HEC Montreal

Effect of US Interest Rate Shocks on Rentier Economies and

Advanced Economies

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Thesis presented for the degree of Master of Science (M.Sc.) – Applied Financial Economics

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Abstract:

This paper aims to study the effect of U.S. monetary policy shocks on foreign economies' GDP, with a particular focus on rentier economies, defined as economies whose rents of natural resources or land are considered a significant portion of GDP. The study examines how the foreign GDP response depends on various channels including trade openness, exchange rate regimes, inflation, external debt, and other variables. First, I estimate a Taylor-type rule to extract U.S. interest rate surprises using annual data from 1985 to 2015. Next, I estimate spillovers to foreign economies using a local projections method (Jorda, 2005) on a panel of 15 industrial and 11 rentier economies. Finally, I examine how the spillovers depend on three factors: (1) the exchange rate regime against the U.S. dollar, (2) trade openness with the U.S., and (3) an index related to how externally vulnerable a country is, which depends on financial variables for each country in the sample. The results validate the impact of monetary policy shocks in the U.S. on foreign developed economies and develop a foundation for the impact of the shocks on rentier economies.

Acknowledgments:

Writing this thesis was a challenging journey due to the pandemic the world is suffering from and due to the political and financial crisis in my home country Lebanon. This research was a fruitful learning experience that led me to build and enhance my research, writing, and communication skills on every level.

First, I would like to thank my advisor professor Nora Traum who guided and supported me in every step from choosing the topic to completing my thesis. I'm very grateful to work with her since her patience, assistance, and feedback was a cornerstone in completing my thesis.

Second, I would like to thank my Mother Dalal, my Father Khalil, my siblings Batoul, Ibrahim, and Mohamad, and my wife Aya for their continuous support throughout my thesis, and my MSc studies at HEC Montreal.

Finally, I would like to thank all my friends and everyone who supported me in completing this piece of research.

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I. Introduction

This paper aims to study the effect of U.S. monetary policy shocks on foreign economies' GDP, with a particular focus on rentier economies where rents of natural resources or land are considered a significant portion of GDP.¹The study examines how the foreign GDP response depends on various channels including trade openness, exchange rate regimes, inflation, external debt, and other variables. After World War II, the U.S. became the largest economic power in the world, which gave different sorts of privilege worldwide and made other countries' business cycles susceptible to U.S. fluctuations. Evidence suggests industrial and emerging economies are affected to a certain extent when there is a recession or economic development in the U.S. (Iacoviello and Navarro, 2019; Kim, 2001; Kose et al., 2017). In addition, the U.S. is a massive consumer of different types of natural resources, and the demand from abroad for those resources in the U.S. is affected by its economic activity. This paper aims to study the foreign spillover of one source of U.S. changes stemming from discretionary monetary policy.

The United States economy is the largest in the world and has potentially the single most significant influence as a country in the world economy. The impact is due to the size and the interconnectedness of its economy (Kose et al., 2017). The United States accounts for up to a quarter of the world's GDP, over a third of the stock market capitalization, and a fifth of global foreign direct investment (Kose et al., 2017). It is a significant export destination for one-fifth of the nations around the world. The U.S. dollar is also the most widely used currency in financial transactions, and global trade and alterations in U.S. monetary policy have a direct impact on

¹ For rentier economies, I take the total natural resources' rents (% of GDP) averaged over the time frame covered and consider each country with an average above 20% as a rentier state.

global financial conditions according to a World Bank statement (2016). Thus, it is no surprise that changes in the U.S. economy can have effects on the rest of the world.

Several papers have examined the spillover effect of U.S. monetary policy changes on foreign economies. Kim (2001) finds contractionary U.S. monetary policy leads to a decrease in economic activity in foreign countries. Canova (2015) finds U.S. monetary policy shocks substantially affect interest rates in Latin America, which in turn affect the economic growth and business cycles of those countries. Iacoviello and Navarro (2019) finds monetary policy shocks in the U.S. have a significant effect on both emerging and industrial economies' GDP.

Despite these past studies, to the best of my knowledge the spillover effects for rentier economies have not been studied. Nevertheless, economic activity in the U.S. can matter for rentier economies. If we observe the consumption graphs of the U.S.'s raw materials and natural resources between 1900 and 1995, we see that the consumption sharply decreases after any recession or crisis hits the U.S. economy (see Figure 1, a reproduction from Matos, 2000).



Figure 1: Measurement of the amount of raw materials consumed in the United States between 1900 and 1995. Source: Matos, 2000 report.

Moreover, in the past, the U.S. consumed around 20% of the total raw material consumed worldwide (Matos, 2000). This suggests an economic boom or recession in the U.S. may affect rentier countries' economic status. This paper studies this effect following changes in U.S. monetary policy.

To evaluate the effects of U.S. monetary policy, this paper follows the approach of Iacoviello and Navarro (2019). First, I estimate a Taylor-type rule to extract U.S. interest rate surprises using annual data from 1985 to 2015. Next, I estimate spillovers to foreign economies using a local projections method (Jorda, 2005) on a panel of 15 industrial and 11 rentier economies. Finally, I examine how the spillovers depend on three factors: (1) the exchange rate regime against the U.S. dollar, (2) trade openness with the U.S., and (3) an index related to how externally vulnerable a country is (depending on its level of inflation, the current account, external debt, and foreign reserves). Relative to Iacoviello and Navarro (2019), I focus on a different set of economies, namely rentier economies. For comparability, I also present results for a similar set of advanced economies as considered in Iacoviello and Navarro (2019). ²

I find that a U.S. monetary policy shock has an impact on foreign economies' GDP. The main results shows that a 1 percent increase in the U.S. interest rate leads to a decrease of 0.3% in developed economies GDP after three years, and to a 3% decrease in rentier economies GDP after three years, which is ten times larger than the effect on developed economies. To my knowledge, this paper is the first to quantify the spillover of a U.S. monetary policy shock on rentier economies and compare this spillover relative to the spillover on advanced economies. The large difference in spillovers suggests more attention to the transmission of U.S. shocks to rentier economies is warranted. In addition, I find that the vulnerability index is the most significant variable of the shocks' transmission to foreign economies.

² The advanced economies set includes 15 of the 25 countries included in Iacoviello and Navarro (2019).

The rest of this thesis is organized as follows. Section II provides an overview of how the U.S. economy relates to the world and provides some details on the structure of rentier economies. Section III includes an explanation of the channels of transmission of US monetary shocks to foreign economies. Section IV describes the data for the analysis. Section V includes the methodology that is used to measure the response of foreign economies to monetary policy shocks in the US. In Section VI, the main results are presented with discussion and interpretation of the observations. Section VII concludes the paper, and section VIII is the appendix that include additional results and additional details about the economic structure of the countries in the sample, and its economic ties with the US. Finally, section IX includes the references.

II. Overview of the Connectedness of the U.S. with the Rest of the World

This section first provides an overview of how the U.S. economy relates to the world and reviews some evidence on its influence on foreign economic activity. It then provides an overview specifically for rentier economies with some specific country examples.

1. The United States' Effect on the World Economy

In this section, the implications of developments in the U.S. economy due to its large size and great international connectedness are discussed. In general, the interconnectedness of the U.S. economy with the global economy is due to trade linkages, financial links, and commodity market links. The U.S. is the largest importer and exporter of goods and services and business services in the world (Kose et al., 2017). Imports to the U.S. are mainly manufactured goods, which account for over three-quarters, while the remainder is mostly comprised of oil products. The U.S. is the largest export destination for a fifth of the world economies (Kose et al., 2017). Another aspect of U.S. significance in trade and financial markets is the relative dominance of the U.S. dollar as the reserve currency. Additionally, 80% of the EMDE bond issuance and over half of the inter-region transfers of cash are in U.S. dollar denominations (Kose et al., 2017).

The U.S. is also a significant producer and consumer of commodities in the world. In recent years, the U.S. has managed to gain a top spot as a producer of oil and natural gas, totaling 13% of the world's total production (Kose et al., 2017). In the United States, production is evenly distributed between petroleum and natural gas (Kose et al., 2017). The U.S. is a leading producer of biofuel, accounting for 42% of global production as their policies require a minimum capacity of renewable fuels. On the other hand , according to the U.S. Energy Information Administration the U.S. imports around 9.14 million barrels of petroleum products a day, and consumes around 20.51 million barrels of oil per day, ³ which is almost 20% of the world's consumption.

The U.S. position in international trade and financial transactions makes it central to the global economy, with any internal change potentially having a ripple effect, more consequentially than any other nation, around the world. Antonakakis and Scharler (2012) suggest the U.S. business cycle is more interlinked with advanced economies than emerging and developing markets worldwide. However, Torres and Vela (2003) suggest Mexico is an exception of developing economies as it is directly affected by U.S. business cycles due to more significant linkages and integration. Notably, there has been marked correlation across countries during the last global recessions of 1975, 1982, 1991, and 2009, caused by challenges from all around the world, but with the most significant recessions originating within the United States.

The economic implications of policies and conditions in the U.S. market directly affect advanced economies, but the effect on emerging and developing markets depends on the

³ Oil includes crude oil, all other petroleum liquids, and biofuels.

underlying conditions. Growth in the U.S. economy that implies strengthening market conditions will positively impact emerging and developing market economies (Arteta et al., 2015). A less accommodative U.S. monetary policy indicates a weakening economic condition that will have adverse consequences on the emerging and developing economies (Arteta et al., 2015). Therefore, the United States' monetary policy can in theory alter other countries' economic conditions and the global economy at large.

2. Rentier Economies

Rentier economies believe in economic practices of monopolizing access to all types of properties, including financial, physical, and intellectual, in which profits are gained without contribution to society. A rentier economy has certain specific characteristics that define it. They typically have a significant source of resources to supply to parties outside the country in exchange for income. The state budget has significant portions flowing from external rents (Abdulla 1999). The domestic sector is characterized by minimal taxation on personal income and corporate earnings of the country (Abdulla 1999). Only a small portion of the country's workforce is engaged in rent production, while most of them participate in its utilization and distribution. The dominant feature of these countries is that the government is the chief recipient of the rents from commodities produced (Toledo 2013). In a rentier state, a form of social contract develops with artificial employment opportunities being provided to citizens while the government secures support and legitimacy (Herb 2005). A rentier economy benefits both citizens and the government and hence can achieve a significant level of stability.

Rentier states are most common in the Arabian Gulf countries. These countries are oilbased, with oil being a central backbone of their economies. The Middle East's oil-based economies emerged in the 1970s bringing new characteristics that sparked the rethinking of the

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rentier economy structure from a political and international relations perspective. For example, based on the threshold defined in this work, the United Arab Emirates qualifies as a rentier state as the UAE has over 77% of its economy based on revenues from oil exports (Toledo 2013). 67% of the country's population is employed in the public sector, with perks such as higher wage-earning and fewer working hours than those in the private sector (Toledo 2013). In Africa, countries such as Gabon, Nigeria, Angola, Uganda, Ghana, and South Sudan also fit the description of rentier states with significant income dependence from trading their natural resources outside the respective countries. The Appendix provides some detailed summaries of the economic structure of several rentier economies and how their economies are tied to the United States.

III. Channels of Transmission of U.S Monetary Policy Shocks to Foreign Economies

This section illustrates and explains three channels of interest rate transmission and why interest rates may affect foreign economies. The three channels work through the exchange rate, trade, and financial markets and are based on economic theory.

The exchange rate channel is based on the idea of "demand substitution between domestic and foreign-produced goods" (Iacoviello and Navarro, 2019). This idea implies that higher interest rates in the U.S will lead to a decrease in investment within the U.S., which may result in the expansion of investment activities abroad. Moreover, higher interest rates can lead to an appreciation in the U.S. dollar, which decreases the demand for U.S products and increases the demand for goods and commodities from other countries. Hence, with flexible exchange rates, GDP should rise in foreign countries. In contrast, for pegged economies, since a higher U.S. interest rate can increase the price of a U.S. dollar (shadow rate) and dollar investment, reserves in U.S. dollars can decrease. This in turn can lead to a devaluation of the local currency and a decrease in local GDP. Therefore, a country's exchange rate regime should explain an essential part of the GDP response variation in countries after U.S interest rate shocks.

The trade channel is based on the idea that high interest rates in the U.S will lead to a reduction in income and expenditures within the U.S. This will result in lower demand for imported and domestic goods and services, which will reduce GDP in the exporting countries. However, the effect on foreign countries' GDP will be related to those countries' trade exposure with the U.S. Therefore, the trade volume with the U.S should explain a significant part of the response in GDP in a particular country or group of countries following a U.S. interest rate shock. In other words, the increase or decrease in the interest rate in the U.S will have a more significant effect on the U.S.' primary trading partner's GDP.

The financial channel is based on the idea that U.S interest rate shocks in turn affect financial markets, particularly the prices of financial assets and liabilities held abroad, which in turn affect foreign economic activity (Iacoviello and Navarro, 2019). For economies that are cohesive with world markets, factors that prevent foreign borrowing and lending may increase the effect of U.S. monetary policy shocks, as they are unable to achieve intertemporal smoothing. Such preventative factors can be worse when the financial basics of a country are weak. In addition, the domestic monetary policy response may be restricted by high inflation rates that may also create political instability due to the worsening of the country's economic status. Furthermore, low foreign reserves or a significant deficit in the current account can increase foreign lenders' financial pressure.

While all these channels can affect the U.S. monetary transmission to any foreign economy, the degree to which they matter may differ across subsets of economies (for instance, industrial and rentier economies) due to the different economic structure , exchange rate regimes,

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and trade volume for countries in each subset. In the next sections, I analyze the effect of U.S. monetary policy shocks on various foreign economies and determine the extent to which each of these channels matters for the transmission.

IV. The Data

This section includes a description of the data used in this paper and its sources.⁴ To examine the effects of U.S. monetary shocks on foreign real GDP, I construct a dataset for 15 developed economies and 11 rentier economies, including the data of the United States. The data cover the period between 1985 and 2015, and the primary data used is at an annual frequency. However, it's essential to mention that working in a more frequent data will lead to better results, but due to limited availability of data especially for rentier economies I preferred to work with annual data between 1985 and 2015. GDP and U.S. GDP deflator data are extracted from the World Development Indicators database. The GDP data is in USD and in nominal values, and then the GDP of each country is divided by the US GDP deflator to get the real GDP for each country. Moreover, to measure U.S. interest rate shocks, data on the annual Federal Funds rate is used and extracted from the FRED database.

The second part of the analysis focuses on specific control variables that can determine the effect of U.S. interest rate shocks on the GDPs of developed and rentier economies. Therefore, I gathered data on (1) the exchange rate regimes of each country relative to the U.S. dollar, (2) trade openness with the U.S., and (3) financial variables to examine a particular country's financial health. Using this data, I constructed three measures: (1) exchange rate exposure, (2) trade exposure, and (3) external vulnerability index.

⁴ See the appendix for graphical presentation of some variables in the data, as well as for a summary statistical table.

The exchange rate regime is based on the discussion paper of Ilzetzki, Reinhart, and Rogoff (2017) and the implementation of Iacoviello and Navarro (2019). The exchange rate data is extracted from Lane and Milesi-Ferretti (2017). I constructed an index between 0 and 1 for each country and period. ⁵ The country closer to zero maintains a flexible exchange rate regime with respect to the U.S. dollar, and a value close to one indicates the country pegs the local currency to the U.S. dollar. After getting the index for each country, I dropped year to year changes greater than 25% in absolute value. I then obtained an average for each country over the time frame considered to determine the general nature of the exchange rate regime for each country.

To determine the trade openness with the U.S., I took the sum of exports to and imports from the U.S. divided by the country's GDP. Export and import data were extracted from the U.S. Census Bureau's online database, which are stated in nominal values of the U.S. dollars. These values are divided by the nominal GDP of each country. Then the higher the portion is, the greater the trade exposure.

The external vulnerability index's construction is based on Iacoviello and Navarro (2019). The index is constructed by taking an equally weighted average of four variables or indicators of the financial status of an economy. The first variable is inflation. For this variable, I used as a primary option the year-to-year change in the consumer price index, and as a secondary option the GDP deflator, if the CPI measure was not available. Inflation data comes from the World Bank indicators database. High inflation can indicate that the government suffers from a financing problem that may lead to political instability. Moreover, high inflation may lead to higher borrowing costs, making it suffer more from higher foreign interest rates, which could increase the

⁵ The scale to determine the value between 0 and 1 is tabulated in the appendix.

borrowing costs even more. Therefore, this variable may capture or explain a portion of the economic response to interest rate shocks.

The second variable is the current account deficit as a share of GDP, taken from the dataset of Lane and Milesi-Ferretti (2017), maintained by the IMF. This variable can reflect the capital inflow or outflow with respect to foreign interest rates. Higher foreign interest rates may trigger an outflow of capital if the deficit is high, and a high deficit may limit the foreign lending sources. Moreover, a high deficit may be an indicator of a severe crisis and impeding devaluation of the currency (see Claessens et al., 2010).

The third variable is external debt as a share of GDP, and the fourth variable is foreign reserves as a share of GDP, both taken from the dataset of Lane and Milesi-Ferretti (2017), maintained by the IMF. These two variables can give an insight into a country's financial status and explain the response of an economy to foreign shocks, since high debt relative to GDP will increase the actual vulnerability of a country and its tendency to suffer from a severe economic crisis (see Lane and Milesi-Ferretti, 2017).

V. Methodology:

This section explains the methodology used to measure the response to U.S. interest rate shocks in both developed and rentier economies. The methodology is adapted from Iacoviello and Navarro (2019). The procedure involves three steps:

- 1- Identify U.S. monetary policy shocks.
- 2- Estimate the U.S. monetary policy shocks' effect on U.S. GDP and foreign GDPs for both advanced and rentier economies.

3- Estimate the U.S monetary policy shocks' effect on foreign GDPs of developed and rentier economies while controlling for the following exposure variables: the exchange rate regime, trade openness, and vulnerability index.

I start by identifying U.S monetary policy shocks. To identify the shock, I regress the Federal Funds rate on several control variables (to mimic a Taylor-type rule) according to the following equation:

$$r_t = \alpha_0 + \alpha_1 Z_t + u_t \qquad (1)$$

where r is the Federal Funds rate, Z_t are the control variables, and u_t is the residual, which I interpret as the monetary policy shock. In the set of controls Z_{tt} , I first include the one-period lag of the Federal Funds rate. Next, I include the one-period lag of each of the following variables. The first variable used is inflation, measured by the GDP deflator. The second variable is log U.S. GDP. The third variable is the corporate spread measured by using "the difference between the Moody's seasoned Baa corporate bond yield and the 10-Year Treasury note yield at constant maturity". For the fourth variable, I took the log of a foreign GDP index constructed in the following steps: (1) calculate the year-over-year growth for each country, (2) calculate the weight of each country in every year of the total GDP of the countries in the sample, (3) use the first two variables to calculate a weighted average of each country for each year, and (4) cumulate the growth of the foreign GDP from year-to-year after adding the weighted average for each country in each year together. Finally, I include a linear and quadratic time trend.

After identifying the U.S. monetary policy shocks from the residuals of equation (1), I estimate the shocks' effect on U.S. GDP and the GDP of foreign countries in my sample, where the foreign countries are categorized into advanced and rentier economies, and the effect is estimated on each subgroup individually. It is essential to estimate the average response of U.S. GDP to the U.S. monetary policy shock and the average response of the foreign economies'

GDPs to the same shock, as this gives a foundation for comparing these general results (or average effects) to the specific results related to a particular international channel of interest rate exposure. To compute the average response, I use the local projection method developed by Jorda (2005), since using the local projection method helps measure the response of a variable to shocks in different time frames without imposing many structural restrictions. This method is adopted by different authors like Auerbach and Gorodnichenko (2013), Hwa et al (2016), and Iacoviello and Navarro (2019). The method consists of estimating a series of recursive regressions for each period after the shock, where the estimated coefficient of a control for the U.S. monetary policy shock represents the impulse response of a variable of interest to this shock.

To estimate the response of the U.S. GDP to the shock, I estimate the following equation:

$$Y_{t+h} = \alpha_h + \beta_h U_t + A_h Z_t + \epsilon_{t+h}$$
(2)

where Y_{t+h} is the log of U.S. GDP in year t+h, Ut is the monetary shock at time t, and Z_t is the set of controls that include a one-year lag of Y_t and a quadratic time trend. A plot of β_h reflects the average response of the U.S. GDP to the shock U_t . I include the response of U.S. GDP to allow for comparison with the responses of foreign GDP.

Next, I estimate the shocks' effect on different types of foreign economies' GDPs (developed and rentier). I do so using a panel version of equation (2)

$$Y_{i,t+h} = \alpha_{i,h} + \beta_h U_t + A_{h,i} Z_{i,t} + \epsilon_{i,t+h}$$
(3)

where $Y_{i,t+h}$ is the log GDP of country i in period t+h, $\alpha_{i,h}$ is the fixed effect for each country, $Z_{i,t}$ is a set of controls that include the one-period lag of GDP and a quadratic time trend. The response for each country is projected to the same shock U_t , so β_h measures the average response of GDP of the countries to the shock U_t . After estimating the average response of foreign GDP to a U.S. monetary policy shock, I estimate how the foreign GDP response depends on the exchange rate regime, trade exposure, and financial status, where the latter is represented by the external vulnerability index. To do so, I extend equation (3) to see the interaction between the shocks and the exposure variables through the following equation:

$$Y_{i,t+h} = \alpha_{i,h} + \beta_h U_t + \sum_{\nu \in V} \beta_h^{\nu} (e_{i,t-1}^{\nu} U_t)^* + A_{h,i} Z_{i,t} + \epsilon_{i,t+h}$$
(4)

To examine the high exposure of an economy to U.S. interest rate shocks, I consider a set of variables $v \in V$ where v is the high exposure. As mentioned in the Data section, I use the following exposure variables for the analysis: (1) the exchange rate regime, (2) trade exposure, and (3) financial exposure. Regarding equation (4), $e_{i,t-1}^{\nu}$ is the exposure index of variable v, and $(e_{i,t-1}^{\nu}U_t)$ is an interaction term of the exposure index and identified U.S. monetary policy shock constructed in the following five steps, which follow from Iacoviello and Navarro (2019):

- 1- Standardize the exposure variable $v_{i,t}$ by subtracting its mean and dividing by its variance. This step will help to put all variables in a comparable aspect, as emphasized by Auerbach and Gorodnichenko (2013).
- 2- Construct a logistic transformation of the standardized variable $v_{i,t}^s$ in the following form: $\vartheta_{i,t}^v = \frac{exp(vsi,t)}{1+exp(vsi,t)}$. This step allows one to consider the variables in distributional terms, and it is a simple approach to determine "the state-dependent effect of shocks" (see Auerbach and Gorodnichenko, 2017).
- 3- Reproduce $\vartheta_{i,t}^{v}$ within its distance between the 50th and 90th percentile in this approach: $e_{i,t}^{v} = \frac{\vartheta_{i,t}^{v} - \vartheta_{50}^{v}}{\vartheta_{90}^{v} - \vartheta_{50}^{v}}$ where ϑ_{p}^{v} is the percentile of $\vartheta_{i,t}^{v}$. This step helps determine the coefficients that are different from the median coefficient effect.
- 4- Construct the interaction term $(e_{i,t-1}^{\nu}U_t)$.

5- Orthogonalize $(e_{i,t-1}^{\nu}U_t)$ using a recursive procedure. For the variable exposure v_1 , I regress $(e_{i,t-1}^{\nu 1}U_t^r)$ on $(U_t, Z_{i,t})$, and obtain the residual $(e_{i,t-1}^{\nu}U_t)^*$. For v_2 , I regress $(e_{i,t-1}^{\nu 2}U_t)$ on $(U_t, Z_{i,t}, (e_{i,t-1}^{\nu 1}U_t)^*)$ to obtain the residual $(e_{i,t-1}^{\nu 2}U_t)^*$. I continue to follow the same approach for the remaining variable. This is a regression by successive orthogonalization (see Balli and Sørensen, 2013). This step helps in making a comparison with the results of equation (3).

For the final step noted above, I chose an order for the variables aligned with the channels' natural ability to account for interest rate spillovers. The exchange rate is ordered first since it the most straight-forward channel. The trade channel is ordered second since it also has a strong economic interpretation backed by theory. The financial channel is ordered last since it captures all remaining forces that operate through international linkages. According to Iacoviello and Navarro (2019), different orderings result in similar quantitative results for their sample.

In equation (4), β_h is the coefficient that measures the response to a U.S. monetary policy shock when the exposure variables are in their median level, and since the interaction terms are orthogonal to U_t, the β_h estimated in (3) and (4) are the same. Moreover, β_h^v is the marginal response to a U.S. monetary policy shock when the exposure index is high. Thus, $\beta_h^v + \beta_h$ is the response to the U.S. monetary policy shock when the exposure variable is high. This is the main variable of interest for the results in the next section.

Before proceeding to the results, since the current analysis follows the procedure of Iacoviello and Navarro (2019), it is worth noting some changes in the current approach relative to their initial study. First, I consider an annual frequency, instead of quarterly, due to the lack of quarterly data availability for several variables and especially for rentier economies.⁶ Second, the time frame of my analysis is 30 years (1985 to 2015), which is shorter than the 1970-2015 time frame of Iacoviello and Navarro (2019). My time frame is shorter due to the lack of data for rentier economies before 1985.Because of these differences, I include a partial replication of Iacoviello and Navarro (2019), validating their results, and then extend the analysis to cover a new sample of rentier countries not previously covered by the literature.

VI. Results and Discussion:

In this section, I present the results according to the previous methodology. I first display impulse response results and then discuss the results in terms of theory and the previous literature.

1. Identified Monetary Policy Shocks

Figure 2 shows the U.S. monetary policy shocks obtained from equation (1). For the positive shocks, there are five large shocks in the years 1989, 1995, 2000, 2008, and 2009. These five shocks are above 0.675 (which is roughly equal to the average of all the positive shocks). Similarly, there are four large negative shocks in 1991, 1993, 2004, and 2011. These four shocks are below -0.675 (which is roughly equal to the average of the negative shocks). The standard deviation for all shocks is 0.88.

⁶ While Iacoviello and Navarro (2019) perform their analysis at a quarterly frequency, they also suffer from a lack of quarterly data availability. These authors chose to interpolate annual data to quarterly frequency. Due to the short data sample, I chose to work with the original annual data, so that the results would not be biased from an interpolation procedure.

Next, the identified shocks in Figure 2 are used to estimate the U.S. GDP's response,

developed countries' GDP response, and rentier economies' GDP response to a 1 percent increase in the U.S. interest rate.

1. General Response to Interest Rate Shocks:

This section presents the general response of U.S. GDP and foreign GDPs (rentier and developed) to the interest rates shocks in the U.S., according to equations (2) and (3). This shows if the U.S. monetary policy matters within and outside the U.S. Results are interpreted and discussed in terms of theory and the previous literature.



Figure 2 shows the U.S. monetary policy shocks obtained from equation (1). The dotted lines represent the average of either the positive or negative shocks which is roughly 0.675 and -0.675.



Figure 3: The response of the US GDP to a 1 % increase in interest rates within the US. The upper and lower bands represent +Std and -Std. The dotted area denotes 68% confidence interval.

Primary economic schools like the classical (e.g., Ricardo, 1817), neoclassical (e.g., Marshall, 1890), Keynesian (Keynes, 1936; Hicks, 1937; Tobin, 1969), monetarist (Brunner and Meltzer, 1971; Friedman, 1970), and new classical (Lucas, 1975) all support the idea that lower interest rates boost economic growth, and vice versa. (Lee and Warner, 2018).

Figure 3 shows that a shock to the U.S. the interest rate that increases the interest rate by 1% results in a direct decrease in GDP that reaches 0.3 % after two years of the shock. In addition, U.S. GDP starts recovering after three years from the shock. The dashed lines in Figure 2 denote the one standard deviation bands from the shock. Similarly, for a negative shock of 1%, the GDP will increase by 0.3% after two years of the shock and will decline after the third year of the shock. This result is consistent with the theory stating that an increase in the interest rate will increase the cost of investment, negatively impacting GDP, and vice versa for a decrease in interest rates (see for instance Bernanke and Kuttner, 2003). Moreover, the result in Figure 3 is

consistent with the finding of Iacoviello and Navarro (2019) that the U.S. GDP experiences a drop of 0.7% two years after the shock., which indicates that interest rate shocks matter in determining the U.S. economy's business cycle. More generally, the results of Figure 3 are consistent with previous findings of Samuel and Nurina (2015), and Saymeh and Orabi (2013) that validate the inverse relationship between interest rates and GDP growth.

Figure 4 shows the average response of developed economies' GDP to a 1% increase in interest rate within the U.S. The response is like the U.S. response, but with a delay. Two years after the shock, developed economies' GDP starts to decline to reach a decline of 0.3% over time, with no recovery arriving after four years from the shock. This result is consistent with Iacoviello and Navarro's (2019) findings that advanced foreign countries' GDPs drop by 0.5% three years after the shock in the U.S., which validates the U.S. monetary policy shocks' impact on foreign developed economies. Moreover, Figures 3 and 4 show that the U.S. and developed economies experience the same GDP reduction in percentages. This validates a strong link and

synchronization in the business cycles of the U.S. and advanced foreign economies documented by Antonakakis and Scharler (2012).



Figure 4:The response of the Developed Economies GDP to a 1 % increase in interest rates within the US. The Upper and lower bands represent +Std, and -Std. The dotted area denotes 68% confidence interval.

Figure 5 shows the average response of rentier economies to a shock from U.S. monetary policy. The results show that foreign rentier economies experience a drop in GDP growth directly after the shock, and the reduction continues to reach almost 3% (ten times the effect in the U.S.) after three years, after which a recovery starts. There is no previous literature that documents findings on the U.S. shocks' effect on my sample of rentier economies to the best of my knowledge. Thus, Figure 5 confirms the significant and direct impact rentier economies experience from a contractionary shock in the U.S.



Figure 5: The response of the Rentier Economies GDP to a 1 % increase in interest rates within the US. The Upper and lower bands represent +Std, and -Std. The dotted area denotes 68% confidence interval.

2. Foreign Response with Respect to the Channels of Transmission (Exposure Variables)⁷

As mentioned earlier, three channels of transmission for the interest rate shocks are examined in equation (4) to determine if high exposure matters for the GDP response of foreign economies. through

i. Developed Economies:

Figure 6 shows the GDP response of developed economies with a dollar peg or a fixed exchange rate regime. The results show that a country with a fixed exchange rate regime will

⁷ Since the set of counties with high exposure can change from one year to another, it is not easy to list the set of high exposure countries. However, the appendix includes some country or region specific results that may give an insight regarding how particular results vary for a specific country more exposed along certain dimensions (for example, Canada's high trade exposure).

start experiencing a 0.2% drop in GDP 1 year after an interest rate shock of 1% in the U.S., which is one year earlier than the general response of developed economies. However, one year after the decline, the response reverses, which is not the case for the median response where the decline continues to take place for more than four years after the shock. Thus, the decline starts to appear earlier in the fixed exchange rate regime, but the recovery is much faster.



Figure 6 The response of Developed Economies with Fixed Exchange rate regime GDP to a 1 % increase in interest rates within the US. The Upper and lower bands represent +Std, and -Std. The dotted area denotes 68% confidence interval.

Figure 7 shows the response of developed economies with high trade exposure with the U.S. The results show that there is no significant decline in GDP for those countries. Therefore, the trade channel is not considered a significant channel for foreign shock transmission for developed economies.

Figure 8 shows the developed economies' response with a high vulnerability index to interest rates shock in the U.S. The result shows that an increase of 1% in interest rates in the U.S. will lead the most vulnerable countries to start experiencing a drop in GDP one year after the shock to reach a decrease of 1% two years after the shock, when a recovery starts. However, this channel has the most significant decline in GDP, and even during the recovery period four years after the shock, the GDP growth is still below the average response. Therefore, Figure 8 shows that the vulnerability index's financial channel is the most significant channel for the transmission of U.S. shocks to developed economies



Figure 7 The response of Developed Economies with High trade exposure to the US GDP to a 1 % increase in interest rates within the US. The Upper and lower bands represent +Std, and -Std. The dotted area denotes 68% confidence interval.



Figure 8 The response of Developed Economies with high vulnerability index GDP to a 1 % increase in interest rates within the US. The Upper and lower bands represent +Std, and -Std. The dotted area denotes 68% confidence interval.

ii. Rentier Economies

Figure 9 shows the response of rentier economies with a dollar peg or fixed exchange rate regime. The results show that the GDP decline occurs directly after the shock for the high (dollar peg) and average responses. However, for the dollar peg, the GDP declines by 3% one year after the shock, while in the average response, it takes three years after the shock to reach a decline of 3%. Although the decline is much faster for the dollar peg case, the recovery is much faster. Three years after the shock, economies with fixed exchange rate regimes are fully recovered, but for other exchange rate regimes, three years after the shock, the recovery still has not started. Therefore, the exchange rate regime channel is significant in the duration of transmission of U.S. monetary shocks to rentier states.



Figure 9 The response of the Rentier Economies with Fixed Exchange rate regime GDP to a 1 % increase in interest rates within the US. The Upper and lower bands represent +Std, and -Std. The dotted area denotes 68% confidence interval.

Figure 10 shows the response of rentier economies with high trade exposure with the U.S. The results show that there is no significant decline in GDP for those countries. Unlike the general response that shows that rentier states experience a drop of 3% in GDP after three years of the interest rate shock in the U.S. Therefore, the trade channel is not considered a significant channel for foreign shock transmission to rentier economies.

Figure 11 shows rentier economies' response with a high vulnerability index to the U.S interest rate shocks. The graph shows that rentier states with the most vulnerable financial status experience a substantial drop in GDP of almost 2.5% after one year, while a full recovery occurs three years after the shock. Therefore, financial vulnerability is a significant channel for the transmission of U.S. monetary policy shocks.



Figure 10: The response of the Rentier Economies with high trade exposure with the US GDP to a 1 % increase in interest rates within the US. The Upper and lower bands represent +Std, and -Std. The dotted area denotes 68% confidence interval.



Figure 11 The response of the Rentier Economies GDP with high Vulnerability index to a 1 % increase in interest rates within the US. The Upper and lower bands represent +Std, and -Std. The dotted area denotes 68% confidence interval.

iii. Remarks:

The exchange rate regime channel is a significant channel for transmitting the U.S. monetary shocks for both developed and rentier economies. In general, fixed exchange rate regimes are affected faster by the shock for different economies and experience a faster recovery. However, the magnitude of the impact is similar to the average response, but the durations are different. These findings conclude that countries with more flexible exchange rate regimes may have more time to react to the shock and may not suffer like countries with fixed exchange regimes since the effect is distributed over a longer horizon. The findings confirm that countries that peg to the U.S. dollar will suffer more from a positive shock to interest rates in the U.S. (and vice versa for a negative shock), but with different magnitudes depending on the economy's nature. Finally, the results are consistent with the theory mentioned in the channels section above and with lacoviello and Navarro's (2019) findings.

The trade channel is not significant for transmitting the U.S. monetary policy shocks to both rentier and developed economies as the results showed a minimal change in GDP for countries with high trade exposure to the U.S. This finding contradicts the theoretical idea behind the trade channel stated earlier. Finally, the findings are not consistent with the previous literature that claims that trade exposure accounts for a significant part of the spillover of foreign shocks (e.g., Erceg et al. 2005).

The financial channel is the most effective channel for transmitting the U.S. monetary policy shock to foreign economies (rentier and developed). Countries with a high vulnerability index react faster and with higher magnitudes to the U.S. monetary policy shock regardless of the economy's nature. These findings are consistent with Iacoviello and Navarro's (2019) previous

finding and the theoretical idea mentioned in the channels section. The faster the impact of foreign shocks on the country's financial status, the faster the impact of foreign shocks is observed, where rentier economies experience a faster and more significant impact than developed economies.

Given the large response of the U.S. shocks on rentier economies illustrated in figures 5, 9, and 11. I used a version of equation (2) to determine the effect of U.S. shocks on oil prices, since oil revenues is a significant source of revenue for countries in the sample, and consumption of raw materials including oil decreases sharply after a recession hits the U.S. (Matos, 2000). For this regression, I use data on imported oil prices to the US extracted from the OECD database as an indicator of oil prices. Although there is a slight difference in imported oil prices between countries each year, the general movement of the prices from one year to another is the same worldwide and strongly correlated with my measure. Figure 12 shows that a shock in the U.S. leads to a decrease in oil prices by almost 3%. Thus, Figure 12 validates the significant impact rentier economies experience from a contractionary shock in the U.S., since a decrease in imported oil prices within or outside the U.S. directly leads to a decrease in revenues for rentier states---especially oil base economies---which is reflected in their GDPs. However, this finding raises a concern regarding the trade exposure result for rentier economies (Figure 10). Since the results represented in figure 12 suggest that trade exposure should matter for rentier economies since a decrease in oil prices will be directly reflected in the value of exports of rentier economies to the U.S. (Imports to the U.S.). In this paper the trade exposure measure is bilateral exports + imports. So even though exports of a country (imports to US) could decrease, at the same time imports of a country (exports from US) could decrease in case the US has a contractionary shock. . Therefore, to see if trade really matters, I suggest looking into exports

from rentier economies alone to get a better insight regarding the shock transmission from the US to rentier economies through the trade channel.



Figure 12:The response of imported oil prices to a 1 % increase in interest rates within the US. The Upper and lower bands represent +Std, and -Std. The dotted area denotes 68% confidence interval.

VII. Conclusion

Interest rates in the U.S. play a significant role in determining the business cycle around the world, which shows the economic power of the U.S. in the global economy. This research validated previous findings related to the impact of interest rates on domestic business cycles and confirmed the negative relationship between interest rates and GDP growth. The research validated the impact of monetary policy shocks in the U.S. on foreign developed economies and developed a foundation for the impact of the shocks on rentier economies that was not studied or examined before. The results show that rentier and developed economies have similar qualitative responses but different quantitative results relative to the spillovers to foreign developed economies. Furthermore, the research validated the effectiveness of the exchange rate regime channel and financial exposure channel in transmitting U.S. domestic shocks to foreign economies. The results also raise a concern about the effectiveness of trade exposure for the transmission of foreign shocks. Moreover , the short time frame and limited availability of more frequent data (i.e., monthly or quarterly) may be a limitation facing the results, especially for rentier economies, so it is recommended that a future replication with a longer time frame be considered for better and more precise results.

Finally, several research questions follow from the analysis. For instance does the political power of the U.S. have a real role in the economic impact on the global economy, or it is just that the size of the U.S. market leads to its world economic impact? Do recessions in other countries that have considerable spillover effects (such as China, Russia, or the euro-zone) lead to a drop in GDPs of foreign economies also? Do interest rates on other major currencies have the same impact as the interest rates on the U.S. dollar? I leave these questions for future avenues of research.

VIII. Appendix:

This section of the appendix includes extra results, and some data plots, and tabulation. The figures show the average response of specific countries or groups of countries to monetary policy shocks in the U.S. For instance, as seen in figure 13 Canada started experiencing a drop in GDP directly after a monetary policy shock hits the U.S. and experienced a drop of 0.25% three years after the shock. Its recovery from the shock starts after the third year. This shows that a shock in the U.S. has almost the same impact in the U.S. and Canada and that the business cycle of both countries is very synchronized. The Euro-zone countries (figure 16) in my sample experience a direct drop in GDP after a monetary shock occurs in the U.S., but the drop is much slower to reach 0.3% four years after the shock. This shows that a monetary policy shock in the U.S. has almost the same impact on Canada, and the euro-zone countries, but the business cycle of the euro-zone countries is less synchronized with the U.S. in comparison to Canada following a U.S. monetary policy shock. Moreover, as seen in figure 15 Scandinavian economies start to experience a drop in GDP one year after a monetary policy shock occurs in the U.S. but experience a continuous drop that reaches 0.75% four years after the shock. This shows that the impact of the shock in the US is greater on Scandinavian countries, but the business cycle of the Scandinavian countries is the least synchronized with the U.S. in comparison to Canada, and the Euro-zone. Finally, the response of the GCC economies (figure 14) to the monetary policy shock in the U.S. is very similar to the response of rentier economies in general. This validates the previous findings documented in the results section on rentier economies and confirms that the U.S. economic status plays a significant role in determining the business cycle in oil-based economies like the GCC, and in rentier economies in general.

	Advanced economies			Rentier economies		
	5%	Median	90%	5%	Median	90%
Dollar Peg	0	0.35	1	0	1	1
Trade	2.1%	4.1%	32.7%	0.0%	3.8%	19.3%
Vulnerability	7.5%	25.5%	91.1%	6%	18%	38.9%

Table 1: This table is the summary statistics for the Exposure Variables.

% change of exchange rate value from year to	Given Value between 0 and 1
another	
0-1%	1
1.01% - 2%	0.95
2.01% - 3%	0.8
3.01% - 4	0.6
4.01% - 5	0.5
5.01 % - 6%	0.35
6.01% - 25%	0

Table 2: This table shows the scale for the index that determine the exchange rate regime for each country in the sample of study.



Figure 13 the response of the Canadian GDP growth to a 1% increase in the U.S interest rates. The Upper and lower band represent +Std, and -Std. The area between the dotted lines denotes a 68% confidence interval.



Figure 14 the response of the GCC GDP growth to a 1% increase in the U.S interest rates. The Upper and lower bands represent +Std, and -Std. The area between the dotted lines denotes a 68% confidence interval.



Figure 15 the response of the Scandinavian GDP growth to a 1% increase in the U.S interest rates. The Upper and lower bands represent +Std, and -Std. The area between the dotted lines denotes a 68% confidence interval.



Figure 16 the response of the Euro-Zone GDP growth to a 1% increase in the U.S interest rates. The Upper and lower bands represent +Std, and -Std. The area between the dotted lines denotes a 68% confidence interval.



Figure 17 Plot of the US Federal Fund Rate (1985-2015)



Figure 18 Plot of US FED rate VS GDP Growth (1985-2015)

This section of the appendix includes extra details about the economic structure and economic ties with the U.S. for some countries of my sample of study.

Saudi Arabia:

The country's global significance stems from its leadership of Islamic religion and the vast oil reserves. Ties between Saudi Arabia and the United States have survived strategic conflicts since the 1940s for various reasons due to shared economic and strategic interests such as the Sunni Islamic extremists and Iranian government policies ("U.S.-Saudi Arabia Relations," 2020). The U.S.-Saudi Arabia relationship is strengthened by the common interests in regional security and oil ("U.S.-Saudi Arabia Relations," 2020). The relations between the two countries have grown under the leadership of U.S. President Donald Trump and Saudi's de facto leader Mohammed bin Salman ("U.S.-Saudi Arabia Relations," 2020). The relationship continues to strain due to issues such as the killing of journalist Jamal Khashoggi.

Over the years, the United States has allied with Saudi Arabia. The first ties can be pointed to a vested interest in the oil industry and subsequent government contractors between respective governments and leaders ("U.S.-Saudi Arabia Relations," 2020). The Standard Oil Company, currently known as Chevron, has had oil mining rights in eastern Saudi Arabia, with the first discovery in 1938 ("U.S.-Saudi Arabia Relations," 2020). Currently, Saudi Aramco runs oil exploration as a Saudi government-owned corporation with various United States companies.

Saudi Arabia has the largest crude oil reserves in the world. The country's oil production is estimated at 10.7 million barrels a day, with 7.43 million being exported ("U.S.-Saudi Arabia Relations," 2020). The country's oil reserves and pioneer position in the Organization of Petroleum Exporting Countries (OPEC) give it autonomy in the energy market ("U.S.-Saudi Arabia Relations," 2020). The strategic importance of Saudi Arabia makes it a central and ongoing concern in U.S. foreign policy over the years ("U.S.-Saudi Arabia Relations," 2020). Saudi Arabia and the United States have economic ties that pull together or apart, depending on the strategic importance to respective countries regarding oil and security.

Iran:

There are no formal diplomatic relations between the United States and Iran since April 1980. The relationship between the two countries is kept by Pakistan, serving as Iran's protecting power, and Switzerland as the U.S.'s protecting power (Yorke 2020). A significant component of Iran's economy is oil, evidenced by its founding position in the Organization of Petroleum Exporting Countries (OPEC) (Yorke 2020). Iran and the other parties, including Saudi Arabia, formed the bloc to rival western companies in the oil sector and affirm their autonomy over domestic reserves of oil (Yorke 2020). The 1970s were when the OPEC countries' profits skyrocketed, giving them significant economic leverage in global economics. Iran's position in the market made it a vital ally to the United States.

Iran's economy is based on oil, and relations with the United States are centered on shared interests in the oil industry and regional security. U.S. president in 1972, President Nixon met with Iran's shah while visiting the country to establish security interests in the middle east ("U.S. Relations with Iran, 1953–2020", 2020). A change of regime brought to power authority that was against western interference. U.S-Iran relations continued to deteriorate through subsequent events, including the capture of fifty-two Americans by Iranian college students demanding the shah's extradition, a stalemate that lasted for 444 days ("U.S. Relations with Iran, 1953–2020", 2020). In the Iran-Iraq war, the U.S. supported Iraq, and in a Beirut attack, U.S. soldiers were killed, leading to Iran's branding as a sponsor for Terrorism in 1984 ("U.S. Relations with Iran, 1953–2020", 2020). The United States' relations with Iran continued to deteriorate over the years with the intensification of sanctions between 1992 and 1996. The ties between the two countries deteriorated over the years, with a considerable worsening of Iran's economy due to sanctions stemming from the United Nations.

Venezuela

Venezuela's economy is centrally planned and directed, with the government leading the production and distribution of goods. Venezuela's economy is based on the petroleum industry and manufacturing industries ("U.S. Relations with Venezuela - United States Department of State," 2020). Venezuela is a rentier economy that is dependent on oil exports as a significant source of revenue. Venezuela's economy has drastically deteriorated since the mid-2010s due to corruption, closure of companies, authoritarianism, high dependence on oil, declining productivity, and gross economic mismanagement ("U.S. Relations with Venezuela - United

States Department of State," 2020). Venezuela is the sixth largest OPEC member in terms of the volume of oil produced. The country has experienced hyperinflation since 2015. The collapse of oil prices in the 1980s saw the country's economy contract, a devaluation of their currency, and skyrocketing inflation reaching 84% in 1989 and 99% in 1996 ("U.S. Relations with Venezuela - United States Department of State," 2020).

The United States recognizes Venezuela's interim president Juan Guaido. The U.S. offers assistance to Venezuela to protect human rights, the creation of civil society, strengthening democracy, transparency, and accountability in the country ("U.S. Relations with Venezuela -United States Department of State," 2020). Before president Guaido, the U.S. determined that Venezuela under the Maduro regime had failed to adhere to drug control obligations as mandated under the counter-narcotic agreements ("U.S. Relations with Venezuela - United States Department of State," 2020). In response to President Guaido's calls, the United States has provided over \$856 million since 2017; \$611 million in the form of humanitarian assistance and \$245 million in economic and development aid ("U.S. Relations with Venezuela - United States Department of State," 2020). Before suspending diplomatic relations, the U.S. was Venezuela's largest trading partner with a capacity of up to \$3.2 billion in 2019. Venezuela imports refined petroleum products, organic chemicals, machinery, and agricultural products and exports crude oil to the United States ("U.S. Relations with Venezuela - United States Department of State," 2020). Venezuela made it to the top five suppliers of crude oil to the U.S. before imposing taxes ("U.S. Relations with Venezuela - United States Department of State," 2020). Bilateral relations between the United States and Venezuela could improve with the recognition of the new regime. The U.K.

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United Kingdom's economy is a market-oriented and highly developed social market economy. It is the sixth-largest economy in the world by gross domestic product (GDP) metric; by purchasing power parity, it is the ninth-largest and twenty-second largest by GDP comprising 3.3% of the GDP of the world ("U.S. Relations with the United Kingdom - United States Department of State," 2020). It is the fifth-largest importer and tenth largest exporter in the world. It is a globalized economy compromising England, Wales, Scotland, and Northern Ireland ("U.S. Relations with United Kingdom - United States Department of State," 2020). The U.K. economy has slowly climbed the ranks of free economies in the last decade, with Brexit causing confusion that led to a slight decline in the economy ("U.S. Relations with United Kingdom -United States Department of State," 2020). UK is the U.S.'s closest cultural and political partner since its independence.

The bilateral economic relations between the United States and the United Kingdom are founded on shared democratic ideals and values. The two countries are the world's first and fifth largest globally ("U.S. Relations with the United Kingdom - United States Department of State," 2020). The bilateral ties are based on mutual trade and investment. Both share a commitment to creating free markets ("U.S. Relations with the United Kingdom - United States Department of State," 2020). The two countries' annual trade is valued at over \$260 billion in goods and services. Over 1.2 million U.S. citizens work for U.K. companies based in the United States. Over 1.5 million Britons are under U.S. companies' direct employment ("U.S. Relations with the United Kingdom - United States Department of State," 2020). The top exports from the United States to the United Kingdom include machinery, aircraft, agricultural products, and financial services ("U.S. Relations with United Kingdom - United States Department of State," 2020).

South Korea

South Korea has a mixed economic structure where centralized planning by the government is combined with personal freedom. South Korea is rated averagely free in the long run with an above-average performance on the freedom index in the last eight years ("South Korea-U.S. Economic Relations," 2020). The economy is characterized by a dynamic private sector constituting a well-educated workforce and a high capacity for innovation capitalized on openness to investment and global trade ("South Korea-U.S. Economic Relations," 2020). South Korea is one of the most significant partners with the United States in Asia. Over the years, the U.S.-South Korea economic interaction has been characterized by disagreements on policies governing trade and the respective economies ("South Korea-U.S. Economic Relations," 2020). However, as from the 1980s, the conflicts have reduced significantly, mainly attributable to South Korea's decision to adopt reforms in exchange for \$58 billion from the IMF after the near-crash of their economy in 1997 ("South Korea-U.S. Economic Relations," 2020). There have been fewer disagreements and more significant economic relations in recent years through trade agreements and arrangements between them.

Recently, goods and services imported by South Korea from the United States amounted to \$81 billion, while exports to the United States totaled \$90.9 billion. The entry of the KORUS FTA into force boosted bilateral trade between the two countries of service exports from the United States, with auto imports having a tremendous increase ("South Korea-U.S. Economic Relations," 2020). The two countries negotiated modifications to the KORUS FTA in 2018, with South Korea agreeing to several concessions that have eased bilateral trade tensions between South Korea and the United States. ("South Korea-U.S. Economic Relations," 2020).

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Canada

Canada's economy is a highly advanced market economy. It is the tenth-largest by GDP and 16th largest by purchasing power parity. A significant part of its economy is the service sector that employs over 75% of Canadian citizens (Canada - OECD Data 2020). The service industry contributes 69.8% to the country's GDP; industries are second at 28.5%, and agriculture is at 1.7% ("Canada - OECD Data " 2020). The three major sectors in Canada's economy are the services, manufacturing, and natural resource sectors. There is a close trade relationship between the United States and Canada. Canada is the largest consumer of commodities from the United States, purchasing a volume exceeding that of the United Kingdom, China, and Japan. Canada is also the top trading partner in most of the states in the United States.

Canada is the largest foreign supplier of oil, natural gas, and electricity to the United States. Almost 40% of the crude oil imported by the United States is obtained from Canada according to 2014 statistics. Canadian companies directly employ approximately 825,000 Americans ("U.S.- Canada Economic Relations," 2020). The two countries have several trade agreements covering their vested interests in various industries and other regions worldwide. The implementation of the North American Free Trade Agreement in 1994 saw the growth of trade ties between the two countries, with trade volume growing to over double the capacity in previous periods ("U.S.- Canada Economic Relations," 2020). The two countries trade over \$2 billion in goods and services every day. The U.S.-Canada economic relationship is valued at \$1.4 trillion, comprising of trade and investment transactions. The two-way trade accounts for roughly \$759 billion, and bilateral investment accounts for \$698 billion of the relationship, according to 2014 statistics ("U.S.- Canada Economic Relations," 2020). The U.S. exports a total of \$375 billion to Canada, which is 16% of the country's total imports, and Canada is the top importer of goods from 35 of the U.S. states ("U.S.- Canada Economic Relations," 2020).

Advanced	Rentier
1. Australia	1. Alergia
2. Austria	2. Irán
3. Canadá	3. Kuwait
4. Denmark	4. Libia
5. Finland	5. Omán
6. Germany	6. Qatar
7. Ireland	7. KSA
8. Japan	8. SYRIA
9. Netherlands	9. UAE
10. Norway	10. Venezuela
11. Korea	11. Yemen
12. Sweden	
13. Switzerland	
14. UK	
15. USA	

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