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The Effect of the Covid-19 Shock on Trade

Exploring the Role of Global Value Chains

University College Groningen

Bachelor Thesis

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Abstract

The striking and unprecedented economic shock caused by the Covid-19 pandemic offers a rare opportunity to further contemporary findings about trade, global value chains, and countries' shock vulnerability. This paper investigates the mechanisms through which the Covid-19 shock effects trade, and makes predictions about the long-run recovery.

This paper applies fundamental trade theory, shock theory, and macroeconomic perspectives to illuminate the fragile relationships that make up our global trade apparatus. The literature review concluded that trade and global value chains act as channels to spread shocks on a global scale. Macroeconomic principles, and their interconnected nature to trade, help establish an overview of the relationship between the different variables before delving into the specific case studies of Germany and Bangladesh.

The Covid-19 shock specifically impacts labor and capital investment in both countries, which significantly affects output and trade in the short-run. However, differences in the composition of trade as well as the position in the global value chain, moderate this effect in the long-run. Furthermore, the size of the government can bolster the negative effect on society as well as the economy, while ensuring a faster recovery in the long-run.

The analysis finds that countries in the beginning of the global value chain have little ability to recover from shocks—Bangladesh in this instance. Through their dependency on trade, they are heavily reliant on foreign demand and supply of goods. Thus, this paper concludes that in order for trade to return to its pre-crisis growth path in the long-run, developed countries located at the end of global value chains need to increase output to stimulate global trade.

Table of Contents

1. Introduction	3
2. Why do countries trade?	4
2.1 Adam Smith - Specialization	4
2.2 David Ricardo - Comparative Advantage	4
2.3 Heckscher-Ohlin model	5
2.4 Krugman and Helpman - Concentration & the home market effect	6
2.5 Sub-Conclusion	6
3. Recent developments in trade	8
3.1 Globalization	8
3.2 Fragmentation & Specialization	10
3.3 Offshoring	11
3.4 Intermediate goods	12
3.5 Global value chain	14
3.6 Sub-Conclusion	14
4. Macroeconomic Shocks	16
4.1 Definition	16
4.2 Supply- and Demand-side shocks	16
4.3 Long-run economic impact of shocks	18
4.4 Responses to shocks	19
4.6 Trade and Shock Vulnerability	20
4.5 The Covid-19 pandemic	22
5. The effect of Covid-19 on trade	24
5.1 Short-run effect of Covid-19 on trade	24
5.2 Long-run effect of Covid-19 on trade	24
5.2.1 The conceptual framework	24
5.2.2 Covid-19 and GVCs	27
6. Findings & Implications	33
7. Conclusion	35
Bibliography	36

1. Introduction

Trade has been present in human history for a long time. Long-distance trade evolved around 3000 BC and was, back then, mostly limited to luxurious goods (Blake & Knapp, 2008, p.202). Nowadays, trade is vital for our global economy and the living standard we experience in developed societies. We do not only trade luxury goods; most items found in the supermarket or convenience store have been subject to some degree of import or trade between regions, countries, or continents.

The current shock of the global pandemic Covid-19 is putting this network to test. Past shocks such as the global financial crisis 2008 significantly disrupted the global economy and international trade and caused stagnating growth or even recession. However, those former shocks did not affect both demand and supply of the global economy in such a symmetric manner.

This paper attempts to answer the question of how the current Covid-19 will affect global trade in the long-run using a literature-based approach and macro-economic theory. It seeks to analyze and understand the mechanism behind the ways global trade is currently organized and the role this system plays in moderating the impact of the shock on an economy. Two examples will be used for this analysis - Germany and Bangladesh. Since the Covid-19 shock presents an ongoing and new phenomenon, an empirical investigation is not possible at this point.

Fundamental papers explaining why countries trade with each other will be analyzed in section 2. In section 3, current phenomena following globalization such as the global value chain will be investigated. This throughout analysis will provide us with more insides about fundamental principles and organization of trade. Afterwards in section 4, the economic concept of shocks will be introduced and characteristics of demand and supply shocks analyzed. This will help to classify the current Covid-19 pandemic and consequently make more accurate predictions about its impacts.

In section 5, the analysis part of this thesis, firstly fundamental macroeconomic indicators will be presented and their relationship to trade explained. Afterwards, using two example countries to represent different positions in the global value chain, the effect of Covid-19 will be examined. These relationships will be summarized in a flow diagram. Lastly, in section 7 the findings will be explained and the paper concluded.

2. Why do countries trade?

Trade is a long persisting and much-studied concept in social sciences and goes back a long way. It has taken place in much of human history, although its exact origin is difficult to trace back. There is evidence that the first long-distance trade routes evolved in the early bronze age 3000 BC and were for a long time limited to luxurious goods such as tin or spices (Blake & Knapp, 2008, p.202). But what are the drivers behind trade and how did it evolve?

2.1 Adam Smith - Specialization

To understand the mechanisms behind trade, one has to go back to the 18th century. Adam Smith, one of the most influential thinkers of his time, published his famous work, "An Inquiry into the Nature and Causes of the Wealth of Nations" in 1776. Smith points out the efficiency gain from breaking up the production chains into smaller tasks. The producers will receive a surplus from this gain which they can exchange with others or invest in labor-saving machinery (Smith, 1776). This concept is later referred to as the vent-for-surplus theory. Trade with another agent can then be used to vent off this surplus. This early division of labor increased trade and wealth of agents. Moreover, it marks the beginning of specialization, as the compartmentalization of the production process gave rise to many smaller tasks completed by specialists.

The focus of this early theory was on labor costs only. Today, it is known as the theory of absolute advantage in which a producer can manufacture their goods at a lower cost than competitors. Other production factors or transportation costs are not considered in Smith's theory. The limitation of this exchange is marked by the size of the domestic market.

Furthermore, free markets are a necessary condition for this to function effectively. Smith believed that governments should not interfere with the workings of the market as they create artificially higher or lower prices. The government should be limited to defense, education, order, and infrastructure (Irwin, 2019). Inferring from Smith's theory, if a country has free economic conditions, then the market is more flexible and can cope better with shocks or future trends.

2.2 David Ricardo - Comparative Advantage

Around 40 years later, the famous British political economist David Ricardo published his work: "On the principles of Political Economy and Taxation" (1817). Even though not related to the main focus of Ricardo's paper, it introduces a new "theory of comparative cost", which is today known as the theory of comparative advantage. In his example, the author uses two countries, each of which produces two goods. In contrast to Smith's theory of absolute advantage, Ricardo demonstrates how

all countries or regions can gain from trade, even if they are, in absolute terms, less efficient in producing both commodities. In other words, countries should specialize in what they are less worse at, meaning the good for which its comparative costs are lowest. Through trade, both countries, even the one that is in absolute terms better at producing both goods, will gain (Ricardo, 1817). This furthermore implies that no country is too poor to be excluded from trade since specialization and the exchange of goods will always be beneficial for both parties. The absolute advantage of producing is not important.

Akin to Smith, Ricardo also sees free trade as the main condition for this mechanism (Ricardo, 1817). If a government imposes a tariff on trade, it would punish both countries—foreign and domestic. To date, Ricardo's theory of comparative advantage is the basis of many economists' belief in free trade and is often used as an argument against protectionist policies.

2.3 Heckscher-Ohlin model

100 years later two Swedish economists, Eli Heckscher and Bertil Ohlin complemented Ricardo's trade theory. They agree on the general comparative advantage theorem, however, they argue that it does not sufficiently explain why these comparative costs differ between countries (Heckscher & Ohlin, 1933). According to Ricardo, trade exists due to the differences in labor productivity alone. If neighboring countries could transmit knowledge, these differences would vanish as the labor force could acquire the same skills. This would decrease differences in comparative advantage and therefore stop trade.

The influential Heckscher-Ohlin model elaborates further on the underlying forces that drive trade. It identifies these forces to be the differences in factor endowments of the production factors of commodities. Discrepancies in comparative costs are therefore resulting from the fact that different countries have different factor-proportions that are needed to produce different goods. The factors identified by Heckscher-Ohlin are capital, land, and labor. Their prices determine the market price of the good and consequently the demand and the income for the factor owner (Heckscher & Ohlin, 1933).

This reasoning implies that if a country, for instance, has a relative abundance in labor, it should specialize in producing labor-intensive goods. Consequently, a country will export the commodity for which they have relative factor abundance and import the ones they lack. Scholars widely agree on this theory.

Contrary to the classical economics viewpoint, Heckscher and Ohlin made no distinction between domestic (interregional), and international trade. Rather they view international trade as a special

form of interregional trade which is differentiated only by the increasing transportation costs (Heckscher & Ohlin, 1933).

Furthermore, in comparison to Ricardo's model, differences in production factors can never completely diminish as inputs such as land and capital are immobile. Comparative advantages and disparities between countries or regions will, therefore, persist and further drive (international) trade.

2.4 Krugman and Helpman - Concentration & the home market effect

Krugman and Helpman identified drivers for trade between countries, even those that have similar factor endowments. Their model is based on two fundamental concepts—increasing returns to scale and economies of scale—both of which associate cost savings to increased production scale (Helpman & Krugman, 1986). Due to these savings, it is beneficial to locate and concentrate the production of a good in one country and one firm. This reinforces the specialization of countries or regions and the trade between them. Furthermore, this concentration, under the assumption that all goods are traded between countries, would cause the world economy to produce a greater variety of commodities. Since, according to Krugman, consumers have a love for variety (Krugman, 1979), trade would increase their utility and well-being since they have a larger bundle of goods to choose from.

When deciding where to locate a factory, next to Ricardo's comparative cost theorem, according to Krugman and Helpman, the size of the domestic market is an important factor to consider. If the production is located close to the market with the largest domestic demand, transportation costs can be minimized and producer surplus maximized. Consequently, assuming two countries have equal factor endowments, each country would produce the products for which it has the largest local demand. Moreover, it will be the net exporter for this commodity. This concept is referred to as the home market effect (Helpman & Krugman, 1986).

If different factor endowments conflict the home market effect, meaning that a country might have the largest demand but not the best factor endowments for production, cost-savings from reduced transportation costs need to be weighed against the additional costs of the production factors.

2.5 Sub-Conclusion

Through the work of the previously mentioned scholars, a basic understanding of the evolution and precepts of trade are presented. This analysis outlined how specialization of workers as well as the spatial concentration of production lead to efficiency gains. Since countries have different factor endowments, reallocation of production can lead to cost-savings. Due to the theory of comparative costs, no country is too poor to be left out. In order to facilitate this, produced goods are being traded

with other regions or countries. However, these cost-savings in production need to be weighed against the transportation costs of the final good to its end-consumer. There seems to be a trade-off between this home market effect and cost-savings from factor abundance. Lastly, scholars agree that production and trade is most efficient in a free market with no government involvement such as trade barriers.

It is important to understand the forces that drive trade. Since these gains from trading will always exist, it will always be beneficial for countries or regions to engage in trade.

3. Recent developments in trade

Trade has seen rapid transformation in the last century. The following section will delve into these advances and characterize the different ways trade is currently organized.

3.1 Globalization

Efficiency gain, as well as cost-savings, are the main drivers behind the rise and continuous expansion of trade. On that note, another key factor that reinforces this development is globalization and, hence, needs close examination. The emergence of globalization is often described in terms of two waves—called unbundlings (Baldwin, 2006). These changes radically transformed production processes towards more economic interaction and integration of regions and countries. As the term unbundling infers, companies are breaking up their production chain to profit from the division of labor and factor abundances of different regions. The key characteristics of both globalization waves are increased investment, migrations, capital flow, and hence trade (Baldwin, 2006).

The first unbundling occurred in the late 19th century; it focused on the country and firm-level. Driven by the improvement in technology and the resulting reduction in trade costs¹, companies were now able to bridge distances, locate production facilities more effectively, and separate different production stages (Blinder, 2006). Even though labor-intensive production facilities were relocated into labor abundant regions, the production stages themselves remained clustered since communication costs were high and work was easier to coordinate. As a result of this limitation, the production mostly stayed within the borders of one country. Furthermore, during this period, migration increased and industrial workers suddenly had to compete with foreign workers. This first wave lasted until the First World War (Baldwin, 2006).

The second unbundling materialized at the end of the 20th century and took place on a global scale. This wave was primarily driven by cost-savings in communication but also aspects such as the further reduction in transportation costs. It became easier for companies to move production facilities to cost-saving environments with lower wages, as these savings now outweighed the additional communication and transportation costs. As further unbundling of production stages became possible; more remote locations with large relative labor abundance such as China emerged as prominent destinations. By exploiting this comparative advantage, firms were able to decrease their factor prices and consequently offer products at a lower price than locally producing competitors. As a result, long-distance trade increased, and more countries became involved in the global trading

¹ Trade costs include transportation costs, transaction costs, communication costs as well as tariffs or other trade barriers.

system (Baldwin, 2006; Yi, 2003). This trend can be noted in Figure 1, which shows the world merchandise trade in current US\$ from 1960 up to today. Trade slowly started to pick up around 1990 but exponentially increased at the turn of the century. During the next 8 years until the start of the global financial crisis (2008), world exports increased by 150% from 6.499 trillion US\$ to 16.265 trillion US\$.



Figure 1: Merchandise exports (1960-2018) (World Trade Organization, 2020)

This was also due to a change in the definition of what is tradable or not. Traditionally, items that could be placed in a box and shipped, mostly manufacturing goods, were considered tradeable; this definition excludes services. The second wave of globalization and the associated developments in the telecommunication infrastructure changed this distinction, because services that could be delivered electronically suddenly became tradable (Blinder, 2006). Gregory Mankiw, professor of Economics at Harvard University and former Chair of the U.S. Council of Economic Advisers described this phenomenon in a Press Conference as, "the latest manifestation of the gains from trade that economists have talked about at least since Adam Smith. ... More things are tradable than were tradable in the past, and that's a good thing" (Mankiw, 2004; Pauwelyn, Guzman, & Hillman, 2016).

Another aspect reinforcing the second wave of globalization and the increase of trade is the reduction of tariff barriers (Yi, 2003). This follows Smith and Ricardo's notion that production and trade are best organized in a free market. Lowering tariffs, such as taxes imposed on imports,

reduces the cost of foreign goods in absolute terms, and the cost of foreign goods compared to domestic ones, which increases competition. As a result of this wave, international trade has become more profitable and attractive. Generally, it is easier for companies to move inputs or goods across borders. The following sections 3.2 to 3.5 will describe and elaborate on phenomena and changes arising from the second unbundling of globalization.

3.2 Fragmentation & Specialization

To understand how modern production is organized, the increasing fragmentation of production needs to be examined. In this process, companies break their production into smaller parts resulting in separate processes (Baldwin, 2006). This allows for further specialization of workers and, following Adam Smith's theory, productivity and wealth gains. Furthermore, it enables a firm to increase its competitiveness. This is not a new phenomenon; for instance, Bertil Ohlin noted in 1933 that "production is in many cases divided not into two stages –raw materials and finished goods- but into many".

However, globalization extended this concept and gave rise to vertical specialization which is defined as the "interconnectedness of production processes in a vertical trading chain that stretches across many countries, with each country specializing in particular stages of a good's production sequence" (Hummels, Ishii, Yi, 2001, p.1). Figure 2 shows a typical pattern of vertical specialization. It should be noted that multiple countries are involved and that the final product is not necessarily produced in the country with the largest demand (country 3), contradicting Krugman's home market effect. This is possible due to decreased trade costs and improved technological progress.

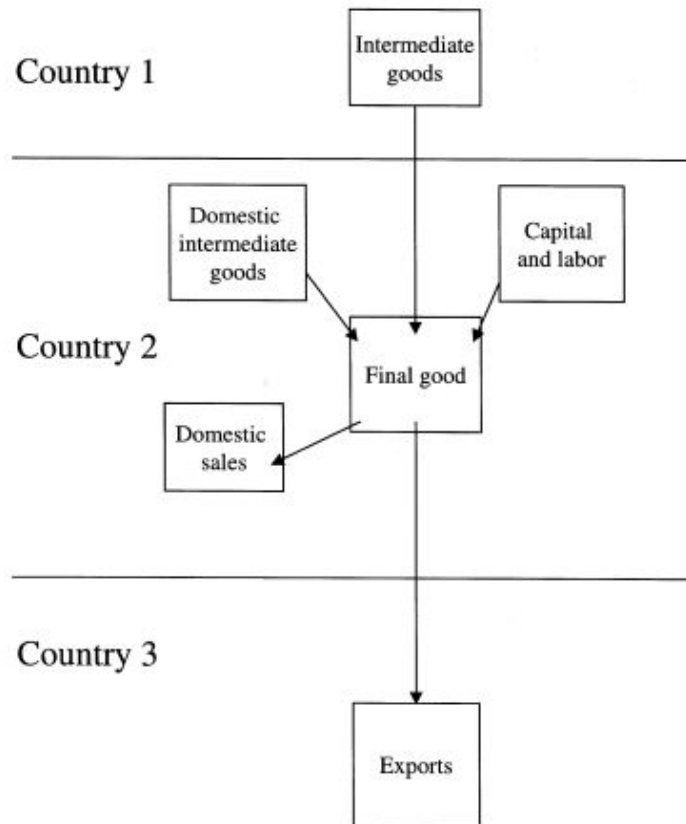


Figure 2: Vertical Specialization (Hummels, Ishii, Yi, 2001, p.26)

3.3 Offshoring

Offshoring is the process of moving part of a production process to a different country. The incentives behind this are lower wage expenses or other costs, such as corporate tax rates (Grossman & Rossi-Hansberg, 2006). Offshoring is often referred to by the more popular term outsourcing, however, the latter is more applicable when describing an activity or task that was formerly completed by the business itself and is now being performed by a different firm, but not necessarily in a different country. Therefore, following the work of Grossman and Rossi-Hansberg, this paper will use the term offshoring, defined as “the practice of basing a business or part of a business in a different country” (“Offshoring,” n.d.).

Which tasks are subject to offshoring?

With more companies exploiting the declining trade costs and the factor abundance of firms, primarily in central and southeast Asia, production costs and product prices are declining. This increases the pressure on competitors. To adjust to the low prices, firms will try to offshore as many tasks as possible (Baldwin, 2006). According to the factor proportion theory of Heckscher-Ohlin, this

would specifically target labor-intensive manufacturing processes, as the “South²” is traditionally characterized by factor abundance for labor (Findlay, 1984).

However, authors such as Shiozawa recently criticized and challenged this conjecture. Assuming that there are only two production factors, labor and material (capital), if there is a country that has better factor intensities for both, then according to Shiozawa, there would be no reason for a firm to retain a part of the process in the home country. They should offshore the whole process to a different firm in a different country (Shiozawa, 2017). However, a firm would risk losing control over its production process as it is entirely done by a different company. Strategically, the firm would, therefore, try to keep some part of the production close by and carry out the final production steps themselves.

The theory of Heckscher-Ohlin can be used as an indicator of tendencies but does not fully explain companies’ offshore decisions. Furthermore, offshoring may lead to a loss of efficiency for various reasons such as low experience of the labor force or transportation and communication costs (Shiozawa, 2017). Therefore, it is not efficient or possible for all jobs or processes to be moved to a different country. Companies are continuously learning which jobs cannot be offshored. Other forces, such as agglomeration, work against this trend, and discourage offshoring (Baldwin, 2012). At this point, economists do not have comprehensive knowledge about these developments and cannot predict which jobs or tasks might be subject to offshoring in the future (Baldwin, 2006). Economically and historically speaking, tasks for which the productivity gap did not outweigh the wage gap were offshored.

3.4 Intermediate goods

Inputs are intermediate goods if they are “made during a manufacturing process but ... are also used in the production of other goods.” (Intermediate goods, n.d.). This includes parts, components, or semi-finished goods. With increasing fragmentation and outsourcing, intermediate goods became of vast importance (Figure 2) and are heavily traded. Their trade exponentially increased following the second unbundling at the end of the 20th century. This trend can be observed in Figure 3. In 2009, trade of intermediates accounted for 56% of goods trade in OECD countries (Backer & Miroudot, 2013).

² The North-South developmental model was introduced by Ronald Findlay in 1984. It postulates the “North” to be the developed and industrialized “core” economy with high levels of technology, whereas the “South” is seen to be underdeveloped and poor, offering labor abundance. Hence, knowledge-intensive parts of the production will be completed by the North (Europe and North-America), and labor-intensive tasks by the South (South-America, Africa and Asia).

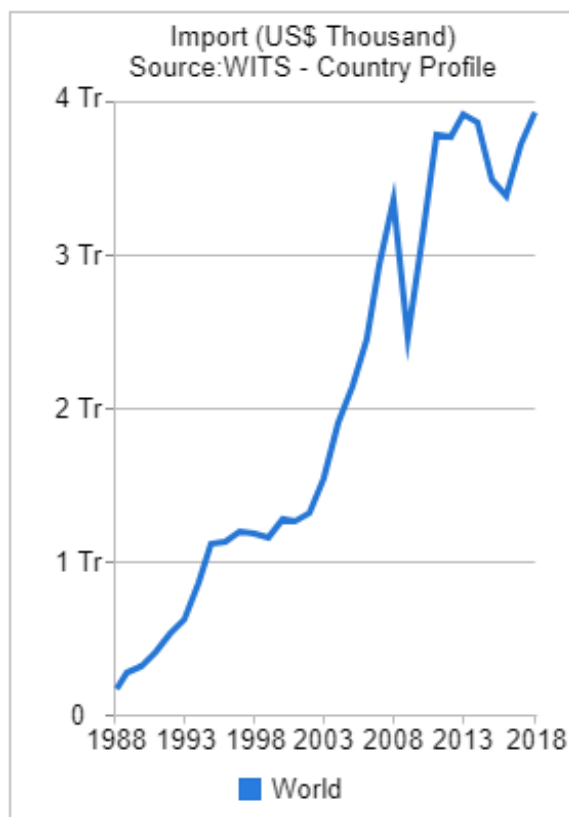


Figure 3: Import of intermediate goods (1988-2018) (WITS, 2019)

Since the trade of intermediate goods is a relatively new phenomenon, fundamental theories such as the ones from Ricardo or Heckscher-Ohlin, exclude them by assumption. There appears to be a gap in research about the effect that this special form of trade has on the global trade structure.

A paper by Deardorff (2005) analyzes the changing role of Ricardo's comparative advantage model including intermediate inputs. The author identifies a main challenge: to develop a new definition of comparative advantage. Traditionally, the comparative advantage was dependent on the unit costs of labor in a country compared to those of another country. However, these prices do not take into account the number of intermediate goods that the country requires for production or the additional costs associated with barriers to trade that occur when importing intermediate goods. High import tariffs can make a country less attractive compared to one with similar factor endowments (Deardorff, 2005). Therefore, lowering trade barriers can increase a country's attractiveness for production processes that require intermediate goods. Countries that have successfully implemented these changes and increased their upstream flow can be particularly seen in Asia (e.g. China, the Philippines, Malaysia). They are specialized in intermediate inputs and hence popular offshoring destinations (Backer & Miroudot, 2013).

3.5 Global value chain

Decreased trade costs, fragmentation of the production process, offshoring of certain production steps, specialization of countries, and the trade of intermediate goods all gave rise to the global value chain (GVC). A value chain is defined as the “full range of activities that firms and workers do to bring a product from its conception to its end use and beyond” (Gereffi and Fernandez-Stark, 2011). Therefore, it includes all aspects and processes that need to be completed to reach the final product. These activities have a wide range—from design and marketing to production and customer support (Backer & Miroudot, 2013). Traditionally, before global unbundlings, these tasks were performed in close proximity to one another, typically in the same country. However, since activities are now spread not only over multiple countries but even over multiple continents, this value chain is considered “global”. The global value chain then links all these geographically separated activities and creates patterns of trade and more interconnected economies. The concept of GVCs was introduced in the early 2000s following the second wave of globalization (Backer & Miroudot, 2013). Following the flow diagram by Hummels et.al (Figure 2), country 1’s position is at the beginning of the GVC, country 2 is in the middle, and country 3 at the end. Countries 1 and 2 are typically developing or emerging countries (“the South”) which are used as offshoring destinations for production, whereas country 3 signifies higher income countries (“the North”) which represent the main consumer of the produced goods. Even though emerging economies, particularly Asia, are often seen in the focus of the GVC due to offshoring activities, OECD countries which are positioned at the end of the chain show similar levels of engagement (Backer & Miroudot, 2013). Especially for developing countries, participation in GVCs is crucial for their development. However, as they often do not have the capacities or knowledge to produce intermediate goods domestically, they are reliant on international sourcing and the stability of the GVC (Gereffi & Fernandez-Stark, 2011). Generally, the developing world is not on the winning side of globalization and the global supply chain, as they tend to be exploited for their cheap labor (Baldwin, 2006; Gereffi & Fernandez-Stark, 2011). Hence, policymakers must understand a country’s position within this network, as it impacts multiple policy areas including trade policies, migration, competitiveness, but also a country’s risk and exposure which will be further elaborated on in section 4.6.

3.6 Sub-Conclusion

The radical reduction of trade costs initiated two global unbundlings. Production steps became specialized and countries became closer. Due to information technology, more goods became tradable and coordination became easier. As a negative symptom of these changes, developed

countries exploited the labor abundance of developing nations. These unfortunate countries had to vertically specialize in labor-intensive tasks or production steps for their economic growth. The production chain emerged to be more and more fragmented, leading to a new phenomenon: the trade of intermediate goods. Trade now cannot only be defined in terms of final goods, but intermediates are being traded between different countries and production steps, causing an exponential increase in trade volume. From this, global value chains have emerged and connected countries from all over the world through the production process of commodities. The participation in this global trade network is crucial for low-income countries as it can dictate the direction and speed of their development.

4. Macroeconomic Shocks

4.1 Definition

To understand the effect a shock has on the economy, it is crucial to first define what a shock is. Following the definition of Bernanke (1986), a shock is a primitive exogenous force that is uncorrelated and economically meaningful (pp. 52-55). Closer examination indicates a shock should be (a) A short-term event, since the resulting costs or gains are not being priced into the market; (b) Unexpected, meaning that it could not be foreseen, since otherwise the economy would have time to adjust to the coming changes; and (c) Large scale, in the sense that they are economically significant for an economy as a whole and not target one specific region. Long term trends such as ongoing demographic changes do not apply to the definition of a shock because they can be predicted and calculated in the market price. Lastly, the definition postulates that shocks would have to be exogenous, meaning that they do not come from a development within the economy but from outside (Bernanke, 1986). Even though many economists affirm this definition, there are also ambiguities (Ramey, 2016).

Generally, shocks can be either upwards and therefore beneficial for the economy, or downwards and hurt the economy. Furthermore, a shock can be symmetric, meaning it has the same effect on all industries of an economy, or asymmetric, only targeting one or a few sectors (Reed, 2020).

4.2 Supply- and Demand-side shocks

Macroeconomic shocks are typically grouped into two categories: supply-side and demand-side shocks (Reed, 2020). Using the aggregate demand-aggregate supply model, one can visualize how supply and demand shocks affect price level and output (GDP) of an economy in the short-run.

Supply shocks can affect aggregate supply through sudden shifts in the price of production factors such as the price of labor or raw materials. As production costs change, firms will adjust their prices proportionate to the change. As a response, the supply curve shifts inwards (if price increases) or outwards (if price decreases). Output and price level respond. This notion challenges the classical Keynesian model, which emphasizes the demand side of the economy and neglects the role of supply.

A classic example of a negative supply shock is the oil crisis of the 1970s when oil-exporting nations started an oil embargo against countries supporting Israel during the Yom Kippur War. When the oil supply in oil-importing countries dropped, global prices responded. In 1974, the price of oil had globally increased by about 400% to \$12 a barrel (Macalister, 2011; Painter, 2014). Following this

negative shock, the aggregate supply curve shifted inwards and output decreased (Figure 4). This shift does not only impact price and output, but also other macroeconomic indicators. In the U.S. as a result of the oil crisis, unemployment as well as the interest rate increased in the short-run (Blanchard & Gali, 2007). Furthermore, the USD/EUR exchange rate, as well as investments, decreased (Cakir Melek, 2018).

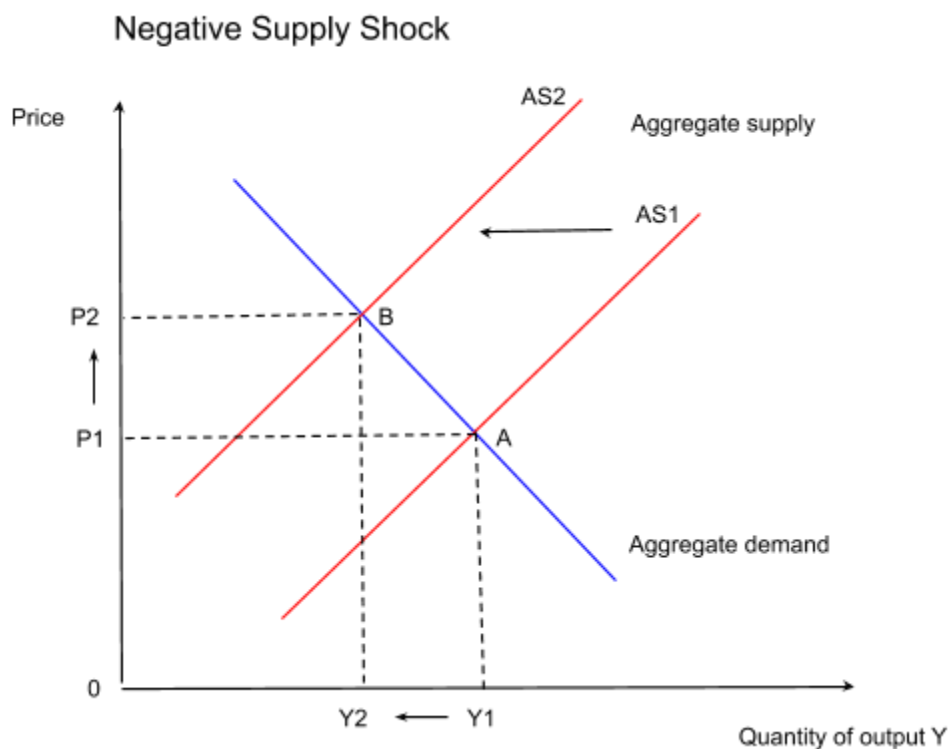


Figure 4: Impact of a negative supply-side shock on aggregate supply and demand

Demand-side shocks occur when demand, for instance, consumer or government spending behavior, radically changes. The aggregate demand curve shifts inwards, thus output and price level decrease (Figure 5).

As the nature of a shock determines the most effective government response, it is important to understand if financial crises are demand or supply-side shocks. Benguria and Taylor (2019) developed a model to empirically answer this question. During a financial crisis, the authors found that, on average, imports decline whereas exports are stable or even increase. Furthermore, the real exchange rate depreciates. This evidence indicates decreasing consumer demand during the crisis time, whereas production stays largely unaffected. Therefore, financial crises are negative demand shocks.

This also applies to the infamous global financial crisis of 2008 (Benguria & Taylor, 2019). However, following the definition of Bernanke (1986) this crisis could technically not be considered a shock

since it developed from decisions made from within the economy and is therefore not exogenous. The definition by Bernanke might be too narrow.

The demand shock of 2008 had an effect on various other macroeconomic indicators in the short-run. Investments decreased (Jermann & Quadrini, 2012) and unemployment rose in the U.S (Goodman & Mance, 2011; Jermann & Quadrini, 2012). Moreover, the interest rate decreased (Blanchard, 2014).

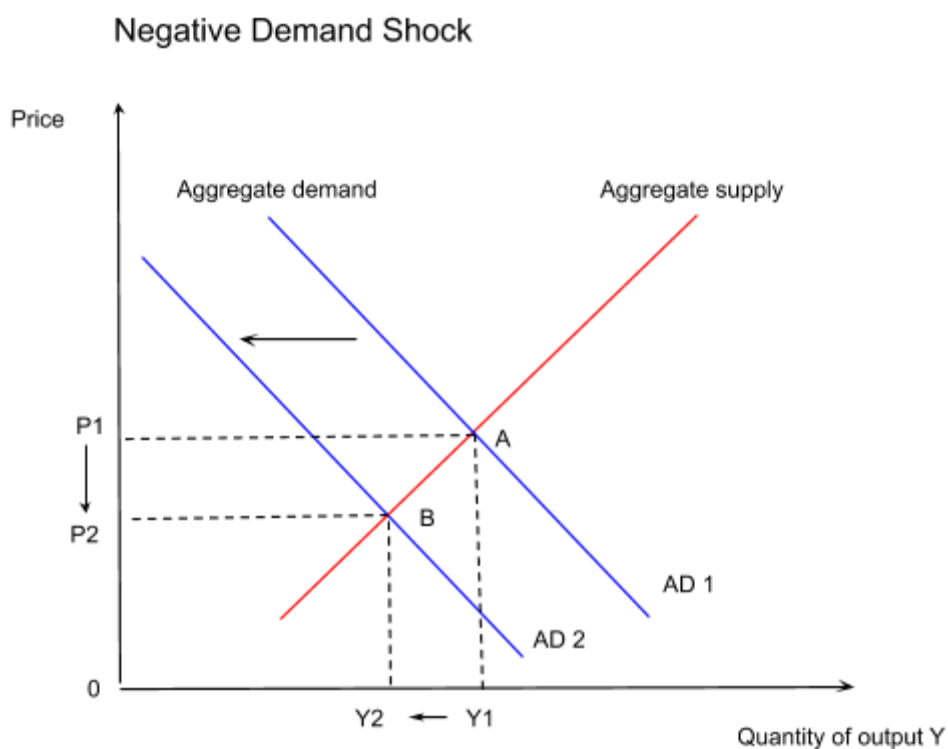


Figure 5: Impact of a negative demand-side shock on aggregate supply and demand

4.3 Long-run economic impact of shocks

Economies show different responses to shocks. An article by Carlsson-Szlezak, Reeves, and Swartz (2020) analyzed different geometrical shapes typically seen in an economy's output (GDP) after a shock. The authors use the global financial crisis 2008 as an example.

Three different shapes (V-, U- and L-shape) can be observed in the three sample countries:

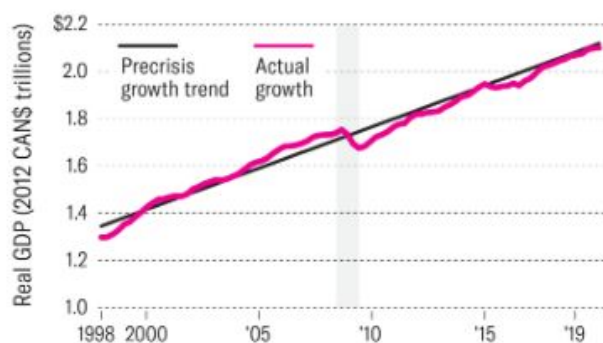
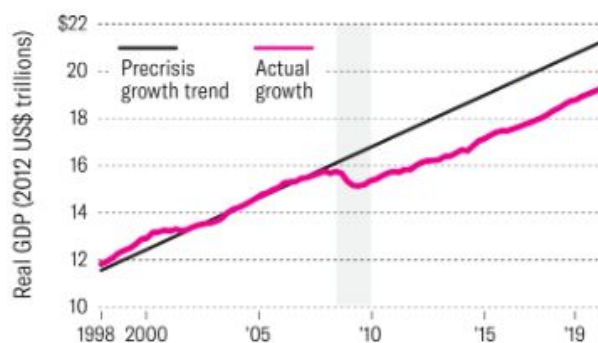
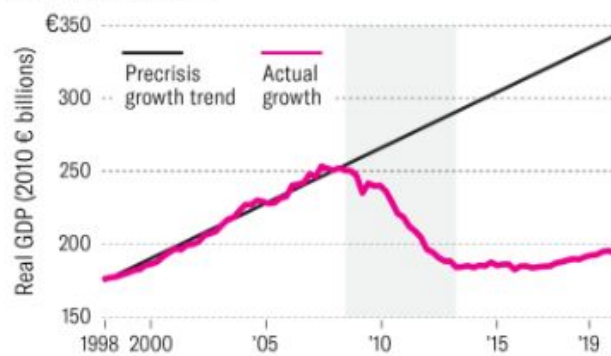
V-shaped (Canada)**U-shaped (United States)****L-shaped (Greece)**

Figure 6: Different shapes of a shock (Carlsson-Szlezak et al., 2020)

The different shapes correspond to the extent the shock damaged the economy, according to the authors, specifically capital formation. The capital stock, and hence output, need to grow for a country to be able to recover from a shock. Otherwise, it becomes structural as can be seen in the L-shape example of Greece, where output growth never recovered. For the U-shaped case, the growth rate recovered to its pre-shock level, however, growth does not return to its predicted path as can be observed in the V-shaped example. The intensity and duration of a shock, therefore, depends on how quickly an economy can continue and pick up with new capital formation (Carlsson-Szlezak et al., 2020). During the global financial crisis, it took countries on average 40 months to recover (Brakman & Marrewijk, 2019).

4.4 Responses to shocks

In the face of a shock, different economic and political mechanisms can help mitigate the negative effects.

The central bank could introduce a monetary policy such as a decrease in the nominal interest rate. This expansionist monetary policy stimulates investment of companies and individuals by making it

more attractive to borrow money. To do so, the central bank increases the money supply by buying bonds. As a result, the aggregate supply curve shifts outwards and output increases. However, negative side-effects such as inflation need to be considered.

In congruence with monetary policy imposed by a central bank, national governments can increase their spending or introduce tax cuts through what is known as fiscal policy. Tax cuts will increase the supply of savings which encourages investment and increases demand. Consequently, the aggregate demand curve shifts outwards and output will increase.

Knowing if a shock originates from the demand or supply is critical to respond appropriately and mitigate the negative effects on the economy. However, there is a lot of uncertainty about the role and effectiveness of such measures (Ramey, 2016).

4.6 Trade and Shock Vulnerability

What is the role trade plays in transmitting shocks? Generally, trade openness³ was found to have a positive effect on economic growth (Rodriguez & Rodrik, 2000). Bejan (2011) found a difference in the effect of trade openness on volatility depending on a country's level of development. A strong positive correlation between openness and volatility was found for developing countries. Interestingly, the relationship is reversed for developed countries, meaning that more openness decreases volatility. Research conducted by Di Giovanni and Levchenko (2008), once more found the correlation between openness and volatility to be positive and economically significant and on average five times higher in developing countries compared to developed ones.

Furthermore, Di Giovanni and Levchenko (2008) confirm the prior notion of this paper that there is a positive correlation between trade and specialization. Thus, higher trade openness leads to increased specialization of a country and significantly contributes to a country's aggregate volatility. This specialization can be observed in the composition of a country's export basket. If a country's exports are concentrated on a few products, the economy is most likely highly specialized. Haddad, Lim and Sabrorowski (2010) examined various export concentration measures and found strong evidence that export concentration does increase economies' vulnerability to global shocks. This is because firstly, product-specific shocks are more likely to cause large fluctuations in a country's export volume and secondly, a decrease in demand in export destinations reinforces larger swings in economic growth. Again, the relationship reverses for well-diversified economies, which were found to be developed nations; in these cases, trade openness even lowers vulnerability to shocks (Haddad et al., 2010).

³ Trade openness = (imports + exports) / GDP (%) (Bejan, 2011)

Rodrik (1998) investigated the relationship between a country's openness to trade moderated by government size. Government size is measured by the share of government expenditure relative to GDP. The paper found a strong positive and robust moderator effect. The logic behind this is that since more open economies seem to have greater exposure to shocks and external risks, government spending increases with openness in order to safeguard the economy or compensate for the effects of shocks. Rodrik notes that "Societies seem to demand (and receive) an expanded government role as the price for accepting larger doses of external risk. In other words, government spending appears to provide social insurance in economies subject to external shocks."(p.1). However, this assumes a working and benevolent government.

The way a country's trade is organized can significantly impact its vulnerability to shocks. Government size and competence helps explain the different effects trade openness has on shock vulnerability in different countries. Whereas in general higher trade openness leads to higher specialization which increases vulnerability to sector-specific shock, a well-working government can lessen the effect of shocks on the economy.

The role of GVC

Through the increasing international cooperation, domestic shocks are more likely to be transferred to foreign countries. A study conducted by Nguyen and Schaur (2010) found that by importing goods, firms transfer foreign price volatility to the domestic market. This also applies to intermediate goods. Nirei and Saito (2014) note that, even if firms are only indirectly linked, they are still affected by the spillover effects through the GVC. In contrast, research done by Escaith et al. (2011), found that the effect of shocks can also be relatively small and temporary if there is no structural impact.

Bems, Robert and Yi (2010) analyzed the global financial crisis 2008 and paid specific attention to spillover effects from changes in demand and the role of trade of intermediate goods. The authors found that 70% of the trade decline during this shock could be explained by changes in foreign demand alone. These effects were found to be strongest for durable goods and countries involved in their GVCs suffered the most. Furthermore, Brakman & van Marrewijk (2019) concluded that strong involvement in GVCs increased the impact of this shock on the economy, while at the same time delaying its recovery. Global value chains can be seen as a powerful transmission tool of foreign changes in supply or demand. The more global the chain and the more firms from different countries are linked through it, the further the shock will be passed on.

4.5 The Covid-19 pandemic

Covid-19 (coronavirus disease 2019) is an infectious disease caused by a newly discovered coronavirus⁴. It originated in the Chinese province Wuhan in December 2019. If infected, people mostly experience mild respiratory illness and recover without special treatment. However, Covid-19 can be quite lethal for individuals with underlying health conditions, or individuals older than 60 years. The virus spreads through droplet infection and is considered to be highly contagious. Covid-19 was categorized as a “Public Health Emergency of International Concern” by the WHO on January 30th and officially got recognized as a pandemic⁵ on March 11th. As of May 31st, 216 countries and territories reported cases of Covid-19. There are 5.934.936 total cases and 367.166 deaths globally, both increasing. The countries with the most officially confirmed cases are the United States of America (1.716.078), Brazil (465.166), Russia (405.843), and the UK (272.830). The Netherlands has 46.257 official cases. However, these are only the official cases, as the real number is expected to be a lot larger, especially in less developed countries with little testing capabilities (WHO, 2020).

Categorizing the Covid-19 shock

Covid-19 can be considered a shock as it is an exogenous short-term event, which could not have been foreseen. The shock is large scale as it affects all countries.

Categorizing the shock as either a demand or supply shock is more difficult as the new coronavirus presents an unprecedented phenomenon, also due to its self-inflicting nature. Never in the past has a virus infected all continents (excluding Antarctica) and countries all over the world. Currently, most countries have implemented travel bans and social distancing, as advised by the WHO, which drastically restricts the movement of goods and people between places to limit the spread (WHO, 2020). As this can not only be seen in one particular region or country but all over the world, it is not viable to identify a source or origin from which Covid-19 negatively impacts the GVC.

The Covid-19 shock did not originate from a change in spending behavior; therefore, at first glance, it cannot be classified as a demand shock. However, neither can it be seen as a classical supply shock such as the oil price shock, since the price of production factor did not increase. Still, the availability of production factors changed. Whereas some jobs, mostly services, can still be performed in “home offices”, the manufacturing sector all over the world had to close factories to

⁴ The following information is retrieved from the World Health Organization (WHO) and reflects the level of knowledge as of May 31st 2020.

⁵ “A pandemic is the worldwide spread of a new disease. An influenza pandemic occurs when a new influenza virus emerges and spreads around the world, and most people do not have immunity. Viruses that have caused past pandemics typically originated from animal influenza viruses.” (WHO, 2010)

slow the spread of the disease. This created a tremendous decrease in the supply of labor and therefore in the supply of primary, intermediate, or final goods. Hence Covid-19 can be seen as a self-inflicted shock to the supply side of the economy. In line with the above-discussed shock theory, the aggregate supply curve will shift inwards and output will decrease (Figure 7).

However, even though Covid-19 can be considered a supply shock, global demand is affected as well. Consumer consumption patterns are changing. Basic foodstuff, canned goods, toilet paper, and cleaning supplies are high in demand. However, these changes in demand are predicted to be fairly temporary. At the same time, due to loss of income, consumers might be less likely to invest in luxury or durable goods, therefore, hurting these industries. Furthermore, the connected uncertainty decreases investment, damages capital formation, and slows productivity. The aggregate demand curve will shift inwards, further reducing the economy's output (Figure 7). The effect on the price level depends on the size of the change in aggregate demand relative to the change in aggregate supply and is therefore difficult to predict at this time.

The supply and demand-side of the global market will be hit by the Covid-19 shock. The shock will hurt the economy and is therefore a downwards shock. All tasks and production steps in the chain are affected in one way or the other, which makes the shock relatively symmetric. Due to the self-inflicting nature of the shock, a direct comparison to the global financial crisis 2008 or the oil shock seems unsuitable. To correctly react to this shock, governments need to consider both the effect on aggregate supply and demand. Therefore, lessons learned about policy responses from previous supply and demand shocks might be applicable to a limited extent.

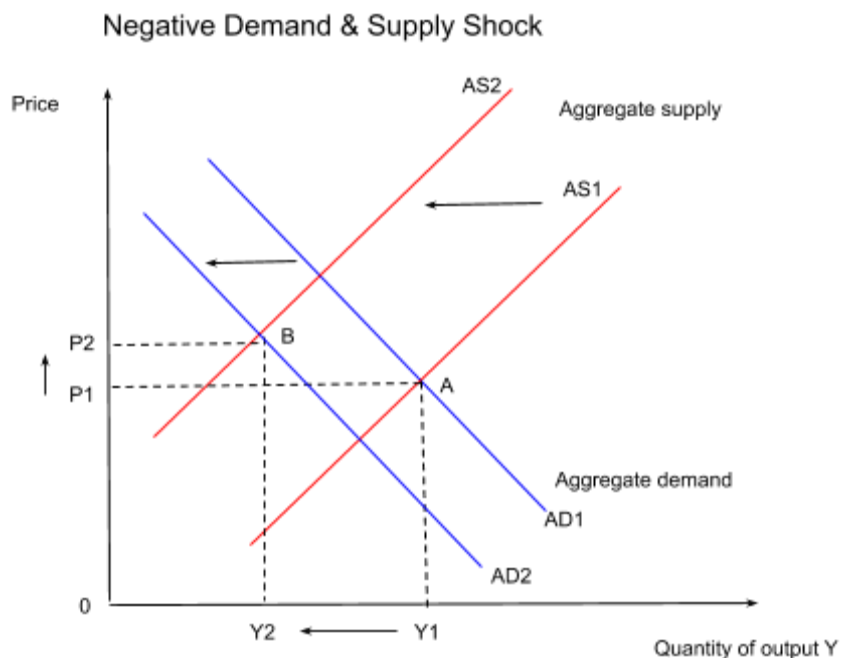


Figure 7: Negative Shock to demand and supply side - Covid-19

5. The effect of Covid-19 on trade

5.1 Short-run effect of Covid-19 on trade

Too much is unknown about the duration of the lock-down and policy response of nations to make precise predictions about the short-run effect of Covid-19 on trade. After characterizing the shock it became clear that both aggregate demand and supply and hence short-run output are strongly affected. Freund (2009) finds that trade was highly responsive to GDP during the global financial crisis, even more than in undisturbed periods. Therefore, trade will decrease. The Dutch CPB World Trade Monitor observed a decrease in the volume of world trade by 1.4% in January 2020 and 1.5% in February 2020 (Hendriks, Heuvelen & Soederhuizen, 2020). The WTO gives indeterminate predictions ranging from 13% to 32% total decrease of global trade. Trade is especially predicted to fall in industries with complex GVCs (Azevêdo, 2020).

5.2 Long-run effect of Covid-19 on trade

The short examination of the oil shock as well as the global financial crisis 2008 revealed the strong influence of demand as well as supply shocks on various macroeconomic indicators. In order to analyze the effect that these changes have on trade in the long-run, one first needs to understand why they occur in the short-run. The following section will introduce basic macroeconomic concepts to a reader with no background in economics. Furthermore, their relation to trade will be explained. These relationships are summarized in Figure 8.

5.2.1 The conceptual framework

Trade

Generally, a country's trade volume depends on its import and export volume. The number of imports primarily depends on the demand for foreign goods by domestic consumers. Consumers can include firms demanding factor inputs, or individual households. If demand increases, imports increase as well. However, imports are restricted by the supply of these foreign products. If the production capacities in foreign countries decrease, the demand for imports cannot be satisfied.

Furthermore, the number of exports are, on the one hand, dependent on the production capabilities in the domestic economy, meaning the excess amount of goods that can be exported. On the other hand, exports depend on the foreign demand for domestically produced commodities. This can be final goods, but also intermediate inputs.

Therefore, a country's trade flow is influenced by domestic supply and demand conditions, as well as foreign supply and demand.

Output

For an economy to grow in the long-run, aggregate output needs to increase. As shown by Freund (2009) growing output has a strong positive effect on trade. Larger output bolsters trade through the increased demand for foreign production inputs as well as a larger supply of exported goods.

To investigate output, this paper uses the basic framework developed by Robert Solow (1956). The aggregate production function is displayed by:

$$Y = F(K,N)$$

Long-run aggregate output (Y) is then a function of two inputs: aggregate capital stock (K), which is the sum of all capitals used in production such as equipment, machinery or buildings, and aggregate employment (N), which corresponds to the number of workers in an economy (Blanchard, Amighini & Giavazzi, 2010). Hence, raising the capital stock and employment will cause economic output to grow, a reduction would result in a decline. This underlines the findings of Carlsson-Szlezak, Reeves and Swartz (2020) who found capital formation to be a crucial aspect for an economy to recover from a shock.

Employment

According to Solow, one main aspect to growth is employment which reflects the number of people who are employed as a ratio of the number of people in the labor force of an economy. Low employment, and therefore high unemployment, is a useful economic indicator as it signals that an economy is not using its human capital efficiently. The country would not be producing to its capacity. Following the equation for aggregate production, if employment increases output follows.

Capital & Investments

In order to enhance the domestic capital stock, investments need to increase. For instance, investments made in production facilities or tools can optimize the production capacity of a firm which increases output. This in turn has a positive effect on trade. If output increases, firms consequently demand more foreign (intermediate) inputs and produce a larger excess supply. Therefore a country's imports and exports increase.

Interest rate

However, investments are influenced by an economy's interest rate. Higher interest rates make borrowing money more expensive and hence increase the opportunity costs of investments.

Investments decline as it becomes less attractive compared to saving money in a bank. Therefore, new capital formation and output growth decrease. Here the central bank can reinforce investments by lowering the interest rate with a monetary policy.

Exchange rate

Another crucial macro-economic indicator for trade is a country's real exchange rate. The real exchange rate captures the price of domestic goods relative to foreign goods. If the price of domestic goods rises compared to foreign prices, the exchange rate increases. This is called appreciation. Depreciation describes the opposite case when the exchange rate decreases. The same principle applies to the relative price of currencies and is referred to as the nominal exchange rate.

There exists a positive relationship between a country's exchange rate and imports and a negative relationship between exchange rate and exports. This is because when the exchange rate increases, it implies that domestic goods become relatively more expensive. As a result, foreign goods become cheaper and hence imports become more attractive. In case of a depreciation domestic goods become relatively cheaper, foreign demand for them will rise, and the export volume increases.

The above elaborated macroeconomic indicators and workings are summarized in a conceptual framework (Figure 8) in order to outline how these different criteria affect an economy's trade volume.

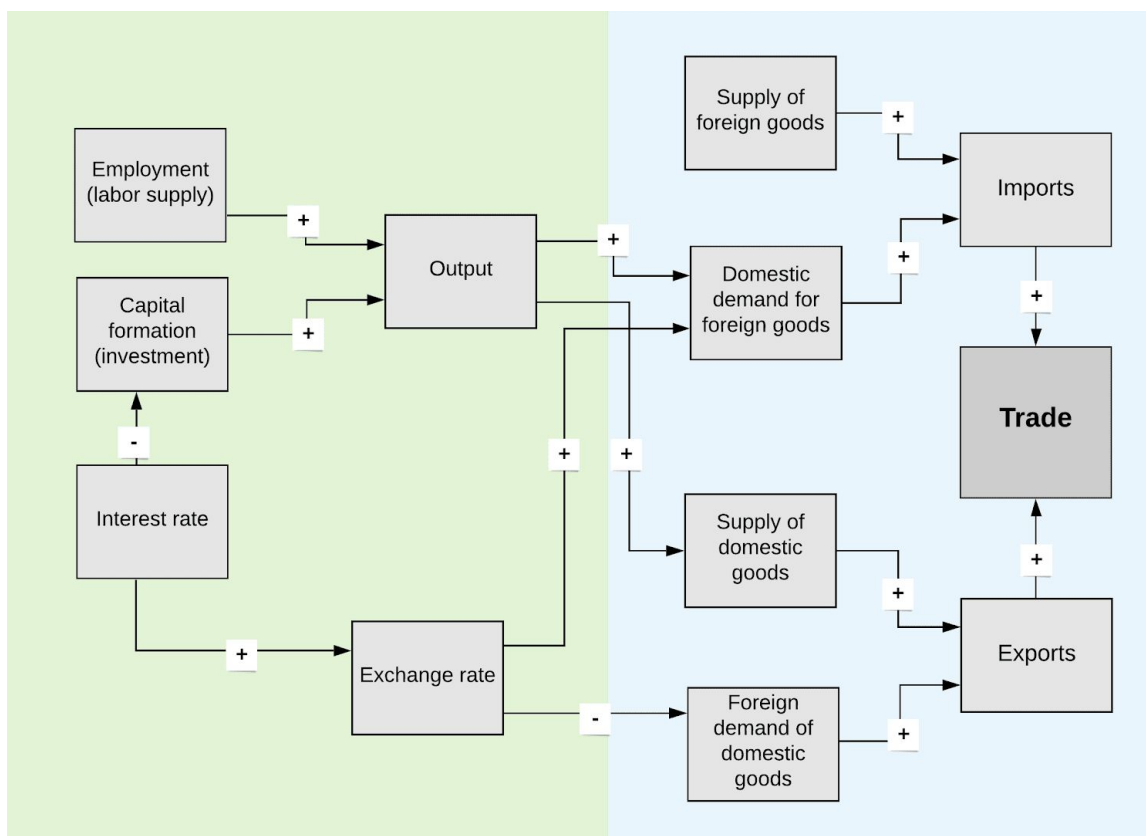


Figure 8: Effect of macroeconomic indicators on trade

5.2.2 Covid-19 and GVCs

For the next step, this paper will examine how the current Covid-19 shock has impacted the indicators in the conceptual framework. To analyze the effects, demand as well as supply implications need to be considered. In section 4.2, a short review of the oil supply shock in the 1970s as well as the demand shock of the financial crisis 2008 has already shown the impact of different types of shocks on macroeconomic indicators. However, this did not indicate the extent of the impact compared to other economies.

Section 4.6 showed that the way countries are involved in the GVC greatly impacts how their trade baskets are composed, which can result in an increase or decrease of an economy's vulnerability to shocks. Therefore, to test this theory, this section will use two countries as case studies - Germany and Bangladesh - to outline how different positions in the GVC moderate the impact of shocks on trade⁶. Firstly, the general composition of trade of both countries will be analyzed and Germany's

⁶ There are more factors that have an influence on the shock impact such as political and social conditions, which in turn affect a country's GVC position. However, for the sake of this analysis, these will not be elaborated on.

and Bangladesh's positions in the GVC determined. Afterwards, the impact of the Covid-19 shock on the above discussed macroeconomic indicator will be examined in order to make predictions about the long-run effects.

Composition of Trade

Germany is the third-largest export economy in the world with a strong positive trade balance. The country's top 5 export products (Cars, Vehicle Parts, Packaged Medicaments, Planes, Helicopters and Spacecrafts, and Humans or Animal Blood and Vaccines) together accounts for 24,3% of their exports (\$323,6B) ("Germany Trade," n.d.). Hence Germany's exports seem fairly diversified and their production involves high value-adding tasks. Furthermore, as a highly developed country, it is likely that the home market effect can be observed here and goods, specifically cars, are also domestically consumed. Therefore, Germany is a country positioned at the end of GVCs.

Bangladesh on the other hand has a negative trade balance. The country's two most exported goods (Textile and Foot - & Headwear) account for nearly 95% of the country's total exports (\$37.09B). The country furthermore imports large amounts of raw cotton and heavy pure woven cotton (\$2,87B) as production input ("Bangladesh Trade," n.d.). Their economy is very concentrated and vertically specialized in one production stage in the GVC, the manufacturing of clothes; a low value-adding activity. Therefore, Bangladesh is positioned at the beginning or the middle stage of the GVC, and is dependent on both the supply of raw materials and especially foreign demand for their products as they have low domestic demand.

Employment

As a developed country with a large government, the German government provides certain means for social and economic security in times of shocks. One of them being "Kurzarbeit", which is a short-term leave system which companies can apply for in order to avoid job cuts while the government pays around $\frac{2}{3}$ of the original wages. According to the Federal Employment Agency, following the lock-down, by April 2020 more than 10 million workers are already on Kurzarbeit, mostly from the hospitality sector, but also from key industries such as engineering and automotive manufacturing (Amaro, 2020). The previous record number was 1.4 million after the global financial crisis in 2009 ("Germany: Record number of workers on reduced hours," 2020). This puts a heavy burden on the government in the short run; however, it is designed to mitigate a faster recovery after the shock. Firstly, after the lock-down companies do not need to search for new labor, but have the same skilled people available. Therefore, production can pick up more quickly and hence the supply of exported goods such as cars can recover. At the same time, the system also reduced the effect of consumption, as consumers do not have to fear job loss and income only partially decreases

("Germany: Record number of workers on reduced hours," 2020). Consequently, the German government eases the negative implications on employment and therefore aggregate supply and demand can recover more quickly in the long-run.

In the case of Bangladesh, the government does not have the means to provide such a generous security system. Therefore, Covid-19 has a larger effect on employment. A survey conducted by the Pennsylvania State University Center for Global Workers' Rights found that millions of workers, mostly women, have already been laid off following lock-downs; without any compensation. Garment factory owners cannot afford this kind of support and Western buyers such as H&M, Zara or Gap in most cases refuse to contribute (Paton, 2020). Following this decrease in labor supply, the supply of goods and hence exports will heavily drop. Additionally, due to the loss in income poverty will increase (Noman, 2020). In the long-run, it will take longer for the country to increase its labor supply and pick up production.

Investments

Towards the end of 2019 Germany was already recording stagnation in new capital formation. The slump in investments following lockdown and increased uncertainty has the potential to push the economy into a recession. Indeed the statistics office revealed a 6.9% drop in firm investment in new capital. The government estimates the GDP to fall by 6.3% this year, the worst recession since the war ("Germany enters recession due to coronavirus," 2020). However, foreign governments and investors praised Germany for its response to the Covid-19 pandemic. If the threat of future pandemics shifts towards the center of attention for investors, Germany's trust and assurance for future risk and crisis management may be an asset ("Will German coronavirus response attract foreign investment, 2020)". Therefore, in the long-run investments and therefore capital formation will increase.

Bangladesh, as a developing country, exhibits high levels of economic growth, averaging around 8% (Kumar, 2020). Offshoring activities of Western clothing companies brought jobs, capital and investments into the country. If investments from overseas decline, GDP growth is going to decrease. It seems unlikely that domestic companies have the capabilities to head off this trend. Even though Vice President Chen announced an investment stimulus package, the reaction to the crisis has been much slower compared to other countries (Divadkar & Islam, 2020). The Asian Development Bank estimated that, as a worst case, Bangladesh's GDP short-run growth will slow down to 1.1% (Kumar, 2020). Due to the country's position in the GVC, the long-run economic recovery is dependent on the return of foreign investments.

Interest rate

In Germany, as a member of the Euro-Zone, the benchmark interest rate is set by the European Union. The pre-Covid-19 interest rate was already at a historic low of -0.5% in order to boost firm and consumer investments. During the Covid-19 crisis, the number of German banks charging negative interest rates has doubled to over 80 (Kabir, 2020). This policy was widely perceived as unconventional and unpredictable.

In Bangladesh, interest rates are set by the Bangladesh Bank. Amid the Covid-19 crisis, interest rates decreased from 6% to 5.25% to stimulate investments (“Bangladesh. Government and institution measures in response to COVID-19,” 2020). In order to boost food production, the interest rate on agricultural loans was even lowered to 4% (Harmachi, 2020).

Exchange rate

Whereas exchange rates in commodity-exporting countries such as Mexico are crashing, the Euro as a monetary union is largely unaffected compared to the U.S. dollar (Reinhold & Wen, 2020). This will reassure investors that economic stability is still an option.

Surprisingly, Bangladesh's currency, the Taka, is also fairly stable compared to the U.S. dollar (Bangladesh Bank, 2020). Additionally, a projection by the IMF showed that a depreciation of the exchange rate would only have a fairly small positive impact on exports (Gomes & Basher, 2020).

Both the Euro and the Taka are not significantly impacted by the Covid-19 shock.

Impact on foreign demand and supply

Trade in both Germany and Bangladesh are not only impacted by domestic macroeconomic changes due to the Covid-19 demand and supply shock but moreover by foreign fluctuations of supply and demand. Both countries have a large manufacturing sector and, therefore, depend on imported intermediate goods. If other countries impose restrictions on these goods, it will further decrease the possible production output of Germany and Bangladesh.

At the same time, a decline in foreign consumption and hence demand for domestically produced products will have a negative impact on both country's export flows. In Germany, industrial orders decreased by over 9% by March, which is the largest drop in 30 years (“Germany enters recession due to coronavirus,” 2020). Bangladeshi factory owners report around 20% less orders for April (Paton, 2020). How and when demand is going to recover is uncertain as it depends on the duration of the confinement measures.

The above-analyzed relationships can be added to the conceptual framework (Figure 9). The resulting framework then illustrates the impact the Covid-19 has on trade and the moderating effect of GVCs.

Generally, in Germany and Bangladesh, employment and investments are most affected by the Covid-19 shock. This will largely impact output, and, as established before, trade in both countries. However, the German government already put soothing measures in place. There is a small negative effect on investments, whereas exchange rates are not impacted in the two sample countries. Additionally, Germany and Bangladesh will be negatively impacted by fluctuations in foreign supply and demand.

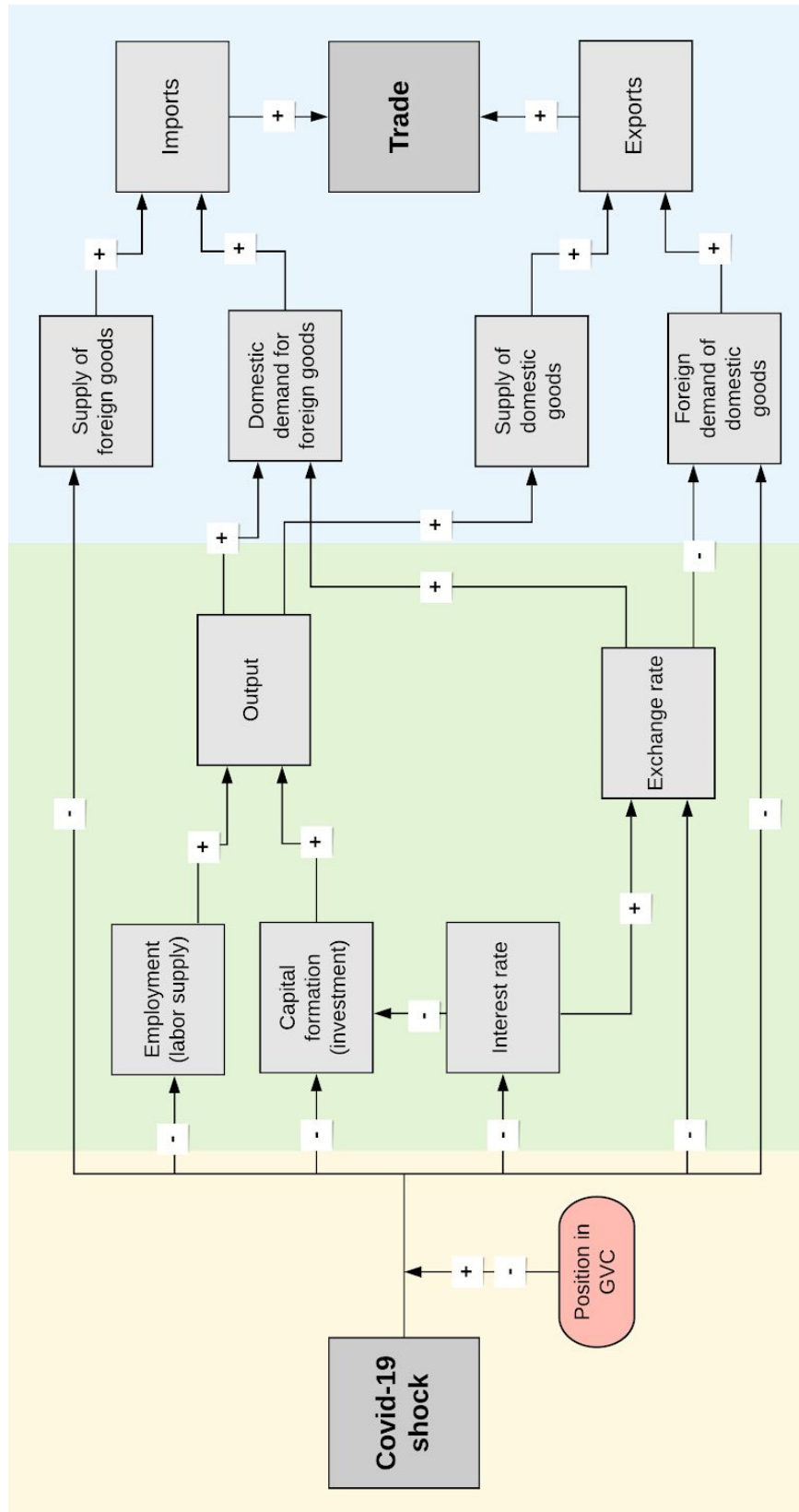


Figure 9: Effect of Covid-19 on trade

6. Findings & Implications

Trade is driven by the cost savings that arise when different countries leverage their comparative advantages in a way that is mutually beneficial. Countries further bolster their efficiency gains by vertically specializing in production steps that match their factor endowments. Furthermore, the concentration of large scale production facilities causes economies of scale advantages. Production is most efficient in a free market and with no trade barriers in place.

The reduction of transportation and communication costs during the second half of the 20th century exponentially increased trade as well as offshoring and gave rise to a new phenomenon: global value chains. This modern apparatus spreads the production process and hence connects economies all over the world. Trading and being involved in the GVC became crucial for a country's growth and development.

However, there are negative aspects to GVCs. First, shocks are now being transmitted further and faster; previously, they were oftentimes isolated in a single domestic market. Second, even though production might be most efficient when countries specialize with regards to their factor endowments, the gains are not equally distributed. Developing economies do not consume the products they produce, but rather perform low-value adding activities while getting exploited for their cheap labor by developed nations. Often being at the "beginning" or the "middle" of GVCs, they are specifically vulnerable to shocks, as they are dependent on the demand for their raw material or produced goods by more affluent nations. Hence their trade is usually concentrated on a few products; their economy is not diversified which increases growth volatility. This is the dilemma developing nations face: increasing their vulnerability due to trade openness or lose the opportunity to grow through the GVC.

Developed countries on the other hand are most of the time at the "end" of GVCs and the main consumer. Moreover, having a well-functioning government significantly decreases the risk and exposure to shocks.

Macroeconomic shocks are typically grouped into two categories - demand and supply shocks. Even though Covid-19 is a shock to the supply side of the economy, the shock also significantly impacts demand. A brief investigation of two previous shocks showed that both demand, as well as supply shocks, affect employment, investments, interest rate, exchange rate and output. These macroeconomic indicators in turn influence an economy's export and imports and therefore trade (Figure 8).

The literature review demonstrated how the trade structure of countries significantly depends on their position in the GVC (Figure 9). Therefore, to test this finding and in order to make predictions

about the long-run impact of Covid-19, the analysis part of this paper made use of two case studies, Germany and Bangladesh. These countries were chosen to illustrate the contrast between economies in different positions of the GVC.

Generally, in order for trade to return back to its pre-shock growth path, output needs to recover. For that to be the case, employment and investments need to be restored after the shock. The case analysis underlined the findings by Rodrik (1998), as the government in Germany quickly put measures in place that were intended to quickly reinstate employment and bolster economic growth. These actions function as an insurance, socially as well as economically. That way the economy is able to buffer shocks and recover more quickly in the long-run.

Bangladesh as a developing country on the other hand does not have the means and institutional stability to establish such measures. However, due to its large economic growth the country is less at risk to slip into recession. Furthermore, a higher pre-shock interest rate allows for adjustment in order to stimulate investment, which is not too viable for Germany with an already negative interest rate.

In both Germany and Bangladesh, employment and investments and therefore output are most affected, whereas interest rate and exchange rate are only of minor importance.

The above-mentioned characteristics are more due to the level of development than directly attributed to the countries' position in the GVC, even though the two are closely linked. However, one crucial difference lies in the dependence on foreign investors and countries to stimulate an economy's domestic growth. Countries all around the world are connected with each other through trade and the demand and supply for and of each other's (intermediate) goods. This results in a mutual dependency, however, more so for countries in the beginning of the GVC. In the example of Bangladesh, the economy is specialized in the manufacturing of one kind of good, for which they have very little home demand. Therefore, they are virtually unable to recover, as long as the demand in the importing countries stays low. The country's production and exports can only pick up again if foreign demand recovers. Germany on the other hand, even though also dependent on trade of its produced goods, has a home demand which can be stimulated. For example, after the demand shock of the financial crisis 2008, the country introduced the "Abwrackprämie" to support its largest industry, the automotive industry. This system rewarded the purchase of a new car with 2,500€, which stimulated home demand (Danhong, 2009).

To conclude this section, in order for trade to recover in the long-run, it is crucial for the countries with the largest economic power, mainly the U.S., China and Europe, to pick-up on capital formation and demand, which will cause a new surge in trade. This increase in demand and supply will be transmitted to countries located in the beginning of the GVC, enabling them to revive their economies through trade. Even though companies might reconsider some of their GVC to secure

themselves against future shocks, the cost-saving forces behind trade are too strong. Therefore, trade will in the long-run return to its pre-Covid-19 level and continue its growth path.

7. Conclusion

This literature-based analysis addresses two salient questions: how will the current Covid-19 shock affect trade in the long-run; and what is the specific role that global value chains play in moderating this effect?

This paper broaches the topic by illustrating past and current trade theories. Specifically, the reasons why countries trade, how trade is currently organized, and the concept of GVCs. Thereafter, the economic implications of the Covid-19 shock are examined. The following analysis of literature regarding the relationship between vulnerability and trade identified that the effect of shocks greatly depends on a country's level of development which is closely connected to their position in the GVC, as countries exhibit different economic and trade structures.

Trade and GDP are closely linked. With falling GDP, trade will decrease. Therefore, employment and investments in capital need to be revived during a crisis. These indicators were also found to be the most impacted by Covid-19 in Bangladesh and Germany.

The completed analysis reveals that countries located at the beginning of GVCs will not be able to stimulate domestic demand and supply in order to boost trade because they are too reliant on demand and supply of foreign countries. Hence, for the global trade to recover from the Covid-19 shock, countries with the largest economic power must increase their output and demand. Less affluent economies will only return to pre-Covid-19 trade volumes after this positive effect is transmitted through GVCs. These relationships have been summarized in figure 9.

The strength of economic forces and drivers of trade will continue to expand global value chains and increase long-run growth. This analysis is relevant when: governments want to decrease their domestic economy's vulnerability to future shocks; policy-makers want to foster an expeditious return to sustained economic growth; or when firms need to analyze market risk to make offshoring decisions. Future research could for instance investigate different policy options and their effectiveness in easing the effects of shocks, depending on a country's GVC position.

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