



The Norwegian model for wage settlements

Theoretical analysis and illustrations

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In this master's thesis, we will take a closer look at the Norwegian model for wage settlements and our understanding of what implications the model provides. Different illustrations are created using Statistics Norway to highlight our hypotheses. We have also used Norwegian Bank for collection of exchange rates.

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Norwegian School of Economics

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Abstract

This study has examined the research question; *How can The Norwegian model for wage settlements be improved using insight from the Ricardo-Viner and Heckscher-Ohlin models?* by formulating hypotheses and illustrating these with data collected from Statistics Norway (Statistisk sentralbyrå) and the central bank of Norway (Norges Bank). Literature on the Norwegian model and international trade has existed for a long time, but we have not found research that applies these theories to the Norwegian model.

The current literature on international trade models has been reviewed and applied to discuss the findings of this thesis. Supplementing theory from international trade with knowledge of partial and general equilibria, traded and non-traded sector and intertemporal trade allowed for additional understanding of the findings.

The findings of this study reveal that there has been a divergence in the capital return and product prices of traded and non-traded goods and that employment in the non-traded sector has more than doubled over the last 50 years, while the employment in the traded sector has been halved during the same time period. This has occurred despite the fact that the two sectors have mostly experienced the same percentage wage growth.

The theoretical analysis revealed that there has been a problem that the Norwegian model delays capital transfers and structural change based on the historical development in Norway. If the development were to change, the biggest problem is that there exists conflicting interests between the short-term and long-term effects.

Our recommendation is to keep most of the features from the existing Norwegian model, but that the basis for wage settlements should be expanded. The concern is that the unions in the manufacturing industry constitute a too narrow basis to determine the wage growth for the rest of the economy. The current emphasis on the unions in the manufacturing industry has led to the Norwegian model relying heavily on a partial equilibrium perception. However, as our results have shown, a general equilibrium perception of wage settlements is superior. Taking the Norwegian economy as a whole into account in the Norwegian model should therefore lead to a valuable improvement of the model.

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1 Introduction and research question

The Norwegian model for wage settlements was published in the 1960s by Odd Aukrust (Aukrust, 1977). The model was customized to the conditions in Norway at the time. This study aims to assess how the Norwegian model has impacted the Norwegian economy since the model was introduced. Economic growth and improved technology have been driving factors for increased wages over time. These factors are common for countries across the world, while use of oil revenues is a factor specific to Norway. An important question that arises, is how these factors should impact the Norwegian economy, compared to the actual impact of these.

This thesis examines how the Norwegian model for wage settlements can be improved using international trade models. The study's purpose is to assess strengths and weaknesses regarding the Norwegian model as of today, both regarding the historical development in Norway, but also if the development were to change in the future. Within this context, the following research question will be addressed:

How can the Norwegian model for wage settlements be improved using insight from the Ricardo-Viner and Heckscher-Ohlin models?

The thesis starts with a presentation of the Norwegian model for wage settlements. Relevant theory about partial and general equilibria, traded and non-traded sector and intertemporal trade is then introduced. These theories are linked to the Norwegian model as they clarify the terms and division of industries used in the theoretical analysis. The theories also explain the historical development in Norway, which is briefly introduced in the theory sections and will be revisited in the hypotheses. The standard models of Ricardo-Viner and Heckscher-Ohlin are then presented. The methodology section then reviews the descriptive method used in the thesis. The discussion and findings section starts off with theoretical analyses of the Norwegian model in the Ricardo-Viner and Heckscher-Ohlin models, where non-standard conditions are taken into consideration. The theoretical analyses lead to hypotheses that are illustrated in the discussion and findings section. Finally, the what-if scenario along with the earlier discussion lead to our recommendation of improvements to the Norwegian model. This then leads to a conclusion of the thesis that summarizes the results from the discussion and findings.

2 The Norwegian model for wage settlements

2.1 Background and history

Norway has experienced economic growth and there are many reasons for this. The oil revenues are viewed as Norway's distinctive feature, although there exists more factors that impacts economic growth. Technological development is a factor that also plays a vital role for the economic growth in Norway. Technological development has led to companies yielding a higher output than before. This results in higher and more efficient output and has contributed to that product prices of the manufacturing goods have decreased relatively to non-traded goods (NOU Norges offentlige utredninger 2016: 3). Technological growth contributes to competition between companies through international trade, which in turn creates pressure for increased productivity. With increased productivity, the costs of the companies decrease. Thus, the employees can demand higher wages. These two mechanisms contribute to increased real wage growth.

The Norwegian Model for wage settlements was published in the 1960s by Odd Aukrust (Aukrust, 1977). The Norwegian model tries to slow down and prevent excessive wage growth from happening. The reason for this, is that workers in Norway will experience the same percentage wage growth regardless of their qualifications. This system enforces an equal percentage wage growth for all employees. This way, all workers meet in a middle ground (Bjørnstad & Nymoen 2015, p. 63). When the Norwegian model was formulated in the 1960s, the model did not account for any future restructuring of the economy nor any technological changes. The model was also developed on the prerequisite that Norway had fixed exchange rates, while today floating exchange rates are used (Aukrust, 1977). The model was created such that the Norwegian economy follows the wage norm in the traded sector. The wage norm is first negotiated by the growth in the value of labour productivity in the traded sector (Bjørnstad & Nymoen 2015).

2.2 Principles of the Norwegian model

The Norwegian economy can be divided into two sectors, namely the traded sector and the non-traded sector. The Norwegian model can be perceived as a "normative scheme for how labour market adaptation in practice can contribute to a low level of unemployment" (Eika et al., 2013, p. 8). The main idea is that the traded sector, represented by the manufacturing industry, negotiates wages first, mainly because these operate as export industries and are exposed to international competition (Eika et al. 2013, p. 8). The idea is that wage settlements should ensure the continued competitiveness of manufacturing industries competing in international markets. Hence, wage increases are first negotiated for the manufacturing industry, and this determines the norm for wage settlements in the rest of the traded sector and the non-traded sector for the Norwegian economy as a whole (Norman & Orvedal, 2019, p. 18). This industry is called "Frontfag" in Norwegian terms, and indicates that the industry goes first in the wage negotiations. In Norwegian, the model is called "Frontfagsmodellen".

Different unions negotiate annual wage growth for both the traded and non-traded sectors. These annual wage negotiations happen between different unions. NHO is the Confederation of Norwegian Enterprises and they are the representatives for the employer unions (Om Næringslivets Hovedorganisasjon (NHO)). YS negotiates wages and working conditions (Yrkesorganisasjonenes Sentralforbund, 2020) while LO is the Norwegian Confederation of Trade Unions and these are the representatives for the trade unions (Gabrielsen & Lund, 2018). NHO, YS and LO in the manufacturing industry negotiate wages first, according to how much the traded sector can withstand. Once there has been established an agreement for what the wage growth should be in the manufacturing industry, it creates a wage norm for the rest of the traded sector and the non-traded sector as a whole in the Norwegian economy. This wage norm functions as a guideline to the wage growth of the other industries that negotiate after the manufacturing industry. Even though the wage norm should function as a guideline for the wage growth of other industries, it is often interpreted as an upper limit for the wage growth.

2.3 Implications of the Norwegian model

One consequence of the annual wage determinations, is that it can affect private companies in a negative way. Once the wage is determined, it can lead to higher costs for the companies because they have to pay their employees more. It can also be the case that less people buy the products from the company, such that the company as a whole also experiences increased operating costs. The higher wages in conjunction with higher operating costs might result in a few workers losing their jobs. However, it is important to notice that the unions do not fight for a low real wage growth, the importance is that the unions set a wage norm for the rest of the economy to create a more fair outcome, and not to restrict the employees' wages growth.

The Norwegian model does not address structural changes that technological development imposes on society. In a worst case scenario, there are incidents where some employers within different sectors are unhappy with the wage norm determined by the unions and this might provoke rebellion or a strike. Technology has created increased wage differences over the years between sectors. The wage differences arise from a shortage of labour with certain types of high competence on the one hand, and too many with low and less relevant competence on the other hand (Bjørnstad & Nymoen, 2015, p. 63). The trade unions have a desire to utilize their market position to achieve higher wages. By valuing high competence workers, the technological development creates a labour imbalance and also increases the wage differences, which can be viewed as a problem (Bjørnstad & Nymoen, 2015, p. 63).

2.4 Issues regarding the Norwegian model

The Norwegian model is under constant pressure, as the underlying mechanisms in the model are the same today as when it was created. However, there exists a desire to develop the model further in accordance to changes that are notable in society today (Bjørnstad & Nymoén, 2015, p.24). One reason for why the model still shows sign of continued relevance today, could be because there is no other model that functions better. Odd Aukrust stated himself that the Norwegian model would not hold if we change from a system with fixed exchange rates to a system with floating exchange rates (Aukrust, 1977). However, it is also worth noting that the Norwegian model works in the same way today as it did back in the 1960s, despite being under pressure. The main goal is therefore continuity and further development of the model (Bjørnstad & Nymoén, 2015, p.24).

One issue of the Norwegian model could be regarding technological development. This has created pressure in the direction of increased wage differences in all countries, and trade unions have lost members, which challenges the collective regulation of work life (Bjørnstad & Nymoén, 2015, p. 63). An important part of the solution lies in educating enough people for what the working life demands (Bjørnstad & Nymoén, 2015, p. 64). Norway has come to great success in this regard by managing this to a greater extent than other countries. Despite technological development, Norway has managed to maintain its wage distribution fairly well (Bjørnstad & Nymoén, 2015, p. 64). Another issue regarding the Norwegian model, is that it does not take into account structural changes sufficiently. This implies that the wage is held back for the employees.

3 Theory

3.1 Partial and general equilibria

3.1.1 Partial equilibrium

Partial equilibrium analysis is defined as "the determination of equilibrium in a particular market while assuming that it is not affected by spillover effects from any other market" (Goolsbee et al., 2016, p. 573). Partial equilibrium analysis is concerned with a given good and its respective supply and demand curves. The Ricardo-Viner model is an international trade model which we will derive in the theory section, and is the closest we get to partial equilibrium analysis in this context. It is actually a general equilibrium model with sector-specific capital, but it can be viewed as a partial equilibrium when looking at the labour market. The model takes the product prices as given in their respective product markets, thus the labour market is the market of interest (Norman & Orvedal, 2019, p. 74). The Norwegian economy can be divided by capital-intensive sector and labour-intensive sector. In this thesis, we will refer to these as traded sector and non-traded sector respectively, which we will revisit later. Intuitively, we can think of the Norwegian model as the labour market with demand for labour in both sectors. However, this can be seen as an oversimplification of reality, as the real world is closer to the labour market in conjunction with the capital market. In this approach, labour is assumed to be homogeneous and fully mobile between the sectors. We highlight that this is a strong simplification throughout our theoretical analysis. The Norwegian model will "force" the same percentage wage growth onto different types of labour.

In some sense, the labour market applies the standard thinking of supply and demand, but with a different approach as it distinguishes between two distinct sectors and a given labour stock. The labour market can be viewed as a "bathtub" in that the labour stock determines the width of the "bathtub" and the wage level determines the height of the "water". This "bathtub model" for the labour market that we use in the Ricardo-Viner model thus takes the supply of labour on the horizontal axis and the respective demands for labour in each sector on the vertical axis (Norman & Orvedal, 2019, p. 74). This then determines the price of labour w , and the quantity of labour n , which is the distribution of

the labour between the two sectors. This partial equilibrium approach completely ignores the capital market, which we will briefly introduce in the next section and investigate further later in the thesis. An illustration of the labour market in the Ricardo-Viner model as a "partial equilibrium" is shown below in figure 1:

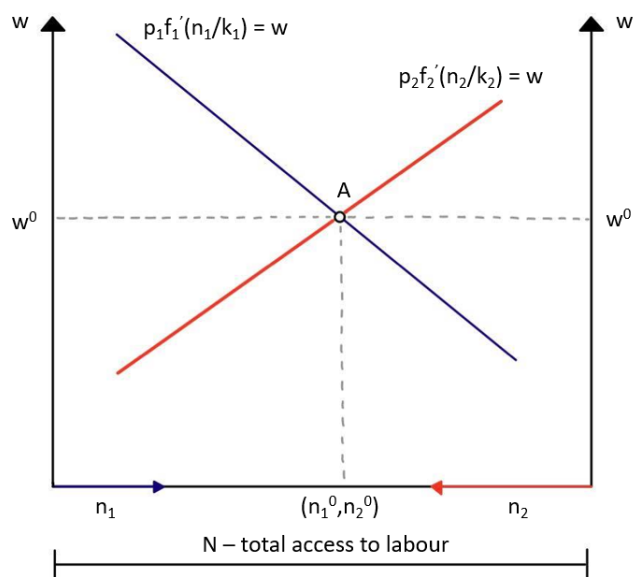


Figure 1: Equilibrium in the labour market. Adapted from Norman & Orvedal (2019, p. 74)

3.1.2 General equilibrium

General equilibrium analysis is defined as "the study of markets that takes into account all cross-market influences to arrive at a set of prices that simultaneously equates supply and demand in many markets" (Goolsbee et al., 2016, p. 573). General equilibrium analysis is concerned with two main topics: The first part takes into account that markets are interrelated through supply and demand and that this affects the size and direction of equilibrium effects in all these markets. The second part discusses whether outcomes of general equilibrium are efficient or equitable (Goolsbee et al., 2016, p. 574). The former approach describes markets in a descriptive way "as they are", while the latter one describes markets in a normative way "as they ought to be".

In this section, we will focus on the descriptive approach to understand the interactions between markets. This will lead to a more accurate representation of reality, which is the Norwegian model viewed as the labour market in conjunction with the capital market. General equilibrium takes the standard supply and demand curves for two goods and investigates the interdependence between them. These markets can be interrelated through supply-side or demand-side links across industries, or both (Goolsbee et al., 2016, p. 575). Price and quantity of a given good is thus not only dependent on its own supply and demand, but also on the supply and demand for other goods through spillover effects (Goolsbee et al., 2016, p. 574).

The Heckscher-Ohlin model is the closest we get to this general equilibrium approach, which we will investigate further later in the thesis. Like the Ricardo-Viner model, the Heckscher-Ohlin model is also a model of international trade. For a small, open economy the product prices are given from the world market in the Heckscher-Ohlin model and the model takes into consideration both the labour market and the capital markets (Norman & Orvedal, 2019, p. 153). It uses the same "bathtub model" as in the Ricardo-Viner model for the labour market, but also includes the capital market with capital return on the horizontal axis and wage level on the vertical axis. Through this approach, the labour and capital markets are linked through the wage level, but also through capital transfer and structural change (Norman & Orvedal, 2019, p. 93). This then determines the price of labour w , and the quantity of labour n , which is the distribution of the labour between the traded and non-traded sectors. It also determines the price of capital r . In

reality, the model applies to two traded goods, but this will be revisited in the section about the Norwegian model in the Heckscher-Ohlin framework. An illustration of the interaction between the labour and capital markets in the Heckscher-Ohlin model as a general equilibrium analysis, is shown in figure 2 below:

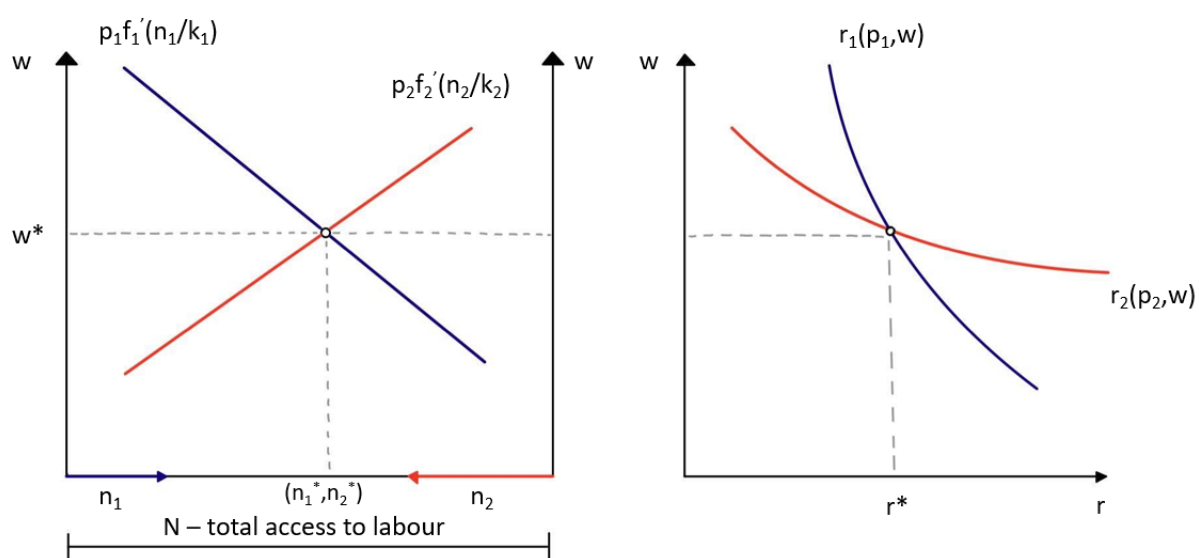


Figure 2: Long-run equilibrium. Adapted from Norman & Orvedal (2019, p. 93)

3.2 Traded and non-traded sector

3.2.1 Traded and non-traded sector

An industry is a collective term for firms that are similar in some sense (Norman & Orvedal, 2019, p. 65). There are two main ways to define an industry, the first one is by defining industries by the type of products they produce, while the second one is by defining industries by the type of input factor they use (Norman & Orvedal, 2019, p. 65). In further analysis, we must choose one of the two. On the one hand, it is tempting to choose the product definition because the demand for goods is aimed towards the specific goods. On the other hand, we consider the fact that industries have similar cost structure when defining by input factor as more important. Thus, we will not refer to industries as firms that produce similar goods, but rather refer to industries as firms that use the same input factors intensively.

In economics, a common simplification is to include labour and capital as the input factors of interest (Norman & Orvedal, 2019, p. 64). As labour and capital are the key input factors, it is natural to distinguish between industries by how intensively they use these input factors. When we distinguish between two industries, we therefore have capital-intensive industry on the one hand and labour-intensive industry on the other. It is worth noting that by this definition, we mean capital-intensive and labour-intensive relative to the other industry. Thus, when we have two industries and two factors, we can always label one of them as capital-intensive and the other as labour-intensive (Norman & Orvedal, 2019, p. 65). Because this section is named "Traded and non-traded market", it implies that industries can be defined by more axes than the capital-intensive to labour-intensive axis, which we will derive next.

Industries can be classified on the axis traded and non-traded industries. The definition of non-traded industries is "production of goods and services that cannot be acquired internationally" (Norman & Orvedal, 2019, p. 107), thus traded industries are production of goods and services that can be acquired internationally. These definitions emphasize the word "can", as in the possibility to acquire something. However, these definitions become too narrow as almost all goods and services can be acquired internationally. It is not the possibility to acquire goods internationally that determines whether an industry is

traded or non-traded, but the costs associated with doing so. A more practical definition of non-traded industries is then "industries that produce goods and services with transport costs high enough such that it is not applicable to acquire them internationally" (Norman & Orvedal, 2019, p. 107). Traded industries are when the transport costs are low enough such that it is actually applicable to acquire the goods and services internationally. Here, "transport costs" include all transaction costs associated with acquiring the goods and services internationally, in addition to the literal transport costs (Norman & Orvedal, 2019, p. 108). With these definitions, there is not an absolute distinction between traded and non-traded industries, but rather an assessment of degree of tradedness.

We choose to classify the industries explained above as traded and non-traded sectors. By doing so, the sectors become aggregated as one homogeneous sector for traded and non-traded goods and services, respectively. Next, we will justify such a distinction, before we look at some characteristics and development in the traded and non-traded sectors. In the traded sector, it can be reasonable to aggregate industries in such a fashion because they can be viewed as production of currency (Norman & Orvedal, 2019, p. 111). Consumption and production can be separated in the traded sector because one can acquire traded goods and services internationally using currency (Norman & Orvedal, 2019, p. 112). However, such a separation cannot be applied to the non-traded sector. Production and consumption must equal one another by definition, because it is not desirable to acquire such goods and services internationally. If and only if the non-traded goods and services can be viewed as a separate group of products, then the non-traded sector can be aggregated as one homogeneous sector (Norman & Orvedal, 2019, p. 112). However, it is not reasonable to aggregate non-traded industries as one homogeneous sector because non-traded goods and services are not viewed as a separate product group. However, such an aggregation can be reasoned as an analytical simplification.

There exists some characteristics and development regarding each sector that it is worth commenting on. Figure 3 below show the development of employment in Norway, whilst figure 4 illustrates the development of price indices for selected goods:

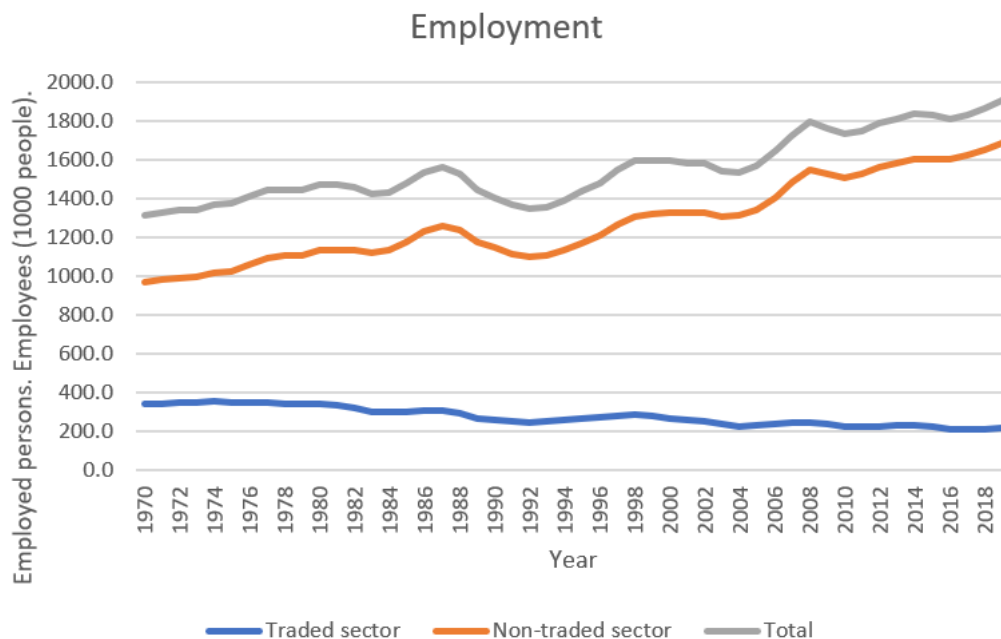


Figure 3: Employment over time (SSB)

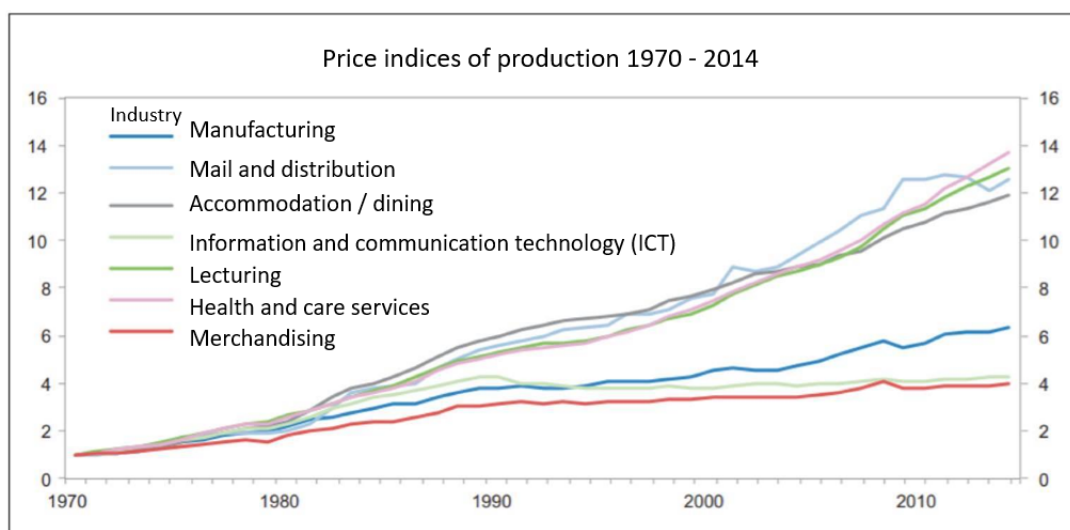


Figure 4: Price indices in production, 1970 = 1 (NOU 2016:3)

For now, we will take the development in these figures as given. Figure 3 shows that employment in the traded sector has decreased over time, while the employment in the non-traded sector has increased. In figure 4 the traded sector is represented by "Manufacturing", while all the other industries are part of non-traded sector. The figure illustrates that the product prices in both sectors have increased over time, but that the product prices in the non-traded sector have increased more than in the traded sector, with the exceptions being ICT and merchandising. The subsequent theory sections will

present theory that can explain the developments that we observe.

In general, the traded sector is relatively more goods-intensive, while the non-traded sector is relatively more service-intensive (Norman & Orvedal, 2019, p. 110). This is important because production of goods can be labelled as capital-intensive and production of services as labour-intensive, as discussed in the previous section. We can then label the traded sector as the capital-intensive sector and the non-traded sector as the labour-intensive. This holds true even though both sectors contain some production of both goods and services (Norman & Orvedal, 2019, p. 110). In the methodology section, we will derive our distinction between the traded and non-traded sectors in detail.

3.2.2 Economic growth

In the following sections under the main sections Traded and non-traded sector and Intertemporal trade, we go through possible explanations of increased employment in the non-traded sector and the development of product prices in the traded and non-traded sectors. The first explanation for changes in the development of product prices, is increased access to capital and technological improvement associated with economic growth (Norman & Orvedal, 2019, p. 117). Economic growth is defined as an "expansion of the production possibilities over time" (Norman & Orvedal, 2019, p. 117). Thus, utilizing existing production possibilities in a better way and transferring resources from industries with low prices to industries with higher prices are not defined as economic growth (Norman & Orvedal, 2019, p. 117). However, these factors are still important for the Norwegian economy.

Improved production technology along with greater access to resources can lead to an expansion of the production possibilities frontier over time. (Norman & Orvedal, 2019, p. 117). Economic growth can either be explained by capital accumulation through savings and investments or by new and improved technology (Norman & Orvedal, 2019, p. 117). The former can be explained by the Solow model and the latter can be explained by the Romer model. In the first case, economic growth will be self-limiting, while in the second case, economic growth may last forever (Jones, 2014, p. 126 & 160). In our context, it is not important whether economic growth is lasting or temporal, because the results from increased access to capital and improved technology are not affected by the type of

economic growth. In the next two sections, we will look at economic growth both through increased access to capital and improved technology.

3.2.3 Increased access to capital

A reason for higher income level and consumption, is an expansion of the production possibilities frontier because of increased access to capital (Norman & Orvedal, 2019, p. 117). This should lead to decreased production in the non-traded sector and increased production in the traded sector, because production in the non-traded sector is on average less capital-intensive than in the traded sector (Norman & Orvedal, 2019, p. 118). This is because of the Rybczynski effect, which we will revisit in the section about the Rybczynski theorem.

When prices are given, the demand will increase for all normal goods. Most goods that are produced in both non-traded and traded sector are normal goods, thus the income effect will result in increased demand for goods from both sectors (Norman & Orvedal, 2019, p. 118). These effects in sum dictate that increased access to capital will lead to higher relative price for non-traded goods. This effect is shown in figure 5 below:

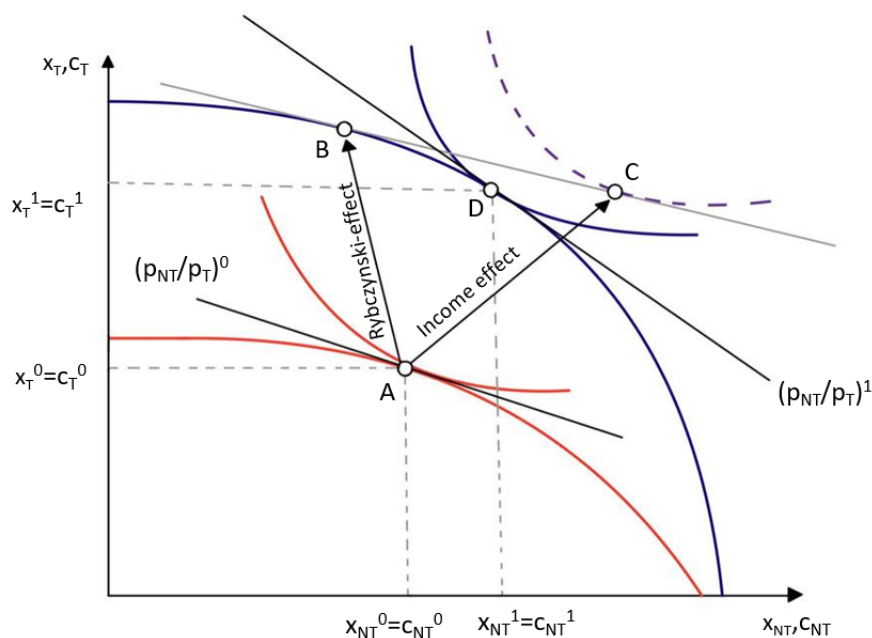


Figure 5: Increased access to capital. Adapted from Norman & Orvedal (2019, p. 118)

Here, "x" means production, "c" consumption, "T" traded, "NT" non-traded and "p" price. The initial equilibrium dictates the quantities produced in each sector and their relative prices, denoted as point A in the figure. We obtain a higher increase in the traded sector than in the non-traded sector when the production possibilities frontier expands. This is because traded sector in general uses capital more intensively than non-traded sector, thus the increase in access to capital will favour production of traded goods to non-traded goods (Norman & Orvedal, 2019, p. 118).

With unchanged relative prices, this will lead to the production shifting towards the tangency point B on the new production possibilities frontier. This shift can be decomposed as the Rybczynski effect. If we were to shift production in such a manner, we would obtain a new budget constraint, parallel to the initial one, this would have given us a new consumption point tangent to the new budget constraint, point C. We denote this as the income effect. The new equilibrium involves a higher relative price for non-traded goods because it leads to excess demand for non-traded goods and excess supply of traded goods. The new outcome is located somewhere between the Rybczynski and income effects. The net effect is therefore an allocation tangent to the new production possibilities frontier, which determines the exact new relative prices. This new allocation is point D. Increased access to capital can explain the development in relative prices, but it does not necessarily explain the increased production of non-traded goods (Norman & Orvedal, 2019, p. 119). This is because the sign of the effect on non-traded goods depends on whether the income effect or substitution effect is larger.

3.2.4 Technological improvement and the Baumol effect

Next, we will look at improved technology in production of goods. For this section, we will make a simplifying assumption that the traded sector is composed mainly of production goods, while the non-traded sector is composed mainly of services. Technological improvement tends to favour production of goods, while there is little to no room for technological improvement in services that are offered (Norman & Orvedal, 2019, p. 119). In some services, technological improvement is even impossible by definition because the input is time itself.

Improved technology allows companies to be more productive, thus they can produce more goods with the same resource inputs as before. This applies to production of goods, but not services. This leads to higher income, which can be used to consume more of all normal goods, including services. The only way for this to happen, is by transferring resources from production of goods to production of services (Norman & Orvedal, 2019, p. 120). This enables us to offer more services, but because we have improved technology, it also enables us to produce more goods (Norman & Orvedal, 2019, p. 120). This effect is shown in figure 6 below:

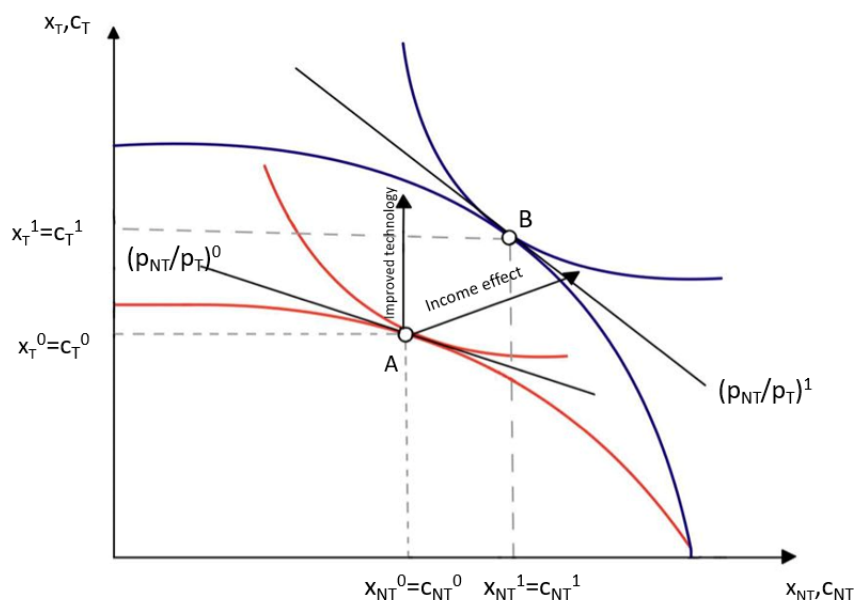


Figure 6: Improved technology: The Baumol effect. Adapted from Norman & Orvedal (2019, p. 120)

The initial equilibrium in point A dictates the quantities produced in each sector and their relative prices. The effect of improved technology can be decomposed as an allocation directly above the initial allocation. This new allocation has increased production of traded goods and unchanged production of non-traded services (Norman & Orvedal, 2019, p. 120). The production possibilities frontier expands along the vertical axis for the traded sector because it can utilize the improved technology, while it stays unchanged along the horizontal axis for the non-traded sector, because it cannot utilize the improved technology.

This gives us a new budget constraint that would then dictate our consumption and this can be decomposed as the income effect. The new equilibrium in point B involves higher relative prices of non-traded goods than the pure effect from technological improvement. The new outcome is located somewhere between the effects of improved technology and increased income. The net effect is therefore an allocation tangent to the new production possibilities frontier, which determines the exact new relative prices. Not only can improved technology explain the development in relative prices, but it can also explain the increased production of non-traded goods (Norman & Orvedal, 2019, p. 121).

Empirically, it has been proven that the wage level has increased in the service sector, even when there has not existed technological improvement there (NOU 2016:3). The increase in wage level has taken place when the labour productivity in the industry has improved. William J. Baumol showed this in the 1960s and the effect has been named the Baumol effect (Norman & Orvedal, 2019, p. 119). Up till the recent times, it has been hard to trace a change after Norway became an oil nation. However, the use of oil revenues have been sharply accelerating in the 2000s (Norman & Orvedal, 2019, p. 121). The growth in the service sector up till recent years can then be attributed to other conditions than use of oil revenues, mostly the Baumol effect. However, as the use of oil revenues have been sharply increasing in the 2000s, we might expect a larger contribution from oil revenues in modern times (Norman & Orvedal, 2019, p. 126). We will elaborate extensively about use of oil revenues in the next section.

3.3 Intertemporal trade

3.3.1 Savings, investments and capital transfer

Capital in this thesis will be distinguished between financial capital and real capital. Financial capital is capital that only has a value on paper and not in and of itself. Real capital is capital that is used in the physical production of goods. It is normal to assume that real capital is immobile (Norman & Orvedal, 2019, p. 204). When we review international capital movements, we usually refer to it as international trade in financial objects and capital, not real capital (Norman & Orvedal, 2019, p. 207). In this section, we will refer to capital strictly as financial capital. We divide the two "goods" as production and consumption of goods today and in the future. It is worth noting that we now look at the Norwegian economy as a whole, including the oil sector, rather than the traded and non-traded sectors.

The main idea is that the Norwegian economy has experienced a rapid income increase with the discovery of oil. It is desirable to distribute this income over the next time periods. Because we have looked at the Norwegian economy as a whole, this implies that today's production possibilities are higher than in the future because of the inclusion of the oil sector. Future prospects for the oil sector imply that the income from the oil sector will decrease in the near future. This implies less consumption today to achieve higher production and consumption in the future. In the next sections, we will exclude the oil sector from the traded and non-traded sectors. However, the use of oil revenues is regulated through the budgetary rule, which will impact the analysis of Mainland Norway when looking at the traded and non-traded sectors.

3.3.2 Oil revenues and currency gifts

In the following sections, we will return to the distinction between traded sector and non-traded sector that we used when analysing the effects of economic growth. The next effect we will discuss, is regarding oil revenues and currency gifts. In the analysis of increased access to capital and technological improvement, we implicitly presupposed that the budget had to be balanced year by year. In the section above, regarding savings, investments and capital transfer, we saw that it is possible to achieve higher utility from

intertemporal trade through international capital movements. When capital exports and capital imports are allowed, it lifts the restriction that the budget must be balanced year by year (Norman & Orvedal, 2019, p. 209).

Mainland Norway alone suggests that the budget should be balanced each year, but the oil revenues from the oil sector allows for a trade deficit for the traded sector in Mainland Norway (Norman & Orvedal, 2019, p. 115). Rather than having a domestic relative price if the economy were closed from international capital transfers, and international relative prices as given, intertemporal trade now works through the use of oil revenues (Norman & Orvedal, 2019, p. 115). However, we can consider the extraordinary income from the oil sector, beyond normal return to factors used in the production, as a currency gift. Hence, it captures the resource rent of oil and gas production. The intertemporal trade framework displayed that Norway would have net capital exports today and net capital imports in the future, but we will still use some oil revenues in each period. The exact use of oil revenues is regulated through the budgetary rule, which we will review in the next section, but for now we will go through how some use of oil revenues and the corresponding currency gift will affect Mainland Norway. The budgetary rule regulates the oil revenues, which are uneven over time, so that they are converted into a permanent income, as shown as g in figure 7 below:

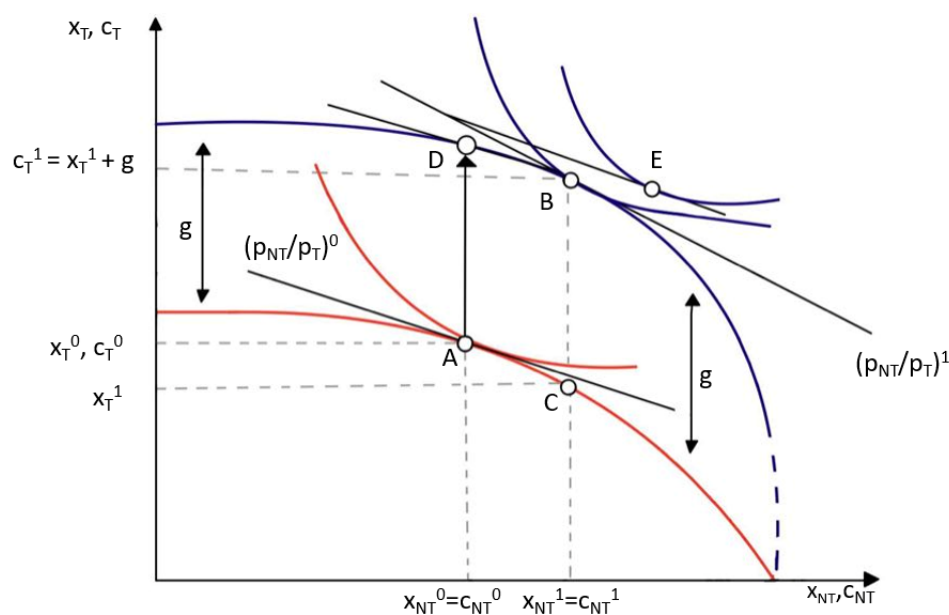


Figure 7: Effects of a currency gift. Adapted from Norman & Orvedal (2019, p. 116)

We start by having our production possibilities frontier and the corresponding indifference curve. This allocation in point A decides the production and consumption of each of the goods and their relative prices. This can be viewed as the balanced approach, as production of each good exactly equals their respective consumption and the budget is balanced. For a given use of oil revenue g , which we will view as a currency gift, the consumption possibilities frontier expands upwards. Since we can only buy goods from the traded sector in the international market, the consumption possibilities frontier will rise exactly by an amount g compared to the production possibilities frontier.

The direct decomposed effect from the currency gift is the point D that lies straight above the initial allocation. This effect is exactly equal to an increased consumption of goods from the traded sector equal to g . This will have given us a new budget constraint. The currency gift g also creates an income effect. Assuming that both goods from the traded and non-traded sector are normal goods, the income effect will be positive for both type of goods. The allocation for the income effect is point E where the indifference curve is tangent to the new budget constraint. Since this outcome would lead to excess demand for non-traded goods and excess supply of traded goods, the new consumption in point B must involve higher relative price of non-traded goods than the effect from currency gift if we were not to change the production allocation.

The gap between production and consumption exactly equals the currency gift, so that we import goods from the traded sector worth the amount g and produce goods at point C. A transition from balanced allocation to a situation with trade deficit in the traded sector and use of oil revenue equal to the currency gift g , can then help to explain the development of relative prices we have observed, but also help explain the increased production of goods from the traded sector.

3.3.3 The budgetary rule

The management of the Government pension fund is an example of intertemporal trade, which we discussed earlier in this section. The premise behind the budgetary rule, is that the budget for the Norwegian economy can have a trade deficit equalling 3 percent of the value of the Government pension fund each year, when evaluating Mainland Norway ("Bruk av oljepenger", 2019). Thus, one excludes the oil revenues and obtain results for traded sector and non-traded sector as in the previous section. For the traded and non-traded sectors, we also exclude the public sector, which will be revisited in the section about determination of traded sector and non-traded sector. By following the budgetary rule, one uses the real return of the Government pension fund (Norman & Orvedal, 2019, p. 126). Thus, the government will not use more money than is earned, such that the fund may last for eternity. Due to the budgetary rule with limited use of oil revenues and continuous income from the the oil industry, the Government pension fund has increased in size over time, thus the use of oil revenues has become larger in recent years (Norman & Orvedal, 2019, p. 217).

The idea of the transition from balanced economy to a trade deficit in the traded sector, is correct for some initial level of oil revenue equal to currency gift g . Next, we will look at how this allocation changes as g changes according to the budgetary rule. Furthermore, the budgetary rule is constructed such that it counteracts the risk of Dutch disease, also known as the reversal problem. A final purpose of the budgetary rule, is that it ensures a fair distribution of oil revenues across generations, according to some measure of fairness. We can generalize the use of currency gifts through the expansion path for consumption of goods from the traded sector and non-traded sectors. The expansion path for consumption is the allocation of consumption of goods from the two sectors as a response to higher income, and thus higher welfare. An illustration of an expansion path for consumption is shown in the figure 8 below:

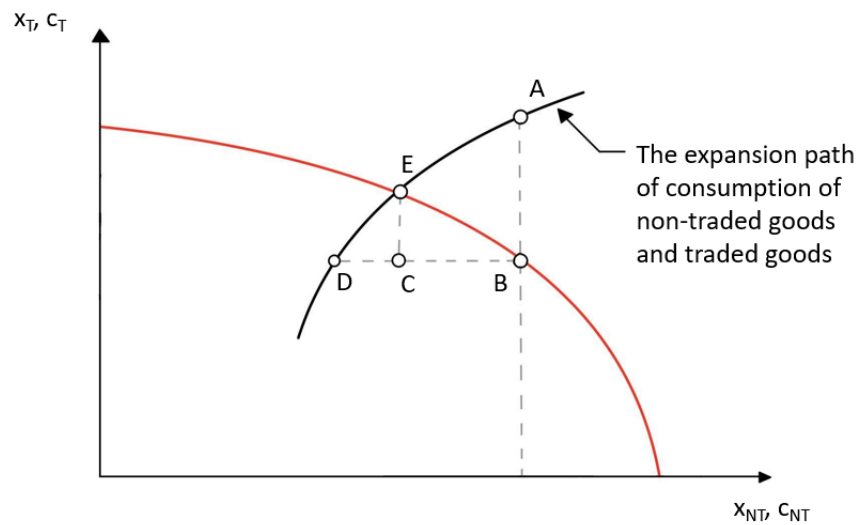


Figure 8: The reversal problem. Adapted from Norman & Orvedal (2019, p. 125)

The gap between consumption and production of traded goods must be covered by currency gifts g or a trade deficit. If the use of oil revenues is reduced, an economy might be forced to reverse the development from the expansion path because the currency gift g is reduced. Likewise, a trade deficit today should preferably be paid back in the future. All else equal, the economy must then have a trade surplus in the future to cover for today's trade deficit. Both are reasons for the reversal problem. The budgetary rule counteracts this problem as it ensures a steady use of oil revenues. Norway as a whole does not run a trade deficit, and by following the budgetary rule, the reversal problem and Dutch disease should not be an issue (Norman & Orvedal, 2019, p. 125)

3.4 The Ricardo-Viner model

3.4.1 Introduction to the Ricardo-Viner model

The Ricardo-Viner model is an international trade model that determines the "short-term effects on employment patterns, wage and profitability of changes in domestic labor supply or international prices" (Norman & Orvedal, 2019, p. 67). The model includes two input factors in labour and capital, and two sectors for goods in the traded and non-traded sectors. The market of interest is the labour market, but the product markets factor into the model as well. In the Ricardo-Viner model, labour is fully mobile in the short-term, while capital is immobile in the same time span. Labour and capital are both assumed to be homogeneous, which is a simplification of reality. The model is also simplified when we talk about education, competence and knowhow. The amount of labour and capital is given from outside, while the product prices are determined exogenously in the product markets (Norman & Orvedal, 2019, p. 67). In the section about the Ricardo-Viner model, we will present the standard theory as if the sectors were capital-intensive on the one hand and labour-intensive on the other hand. However, we have interpreted these sectors as the traded sector and non-traded sector, respectively. The reasoning behind this, is to get a clearer connection to the theory sections above. In the next subsection, we will treat the traded sector and non-traded sector as if they were the standard capital-intensive sector and labour-intensive sector. The non-traded sector differs from the labour-intensive sector in that the product price is determined endogenously, and this will be addressed in the analysis of the Norwegian model in the Ricardo-Viner framework section in the Discussion and findings section.

3.4.2 The Ricardo-Viner model

The Ricardo-Viner model includes the labour demand curves in each sector. A price increase shifts the demand curve upwards, while capital transfer to the sector shifts the demand curve outwards. A percentage increase in the product price leads to an equivalent upward shift in the labour demand curve, while a percentage increase in the amount of capital leads to an equivalent outward shift in the labour demand curve (Norman & Orvedal, 2019, p. 71). An illustration of labour market equilibrium is shown in figure 9 below:

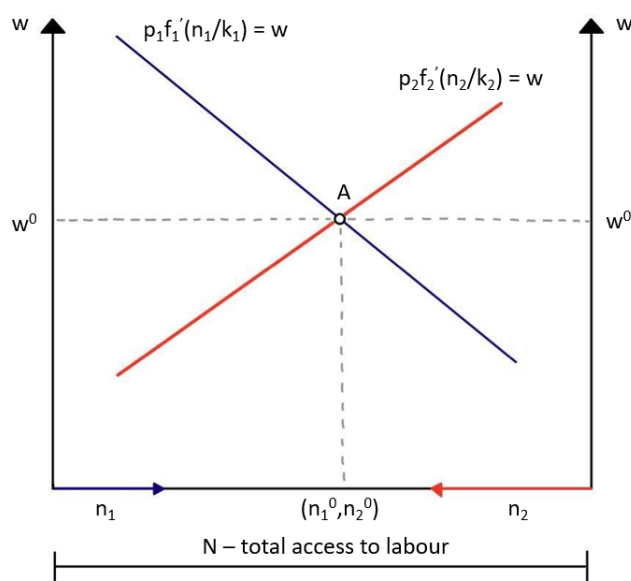


Figure 9: Equilibrium in the labour market. Adapted from Norman & Orvedal (2019, p. 74)

Here, the red line corresponds the labour-intensive industry and the blue line corresponds to the capital-intensive industry. The capital level in a sector is represented by the variable "k". As discussed earlier, the non-traded sector is relatively more labour-intensive than the traded sector, meaning that the traded sector is relatively more capital-intensive than the non-traded sector. In further analysis, the red line corresponds to the non-traded sector and the blue line corresponds to the traded sector.

Next, we will go through the effects of increased product price, as shown in figure 10 below:

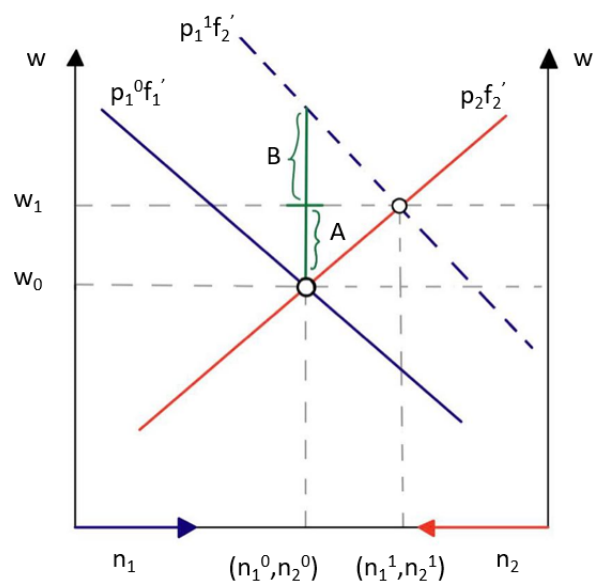


Figure 10: Effects of increased product price. Adapted from Norman & Orvedal (2019, p. 75)

Here, the product price of traded goods increases with some percentage. The effect on the labour market equilibrium, is that the traded sector will hire some of the labour from the non-traded sector. This leads to increased employment and production in the traded sector and decreased employment and production in the non-traded sector. Furthermore, the wage level will increase, but less than the percentage increase in product price. In particular, the wage will have a percentage increase between zero and the percentage increase in product price.

3.5 The Heckscher-Ohlin model

3.5.1 Introduction to the Heckscher-Ohlin model

The Heckscher-Ohlin model is also an international trade model. It includes the same input factors and markets as the Ricardo-Viner model, in addition to the capital market. The Heckscher-Ohlin model looks at the interaction between the capital markets and the labour markets. When doing so, it results into different production patterns and factor prices than in the Ricardo-Viner model (Norman & Orvedal, 2019, p. 67). In the Heckscher-Ohlin model, labour is fully mobile in the short-term, while capital is immobile in the short-term and mobile in the long-term. Labour and capital are both assumed to be homogeneous, which is a simplification of reality. The amount of labour and capital is given from outside, while the product prices are determined exogenously in the product markets (Norman & Orvedal, 2019, p. 67). In the next sections about the Heckscher-Ohlin model, we will present the standard theory as if the sectors were capital-intensive on the one hand and labour-intensive on the other hand. However, we have interpreted these sectors as the traded sector and non-traded sector, respectively. The reasoning behind this, is to get a clearer connection to the theory sections above. The facts that the sectors are actually traded and non-traded respectively, and that the product price is determined endogeneously in the non-traded market will be addressed in the analysis of the Norwegian model in the Heckscher-Ohlin framework section.

3.5.2 Structural change and capital transfer

The capital return curve defines the capital return r as a function of the wage level w and the product price p . The function is decreasing in r as w increases, and is concave. When drawing the capital return curves along with the labour demand curves, we invert the axes such that wage is on the y-axis in both markets. An illustration of an initial allocation is shown in figure 11 below:

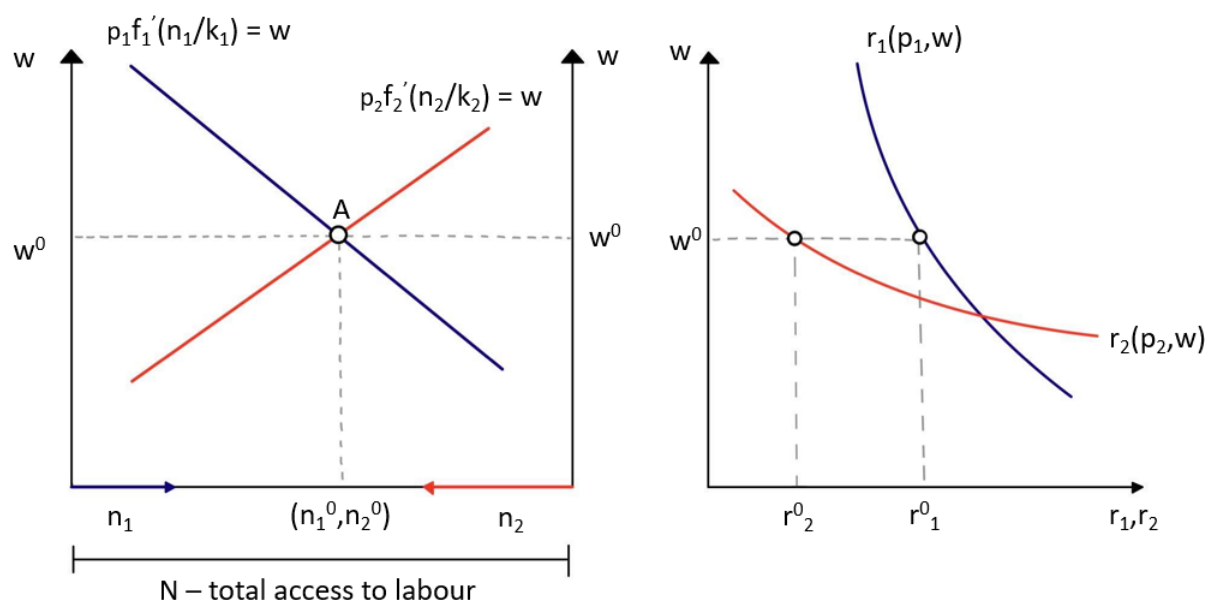


Figure 11: Wages and capital returns in the short-run. Adapted from Norman & Orvedal (2019, p. 84)

The figure shows a short-term equilibrium in the labour market, giving an initial allocation. This pins down the wage level and the distribution of labour between the two sectors. However, at this wage level, the capital return is different in the two sectors in that the capital return is higher in the traded sector compared to the non-traded sector. The difference in capital return between the two sectors leads to an incentive to move capital from the non-traded sector to the traded sector. An illustration of such capital transfer is shown in figure 12 below:

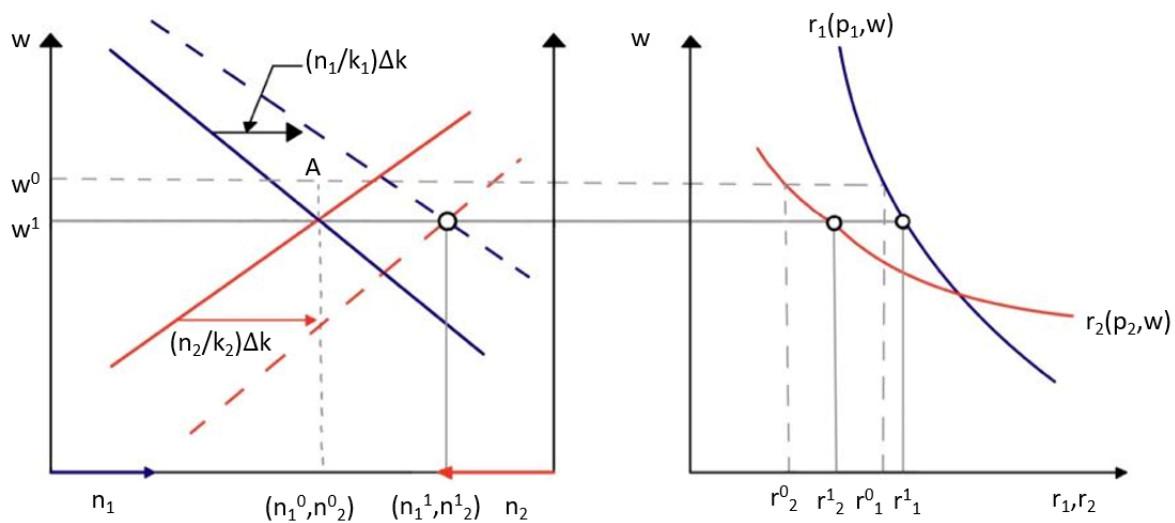


Figure 12: Effects of structural change. Adapted from Norman & Orvedal (2019, p. 85)

The capital transfer leads to increased labour demand in the traded sector and decreased labour demand in the non-traded sector. However, the effect is larger in the non-traded sector than the traded sector, because the non-traded sector is relatively more labour-intensive than the traded sector. The net effect is increased employment and production in the traded sector and decreased employment and production in the non-traded sector. The capital transfer also leads to a lower wage level than in the initial allocation. This leads to higher capital return in both sectors and the difference in capital return between the two sectors is reduced. Whether the capital returns become completely levelled, is an empirical question. The way we have drawn the capital transfer, makes it so that the difference in capital return is not completely gone. Thus, the capital returns have become more alike, but they are not completely levelled.

3.5.3 Transition dynamics

Transition dynamics can be understood as the behaviour of the economy when it is away from its long-term equilibrium (Jones, 2014, p. 108). Furthermore, the principle of transition dynamics can be interpreted as the farther away in percentage terms the economy is from its long-term equilibrium, the faster the economy will transition towards its long-term equilibrium (Jones, 2014, p.121). In the context of the capital market, transition dynamics can be interpreted as the dynamic that leads to capital transfer. It follows that the transition towards long-term equilibrium is faster in the beginning and that one obtains a convergence towards long-term equilibrium over time. Transition dynamics is not mentioned explicitly in context of the Heckscher-Ohlin model, but we will include transition dynamics as an important micro foundation. Transition dynamics summarize the effects of structural change, in addition to being useful in modelling capital transfer. In the previous section, we saw that an initial difference in capital return led to capital transfer and more similar capital returns afterwards. However, the capital returns were not completely levelled because of the way it was drawn and that it was a one-period change. In our interpretation, the capital market requires multiple time periods to reach long-term equilibrium. As such, capital transfer between the two sectors will continue until we reach long-term equilibrium. Figure 13 below shows the equilibrium in the capital market, which is also the long-term equilibrium and an illustration of transition dynamics:

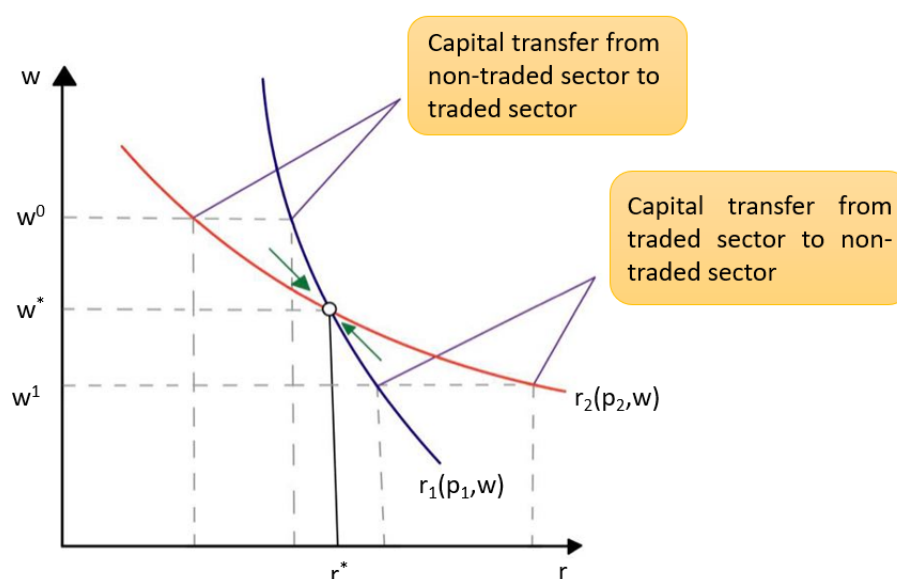


Figure 13: Transition dynamics. Adapted from Norman & Orvedal (2019, p. 88)

The green arrows that point towards the long-term equilibrium represent transition dynamics. If the initial wage level is above the long-term equilibrium, capital return is higher in the traded sector than in the non-traded sector. Gradually, this leads to capital transfer from the non-traded sector to the traded sector, as seen in the example in the previous section. As a result of this, the employment and production in the traded sector will increase, while the employment and production in the non-traded sector will decrease. This leads to a lower wage level closer to the long-term equilibrium, where the capital return has increased in both sectors. Transition dynamics dictate that capital transfer will continue until we reach the long-term equilibrium. As such, all following capital transfers will have the same sign, but with a decreasing impact each time.

If the initial wage level is below the long-term equilibrium, capital return is higher in the non-traded sector than in the traded sector. Gradually, this leads to capital transfer from the traded sector to the non-traded sector. As a result of this, the employment and production in the non-traded sector will increase, while the employment and production in the traded sector will decrease. This leads to a higher wage level closer to the long-term equilibrium, where the capital return has decreased in both sectors. This is because the non-traded sector is relatively more labour-intensive. Transition dynamics says that capital transfer will continue until we reach the long-term equilibrium. As such, all following capital transfers will have the same sign, but with a decreasing impact each time. (Norman & Orvedal, 2019, p. 88 & 89).

3.5.4 Long-term and capital market equilibria

Long-term equilibrium is reached when the labour market and capital market clear. In this equilibrium, the wage level is w in both sectors and the capital return is r in both sectors. There is also full employment of labour N and full employment of capital K (Norman & Orvedal, 2019, p. 92). An illustration of the long-term equilibrium in the labour and capital markets is shown in figure 14 below:

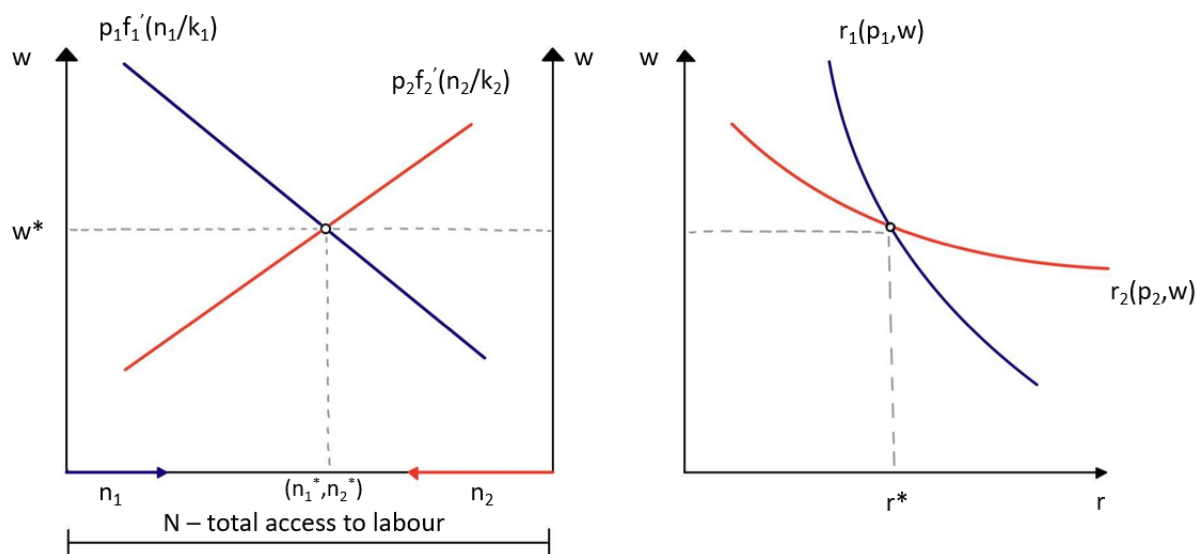


Figure 14: Long-run equilibrium. Adapted from Norman & Orvedal (2019, p. 93)

The figure above displays the long-term equilibrium from the section about transition dynamics after capital transfers. Thus, there exists a corresponding long-term equilibrium in the labour market for the long-term equilibrium in the capital market.

3.5.5 The Stolper-Samuelson and Rybczynski theorems

The Stolper-Samuelson and Rybczynski theorems are results that hold in long-term equilibrium. The Stolper-Samuelson theorem says that: "Increased price of a good leads to an increased price of the input factor that is used intensively in the production of said good, and a reduced price of the other input factor. The input factor that increases, will have a higher percentage increase than the product price" (Norman & Orvedal, 2019, p. 96). The latter statement is not that important to show graphically, but we will show the former statement graphically. We will do this in the following two examples, and figure 15 below shows an increased product price of goods from the non-traded sector:

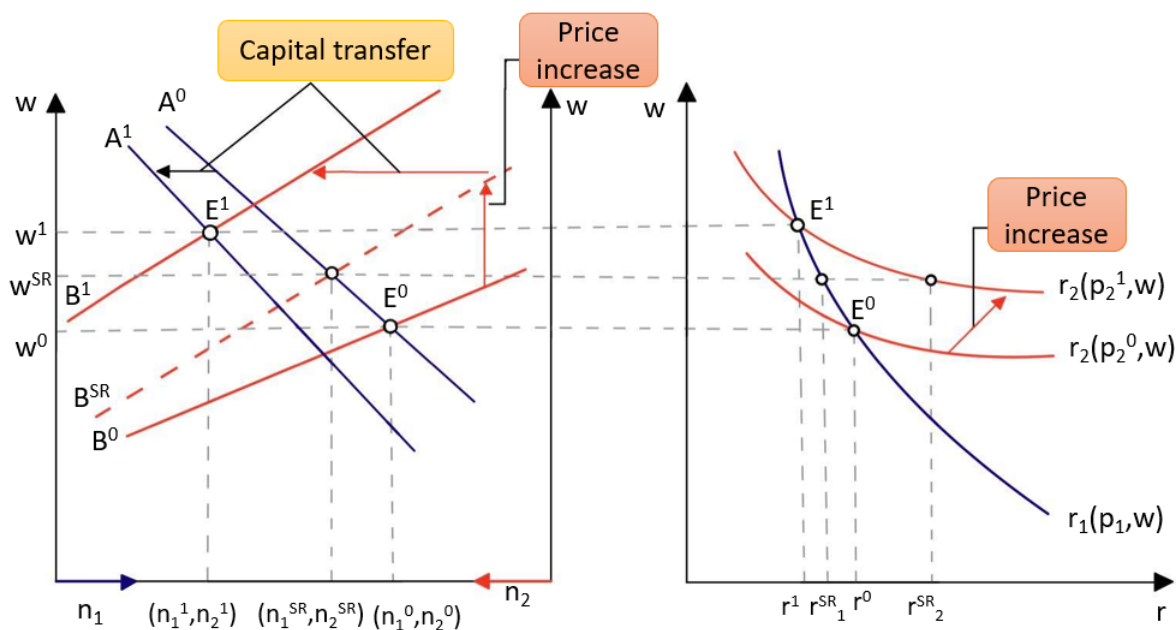


Figure 15: Increased price in non-traded sector. Adapted from Norman & Orvedal (2019, p. 97)

We start in an initial long-term equilibrium allocation E^0 and experience an increase in the product price of non-traded goods, which we will refer to as the first-order effect. In the short-term, the labour demand and capital return curves of the non-traded sector both shift outwards. In short-term equilibrium in the labour market, the non-traded sector will hire some of the labour from the traded sector. This leads to increased employment and production in the non-traded sector and decreased employment and production in the traded sector. The wage level will then increase, but the percentage increase is less than

the percentage increase in product price. Because of the shift in the capital return curve for the non-traded sector, the capital return will increase in the non-traded sector, while it will decrease in the traded sector. This happens because the wage increases, while the product price for the traded sector remains unchanged. For non-traded goods, the product price increases more than the wage level increase. These are all short-term results, which all stem from the first-order effects from increased product price. These results are the same as from the Ricardo-Viner model (Norman & Orvedal, 2019, p. 98 & 99).

The secondary effects associated with transition dynamics is where the Heckscher-Ohlin model differs from the Ricardo-Viner model. Because the wage level is lower than the long-term equilibrium wage level, we obtain the same results as in the section about transition dynamics. An important clarification is that in the long-term equilibrium, the percentage increase in the wage level is higher than the percentage increase in product price. It is worth noting that the secondary effect has the same sign as the first-order effect for both the wage and employment, thus it reinforces the short-term effects. The capital return has also decreased in both sectors, thus it is line with the prediction from the Stolper-Samuelson theorem in that increased price of labour-intensive goods leads to increased price of labour, and decreased price of capital (Norman & Orvedal, 2019, p. 97 & 98). The Stolper-Samuelson theorem also holds for an increase in the product price of traded goods, which is illustrated in figure 16 below:

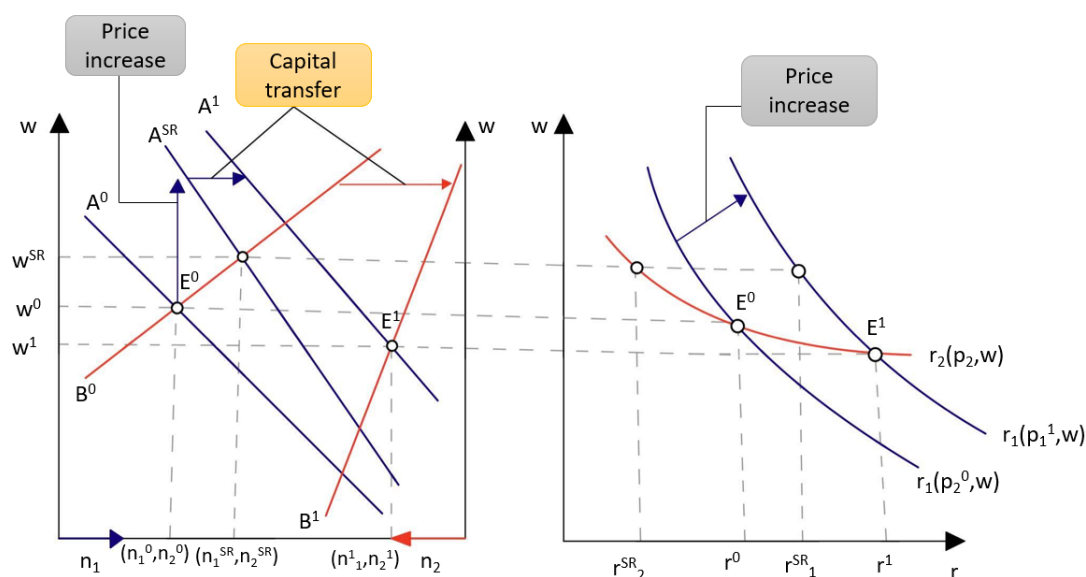


Figure 16: Increased price in traded sector. Adapted from Norman & Orvedal (2019, p. 98)

The initial long-term equilibrium is the same as in the previous example. In the short-term, the labour demand and capital return curves of the traded sector both shift outwards. The traded sector will hire some of the labour from the non-traded sector. This leads to increased employment and production in the traded sector and decreased employment and production in the non-traded sector. The wage level will then increase, but percentage increase is less than the increase in product price. Because of the shift in the capital return curve for the traded sector, the capital return will increase in the traded sector, while it will decrease in the non-traded sector. These are all short-term results, which all stem from the first-order effects from increased product price. These results are the same as from the Ricardo-Viner model. Because the wage level is higher than the long-term equilibrium wage level, we obtain the same results as in the section about transition dynamics.

An important clarification is that in the long-term equilibrium, the percentage increase in capital return is higher than the increase in product price. It is worth noting that the secondary effect has the opposite sign for wage compared to the first-order effect, thus it counteracts the short-term effects. However, the sign for employment is the same for the short-term and long-term effects. The wage level has also decreased in both sectors, thus it is line with the prediction from the Stolper-Samuelson theorem in that increased price of capital-intensive goods leads to increased price of capital, and decreased price of labour.

The Rybczynski theorem says that "increased access to an input factor leads to increased production of the good that uses said input factor intensively, and reduced production of the other good" (Norman & Orvedal, 2019, p. 99). Here, we will assume that the results from the Rybczynski theorem holds, without formally showing it.

4 Methodology

4.1 Descriptive method

In the following parts of the thesis, we will start with having an analysis of the Norwegian model in the Ricardo-Viner framework and the Heckscher-Ohlin framework, respectively. This gives us some results that we will use as hypotheses for discussion and findings. We will illustrate and discuss the results from the theoretical analysis by looking at the development of different variables in the Norwegian economy. This thesis is therefore not a formal data-based analysis, but rather an attempt to use data to illustrate the effects we have mentioned above. Our aim is to collect data that can illustrate the main points mentioned in the theoretical approach and how data and theory can help us understand how wage determination has functioned in Norway. To do so, we use the data to create graphs that can illustrate some of these mechanics. We will also consider the hypotheses mentioned in the theory section and create a discussion around this, with focus on the Norwegian model for wage settlements.

4.2 Data collection

To illustrate the hypotheses that will be derived in the section about the Norwegian model in Heckscher-Ohlin framework, we need values for "labour costs", "employment", "capital", "product price" and "return on capital" for both the traded and non-traded sectors. The data material used for these data analyses has been collected from Statistics Norway. However, data material used for illustrating the exchange rate over time has been collected from the central bank of Norway. Our approach towards the use of data from Statistics Norway are shown in detail on page 37.

Using different tables on a year-to-year basis from the National Accounts at Statistics Norway, we were able to create most of the graphs needed. We chose the yearly numerical tables instead of the quarterly numerical tables, because the Norwegian model functions on a year-to-year basis. As mentioned, the tables we used are all listed in detail on page 37. We decided to proceed with these exact tables as they gave us the best match for illustrating our hypotheses in both sectors. The data in our tables are collected from the years 1970 to 2019, because the time series started in that year and we wanted to collect data as far back in time as possible. However, the variable "product price" was taken from NOU 2016:3 and was not found from a table. The reason for this, is because we did not find a proper distinction between the traded and non-traded sectors in the tables that we wanted to use as an estimate for the product prices. From NOU 2016:3 we reproduce a graph that displays the traded sector and includes different industries within the non-traded sector. The data shown here are from year 1970 to year 2014. The data material used for illustrating the exchange rate was collected from year 1982 to year 2019, because the time series started back then.

An overview of our data collection is given in the summary table shown in table 1 below:

Table	Variable name	Content	Year	Industry: Non-traded sector	Industry: Traded sector
09174 - Wages and salaries, employment and productivity, by industry	Labour costs	Compensation of employees (NOK million)	1970 - 2019	Production for market Mainland Norway minus Manufacturing	Manufacturing
09174 - Wages and salaries, employment and productivity, by industry	Employment	Employed persons. Employees (1000 persons)	1970 - 2019	Production for market Mainland Norway minus Manufacturing	Manufacturing
09181 - Gross fixed capital formation and capital stocks, by type or industry	Capital	Fixed assets. Current prices (NOK million)	1970 - 2019	Production for market Mainland Norway minus Manufacturing	Manufacturing
Graph from NOU 2016:3 (no table)	Price index	Producer price index (1970 = 1)	1970 - 2014	NOU 2016:3	NOU 2016:3
09170 – Production account and income generation, by industry	Return on capital	Operation surplus. Current prices (NOK million)	1970 - 2019	Production for market Mainland Norway minus Manufacturing	Manufacturing

Table 1: Determination of variables (SSB)

In the discussion section, we will show our illustrations. Two of the illustrations need addressing. The first illustration displays wage development over time between both sectors. The wage level was obtained by taking the variable "labour costs" and dividing it by the variable "employment" for both sectors. The second illustration displays the "capital return" in both sectors. The capital return over time was obtained by taking the variable "operation surplus" and dividing this by the variable "capital".

4.3 Determination of traded sector and non-traded sector

In this section, an explanation for what is included in the two different sectors will be given. First, we will define what is included in the non-traded sector. All the data used for illustrating non-traded sector in this thesis was obtained by using "Production for market Mainland Norway" minus "Manufacturing", which we will assume are all part of the non-traded sector. From Statistics Norway, "Mainland Norway consists of all domestic production activity except exploration of crude oil and natural gas, transport via pipelines and ocean transport" ("Concepts and definitions in national accounts", 2012). The reason why we subtract the manufacturing industry, is because market-oriented industries include all production in Mainland Norway, both for the traded and non-traded sector. Thus, we obtain the division that we looked for by excluding non-Mainland Norway, non-market-oriented Mainland Norway and the manufacturing industry.

All the data used for illustrating traded sector in this thesis was obtained by using "Manufacturing". Thus, the public sector which is part of non-market Mainland Norway and the oil industry which is part of non-Mainland Norway are not included in our analysis. In Statistics Norway a division in subcategories was shown when choosing "Manufacturing". This division from Statistic Norway is shown below in table 2:

Manufacturing

- Food products, beverages and tobacco
 - Food products excl. processing of fish, incl. beverages and tobacco
 - Processing and preserving of fish, crustaceans and molluscs
- Textiles, wearing apparel, leather
- Manufacture of wood and wood products, except furniture
- Manufacture of paper and paper products
- Printing and reproduction of recorded media
 - Refined petroleum, chemical and pharmaceutical products
 - Manufacture of basic chemicals etc.
 - Rubber, plastic and mineral products
 - Basic metals
 - Machinery and other equipment n.e.c
 - Building of ships, oil platforms and moduls and other transport equipment
 - Furniture and other manufacturing n.e.c

Table 2: Manufacturing divided by industries in the traded sector (SSB)

Even though "printing and reproduction of recorded media" is considered as non-traded, we choose to look at the Manufacturing industry as a whole for the traded sector.

5 Discussion and findings

5.1 The Norwegian model in the Ricardo-Viner framework

Before we start the analysis, we will present some clarifications regarding the analysis. The first one, is the use of the terms "model" and "framework". By "model", we refer to the standard results from the respective theory sections. For the "Ricardo-Viner model" we therefore refer to the results that we derived in the Ricardo-Viner model. By "framework", we refer to the same setting as in the corresponding model, but it is a framework because the results deviate from the standard model. For the "Ricardo-Viner framework" we therefore refer to a setting with two product markets and a labour market. The second clarification is that the Norwegian model deviates from the standard model because of the non-traded sector. The product price is determined endogenously in the non-traded sector, thus it cannot be taken as exogenous. The figure below shows the partial equilibrium for the traded and non-traded markets.

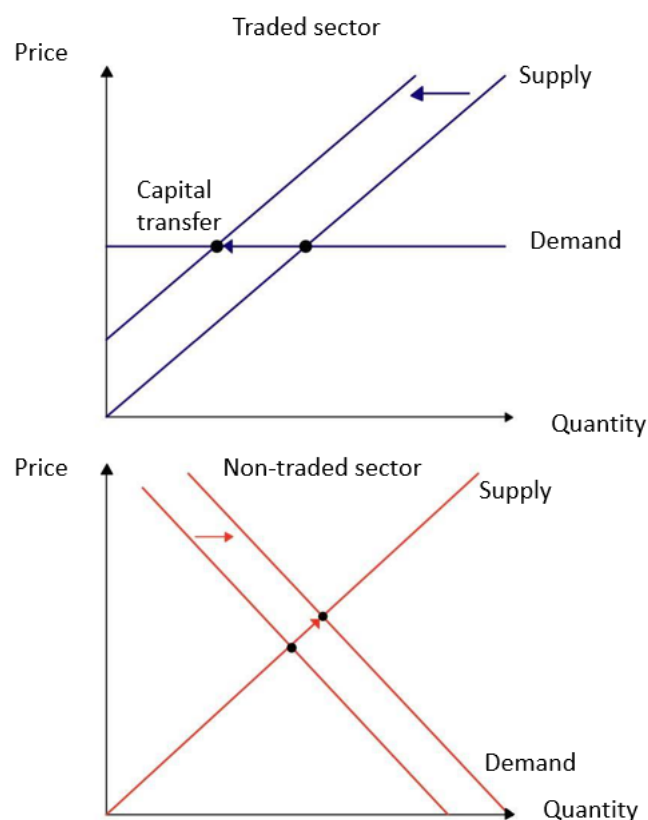


Figure 17: Partial equilibrium in traded sector and non-traded sector

In the figure above, both sectors have upward sloping supply curves because the capital level is fixed. For the non-traded sector, the demand curve is downward sloping, while it is flat for the traded sector. A shift in the supply curve of non-traded sector will impact the price and quantity of non-traded goods. However, a shift in the supply curve of traded goods will only impact the quantity of traded goods, but not the product price. This will have more implications for the Heckscher-Ohlin model, but it is important to keep in mind that there is a difference between the price dynamics in the traded and non-traded sectors.

In our interpretation of the Norwegian model in the Ricardo-Viner framework, we will use two distinct outcomes as starting points and argue that reality might lie somewhere in between said outcomes. On the one hand, we look at an allocation in which the Norwegian model leads to a wage settlement completely in line with the Ricardo-Viner model. On the other hand, we will also look at an allocation in which the Norwegian model aims to

maintain employment level in the traded sector, resulting in a wage settlement that is different from the Ricardo-Viner model. In our analysis of the Norwegian model in the Ricardo-Viner framework, we will focus on changes in the product prices of traded goods and non-traded goods. We will use the development in Norway as starting point for our analysis to show what impact it should have on the Norwegian economy. The shock that we will analyze, is that the product prices of non-traded goods have increased more than the product prices of traded goods. A general reason for this, is economic growth through increased access to capital and improved technology with the corresponding Baumol effect. The use of oil revenues is specific to Norway and it amplifies the effects from economic growth. Because these effects point in the same direction, it is not important whether the development of relative prices stems from economic growth or use of oil revenues.

The first interpretation embraces wage settlement as a partial equilibrium approach with labour market equilibrium. To be precise, this is really a general equilibrium approach with sector-specific capital, but the intuition from partial equilibrium can be applied here. The reasoning behind this, is that we have an equilibrium in the labour market and two markets for goods and that the product prices are given exogenously. This is true for the traded sector, as product prices are given from the world market and our production level does not affect product prices notably. However, product prices and quantities are determined domestically for the non-traded sector. Thus, the condition that product prices are given exogenously does not hold for the non-traded sector. In our analysis, we will mainly stick to the standard dynamics, but draw on the insights from endogeneity when applicable. In addition, productivity increase also factors into the labour market. We will assume Hicks-neutral productivity increase in that all factors in a sector become more productive. With this interpretation, productivity increase functions the same way as an increase in product prices. However, it is not obvious whether productivity increases point in the same direction as increases in product prices. Conversely, empiricism has shown that these effects tend to point in the opposite directions. Thus, when we refer to increases in product prices, it also factors productivity increases into the price increases in that it is the net effect of the two. In a market solution, different productivity development in the two sectors will lead to different wage levels, even though product price and productivity factor into wage settlements in the same way. The Norwegian model will force the same wage development onto both sectors, even if they experience different development in

productivity.

Here, we will look at changes in product prices. According to theory from the Ricardo-Viner model, a percentage increase of the product price in the non-traded sector will lead to a wage increase between zero and the percentage product price increase. In addition, it will also lead to an increased production in the non-traded sector and reduced production in the traded sector, as shown the sections about the Ricardo-Viner model. When the product price of non-traded goods has increased more than the product price of traded goods, it is sufficient to analyze it as a product price increase in the non-traded sector. The main results are that a product price increase in the non-traded sector will lead to increased wage, while the structural change dictates that the non-traded sector will hire some of the labour from the traded sector. This has been the development over time because the product price of non-traded goods is determined endogenously from supply and demand in the domestic market and not exogenously from the world market. This is the reason why the product prices have increased in the non-traded sector. However, the implications from such a development can be analyzed in the Ricardo-Viner model. Equilibrium in the labour market is always given by the intersection by the two labour demand curves. Because wage settlements happen every year, it can be viewed in a discrete time setting, with each period corresponding to one year. As the trend has been that the product prices have increased more in the non-traded sector than in the traded sector, this leads to increased wages in every time period. In this interpretation of the Norwegian model in the Ricardo-Viner framework, the wage level is determined literally according to the Ricardo-Viner model. The intuition is that labour market clears as in a partial equilibrium setting, as it takes into account the first-order effects.

The second interpretation looks at wage settlement through the Norwegian model with the aim to maintain employment levels in the traded sector. This can be analyzed in the Ricardo-Viner framework because it also looks at the labour market, but does not necessarily lead to an equilibrium. This approach will depart from the results from the Ricardo-Viner model, which we will see shortly. While the Norwegian model in this interpretation aims to maintain employment in the traded sector, the development in product prices puts pressure onto the traded sector. This approach sets a floor for the employment level in the traded sector equal to the initial employment level in each period.

Thus, the wage settlements support this policy. Because the product prices have increased more in the non-traded sector than in the traded sector, this results in the wage level increasing less than in the previous approach for any increase in product prices and no structural change. Graphically, this can be shown as the same allocation as the initial allocation, as the labour distribution remains at status quo, even though one experiences increased wage levels. The intuition is that labour market does not clear as in a partial equilibrium setting, because employment in the traded sector is maintained. Such a development is illustrated in figure 18 below:

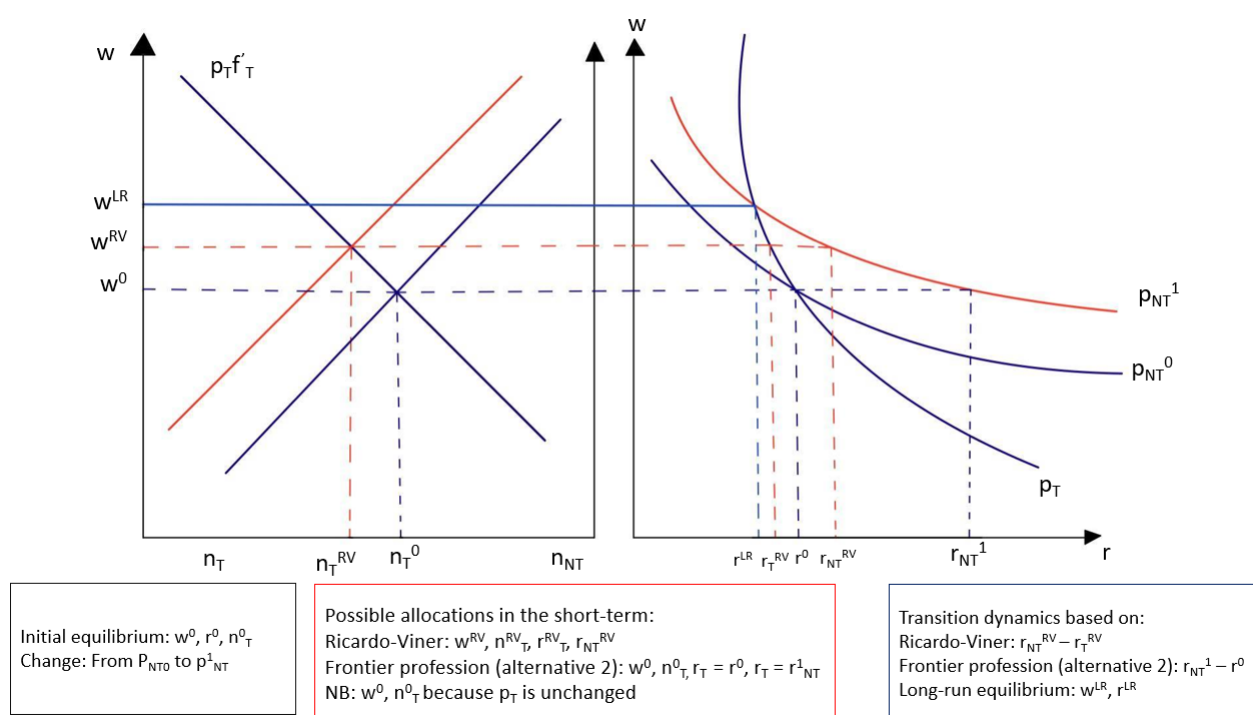


Figure 18: Wage settlements in the short-run (Haaland, 2020)

In the figure above, LR means long run, while RV means Ricardo-Viner. The left side in the figure shows the labour market and the short-term effects discussed in this section. The right side shows the capital market and the long term effects, which will be discussed in the Heckscher-Ohlin model. It is worth noting that this does not lead to an equilibrium in the labour market, because there exists excess demand for non-traded goods at this wage level. The implications of this are unambiguous, but possible implications may be increased product price or wage drift in the non-traded sector. If the wage level is held constant while the product price of non-traded goods increases, then the real wage will

decrease. This is because nothing "real" happens to the wage, it is only normalized to consider simultaneous changes in the product prices. In this second interpretation of the Norwegian model in the Ricardo-Viner framework, the wage level is determined such that it maintains employment in the traded sector.

As mentioned earlier, the Norwegian wage settlements are not as straightforward as either of our two interpretations. Because of this, we understand that real-life wage settlements result in an allocation somewhere between those allocations. On the one hand, trade unions strive for an allocation that follows the Ricardo-Viner model literally, because it leads to relatively higher wage increases and flexible structural changes. On the other hand, employer unions strive for an allocation that maintains employment levels because it leads to relatively lower wage increases and predictability when it comes to employment. Alternatively, one can view wage negotiations as a case where there exists trade and employer unions in different sectors. In the traded sector, both trade and employer unions want wage moderation to maintain employment in their sector and support the Norwegian model in that other sectors must follow the same wage moderation. In the non-traded sector, trade unions want higher wages because of increased demand, while employer unions may be ambiguous. On the one hand they want to minimize costs, while on the other hand they may need higher wages to attract more labour. As these unions have conflicting interests, it seems plausible that negotiations between the two parties result in an allocation as a compromise between if each part were to determine the wage level alone. It is worth noting that both unions in the traded sector have a mutual interest in that employment levels should not decrease too much in the traded sector and that they are concerned with both the wage and employment levels.

If our first interpretation were the actual wage settlements, then the trade and employer unions in the manufacturing industry must have a general equilibrium perception of the whole Norwegian economy. In the Norwegian model, the manufacturing industry negotiates first, but in a market solution it does not matter who negotiates first. However, the results from the first approach are not in the interest of the unions in the manufacturing industry. Thus, we believe that real life wage negotiations are closer to the second approach than the first approach. However, wage settlements are not literally the second approach either because there exists a willingness to sacrifice some jobs to achieve real wage increases.

Thus, real life wage settlements are mostly the second approach with some features from the first approach. When interpreting the Norwegian model in the Ricardo-Viner model, the main intuition is to view wage settlements as a partial equilibrium allocation. This view will be lifted when we interpret the Norwegian model in the Heckscher-Ohlin framework. The Ricardo-Viner model is used as a short-term version of the Heckscher-Ohlin model, but can also be interpreted as the Heckscher-Ohlin model with industry-specific knowhow. The Heckscher-Ohlin model in its traditional sense assumes that all capital is transferable over time between sectors, while the opposite is true when assuming industry-specific knowhow. Reality might lie somewhere in between these two outcomes.

5.2 The Norwegian model in the Heckscher-Ohlin framework

We will use the same distinction between "model" and "framework" as in the analysis of the Norwegian model in the Ricardo-Viner framework. The distinction between traded and non-traded goods will have more of an impact in this section, as shown in figure 19 below:

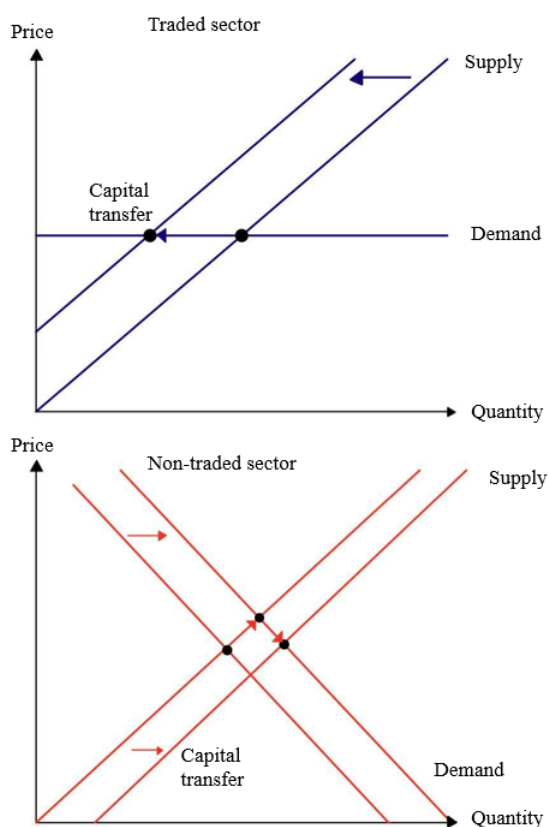


Figure 19: Partial equilibrium in traded sector and non-traded sector

Increased demand for non-traded goods will increase the product price of non-traded goods. Because of the shift in the capital return curve in the non-traded sector, capital return will be higher in the non-traded sector than in the traded sector. This will create an incentive to move capital from the traded sector to the non-traded sector. However, capital transfer from traded sector to the non-traded sector will shift the supply curve outwards. This will lead to increased quantity and lower product price compared to the short-term effect. In the figure above, the product price increases before it decreases to

some extent. However, in reality the product price does not fluctuate in this fashion. It increases or decreases to some extent, which is what we observe in real life. The problem that arises, is that the effect on product price is ambiguous, so that it is hard to pin down the exact effect. With this in mind, it is clear that it is harder to determine the effects in practice than is the case in theory.

In our interpretation of the Norwegian model in the Heckscher-Ohlin framework, we will use the same two outcomes as for the Ricardo-Viner framework as starting points. We will then also argue that reality might lie somewhere in between said outcomes. On the one hand, the first interpretation viewed wage settlement completely in line with the Ricardo-Viner model, which is the correct wage level in the short-term. On the other hand, the second approach aimed to maintain employment levels in the traded sector, such that it differs from the Ricardo-Viner model. In our analysis of the Norwegian model in the Heckscher-Ohlin framework, we will focus on changes in the product prices of traded and non-traded goods. Here we will also analyze the shock that the product prices have increased more in the non-traded sector than in the traded sector, as in the section about the Norwegian model in the Ricardo-Viner framework. The long-term effects will then be different depending on which interpretation we look at.

The Heckscher-Ohlin model differs from the Ricardo-Viner model in that it also includes the capital market. The short-term effects are the same as in the Ricardo-Viner model, but by including the capital market as well, we can see that this wage level creates a wedge between the capital returns in the traded and non-traded sectors. When the product price has increased more in the non-traded sector than in the traded sector, it implies that the capital return will be higher in the non-traded sector if it experiences the increase in product price, as has been the case in Norway. Thus, there exists an incentive to move capital from the traded sector to the non-traded sector through capital transfer and transition dynamics. However, it is important to consider that product price is determined endogeneously in the non-traded sector. On the one hand, increased demand for non-traded goods will shift its demand curve outwards. This will lead to increased quantity of non-traded goods. On the other hand, capital transfer from the traded sector to the non-traded sector will shift the supply curve of non-traded goods outwards. This will also increase the quantity of non-traded goods, but it will decrease the product price

of non-traded goods after increasing initially. However, the trend should still be that the product price increases more in the non-traded sector than in the traded sector, such that the results from standard Heckscher-Ohlin model should still apply.

As for the interpretation in the Ricardo-Viner framework, one can obtain the real effect of the product price increasing more in the non-traded sector than in the traded sector by analyzing a product price increase in the non-traded sector. For the Heckscher-Ohlin model, transition dynamics then determine the capital transfers and structural changes that lead towards long-term equilibrium according to the Stolper-Samuelson theorem, as highlighted in the theory section. The dynamics from the Stolper-Samuelson theorem will hold, but the product price of non-traded goods will decrease to some extent after an initial increase. The theorem will still apply, but it is important to note that the product price of non-traded goods will adapt because of capital transfer that leads to shifts in the supply curves. Because the product price is determined endogeneously in the non-traded sector, it might increase or decrease to some extent, but the most important aspect is that there has been a trend with increasing product prices. If this first approach were the actual wage settlements, there would not exist major problems related to the Norwegian model, apart from the fact that the product price of non-traded goods is determined endogeneously.

In our second approach, wage settlements were determined with the goal to maintain employment in the traded sector. This was done looking at the labour market, which could be analyzed in the Ricardo-Viner framework. Firstly, the Heckscher-Ohlin model differs from the Ricardo-Viner model in that it also includes the capital market. The short-term effect was that there existed no structural change and no real increase in the wage levels, they were only adjusted by normalization. Given that the product prices have increased more in the non-traded sector than in the traded sector, this implies that the wedge between the capital returns in the two sectors is even bigger in the short-term in this approach. This also leads to a higher capital return in the non-traded sector than in the traded sector, but this difference is higher than when the labour market clears. The dynamic where the product price of non-traded goods is determined endogeneously is the same as in the first approach. For the Heckscher-Ohlin model, transition dynamics then determine the capital transfers and structural changes that lead towards long-term

equilibrium according to the Stolper-Samuelson theorem. However, the economy is never actually at the long-term equilibrium from the Heckscher-Ohlin model, the question is whether one moves away from or towards this equilibrium. The two approaches differ in that the wage settlements in the Ricardo-Viner model decrease the pressure onto the employment in the non-traded sector, while the pressure will be maintained in the other approach, and the structural change will occur through capital transfer because of different capital returns. This is shown in figure 20 below:

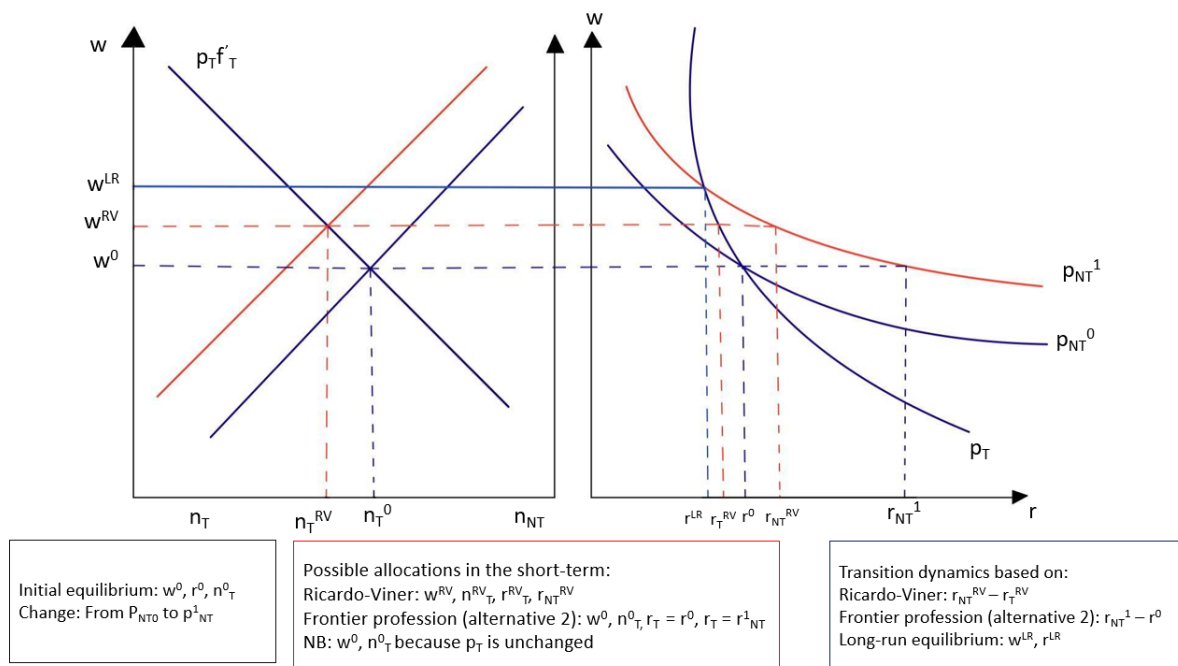


Figure 20: Wage settlements in the short-run (Haaland, 2020)

This second approach also includes these effects when looking at wage settlements in the long-term. Because there exists differences in capital returns, there will exist transition dynamics and capital transfer from traded sector to the non-traded sector in this approach. As capital is transferred from the traded sector to the non-traded sector, it will decrease the labour demand in the former sector and increase the labour demand in the latter sector. The traded sector will not hire more labour than it demands, so the non-traded sector will hire the labour that is no longer demanded by the traded sector. It is important to note that there still exists excess demand for labour in the non-traded sector after the capital transfer, so there is not an equilibrium in the labour market either. In the next wage settlements, one will attempt to maintain this lower employment level in the

traded sector and maintain the same wage level. However, the wage settlement dynamics in the labour market will delay transition dynamics and structural change, because the goal is to maintain employment in the traded sector in each wage settlement. This delay implies that even with a well-functioning capital market, one can experience sustained differences in capital returns over time. If we were to interpret the Heckscher-Ohlin model literally, it could imply that the non-traded sector would eventually attract all the production, while there could be no production in the traded sector. However, we can not interpret the model this way because the product price of non-traded goods is determined endogeneously. Too much specialization towards production of non-traded goods will decrease the product price of non-traded goods and counteract the differences in capital return and the incentives to continue capital transfer. In practice, sustained differences in capital return may lead to higher levels of capital transfer, but not complete specialization.

These two approaches to the Norwegian model in the Heckscher-Ohlin framework both have some problems, which are reinforced by the fact that the product price is determined endogeneously in the non-traded sector. In the first approach, there exists a well-functioning labour market, as wage settlements are determined according to the Ricardo-Viner model in the short-term, which will move towards the Heckscher-Ohlin model in the long-term. In the second approach, the long-term effects from the Heckscher-Ohlin model are present, but they are delayed by the labour market as it does not follow the short-term wage settlements from the Ricardo-Viner model. However, the capital market does not necessarily reach an equilibrium state because the labour market delays transition dynamics and structural change. Because of this, there can arise two types of pressure in the form of different wage levels and different capital return, or both across sectors. Both of which can serve as a foundation for capital transfer over time. The Norwegian model attempts to avoid that the wage level in the non-traded sector becomes too high and that the wage increase in the non-traded sector does not become higher than in the traded sector, but it is not guaranteed to succeed.

In reality, a market is neither perfectly well-functioning nor a complete market failure, as highlighted in the theory section. This is reflected in the short-term wage settlements of the real-world approach that the Norwegian model in the Ricardo-Viner framework represents. If reality is somewhere between our two outcomes, it implies that the capital market factors into the wage settlements to some extent. On the one hand, this implies that the transition dynamics and structural changes not only are delayed as in the second approach, but that these dynamics do not necessarily reach an equilibrium in the capital market in the long run. On the other hand, wage settlements are not that straightforward as pointed out in the first approach, because the product prices are determined endogeneously in the non-traded sector. The second approach does not consider the general equilibrium effects and the implications for wage settlements sufficiently, but these dynamics must factor into wage settlements in some way.

The previous section stressed that some capital might be transferred over time, while other capital is sector specific knowhow. A question that arises, is what happens to this sector specific knowhow over time. Some knowhow might stay in its specific sector, while other knowhow might arise in the non-traded sector with high capital return and dismantle in the traded sector with low capital return. This can be viewed as capital conversion, in that capital is converted from specific to the traded sector to specific to the non-traded sector. This is also referred to as putty-clay theory in that capital is flexible and non-sector-specific before it is invested, but it becomes inflexible and sector-specific once it has been invested. Over time, existing capital gets worn down, while new investments occur where the expected capital return is highest. This shows that it might take time for capital to convert from one sector to another. Because of this, reality might lie somewhere between these two models. To summarize our interpretation of the Norwegian model in the Ricardo-Viner and Heckscher-Ohlin frameworks, we believe that wage settlements are mostly interpreted as a negotiation that determines a wage level that will maintain the employment in the traded sector, even though there exists interests to increase the real wage. Capital transfer and transition dynamics then factor into the business structure, but the effects on the wage developments are not sufficiently taken into account.

With this in mind, we will next formulate some hypotheses that display implications of the Norwegian model when comparing it to the theoretical results from the Ricardo-Viner and Heckscher-Ohlin models. We have constructed a total of four hypotheses. A first implication is that if the Norwegian model were to work as intended, then both sectors should have experienced the same percentage wage increase over time. A second implication is that if the goal is to maintain employment in the traded sector, then the non-traded sector should experience increased employment level, while the employment level in the traded sector is maintained. This should only be possible because total employment has increased over time, which we will show in the review of the hypothesis. If this had not been the case, then increased employment in the non-traded sector would only have been possible by decreased employment in the traded sector. A third implication is that, given this, capital returns should be different across sectors, because of delayed structural change. A fourth implication is a development with product prices increasing more in the non-traded sector than in the traded sector and that exchange rates factor into this. This has been the decisive factor that has shaped the historical development in Norway. These hypotheses will be elaborated further on in the next sections. We will illustrate these hypotheses to show some of these effects.

5.3 Hypothesis 1: Wage development over time

Here, we apply a direct implication for the Norwegian model for wage settlements. If we consider that the Norwegian model for wage settlements works as is supposed to, this will imply that the wage level determined by the traded sector will have spillover effects onto the non-traded sector and determine the wage level there. This implies that both sectors have the same percentage wage increase. Here, it is worth noting that wage settlements according to the Ricardo-Viner and Heckscher-Ohlin models also dictate that the percentage wage increase should be equal across sectors. The alternative is therefore a model that does not reach an equilibrium state, with different wage development across sectors. Equal wage development in a market solution assumes a homogeneous labour force. If there exists differences in the labour force in the traded and non-traded sectors, a market solution will yield different wage development in both sectors, while the Norwegian model will yield the same wage development for both sectors. Differences in the labour force between the two sectors might be due to different productivity development or different labour composition. In figure 21 below, we include an illustration of our first hypothesis, namely the wage development. This figure illustrates the nominal wage rate in both sectors. These are plotted against each other and we will here focus on the relative development.

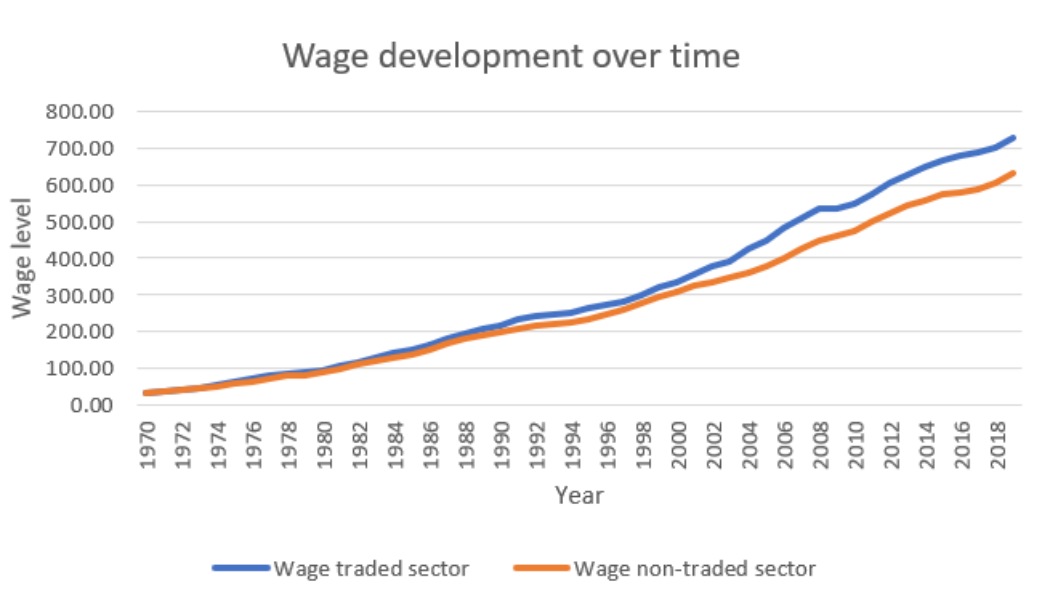


Figure 21: Wage development over time (SSB)

From figure 21 we observe that from year 1970 to year 2000 the wage level has been more or less equal in both sectors. From the year 2000 onward, the nominal difference in wage level has increased significantly. Overall, the wage level in the traded sector has had a higher wage level than the non-traded sector. According to theory, this is unusual and could have something to do with productivity growth. However, it is not obvious how this difference has developed over time just by looking at the graph. To get a clearer picture of how this gap between the sectors has developed over time, we have plotted the nominal differences over time. This is illustrated in figure 22 below:



Figure 22: Nominal wage difference over time (SSB)

The nominal wage difference over time between the sectors has risen steadily from year 1970 to year 2000. From year 2000 onward, we observe a drastic increase in the nominal wage difference. Overall, it has had an increasing trend over time. If there are higher wages in the traded sector than in the non-traded sector and these are connected to labour, then this will be reflected in wage developments. A question that arises, is whether an increase in the nominal wage difference is due to different wage growth or different initial level. In the event of equal wage growth, the difference in nominal wage levels will increase over time because the initial difference in wage level will be reinforced by equal wage growth. Alternatively, increasing nominal wage difference can be due to the percentage wage development being higher in the traded sector than in the non-traded sector. We can distinguish between these effects by looking at the percentage increase

in wage development in both sectors over time. Next, we plot $\ln(w_t) - \ln(w_{t-1})$ for traded sector and non-traded sector to get an illustration of whether annual wage growth has been equal in the two sectors:



Figure 23: Wage growth over time (SSB)

The main point we observe from figure 23, is that the wage growth between the sectors has been more or less stable in the two sectors from year 1970 to year 2000, but the wage growth itself has fluctuated quite a lot. In that time period, both the traded sector and the non-traded sector follow the same trend. Deviations between these two sectors can be observed in the years 2004 and 2008. The trend has consisted of similar wage growth in both sectors over time and the main reason for increasing nominal difference in the wage level between the two sectors is because the traded sector initially has had a higher income level. However, there also exists some deviations in the wage growth in some periods. These periods with different wage growth can then also explain some of the trend with increasing difference in nominal wage levels between the traded and non-traded sectors. Next, we will investigate some of the periods when the wage growth has been different between the two sectors.

In figure 21 we saw that wage levels have diverged a little bit since 2000. A reason for this, could be increasing use of oil revenues in the 2000s onward. We also generally experience a higher nominal wage level in modern times, which explains the visual wage gap between the traded and the non-traded sector. The latter holds true because the Norwegian model will force them to be more similar to each other, while for the former one, market forces or the composition of the workforce may force them to go in different directions. The same wage development in both sectors in figure 21 from year 1970 to year 2000 could either be due to the mechanics of Norwegian model or because we have been in a general equilibrium in that period. Examples of this could be due to wage drift, due to more use of local wage agreements, changes in qualifications or working excess hours due to high demand. We take notice that productivity and the composition of the workforce are two important factors here.

The financial crisis that took place in year 2008 has had a significant impact on the development in Norway. This has resulted in a bigger impact in the traded sector than in the non-traded sector. This is because a financial crisis has a direct impact on the traded sector and thus it suffers the most. After the financial crisis, we see that the wage growth in both sectors followed the same pattern and remained quite stable. The Norwegian model will force the two sectors to be more similar to each other, while the market forces or the composition of the workforce may force them to go in different direction. A greater wage differences in a market solution can stem from different productivity, different composition of the workforce or industry-specific skills. In other words, if a market solution were to yield larger wage differences, it could be because of the workforce that includes highly educated workers would be higher in one sector than the other. It could also be because of higher productivity growth in one sector compared to the other. It is important to mention that the Norwegian model may have reduced wage differences for such reasons.

Given what the Norwegian model would predict, we see that the wage growth has followed the same pattern in the traded sector and the non-traded sector. However, if we found ourselves being in a general equilibrium situation, either in the Heckscher-Ohlin model or in the Ricardo-Viner model, the result would be the same. We would experience a parallel wage increase no matter which model we tend to use. Given this general equilibrium scenario, the hypothesis is whether or not both sectors would experience the same wage

development. A question that arises is whether or not this will still hold true for the Norwegian model, as long as it is not due to different wage developments. It could also be that there exists different productivity development in the traded and the non-traded sector. However, we do not have data for this.

The wage in the traded sector could increase more after the financial crisis. This may be in line with the Norwegian model, where the wage in the traded sector sets an upper limit for wage development in the non-traded sector. In general we observe a greater fluctuation in traded sector than in the non-traded sector. In recent years the wage development has been more or less equal, which is in accordance with what the Norwegian model would predict.

5.4 Hypothesis 2: Employment over time

Over time, total employment has increased. If the goal is to maintain employment in the traded sector, then the non-traded sector should experience increased employment level and the employment level in the traded sector should be the same as before. This is an interesting phenomenon, and results in a hypothesis that we try to illustrate below. The condition is that the overall employment has actually increased. If this had not been the case, then employment increase in the non-traded sector must be taken from the traded sector. An overview of employment level in both sectors in Norway is illustrated in figure 24 below. The sum of the traded and the non-traded sector displays the total labour employed in both sectors.

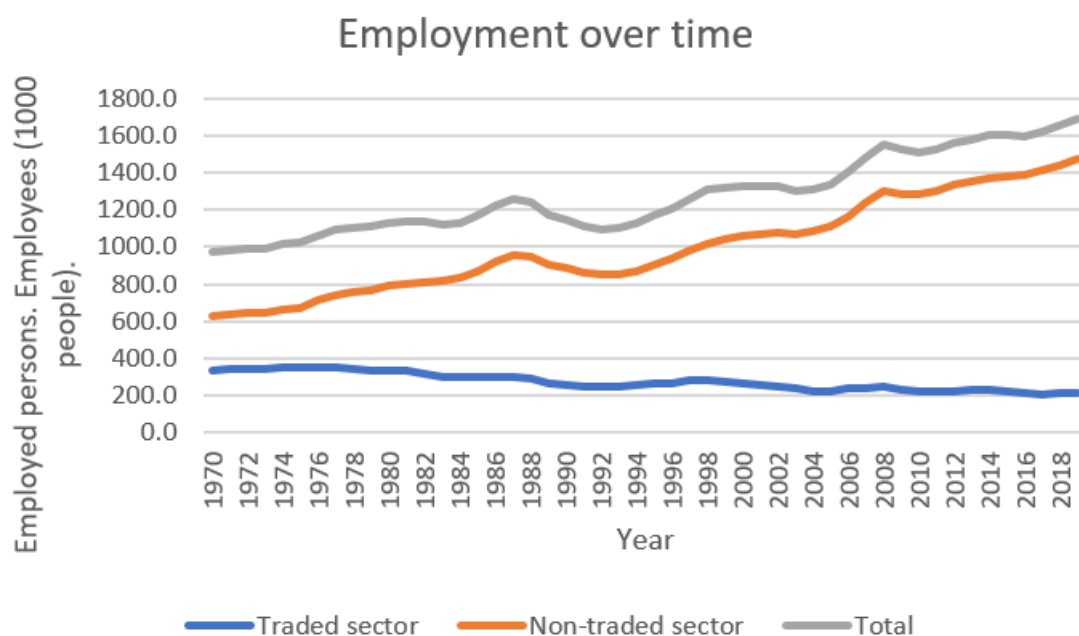


Figure 24: Employment over time (SSB)

The employment level in the traded sector has dropped from almost 400,000 to around 200,000 in a time span of 50 years. For the non-traded sector, the employment level has risen from just above 600,000 to about 1,400,000 during the same time period. Total employment has also increased from about 1,000,000 in 1970 to approximately 1,700,000 in 2019. We observe that the development in the traded sector has been more stable in the last part of the period, while it has been increasing in the non-traded sector. This is reflected in that the curves for employment in the non-traded sector and total employment

have been almost parallel.

The second approach in the theoretical analyses would predict that the employment level in the traded sector should be maintained when the total employment increases. However, we observe a decrease in the employment over time in this sector and there are many reasons for this. It could be because of the Baumol effect along with technological improvement and growth in the use of oil revenues. The main point is that increased demand for non-traded goods, given these different reasons, has led to employment being shifted towards the non-traded sector. This happens because we transfer resources from production of goods in the traded sector to production of services in the non-traded sector. This should indicate that we are able to produce more goods because of improved technology. However, the important thing is that several of these reasons point in the direction of increased demand for non-traded goods compared to traded goods. The use of oil revenues enables us to have such an increase without having to reduce our imports. Greater access to labour has enabled us to have a greater employment in the non-traded sector without having a one-by-one structural change from the traded sector to the non-traded sector. However, as seen in the context of the other figures, the Norwegian model has performed reasonably well in terms of maintaining employment in the traded sector.

A larger workforce is required in order for the employment to be maintained in the traded sector while the non-traded sector experiences increased employment level. However, one does not obtain the exact same results as the Rybczynski theorem predicts, because the product price of non-traded goods adapts to the wage level. An increased workforce may then be the reason as to why the non-traded sector has grown, while the Norwegian model has also been maintained. Given the development of relative prices over time, the Stolper-Samuelson theorem contrasts this result, as it implies higher price of labour and lower price of capital for both sectors, but higher production of non-traded goods and lower production of the traded goods. The reason for why we do not obtain the exact same results as the Stolper-Samuelson theorem would predict, is due to the product price being determined endogeneously in the non-traded sector.

As mentioned earlier, the total employment has gone up over time. This is reflected in that the labour force has been mobilized to a greater degree. It could also be because the public sector has grown. We have pointed out that the public sector is not included in the non-traded sector and we have not included the public sector in our material. Employment in the agricultural industry has fallen sharply in Norway over time, but this industry does not contribute to large numbers in the Norwegian economy. However, even though the public sector has experienced a lot of ups and downs over the period, the public sector has mostly experienced upsides. This is a clear sign that there will be less labour left for the private sector. If the public sector is decreased in size, it implies that there is more labour available to the private sector. Increased participation of women in working life was an important factor in the first part of the period from year 1970 onward. Immigration and foreign workforce has been an important part in recent times, while the public sector may have moved more towards the opposite direction by pulling labour out of the private sector when there has been growth in the public sector. Increased labour immigration could help explain why the non-traded sector has increased a lot without the traded sector decreasing as much. Labour immigration is an important factor when looking at our chosen time period. The EU extension towards central Europe took place in year 2004, and since then there has been significant labour immigration.

5.5 Hypothesis 3: Capital return over time

As seen in the theory, an effect of delayed structural change would imply that the capital returns should be different across sectors, which leads to hypothesis number three. The statement always holds true because we are never at long-term equilibrium. However, delayed structural change implies that the difference in capital return should be higher than it would be otherwise. This hypothesis is important to include, because if we find ourselves being closer to a Ricardo-Viner model rather than a Heckscher-Ohlin model, looking at the capital return becomes more interesting. An illustration of the capital return over time between traded sector and non-traded sector is given below in figure 25:

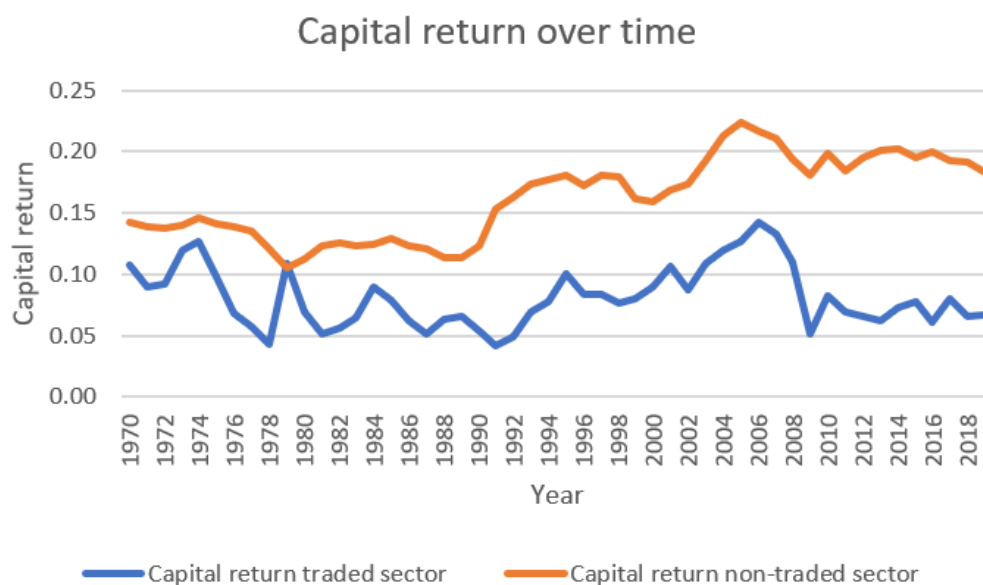


Figure 25: Capital return over time (SSB)

The main trend is that the capital return in the non-traded sector has always been equal to or higher than the capital return in the traded sector. The capital return in the non-traded sector has exhibited a smooth development from 1970 to 1990. From 1990 to 2004, there is an overall positive trend. This high level was maintained till the financial crisis in 2008. The level of capital return has then recovered and stabilized at a lower level after the financial crisis in 2008. The capital return in the traded sector has generally fluctuated more than the capital return in the non-traded sector. From year 1970 to year 1990, the overall trend was downward sloping, but with huge fluctuations. Like the non-traded sector, there was an overall positive trend from year 1990 to year 2004, but with a bit

more fluctuations. The financial crisis also impacted the traded sector, but even more so than the non-traded sector. The capital return in the traded sector has also stabilized at a lower level after the financial crisis, but at a relatively lower level than the non-traded sector. The fact that capital return in the non-traded sector has always been higher or equal to the capital return in the traded sector and the fact that both sectors have been impacted by the same shocks, makes it interesting to look at the difference in capital return over time in figure 26 below:

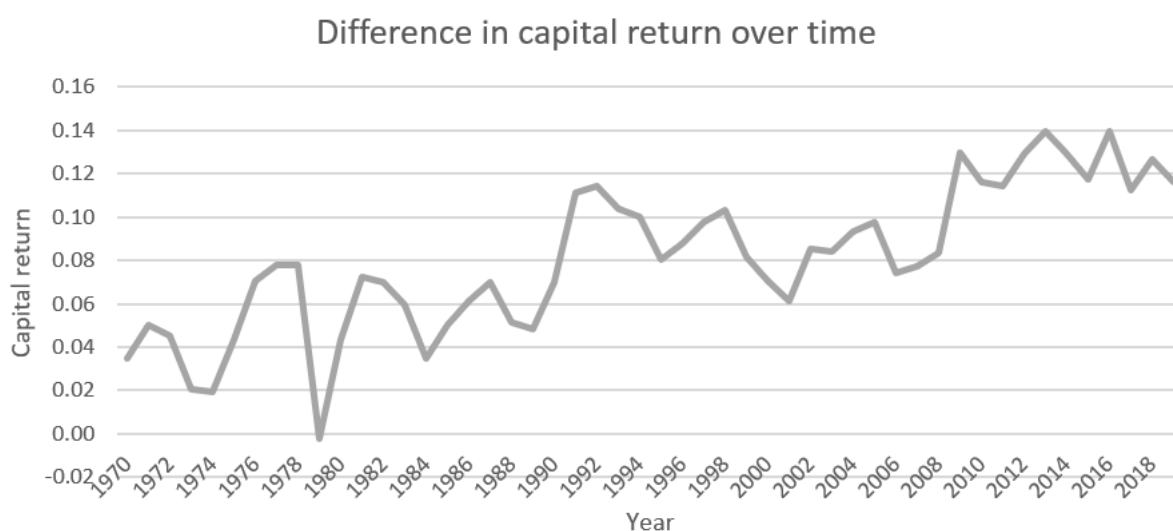


Figure 26: Difference in capital return over time (SSB)

What we observe is great fluctuations in the difference in capital return, although the trend points to increased difference over time. The overall trend displays that capital return is higher in the non-traded sector than in the traded sector. The capital return in the non-traded sector has exhibited a smoother development than the traded sector, such that the fluctuations in the level of capital return in the traded sector is reflected in difference in capital return between the sectors. Over time, the non-traded sector has experienced some shocks to the capital return and the traded sector has been affected by the same shocks, but with different impact. Thus, there exists a divergence in capital return between the two sectors over time, but the actual difference varies around a positive trend.

Increasing difference in capital return can be explained by capital transfer occurring the "right" way from the traded sector to the non-traded sector, but with too little scope to equalize capital return across sectors. This will imply increased employment in the non-traded sector and decreased employment in the traded sector. Increasing difference in capital return can also be explained by capital transfer occurring the "wrong" way from the non-traded sector to the traded sector. An implication of this, is decreased employment in the non-traded sector and increased employment in the traded sector. However, the employment graph showed that employment has increased in the non-traded sector and decreased in the traded sector. The increase in employment in the non-traded sector can mostly be attributed to increased employment level overall, because new investments and employment will occur where expected capital return is highest. When overall employment increases, it becomes natural that new investments and employment occur in the non-traded sector. However, employment in the traded sector has also been halved during the time period we investigate. Some of the decrease in employment can then be attributed to the non-traded sector hiring some of the labour from the traded sector, and this can occur if there has been capital transfer from the traded sector to the non-traded sector. The non-traded sector should then receive all new investments and employment that comes with increased overall employment, but also hire some of the labour in the traded sector such that new investments and employment become even larger. This suggest that increased difference in capital return has occurred because of capital transfer occurring in the "right" way, but that the capital transfers have not been sufficiently large to equalize differences in capital return.

The graph displaying capital return showed that the capital return in the non-traded sector has always been equal to or higher than the capital return in the traded sector. Our first interpretation of the Norwegian model was one with equilibrium in the labour market. For this to happen, the non-traded sector needs higher wages to attract labour. Our second interpretation was one where one attempts to maintain the employment level in the traded sector. This contrasts the first interpretation, in that the traded sector needs wage moderation to maintain employment. A question that arises, is which of these considerations is taken most into account.

It may look as if the wage growth in the non-traded sector has been limited after the financial crisis, and this has led to a shift in the difference in capital return between the non-traded sector and the traded sector. In some periods, the traded sector has had a stronger development than non-traded sector. In figure 23 regarding the wage growth over time, it is possible to see that in year 2003 to year 2006 there is a higher wage growth in the traded sector than in the non-traded sector. However, there is a huge drop in the financial crisis in the years 2008 to 2010. We observe that the sectors are quite parallel afterwards. Holding this up against the capital return over time in figure 25, it is possible to observe that from the financial crisis in 2008 onward, there is an abrupt shift in that the Norwegian model or the traded sector suddenly experience lower returns with fluctuations, while the non-traded sector continues to grow a little before it slowly goes down in year 2016 to 2018.

In the period in year 2011 to year 2018 in figure 23, we can observe that the traded sector has acted as a brake for the wage growth in the Norwegian economy. The wage growth in these parallel periods has been held back. This is the period where the non-traded sector would like to have achieved a higher wage growth, but is limited and held back by the mechanisms of the Norwegian model. This accumulates a higher capital return in the non-traded sector. However, in the period 1970 to 2000, we observe that the traded sector and the non-traded sector have experienced some ups and downs in different periods. Sometimes the Norwegian model dominates with high productivity growth or prices, while in other times it is dominated by other factors.

The development over time on the capital return in figure 25 is an interesting claim to look at. We observe that there is a drop in the capital return around the financial crisis in year 2007 in both the traded sector and the non-traded sector. Up until this period, the capital return has been upward sloping for both sectors. After this, the development has shifted and we observe that the non-traded sector is still about at a slightly growing higher level, while the traded sector has fluctuated, but in general gone up. From the period involving the financial crisis onward, an increasing gap in the capital return between the traded sector and the non-traded sector can be observed. This development may indicate that the Norwegian model has slowed down the wage growth in the non-traded sector and acts as a trace from the Norwegian model.

As in the theoretical analysis, it seems plausible that the actual Norwegian model is closer to the second approach that aims to maintain the employment in the traded sector, than the first interpretation that creates an equilibrium in the labour market. It is also worth noting that the difference in capital return between the two sectors is relatively stable in the period with high wage growth from year 1970 to year 1990. From year 1990 onward, the wage growth has stabilized at a lower level and the difference in capital return between the traded sector and the non-traded sector has been sharply accelerating. This is further supported from the fact that the employment in the traded sector was rapidly decreasing from year 1970 to year 1990, but that the decrease has slowed down from year 1990 onward. Equivalently, employment in the non-traded sector fluctuated around a relatively low level from year 1970 to year 1990, before sharply increasing after that. In sum, these observations suggest that lower wage growth has slowed down capital transfer and structural change from year 1990 onward. That acts as a reason for why Norway has experienced an increasing difference in capital return between the traded and non-traded sectors over time. If the wage growth were higher, as our first interpretation of the Norwegian model dictates, we should expect a convergence to a lower level of capital return in both sectors and an even steeper decrease in employment in the traded sectors because of increased capital transfers.

5.6 Hypothesis 4: Development of product prices and exchange rates

We searched for the product prices for both the traded and non-traded sector. However, we were not able to obtain good data estimates for the product prices of the two sectors. The closest we got, was a figure from NOU 2016:3. The hypothesis for product prices is interesting to look at, because theory would predict a development with higher percentage increase of product prices in the non-traded sector than the increase of product prices in the traded sector. It is also interesting because relative prices are important for the development between the sectors. An illustration for the product prices in the manufacturing industry and other industries is shown below in figure 27:

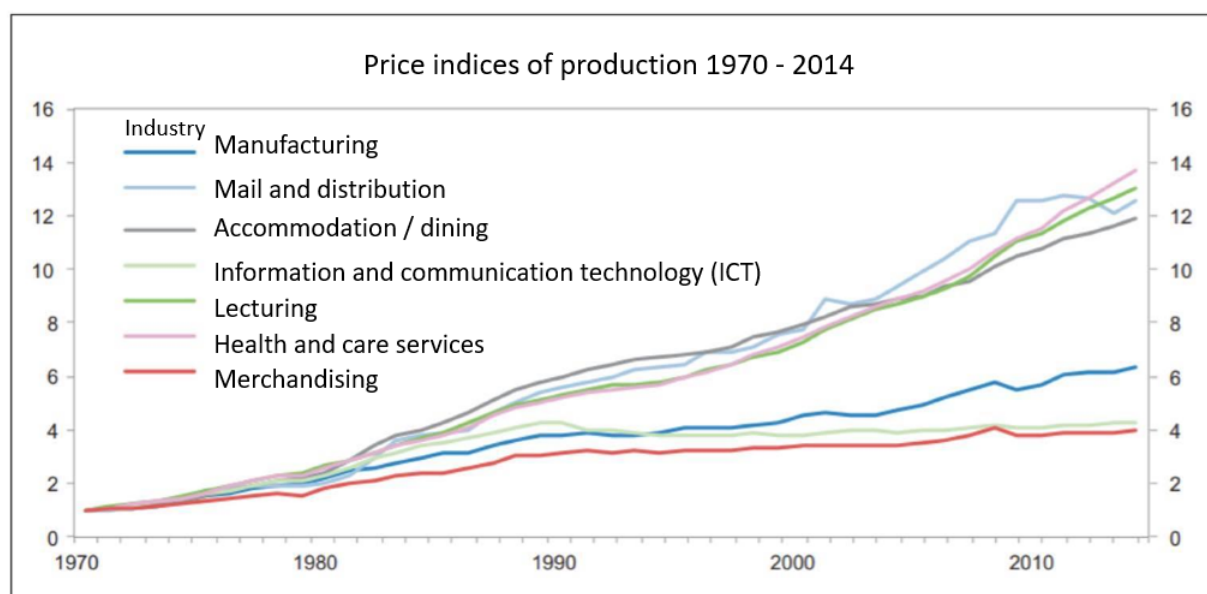


Figure 27: Price indices in production, 1970 = 1 (NOU 2016:3)

The figure compares the development in different industries across time. The price level index in 1970 is set equal to 1 and the graph shows the relative development in the industries. The manufacturing industry can be labelled as the traded sector, while all the other industries are part of the non-traded sector. From 1970 to 1980, the development in product prices is relatively similar across sectors. From 1980 to 1995, a pattern is established with manufacturing, ICT and merchandising on the one hand, and the other industries on the other hand. From 1995 onward, manufacturing has increased compared

to ICT and merchandising. Other industries have shown an even higher development, converging to a higher level than manufacturing, ICT and merchandising. Overall, goods from the non-traded sector have mostly exhibited a larger increase in product prices than the traded sector represented by the manufacturing industry. The few exceptions to this, are the ICT and merchandising industries. These industries constitute a relatively small part of the non-traded sector, so the trend is that the non-traded sector as a whole has increased more in product prices than the traded sector. This result is all according to the theory shown in the theory section. This can be due to economic growth and inflation. As we saw, there are two reasons for economic growth, namely capital accumulation through savings and investment. The Baumol effect explains that the wage level should increase in the non-traded sector despite there not actually existing productivity improvement in that sector. The use of oil revenues has been sharply accelerating in recent years, which might also explain why the product prices in non-traded sector should experience a higher growth than the product prices in the traded sector. We might also expect a larger contribution from oil revenues in modern times.

Exchange rates are a crucial factor to discuss here, as it can be linked to the product price. There are two mechanisms that adjust the price between non-traded sector and traded sector. The first is that domestic conditions affect non-traded goods. The second is that the exchange rate changes such that if there is an imbalance in the traded sector, the exchange rate will either go up or down, which in turn will shift the whole curve. This is an example of international conditions. One example regarding exchange rates is the Brexit vote in England where the pound's exchange rate fell instantly. This is an adaptation between non-traded sector and traded sector. In our case, we show an illustration of the effective exchange rate in the manufacturing sector given in figure 28:

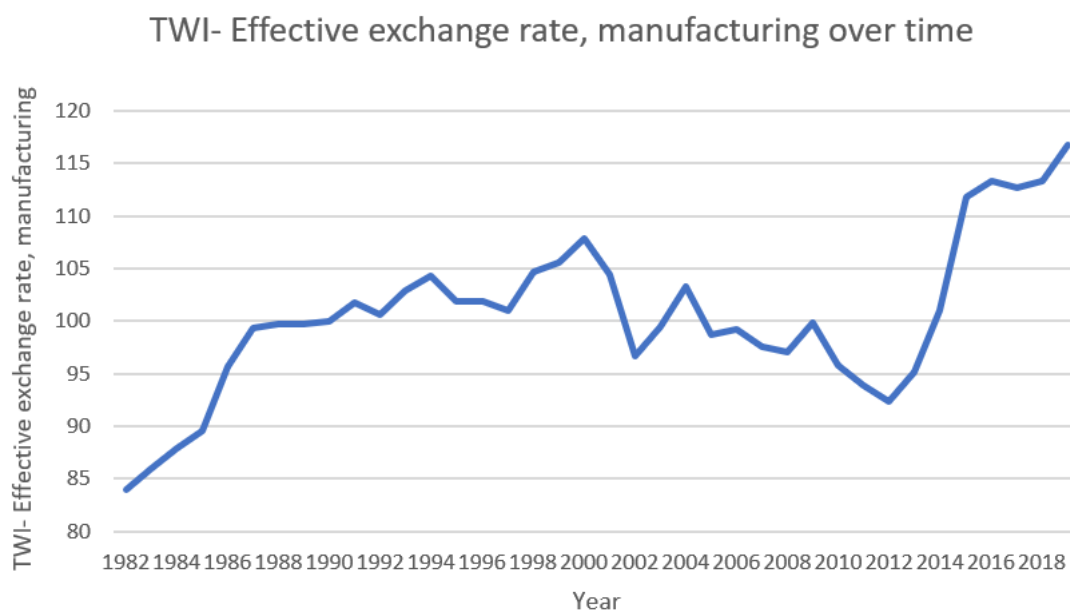


Figure 28: TWI - Effective exchange rate, manufacturing over time (Norges Bank)

TWI corresponds to Trade weighted exchange rate index for the manufacturing industry. It is a nonimal exchange rate for the Norwegian krone, which is a geometric average of Norway's 25 main trading partners. The index is set to 1990 = 100. When TWI is low, it indicates a strong currency, while the opposite is true when TWI is high. From 1982 to 2001 TWI has increased, while there has been a downward trend from 2001 to the oil price shock in 2014. Since then, it has experienced a sharp increase. These fluctuations in TWI have had a huge impact on the product prices in the manufacturing industry.

5.7 What-if scenario

In our analysis, we have taken for granted the historical development for Norway as a starting point. A question that arises, is what would have happened to the wage settlements in the Norwegian model if the development were different. The key points to the development in Norway, were economic growth and use of oil revenues. Countries across the world have experienced economic growth and increased access to capital, including Norway, but it is not certain that this development will continue in the future. Recessions to the economy might lead to economic decline, which will have the opposite impact compared to the shocks that we analyzed earlier. When it comes to economic growth through improved technology, we made a huge simplification in that only the traded sector experienced said technological improvement. This is an oversimplification and it could be that in reality, the non-traded sector can also benefit from improved technology to some degree, or even more so than the traded sector. This is because it is plausible to assume that technological improvement is not exclusive to the traded sector and that the non-traded sector could benefit from technological improvement as well. If we were to account for that, the results become unambiguous because the net effect is dependent on the relative impacts. The last point is the use of oil revenues, or increased use of oil revenues over time, to be specific. If Norway is forced to use less oil revenues in the future, the development in the Norwegian economy should be the opposite compared to a situation with increased use of oil revenues. Such a development was outlined in the section about the budgetary rule.

The main results from these key points were increased relative product price of non-traded goods compared to traded goods and increased production of non-traded goods. If the development were different, then one should experience increased relative product price of traded goods compared to non-traded goods and increased production of traded goods. Specifically, such a development may be because of economic recessions and decreased access to capital, improved technology in the non-traded sector and a decrease in use of oil revenues compared to an initial high level. A justification for wanting to maintain employment in the traded sector through a floor for the employment level, is that Norway may have more use for the traded sector in the future compared to the present. The concern is that if the Norwegian economy shrinks its traded sector, it may be hard to

reverse such a development in the future. The development that was outlined in the previous section is an example of a situation in which Norway will have more use for the traded sector. Next, we will investigate how the Norwegian model would work with such a development. The shock that we will analyze is a development where the product price of traded goods increases more than the product price of non-traded goods.

In the interpretation of the Norwegian model in the Ricardo-Viner framework, we had two different outcomes. The first one was a situation in which the Norwegian model sets the wage according to the Ricardo-Viner model, while the latter one was a situation in which the goal was to maintain employment in the traded sector. Referring to the discussion of the Norwegian model in the Ricardo-Viner framework, it is sufficient to look at a situation where the product price of traded goods increases to show the real effects. While there was a goal to maintain employment in the traded sector in the second interpretation, it does not prevent an increase in employment. That is, there exists a floor for the employment level in the traded sector, but not a corresponding employment ceiling. Because of this, both interpretations from earlier actually yield the same results in the Ricardo-Viner framework. Specifically, this means that an increased product price in the traded sector leads to increased real wage, increased production of traded goods and decreased production of non-traded goods. Thus, both interpretations sets the wage level according to the Ricardo-Viner model.

These two outcomes can also be extended to the Norwegian model in the Heckscher-Ohlin framework. While there were differences both in the short-term and in the long-term when the product prices increased more in the non-traded sector, there exists no difference in the long-term when the product prices increase more in the traded sector. This stems from the fact that both interpretations yield the same results in the Ricardo-Viner and Heckscher-Ohlin given an opposite development in product prices. The short-term effect from the Ricardo-Viner model dictates that the real wage and production of traded goods should increase, while the production of non-traded goods should decrease. However, this leads to a wedge between the capital returns in the two sectors, in that the capital return is higher in the traded sector than in the non-traded sector. Thus, there exists an incentive to move capital from the non-traded sector to the traded sector through capital transfer and transition dynamics. However, it is important to consider that the product price is

determined endogeneously in the non-traded sector. On the one hand, decreased demand for non-traded goods will shift its demand curve inwards. This will lead to decreased quantity of non-traded goods, but also a decrease in the product price. On the other hand, capital transfer from the non-traded sector to the traded sector will shift the supply curve of non-traded goods inwards. This will also decrease the quantity of non-traded goods, but it will increase the product price of non-traded goods after decreasing initially. However, the trend should still be that the product price increases more in the traded sector than in the non-traded sector, such that the results from standard Heckscher-Ohlin model should still apply. Thus, in the long run an increase in the product price of traded goods actually leads to decreased real wage, increased production of traded goods and decreased production of non-traded goods. This is the same results from employment as the short-term effects, but opposite when it comes to the wage level. It is then clear that a model for wage settlement must take the effects of capital transfer and transition dynamics into account.

A challenge here is that the short-term and long-term results yield opposite results for the wage level, as the real wage should increase in the short-term and decrease in the long term, even though both point at increased production of traded goods and decreased production of non-traded goods. A conceivable issue in the Norwegian economy arises if there exists wage rigidity. That means that there exists reluctance when it comes to lowering the wage level. Theory has shown that there might exist nominal wage rigidity, but not necessarily real wage rigidity. This is probably because nominal wage is more easily observable compared to real wage. As discussed in the Norwegian model in the Ricardo-Viner framework, it is the trade and employer unions in the manufacturing industry that negotiate wages first. These unions will negotiate a wage settlement in their members' interest.

When the product price of traded goods increases more than in the non-traded goods, it is beneficial for both the trade and employer unions in the traded sector to increase the real wage in the short-term. The reasoning behind this, is that the labour demand increases in the traded sector and they want to hire some of the labour from the non-traded sector. However, this is exactly the opposite development compared to the long-term results. Here, the long-term effects are the exact opposite of the interests of the unions in the

manufacturing industry, but they are the ones who determine the wages. There exists a risk that there will be a high real wage increase, even when the real wages should decrease in the long-term. As such, achieving real wage decrease could pose a problem when wage settlements are according to the Norwegian model. This can be viewed as an analogy to the reversal problem and Dutch disease, as it can be hard to reverse a development with increasing use of oil revenues. This will be addressed in the next section about recommendations of improvements of the Norwegian model.

5.8 Recommendation of improvements to the Norwegian model

The Norwegian model has been applied to the Norwegian economy in more than 50 years. A question that arises, is how the wage settlements would have been under an alternative to the Norwegian model and what implications this would have brought. In earlier sections, we have looked at the Norwegian model in the Ricardo-Viner and Heckscher-Ohlin frameworks, both given the historical development in Norway and a what-if scenario if the development in Norway were to change. A recurring issue is that the Norwegian model creates some problems with wage settlements in both scenarios. In this section, we will formulate recommendations of improvements to the Norwegian model. To answer the question of what implications for wage settlements would have been under an alternative to the Norwegian model, we will assume that our alternative model is an applicable alternative to today's model. We will then compare the results from the Norwegian model to the improved version. As discussed in the section about the Norwegian model in the Ricardo-Viner framework, wage settlements are negotiated first by the trade and employer unions in the manufacturing industry. This will then have spillover effects onto the non-traded sector.

Given the historical development in Norway, the main problems with the Norwegian model are that it delays capital transfer and structural change from the traded sector to the non-traded sector, and that wage settlements do not take these factors into account sufficiently. The main reasons for this, are that there exists a policy to maintain employment and production in the traded sector and that the intuition behind wage settlements leans more towards a partial equilibrium approach rather than a general equilibrium approach. Another concern that arises regarding the Norwegian model, is that the trade and employer unions in the manufacturing industry constitute an overly narrow basis in determining the wage settlements for the Norwegian economy. A reason for this, is that the trade and employer unions negotiate wages first according to the interest of their own members. Because of this, real wage settlements are probably closer to our second approach where one attempts to maintain the employment level in the traded sector, than our first approach where the wage is set according to equilibrium in the labour market.

In our recommendation on improvements of the Norwegian model, we will keep most of the features from the original model. These are specifically to create a wage norm for the Norwegian economy through negotiation and that this wage norm should be negotiated by a basis from the Norwegian economy. An important aspect is whether the market conditions in a relatively small part of the economy should dictate wage developments, or whether a larger part of the overall Norwegian economy should be used as a basis. The Norwegian model contributes to a national wage determination with a wage norm, rather than on a sector-basis, which is an approach we will keep. If we consider that a larger part of the overall Norwegian economy should be used as a basis for wage determination as the main point, it will allow for national negotiations to take place. The manufacturing industry and the traded sector are important parties in the Norwegian economy, but they also account for a very small part of total employment in Norway. Allowing for such a small part of the employment in Norway to control and determine the wage developments for the whole workforce can seem contradicting. However, accounting for a wider basis could perhaps provide a better standpoint for the Norwegian economy, despite some issues.

As was shown in the discussion earlier, an interpretation of the Norwegian model as a general equilibrium yields a natural way to determine wage settlements. However, real wage settlements are probably closer to the second interpretation because of the parties that negotiate first. Thus, we view the first interpretation as a more desirable outcome. To achieve this, the order of negotiations in the Norwegian model should not impact the wage settlements, because there should exist one "balanced" outcome that balances the interests of the actors in the economy. If the order of negotiations were not to have an impact on the wage settlements, then the parties that negotiate should have a general equilibrium perception of the Norwegian economy. It is unlikely that this is the case if it is only the trade and employer unions in the manufacturing industry that negotiate first. If we view the trade and employer unions in the manufacturing industry as a basis from the Norwegian economy, it should then be possible to achieve a more representative basis. However, only having the trade and employer unions in the manufacturing industry negotiate first will lead to the wage determination relying heavily on the negotiation results of said unions. In the what if-scenario, we also stressed that the trade and employer unions in the manufacturing industry have an interest in increasing the real wage in the short-term if the development were different. However, the long-term effects of such a

development is directly opposite for the wage level. A wider basis for wage settlements could help balancing the wage settlements, such that it slows down the wage growth in such a scenario.

The fact that the product price is determined endogeneously in the non-traded sector has mostly served as a complicating factor in our analysis, but in our recommendations it actually helps us address some concerns regarding wage settlements. A concern regarding the Norwegian model, is that departing from the model might lead to complete specialization in production of goods, either in the traded sector or in the non-traded sector. Given the historical development in Norway, the first concern is that the traded sector will eventually disappear completely if the wage settlements were according to equilibrium in the labour market in all time periods. This is because the historical development dictates a higher wage growth than the realized wage growth. However, the fact that the product price is determined endogeneously in the non-traded market, ensures that the product prices of non-traded goods cannot increase indefinitely because capital transfers will decrease the product price. Thus, there will never be complete specialization in the non-traded sector. If the development in Norway were to change, a second concern is that the non-traded sector will then eventually disappear completely. Conversely, the fact that product prices are determined endogeneously in the non-traded sector dictates that demand for non-traded goods must be satisfied domestically. If there is demand for non-traded goods, it will always exist production of non-traded goods as well. Thus, there will never be complete specialization in the traded sector either.

Our recommendation of improvement to the Norwegian model, is to expand the basis for wage negotiations from only the manufacturing industry to a more representative basis for the Norwegian economy. As was discussed earlier, trade and employer unions negotiate on behalf of the interests of their own members. Thus, the interest of the manufacturing industry is probably maintained in the wage negotiations. However, the interest of other parties in the Norwegian economy are not necessarily maintained. A concern with today's model, is that it is closer to a partial equilibrium approach where one attempts to maintain the level of employment and production in the traded sector. However, general equilibrium results can be achieved by short-term equilibrium in the labour market. If the parties negotiating need a general equilibrium perception of the Norwegian economy, then it is

favourable that the basis for wage settlements is more representative of the domestic economy. General equilibrium is concerned with equilibrium in all markets, not just the product market for the manufacturing industry. If the basis for wage settlements were more representative of the Norwegian economy, then one could expect results that are closer to the first approach.

Given the historical development in Norway, a modification of the Norwegian model would yield higher wage growth in both sectors. This will lead to a convergence in capital return to a lower level. Because of increased capital transfers, the employment and production would be even higher in the non-traded sector, while the employment and production would be even lower in the traded sector. In a what-if scenario, the differences between today's model and an improvement of said model is a high wage growth in the short-term in today's model and a more moderate wage growth with the improvement. However, with today's model it can be hard to realize the long-term results, which is decreased real wage. An improvement of the Norwegian model could then slow down the wage growth and ensure real wage decrease in the long-term. The main concern is that the manufacturing industry could be too eager to increase the real wage in the short-term, while other industries need a real wage decrease. If wage settlements were negotiated by a more representative basis, it should become easier to realize the long-term results, both regarding the historical development in Norway and if the development were to change. This shows that a wider basis for wage settlements could be helpful no matter which development is to come in the Norwegian economy.

6 Conclusion

In this thesis we have examined the research question; *How can The Norwegian model for wage settlements be improved using insight from the Ricardo-Viner and Heckscher-Ohlin models?*. The Norwegian model for wage settlements was published in the 1960s by Odd Aukrust and was customized to the conditions in Norway at the time.

In the analysis of the Norwegian model in the Ricardo-Viner framework, we found that short-term wage settlements are closer to maintaining employment in the traded sector than achieving an equilibrium in the labour market. The implications for the analysis of the Norwegian model in the Heckscher-Ohlin framework, was that this short-term wage settlement delays capital transfer and structural change regarding the long-term effects of wage settlements. These analyses took into account the historical development in Norway.

The hypotheses that stem from the theoretical analyses, reveal that here has been a divergence in the capital return and product prices of traded and non-traded goods and that employment in the non-traded sector has more than doubled over the last 50 years, while the employment in the traded sector has been halved during the same time period. This has occurred despite the fact that the two sectors have mostly experienced the same percentage wage growth. If the development were to change, the short-term effect is that the real wage should increase, but the long-term effect is conversely that the real wage should decrease. Thus, there exists a conflict between the short-term and long-term effects. The problems with the Norwegian model arise because it is only the unions in the manufacturing industry that negotiate wages first.

Our recommendation is to keep most of the features from the existing Norwegian model, but that the basis for wage settlements should be expanded. A wider basis is preferred to take more into account the Norwegian economy as a whole. With the historical development, an improvement of the Norwegian model would imply higher wage growth so that capital transfer and structural change are sufficiently large. If the development were to change, an improvement of the model would conversely slow down the wage growth. Such an improvement could then benefit the Norwegian economy whether the historical development continues or if the development were to change.

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