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Bachelor Thesis [International Bachelor of Economics and Business Economics]

The Effect of Monetary Policy on Foreign Trade in the Ottoman Empire during the 19th Century

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Abstract

The research estimates the effect of monetary policy on foreign trade in the Ottoman Empire in the 19th Century by analyzing the impact of the change in the grams of silver content in the monetary unit on the change in net exports in millions of Great British Pounds. The research uses structural vector autoregression (SVAR) to estimate impulse response functions (IRF) in order to determine the dynamic effects of a change in the silver content of coinage on net exports. The data set captures the silver content of coin in grams and net exports in millions of GBP between 1840-1900. The results indicate that an increase in the silver content of coin has a negative impact on net exports. A revaluation in the content of coin seems to have lasting effects on net exports.

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1. Introduction

In today's globalized environment, where the world as a whole is one big market, price differences can be influential in steering demand. Does cheap currency induce more exports? Can a country increase its competitiveness by depreciating its currency? What impact does monetary policy have on trade? These are some of the many questions that occupy the economics discourse in both academic and public forums. Established theory dictates that a devaluation in currency can lead to an increase in output and an increase in exports at the expense of imports. Does this mean that a country can raise its production level if it pursues a more relaxed monetary policy? Within the academic world, one perspective suggests that devaluation can stimulate production by putting unemployed resources to use.[1] Another view argues that currency devaluation can have contractionary effects on output.[2]

History can provide us with natural experiments on how monetary policy can influence trade. In the early 19th Century, the Ottoman Empire conducted successive debasements in order to attain seigniorage revenue.[3] The frequency of the debasements can be contemporarily defined as ultra-expansionary monetary policy. This research seeks to examine how the monetary policy conducted by the Ottomans impacted their trade. Hence, the topic of this research will be: *The Effect of Monetary Policy on Trade in the Ottoman Empire during the 19th Century*. The research wants to examine if there was any correlation between the value of the monetary unit and the volume of foreign trade. The research will exclusively concentrate on the country's foreign trade as the lack of proper data on domestic trade makes it very difficult to analyze it. Furthermore, especially onwards the 19th Century, the Empire's territory contracted severely, making research on domestic trade increasingly difficult. The paper will focus on the 19th Century as this was a period when the Empire increased its trade openness and global economic integration.[4] The paper will try to understand if the debasements or reinforcements

[1] Alexander, S. S. (1952). Effects of a Devaluation on a Trade Balance. *Staff Papers (International Monetary Fund)*, *2*(2), 263–278. https://doi.org/10.2307/3866218
[2] Krugman, P., & Taylor, L. (1978). Contractionary effects of devaluation. *Journal of International Economics*, *8*(3), 445–456. https://doi.org/10.1016/0022-1996(78)90007-7
[3] Pamuk, Ş. (2000). *A Monetary History of the Ottoman Empire*. Cambridge University Press.
[4] İnalcık Halil, Quataert, D., & Faroqhi, S. (1997). An Economic and Social History of the Ottoman Empire (Vol. Vol. 2, 1600-1914 / Suraiya Faroqhi ... [et al.]). Cambridge University Press.

conducted by the state impacted the country's net exports. The findings of this research can display important insight regarding the effects of monetary policy on trade, especially one that is reliant on a commodity standard.

Standard economic theory suggests that a depreciation in currency would increase a country's exports. This research would like to see if this theory is present in an historical situation. The research will use time-series variables and utilize the appropriate econometric methodology. The results will be analyzed and interpreted within the historical context and the mentioned economic theory.

2. Historical Background

2.1 The 19th Century and Trade

The Ottoman Empire was an entity that ruled over a swath of territory that stretched from southeast Europe to the Persian Gulf. Near the end of the 18th Century, the Empire began to increase its integration into the world economy. [5] The 19th century was a period of great political upheaval and reform for the empire. Throughout the century, the Ottoman state launched a series of reforms to strengthen central authority, finances, and social welfare. [6] As part of the reforms undertaken by the state, the Empire's trade and finances saw increasing liberalization. The economic liberalization of the Empire is best signified by the Anglo-Ottoman trade convention of 1838 which abolished monopolies in foreign trade, lowered trade barriers for imports, and exempted foreign merchants from paying domestic trade duties (Pamuk, 1987). Onwards 1838, the Ottoman trade regime was unique in its degree of openness (Issawi, 1980). Contrary to other European Empires, the Ottomans followed trade policies that can be considered the exact opposite of mercantilism. European colonial empires such as Britain and France, forced trade liberalization on their colonies while instituting trade barriers at home. This was made possible due to a lack of sovereignty by colonial states such as India and Algeria. The

[5] Kasaba, R. (1988). *The Ottoman Empire and the World Economy: The Nineteenth Century*. State University of New York Press.
[6] Inalcik, H., Quataert, D., Faroqhi, S., McGowan, B., & Pamuk, Ş. (2006). *An Economic and Social History of the Ottoman Empire*. Cambridge University Press.

Ottomans shared the military vulnerability of most colonial states and hence were unable to resist Western pressures to liberalize their economy. Authors such as Pamuk (1987), argue that the treaty of 1838 is not a drastic change nor a result of foreign dominance but simply a formal acquiescence of the liberal trends present in policymaking since the 1820s. As a result of the industrial revolution, British manufacturing exports had already percolated into the Ottoman market since the late 1820s (Pamuk & Williamson, 2010).

The industrial revolution rendered existing methods of production obsolete. As European manufactures of cotton and textiles became increasingly cheaper and more reliable, cotton textile manufacturing and other handicrafts around the world decreased. The rise of factories in the industrializing world had a decisive impact on the makeup of international trade. Western Europe and North America became exporters of manufactured goods while the rest of the world economy, known as the "periphery", started exporting primary goods. Pamuk (1987) states that even before the industrial revolution, the Ottoman cotton textile industry did not have a notable footprint in international markets. The author states that at the end the of the 18th Century, cotton textile producers in Greece, Anatolia and Syria were net exporters to other parts of the Empire. Before the penetration of manufactured cotton textiles from Western Europe, the Ottoman cotton textile industry mostly sustained domestic consumption. Onwards the Napoleonic Wars, local manufacturers started losing their share of the domestic market (Pamuk, 1987). Cotton textiles from Britain led the greatest growth in imports until the late 19th century. According to Inalcik et al. (1997), textile manufactures constituted half of all imports at the port city of Izmir in 1900. As European manufactures displaced indigenous handicrafts, primary goods such as foodstuffs and other agricultural products came to dominate Ottoman domestic production. Grapes, silk, figs, olive oil, barley, wool and sheepskin were some of the products that constituted the Empire's leading exports (Inalcik et al., 1997). In the last quarter of the century, certain foodstuffs such as grain, sugar, coffee and rice increased their share of imports (Pamuk, 1984).

With the signing of the free trade agreement in 1838, favoring foreign competition at the expense of domestic exporters, the decline in domestic manufacturing accelerated. Foreign domination of the Ottoman market was also made available as a result of technological advancements in transportation that brought down freight costs (Pamuk &

Williamson, 2010). The availability of affordable transportation and lower barriers to trade ushered in a boom period in Ottoman foreign trade (Ibid.) The Empire's Mediterranean port cities such as Izmir (Smyrna), Beirut, Salonica and Alexandria became increasingly vital with the development of steamships (Issawi, 1980). In line with these developments, the Empire saw a shift in its trade. Until the mid 19th Century, interregional trade and trade with the Empire's regional neighbors were more important to its economy. After the 1840s, trade with the West increased dramatically and on the eve of the First World War, trade with Western Europe and the United States stood at 60% of total foreign trade (Pamuk, 1987). Until the early 19th Century, foreign trade was mostly dominated by France. In subsequent periods, the Napoleonic Wars and the industrial revolution caused Britain to surpass France as the leading Ottoman trading partner. Britain's status as the Empire's principal business associate was solidified with the convention of 1838 (Inalcik et al.,1997). In the early 1870s, Great Britain received a quarter of all Ottoman exports and accounted for one third of all imports (Pamuk, 1987).

The rapid period of trade growth between 1840 and 1870 ended with the "Great Depression" of 1873. The Depression of 1873 started with bank failures and a stock market crash in Europe which spread around the industrialized world. As a consequence of the lower output in Western economies, a drop in global demand decreased price levels internationally (Pamuk,1987). Demand for Ottoman exports decreased rapidly, causing severe unemployment and negative terms of trade (Ibid.) Growth rates picked up again in the 1890s but were behind the rates of growth seen before the 1870s. Ultimately, the Ottoman economy in the 19th Century was responsive to the changes in international trade. At the beginning of the First World War, the Ottoman economy was more globally integrated than Asia but fell behind Latin America (Pamuk, 1987). The industrial revolution in Europe decisively established the continent as the World's economic core. The products of the industrial revolution quickly flooded the Empire's pre-modern economy, ushering in a period of de-industrialization. The Ottoman administration was unable to both economically and politically resist global economic trends and signed free trade agreements that made its trade regime one of the most liberal in the world (Issawi, 1980). Throughout the 19th century, the Empire solidly remained an importer of manufactures and an exporter of primary goods.

2.2 Monetary System

For most of its existence, the Ottoman Empire used a monometallic system of coinage based on silver unlike the monetary systems of early-modern Europe (Gerber, 1982). Silver and gold coins brought by foreign merchants were freely circulating throughout the Empire but both types of specie lacked an official conversion rate administered by the government (Ibid.) The Empire relied on different types of coinage until the 17th Century when the monetary system collapsed (Inalcik et al, 1997). Onwards the early 18th Century, the government started to mint silver coins known as ***kuruş*** (pronounced as *kurush*, also called the piastre) for official use (Pamuk, 2000). Until the middle of the 18th Century, we see that the silver content of the ***kuruş*** is relatively stable when wars and fiscal troubles forced the government into conducting debasements (Ibid.). Although the kuruş was the main and most common coin in the Empire, it was not the only one. Gold coins were also common and used as a medium of exchange. The government issued a myriad range of gold coins in the early 19th Century. However, government obligations were denominated in silver, incentivizing the government to firmly control the silver coin. In addition to local coinage, various European coins freely floated within the Empire. In the frontiers of the Empire, coins like the Spanish real and the German thaler were also used (Inalcik et al., 1997).

The period between 1760 and 1844 saw frequent debasements in order to attain seigniorage revenue. Seigniorage is the difference between the value of the monetary unit and the cost of producing and distributing it. Within the historical context, the profits from a debasement seigniorage amounted to the difference between the higher gram of silver from the old coin and the lower silver amount in the newly minted coin. The early 19th Century was filled with war, political turmoil, and monumental administrative reform. This coincided with the reign of the reformist Sultan Mahmud II (1808-1839), where the state issued 47 different coins (Pamuk, 2000). In 1804, the First Serbian Uprising was the first of the many events that burdened the treasury. The Greek Revolution and subsequent independence in 1821 further strained state finances. The reign of Sultan Mahmud II was an era of Westernizing reforms. The Empire had been in a continuous state of decline and required serious reorientation to perpetuate its existence. The central administration had severe problems with controlling revenue sources. Revenues of the

Porte in Istanbul in the 1780s had only marginally increased from the 1560s (Karaman & Pamuk, 2010). Compared to European powers, the Ottomans lacked the capacity to establish a fixed source of revenue through taxation. Such fiscal problems made seigniorage from debasements appealing, especially in times of crisis. At the start of the century, the kuruş contained 5.9 grams of silver. By 1831, that amount was reduced to 0.53 grams (Karaman et al., 2020). This record change is understandable as within that period, the epoch saw the creation of a vast professionalized standing army and the expansion of a modern civil service. The benefits of the debasements were not limited to just seigniorage. The debasements lowered the borrowing requirements of the state, lowering interest rates in the economy (Pamuk, 2000). The debasements generated social opposition from urban groups such as merchants, shopkeepers as well as salaried bureaucrats and clergy (Ibid.). The debasements under Sultan Mahmud II were successful in raising much needed revenue in the face of ballooning expenditures but were unsustainable. The government abandoned debasements as a way to raise revenue in 1844 when it switched to a bimetallic standard backed by gold and silver.(Pamuk, 2000).

The gold to silver ratio was officially fixed at 15.09 for the remainder of the century and 100 kuruş for one gold lira. The gold lira, the silver kuruş and the 20-kuruş coin called the *mecidiye* (pronounced medjidiyeh) became the main coinage of the Empire (Inalcik et al., 1997). Until the end of the century, the gold content of the lira rarely changed, but the exchange rate against the silver kuruş fluctuated. The transition from a monometallic standard to a bimetallic one was hindered due to the state's inability to withdraw previous coin from circulation (Pamuk, 2000). As a consequence, the state had to include the discontinued coinage to its published exchange rates. Post mid-century, the Ottomans sought avenues other than debasements to solve their fiscal problems. For a brief period, the government decided to print interest bearing paper currency called the *kaime* to raise revenue. (Inalcik et al., 1997). However, during the Crimean War (1853-1856), the government expanded the volume of the kaime. As a result, one gold lira began to exchange in 200-220 kuruşes in kaimes (Pamuk, 2000). The result of this brief interlude of fiat currency was high inflation and the government consequently retired the kaime in 1860.

The Ottoman Empire was heavily influenced by the changing currents in the global economy. Onwards the 1870s, most European countries and the United States began to abandon the bimetallic system in favor of a monometallic system backed by gold. The global transition to the gold standard came at a time when the Ottomans, deep in debt and financially unstable, were susceptible to European pressures (Pamuk, 2000). In 1881 the government adopted a monometallic system, severing the link between gold and silver. Furthermore, the treasury decided to limit the minting of silver coinage, especially the *mecidiye* (Pamuk, 2000). Similar to the problematic transition to the bimetallic standard in 1844, the Ottoman government again lacked the fiscal weight to draw existing coins from circulation. Therefore, the Empire was unable to adopt a proper gold standard. The government continued to accept payments in silver coinage until the First World War. The silver-supported monetary system came to be known as the "limping" gold standard (Inalcik et al., 1997). Gold was at the center of the Empire's financial relationship with international financial markets. The silver kuruş remained the main medium of exchange in daily commerce. According the Pamuk (2000), the limping gold standard was a compromise between the preferences of urban, European interests and the reality of being an agrarian economy. The author underlines that going back to a monometallic silver backed currency in 1881 would have increased the competitiveness of the exporting and import competing sectors due to the depreciation in the content of silver. Even so, resisting the transition to the gold standard would have isolated the Empire from international markets, diminishing its integration to the world economy (Pamuk, 2000). The limping gold standard created an array of exchange rates for silver coinage in different provinces of the empire (Ibid.).

Similar to its trade, the Ottoman Empire's monetary policy was heavily aligned with the industrial nations of Europe. Until the mid 19th Century, the Ottoman government frequently turned to debasements in order to raise revenue. The value of the kuruş was decimated until the middle of the century. Mid-century, under pressure from European interests, the government switched to a bimetallic standard backed by both silver and gold. The transition to a monometallic gold standard was conducted again in accordance with the prevailing global trend. Both transitions were significantly hampered due to a lack of fiscal capacity on behalf of the government. Throughout the 19th century, the Empire's

monetary policy saw significant alterations. However, silver coinage was the consistent medium of exchange within the Empire's lands.

3. Theoretical Framework

3.1 Economic literature

In a simplified setting, standard economic theory commits to the understanding that a devaluation in currency can lead to an increase in exports. The understanding behind this paradigm is based on a number of viewpoints that form the basis of a general mechanism. This general mechanism is that devaluation raises the domestic price of imports while decreasing the foreign price of exports. As a result, foreign demand for domestically produced goods and services increase while domestic demand for foreign goods and services decrease. Therefore, the net exports of a country increases, improving its current account. Existing literature regarding the relationship between devaluation and trade offers different approaches on how a change in the exchange rate can impact production, consumption, and the balance of payments.

Sidney Alexander (1952) examines the underlying effects of a devaluation of currency on trade balance by highlighting different ideas that might contribute to the general mechanism stated above. The author's first example, the idle resources effect, states that a devaluation is transmitted to the aggregate economy through a multiplier to boost production, provided that there are unemployed resources. Another example, the terms of trade effect, has a negative effect on trade balance. Devaluation causes the relative price of exports to decrease and the price of imports to increase; without an increase in the volume of exports at the expense of imports, the devaluation might adversely affect the devaluing nation.[7] If exports increase with imports decreasing at the same time, devaluation has a positive effect on the balance of trade .[8] Johnson (1976) evaluates different approaches to devaluation theory and highlights certain caveats regarding the existing assumptions on devaluation. On the multiplier approach, one important warning is that as a consequence of devaluation, the balance of payments will

[7] Alexander, S. S. (1952). Effects of a Devaluation on a Trade Balance. *Staff Papers (International Monetary Fund)*, *2*(2), 263–278. https://doi.org/10.2307/3866218
[8] Ibid.

only improve if domestic output surpasses domestic expenditure.[9] If the multiplier effect of devaluation is the same or even more for domestic spending, the devaluation might have a negative impact on the balance of payments as it might lead to an increase in imports. A more recent empirical research by Cheng (2019) examines the U.S. services industry to analyze the effects of currency devaluation on trade balance. The paper finds that dollar devaluation boosts service exports in the short-run while increasing the elasticity of service imports in the long-run. Evidence for tangible benefits of devaluation on services trade in the long-run is opaque and largely dependent on the nature of the services.[10] Krugman (1978) outlines the contractionary effects of devaluation by taking into account the possible income effects. The reasoning is, that by raising domestic prices (as a consequence of devaluation), there is a transfer of purchasing power towards economic agents who have a higher propensity to save.[11] When savings are in excess over planned investment, both real output and imports can fall.[12] This effect exists in the presence of wage rigidities, where income from labor rises much slowly than prices. The implications drawn up by Krugman (1978) leaves room for further research to understand the net effect of devaluation on trade. As devaluation distributes real income from labor to capital, it might diminish imports in favor of exports.

3.2 Variables and model

The research formulates a main framework with three variables to measure the impact of debasements on net exports and inflation. Net exports is measured in millions of Great British Pound (GBP), the monetary value of a coin is measured in the grams of silver it contains. Additionally, a dummy variable was created to control for war and conflict. Additionally, the research formulates two more secondary frameworks that include a consumer price index from Istanbul in order to understand the effects of monetary policy on inflation. The additional models are identical to the main one, created

[9] Johnson, H. G. (1976). Elasticity, Absorption, Keynesian Multiplier, Keynesian Policy, and Monetary Approaches to Devaluation Theory: A Simple Geometric Exposition. *The American Economic Review*, *66*(3), 448–452. http://www.jstor.org/stable/1828184

[10] Cheng, K. M. (2020). Currency devaluation and trade balance: Evidence from the US Services Trade. *Journal of Policy Modeling*, *42*(1), 20–37. https://doi.org/10.1016/j.jpolmod.2019.09.005

[11] Krugman, P., & Taylor, L. (1978). Contractionary effects of devaluation. *Journal of International Economics*, *8*(3), 445–456. https://doi.org/10.1016/0022-1996(78)90007-7

[12] Ibid.

to assist the interpretation of the results of our main model: the impact of a change in the specie content of coin on net exports.

The change in net exports is our dependent variable whereas the change in the silver content of coin is our independent variable. Informed readers can imagine the existence of reverse causality and therefore bias between these variables as most modern states pursue devaluation to pay for their trade deficits. However, the research is confident that the trade balance did not in any way affect coinage for two reasons. The primary reason is that the established literature overwhelmingly suggests that the Ottoman government sought to use debasements as a source of revenue in order to pay for rising expenditures.[13] The 19th Century, especially the first 40 years, was a time of reform and great change for the Empire. The Ottoman military and administrative apparatus experienced a colossal overhaul that resulted in the creation of a larger army and bureaucracy.[14] The reforms inclined the government to debase the coinage to attain seigniorage revenue as the maintenance costs of the army and civil service exceeded revenues from taxation. Additionally, the early 19th Century was also a time of frequent conflict for the Empire, which additionally strained government finances, pushing for devaluation.[15] The secondary reason why trade was not influential in motivating debasements was that the Ottoman authorities were not conscious of the Empire's role in trade. Official Ottoman statistics were recorded only starting from 1878 and are of incondite quality, unrepresentative of the real volume of trade (Pamuk, 1987). The research is confident that simultaneous causality between monetary policy and trade is not present and hence the relationship between the estimated coefficients of the variables is not biased.

The third variable in our model is a dummy variable to control for the effects of conflict and war. It is unlikely that war and conflict had a major impact on the Ottoman Empire's trade. The economies of Europe and the United States shared the bulk of the Empire's foreign trade of around 75 percent by the 1880s (Pamuk, 1984). Britain held the majority stake in the volume of trade among all other nations (Ibid). The Ottoman Empire

[13] Pamuk, Ş. (2000). *A Monetary History of the Ottoman Empire*. Cambridge University Press.
[14] Inalcik, H., Quataert, D., Faroqhi, S., McGowan, B., & Pamuk, Ş. (1997). *An Economic and Social History of the Ottoman Empire*. Cambridge University Press.
[15] *Ibid.*

seldom fought a war against any of its major trading partners. The exception to this is Russia, whom the Ottomans fought numerous times throughout the century. Data compiled by Şevket Pamuk shows that trade with Russia decreased a decade after the Russo-Turkish war of 1877-78, suggesting that trade may be unaffected from war. Further exceptions might be the seizure of Tunisia by the French in 1881 and Egypt by the British in 1882. Yet these cannot be justified as examples of major conflict between the Ottomans and another state as the two mentioned provinces of the Empire had achieved *de facto* independence from Istanbul and the Ottoman central administration had no control over them. Such events did not affect trade between Anatolia and the Levant, which made up the main entity of the Empire. However, the conquest of Tunisia was recorded as war (1) in our dataset since the French established a protectorate, ending official Ottoman control.[16] Egypt nominally remained a part of the Ottoman Empire until 1914.

The fourth variable is the consumer price index. The consumer price index (CPI) is compiled only for Istanbul. However, as the CPI is constrained to one city, the research will use the results of the model with the CPI only to interpret the results of the main model.

The research uses time-series data between 1840 and 1900. In order to attain a comprehensive view of how the changes in the content of coinage affected foreign trade, the research will estimate impulse response functions (IRFs) through structural vector autoregression. Since multiple variables are present over a 60 year period, vector autoregression (VAR) is a necessary method to understand the relationships between the variables. As the research is interested in measuring a causal effect of monetary policy on trade, structural vector autoregression (SVAR) is a suitable method since it is used to identify a causal relationship between the variables. SVAR needs constraints imposed in order to work. The assumptions of the research can easily be included in the model to estimate the effects of a change in the coinage on net exports. The IRFs will be the primary mode of analysis for the research as they will display both the immediate and the dynamic effects of changes in the coin content.

[16] Encyclopædia Britannica, inc. (n.d.). *The protectorate (1881–1956)*. Encyclopædia Britannica.

3.3 Expectations and hypothesis

The research will try to estimate the aggregate effect of a change in the coin content on the change in net exports. The dataset contains only two variables. The data on net exports is believed to be an accurate reconstruction of Ottoman foreign trade. It was reconstructed from the foreign trade ledgers of the all the states the Empire had trade relations with (Pamuk, 1987). The data on the silver content of coinage is assumed to be an accurate representation of the developments in the monetary makeup of the Ottoman Empire. The variables are enough to analyze and explain the overall effects of monetary policy on foreign trade; they are not enough explain the reason behind the effects. The research is motivated by the theories discussed by Alexander (1952), Johnson (1976) and Krugman (1978). The theories explain their reasoning through theoretical mechanisms that cannot be replicated with the variables present in our model. Alexander (1952) and Johnson (1976) highlight the importance of the multiplier effect a monetary shock might have on aggregate output and net exports. Krugman (1978) underlines that monetary shocks such as a sudden devaluation might distribute real income from labor to capital, decreasing expenditures on imports and consumption. This research will not make any conclusions regarding such theoretical designs, it will only use them to interpret the results.

The research hypothesizes that the silver content of coin, the ***kuruş***, has an inverse relationship with net exports. The research believes that an increase in the silver content of coin, the ***kuruş,*** will decrease net exports. The research formulates this hypothesis based on the composition of Ottoman foreign trade. Pamuk and Williamson (2010) study how the movements in the Ottomans' foreign trade contributed to its de-industrialization and highlight the importance of a change in relative prices. The authors state that as a result of a meteoric rise in productivity in Western economies, manufactures became more affordable to import. Similarly, a worldwide transportation revolution severely diminished the costs of outsourcing raw materials from different regions for European factories (Pamuk & Williamson, 2010). Foreign productivity advances and the increased relative prices of primary goods confined the Ottomans in exporting cheap raw materials and importing sophisticated manufactures. The Empire's exports consisted mostly of agricultural raw materials, foodstuffs and some minerals

(Issawi, 1980). Carpets and similar products were the only manufacturing exports (Ibid.). The Empire's imports, however, consisted of manufactured goods, consumer items, metals and fuel (Issawi, 1980). The research surmises that any shock that might alter relative prices can have a proportional effect on trade. Consequently, the research hypothesizes that an increase in the silver content of coin will decrease net exports as it will make expensive manufactures cheaper to import and cheap primary goods less competitive in foreign markets. Within the parameters of the impulse response function (IRF) graph, it is expected that one increase in the standard deviation of the coin content will have a negative response from net exports. The reason why the research focuses on the standard deviation is due to the difference in the measurement scales of the variables. The silver content of coin is measured in grams whereas net exports is measured in millions of GBP. This method of inference was influenced by Lütkepohl (2005), which displayed the IRF graphs of macroeconomic shocks on consumption and investment as an example. Analyzing the impact in one increase in the standard deviation of the specie change in coinage will give a more comprehensive picture regarding its relationship with the change in net exports.

The research expects an inverse relationship between the specie content of coin and CPI. Historical accounts support this assumption since debasements in the early 19th Century led to rampant inflation which led to discontent amongst the urban population (Pamuk, 2000). The research expects a devaluation of the coin to increase net exports. An increase in CPI can be expected to have a positive effect on net exports. This is because the CPI is an indication of a depreciation in currency. However, if the increase in prices is proportional to the devaluation, an increase in CPI would have a negative impact on net exports as the real exchange rate would be less competitive. The increase in CPI would have a positive effect on net exports if the rise in prices is a catch-up effect arriving after a currency devaluation. The depreciation in currency has to be higher than the increase in prices to foster a more competitive real exchange rate that would boost net exports.

4. Data and Methodology

4.1 Data

The research will be using data that was recreated much after the fall of the Ottoman Empire. As said previously, official Ottoman statistics on trade were recorded only near the end of the 19th Century and are unreliable. For official trade data, the research will use the historical statistics volume titled "*Ottoman Foreign Trade in the 19th Century"* compiled by Professor Şevket Pamuk of Boğaziçi University for the Prime Ministry of the Republic of Turkey in 1995. The data is reconstructed through the foreign trade statistics of all the Ottoman Empire's trading partners between 1830 and 1913. Pamuk estimates that his dataset is representative of at least 95 percent of Ottoman trade after 1840. The data set is reconstructed using statistics from Britain, France, Germany, Austria, the U.S., Russia, Italy, Belgium, the Netherlands, Sweden, Serbia, Romania, Bulgaria, Egypt and Iran. The author expresses that due to a lack of proper data before 1840, statistics for that period are more uncertain. This research will use the data between 1840 and 1900 to get a more clearer picture of Ottoman trade.

For the data on monetary policy, the research will use the time series data put together by Karaman, Pamuk and Yıldırım-Karaman (2020). The time series contains monetary units of 11 states (including the Venetian Republic) from 1300 to 1914. The data is very comprehensive and makes the necessary adjustments when the states alter their monetary units or issue new ones. The data set is consistent with the data series made available by Şevket Pamuk on Ottoman currency. The data that is used in the research is between the years 1840 and 1900 and it tracks grams of silver in one kuruş, the main medium of exchange. Additionally, to keep track of the inflation, the data set contains a consumer price index in Istanbul, compiled by Professor Pamuk and available on his website. The CPI data starts from 1469 and was reconstructed by Pamuk from the food ledgers of the pious foundations that regularly organized soup kitchens and distributed meals. To control for the political situation, the research has created a dummy variable called "conflict". The variable was created using the timeline obtained from Inalcik

et al.(1997) and the Ottoman State Chronology from the Turkey portal of the Ministry of Culture and Tourism of the Republic of Turkey (Çay, 2009).

4.2 Methodology

4.2.1 Model assumptions

The research will make use of structural vector autoregression (SVAR) to estimate the cumulative impulse response functions (IRFs). The research will utilize IRFs to estimate the cumulative effect of a monetary shock on net exports. The SVAR model builds up on the vector autoregression model (VAR) in that it allows the incorporation of economic theory into the framework. The SVAR model makes three key assumptions. The first assumption is that there is a linear relationship between the variables. The second assumption is that the variables are stationary, that their mean and variance do not contain any trends over time. The third assumption is the triangular Cholesky decomposition that defines an ordering of the variables based on the causal relationships among them. It assumes that contemporaneous effects between the variables follow the established order.

These assumptions are present in the model. The research design uses the differences in the values of variables in subsequent time periods to measure for the impact of exogenous interventions. The first assumption is that an increase in the difference of the silver content of the coinage decreases the difference in net exports. The research drew this assumption from Alexander's (1952) theory. The research's most essential theoretical assumption is that net exports are impacted by the contemporaneous effect of the silver content but do not affect the silver content itself. Hence, there is no simultaneous causality. The reasons for this were explained in the theoretical framework section. The Ottoman government did not change the coin content as a result of its trade balance and lacked the sufficient data on trade to make decisions. The linearity assumption is difficult to test. The research conducted Ramsey's RESET test to check for the linearity assumption in our model. Ramsey's RESET test examines if the model's fit can be improved by adding powers of the variables to control for any nonlinear relationships. The results of the test shows that we cannot reject the null hypothesis that the model has no omitted variables. As a result, we can make the assumption that there

is a linear relationship between net exports and the silver content of coinage. The second assumption can be tested through a Dickey-Fuller test for stationarity. Stationarity is key for time-series analysis and the SVAR model. Non-stationary variables contain trends and patterns that generate spurious regression results. The tests for all four variables, including the dummy variable conflict, show that the variables are stationary and can be seen in the appendix (Tables 1.1-1.4). The third assumption can be evaluated through a Wald test to see if the lagged values of the coin and net exports are correlated with the coin variable. A Wald test was conducted after the VAR model with net exports and coin. The result of the test displayed that the lagged values of the changes in both coin and net exports do not have a significant effect on the change in coin, our variable of interest. The results are supportive of the exogeneity assumption and also suggests simultaneous causality is not present.

4.2.2 Models

The research model is a SVAR model with three variables. The change in net exports is our response variable and the change in the coin content is our explanatory variable. The main model is represented below in three different autoregressive equations. ΔNX_t is the change in net exports at time t. $\Delta Coin_t$ is the change in the silver content of coin at time t. $Conflict_t$ is the value of the dummy variable at time t. The error term is represented as ε_t at time t. We have two identification matrices in order to impose our assumptions regarding the contemporaneous relationships between the variables.

The aggregate representation of the model is represented with three vectors.

$$y_t = \mathrm{A}y_{t-1} + \mathrm{B}y_{t-2} + \varepsilon_t$$

$$y_t = \begin{bmatrix} \Delta NX_t \\ \Delta Coin_t \\ Conflict_t \end{bmatrix}$$

y_t is the vector of the outcome variables with each variable at time t.

The matrix can be disaggregated into its individual components down below with equations (1), (2), (3).

Net exports:

(1) $\Delta NX_t = a_{11} * \Delta NX_{t-1} + a_{12} * \Delta Coin_{t-1} + a_{13} * Conflict_{t-1} + b_{11} * \Delta NX_{t-2} + b_{12} * \Delta Coin_{t-2} + b_{13} * Conflict_{t-2} + \varepsilon_t$

Silver content of coinage:

(2) $\Delta Coin_t = a_{21} * \Delta NX_{t-1} + a_{22} * \Delta Coin_{t-1} + a_{23} * Conflict_{t-1} + b_{21} * \Delta NX_{t-2} + b_{22} * \Delta Coin_{t-2} + b_{23} * \Delta Conflict_{t-2} + \varepsilon_t$

Conflict:

(3) $Conflict_t = a_{31} * \Delta NX_{t-1} + a_{32} * \Delta Coin_{t-1} + a_{33} * Conflict_{t-1} + b_{31} * \Delta NX_{t-2} + b_{32} * \Delta Coin_{t-2} + b_{33} * \Delta Conflict_{t-2} + \varepsilon_t$

The IRFs are estimated over an eight year horizon $(h = 0, \ldots, 8)$.

The main model is replicated two times by including CPI. Including the CPI, the matrix y_t becomes;

$$y_t = \begin{bmatrix} \Delta NX_t \\ \Delta CPI_t \\ Conflict_t \end{bmatrix}$$

for the second model and,

$$y_t = \begin{bmatrix} \Delta CPI_t \\ \Delta Coin_t \\ Conflict_t \end{bmatrix}$$

for the third model. ΔCPI_t is the change in CPI at time t.

In the second model, the CPI displaces coin as the independent variable and its impact on net exports is estimated. The rationale behind the model is to estimate the effect of an increase in prices on net exports. As said previously, a rise in prices can have an adverse effect on net exports if it leads to an appreciation of the real exchange

rate. The research wants to observe if a shock increase in prices can decrease the net exports. The model serves to help the research attain a comprehensive view of the effect of monetary policy. In the third model, the CPI is the dependent variable and the silver content of coin is the variable of interest. With the third model, the research seeks to confirm that a depreciation of the monetary unit does indeed lead to inflation and a revaluation would lead to the opposite. Since the assumptions for the two supporting models are the same, matrices A and B are left unchanged. It is assumed that CPI affects net exports but is not affected by it. CPI is assumed to be affected by the value of coin but does affect the content of coin. This assumption can understandably draw certain objections regarding reverse causality. As CPI is an important factor in monetary policymaking, a higher CPI might cause the government to react and increase the value of the coin to curtail inflation. However, the research emphasizes that the Ottoman policymakers had no proper data on inflation at the time and would not have been influenced by the rate of inflation to conduct policy. The regressions for model 2 and 3 are exactly replicated through equations (1), (2) and (3) with the equation numbers corresponding to the variables in the rows of the matrices.

$$\textbf{Matrix A} = \begin{matrix} 1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{matrix} \qquad \textbf{Matrix B} = \begin{matrix} . & . & 0 \\ 0 & . & 0 \\ 0 & 0 & . \end{matrix}$$

Matrix A represents the contemporaneous relationships between the variables in the model. The change in net exports is impacted by its own contemporaneous value and the contemporaneous value of the change in the content of coinage. The change in the content of coinage is only affected by its own contemporaneous value and nothing else. This is due to our assumption that foreign trade has no effect on decisions regarding monetary policy. Conflict is assumed to be unaffected by both net exports and the content of coinage. The error term of each matrix is represented at time t. For matrix B, coefficients of interest were left as “missing” in order to estimate them. The SVAR model is estimated at two lags, selected after estimating the lowest information criterion.

5. Results

The results of the impulse response function for the primary model (IRF) confirms the research hypothesis that a monetary shock in the nature of an increase in the content of coinage will decrease net exports. The impulse response function vividly depicts that one standard deviation increase in the change of the content of coin, decreases the change in net exports. A shock in the form of an increase in the coin content decreases net exports by nearly GBP 5 million, 19% of the average trade and 40% of average exports for the concentrated time period. The effect of the shock decreases after 2 years and seems to stabilize with net exports staying constant.

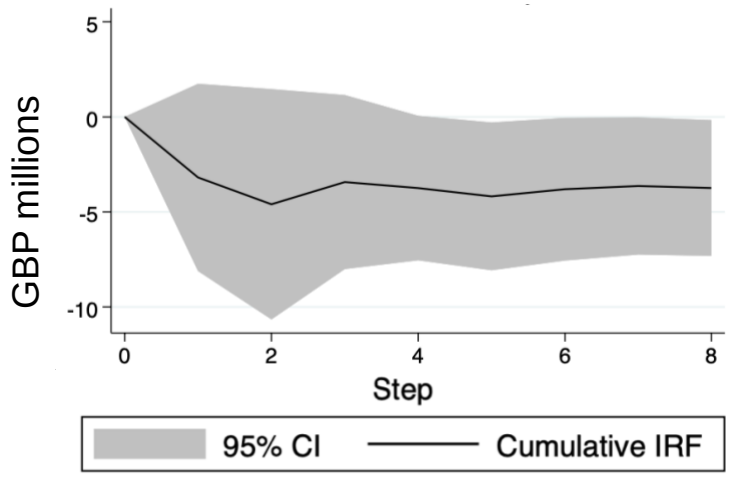

Figure 4.1 Impulse response of a coin shock on net exports

The results of the IRF for the second model is noteworthy. A shock in the terms of an increase in the CPI does not seem to translate into a major increase in the change of net exports. A close examination of the IRF graph displays that an increase in the standard deviation of CPI leads to a marginal increase in net exports. It can be seen that there is a miniscule increase in net exports after a CPI shock. The small-scale effect seems to peak at the end of the first period, stabilizing immediately afterwards. The model displays no permanent alterations as a response to a shock by the CPI, leading the research to infer that a change in CPI has no significant effect on net exports.

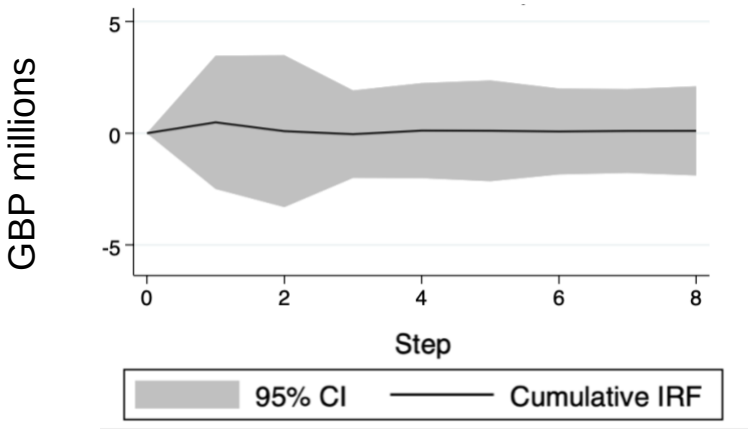

Figure 4.2 Impulse response of a CPI shock on net exports

The results of the IRF for the third model displays a response function in accordance with the assumptions of the research. One standard deviation increase in the change of the content of coin leads to a decrease in the change of CPI. An increase in the specie content of coin expectedly decreases inflation. However, a close examination of the graph shows that after a two year period, CPI nears its pre-shock levels. This displays that a revaluation of the currency may not have a long lasting effect on inflation.

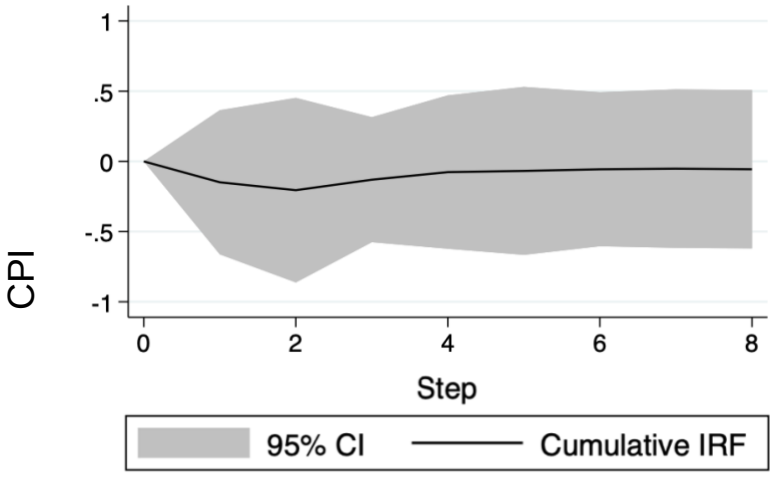

Figure 4.3 Impulse response of a coin shock on CPI

6. Discussion

The results of the primary model IRF analysis confirms the hypothesis that an increase in the silver content of coin would decrease net exports. After a positive change in the specie content, there seems to be a lasting decrease in net exports. A shock in the form of an increase in the silver content lowers net exports in two periods and stabilizes at that level. As expected, the IRF analysis for the third model demonstrates a decrease in CPI as a result of an increase in the value of the monetary unit. However, it can be observed that the devaluation has a much more milder effect on prices compared to net exports. This can be indicative of certain price rigidities and can explain why the effect of reinforcements is so powerful. Looking at the IRF for the second model, we see that an increase in the CPI seems to have no tangible effect on net exports. This is noteworthy. The impact of monetary policy on foreign trade might be more isolated than previously thought. A stronger currency makes exports less competitive yet high inflation does not make exports more desirable. Higher prices make the real exchange rate more uncompetitive. The devaluation of the kuruş outweighs the increases in prices, depreciating the real exchange rate. This result might be in line with Alexander's (1952) theory, that devaluation might put into use unemployed resources. Pamuk (2000) also states that an undervalued silver-coinage was mostly supported by agrarian interests, aimed at boosting their exports. A change in the content of coinage can have a more vivid impact on the export oriented producers rather than the aggregate economy.

It must be remembered that the CPI is compiled from the prices only in Istanbul and from the basic consumer foodstuffs. The first caveat is that although Istanbul was the beating heart of the Ottoman economy, it was one of many ports that international trade took place in the Empire. Although representative of the monetary policy, the inflationary effects recorded in Istanbul might not be representative of price trends in other cities in the Empire. Additionally, the CPI is compiled from the food ledgers of the soup kitchens of the pious foundations in Istanbul. The CPI may exclude the average Ottoman export products and hence might not be correlated with the price changes that influences exports.

7. Conclusion

The main limitation of this research is arguably the lack of data on trade before 1830. Between 1800-1830, the coinage saw enormous debasements. Trade data on that period would certainly assist to understand the full effect of monetary policy on trade. Another suggestion for future research can be to take a more compartmentalized approach. The data on coinage can be broadened and categorized into the regions of the Ottoman Empire. Monetary policy had different effects in the frontier regions compared to the core regions. The regional data on coin can be used together with regional data from the Empire's trading ports. An aggregate picture can be composed from the individual studies. A final remark is that the data set contains data on the silver coin, the *kuruş*. Although the kuruş was without a doubt the most common medium of exchange until the First World War, foreign currencies freely floated in the Empire. An expanded data set can include foreign currencies and see how they affected foreign trade.

The research wanted to understand the effect of monetary policy on trade in the Ottoman Empire in the 19th Century. Analyzing time-series data between 1840 and 1900 gives us the conclusion that an increase in the content of coinage decreased the Empire's net exports. The results of the impulse response analysis vividly display that a positive shock in the silver content of coin decreases net exports. Similarly, an increase in the coin content leads to higher levels of inflation. IRF analysis also displayed that inflation indicators do not seem to translate into an increase in net exports. Overall, the research comfortably concludes that the effect of Ottoman monetary policy was in line with modern theoretical predictions. A more valuable currency decreased net exports.

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Appendix

Table 1.1 Dickey-Fuller test for stationary on the coin variable

	Test statistic	Dickey-Fuller critical value		
		1%	5%	10%
z(t)	-8.843	-3.567	-2.923	-2.596

H0: Random walk without drift, d = 0

MacKinnon approximate *p*-value for Z(t) = 0.0000

Table 1.2 Dickey-Fuller test for stationary on the net exports variable

	Test statistic	Dickey-Fuller critical value		
		1%	5%	10%
z(t)	-7.397	-3.567	-2.923	-2.596

H0: Random walk without drift, d = 0

MacKinnon approximate *p*-value for Z(t) = 0.0000

Table 1.3 Dickey-Fuller test for stationary on the conflict variable

	Test statistic	Dickey-Fuller critical value		
		1%	5%	10%
z(t)	-4.344	-3.566	-2.922	-2.596

H0: Random walk without drift, d = 0

MacKinnon approximate *p*-value for Z(t) = 0.0004