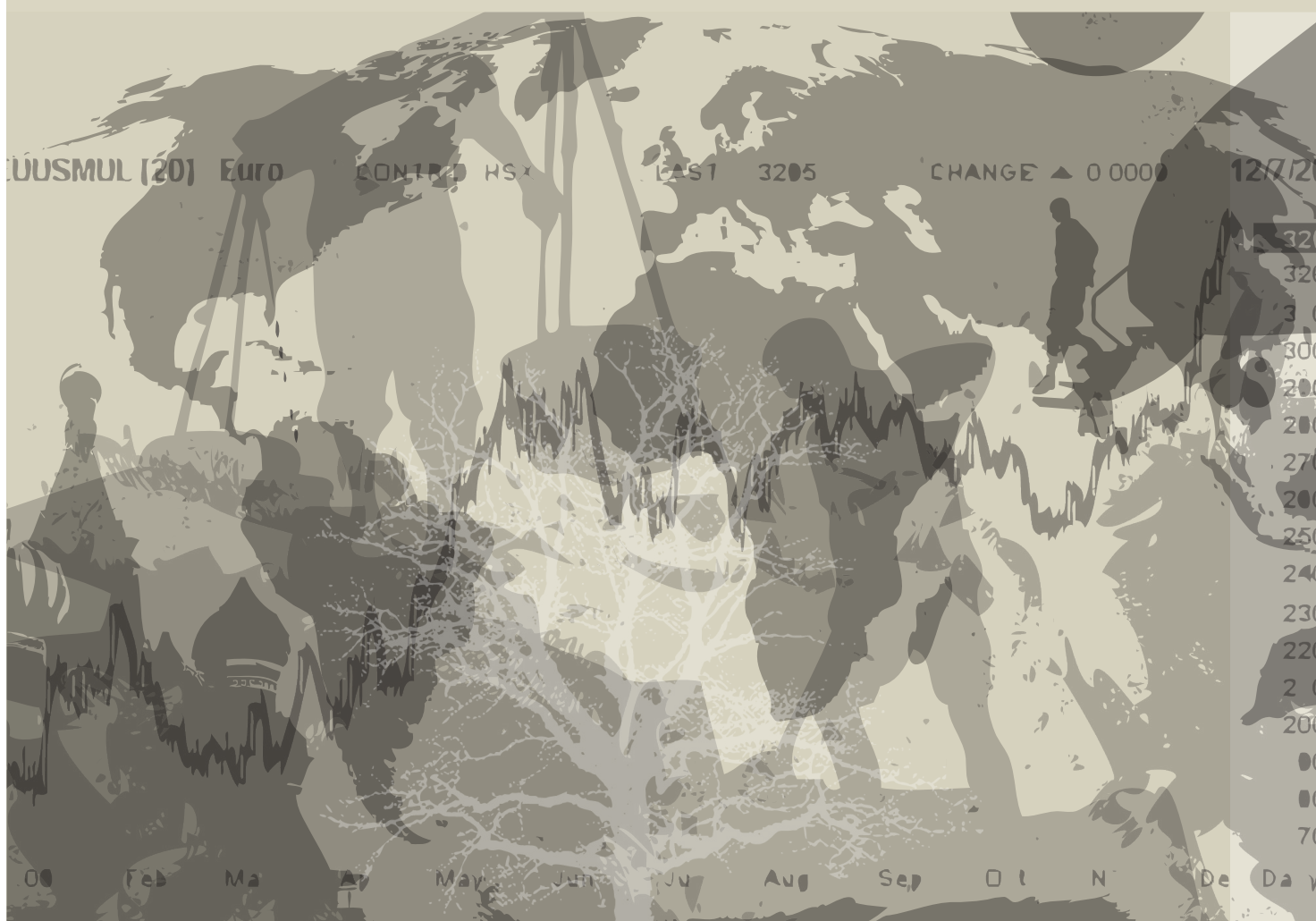




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New trade theory: implications for industrial policy

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New trade theory: implications for industrial policy*

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Abstract

The new trade theory, which emerged in the early 1980s, emphasised economies of scale and market failures as driving forces behind international trade. As opposed to the earlier theory, which mainly assumed perfect competition, the new trade theory provided a rationale for industrial policy. This article shows how industrial policy targeting specific firms or industries may be socially desirable within the new trade theory framework. Models from new economic geography and the more recent 'new' new trade theory with heterogeneous firms are also discussed. The main focus is put on models with pecuniary externalities.

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Contents

Introduction	4
Models with strategic interaction.....	7
Models with positive externalities	9
Discussion	20
Acknowledgements	22
References	23

Introduction

In 1987 Paul Krugman, who was later to win the Noble memorial prize in economics, published a famous article titled 'Is free trade passé?' His question was based on the emergence of the new trade theory in the early 1980s. In this article I discuss how this new theory provided a rationale for industrial policy. Industrial policy is normally thought of as policy aimed at influencing a country's industrial structure so as to create the highest possible national income. However, here I employ a more narrow definition, seeing industrial policy as policy that targets certain firms or industries. There are many different types of policy instruments, including various kinds of subsidies, taxes and public ownership, as well as other types of regulations that affect the industrial sector, such as legislation on concessions, competition and public procurement. My focus here is on subsidies and taxes, including trade policy measures such as export promotion and import tariffs. An example of this type of industrial policy in Norway is the exemption from the electricity tax for energy-intensive industry. Such policy is not unproblematic, as it may conflict with EEA and WTO regulations.

Before 1980, mainstream international trade theory had focused on trade in different products between different countries, and comparative advantage was held to be the main driving force behind trade. Any deviations from perfect competition were believed to not to have any major impact on the conclusions offered by the models. Under perfect competition, the market ensures that resources are allocated in the most efficient way. That means it is not possible to increase national income by supporting specific firms or industries. Therefore, industrial policy can, at best, benefit certain actors; for society as a whole it will lead to net losses. From an efficiency point of view, industrial policy would make sense only if there were deviations from perfect competition, so that it could correct for market failures.¹ Traditional trade theory therefore provided a poor rationale for

¹ Increasing national income is not necessarily the only goal of economic policy. Other goals may be reduced unemployment, or more equal income distribution. Yet, basic economic theory holds that in order to achieve a goal one should use the most targeted policy instrument – which will normally not be industrial policy in the above-mentioned cases. Yet, St. meld. [Norwegian White Paper] (2011–2012) states: 'Den overordnede målsettingen for næringspolitikken er å legge til rette for størst mulig samlet verdiskaping i norsk økonomi og arbeid for alle – that is, not only highest possible national income, but also employment for everyone are stated as goals for Norwegian industrial policy.'

industrial policy: instead, free trade and no government intervention would ensure the best allocation of resources.²

This changed with the emergence of the new trade theory, where Paul Krugman himself was a major contributor. Emphasising the importance of economies of scale and market failures such as imperfect competition and externalities as driving forces behind trade, the theory provided a rationale for industrial policy. There are two strands within the new trade theory. The first one emphasises imperfect competition and strategic interaction, and there are economies of scale at the level of the individual firm. The second places the emphasis on positive externalities, and there are often economies of scale at industry level. Externalities may be pure, stemming, for example, from technological factors such as knowledge spillovers; or they can be pecuniary, stemming from market access effects. The idea in both strands is that some firms or industries create exceptionally high gains for society – gains that are not always reflected in private returns. Industrial policy can therefore work to increase national income by helping domestic firms to gain market power abroad (causing profit shifting), or by encouraging the establishment of industries with positive externalities.

In this article I show how models from both strands have provided a rationale for industrial policy, but the main focus will be on models with pecuniary externalities. These types of models are frequently used. They form the basis for a large part of the literature on new economic geography, and also for the ‘new’ new trade theory with heterogeneous firms; and they work as baseline models for analysing a wide range of issues such as economic growth, foreign direct investments (FDI), environmental legislation, minimum wage, worker migration etc.³

Even though the new trade theory provides a rationale for industrial policy, the objective of the theory was not primarily to advocate interventionism, but rather to explain how trade in similar products between similar countries can arise. Krugman himself notes several problems in conducting industrial policies in practice. Therefore, in his 1987 article he concludes that free trade is still a ‘reasonable rule of thumb’, but that it ‘can never again be asserted as the policy that economic theory tells us is always right’ (Krugman, 1987a, p. 132).

Section 2 discusses models with strategic interaction, while section 3 discusses models with externalities. In section 4, I turn to the

² An exception is the argument of optimal tariffs, which holds that a country may benefit from imposing a tariff, provided it is large enough to affect the world market price.

³ For older surveys on industrial policy in the light of new trade theory see e.g. Klette (1992) and Shams (1997). De Carlo (2007) provides a more recent survey.

problems involved in conducting industrial policy, and offer some conclusions.

Models with strategic interaction

Models with strategic interaction focus on economies of scale at the level of the individual firm and oligopolistic competition between a limited number of firms. Firms have market power and can earn pure profits in international markets. A good example of an international industry with characteristics like this is the industry for videogame consoles. This is a highly internationalised industry consisting of three main actors – Microsoft, Sony and Nintendo. Other examples could be the industries for credit cards, web browsers, or tablets.

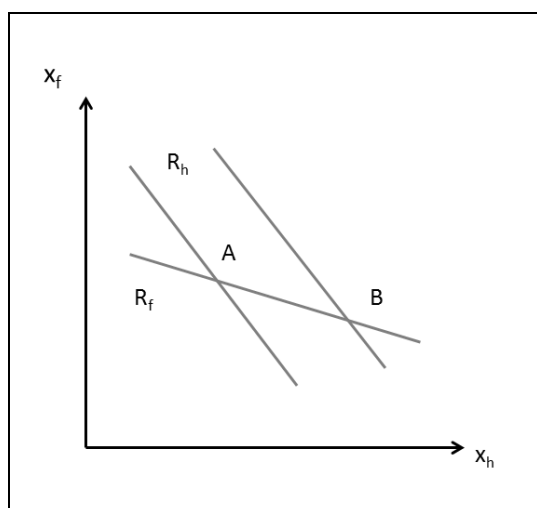
Firms can affect the world market prices of their own outputs or those of other firms. Typically, a firm will take into account how its own choices affect the choices of other firms – in other words, there is strategic interaction. Firms' strategic choice variables may be prices, output, R&D investments, etc. By influencing these strategic choices, industrial policy can increase a domestic firm's market power at the expense of a foreign firm, and thereby increase national income.

A simple and well-known example of a model from this strand of literature is given by Brander and Spencer (1985), who describe how export subsidies can affect a firm's strategic choice about output. This is often used to illustrate competition between the two leading aircraft manufacturers, Airbus and Boeing. There is one domestic firm and one foreign firm competing in a third foreign market. Each firm first decides how much output to produce (i.e. the strategic choice variable is output). Thereafter, the market price adjusts to total output. Higher aggregated output will lead to a lower market price, which again may lead to loss of profits. Therefore, firms find it profitable to restrict their production.

Figure 1 illustrates each firm's reaction function (R_i , $i=h,f$). The reaction function for the domestic firm (R_h) describes how its choice of output is influenced by the foreign firm's choice of output. As shown in the figure, if the foreign firm decides to increase its output (x_f), the domestic firm will find it profitable to decrease its own output (x_h). However, the decrease in x_h will be smaller than the increase in x_f . For simplicity, we assume that firms are symmetric. R_f describes the same points, but from the foreign firm's point of view. The equilibrium in the model is given by point A, where the two reaction functions cross. Now, what happens if the domestic government imposes an export subsidy? In this case, for each level of output from the foreign firm, the domestic firm will find it profitable to produce more. R_h therefore shifts out, while R_f remains unchanged. The new equilibrium is given by point B. We see that the optimal choice for the domestic firm is to produce

more, whereas the optimal response of the foreign firm is to produce less. Therefore, the domestic firm grabs a higher share of the market and increases its profit. It can be shown that these extra profits are higher than the cost of the subsidy; consequently, the subsidy will lead to a net increase in the home country's income.

Figure 1



This model is very appealing, providing many insights in a simple way – but, unfortunately, any conclusions regarding the best policy instrument are highly dependent upon assumptions. Eaton and Grossman (1986) showed that if the strategic choice variable is price instead of output, we may reach the opposite conclusion: an export tax will be welfare improving.⁴ There are also many other factors that can affect the conclusion regarding the best policy instrument. If there are many domestic firms and only a few foreign firms, an export tax may be better. If there are many oligopolistic industries with different profit-shifting opportunities, it may be profitable to subsidise some of them and tax others. There are also various possible strategic choice variables, and a range of possible policy instruments. These and many other points are discussed in the survey article by Brander (1995). To conclude on this point, I believe that it is fair to say that this strand of literatures offers no simple and robust recommendations regarding industrial policy.

⁴ The reason is that price competition tends to lead both firms to set the price too low and produce too much output as compared to what is optimal for each firm. An export tax forces the domestic firm to charge a higher price and hence restrict its output.

Models with positive externalities

Models with positive externalities explain how international trade can lead to concentration of industrial activity within countries because firms are internationally mobile.⁵ Examples of industry concentration could be the watch industry in Switzerland or the shipping and offshore industries in Norway. There is some empirical evidence to indicate that industrial concentration has increased in recent decades (see e.g. Midelfart-Knarvik and Overman, 2002).

A positive externality is a positive side effect of economic activity. An example is spillovers: knowledge in one firm, for example acquired through on-the-job training, can spill over to another firm, for example when employees shift jobs. The larger the number of firms within an industry, the higher will be the economic gains for society. Industrial policy that encourages the domestic establishment of firms can therefore increase national income.

There are various types of positive externalities. Some externalities are pure, and due to technological factors. Knowledge spillovers fall within this category, and are held to have been important, for example, for the concentration of the IT industry in Silicon Valley (see e.g. Krugman, 1991). Other types of externalities, known as pecuniary externalities, are due to market access effects. An example here is an input variety externality, where having a greater variety of intermediate inputs available results in more efficient production. This type of externality is commonly modelled in the new trade theory and new economic geography traditions. Empirical evidence indicates that it is important in several Norwegian maritime transport industries, where access to a greater variety of service suppliers yields higher efficiency (Knarvik and Steen, 2002). The above-mentioned examples are examples of externalities that create economies of scale at industry level. However, much of the literature builds on a class of models where positive externalities increase consumer satisfaction rather than the productivity of firms. In the following section I discuss some important mechanisms in this class of models by taking a closer look at the seminal model presented in Helpman and Krugman (1985), chapter 10.4 (from now on referred to as HK, 1985). This is an important workhorse model, and has been used as the point of departure for many other models within the traditions of new trade theory, new economic geography, and 'new' new trade theory with heterogeneous firms.

⁵ See Ulltveit-Moe (2008) for a good overview.

New trade theory and the product variety externality

The model describes a world where there are two countries, *home* and *foreign*; and two sectors of production, traditional and manufacturing. Consumers spend a constant share of their income on goods from each sector. The traditional sector produces a homogeneous good under constant returns to scale. This sector should not be interpreted too literally. It mainly serves as a modelling trick in order to ensure wage equalisation between the two countries, and it allows us to focus on firm relocation and concentration effects in a simple way.⁶ It is the manufacturing sector that is of interest. It consists of one industry which is characterised by many homogeneous firms. Each firm produces a unique variety of the industry's good under increasing returns to scale. A popular textbook example of an industry like this is the car industry: there are many different cars, but each car basically does the same thing: they are all varieties of the same good. Other examples are the industries for soft drinks, athletic shoes, or breakfast cereals.

Each firm has monopoly power in its own good, but faces competition from other firms producing other varieties of the good. A firm does not take into consideration how its own choices affect other firms' choices; and, as opposed to the model described in section 2, there is no strategic interaction between firms. This type of competition is called monopolistic competition. For simplicity, all firms are assumed to be symmetric, thus the producer prices of all varieties are equal. Demand for manufacturing goods is characterised by consumers valuing variety (so-called 'love of variety'); they all want to consume some of each variety of the industrial good. We assume that manufacturing firms can move without cost from one country to another, but that trade in manufacturing goods is costly.

How will the patterns of trade be in this model? The first main point of the model is that it creates intra-industry trade. Countries will sell manufacturing goods to each other, because consumers value variety and want both foreign and domestic varieties of the industrial good. For example, let us say the two countries are Germany and South Korea, and the manufacturing sector consists of one industry: cars. German consumers buy German cars. They also want to buy some South Korean cars because each car is perceived somewhat differently from another, and consumption of a greater variety of car types is considered a benefit that increases consumer utility.⁷ The same is true

⁶ Nevertheless, as pointed out by Davis (1998), the assumptions made about this sector are not unimportant, and may influence the results of the model considerably.

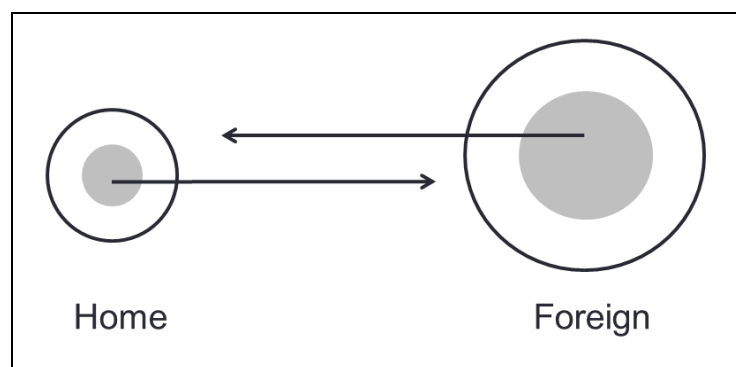
⁷ Strictly speaking the model assumes a representative consumer who wants some of each variety, which makes more sense with soft drinks than with cars. However, the model makes sense also for the car example if we interpret the representative

for South Korean consumers. Germany and South Korea will therefore sell cars to each other.⁸ However, since cars are costly to trade, domestic consumers will buy more domestic car types than foreign ones.

The second main point of the model is that differences between countries may lead to a greater concentration of manufacturing firms in one of the countries. We will look at differences in country size, as in the original model by HK, 1985. However, other authors have showed that other type of differences may lead to similar results (see Huang and Huang, 2011 for differences in technology, or a slightly different model in Martin and Rogers, 1995 for differences in infrastructure).

To illustrate the point, we first assume that the world's manufacturing production is distributed according to country size. Figure 2 shows the two countries and the pattern of trade. The size of the circles indicates the size of demand in each country. The grey shaded area is the size of the manufacturing sector, and the white area is the size of the traditional sector. Now let us return to the example of the car industry in Germany and in South Korea. If Germany is twice the size of South Korea and the German car industry is twice the size of the South Korean car industry, each South Korean car producer will export twice as much as each German car producer, because demand for cars is twice as high in Germany as in South Korea. Trade in cars will be balanced, and there will be no trade in the traditional good.

Figure 2

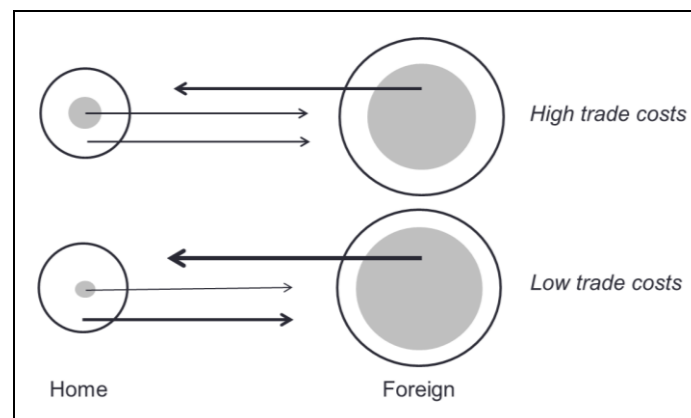


consumer as an aggregate of all consumers, where some prefer one type of car while others prefer another.

⁸ The ability to explain intraindustry trade like this represented a major step forward in international trade theory. The earlier theory of comparative advantage focused on trade in different products between different countries, such as USA selling machinery to Bangladesh and Bangladesh selling clothes to the USA. Among the first models to deal with intraindustry trade was the one presented in Krugman (1980), which is similar but somewhat different from the one described here.

Now, by moving from South Korea to Germany, a car producer will pay trade costs on a lower share of its sales, because it can now sell more in its home market. Profitability in the car industry is therefore higher in the large country, and firms will move from the small to the large country until there is no additional benefit. In equilibrium, the large country gets a more than proportional share of the total number of firms in the manufacturing sector. This is the ‘home market’ effect, shown in figure 3. The size of the car industry in Germany becomes more than twice the size of the car industry in South Korea, and, although there is still intra-industry trade in cars, Germany has become a net car exporter. South Korea exports the traditional good in addition to cars, in order to keep total trade balanced. The figure also illustrates what will happen if trade costs decline. Then the benefits of a manufacturing firm moving to the large country will be even higher, because it becomes less costly to serve small-country consumers from abroad. The home market effect is therefore magnified, and for sufficiently low trade costs the small country may become de-industrialised. The home market effect does not only appear in HK, 1985, but in many other models with other competition forms or demand structures (Felbermayr and Jung, 2012 provides an overview).

Figure 3



From this example, we see that manufacturing production will become concentrated in the large country. As mentioned above, other type of country differences would create similar effects. Industrial policy that creates favourable conditions for manufacturing production can therefore lead to concentration of the manufacturing sector.

But should countries strive to attract more manufacturing production? The answer is yes, and the reason is the product variety externality. Consumers buy some of all manufacturing goods, home-produced as well as imported. But imports have higher prices due to trade costs. The general price level could therefore potentially be reduced by getting firms to move from abroad to the home country.

Equation 1 shows the expression for real income in home country Y_h . Real income is equal to nominal income, y_h , divided by the general price level, as given by the ideal price index for manufactured goods, P_h , in the power of μ . P_h is determined by the price of each variety of the industrial good, q , the number of firms in each country n_i , and an expression reflecting the level of trade costs t (increasing t indicates lower trade costs).⁹

Equation 1

$$(1) Y_h = y_h \frac{1}{P_h^\mu} = y_h \frac{(n_h + tn_f)^{a\mu}}{q^\mu}, \quad t < 1$$

From equation 1 we see that a reduction in the number of foreign firms (n_f) and a corresponding increase in the number of domestic firms (n_h) will increase real income, because the price index falls. The intuition is that home country consumers get access to more varieties at a lower price (because they have to pay trade costs on a lower number of the varieties they buy).

Industrial policy implications

To analyse implications for industrial policy in the HK 1985 model, we will first look at what happens if there is a mutual reduction in trade costs of manufacturing goods. This has two effects. The first effect is that the price of imported goods decreases. t increases in equation 1, and this results in a lower price index and hence a higher real income. Consequently, the effect tends to increase real income in both countries. The second effect is a magnification in the home market effect as described above: firms relocate to the large country (or, alternatively, the country with more favourable conditions for manufacturing production). This tends to increase the price index and hence decrease real income in the small country. Thus for the small country the two effects pull in opposite directions. It can be shown, however, that for the small country the first effect is greater than the second. In consequence, both countries gain from trade liberalisation in terms of real income, although we should note that the small country loses in terms of manufacturing production.

Whereas the example above concerned mutual policy, we are often interested in unilateral policy. Venables (1987) analyses taxes and

⁹ μ and a are parameters in the utility function. They are both positive. μ is the expenditure share for manufacturing goods, and it is lower than 1. $a = 1/(\sigma - 1)$ where $\sigma > 1$ is the elasticity of substitution between each variety of the industrial good. $t = \tau^{1-\sigma}$, where $\tau > 1$ is trade costs of the iceberg type. τ denotes how much of the good that has to be shipped in order for 1 unit to arrive at the destination.

subsidies. If a country imposes a unilateral tax on imports (i.e. a tariff), it is usual to believe that the price level will increase, due to more expensive imports. However, that does not happen here. When exporting to the home country becomes more expensive, some firms will find it profitable to relocate from *foreign* to *home*. Thus, n_h increases and n_f decreases. The share of imports in manufacturing consumption declines in the home country, and real income increases via reductions in the price index. We should note that real income increase even if we do not consider tariff revenues. Consequently, a country can attract manufacturing firms and increase its real income by imposing an import tax. As Baldwin et al. (2003) note, this modelling framework therefore provides a rationale for the general system of preferences (GSP) within the WTO, where developing countries are allowed to keep higher tariffs towards developed countries than vice versa. The system will let developing countries attract manufacturing production.

Subsidies on export, production or R&D have similar effects as an import tax. They all increase the profitability of manufacturing production in the home country, which leads to firm relocation from *foreign* to *home*. This again leads to a reduction in the price index and an increase in real income. Venables (1987) shows that the increase in real income is larger than the expense of the subsidy: thus, also industrial policy that works through subsidies is socially desirable.

New economic geography and the input variety externality

In the modelling framework described above, the benefit of getting a large manufacturing sector comes from one channel only – the product variety externality that increases consumer satisfaction. However there are many other potential benefits in having manufacturing production that are not part of the model. The benefit may therefore be undervalued. A manufacturing sector of a certain size may be important for a country's ability to absorb new technology. There may also be technological externalities and dynamic benefits related to R&D or learning by doing. Elements like these are discussed in the 'new growth' literature. Furthermore, there can be input variety externalities, something which is frequently discussed in the new economic geography literature.

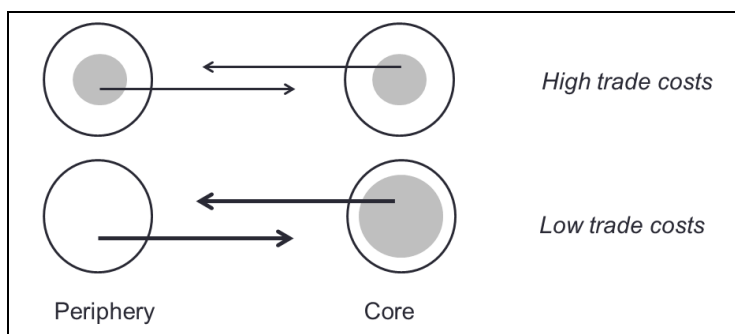
Krugman and Venables (1995) is a well-known example of the latter. The model is an extension of HK, 1985 where it is assumed that manufactured goods are no longer used solely for consumption. They can also be used as intermediate inputs in the production of manufactured goods. As a consequence, there will be a factor price index for intermediate inputs that is equal to the price index for manufactured consumption goods, P , in equation 1. More manufacturing firms in one country now yields two advantages. Firstly, it gives higher consumer satisfaction because a larger share of domestic

consumption is based on domestically produced goods with no transport costs. This is the same effect as before. It also gives greater profitability in production, because a larger share of domestic firms' use of intermediate inputs is based on home-produced inputs with no transport costs. This is the new effect, and it creates economies of scale at industry level. These two effects make full concentration of manufacturing production possible in one country, even if the two countries are initially (almost) equal.

Figure 4 illustrates this. We now assume countries of equal size in order to highlight the new mechanism. Initially, manufacturing production is divided equally between the two countries. If, for some reason, a manufacturing firm moves from one country to another, profitability in manufacturing production will increase in the country with more manufacturing firms, through a lower price index on intermediate inputs. This could make it profitable for yet another firm to relocate to that country, which in turn would increase profitability in manufacturing production even more. The process becomes self-reinforcing, and leads to full concentration of manufacturing production in a core country. This core country will export manufacturing goods to consumers in the other, peripheral country, and the peripheral country will export the traditional good to the core.

However, this core-periphery pattern does not always result. Trade costs must be sufficiently low. If trade costs are high, it is very expensive to supply manufactured goods to the consumers in the periphery from the core, and firms will prefer to stay in their local markets.

Figure 4



From our previous discussion it is now evident that industrial policy aimed at attracting manufacturing firms can be even more advantageous than before. A country can now get full concentration of the manufacturing sector, even if that country is initially not too different from the other country. Reductions in trade costs make this more likely to happen. In addition, small and temporary differences between countries may lead to large, lasting changes.

'New' new trade theory with firm heterogeneity

A limitation of the new trade theory is that it is less suitable for analysing policy that serves to reduce entry barriers in foreign markets. When firms want to start exporting they must spend resources on gathering information and finding customers in the export market. There may also be non-tariff barriers between countries, like differences in product standards or other types of regulations. Such barriers may require firms to undertake costly product adjustments in order to be able to export, which will often involve paying a fixed cost before starting to export.

Fixed export costs may be important. Direct export subsidies, which affect variable trade costs, are less relevant today because the WTO and EEA agreements emplace heavy restrictions on such measures. They are also likely to be subject to countermeasures. Therefore, today's export promotion policy is more concerned with helping firms to overcome entry barriers by supporting institutions that can provide market information, customer networks, or export credits. This type of policy aims more at reducing the fixed export costs of firms, and not their variable trade costs. Furthermore, WTO (2012) has shown that non-tariff barriers have become increasingly prevalent in the past decade. Reducing them is often an important element in today's preferential trade agreements (WTO, 2011).¹⁰

All the same, fixed export costs were not part of the original new trade theory literature, which considered only the variable costs of trade. This changed with the introduction of the *'new' new trade theory* with heterogeneous firms. Although earlier contributions exist, the seminal article by Mark Melitz from 2003 is generally considered to have initiated this strand of literature. While the focus in the new trade theory had been on sectors, the *'new' new trade theory* places more focus on firms. Melitz makes two important adjustments to the earlier literature. Firstly, he introduces fixed export costs into the model, which allows us to analyse the topics described above. Secondly, he abstracts from the assumption of homogeneous firms. Firms' marginal productivities differ and are described by a continuous distribution. Within models of this type we get a firm selection effect. Only the most productive ones will earn enough in the foreign market to cover the fixed export costs. Therefore, only some firms will find it profitable to export, and exporters will be larger and more productive than non-exporters. These predictions are clearly in accordance with empirical evidence (Bernard et al. 2011), but contradict the models of new trade theory, which predict that either all or no firms will export. Mutual trade liberalisation will induce more firms to start exporting, and a few

¹⁰ For example, it is an important part of the ongoing negotiations of a trade and investment partnership (TTIP) between the EU and the USA.

large, highly productive exporters will replace many small, less productive non-exporters.

Analysis of industrial policy within this framework is still in its infancy, but a few recent contributions have touched upon the issue. For example, Baldwin and Forslid (2010) discuss welfare effects from mutual trade liberalisation and explicitly analyse the difference between reducing fixed and variable trade costs.

Reductions in variable costs can have an anti-variety effect. The number of home-produced goods decreases because a few large and highly productive exporters replace many small and less productive non-exporters. This loss of domestically-produced varieties is offset by an increase in the number of imported varieties. Still, the number of varieties consumed may decrease in small countries.

Mutual reductions in fixed export costs, on the other hand, have a more ambiguous effect. Such reductions may come as a consequence of preferential trade agreements that reduce non-tariff barriers, or when countries adapt to international standards. Exporters no longer have to sell such large quantities in the foreign market in order to cover their fixed export costs. The new exporters that replace the smallest and less productive non-exporters are not as large as in the case of variable trade cost reductions. The reduction in the number of home-produced varieties is hence dampened, so mutual reductions in fixed export costs do not necessarily induce the same anti-variety effect as mutual reduction in variable trade costs.

Baldwin and Forslid (2010) show that, despite the anti-variety effect, both types of trade liberalisation will be welfare improving regardless of country size, just as in HK (1985). Nevertheless, if home-produced goods have a special value, or product variety is particularly important, trade liberalisation through reductions in fixed trade costs would be more desirable than trade liberalisation through reductions in variable trade costs.

Unilateral policy is analysed in Pflüger and Russek (2014). With heterogeneous firms, policy effects on real income work not only through changes in prices and firm relocation as in HK (1985), but also through the firm selection effect. Unilateral policy that improves access to the foreign market, be it through reductions in fixed or variable trade costs, increases average firm size and productivity in the home market, thereby creating a competitive advantage. Pflüger and Russek show that such policy leads to increased real income in the home country –

just as in the homogeneous firms framework analysed by Venables (1987).¹¹

Is industrial policy always advantageous?

The models sketched above have shown that industrial policy can be socially desirable in the presence of externalities. By attracting manufacturing production, it can lead to an increase in a country's real income. Does this mean that the strand of new trade theory dealing with externalities provides simple and robust recommendations with regard to industrial policy? Unfortunately not. The models build on some highly simplifying assumptions. They often posit no technological differences between countries, that there are trade costs only on manufactured goods, and that firm relocation entails no costs. These simplifications make it possible to isolate welfare effects originating from company relocation.

However, as pointed out in Baldwin et al. (2003, ch. 10.2), the benefit of industrial policy hinges on firm relocation being sufficiently large. Conclusions can therefore be highly sensitive to the assumptions of the model. If firm relocation is costly, that may change the conclusions. This point can be studied in the canonical model of Krugman (1980), where firm relocation is impossible. The model is similar to the HK, 1985 model and deals with homogeneous firms. However, in that model there is no traditional sector and the number of firms in a country is therefore determined solely by its size. Demidova and Rodriguez-Clare (2011) show that a unilateral import tariff in this model will reduce real income in the country that imposes the tariff.¹²

A final point is that in the simple framework of HK (1985), the worldwide number of firms, firm output, and factor prices remain unaffected by trade costs. However, Flam and Helpman (1987) show

¹¹ Unilateral reduction in fixed export costs might come from export promotion policies. It should be noted, however, that the authors do not consider the cost of the policy. Thus it would not be correct to interpret the policy instruments in their model as subsidies, which also has a cost that must be taken into consideration. This can make it somewhat unclear as to what type of policy they are actually analysing.

¹² Note however, that they do not consider the tariff revenue. Gros (1987) showed that there is in fact an optimal tariff in these type models if tariff revenue is taken into consideration. The reason is that '... each producer has some monopoly power, and it is in the interest of the home country that producers exercise this monopoly power abroad but not at home' (p. 357). This is very similar to the argument about optimal tariffs from the traditional trade literature. Felbermayr, Jung and Larch (2013) conduct a similar analysis within the heterogeneous firms framework. They show that the optimal tariff will be larger if firm level productivity is more dispersed.

that effects from subsidies can be ambiguous when trade costs can affect factor prices and output per firm.

Discussion

We have seen that the new trade theory can provide a rationale for industrial policy targeting certain strategically important firms or industries. However, we have also noted several problems with this type of policy. Conclusions regarding benefit from the policy are often sensitive to modelling assumptions, so the theory provides no clear and robust policy recommendations. Moreover, industrial policy in one country may induce other countries to implement countermeasures, which may lead to losses for everyone.

Another point is that these theories do not always consider the full cost of the policy. Subsidies are often assumed to be financed through lump-sum taxes, but in real life we know that tax collection leads to efficiency losses. In addition, promoting export in some industries may lead to increased factor prices which can harm other industries. There may be distributional concerns as well: for example, the social planner may put more emphasis on consumers than firms. All these cases may alter the conclusions regarding the social desirability of industrial policy.

Even in the case where policy recommendations are fairly clear, many authors have pointed out the huge information problems related to conducting industrial policy that targets specific firms or industries. In section 2 we saw that the government must have knowledge about the competition form and the strategic choice variables of firms. If there are externalities, the government should also have knowledge about the characteristics of the externalities.

Firstly, the government should have information about the mechanism that creates the externality, because the best industrial policy should target this mechanism directly. For example, in the case of knowledge spillovers the best policy would be to support R&D or training, not production of final goods, whereas in the case of externalities stemming from intermediate input variety effects, the best policy would be to support production of intermediate goods.

Secondly, as pointed out by Krugman (1987b) and many others, the government should know whether or not externalities are limited by national borders. If they are not, industrial concentration is not likely to occur and then it will not matter where the industry is located. For example, if R&D in the cell-phone industry spills over to firms in other countries through reverse engineering there is a global externality. In this case there is no reason to support/protect domestic establishment of firms. In fact, protecting the domestic market through import tariffs

may actually prevent the inflow of knowledge from abroad. By contrast, knowledge spillovers from workers shifting jobs are an externality more likely to be limited by a geographical area, and supporting/protecting a local industry may be wise.

Thirdly, as discussed in e.g. Forslid and Midelfart (2005), the government should know who will get the externality gains. For example, an intermediate input externality that reduces firms' production costs may result in lower consumer prices and/or higher profits. If consumer prices decline but most of the goods are exported, the gains will accrue mainly to foreigners. In the case of higher firm profits, foreigners will also be the ones that benefit if firms are owned mainly by foreign shareholders. In both cases there would be little reason to support/protect the domestic industry.

Both when there is strategic interaction and when there are positive externalities, the government should have information about the size of the policy instrument required and the size of the potential gains. Subsidies/taxes that are too low will not cause rent shifting or firm relocation, whereas subsidies/taxes that are too high would lead to more production than desirable. Both cases can lead to losses rather than gains. Also, if expected gains are small, the policy may simply not be worth the effort.

These information problems are likely to create lobbying and rent-seeking. Firms and industries will try to convince the government that they are strategically important and need support, and the government may be choosing the wrong firms or industries. This has led many authors to conclude that *sector-neutral policy* is preferable. Such policy aims at creating good conditions for the industrial sector as a whole. It can be policy that ensures macroeconomic stability, improves infrastructure, ensures flexible labour markets, ensures competition, encourages innovation, etc. The argument is that this type of policy will ensure that the best firms succeed. An example of sector-neutral industrial policy that serves to encourage innovation in Norway is the tax deduction scheme for costs directly related to R&D, *Skattefunn*.

However, as pointed out by Reve (1996), this type of policy may not be sufficiently targeted, and potentially large gains that could follow from the correct sector-specific industrial policy will not be realised. Thus, governments should be careful with sector-specific policy. It should be considered only when there are large and identifiable profit shifting opportunities or positive externalities. Such policies should be founded on research-based knowledge, not suggestions from the industrial sector.

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