5. The carbon tax in Sweden

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INTRODUCTION

To have a reasonable chance of avoiding the worst effects of climate change, the level of carbon dioxide (CO_2) in the atmosphere needs to be stabilized as soon as possible. This basically means that the whole world must stop emitting carbon completely within the space of less than two generations. For the rich and developed countries, it is reasonable to demand more, leaving a little more room for the poorest countries to adapt a little more slowly. A suitable goal would be decarbonization by 2050. It also happens to be the official goal in Sweden for 2045 and luckily, there is some degree of unity around this goal even though the environmentalists would like to set the date to 2040 and the conservatives maybe 2050 or 2060.

The crucial question is, of course, how is this to be done? Activists often focus on demanding percentage reductions, plans or laws. There is, however, no guarantee that these instruments have any effect. A price of carbon is different. It takes effect automatically in a market economy. Societies are complex and there are numerous policy instruments at various levels. This ranges from the European Community with its plans and its instruments (in particular, the EU Emissions Trading Scheme for climate permits for large industry) to the level of municipalities that plan and permit industries and other economic activities at the local level. Sweden has followed in the footsteps of the United Kingdom in implementing climate legislation and planning (Government Offices, 2008). It has followed Germany in subsidizing renewables, but the most striking feature of Swedish policy is the carbon tax.

Economists often put much emphasis on carbon taxation as the prime instrument of climate policy. One of the reasons for this is that in a market economy, affecting the price of a good or resource will typically be (1) the most effective way of changing resource allocation, and also it is (2) the most all-encompass-

ing, and (3) the most compatible with consumer and producer sovereignty. Let me start with the last of these points. In reverse order:

3. To achieve decarbonization, many everyday choices have to be affected: how and where we build our houses, how we commute to work, what we wear and what we eat. But instead of telling everyone what to eat, how long to shower and whether to go by bike or by (electric) car, we just set the price of carbon – which affect the prices of gasoline, fuel oil, electricity, metals, cars and so on – and then let people make their own individual choices based on their preferences, health, age and other circumstances. Thanks to the price of carbon these individual decisions will automatically take account of the need to quickly phase out carbon and provide incentives for producers and entrepreneurs to find new ways of satisfying consumer demand in a more sustainable manner.
2. We also have the engineering approach. We tell the car companies to build more energy-efficient cars. Sweden has started ambitious and exciting projects in collaboration between the state and business to develop carbon-free steel and carbon-free cement. These are exciting and ambitious projects but at the end of the day, we still need a price on carbon. Otherwise, people will think of NEW ways to burn fossil fuels – new products ranging from anything like heating pools in the winter to the senseless so-called “mining” of bitcoins that now accounts for so much electricity that it requires numerous mega-sized power plants to produce. Thus, to set a price on carbon would be the most efficient tool to encompass a broad set of products and disincentivize the use of fossil fuels.
1. By respecting consumer sovereignty, incentivizing new technology and by covering as many uses as possible, carbon pricing tends to achieve emission reductions much more cheaply than through mandated programs in which government just tells firms and consumers what to do.

Experts argue what the optimal level of a carbon tax should be, and estimates start at about €50/ton of CO₂ (see, e.g., Edenhofer et al., 2019). Only one or two countries come close to this and the country with the highest tax, which has been imposed for a substantial time, is Sweden, with a tax of above €100/ton. The carbon tax was introduced in 1991 at a rate corresponding to SEK250 (€24) per ton of fossil carbon dioxide and has gradually been increased (see Swedish Government, 1994). In 2019 it was SEK 1180 (€115).¹ By increasing the tax level gradually and in a stepwise manner, households and businesses have had time to adapt, which has improved the political feasibility of tax increases. The CO₂ tax and the use of revenues is determined following general Swedish national budgetary rules (Swedish Government, 2009). A central element is not to earmark tax revenues, but instead the spending of the tax rev-

enues is decided in the normal, annual, national budget process. People wonder about what measures have been taken to address, *inter alia*, distributional consequences of CO₂ taxation. The truth is that there are few obvious answers to this question. On the other hand, Sweden is well known as being one of the countries that already has an unusually even income distribution and very active state programs to complement the market for various social programs. When industries close, the famous active labor market policies are used to retrain workers. In this case, there were very significant programs to insulate large apartment buildings already in the 1970s and 1980s as a response to the oil crises. Other examples of complementary policies include public transport and “public heating” – in other words, centralized district heating that provides very cheap heating to a majority of the population.

As mentioned, there is uncertainty about the optimal tax level and indeed there are people who think a tax may not be enough to do the job, but since so few countries have tried, Sweden with its unusually long history of a high carbon tax provides an interesting case study.

As is to be expected, once the tax is in place it has the effect of leading Swedish agents to economize in various ways on carbon emissions. Although we will see that there are some interesting details, exceptions, and some difficulties in definitively pinning down the effect, we show that in broad terms carbon intensity has fallen as expected. In most respects the carbon tax has worked smoothly and not triggered more opposition or discussion than other taxes, maybe even to the contrary. The bigger question marks are over why it was possible to introduce it in Sweden and how readily this experience can be transferred to other countries. We try therefore to give a broad background that suggests some explanations as to why this tax reform was possible in Sweden when it has been so elusive elsewhere.

A BRIEF CONTEXT IN TERMS OF GEOGRAPHY, POLITICS, RESOURCES AND HISTORY

The introduction of carbon taxes in Sweden should be seen within a historical context that focuses in particular on its resource base and its tax system. We start with the latter. Sweden has been a high-tax country for a long time. The Social Democrats had uninterrupted power for about half a century until 1976. The party supports provision of social welfare funded by progressive taxation, which largely shaped the Swedish tax system during the party's time in power. In the 1930s, taxes rose sharply and in the 1940s income tax differentiation became more common and more pronounced. By the 1960s, marginal taxes were around 70 percent and during the late 1970s they reached 90 percent. The speed of this change was partly due to the socialist aspirations of the ruling party but also due to the unintended consequences of inflation, which

implied that tax rates originally designed for the very rich suddenly began to affect ordinary income earners. Anecdotally, the marginal tax rates were said to be even higher and the very popular children's book author Astrid Lindgren famously claimed to be paying 102 percent on her royalties. This is likely apocryphal but was highly influential. In the major tax reform of 1990/91, the big issue was the lowering of income taxation (Swedish Green Tax Commission, 1997). There was also major discontent concerning a whole battery of progressive taxes: wealth taxes, inheritance taxes, property taxes, and so on, which were reduced or abolished.

For the average person, the most striking aspect of the reform was the simplification of taxes which started in 1991 and has continued since then. Instead of saving receipts for so-called deductible items and employing accountants and spending long days preparing tax returns, most young people nowadays simply do it with a few clicks on their mobile phone! The taxes were lower, but most exemptions had also been abolished. It seems that this reduced manipulations but also the burden of tax preparation, and on the whole, this was well received.

At the same time there was general agreement on not cutting down too much of the "welfare state" – that is, state expenditure – or revenue. The solution was to broaden tax bases, reduce deductions, simplify, lower direct tax rates and increase indirect taxation (Agell, Englund and Södersten, 1996). In this context, the carbon tax was first not a big issue per se, and second perceived rather as being a part of the solution and not seen as a new problem. A contributing factor to why this could be the case is related to environmental awareness and resource base factors in Sweden.

Sweden also has a fairly peculiar history and resource base. It industrialized late and most people have a strong connection to their rural roots as farmers. There is a big interest in environmental issues. It is also like Canada, a sparsely populated country with ample resources of hydropower and much forestry. There are, however, no fossil-fuel resources. Apart from some peat, Sweden simply does not have any coal deposits, oil or natural gas worth exploiting and thus also does not have any major companies in these industries. This means that there is a notable absence of the anti-climate lobbying that is frequently found in economies with rich fossil endowments. Oil and other fossil fuels have thus always been imported and there are always some traces of mercantilist thinking that make it much easier for politicians to resort to taxing imports than export industries. Sweden has a severely cold climate and we have always had a concern for fuel dependency and fuel security. This has also favored policies for energy efficiency, biomass use, collective solutions for urban (district) heating and public transport – and again taxes. Two other features of the Swedish economy and political system that came to have some importance for the actual implementation of the carbon tax are (1) a relatively low level of cor-

ruption and high degree of trust in the political system; and (2) a very skewed distribution of industrial size with a small number of very large firms (ABB, Volvo, IKEA, etc.) and relatively less importance of small or mid-sized firms.

The introduction of CO₂ taxation was, as mentioned, just a small part of the (partial) funding of this reform that overall implied dramatically lower taxes on capital and labor. The political opportunity to introduce this rather unique tax consisted of the confluence of two separate political processes. On the one hand, there was a demand for a drastic reduction in marginal income tax rates, which had reached very high levels. At the same time there was an increasing interest in environmental issues. The CO₂ tax was thus introduced at a moment when there was a need to fill a gap created by reduced taxes on other factors of production (Hammar and Åkerfeldt, 2011). As the propaganda against carbon taxes often revolves around avoiding an increase in general taxation, it may be worth pointing out that the introduction of carbon taxes in Sweden in no way increased overall taxes. On the contrary the “burden” of taxation has decreased by about 10 percentage points of GDP since 1990.

CARBON PRICING IN SWEDEN

As mentioned, the CO₂ tax was introduced in 1991. The tax has grown fast, but changes have been implemented stepwise so that households and companies have had time to adapt. Typically, tax increases for companies and households in the energy and environmental areas have been combined with general tax relief in other areas in Sweden in order to avoid increases in the overall level of taxation, address undesirable distributional consequences and stimulate job growth (Hammar and Åkerfeldt, 2011). Due to its cold climate, Sweden reacted strongly to the “oil crises” of the 1970s and started ambitious programs of renovating the building stock to mitigate and avoid the existence of problems of “energy poverty”.

The distributional fairness has thus not been a dominant item in the debate. Analyses show that the different deciles of the income distribution pay roughly the same income share on transport fuels, so in this sense there is no big distributional effect (Berg and Forsfalt, 2012). In France, the situation is somewhat similar for road transport but one significant difference between France and Sweden is a larger problem in France with low-income households who struggle to pay their heating bills. In Sweden, the quality of housing and retrofit investments appear to have largely solved this problem. In Sweden, the dominant problem with a carbon tax was perceived risk of losing jobs: an essential aspect when designing the energy taxation system has been to strike a balance between fulfilling environmental objectives and accounting for the risks of carbon leakage (the risk that business moves outside Sweden to countries with laxer environmental regulations and taxes) (Sumner, Bird and Dobos, 2011).

Industry was initially granted an exception and only paid a quarter of the tax (which is still a very high tax by international standards). Given the considerable importance of a handful of big companies it was very important to avoid disruptive effects on competitiveness, but now these exceptions have been abolished. In fact, since 1991, the number of exceptions and their level have generally been reduced as the governments have successively chipped away the various tax expenditures. There is today one major exception, and that is that Sweden was obliged to remove the CO₂ tax within the industries that are part of the cap and trade program, the EU Emissions Trading Scheme, since it conflicts with the EU principle against double taxation (Swedish Energy Agency, 2012).

Within the framework of this brief chapter, we cannot establish causality, but we can point to the fact that Sweden has seen big reductions in carbon intensity, particularly in the sectors where the full tax is applied. This is the case, for example, in the district heating sector, where district heating is very common. Instead of using oil, the district heating system mainly uses wood, biomass, heat pumps and waste heat from industry or waste incineration. Houses are well insulated and generally use less energy for heating than what is common in warmer countries in Central or Southern Europe.

When it comes to the transport sector, we can broadly take the whole of the Organisation for Economic Co-operation and Development (OECD) experience as a natural laboratory. In virtually the whole of Europe and Japan, fuel taxes are high, while other countries such as the US have low levels of taxation, and countries such as Australia, Canada and New Zealand are somewhat intermediate (OECD, 2018). Sweden is thus not unique when it comes to fuel taxes – they are high across the continent and the only difference is that they are overtly called CO₂ taxes in Sweden rather than just fuel taxes – but they are assumed to have the same effect. The differences with prices in most European countries are sizeable, being far in excess of twice as high as US prices and consumption per capita less than half (see, for instance, Sterner, 2007 or Andersson, 2019).

CONCLUDING REMARKS

A CO₂ tax assumes that different fossil fuels are taxed strictly according to actual CO₂ emissions. The Swedish experience can be summarized by increased tax levels over time and steps taken towards a more uniform national price on fossil CO₂. Moreover, the CO₂ tax base is only moderately sensitive to price changes (particularly in the short run) when it comes to petrol and diesel, implying quite stable tax revenues but only slow decarbonization. When Sweden today wants to become fossil free in a short period of time it is difficult to rely only on carbon taxation in the transport sector. In particular, since the

EU does not appear to understand or accept the motive for Swedish carbon taxes and therefore does not accept the exception it has for biofuels. Currently, Sweden has now (in the transport sector) resorted to regulation concerning the phase-out of fossil components in transport fuel (a fossil-fuel replacement mandate) instead of relying entirely on the carbon tax. On the other hand, the CO₂ tax seems to have had a major impact on fuels used for heating purposes, where biofuels and other non-fossil energy sources (such as energy from waste and surplus heat from industrial processes) have significantly increased their shares. Ironically, this means that there are now very low tax revenues (in the heating sector) from the carbon tax in Sweden. In fact, Sweden generally has quite a small share of tax revenues from environmental taxes. Sometimes this is misinterpreted as saying that the Swedish carbon (and other environmental) taxes are not efficient or do not apply everywhere. The opposite is true. The tax has been so effective and over such a long time that tax base erosion has set in – we simply don't use any oil for heating anymore!

The Swedish experience thus shows that once a tax is put in place – it works. This is not really surprising. At this level, economics is quite simple: if things are expensive, people economize. The Swedish experience also shows that emission reductions can be combined with economic growth. During the 1990–2010 period, the CO₂ equivalent emissions were reduced by 8 percent, while at the same time economic activity increased by 51 percent. Since then the same pattern has continued. In addition to the above, a further important advantage of a tax (as compared with a cap and trade program) is that the tax works well together with other instruments of climate and energy policy such as green certificates, subsidies to renewables, regulations that have been introduced after (or in some cases before) the tax.

The bigger question of why Sweden was able to introduce a carbon tax when other countries have failed (and implicitly how can it be spread to other countries) is more complex. Sweden does have some obvious starting points: it has no fossil fuels and hence no producer lobbyists. I think this is very important. Furthermore, most Swedish industry is in manufacturing and mechanical engineering; there are relatively few big energy users to form a lobby. Finally, Sweden did have abundant hydro, biomass, other renewables, and also nuclear industries that probably did not object to carbon pricing (see also Criqui, Jaccard and Sterner, 2019 for a discussion of the differences between Canadian, French and Swedish experiences with introducing carbon taxes).

Due to Sweden's particular history and resource base, the Swedish experience may not be exactly transferable to other countries but there are aspects of the design of the tax that can be taken onboard. A further line of analysis emphasizes that the Swedish carbon tax was introduced as part of a total tax reform that was driven by many other goals and ambitions – it was not an isolated carbon tax. The question of “refunding” carbon taxes never arose – the

revenues were needed to fund other tax reductions and public goods provision. This has the advantage of respecting the usual budgetary process. Presumably, an important boundary condition is that Swedish governments generally do take some income distribution and legitimacy issues into account. The group of people in society who feel that everything is unfair may have been somewhat smaller than in other countries where attempts at fuel taxation have been resisted more vehemently – but this is speculation.

NOTE

1. Based on an exchange rate of 10.23 SEK/€ on January 1, 2019.

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