	50	45	-38
	S	118	162	149	145	171	126	7
36	NS	44	40	48	44	46	52	18
	S	30	30	40	70	-	-	-
37	NS	4	4	-	-	-	-	-
	S	77	81	76	75	66	62	-19
38	NS	433	382	424	348	335	290	-33
	S	489	545	489	363	286	280	-43
39	NS	9	5	2	4	3	3	-67
	S	19	19	18	14	3	3	-84

^a The employment index for the manufacturing industry was slightly modified in 1989 so the figures before 1989 are not fully comparable with the figures after 1989.

Table 6. Bankruptcies in % of all firms which existed in 1988

Year	<i>Non-supported</i>		<i>Supported</i>	
	Count	%	Count	%
1990	2	1.5	1	1.2
1991	2	1.5	1	1.2
1992	6	4.4	2	2.5
1993	6	4.4	4	4.9
Total	16	11.8	8	9.8

The fall in total employment over the whole period (see first row in Table 5) and the increase of bankruptcies after 1992 suggest that the general economic development is important for the level of employment and that the supports are of

marginal value. To test if this observation is correct, and to assess more exactly the effects of the supports, an econometric model, which controls for the general economic development as well as other factors, is presented and estimated below.

5.3.1 Econometric specification

The change in the level of employment over a period of time in an individual firm can be seen as a function of firm-specific factors, industry-specific factors, political factors and other factors.

To test if political factors matter, i.e. if the capital subsidies affect the total level of employment between 1988 and 1993, we look at the supported and the non-supported firms on an aggregate level in order to cancel out firm-specific factors. The dependent variable is an index of the development of the total employment of supported and non-supported firms at the ISIC 2-digit level for industries 31-39 between 1988 and 1993 (EMPL). To explain the dependent variable the general development in the whole industry, some control variables and a time-dummy for the supported industries for each year between 1988 and 1993 are included.⁸⁹ An index of the overall development of employment in industry i for industries 31-39 between 1988 and 1993 (IND) is used as a measure of the development in the whole industry. The time-dummies take on the value one for supported industries and zero for non-supported industries for each year, (λ) . If the supported industries perform

better than the non-supported industries then each of the time-dummies should be positive and significant. To test the importance of the supports over the whole period an F-test, which simultaneously tests all time-dummies, is calculated. That is to say, the following hypotheses are tested.

$$H_0 : \lambda_{t,S} = 0 \text{ for } t = 88, \dots, 93 \text{ and}$$

$$H_0 : \lambda_{88,S} = \dots = \lambda_{93,S} = 0$$

A problem when one tries to assess the employment effects of subsidies is the choice of time-span. If one uses too short a period there is a risk that the evaluation will misrepresent the success/failure of the program. Having too long a time span might make it difficult to isolate the effects of the support. What is too short and too long is difficult to say. We have chosen six years primarily due to data limitations. However, the inclusion of time-dummies allows us to study if the effect of the support changes over the years.

Looking at the two-digit ISIC level cancels out several firm-specific factors. Some differences might still exist and in order to control for these differences, several variables which pick up different dimensions of the firms have been included. The total assets (book value) per employee (CAPINT) have been included in order to control for differences between the industries in the capital/labour structure. Because the supported industries were, on average, much larger than the non-

⁸⁹ The model we use is a modified version of a fixed effect model (see Judge et al, 1985, Ch. 13).

supported ones the average turnover (SIZE) is included in order to control for differences in size. A value added per employee (LPROD) is included to control for differences in productivity. To control for differences in the skill of the workforce an average wage (SKILL) has been used as a proxy. The variable AGE (= average year firms were founded) is used as a proxy for differences between old and new firms. Finally, to control for differences in profitability the variable PROFIT (= (value added - wages)/total assets)) has been included. The estimated model is specified as follows:

$$EMPL_{itv} = \bar{\beta}_1 + \lambda_{it} + \beta_2 IND_{itv} + \beta_3 CAPINT_{itv} + \beta_4 PROFIT_{itv} + \beta_5 SIZE_{itv} + \beta_6 LPROD_{itv} + \beta_7 SKILL_{itv} + \beta_8 AGE_{itv} + e_{itv}$$

where:

$i = 31, 32, \dots, 39$ (industries at the ISIC 2 - digit level),

$t = 88, \dots, 93$ (year),

$v = NS, S$ (type of firm).

5.3.2 Results

To be able to calculate the F-test, two models have been estimated, one which does not contain the time-dummies and one in which the time-dummies are included. In the estimated models no problems were found with heteroskedasticity, non-normality or multicollinearity. The Durbin Watson test was in the inconclusive region. The results are presented in Table 7.

Table 7. Employment in supported and non-supported industries, 1988-1993.

<i>Variable</i>	<i>Coeff.</i>	<i>t-value</i>	<i>Coeff.</i>	<i>t-value</i>
CONST	-23.78	-0.82	-6.64	-0.20
IND	0.76	5.03 ^a	0.69	3.65 ^a
CAPINT	-4.02E-07	-0.06	-5.24E-06	-0.62
PROFIT	20.22	0.47	3.76	0.08
SIZE	1.65E-06	6.24 ^a	1.96E-06	4.92 ^a
LPROD	-5.12E-05	-1.14	-4.23E-05	-0.92
SKILL	2.58E-04	3.08 ^a	2.57E-04	2.99 ^a
AGE	-0.16	-0.52	-0.27	-0.86
$\lambda_{88,5}$			-6.72	-0.83
$\lambda_{89,5}$			-7.44	-0.86
$\lambda_{90,5}$			-7.37	-0.83
$\lambda_{91,5}$			3.76	0.44
$\lambda_{92,5}$			-13.78	-1.56
$\lambda_{93,5}$			-10.82	-1.16
N	102		102	
Adj. R Square	0.59		0.58	
SS Residual	35624		33550	
DW Test	1.62		1.61	
F-test of the time dummies.	0.90 < $F_{95\%, 14, 88} \approx 1.80$			

Note. ^a, ^b and ^c indicate significance at 1, 5 and 10 percent respectively, using a two-tailed test.

Irrespective of model, the general development (IND) is significant and important. That is to say, both supported and non-supported firms follow the general economic development. The control variables indicate (in both models) that industries which consist of larger firms and firms that pay out higher wages have a higher employment level, i.e. employment does not fall as much in these industries. Other variables are insignificant.

Do the subsidies significantly increase employment? The tests of the hypotheses indicate that this has not been the case. The F-test is insignificant, i.e. no additional information is added when the time-dummies for the supported industries are

included. The individual time-dummies are insignificant, too. That is to say, it seems as if the capital subsidies do not affect the total employment in the supported firms.

5.4 CONCLUDING REMARKS

To create jobs, governments grant subsidies to the business sector, and to justify the subsidies they often refer to different types of market failure. However, because government intervention in the market process is not unproblematic, there is a possibility that subsidisation of firms destroys more jobs than it creates. Moreover, if the subsidies are granted to an inferior producer, subsidisation can give rise to lock-in effects which affect both growth and long-term employment negatively. To study whether subsidisation of firms creates any new jobs, this paper has examined the direct employment effects in Sweden of two selective capital subsidies to the business sector.

By comparing supported and randomly chosen non-supported manufacturing firms located in the same area between 1988 and 1993, it was found that the supported ones had a better development of employment in the first year. But after the first year, the development was worse than in the non-supported firms. The proportions of bankruptcies were about the same for both types of firm. Because the two groups differed in different respects, a model was estimated which controlled for different factors and which isolated the employment effects of the support. The estimation showed that no differences in the development of employment could be found

between supported and non-supported firms, and that both types of firm to a large extent followed the general development of the whole industry.

Although the firms must promise to hire new workers in order to be eligible for a support, the results of the study are not especially surprising. One reason is that the supports are capital subsidies, which give the firms an incentive to substitute labour for capital. Another reason is that the support-granting authorities cannot force the supported firms to uphold the level of employment over time. Due to the severe economic crisis the Swedish industry experienced in the beginning of the 1990s, both the supported and non-supported firms seem to have been forced to lower the number of employees or to become liquidated.

So far, the indirect employment effects of the supports have not been discussed. Perhaps the most important factor is the financing of supports. Resources have been withdrawn from other uses, where they could have been used to e.g. start up new firms or expand existing ones.⁹⁰ A second effect is that the supports might have led to unfair competition. The supported firms might have been able to lower their prices and outcompete non-supported firms, which then might have been forced to fire several workers. How many jobs the financing of the supports destroys and whether non-supported firms have been outcompeted by supported firms, are two interesting questions for further research.

⁹⁰ These and other more “dynamic” welfare losses of taxes have also been discussed by e.g. Kirzner (1985, Ch 5-6). He argues e.g. that taxes (and regulations) destroy the entrepreneurial

In the introduction, we referred to the 8th Annual report on the Structural funds of the EU, which reports that the expected result of Objective 2 assistance is that about 870,000 gross jobs will be either created, saved or redistributed as a result of the assistance over the period 1997-99. A policy implication of our study is that the use of gross jobs to assess whether a support program has been or will be successful is insufficient. Policy-makers, who wish to make good decisions and who wish to evaluate different types of support programs correctly, must take into account several other factors. In addition to the ones that have been discussed above, two more are worth mentioning. First, because it might be profitable to lobby for a subsidy it is important to take into account the costs related to lobbying and the risk that the entrepreneurs become more interested in unproductive support-seeking activities than in other more productive activities. If the entrepreneurs become less interested in productive activities, then long-term growth might be negatively affected, or as Baumol (1990, p 909) argues: "The allocation of entrepreneurship between productive and unproductive activities, though by no means the only pertinent influence, can have a profound effect on the innovativeness of the economy and the degree of dissemination of its technological discoveries." Second, government evaluations of supports to the business sector should to a larger extent examine productivity effects rather than the number of jobs created, because productivity is much more important for welfare and competitiveness in the long run.

discovery process which is an important characteristic of a well-functioning competitive market process.

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