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Effect of Increasing Import Competition from China on Manufacturing Employment:

Evidence from Nordic Countries

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Abstract: Over the last decades, the adverse effects of increased international trade and the rapid rate of globalization have been widely discussed - with labor markets in focus. This study examines the effect of increasing imports from China on manufacturing employment in Nordic countries. I analyze the effect of rising Chinese import competition over the years 1995 to 2020 by employing a two-stage least squares estimation method. The results found indicate that the effect of increasing import exposure from China has no statistically significant effect on Nordic countries' manufacturing employment growth in the past decade. Although, it is found that the import penetration ratio, accounting for Chinese imports, has a small positive effect on the growth of manufacturing employment when testing for the whole sample. When testing for the years between 2000 and 2010, capturing the early years following China's entry into the WTO, I find weakly statistically significant results implying that increased import exposure from China had a negative effect on the manufacturing employment growth.

Keywords: International Trade, Import Competition, Labor Markets, Employment, Manufacturing Sector, China, Nordic Countries

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1 Introduction

Over the past couple of decades, the rate of globalization has increased rapidly, which has had beneficial consequences but also caused some challenges. One of the central forces behind the rise in the rate of globalization has been the rise of Southeast Asian countries, especially China. Once having been a low-income country, China became the fastest growing economy and was able to lift almost 800 million people out of extreme poverty in a matter of 40 years, contributing to almost 75 percent of the global reduction in the number of people living in extreme poverty (World Bank, 2022). China's remarkable growth and development have also led the country to become the leading country in terms of manufacturing output and thus earning the name "the world's factory". The emergence of China as a manufacturing superpower and its rapid growth in exports has not been frictionless. It has raised concerns all over the world. Developing countries that hoped to grow through low-wage goods might have to reconsider, meaning that industrialization opportunities are becoming scarcer (Rodrik, 2016). However, developed countries have been affected by this shift in the global economy as well.

Although a large majority of economists were convinced of the Pareto-improving nature of trade and further liberalization of economies at the end of the last century, the debate regarding the adverse effects of international trade has risen over the past decade. Not everyone is convinced that the gains of trade in terms of welfare improvements, as proposed by neoclassical trade theory, compensate for the negative effects that foreign competition causes. Economists are focusing more and more on trade theories that emphasize the adverse effects of trade, making the role of countries' abundant factors more important. The discussion about international trade has become increasingly more complex. A plethora of studies have found that developed countries are experiencing a fall in employment rates, rising income inequality, and a contraction in sectors that have been the hardest hit by import competition (e.g., Freeman, 2005; Autor *et al*., 2013; Rodrik, 2016). However, the studies that explore the negative effects of trade have also been met with criticism, where some economists refer to technological change as a driving force behind the above-mentioned changes in the labor market. This matter is a continuing debate.

This area of research has primarily been focused on the U.S. since its labor market has experienced a significant decline in employment - especially in the manufacturing sector which has been the hardest hit by import competition (see Autor *et al*., 2013; 2014; 2016). Moreover, they have seen a rise in income inequality and a fall in real wages of low-education workers. This has raised the question of the role of international trade, which is why China's rise has been the subject of interest. Its entry into the world market has provided a unique opportunity for studying the effects of a large trade shock.

Like other high-income countries, Nordic countries have also experienced an increase in Chinese imports. However, the research dedicated to exploring the effects of globalization and increased international trade on Nordic countries has been limited, almost non-existent. Nordic countries are interesting to examine, since the size of their manufacturing industry, in terms of GDP percentage, is similar to that of the United States (except for Norway's case). However, their labor markets differ quite a lot from United States' labor markets in their institutional settings and the skill composition of the labor force. For instance, the strength of trade unions is the main characteristic of their labor markets, as Nordic countries are among the countries in the world with the highest union density (Logue, 2019). Low-skilled workers are known to be more vulnerable in the labor market and are often most hard hit by technological changes and trade. Interventions, such as the Swedish "Knowledge lift" has helped to enhance the skill levels of low-skilled workers (Miao *et al*., 2022). This is an example of how a Nordic country has dealt with new technology and rising globalization. In short, there are important differences in the institutional settings between the Nordic countries and the U.S. that may play a central role in how their respective labor markets react to increased international trade. Therefore, the purpose of this study is to investigate the effect increased import competition has had on Nordic countries' labor markets.

1.1 Delimitations

As mentioned, past research that has investigated the effect increased international trade has had on labor markets has also in some shape or form investigated the impact it has had on wage structures and income inequality. Within the scope of this thesis, it is impossible to examine all the parameters that might be impacted by increased import competition. This

study does not test for changes in the wage structure, changes in real income, or income distribution. Neither does it test for the effect of import competition on different industries, but it is rather focused on the manufacturing sector in the respective country. Moreover, it is important to note that this study is not able to address how individuals adjust to trade shocks. This limits the study in examining the detailed effect that increased import competition has on Nordic labor markets and their workers.

1.2 Aim and Scope

This thesis aims to investigate what the effect of increased import competition has been on Nordic countries' labor markets, using China's entry into the world market as a trade shock. The countries that are included in this study are Denmark, Finland, Norway, and Sweden. These countries are similar in size and their economies have similar features in terms of institutions and the size of their manufacturing sector. The empirical research uses the import penetration ratio and the change in Chinese imports as measures of trade exposure. These measures of trade exposure are used to determine the effect increased import competition has had on manufacturing employment. As mentioned earlier, the research regarding the effects of international trade on Nordic countries is very limited. This study aims to fill that gap and contribute to this area of research.

Although the countries included in the research have all experienced a fall in their manufacturing sector and its employment, a rise in inequality, and rapid growth of imports from China - the results imply that increased import competition from China has not had any significant impact throughout 1995 to 2020. However, there is some evidence that suggests that increased Chinese import exposure had a negative effect on manufacturing employment in the first decade of the 21st century.

1.3 Outline of the Thesis

The thesis is structured as follows. Chapter two presents the theoretical background, where the theoretical framework that is presented is aimed to explain the patterns of trade and its adverse effects. This chapter is focused on the Heckscher-Ohlin model and some of its

extensions. Chapter three provides the previous research that has been made in this area. This chapter also contains a discussion of the "Race to the Bottom"-phenomenon. Each section is followed by a summary of the main findings. Chapter four presents the data that has been collected and their sources. Moreover, the quality of the data is discussed. Chapter five introduces the methodology. This chapter contains the computations that were made to obtain the import penetration ratio. The chosen quantitative method, 2SLS, is presented and followed by a discussion of the method's strengths and weaknesses. Chapter six presents the results of the quantitative research, followed by a discussion of the main findings and their relation to past literature. Lastly, Chapter seven concludes the findings of the study.

2 Theory

In the following chapter the theoretical background used for analyzing the effect of trade on labor markets, particularly inequality, is presented. The Heckscher-Ohlin is a common framework when analyzing the effects of trade and it has been of great importance to not only trade theory but also international economics. I will begin by describing the standard Heckscher-Ohlin model, which is later followed by a presentation of the two of the most influential extensions: the Stolper-Samuelson theorem and the Valek theorem. Lastly, the criticism and the shortcomings of the framework will be discussed.

2.1 Heckscher-Ohlin (H-O) Model

The Heckscher-Ohlin model of international trade has been a prominent construct in trade economics. It was first conceived by two Swedish economists, Eli Heckscher and Bertil Ohlin in the early twentieth century, and was built on the Ricardian model of comparative advantage. The Ricardian model was the first one to introduce the concept of comparative advantages, which basically says that agents have an advantage over others in producing a particular good at a lower relative marginal cost (Maneschi, 1998). The classical theory of comparative advantage aims to explain why countries engage in international trade. In simple terms, if two countries capable of producing two commodities engage in a free market, each will raise its overall consumption by exporting the good for which it has a comparative advantage while importing the other, assuming that labor productivity differences exist between the two countries (due to technological differences). So, with the assumption of comparative advantages, the Ricardian model concludes that everyone benefits from trade.

The Heckscher-Ohlin model, however, is not as optimistic. When accounting for endowment differences, the H-O model concludes that there will be winners and losers from trade.
The Heckscher-Ohlin model introduces factor endowments into its theoretical framework instead and removes production technology as its source of comparative advantage. Countries will specialize their production depending on their factor endowments, which essentially

means that countries will export products that use their relatively abundant and cheap factors of production while importing products that make use of the countries' relatively scarce factors of production (Leamer, 1995; Srivastava, 2012). In the original H-O model, there are only two countries, and the factors of production, in which a country can have relative factors of endowments, are land, labor, and capital which determine a country's comparative advantage. Other assumptions are: i) both countries have identical production technology, meaning that producing the same output of either good could be done with the same level of capital and labor in either country, ii) production of output exhibit constant returns to scale, meaning that there are diminishing returns in a factor of production, iii) there is a difference in the technologies used to produce the two commodities, otherwise trade will not be of use, iv) factor mobility within countries, but not between countries, v) commodity prices are the same everywhere, meaning that consumers in either country pay the same price for the goods, and vi) perfect competition within countries so that the supply of neither labor nor capital can affect prices. As can be seen, several assumptions limit the model's predictive power and its usefulness in empirical studies. Its limitations and the criticism against it will be discussed later.

2.1.1 The Stolper-Samuelson and the Vanek Theorem

In the hopes of increasing the model's predictive power and making the model a better reflection of the realities of trade, there have been many extensions by numerous economists. Two extensions within the framework of the Heckscher-Ohlin model that has been prominent and influential in trade economics are the Stolper-Samuelson theorem (1941) and the Vanek theorem (1968).

The standard Stolper-Samuelson (SS) theorem consists of two economies, two commodities, and two factors of production (labor and capital) - just as the basic H-O model (Stolper & Samuelson, 1941). Moreover, they assume that the total amounts of the factors of production remain fixed. However, what differentiates the SS extension from the original H-O model is that they describe the relationship between relative prices of output and relative factor rewards. They mean that the introduction of trade will lead to a fall in the relative share in the real national income going to the scarce factor of production. Simply put, the real income of the owners of the abundant factor increases while the real income of owners of the scarce factor decreases, which will ultimately lead to widening wage inequalities. This argument has

since then been extended and stretched to better fit certain situations. Several researchers (e.g. Abrego & Edwards, 2002; Mitchener & Yen, 2014; Basco *et al*., 2020) have used the SS theorem to explain trade shocks by relating factor price changes to trade liberalization, and where the two factors of production instead are denoted as skilled and unskilled labor. This means that when countries reduce trade barriers the relative prices of skill-intensive goods will rise in skill-rich countries and fall in skill-poor countries - which also implies a rise in skilled wages and a decline in unskilled wages in skill-rich countries. Trade barriers in this case could be everything from tariffs to natural barriers such as distance, which means that increasing rates of globalization reduce trade barriers. So, to put it shortly, depending on a country's factor endowments (whether it is labor or capital abundant) will determine who benefits from trade, and who will continue to do so, in the globalized world of today.

As mentioned, in the basic H-O model, there are two countries, two commodities that can be produced, and two homogenous factors of production - hence why it is called the 2x2x2 model. In reality, trade consists of many goods, factors of production, and nations - which Vanek (1968) tried to incorporate in his extension of the H-O model. Vanek's theorem is that the factor content of a country's national trade is a linear function of its endowment - assuming there are an arbitrary number of goods, factors, and countries. This implies a rank-order, where products are ranked according to factor intensity. In addition, his theorem states that relatively abundant factors will be exported and vice versa. In other words, Vanek proved that a country better endowed in the *j*th factor relative to its *i*th factor with respect to the world will never be a net exporter of commodities using the *i*th factor.

2.1.2 Criticism of the Heckscher-Ohlin Framework

The Heckscher-Ohlin framework has been met with a lot of criticism throughout the years. It has mainly been criticized for performing poorly in empirical tests, which is not strange because it does have many assumptions that limit its explanatory power. For example, the H-O model does not consider trade barriers and their effect on trade and prices of commodities. A more critical assumption is that the two countries are assumed to be identical, except for the difference in endowments. This consequently leads to the model failing to capture crucial differences, such as aggregate preferences, differences in production functions, and much more. Another aspect that is not taken into account, not even in the SS theorem, is unemployment. Although one could argue that the SS shows that low-skilled workers get

disproportionately hit by a trade shock in a skill-rich (capital abundant) country, the model does not include unemployment in specific. Michener and Yen (2014) explain that the H-O framework will continue to lose its explanatory power because trade is becoming more complex than what factor endowment models can describe. For example, it is difficult for any theoretical framework to capture intra-industry trade, outsourcing, offshoring, and several other factors. Even the patterns of skill premia are difficult to capture in a simple model like the SS since it cannot account for union power, minimum wages, increased rates of immigration of unskilled workers, and skill-biased technological change.

An additional critique against the H-O model is the Leontief paradox (Leontief, 1953), which refers to the phenomenon of capital-abundant countries exporting commodities that are more labor-intensive. This stems from Leontief's study, where he found that U.S. imports were more capital intensive than U.S. exports - which according to the H-O model means that the U.S. is relatively labor abundant. However, this is not consistent with reality, as the U.S. is one of the most capital-rich countries, relatively to its labor as well. Nonetheless, it is worth noting that other studies find evidence that is in line with the SS theorem (e.g. Wei & Wu, 2001). What one can gather from this is that there are most likely other factors that play a role in trade than just factor endowments.

3 Previous Research

This chapter presents the previous research investigating the effects of globalization and increasing trade on labor markets. Additionally, it aims to review to what extent previous research reflects the theoretical background that was presented in chapter 2. The chapter is structured as follows. First, the literature regarding the rise of China as a global manufacturer and its rapid growth in exports is presented. The interest in China stems from its great quantitative importance as a manufacturer exporter, but also due to the scarcity of natural experiments in social sciences. China's rise and entry into the global market have provided a rare opportunity for studying the impact of a large trade shock on labor markets in developed economies. Second, empirical evidence and previous literature on the effects of globalization on labor markets will be introduced. At the end of each section, there will be a short summary of the main findings.

3.1 Rise of China

Since the Chinese economic reform in 1978, the country has experienced remarkable growth and fundamental changes (World Bank, 2022). Since China began to open up in 1978, not only has GDP averaged almost 10 percent a year but over 800 million people have been lifted out of poverty as well. An important feature of China's growth is that it has been based on resource-intensive manufacturing, exports, and low-paid labor. Between 2004 and 2020, China's share of the global manufacturing output rapidly rose from 8.6 percent to 28.5 percent - making China the leading country in terms of manufacturing output and thus earning the name "the world's factory" (World Bank, 2020). Although the existing literature is divided regarding the key driving force behind the economic miracle, several authors attribute China's success to the reforms that took place from 1978 to 1984, especially the establishment of Special Economic Zones (SEZs) (Storesletten & Zilibotti, 2014; Yao, 2018; Chen, 2018). Storesletten and Zilibotti (2014) emphasize the importance of SEZ, explaining that these areas received preferential treatment in terms of tax deduction, custom duty deduction, reduced land use-price, and flexibility in labor and financial contracts. Initially, SEZs were established in

Shenzen, Xiamen, Zhuhai, and Shantou. However, the success of this experiment lead to an expansion, which began with coastal cities but was later extended to inland cities as well. This was a significant effort to attract foreign direct investment (FDI) inflows. Chen (2018) also mentions that the Chinese government introduced a series of laws and regulations to further encourage FDI inflows. The period 1979-91 is usually referred to as the first phase of China's opening to the world, and during this period FDI inflows averaged US$1.8 billion annually.

In the second phase, which began in 1992 and continued until 2001, a more systematic and consistent regulatory framework for FDI was developed. During the first years of the period inflows of FDI grew rapidly; in 1992 and 1993 growth rates were about 150 percent in both years (Whalley *et al.,* 2007). Although high growth rates of FDI inflows continued, they slowed down after 1997 and declined in 1999 and 2000 (Chen, 2018). The slowdown was mainly because of the East Asian financial crisis, which weakened the investment abilities of East and South-East Asian economies that had been important investors in China. In 2001, China became a member of the World Trade Organization (WTO), and a year later the third phase began. Chen (2018) explains what distinguished this period from the 1980s and 1990s is the creation and development of a more consistent and systematic regulatory framework, and also greater efforts to conform to international FDI requirements.

So in short, a large share of the existing literature emphasizes the role of the economic reforms in creating a foundation for the rapid growth in the decade after China’s accession to the WTO, which is what ultimately helped the country to become the manufacturing export superpower it is today (Naughton, 2007: pp. 104-105; Storesletten & Zilibotti, 2014; Yao, 2018). In fact, China's export growth averaged 29 percent each year between 2001 and 2008, more than quadrupling its overall value during that time (Yao, 2018). Yao argues that economic reform was the engine of economic growth in China in the past four decades. However, Yao also emphasizes that the establishment of a market economy and opening up to the world are not sufficient conditions for economic growth. Instead, there are other features China possessed that made the country so successful in its development. For example, China had a higher degree of industrialization, a more comprehensive industrial system, stronger technological strength, greater coverage of basic education, and longer life expectancy than developing countries comparable to China (such as India) in their stage of development and income levels in 1978. These accomplishments aided in laying a solid foundation for economic dynamism following the reform.

3.1.1 China's Comparative Advantage

Several authors also underline the importance of China's comparative advantage in unskilled manufacturing in relation to the rapid development of the country's exports. For example, Li and Jiang (2018) argue that the dominant feature of China's rapid export growth is the use of its abundant and relatively cheap labor, which prompted China to exploit its comparative advantage in labor-intensive products. This ultimately led China to gain a dominant position in the labor-intensive portion of global production. However, other economists dispute this view and instead argue that China's comparative advantage and thus exports are much more sophisticated than that (Rodrik, 2006). Drysdale and Hardwick (2018) discuss the complexity of the pattern of development in China and its comparative advantage, explaining that what constitutes the country's comparative advantage has itself changed dynamically over time. For example, agricultural products and primary goods such as coal and oil were the main exports at the start of the reform period. Thereafter, throughout the first two decades of reform, the share of labor-intensive products like textile increased. In the first decade of the twenty-first century exports of capital-intensive products including steel, machinery, electronics, and vehicles increased. The authors are convinced that China will evolve to produce and export more technology-intensive products in the future. Additionally, Rodrik (2006) argues that China's success in exports has much less to do with comparative advantage in labor costs or how voluminous it is, and much more to do with that China is selling products that are associated with a productivity level that is substantially higher than a country at China's level of income.

3.1.2 The Lewis Point and the Future of China

There has been an emerging issue over the past decade regarding China's labor shortage. The economy has been experiencing a demographic shift, which has social and economic consequences. However, whether China has crossed the Lewis turning point and entered a new era of labor shortages after a time of unlimited labor supply remains a contentious issue. First and foremost, the Lewis turning point, a model developed by Lewis (1954) is a concept that describes the process of economic transformation, more specifically the balance between labor supply and demand. As an economy transitions from a low productivity sector (such as agricultural production) with excess labor to an industrial sector, wage increases in the industrial sector are limited by wages in agriculture (Zhang *et al.,* 2011; Das & N'Diaye,

2013). This is because in the initial stage of development there is underemployment in rural areas, which makes the industrial sector able to expand and increase its labor force without having to raise wages. However, once the industrial sector grows to the point that the surplus labor from rural areas is exhausted, industrial wages begin to rise quickly. At this point, when this transition takes place, the economy is said to have crossed the Lewis Turning Point. This has important implications, as it will give workers more bargaining power which will consequently result in a more rapid increase in wages (Zhang *et al.,* 2011). The rise in income will have two effects with respect to income distribution: i) the rural-urban income gap will decrease, and ii) domestic consumption will increase, which will reduce the global imbalance.

Whether China has passed the Lewis turning point or not, is a relevant aspect to consider. Since China is the world's largest exporter of manufactured goods, they also determine the world prices to a great extent (Zhang *et al.,* 2011). So, if labor costs rise, due to labor shortages, the prices of Chinese goods will eventually also rise. Higher prices will not only affect the global markets, trade, and consumers, but it will also affect the global standing China has, as its comparative advantage, low labor costs, will eventually disappear. So, the question remains; Has China passed its Lewis turning point? According to an influential study conducted by Zhang *et al.* (2011), where they explore the subject by using micro-level data in six provinces, China passed the Lewis turning point as early as 2003. They find evidence of nationwide labor shortages, which have been represented by substantially rising real wages. However, in another study by Das and N'Diaye that was published in 2013, they argue that the Lewis turning point has not been crossed, but will in the years between 2020 and 2025, although they note that the working-age population has begun to shrink. The authors focus more on the demographic shift and its implications, which is also why they argue that higher fertility through the relaxation of China's one-child policy will delay the depletion of surplus labor. China has indeed replaced the one-child policy that was set in place in 1980, first in favor of a two-child policy in 2016, but has further relaxed the policy to a three-child policy in 2021 (BBC, 2021).

So, how does the future of exports look for China? Although economic growth remains very high in China, numerous economists are arguing that the Chinese growth model is running out of steam (Rodrik, 2006; Dollar, 2013). Rodrik (2006) argues that future economic performance is dependent on China continuing to be flexible and adaptable, in other words,

whether China is able to produce higher- and higher-income products over time. This statement is supported by Amiti and Freund (2008), who also refute the belief that China's export structure has already transformed into more sophisticated products. They argue that this is not the case, since the skill content of China's manufacturing exports has remained unchanged once processing trade is excluded. Although it may look like the skill content of Chinese exports has increased, the authors argue that this is due to the increased skill content of imported inputs that are then assembled for export, i.e., the practice of processing trade. Others argue that China needs to rebalance its economy from heavy reliance on exports and investment, toward consumption (Dollar, 2013; Ma *et al.*, 2018). They point out that China has an unbalanced growth pattern with low consumption and high investment relative to GDP, which is rooted in labor and capital market distortions that artificially lower the cost of labor and capital, repressing consumption. Ma *et al.* (2018) argue that a rebalancing from investment and export-driven patterns of growth towards more consumption-driven growth is already happening in China.

3.1.3 Summary

The rise of China as the "world's factory" is a multifaceted developmental story, although it seems like most economists are convinced that it is rooted in economic reforms. Moreover, the establishment of SEZs has played a large part in encouraging foreign investments, which spurred further development in China. Additional economic liberalization, such as the entry into the WTO, made the rapid growth of Chinese exports possible. It also resulted in a large increase in FDI inflows from outside of South-East Asia, which ultimately created an environment that promoted technological advancement and raised general productivity. In sum, economic reform, i.e. the establishment of a market economy and opening up to the world, was the engine of economic growth in China. However, there is a discussion about whether China possessed particular pre-conditions which made the economy able to grow much faster than similar economies.

There is a wide discussion about China's trade patterns, especially when it comes to its comparative advantage. Many economists relate the successes in exports to China's abundant and cheap labor, which they argue is why China has been able to gain a dominant position in the labor-intensive portion of global production. There are other economists that argue that the country's comparative advantage is much more sophisticated and dynamic than that. Their

ability to adjust and sell products that are associated with a productivity level that is substantially higher than their income level may be their real advantage. However, the level of sophistication in China's exports may not be as high as it seems due to the practice of processing trade.

So, how does the future look for China? The economy has been experiencing a demographic shift and also a rise in wages, which makes many economists convinced that China has passed its Lewis turning point. The consequences of this have been widely discussed as well. While crossing the Lewis turning point may indicate that the era of high export rates is over, due to the depletion of surplus labor, China is making efforts to slow down the transition through different policy changes. However, there is a consensus regarding China's future economic performance, which is that the skill content of the country's exports needs to increase over time. Moreover, China is also in need of a rebalancing from investment and export-driven patterns of growth towards more consumption-driven growth - which is already seen to be happening. To conclude, what does this imply for developed countries? Looking at it through a theoretical lens, one could argue that the decrease in surplus labor in China may reduce the negative effects on low-skilled workers in other parts of the world. On the other hand, as the skill-content of the country's exports increases, one could also argue that developed countries will start to feel the effects of increased competition in higher-skilled industries.

3.2 Globalization

Globalization figures prominently in discussions of income and employment positions of unskilled workers. However, in the last decade, the discussion of globalization and its effects have extended beyond labor standards for unskilled workers. Instead, the focus has shifted to the pervasiveness of globalization. The development of "the race to the bottom" term is an example of the shift in the discussion of globalization and its effect on economies. The race to the bottom phenomenon describes the competitive situation where countries lower their labor standards, environmental standards, and tax rates in order to attract or retain foreign economic activity (Olney, 2013). The phrase refers to nations' attempts to undercut each other's prices by sacrificing economic and ethical standards by deregulating the business environment as a means to gain a competitive advantage. This is seen as a consequence of globalization, as companies tend to move to countries with lower labor costs and lower labor rights. To be able

to keep their market share in the global economy or even expand it, countries consequently want to lower their regulations in order to keep firms' production in their jurisdiction, hence driving the race to the lowest regulatory standards. However, the term has come to cover more than just the competition of the cost of production. The race to the bottom hypothesis covers several topics regarding the negative impacts of globalization, such as; i) unemployment, ii) labor standards, iii) inequality, and even iv) populism. These areas of research will be presented below, as well as some counterarguments to the negative effects of globalization.

3.2.1 The Negative Effects of Globalization on Labor Markets and Inequality

In 2005, Richard Freeman expressed his concern regarding the increased globalization and what implications it might have for workers around the world. He explains, with what he calls "The Great Doubling", that the joining of China, India, and the ex-Soviet bloc in the 1990s to the global economy, increased the size of global labor from approximately 1.46 billion workers to 2.93 billion workers. Freeman (2006) argued that there would be two outcomes of this change (for the U.S. in specific, although it can be generalized): i) either the U.S. adjusts well, which will improve living standards for all Americans, or ii) economic divisions will be exacerbated over the next several decades. By adjusting "well", Freeman points to policies that focus on education, taxation, and investment in social overhead capital. However, the much more sobering outcome would completely erode the position of workers.

The Great Doubling puts a lot of emphasis on the capital/labor ratio. Since these new entrants brought little capital with them, either because they were poor or the capital they had were of little economic value, we now have a global economy with twice as many workers while having the same amount of capital (Freeman, 2005). This has led to increased pressure to compete and has put even greater pressure on labor markets. Freeman argued that the entry of these economies cut the capital/labor ratio, which is a critical determinant of the wages paid to workers and the rewards to capital, by just 55 to 60 percent of what it otherwise would have been. A decline in the global capital/labor ratio shifts the balance of power in markets away from wages paid to workers and toward capital. Although this has detrimental consequences for developing countries wishing to industrialize through manufacturing, it does have some serious implications for developed countries as well. Not only will low-skilled workers be

affected, but high-skilled workers will increasingly start to feel the consequences of globalization. The author explains that China, India, and other developing countries have increased their number of university graduates, which has diminished the high-tech innovative capacity monopoly developed countries used to possess. This will ultimately lead to an increase in labor market pressures on educated and skilled workers as well.

There is quite a large body of literature that empirically investigates the impact of globalization on labor markets - more specifically the effect of international trade on U.S. markets. In an influential paper by Autor, Dorn, and Hanson (2013), they examine the effect of rising Chinese import competition on U.S. labor markets between 1990 and 2007. This is mainly done through an instrumental variable approach, specifically by performing a two-stage least squares analysis (2SLS). They divide the economy by treating local labor markets as sub economies subject to differential trade shocks based on initial industry specialization patterns, as they differ in their exposure to import competition. These sub economies are called commuting zones. The difference is because of the variation in the importance of different manufacturing industries to local employment. The authors find that Chinese import competition affects local labor markets through various channels and not only through manufacturing employment. Chinese import competition also leads to a decline in wages, which is mainly observed outside of the manufacturing sector. Reductions in both employment and wage levels lead to a drop in the average earnings of households - which is found to contribute to rising transfer payments through federal and state programs.

Similarly, in Autor, Dorn, Hanson, and Song (2014) the effect of exposure to international trade on earning and employment of U.S. workers is analyzed. They use the time frame 1992-2007 and the method of 2SLS. What is important to note, which the authors explain, is that manufacturing is one of the biggest sectors in the U.S. and also accounts for the majority of U.S. trade. This means that China's entry into the world market, and its expanding role in global manufacturing, create a substantial competitive shock for the United States. Moreover, U.S. manufacturing has undergone a contraction since the 1980s. While evidence suggests that skill-biased technological change played a more important role in the 1980s, the role of trade has become more and more important. The number of workers employed in the sector dropped by 9.7 percentage points between 1991 and 2001, and by an additional 16.1 percentage points between 2001 and 2007 - hence the interest in examining the role of increased exposure to rising competition from China during this time period. The authors use

longitudinal data to estimate the impact of exposure to Chinese import competition on cumulative earnings, employment, movement across sectors, movement across regions, and receipt of Social Security benefits. In contrast to Autor, Dorn, and Hanson (2013), Autor *et al.* (2014) are able to address how individuals adjust to trade shocks. They find that workers that were employed in industries in 1991 who were exposed to higher import competition from China experienced lower cumulative earnings, a reduction in time working for their initial employers, faced a higher risk of obtaining public disability benefits, and were more likely to leave their initial employer and manufacturing overall. Autor *et al*. also found that low-wage workers were disproportionately affected by import competition, while high-wage workers were less affected. This is because it is easier for high-wage workers to change jobs, with minimal earnings losses.

Two years later, the same group of researchers gathered again (Jae Song excluded) to reassess the impact of increased import competition from China on U.S. labor markets - using the same time period and method. However, this time they also examine the effect increased trade between China and the U.S. has had on overall employment, outside of manufacturing as well (Autor *et al*., 2016). Although employment has fallen in industries that are more exposed to import competition, employment has also fallen in the local labor markets in which these industries were concentrated. Once again, they emphasize that lower-wage workers are disproportionately affected in comparison to higher-wage workers. A lower-wage worker experiences larger proportionate reductions in both annual and lifetime earnings, a diminished ability to exit a job before an adverse shock hits and is more likely to exit the labor market. In contrast to earlier research, Autor *et al.* (2016) are convinced that their comparative advantage in (cheap) labor abundance is coming to an end, which the rapidly rising wages are an indicator of. It is worth noting that not everyone is convinced that rising real wages is the end of China's comparative advantage. Although ILO (2016) acknowledge that wages have risen and thus expanded the Chinese middle class, they do underline that minimum wages have risen much less than the real wages - which are of importance for reducing inequality and supporting lower-wage workers - leading to a widening gap between minimum wages and average wages in China. Moreover, they find that labor productivity has grown faster than labor compensation - which means that wage growth will not hamper the country's competitiveness.

As discussed in the above-mentioned studies, import competition and globalization have also led to a widening gap between low-skilled and high-skilled workers. In fact, over the last couple of decades, there has been an apparent contradiction in the global inequality of income or living standards. While inequality between countries has decreased significantly - and therefore decreased global inequality - inequality within countries has increased, specifically in developed countries after decades of stability (Bourguignon, 2013). Although the most well-documented countries of this historical shift have been the U.S. and the UK, countries such as Germany, Italy, Canada, and Sweden have also experienced rising inequality. According to Bourguignon, trade, and globalization are responsible for the rising inequality within countries. This rise in inequality, mostly in wages, in favor of the most highly skilled has been bolstered by a growth in profits and returns on capital, which are predominantly held by those with the highest living standards. However, Bourguignon explains that there are other factors that have contributed to rising inequality within developed countries, and he cites three of them. First, we have seen a rapid growth in technological productivity in the last few decades, which has led to lower demand for low-skilled workers and a higher demand for high-skilled. Second, because of the economies of scale enabled by technological advancement, some activities' income has been concentrated in the hands of a limited number of economic actors. Third, marginal tax rates have been reduced in some countries (such as Sweden, and more dramatically in the U.S. and the UK) for the benefit of economic efficiency and international mobility. Bourguignon argues that these factors are not independent of globalization, as they most likely are aimed to raise the competitiveness of the economies concerned - which is provoked by globalization.

As touched upon, China's position in the global market has changed during the last decades. Going from mainly receiving FDI, which has been of great importance for China's development, China has today become a noteworthy global investor as well. In fact, in 2015 China became the second-largest investor in the world in terms of FDI[1] flows (Molnar *et al.*, 2021). However, in terms of outward direct investment (ODI), it is still quite small, although it has increased rapidly in the past decade. China's growing influence as an investor in the

[1] It is important to note the difference between foreign direct investment outflows (FDI) and outward direct investment (ODI). While FDI is the value of outward direct investment made by the residents of the reporting economy to external economies, ODI includes assets and liabilities transferred between resident direct investors and their direct investment enterprises (World Bank, n.d). If the ultimate controlling parent is a resident, it also covers transfers of assets and liabilities between resident and nonresident fellow firms.

global economy has been criticized. For example, in a paper by Kolstad and Wiig (2012), where the authors examine the incentives behind Chinese investments abroad, it is discovered that large markets and countries with an abundance of natural resources and poor institutions attract Chinese outward FDI. However, Kolstad and Wiig (2012) primarily focus on the effect of Chinese FDI on developing countries. Instead, Olney (2013) investigates the effect of global FDI on OECD countries. The author tests the hypothesis of the race to the bottom in relation to increased globalization, by testing the impact of employment protection on FDI, and whether employment protection rules in the host country depend on labor standards in other foreign countries. The first hypothesis is analyzed by performing a simple ordinary least squares (OLS), while the second hypothesis uses instrumental variables (IV) estimator and generalized method of moments (GMM). Olney finds that FDI affects employment protection rules negatively and that there is evidence that countries are competitively undercutting each other's labor standards in order to attract FDI. Olney concludes that his results provide support for the race to the bottom hypothesis.

The research dedicated to exploring the effects of globalization on European countries is much more limited in comparison, even more so when it comes to Nordic countries in particular. However, in a recent study by Paulie (2021), the author examines if increasing product-market competition from foreign firms affects domestic labor shares by using Swedish micro-level data on manufacturing firms. The empirical analysis is based on a 2SLS method similar to Autor, Dorn, and Hanson's (2014), but does not only focus on increased competition from China. Paulie (2021) finds that an increase in competition has a negative effect on firm-level labor shares, which is driven by an increase in productivity that is not met by an increase in compensation to labor. There have been some studies that have found insignificant effects of Chinese trade exposure on labor markets in Europe. These are presented in section 3.2.3.

3.2.2 Globalization and Populism

There has been a strand of research that has grown these last few years that has investigated and found a relationship between globalization and populism. In 2017, Rodrik took on this question by examining right-wing and left-wing populism and its roots. First of all, Rodrik explains that there are a lot of different factors that are in play when it comes to populism, such as changes in technology, the rise of winner-takes-it-all markets, erosion of labor market

protections, and an increasing difference between the wage rates of different groups of workers. However, these are not necessarily independent of globalization but rather reinforced by it. Rodrik notes an interesting difference between populism in Europe and the U.S., which is that neither right-wing nor left-wing populists have pushed for trade barriers. Not even Brexit advocates in Britain pushed for it but were rather more insistent on freer trade. The author argues that this difference is because of the stronger social protections in Europe and more generous welfare states. Openness to trade in Europe has been accompanied by a higher grade of redistribution and social insurance - which might be why the backlash against immigrants and refugees in Europe is partly rooted in the fear of the social benefits of the welfare state being eroded or displaced. Rodrik finds that right-wing populism has been predominant in Europe, while left-wing populism has been more predominant in Latin America. Moreover, the author argues that the different reactions are because the regions have been affected by different types of globalization shocks.

There has been an increase in research looking into the effects globalization has had on elections. Colantone and Stanig (2017) find through an IV approach that the support for the Leave option in the Brexit referendum was higher in regions that had been harder hit by globalization driven by the Chinese import shock. Interestingly, they find only weak evidence in support of increased immigration in a region being a driver of Leave voters. In both studies by Autor *et al*. (2017) and Rodrik (2021), they analyze the outcome of the 2016 presidential election. While Rodrik further investigates populism, Autor *et al*. examine if rising import competition has contributed to the polarization of U.S. politics. Rodrik (2021) found more evidence of globalization driving up populist movements, the right-wing kind in particular. By using globalization-related attitudinal variables gathered from survey data, Rodrik found that they were important correlates of the switch to Trump in 2016. Autor *et al*. (2017) analyze the outcomes of two congressional elections and three presidential ones in relation to globalization by using rising trade and import competition from China. They find that trade-exposed districts with a majority white population or that were previously controlled by Republicans became significantly more likely to elect a conservative Republican, while trade-exposed districts with a majority minority population or that were previously controlled by Democrats became significantly more likely to elect a liberal Democrat. Additionally, their results showed that counties exposed to greater trade voted for the Republican candidate in the presidential election.

3.2.3 Globalization: the good, the not-so-bad, and the "might be technology"

There are also studies that confirm the gains and losses that are predicted in the traditional neoclassical trade models, such as the Ricardian and Hecksher-Ohlin framework. For example, in a study conducted by Feenstra *et al.* (2017), where they examine the effect of import competition from China and global export expansion from the U.S. on employment in the U.S. from 1991 to 2011, they find evidence of globalization has both a negative and positive effect. By using an instrumental variable approach, the authors find that increased import competition has led to job losses, as found in earlier studies. However, they also find that the global export expansion of U.S. products has led to job gains, where the job creation effect almost offsets the negative effect caused by increased imports from China. Similar to Autor *et al.* (2013) they examine the effects on commuting zones and find that the commuting zones that had higher percentage losses are also more likely to have higher percentage gains. Moreover, Dauth *et al*. (2013) analyze the effect of rising trade between China and Eastern Europe on German labor markets over the time period of 1988 to 2008. By using the same approach as Autor *et al*. (2013) they find that rising import competition caused substantial job losses, in import-competing industries in particular. They also find that other sectors besides manufacturing were affected. Similar to the results by Feenstra *et al*. (2017), they find increased trade and globalization have had positive effects on regions specialized in export-oriented industries, creating a large number of additional jobs. However, this effect is not found to be caused by China but is almost exclusively driven by the rise of Eastern Europe. Earlier this year, Jiang *et al*. (2022), published research where they follow the method of Autor *et al*. (2013) and examine the of increasing manufacturing imports from China on manufacturing employment and wage earnings distribution in Sweden over the period 1996-2007. They find that the increased trade exposure from China has not had any significant effect on Swedish labor markets. Their explanation behind these results is that the institutional setup in Swedish labor markets differs from many other European countries, especially the United States. They also refer to previous research (e.g. Amiti & Khandelwal, 2009) that has found that increasing import competition from low-income countries can induce firms in high-income countries to upgrade their product quality and invest more in technology. Meaning that Sweden might have differentiated their goods from the imported foreign goods to better adjust to the rising globalization.

The main argument in opposition to the negative effects of globalization on labor markets is that increased trade and import competition are not responsible for unemployment and rising income inequality. Unemployment and income inequality are instead merely a consequence of rising technological productivity. The structural changes in the wage structure and income inequality for the U.S. and other OECD countries in the 1980s and 1990s raised concerns about new technologies rendering labor redundant. The observation that demand was shifting in favor of more educated workers led to the "Skill-Biased Technological Change" (SBTC) hypothesis (Autor & Katz, 1999; Acemoglu & Autor, 2011). Some researchers believe that the same forces are behind the shift in labor markets today. Edwards and Lawrence (2013) argue that the reason for manufacturing's weak employment growth in the U.S. is not because of trade with emerging-market economies such as China, but due to faster productivity growth in the manufacturing sector.

In a study by Moore and Ranjan (2005) they try to compare the effects globalization and skill-biased technological change have on the increase in U.S. wage inequality since the 1980s, by using a model of search unemployment. They confirm that both globalization and SBTC lead to increases in wage inequality, but that they have different effects on unemployment. The SBTC has a substitution effect, where an increase in the skilled intermediate product favors the skilled worker and hurts the unskilled. However, SBTC has an income effect as well, that favors both types of workers, which arises because skilled and unskilled intermediate goods are complements in the production of the final good. If the income effect is greater than the substitution, SBTC will ultimately lead to a fall in the unemployment rate of unskilled workers. Moore and Ranjan find that globalization, however, only increases the rate of unemployment of unskilled workers.

Interestingly, Krugman (2000) was also quite convinced that it was technological improvements that mainly explained the change in factor prices. Meaning that skill-biased technological change is primarily to blame when it comes to the rising skill premium. However, in 2019, Krugman came out with an essay titled "What Economists (Including Me) Got Wrong About Globalization", where he admits that rapid globalization and increased trade have affected inequality and unemployment in the U.S. significantly. In the essay, Krugman also emphasizes the role of trade imbalances, where he states that rapid changes in trade balances can cause serious problems of adjustment. Moreover, he argues that increasing trade deficits can explain a large part of the fall in employment - although only over a short

time period. In the long-run, trade deficits only explain little in an economy's adjustment. He, however, believes that the growth of trade and rapid globalization will have persistent effects on classes of workers and have long-run consequences for inequality. So having once dismissed the role of trade, Krugman later admitted that he was wrong.

3.2.4 Summary

The literature on globalization, and its effects, is large and it continues to increase as globalization becomes more central in our lives. The discussion about the negative effects of international trade and the increased rate of globalization initially began with examining its impact on labor markets. However, the debate has extended beyond that. Now, the subject of the race to the bottom is taking a more central role. The competitiveness has risen in the global market, leading to countries being willing to sacrifice regulatory standards in favor of keeping their market share in the global economy.

Most of the research that has been done on the topic has focused on China's rising presence in the U.S. labor markets. Several economists have reported that increasing import competition has led to reductions in employment and wage levels, mainly in industries most exposed to Chinese imports (such as manufacturing). Another consequence is that low-wage workers have been harder hit than high-wage workers, leading to a rise in inequality. These findings are in line with the outcomes the Heckscher-Ohlin framework, especially the Stolper-Samuelson theorem, hypothesizes.

It is also found that FDI affects employment protection rules negatively and that there is evidence that OECD countries are competitively undercutting each other's labor standards to attract FDI. Although countries such as Germany and Sweden have experienced rising inequality as well, research examining the role of Chinese import competition does not find any significant effect. Meaning, that one cannot draw the causal relationship between China's increasing presence in respective countries' labor markets as a driving force in their rising inequality. If the lack of significant effect in these countries is due to their institutional setting, or because Chinese imports in specific are insignificant, is unclear. Additionally, some researchers instead believe that increased trade and import competition are not responsible for the rise in inequality, but that skill-biased technology is to blame.

Another strand of literature within this area of research is the effect of increased import competition, especially from China, has affected populism. These studies find that regions and countries that have been harder hit by globalization and the adverse effects of international trade have seen an increase in polarization. These studies include both European countries and the United States.

In short, the effects of the increased rate of globalization and international trade are many and draw a lot of attention from economists. While this study will not look at the shifts in earnings of workers or populism in the Nordic countries, these findings are interesting and interconnected with the shifts in the labor market. One cannot argue that polarization and its features are completely independent of changes in the labor market.

4 Data

The following chapter presents the data that has been collected and used in the research. The particular data and sources are described, followed by a critical review. The chapter includes a brief presentation of the variables that are used, however, the computation and the construction of certain variables will be presented in the next chapter. The reliability, representativity, and validity of the data will be discussed.

4.1 Source Material

To examine the impact of exposure to Chinese import competition on Nordic labor markets, the study makes use of pooled data for four Nordic countries; Denmark, Finland, Norway, and Sweden. The reason behind the choice of these four economies is that they are roughly the same size and have similar features, especially when it comes to their welfare systems and the size of their manufacturing sector (as measured as the share of GDP). The chosen time period is 1995 to 2020, although the availability of detailed data on industry-level factors varies between the countries. There are some issues with the sample period of 2008 and forward. As argued by Jiang *et al*. (2022), this time period might cause ambiguous effects due to complex shocks to the economy – such as the 2008 global financial crisis, 2010 European sovereign debt crisis, 2015 European refugee crisis, 2018 U.S.-China trade war, and the Covid-19 pandemic in 2020. However, the time period of choice aims to capture the rise of China, specifically China's accession to the WTO, and its continued effect on Nordic countries almost two decades later. In other words, capture some kind of long-run effect. As mentioned, the entry of China into the world market has provided a rare opportunity for studying the effects of a large trade shock. To conduct the empirical research, three datasets have been used, one that covers the years between 1995 to 2020, and the other two that cover the years between 2000 to 2010, and 2010 to 2020. The datasets covering the earlier years are based on unbalanced data, which in simple terms means that there is no complete data for each country for each year and that some variables have more observations, both between countries within the variable and relative to other variables. The lack of data covering the years leading up to

China's accession to the WTO limits the study's ability to capture the effects of the trade shock caused by China. Moreover, data on industry-level imports and exports pre-trade shock is scarce, which adds to the difficulty of capturing the impact it has had on certain sectors and their labor force. This is one of the biggest weaknesses of this research since lack of data consequently affects the reliability of the regression results and increases the risk of finding insignificant estimates. Moreover, I wished to analyze the impact of increased import competition on cumulative earnings and income inequality between workers employed in different sectors. However, the detailed data for this is not available for the included countries. This makes it impossible to derive any causal effects rising import competition has had on income inequality.

4.1.1 Sector-level Data.

Data on industry-level imports, exports, and production are gathered from UN Comtrade, and the national government agencies responsible for producing official statistics for respective countries. They are specifically called Statistics Denmark (DST), Statistics Finland (STATFI), Statistics Norway (SSB), and Statistics Sweden (SCB). The data reported on imports and exports follow the Standard International Trade Classification (SITC) Revision 3/4, which is a standardized system of classifying traded goods. Each commodity group is coded and thereafter grouped into nine categories. They can thereafter merge into seven categories, which is the categorization this study follows due to simplifying purposes. The SITC categorization is summarized in **table 1** below. The data collected from UN Comtrade is the total imports and exports of the countries that are included in the empirical analysis (including the countries used as instruments).

The industry-level data on production is classified according to the Nomenclature of Economic Activities Revision 2 (NACE Rev. 2), which is the European statistical classification of economic activities. NACE is also divided into codes and categories representing different economic activities. The data from UN Comtrade is in USD, while the data from respective national government agencies are in their national currency. For consistency, the data on trade flows have been converted to Euro, in constant prices with 2015 as the base year.

The data sources, NACE and SITC, are reported by different classification systems. When converting the data to a common classification system, in this case fitting the NACE codes into the SITC framework, generates a loss of some industries and general information. Several weaknesses occur in the data during the conversion process. First, the seven-category SITC framework that is used to simplify matters also leads to some loss of information. This is amplified by fitting production data that is NACE classified - ultimately creating information that can be ambiguous. Ideally, one would use trade data by HS-system (Harmonized Commodity Description and Coding System), which is considerably more detailed than SITC. However, within the scope of this research, it is difficult to go into the details of trade. In addition, as trade patterns become more complex, gathering valid data that reflects that complexity will become harder and harder.

Table 1: The SITC categorization

Category	Description
0+1	Food, live animals, beverages, and tobacco
2+4	Crude materials (inedible & except fuels), animal and vegetable oils
3	Mineral fuels, lubric. and related materials
5	Chemicals and related products, n.e.s. (e.g. pharmaceutical)
6	Manufactured goods, classified by material
7	Machinery and transport equipment
8+9	Other (miscellaneous) manufactured goods, n.e.s.

Notes: The complete list of the Standard International Trade Classification (SITC) and how the goods are classified is available here: https://www.scb.se/en/documentation/classifications-and-standards/standard-international-trade-classification-sitc/

4.1.2 Labor Market Data

Data on the respective Nordic countries' labor markets have been collected from the International Labour Organization's (ILO) statistical database. The information that has been gathered is: i) total labor force, which includes people who are currently employed or who are unemployed but seeking work as well as first-time job-seekers, ii) female labor force participation rate, iii) working-age population, which is the total population between the ages 15 to 64, iv) labor force with advanced education, which is the ratio of the labor force with advanced education to the working-age population with advanced education, v) labor force with intermediate education, which is the ratio of the labor force with intermediate education to the working-age population with intermediate education, and vi) manufacturing employment, both number of people and as a share of total employment.

It is worth noting that the labor force with advanced and intermediate education is comprised according to the International Standard Classification of Education (ISCED 2011). Labor force with advanced education refers to people with short-cycle tertiary education, a bachelor's degree or equivalent education level, a master's degree, or equivalent education level, or a doctoral degree or equivalent education. Labor force with intermediate education refers to people with upper secondary or post-secondary non-tertiary education.

Data on income inequality is gathered from the World Inequality Database, which combines national accounts and survey data with fiscal data sources, instead of only relying on household surveys. The data that has been collected provides information about income distribution, more specifically the income shares of the bottom 50 percent and top 10 percent of the population. The bottom 50 refers to the income shares of the bottom 50 percent of the population, i.e., that part of the population whose income lies below the median. Top 10 refers to the income shares of the top 10 percent of the population who accrue the highest income. These measures are computed with pre-tax national income values.

5 Methodology

This chapter presents the empirical approach taken in my study, with previous research as a guideline. The aim of this empirical analysis is to examine the effect of increased import competition on Nordic countries' labor markets. More specifically, it focuses on the effect rising import exposure has had on the manufacturing sector due to its labor-intensive nature, in which China has become the world's dominant supplier. This is the reason why the manufacturing sector has been chosen, as it is the sector whose workers have been the most exposed to import competition. The chapter contains different sections, it is structured as follows. First, the measure of import competition is introduced. Second, my instrumental variable approach is presented. Third, my model specification and my baseline model are presented and discussed. The chapter ends with presenting my method followed by regression diagnostics.

5.1 Measure of Import Competition

To estimate the impact of exposure to Chinese import competition, I follow Paulie (2021), which is a slight adjustment to Autor *et al*. (2014) baseline measure of trade exposure: the import penetration for an industry over the period 1995 to 2020. The import penetration ratio is defined as:

$$IP_{i,j,t} = \frac{M^{C}_{i,j,t}}{Y_{i,j,t} + M_{i,j,t} - E_{i,j,t}} \cdot 100 \qquad (1)$$

where $M^{C}_{i,j,t}$ are the imports from China in industry *j* in year *t,* in country *i*. $Y_{i,j,t}$, $M_{i,j,t}$, and $E_{i,j,t}$ are the production, imports, and exports in industry j in year t, in respective country. The import penetration ratio shows to what extent demand for goods on the domestic market is met by foreign production, and the ratio in equation (1) also captures China's presence in the country i's labor market. This means that a country whose domestic consumption is met by Chinese imports will have a high import penetration ratio, while a country whose domestic consumption is met by domestic goods will have a low import penetration ratio. In other

words, the import penetration ratio can be interpreted as the competitive pressure from China. Note that in the regression analysis the change in the import penetration ratio is used since we want to make statements about the causal effect of changes in the import competitiveness from China on Nordic countries' labor markets.

5.2 Instrumental Variable Approach

There are some econometric pitfalls to identifying the impact of import competition using the import penetration ratio, which Autor *et al*. (2014) and Paulie (2021) discuss. The main concern raised by the authors is that the import penetration ratio may also capture domestic shocks and therefore not accurately reflect the changes in the import competitiveness stemming from China. Hence, there is a need to isolate the exogenous effect of import penetration that comes from a trade-induced increase in competition - which means that we need an instrument that is correlated with changes in domestic import penetration but uncorrelated with domestic shocks. To overcome this issue, Autor, Dorn, and Hanson (2013), and Autor, Dorn, Hanson, and Song (2014) consider the change in imports from China to other high-income countries - in which they use the import penetration ratio in non-U.S. high-income countries. Their motivation for the instrument is that high-income countries are similarly exposed to growth in Chinese imports that is caused by supply shocks from China. In other words, they are exposed to the same intensification in imports but do not face the same domestic shocks. However, there is a potential problem to this identification strategy as well - since it is likely that demand shocks are similar across high-income countries, especially between neighboring countries. Paulie (2021) for the same reason, explain that it is likely that industry shocks to neighboring countries and countries within the European Union (EU) have a direct effect on Nordic countries' labor markets. Therefore, all neighboring countries and EU members are excluded as instruments. Paulie, whose reasoning I follow in finding my instruments, uses the instrumenting countries Canada, Japan, New Zealand, Australia, and Switzerland. Like Paulie, the instruments are the changes in Chinese imports in other countries instead of computing their import penetration ratios, due to data limitations - specifically regarding the poor production data at the detailed industry level.

5.3 Model Specification

To estimate the effect of rising import exposure from China on the domestic labor market, I follow Autor *et al.* (2013) approach. The included variables and their sources are summarized in **table 2** below. The baseline specification is as follows:

$$\Delta Y_{i,t} = \beta_0 + \beta_1 \Delta IP_{i,t} + \beta_2 \Delta IPC_{i,t}/W_{i,t} + \beta_3 \Delta X'_{i,t} + \gamma_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $\Delta Y_{i,t}$ is the change in the manufacturing employment share of the working population in country *i* at time *t.* Moreover, $\Delta IP_{i,,t}$[2] is the change in import penetration, aimed to capture changes in import competition from China, as discussed in section 5.1. Although here, it is not distinct by industry *j*, but is rather a sum over the industries. This makes the variable reflect the average import penetration ratio over industries of country *i*. My second endogenous variable is $\Delta IPC_{i,t}/W_{i,t}$, which is the change in imports from China divided by the total labor force. The vector $X'_{i,t}$ contain a set of control variables such as the change in the percentage of the labor force with advanced education, change in the percentage of the labor force with intermediate education, and change in the percentage of employment among women. Note that all the regressions are run on differenced variables. In contrast to Autor *et al*. (2013), I, in a similar fashion as Dauth (2013), dropped the variable measuring the growth rate of the manufacturing employment share in the labor market. The reason behind this decision is the risk of reverse causality. The parameter $\gamma_{i,t}$ is a time dummy, to allow for aggregate time effects. Since time dummy variables are exogenous, they act as their own instruments (Wooldridge, 2012: pp. 540-541). The regressions are run separately on ten-year changes, although one of the regressions accounts for the whole time period, 1995 to 2020. $\varepsilon_{i,t}$ is the error term.

[2] As argued by Paulie (2021), I do not include industry dummies to control for potential industry-level effects, since the regression is run on differenced variables. The import penetration ratio that is used in the regression is the sum over the industries, meaning that imports, production and exports are not distinct by industry *j*.

Table 2: The variables; descriptions and sources of data

Variable	Description	Source
Δ manufacturing employment/working-age pop	The ratio of the change in manufacturing employment divided by the total working-age population (15-64) (in % pts)	ILO
Δ imports from China/worker	The ratio of the change in Chinese imports to country divided by the total labor force	UN Comtrade, ILO
Δ IP	The change in import penetration ratio measuring the increase of Chinese import competition. Author's own computations.	UN Comtrade, DST, STAFI, SSB, SCB
Δ advanced educ. pop.	The ratio of the change in the labor force with advanced education to the working-age population with advanced education (in % pts).	ILO
Δ employment among women	The change in labor force participation rate, female (% of female population ages 15-64) (in % pts)	ILO
Δ imports from China	Change in imports from China for the instrumenting countries; Canada, Japan, New Zealand, Australia, Switzerland	UN Comtrade

5.4 Regression Diagnostics

In this section, I will present the model of choice and the series of tests that are performed to test and check the properties of the variables and thus the quality of the model. The purpose of this is to investigate if the assumptions made about the data and the model are consistent with the actual recorded data. All econometric analyses are performed in Stata.

To begin with, all the variables that have been used in the regressions have been tested for stationarity by being tested for unit roots using the augmented Dickey-Fuller tests of the types, Levin–Lin–Chu (LLC) or Im-Pesaran-Shin (IPS) unit root tests. LLC is used when the data is strongly balanced. However, the majority of the data is unbalanced, therefore the testing for stationarity is mainly based on Im–Pesaran–Shin unit-root test, which is best suited for unbalanced data. The null hypothesis - that all panels contain unit roots - is rejected for all variables, meaning that the data that is used is stationary.

Moreover, it is important to assure whether the two-stage least squares (2SLS) regression model is even necessary, since using an instrumental variable approach instead of relying on an ordinary least squares (OLS) regression model has its consequences. The 2SLS estimator is less efficient than the OLS when the variables are exogenous - since the 2SLS often produces large standard errors (Wooldridge, 2012: p. 534). Therefore, it is only motivated to take an IV approach if the OLS estimator is biased and inconsistent. To test whether the OLS estimator is consistent and efficient, the Durbin-Wu-Hausman test for endogeneity is performed. The null hypothesis, that the OLS is more efficient, is rejected. Hence, we land in a 2SLS regression model.

Additional tests have been performed to examine the quality of the instruments, since using 2SLS with poor instruments can be worse than OLS (Wooldridge, 2012: p. 543). The instruments must satisfy two requirements. The first requirement is that the instrument must be uncorrelated with the error term - which is the exogeneity assumption. The instrument exogeneity condition is not verifiable. The second requirement is that the instrument must be correlated with the endogenous variable, due to the relevance of the instrument. To test if the second requirement is met, the Kleibergen-Paap F-statistic test for weak identification is used. There is a general rule of thumb, as suggested by Stock and Watson (2005), that if the first-stage F-statistic is smaller than 10, the instrument is weak. This confirms the relevance of the instruments that are used, as the F-statistics are above 10 for all regressions. Additionally, tests for overidentification of the instruments have also been performed. In simple terms, overidentification is that we have more instruments than we need to estimate the parameters consistently. Sargan's and Bassman's chi-squared tests report insignificant results, indicating that the instruments are valid.

The problem of multicollinearity, meaning that independent variables are highly correlated to each other, can cause an overfitting problem and consequently make it difficult to interpret the produced estimates (Wooldridge, 2012: pp. 94-95, 530). This issue can be even more severe with 2SLS. However, multicollinearity is almost always present in regressions, so it is rather a question of how severe it is. A rule of thumb for severe multicollinearity is when the value of correlation exceeds the threshold of 0.7 (Dormann *et al*., 2012). Another indication of multicollinearity is when the value of R^2 approaches 1, although when it comes to 2SLS or IV estimates, R^2 has no statistical meaning. As can be seen in the correlation matrix in **table 3**, is that the change of female labor participation rate is highly correlated with the change in labor

force with intermediate education. In addition, the instruments, except for the change in imports for Switzerland, are highly correlated with each other. This may be an issue, where the ability to predict the endogenous variable while not correlating with the error term is threatened.

Lastly, the regressions are tested for heteroskedasticity of the error terms with a Breusch-Pagan-Godfrey test. The null hypothesis stating that the error variances are equal (i.e., homoskedastic), is rejected - meaning that the error terms are heteroskedastic. This raises some issues, as heteroskedasticity makes the coefficient estimates less precise and tends to underestimate p-values.

Table 3: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Δ C imports/w	1.000										
(2) Δ manuf./w.pop	0.207	1.000									
(3) Δ IP	-0.131	0.296	1.000								
(4) Δ adv. educ. LF	0.189	0.186	0.171	1.000							
(5) Δ int. educ. LF	0.134	0.192	0.133	0.506	1.000						
(6) Δ empl. wom.	0.132	0.122	0.075	0.444	0.882	1.000					
(7) Δ can. imp.	0.392	0.079	-0.482	0.162	0.165	0.144	1.000				
(8) Δ jap. imp.	0.444	-0.026	-0.366	0.103	0.091	0.069	0.676	1.000			
(9) Δ nz. imp.	0.260	0.058	-0.343	0.114	0.147	0.146	0.641	0.807	1.000		
(10) Δ aus. imp.	0.492	-0.031	-0.431	0.222	0.182	0.149	0.818	0.869	0.760	1.000	
(11) Δ sw. imp.	0.383	0.039	-0.124	0.196	0.103	0.073	0.228	0.515	0.200	0.463	1.000

Note: (1) is the change in Chinese imports divided by total labor force. (2) is the change in manufacturing employment divided by working age-population (15-64 year). (3) is the change in import penetration ratio as described in section 5.1. (4) is the change of the proportion of labor force with advanced education. (5) is the change of the proportion of labor force with intermediate education. (6) is the change of the employment among women. (7)-(11) is the change in imports in the instrumented countries Canada, Japan, New Zealand, Australia, and Switzerland.

6 Empirical Analysis

The following chapter presents the results of my empirical analysis. More specifically, it covers two areas: statistical analysis and regression analysis. The chapter begins by presenting the descriptive statistics over the variables that have been used in the quantitative part of the study. This section also presents some descriptive graphs of the development of certain variables. The following section presents the main results of the regressions that are run, where the estimates are interpreted briefly. Lastly, the results are analyzed and discussed, where my findings are compared to previous literature and the theoretical framework that was presented in Chapter 2.

6.1 Descriptive Statistics

Table 4 shows the summary statistics over the variables that have been used in the regression analysis. The numbers show the number of total observations, the mean, the minimum value, and the maximum value. The standard deviation is also reported. The differences in the variables are annual, meaning that the study does rely on short-term variations. This is beneficial for tracking the effect of the entry of China in 2001 but can consequently underestimate the effects of certain variables, such as the changes in import penetration ratio. In table 3 we can see that the changes in the import penetration ratio range from -0.466 percentage points to 3.698 percentage points. However, the mean is positive, approximately 0.5 percentage point rise annually. The annual change for all imports from China to the instrumenting countries is also positive and quite high. One can also see that the mean value of the ratio of the change in manufacturing employment over the working-age population is negative, -2.159 percentage points. This reflects the decline in the manufacturing share in the Nordic countries. This is further represented in **figure 1** which shows the contraction in the manufacturing sector. The development is also compared to the one of the U.S., showing that the evolution of the manufacturing sector in each country has been very similar. The Nordic countries, except for Norway, have a relatively large manufacturing sector, in terms of GDP percentage. From the graph, one can see that Denmark and the U.S. have had a relatively

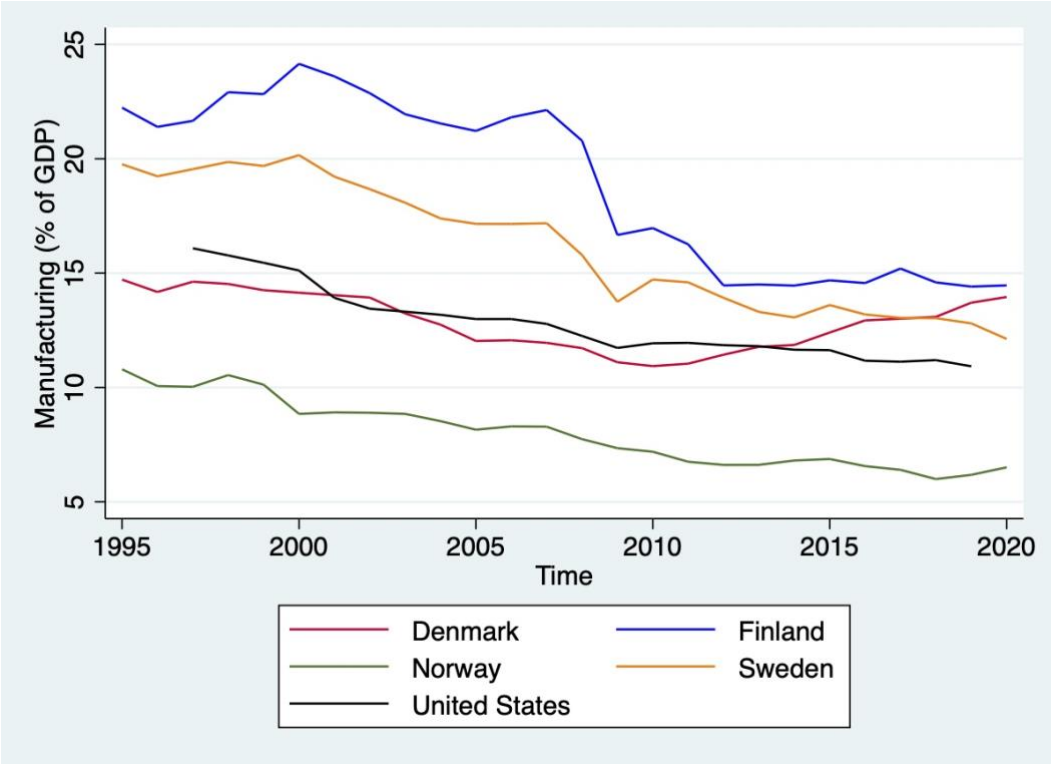
stable evolution, whereas Finland and Sweden have experienced a steeper decline. **Figure 2** further confirms the contraction of the manufacturing sector in the Nordic countries, showing that all four have experienced a large decline in their manufacturing share of total employment. Unfortunately, data for the pre-entry of China into the WTO is not available.

Table 4: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Δ manuf. empl./work.pop	82	-2.159	.002	-15.859	3.8577
Δ C imports/worker	100	.087	.25	-.845	1.062
Δ IP	91	0.472	0.267	-0.466	3.698
Δ adv. educ. labor force	99	-.222	1.087	-6.3	4.04
Δ int. educ. labor force	99	-.375	1.308	-7.17	3.67
Δ empl. among women	99	-.456	1.515	-8.06	4.59
Δ C imports, Canada	84	11.146	9.353	-6.96	29.711
Δ C imports, Japan	100	6.875	11.619	-14.421	28.595
Δ C imports, New Zealand	100	13.245	16.941	-15.995	52.204
Δ C imports, Australia	100	13.849	13.395	-7.523	43.132
Δ C imports, Switzerland	100	13.463	14.496	-14.989	55.522

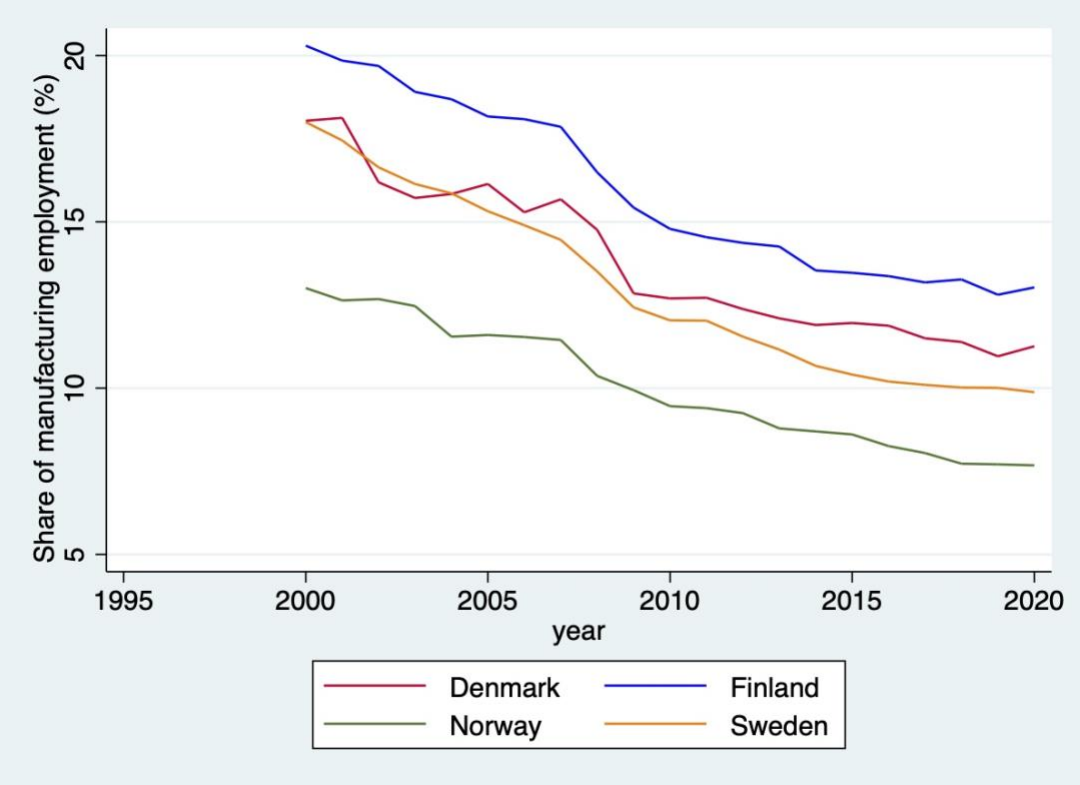
Notes: All the values that are reported are all differences, meaning that they all report the percentage point change.

Figure 1: Size of the manufacturing sector (% of GDP)



Notes: Manufacturing, value-added. *Source*: World Bank national accounts data: (https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=SE-NO-FI-DK-US)

Figure 2: Manufacturing share of employment (%)



Notes: Manufacturing share of employment as a proportion of total employment.

Source: International Labour Organization, ILOSTAT database.

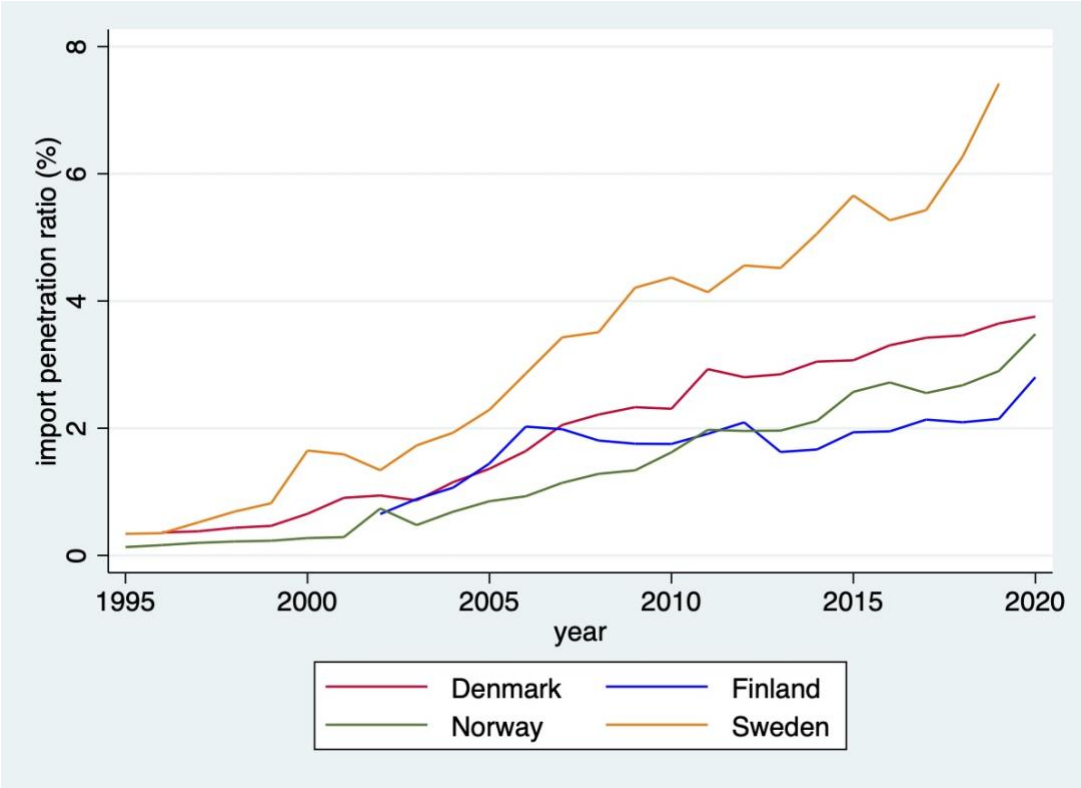
6.1.1 Import Penetration Ratio

The import penetration ratio, as presented in Chapter 5, captures China's presence in the labor market by measuring to what extent demand for goods on the domestic market is met by Chinese imports. Looking at **figures 3-7** one can see that the import penetration ratio differs between the countries. In **figure 3**, it is clear that Sweden has had the highest overall import penetration ratio. Looking at the ratio on an industrial level, however, the import penetration ratio differs both between and within the countries. Nevertheless, the Nordic countries have several common features in their ratios. One can easily see that the import penetration ratio has increased for all countries, and one can also see a clear spike in 2001 and the following years – which reflects an increasing trade exposure from China since their entry into the WTO. Interestingly, what the countries also have in common is that they all have experienced high import competition in their industries of machinery and transport equipment. More importantly, the imports are not necessarily of low-skill nature, rather the contrary. Instead, they all seem to be importing high amounts of goods from the machinery-and transport-

equipment group[3]. This means that their imports from China are not what one would initially think - low-skill manufacturing goods.

Comparing the countries with each other, we can see that Sweden has the highest import penetration ratio overall. Although Norway seems to be having the highest import penetration ratio in their industries of machinery and transport equipment, their other industries have very low values, with almost no change over the past two decades. Denmark has experienced import competition in various industries as well, but like Finland, they have much lower percentages in comparison to Sweden.

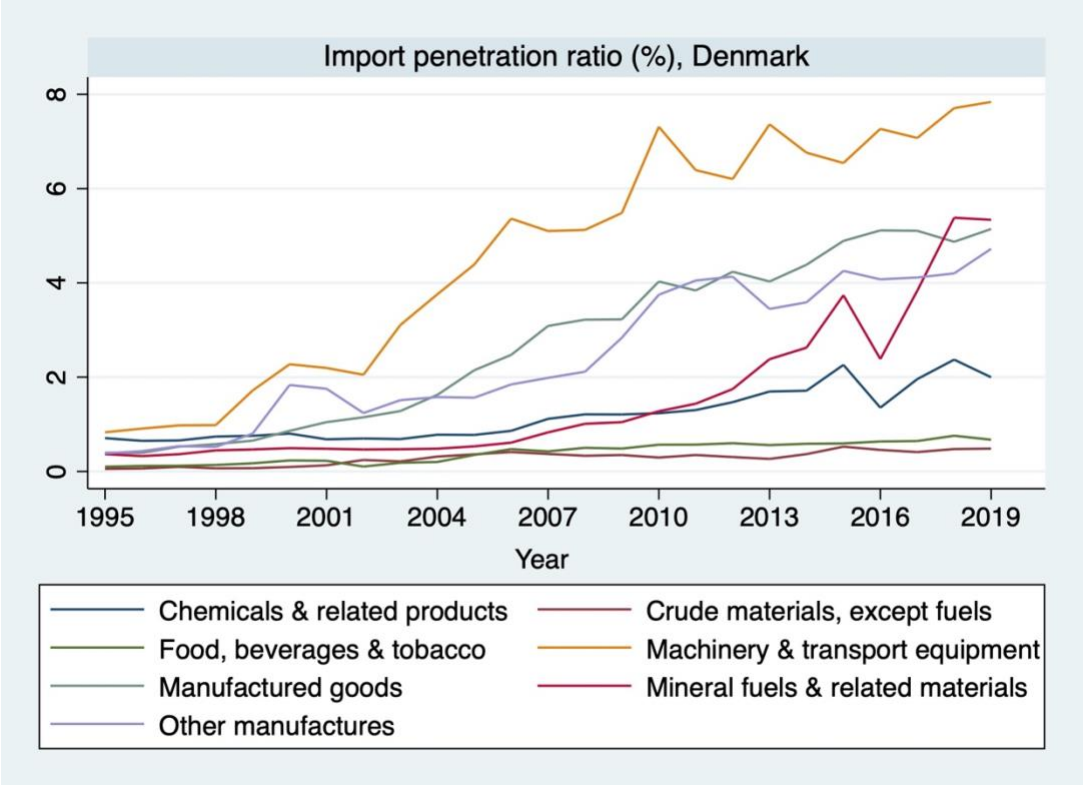
Figure 3: Import penetration ratio, over all industries



Note: The import penetration ratio reports the total over all industries, which can be interpreted as the mean over all industries. *Source:* Author's calculations, see closer description in Chapter 5.

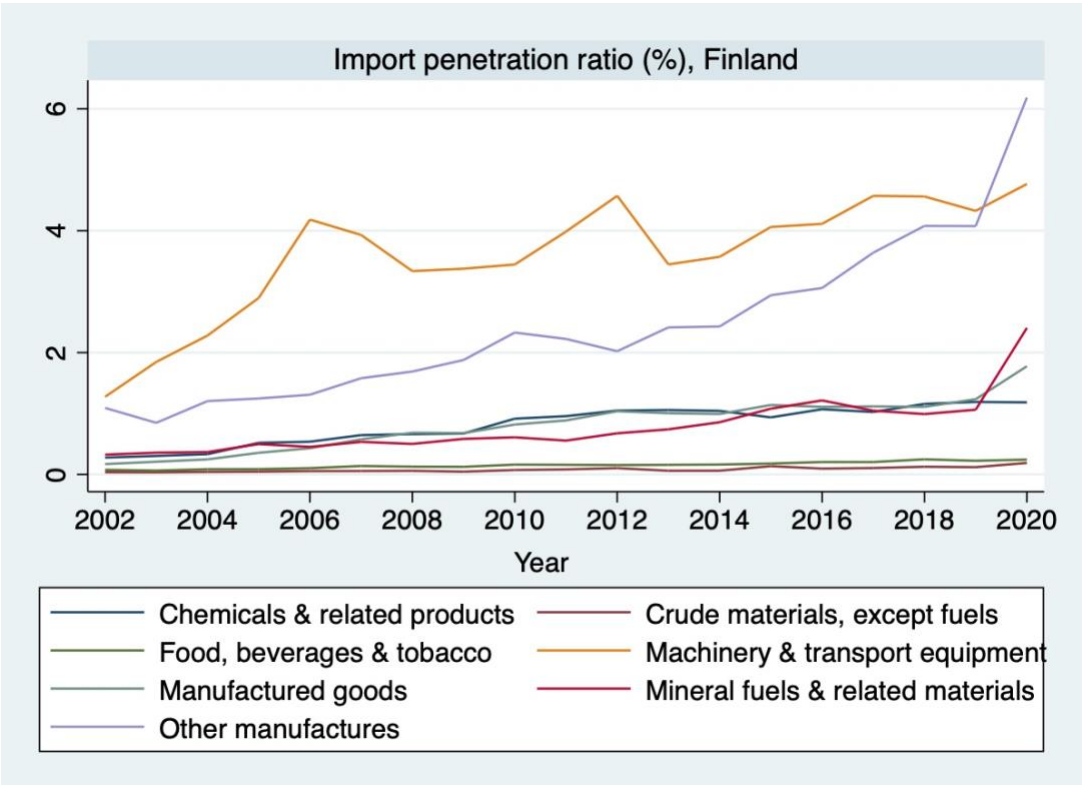
[3] More specific information of what each industry group contain and how goods are classified, see the Standard International Trade Classification (SITC). It is available here: https://www.scb.se/en/documentation/classifications-and-standards/standard-international-trade-classification-sitc/

Figure 4: Denmark's import penetration ratio



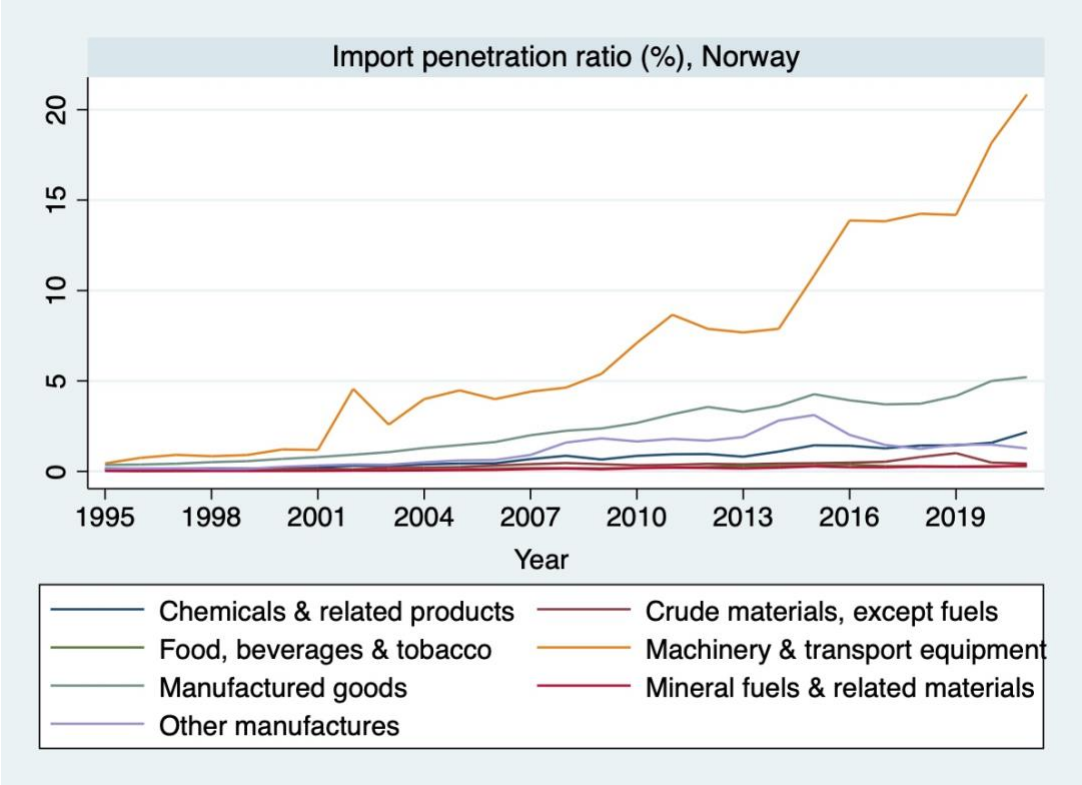
Source: Author's calculations, see closer description in Chapter 5.

Figure 5: Finland's import penetration ratio



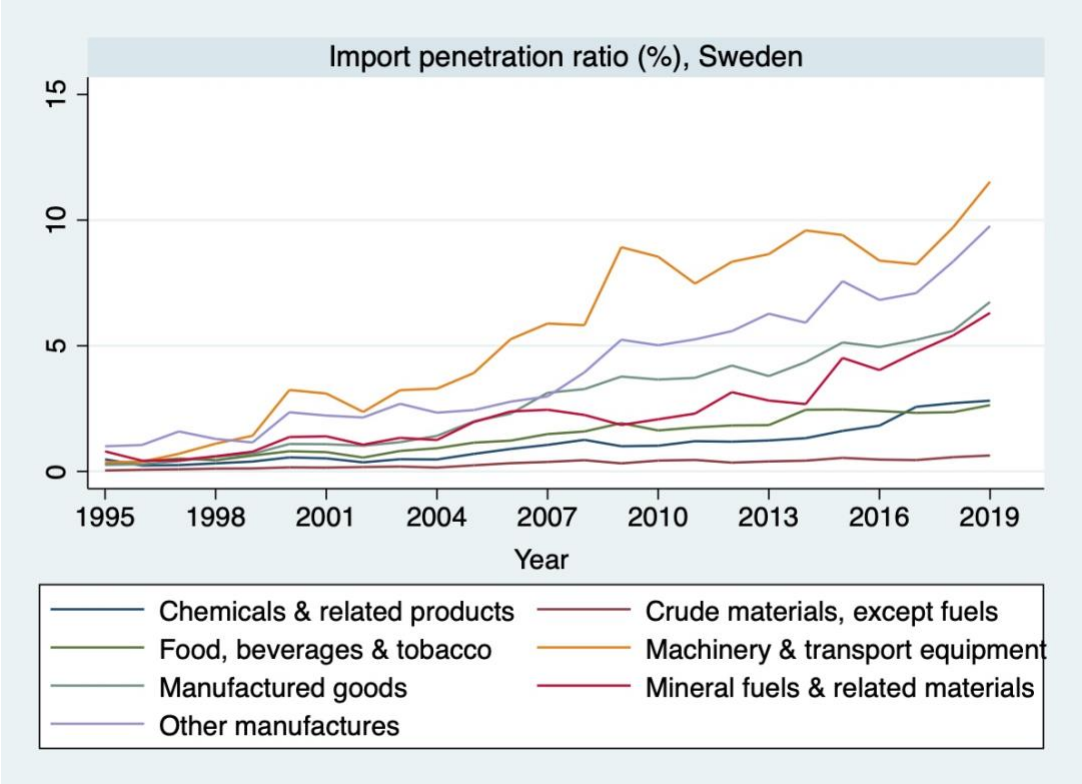
Source: Author's calculations, see closer description in Chapter 5.

Figure 6: Norway's import penetration ratio



Source: Author's calculations, see closer description in Chapter 5.

Figure 7: Sweden's import penetration ratio

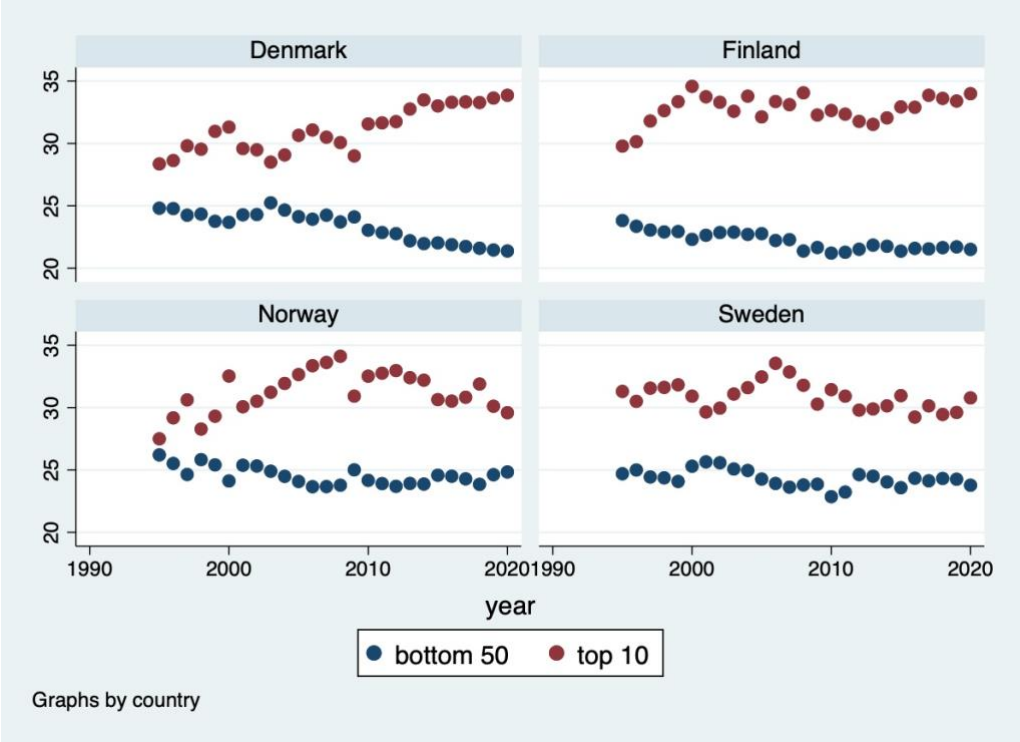


Source: Author's calculations, see closer description in Chapter 5.

6.1.2 Inequality

Figure 8 reports the evolution of income inequality by the measure of the distribution of income. While Denmark has experienced a substantial increase in the share of income accrued to the top 10 percent of the population, it has also experienced a relatively large fall in the share of income accrued to the bottom 50 percent. Finland has also experienced similar shifts in the income distribution, where the gap between the top 10 and bottom 50 has increased significantly. Interestingly, what the countries have in common is that the gap between the top 10 and bottom 50 experienced an increase in the years following 2000. Although this happened coincidently with China's entry into the WTO, one cannot draw a causal connection between these two by just looking at the income distribution structure of these countries. Moreover, I chose to not include this measure of income inequality in my regression analysis due to its ambiguity. These parameters do not explain the earnings of workers employed in specific industries and were therefore not of interest. However, one can note that the income gap increased for the four countries between the years 2000 to 2010.

Figure 8: Evolution of income distribution (%)



Notes: Bottom 50 refers to the income shares of the bottom 50 percent of the population, i.e. that part of the population whose income lies below the median. Top 10 refers to the income shares of the top 10 percent of the population who accrue the highest income. Computed with pre-tax national income.
Source: World Inequality Database

6.2 Results

To examine the effect of increased import competition from China on employment within the manufacturing sector for the four included Nordic countries, I perform the 2SLS estimation first on the whole period (1995-2020), then for two ten year-periods. (2000-2010 and 2010-2020). **Table 5** presents the regression results over the whole time period, 1995-2020. Interestingly, the results suggest a positive relationship between the change in the import penetration ratio and the change in manufacturing employment. The import penetration ratio is significant at the 5 percent level for regressions 2 and 3, and weakly significant at the 10 percent level for regressions 4 and 5. In column 2, no control variables are included but the regression does contain time dummies. Here, the change in Chinese imports per worker is weakly significant at the 10 percent level. Note that although the R^2 increases slightly as each control gets added, implying a loss of precision, the robust estimates remain significant. This robustness check strengthens the validity of our estimated results in that it likely is not suffering from multicollinearity.

Moreover, the results in column two imply that the effect of one percentage point increase in the change of Chinese imports per worker and the import penetration ratio is associated with an increase of 0.301 percentage points and 0.0625 percentage points respectively. In column 3-5, the positive effect gets smaller and smaller. The control variables do not have any significant effect on the dependent variable.

Table 5: Imports from China and change in manufacturing employment, 1995-2020: 2SLS estimates

Dependent variable: annual change in manufacturing emp/working-age pop. (% pts)

	(1)	(2)	(3)	(4)	(5)
Δ Chinese imports per worker	-0.319	0.301*	0.254	0.249	0.230
	(0.288)	(0.168)	(0.166)	(0.165)	(0.157)
Δ Import penetration ratio	-0.0712	0.0625**	0.0506**	0.0475*	0.0425*
	(0.0756)	(0.0247)	(0.0252)	(0.0244)	(0.0238)
Δ Advanced educated labor force			0.0316	0.0121	0.0154
			(0.0473)	(0.0525)	(0.0538)
Δ Intermediate educated labor force				0.0281	0.0748
				(0.0381)	(0.0826)
Δ Employment among women					-0.0370
					(0.0488)
Constant	0.0907	-0.300***	-0.260***	-0.243***	-0.226***
	(0.189)	(0.0799)	(0.0843)	(0.0844)	(0.0838)
Time effect	No	Yes	Yes	Yes	Yes
Observations	78	78	78	78	78
R-squared		0.134	0.151	0.158	0.166

Notes: Regressions 2-5 include time dummies for the period of 1995-2029. Regression 5 includes all control variables. Robust standard errors in parentheses.
***Significant at the 1 percent level
**Significant at the 5 percent level
*Significant at the 10 percent level

However, **table 6** reports contrasting results. When doing regression analysis over the period 2000-2010, the 2SLS estimates show a negative relationship between the import penetration ratio and the change in manufacturing employment in all regression except for the first, which do not include any time dummies. The estimates are all weakly significant at the 10 percent level, where the negative varies between the regressions. They are likely not suffering from multicollinearity, since the significance remain even when more controls are added. In column two, an increase of a percentage point in the import penetration ratio is associated with a fall in manufacturing employment by 0.165 percentage points. The biggest effect is when the control variables for education are included, in column 4. Here, a percentage point increase in the import penetration ratio leads to a fall in manufacturing employment by 0.232 percentage points. These results suggest that rising trade exposure from China, i.e., increased import competition from China, has a negative effect on manufacturing employment in the Nordic countries. However, only over the time span of 2000-2010. Additionally, a result that

contradicts the effect of the import penetration ratio, is the change in Chinese imports per worker. In column 2, the parameter is significant at a 5 percent level and has a relatively high coefficient. The estimate suggests that a percentage point increase in the change of Chinese imports per worker is associated with an increase of 0.523 percentage points in the annual change in manufacturing employment. However, the variable is not significant when control variables are added to the regression.

Table 6: Imports from China and change in manufacturing employment, 2000-2010: 2SLS estimates

Dependent variable: annual change in manufacturing emp/working-age pop. (% pts)

	(1)	(2)	(3)	(4)	(5)
Δ Chinese imports per worker	0.223	0.523**	0.172	-0.0152	0.158
	(0.350)	(0.256)	(0.361)	(0.514)	(0.368)
Δ Import penetration ratio	-0.0729	-0.165*	-0.169*	-0.232*	-0.179*
	(0.0709)	(0.0853)	(0.0868)	(0.132)	(0.0930)
Δ Advanced educated labor force			0.0360	-0.0351	-0.0384
			(0.0830)	(0.122)	(0.108)
Δ Intermediate educated labor force				0.0926	0.0783
				(0.0692)	(0.134)
Δ Employment among women					-0.000684
					(0.0753)
Constant	0.0529	-0.159	0.0771	0.244	0.114
	(0.114)	(0.109)	(0.121)	(0.248)	(0.138)
Time effect	No	Yes	Yes	Yes	Yes
Observations	38	38	38	38	38
R-squared		0.074			

Notes: Regressions 2-5 include time dummies for the period of 2000-2010. Regression 5 includes all control variables. Robust standard errors in parentheses.
***Significant at the 1 percent level
**Significant at the 5 percent level
*Significant at the 10 percent level

Table 7 reports the estimates of the 2SLS regressions run over the time period 2010-2020. As can be viewed, no endogenous variable is significant in any regression. In fact, all variables, except for the change in the intermediate educated labor force, are insignificant in all five regressions. The change in the intermediate educated labor force is interestingly positively associated with the annual change in manufacturing employment, although only weakly

significant at the 10 percent level. A percentage point change in the variable is associated with an increase of 0.142 percentage points in the dependent variable. There is a risk that this reflects a reverse causal relationship.

Table 7: Imports from China and change in manufacturing employment, 2010-2020: 2SLS estimates

Dependent variable: annual change in manufacturing emp/working-age pop. (% pts)

	(1)	(2)	(3)	(4)	(5)
Δ Chinese imports per worker	0.158	0.0635	0.0405	0.0440	0.0297
	(0.138)	(0.105)	(0.0835)	(0.0955)	(0.0946)
Δ Import penetration ratio	0.0292	0.0546	0.0186	-0.0253	0.0154
	(0.0582)	(0.0537)	(0.0699)	(0.0587)	(0.0543)
Δ Advanced educated labor force			0.0608	0.114	0.0373
			(0.117)	(0.105)	(0.0949)
Δ Intermediate educated labor force				0.0362	0.142*
				(0.0486)	(0.0858)
Δ Employment among women					-0.117
					(0.0730)
Constant	-0.150	-0.230	-0.102	0.0641	-0.101
	(0.185)	(0.169)	(0.238)	(0.209)	(0.194)
Time effect	No	Yes	Yes	Yes	Yes
Observations	39	39	39	39	39
R-squared			0.103		0.212

Notes: Regressions 2-5 include time dummies for the period of 2010-2020. Regression 5 includes all control variables. Robust standard errors in parentheses.
***Significant at the 1 percent level
**Significant at the 5 percent level
*Significant at the 10 percent level

6.3 Discussion

There are a couple of changes in the Nordic countries we can state with certainty. One is that the size of the manufacturing sector, as measured by the percentage of GDP, has substantially fallen. Additionally, the manufacturing share of employment as a proportion of total employment has experienced a significant fall as well. Another shift is that we have seen an increase in inequality, especially between the years 2000-2010. Coincidentally, there has been a substantial rise in Chinese import competition, where several domestic industries have seen

a rise in their import penetration ratio. Meaning that China's imports are getting a more central role in domestic demand in Nordic countries.

However, although these experiences have been shared between Denmark, Finland, Norway, and Sweden, we cannot draw a causal inference between rising import competition from China and the contraction of the manufacturing sector and its employment. We can definitely not draw any conclusions about the impact Chinese imports have had on inequality, no matter how much a coincidence it may be that it started increasing after China entered the WTO. The insignificant results found of the effect of increased trade exposure from China on Nordic manufacturing employment growth contradicts findings from other studies (e.g. Autor *et al.*, 2013: Feenstra *et al*., 2017). However, the focus of these studies has been on the United States labor markets and its manufacturing sector. In fact, my results over 2010-2020 seem to be in line with Dauth *et al.* (2013) and Jiang *et al*. (2022) results, who have investigated European economies' manufacturing employment growth. Dauth *et al*. (2013), who examined Germany, found that rising import competition caused substantial job losses, in import-competing industries in particular – but found that China's role in this to be insignificant. Jiang *et al*. (2022) also found the effect of increasing import exposure from China on Swedish labor markets (both manufacturing, and non-manufacturing employment growth and income distribution) to be statistically insignificant. What might be the possible explanation for these findings? Can it be explained by the Nordic institutional setting? Meaning that the high rate of union participation and collective agreement have helped deter the negative effect of trade shocks on employment? That I cannot with certainty answer to, but maybe. Although, this feature of Nordic labor markets would explain why Rodrik (2017) finds that European populism, that have been reinforced by increased globalization, has not been insistent on limiting free trade.

I, unexpectedly, when testing for the whole sample (1995-2020) I find a small but significant (albeit weak) positive effect of the change in the import penetration ratio – implying that increased imports from China have a positive effect on manufacturing employment growth in the Nordic countries. If this reflects that Chinese imports are complements to the manufactures produced in Nordic countries is unclear. It might also reflect the activity of processing trade. Although, when testing for the years of 2000-2020, and 2010-2020, this effect disappears.

Nevertheless, one cannot forget that the manufacturing sector in all four Nordic countries has in fact contracted, despite the presence of social protection. Dauth *et al*. (2013) did, in actuality, find that increased import competition caused job losses in import-competing industries – even though, Chinese imports were not significant contributors to this. The same may apply to Nordic countries, i.e., that increased import competition has caused the contraction in their manufacturing industries, but that the driving force has not necessarily been Chinese imports. This statement is reinforced by Paulie's (2021) findings, who found negative effects caused by increases in import competition when not only testing for Chinese imports. Another explanation for the fall in the manufacturing share of employment might be skill-biased technological change. For example, routine-intensive tasks are easily offshored to other countries or replaced by technology, which contributes to the decline of manufacturing employment (Jiang *et al*., 2022). Having said that, this study does not test for skill-biased technological change.

Interestingly, I find weakly significant evidence of the import penetration ratio, measuring the change in China's import competition, having a negative effect on the growth of manufacturing employment between the years 2000-2010. This contradicts the results found by Jiang *et al.* (2022), who found insignificant results for the period of 1996 to 2007 for Sweden. Moreover, income inequality (see **figure 7**) saw a rise during the same period, which eventually almost went back to the initial value, in Norway and Sweden which has the largest import penetration ratio. Although I cannot draw a causal relationship between these two events, one can argue that they are following the pattern of the Heckscher-Ohlin framework – the Stolper-Samuelson theorem in particular. The effects of China's import competition become completely insignificant when testing for the following years, up till 2020, and as mentioned, income inequality in Norway and Sweden decreases these years as well. Are these signs of the economies adjusting to the trade shock? Maybe. As mentioned, previous research (e.g., Amiti & Khandelwal, 2009) has found that increasing import competition from low-income countries can induce firms in high-income countries to upgrade their product quality and invest more in technology. This might be an explanation for the lack of significant results in the last decade, meaning that Nordic countries might have adjusted to the rising globalization by differentiating their goods from imported Chinese goods. This would also explain the fall in inequality for Norway and Sweden, which is also in line with the H-O framework in that their imported labor-intensive goods from China no longer compete with domestic labor-intensive goods. Although, this does not explain the continuing fall in their

manufacturing sector and manufacturing share of employment. Even if we do assume that the economies have adjusted, the future of international trade for high-income countries is uncertain. Although, many argue that China's comparative advantage in low-cost labor is coming to an end, there is evidence that suggests that the country is shifting its exports to more advanced commodities that require higher-skilled labor. What the effect of this shift will be, only time can tell. Perhaps high-income countries will experience the adverse effects of trade to a higher extent, or perhaps the opposite.

7 Conclusion

Globalization has increased at a rapid rate, which has had its benefits but also caused some challenges. One of the central forces behind the rise in the rate of globalization has been the rise of Southeast Asian countries, especially China. In a matter of a couple of decades, China has managed to become the leading country in terms of manufacturing output, thus earning the name "the world's factory". Its rapid growth in exports has not been frictionless. Developed countries, the U.S. in particular, have experienced a substantial fall in employment - especially in sectors most exposed to China's import competition. Like other high-income countries, Nordic countries have also experienced an increase in Chinese imports. However, the institutional setting of Nordic countries, and their labor market features, differ from many other high-income countries, such as the United States. Therefore, this study has aimed to examine the effect increased import competition from China has had on Nordic countries' labor markets.

Due to the scope of this thesis, the focus has been on the change in employment in the manufacturing sector. The empirical results indicate that the effect of increased Chinese import competition on manufacturing employment growth has not had any significant negative effect when testing for the period 1995 to 2020. On the contrary, I find a small, weakly significant effect implying a higher import penetration ratio of Chinese imports having a positive effect on the manufacturing employment growth. This suggests that China's imports may not be harmful to manufacturing employment in Nordic countries, but rather the opposite. To be able to confirm that Chinese imports are complementary to Nordic manufacturing products, or perhaps the results of processing trade activities, further investigation is needed.

When testing for 2010-2020, I do not find any significant results. This is in line with previous research that has examined China's rising imports in Germany and Sweden, which also did not find China's increased trade exposure to have any significant effect on manufacturing employment. However, I find a statistically weak significant negative effect when testing for the years between 2000-2010, which coincidences with China's entry into the WTO.

Although these results might suggest that the Nordic economies may have adjusted to China's trade shock, the manufacturing sector has experienced a substantial contraction in both size and employment. On this basis, I cannot conclude that China's import competition has had a strong significant effect on Nordic countries' labor markets.

7.1 Future Research

This research focuses on the shifts and changes the Nordic manufacturing sectors have experienced due to rising international trade, using China's entrance to the WTO as a trade shock. This means that several other factors have been unfairly dismissed and disregarded. Based on this study's results, one cannot draw any conclusions about whether there has been any race to the bottom in the Nordic setting. This is particularly interesting to examine since the institutional setting in the Nordic countries differs from many other high-income countries. For instance, their labor markets are highly unionized and more regulated – maybe making it harder for the race to the bottom to take place. This requires more detailed research on how labor standards have changed in these countries. This matter I leave for future research.

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