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Exchange Rate Movements and Economic Activity: The Role of Trade and Financial Channels

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Abstract

The paper analyzes the impact of exchange rate movements on economic activity for a panel of countries from 2002 to 2021. By introducing a novel approach of considering the asset side of banks' balance sheets in addition to their liabilities, the paper analyzes the importance of considering banks' net financial position to determine the significance of the financial channel through which exchange rate fluctuations impact output. The results confirm the importance of both - trade and financial channels - in driving the impact of exchange rate movements in the economic activity, yet the direction and magnitude of the financial channel is contingent upon banks' net financial position, corroborating the noteworthiness of analyzing both sides of banks' balance sheets.

Keywords: Exchange rate movement, Output, Panel Estimation, Financial Channel, Trade Channel.

JEL Classification: E31, E32, E52, F31

1 Introduction

Fluctuations in exchange rates have consistently been a significant area of concern in several economies. This significance is evident in daily newspapers, which frequently cover exchange rates changes due to their direct influence on individuals' lives and business operations. The conventional wisdom rooted in standard open macroeconomic models, such as the Mundell-Fleming model, posits that a depreciation of the local currency has an expansionary effect. The rationale behind this is straightforward: a depreciation in the local exchange rate makes the local tradable goods more affordable, thus stimulating foreign demand. Simultaneously, imported goods become more expensive, which suppresses domestic demand for these goods. This dynamic results in an increase in net exports, thereby boosting the economy. Yet, the contractionary impact of domestic depreciations episodes cast doubt on this positive link between economic activity and the exchange rate. Other factors also play a role on the dynamics of output after exchange rate movements.

One additional impact of fluctuations of the exchange rate on activity would come from the role of the exchange rate on the balance sheet of the private sector. Firms and banks might have its assets and liabilities denominated in foreign currency and any local currency movement will impact their balance sheet, and consequently investment and output. In times of more financial integration, it is possible that this financial channel to play a more critical role than the traditional trade channel.

It's noteworthy that when formulating a measure for the financial channel, papers often focus solely on the liability side of the balance sheets of banks and firms. Implicit in this approach is the assumption that foreign currency liabilities predominantly outweigh foreign currency assets, as stressed by Avdjiev et al. (2017). However, neglecting claims [1] may not fully capture the impact of the financial channel, since the claim side of the balance sheet could act as a financial buffer against exchange rate movements—particularly when a country's foreign assets greatly exceed its liabilities.

This paper moves forward by incorporating foreign claim into the analysis and investigating their significance in the financial channel. To enrich the existing literature and explore the relevance of the foreign currency claims side of balance sheets for banks, we propose a new measure for examining the financial channel. Therefore, the paper evaluates the financial channel by analyzing the foreign currency position of banks in local currency within each country analyzed. Differently than in other papers in the literature, in addition to the liability of the banks, we also consider the claims side of the balance sheet when evaluating the financial channel of exchange rate fluctuations.

The results show that both channels - trade and financial channels - contribute to the impact of the exchange rate on economic activity. Yet, by considering the asset side of banks' balance sheets in addition to their liabilities, the paper finds that the size and magnitude of the financial channel depends on the net financial position of the banks. Net creditors in foreign currency observe a positive impact of currency depreciations, indicating that a local currency depreciation undoubtedly enhances economic activity in these countries. In opposition, net debtors in foreign currency observe a fall in the economic activity after currency depreciations due to the negative financial channel. The paper also shows that the symmetry in the response for appreciations and depreciations and nonlinearities in the response also depends on the net financial

[1] One should note that we use the claims name instead of the usual assets name. This is because the balance sheet showed by the BIS shows explicit Claims instead of Liabilities and also because Claims represents assets liabilities equity. According to BIS the claims side represents how much banks located in a particular country lend to borrowers in other countries.

position of the banks; therefore, the paper highlights the importance of considering the claims side of banks' balance sheets when analyzing the financial channel resulting from exchange rate fluctuations. The paper is organized as follows: in section 2 we discuss the literature on the relationship between exchange rate movements and economic activity mainly focusing on the financial channel. In section 3 we explain the data and the econometric methodology. The results are shown in section 4 followed by some robustness exercises. Section 5 concludes.

2 Literature Review

The trade channel states that an exchange rate depreciation stimulates the economy through the improvement in the trade balance. As pointed out by Kearns and Patel (2016), the significance of the trade channel will depend on different factors like the impact of exchange rate movements on traded goods prices and volumes, and the trade share of the economies.

Regarding the financial channel, there are two primary interpretations of its source in the literature: (1) a currency mismatch in firms' or banks' balance sheets, and (2) an increase in foreign funding costs affecting domestic financial conditions. While both interpretations usually lead to contraction (expansion) in domestic activity following a local currency depreciation (appreciation), they differ in their specific operational channels. For example, foreign funding becoming more costly following significant local currency depreciation weakens foreign-currency domestic borrowers' balance sheets and deteriorates domestic financial conditions. Conversely, a currency mismatch directly erodes local banks' and firms' balance sheets, slowing domestic economic activity via a balance sheet effect[2].

The relationship between exchange rate movements and financial conditions is well-explored in many studies. Factors such as expectations about future exchange rate movements, the U.S. interest rate, the global economic outlook, and the local currency's position often determine the incentive to source resources abroad.Kohn et al. (2020) examined how exports respond to large depreciations. Assuming the existence of financial frictions and foreign-denominated debt within a general equilibrium model, they found that exports are negatively impacted following significant real depreciations.

Bruno and Shin (2015) found evidence that the banking sector's leverage is influenced by currency appreciation. In countries with expansionary financial conditions and appreciating local currency, the banking sector's leverage increases, amplifying the financial channel of exchange rate movements through the balance sheet effect. U.S. monetary policy also plays a role, as the risk-taking channel may become prominent under specific conditions. Bruno and Shin (2014) argued that the easing of financial conditions in the advanced world over many years led emerging countries to borrow abroad. In such a scenario, any interest rate hike would have a more significant impact on emerging countries, given their high levels of dollar-denominated debt. Bebzuck et al. (2006) highlights the impact of exchange rate movements on consumption and investment decisions in countries with high levels of dollar-denominated external debt.[3]

Kearns and Patel (2016) introduced a measure called the Debt-Weighted Exchange Rate

[2]It's worth noting that in the literature, the term 'risk-taking channel' is often used when domestic firms' balance sheets are sensitive to exchange rate changes. This term is frequently used interchangeably with 'financial channel', given the close link between currency mismatch and the importance of foreign funding in the domestic economy.

[3]The significance of currency mismatches decreases if firms are hedged against exchange rate fluctuations. However, in countries where financial restrictions are a major concern, such financial instruments may not be readily available.

(DWER) to highlight how the financial channel goes through the influence of exchange rate movements on foreign funding availability and cost, subsequently affecting domestic economic activity. The DWER is an index that weighs the total foreign currency-denominated debt using the five major currencies. Therefore, it is postulated that the financial channel operates through a negative correlation, implying that an exchange rate depreciation leads to recessionary effects. In their paper, which covers more than 40 countries, Kearns and Patel (2016) employ a univariate Autoregressive Distributed Lag (ARDL) model to investigate the financial and trade channels in each country. The authors found the expected signs for both channels in almost all the countries analyzed: a negative sign concerning the financial channel and a positive sign for the trade channel.

Beckmann and Comunale (2021) extended the ideas of Kearns and Patel (2016), employing a local projections approach and analyzing the total credit to non-bank borrowers in foreign currency to investigate the impact of exchange rate fluctuations on domestic activity. Using the aforementioned measure to examine the financial channel, they found that the trade channel predominates over the financial one in several emerging countries. Interestingly, Beckmann and Comunale (2021) discovered that domestic credit often responds negatively to exchange rate appreciations, while foreign currency borrowing increases simultaneously. such as the role of the business cycle in determining domestic and foreign credit demand. Furthermore, the local projections approach enabled them to delve deeper, revealing additional causalities, such as the business cycle's role in determining domestic and foreign credit demand.

Finally, countries with large financial exposure in foreign currency might experience a fear-of-floating phenomenon in line of Calvo and Reinhart (2002) description. In this case, the monetary authority would act in favor to minimize the exchange rate changes to avoid any financial implication coming from the exchange rate. In a more recent paper, Georgiadis and Zhu (2021) suggest that countries with financial exposure the fear-of-floating is real, and its more pronounced when the country is with a monetary policy tightened and also with debt rather than non-debt instruments.

3 Database and Econometric Methodology

We use the Liabilities and Claims data in foreign currencies available in Table A5 of the Local Banking Statistics (LBS) from the BIS website. We sum the Claims and Liabilities for both cross-border and local positions, thereby encapsulating the total foreign currency position. According to the BIS, the foreign currency liability account represents borrowings in foreign currency taken by the banks located within the country from other banks situated abroad. Conversely, the Claims account represents lending made by local banks. For clarity, we provide in Appendix B an example of Table A5 for Brazil in the first quarter of 2019, with the choose account highlighted in red.

There are several factors worth noting regarding the selection of this variable to identify the financial channel. Firstly, the greater the foreign currency liabilities, the more the bank's balance sheet may be impacted by exchange rate fluctuations. If banks have significant foreign currency borrowings, any change in the exchange rate will affect their balance sheets, especially if these banks' claims are in the national currency. This situation could reduce lending capacity, thereby negatively affecting the economy. Simultaneously, some banks fund their lending through external resources. A local depreciating exchange rate makes these funding resources more costly, subsequently making lending more expensive for firms in the country. Thus, we see two channels operating in the same direction: one that weakens the bank's balance sheet,

impacting lending capacity, while the other makes funding resources more expensive

It's worth noting that some variables from Table A5 have already been chosen by other studies to investigate the financial channel. For example, the Debt-Weighted Exchange Rate (DWER) from Kearns and Patel (2016) is constructed considering liabilities in foreign currency. Beckmann and Comunale (2021) use, among other variables, the total credit to non-bank borrowers in foreign currency. They argue that they do not consider cross-border banking loans as they are investigating credit demand, which is primarily made by firms and households. Nonetheless, the focus of Beckmann and Comunale (2021) is more extensive, as they also examine the determinants of foreign credit demand.

Some discussions regarding our data may emerge. However, the other variables used in existing literature also have their own features that complicate their use in this paper. There are at least three notable points: (1) for some countries, the share of foreign-denominated debt for non-bank corporations is quite low in the total credit, thus making the non-bank cross-border position act more as a residual. (2) Borrowings and lendings for non-bank corporations in local and cross-border positions are not segregated by foreign and domestic currency. If domestic currency is used in these operations (which is not shown in Table A5), the financial channel's impact through banks' balance sheet effects may not be observable. (3) Both liabilities and claims in cross-border and local positions have their own foreign currencies separation, making it difficult to combine a debt and credit currencies weighted index.

There is an intriguing aspect to examining the main drivers of movements in foreign currency claims and liabilities in banks' balance sheets. From Table A5, we can extract useful data to evaluate foreign credit demand, domestic financial market development, and the impact of domestic and foreign monetary policy, among other variables. These have already been used as observed in Kearns and Patel (2016) and Beckmann and Comunale (2021). However, the aim of our paper is not to investigate the drivers of foreign claims and liabilities. Our focus is on studying the financial channel of exchange rate fluctuations, considering the role of claims and liabilities in foreign currencies on banks' balance sheets. Therefore, we select the aforementioned data.

After summing the accounts highlighted in red (shown in Appendix B), we calculate the net position by taking the difference between the liabilities and the claims with the following formula:

$$\begin{aligned} Position_t &= Liabilities_t - Claims_t \\ ExtPosition_t &= ln(1 + \frac{Position_t}{1000000}) \end{aligned} \tag{1}$$

where: $Liabilities_t$ is the sum of the foreign currency liabilities in both the cross-border and local positions. $Claims_t$ represents the sum of the foreign currency claims in both positions. We take a log transformation of this variable to deal with negative values; i.e: countries with more claims than liabilities. Our data cover 13 countries: Brazil, Chile, Mexico, Turkey, Austria, Belgium, France, Italy, Germany, Netherlands, Canada, Australia and Japan from Q4 2002 to Q4 2021. Although there are data-base for countries like USA and China we choose not to incorporate those countries in the estimation since China have a very dirty exchange rate policy and the US Dollar is the world's dominance reserve currency which makes the USA a special case[4]. For a clearer understanding of $Position_t$, next we present the $Liabilities_t$ and the $Claims_t$

[4]As stressed by Maggiori (2017) the US dollar being the main currency in the international trade gives the USA some great benefits as the opportunity to runs persistent trade deficits, its currency is the world's reserve currency and earns a safety premium.

in two countries: Chile, which has more liabilities than claims, and the Netherlands, which has more claims than liabilities. [5]

Figure 1: Claims and Liabilities in foreign currency

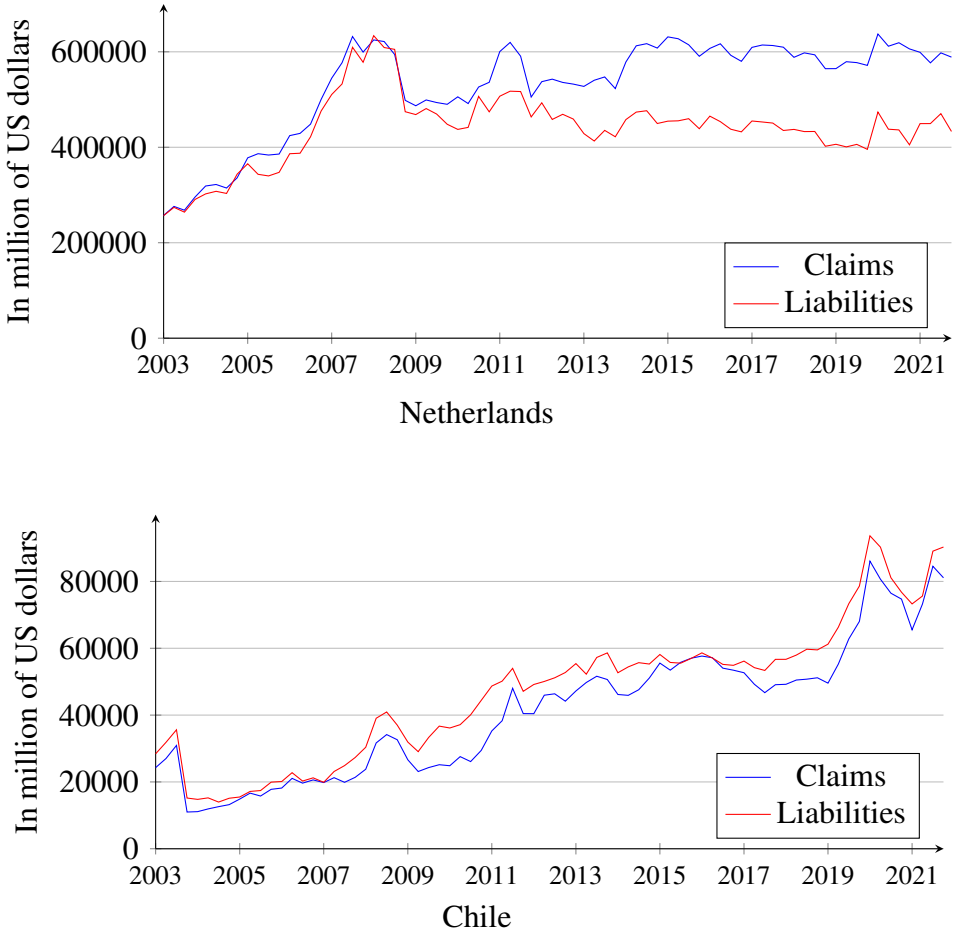

Figure 1 shows interesting dynamics, raising important questions about these patterns. For example: should we only choose liabilities when analyzing the financial channel? Do countries with more claims than liabilities react the same way as those with more liabilities than claims in terms of the financial channel? The variables shown in Figure 1 allow us to explore these questions and open up a new approach to include the claims side in our analysis[6]. This new approach potentially provides a more comprehensive understanding of the financial channel of exchange rate movements.

In order to fulfill our objective, we employ a dynamic panel estimation with country fixed effects to account for countries particularities. Our data set is an unbalanced panel, with most countries beginning their sample period in 2002Q4 and ending in 2021Q4. The dynamic panel is estimated with a lag, as follows:

$$\Delta y_{it} = \alpha + \rho \Delta y_{it-1} + \delta \Delta ner_{it-1} + \phi ExtPosition_{it-1} \Delta ner_{it-1} + \lambda \Delta x_{it-1} + \varepsilon_{it} \qquad (2)$$

[5]The graphs for all countries included in the sample estimation can be found in Appendix C

[6]Figure 1 add several relevant questions regarding the dynamics of claims and liabilities. Looking at those variables We might ask what economic circumstances determine the level of foreign currency liabilities, and what motivates banks to source funding internationally. Although these are important inquiries, the primary focus of this paper is to explore the role of the financial channel in response to exchange rate fluctuations, with particular emphasis on the claims side of banks' balance sheets.

Where: y_{it} is the GDP, the Δner_{it-1} is the nominal exchange rate change measured in terms of the country's currency against the US dollar and x are control variables such as CPI, a commodities index represented by the CRB, the interest rate, the Global GDP, a trend term and a time dummy representing the economic crises periods which covers the 2008/2009 financial crises and COVID period. All the variables but the interest rate are in quarterly time period and in log differences[7]. Note that, we multiply the $ExtPosition_{it-1}$ by the nominal exchange rate change, to account for the effect of exchange rate changes. One should remember that there are other currencies in the claims and liabilities, but the US Dollar have maintained its prevalence (by far) in international operations and even gained space against the Euro in the lastly years as showed by Maggiori et al. (2019). So, it is not a strong assumption to take the bilateral US dollar exchange rate in the $ExtPosition_t$. Finally, we take 4 countries subsets partitioned by geographic locations, level of development and $Position_t$ negative which means the countries that have more claims than liabilities[8] [9]. We expected that the trade channel measured by Δner_t be positive and $ExtPosition\Delta ner$ being negative. However, for countries with $Position_t$ negative the financial channel may be positive as a local depreciation should strengthen the balance sheets of the banks and increases the domestic economic activity.

It is interesting to highlight that we use the nominal exchange rate as the main variable to investigate the trade channel, differently from other papers that usually takes the real exchange rate or the effective nominal exchange rate. Our choose belongs to the fact that we would like to have a variable that could be used also by the financial channel and it is also public and clear. The effective exchange rate, for instance, is an index created from the weighted commercial trade what makes unreliable to use it in the financial channel. And the real exchange rate is a variable that is not used in daily operations and its difference to the nominal exchange rate may arises in long periods and not in only one period as we are investigating in the equation (2).

Note that as we are dealing with a dynamic panel estimation, we must consider the potential issues of endogeneity and auto-correlation that may arise. We have two possible sources of endogeneity: one of them is due to the cause/effect between the exchange rate and the External Position with the GDP growth. The other one comes from the lagged GDP in the right hand size in the equation (2) and the error term, such as: $E[\Delta y_{it-1}|\varepsilon_{it}] \neq 0$. In fact, the reverse causality is really a problem in equations that investigates the exchange rate impact on GDP. An economic activity expansion period, for example, might cause an appreciation of the exchange rate, bringing foreign money due to the robust economic scenario. This question have been covered by Habib et al. (2017) where they use external instruments to deal with the reverse causality, and also in Bussiére et al. (2015) and Rodrik (2008) where they used GMM techniques. While this might hold true for specific instances, our primary interest is the influence of exchange rates on economic activity. To mitigate endogeneity concerns, many studies employ either a VAR methodology or an instrumental variables approach as citeHabib17, Aguirre and Calderon (2015), Kamber et al (2016), among others. In equation (2) the endogeneity concern is reduced since we are using lagged variables in the right hand size. Even if some

[7]The GDP and its components are calculated as the cumulative growth in four quarters against its previous cumulative four quarters growth. The CPI are seasonal adjusted. All the variables but the $ExtPosition_{it-1}$ and ner_{it-1} are taken from the IFS data-base.

[8]The Latin countries are: Brazil, Chile and Mexico. The European countries are: Austria, Belgium, Netherlands, Germany, France, Italy. The Advanced countries are: the European Countries, Canada, Australia and Japan. And finally the Net Positive are the countries which have more claims than liabilities: Austria, Netherlands, Mexico and Japan.

[9]As for some countries occasionally the liabilities are higher than the claims and vice-versa, we assume the that claims should be higher than the liabilities at least in 90% of the data-sample to be in the $Position_t$ negative subgroup.

variables are forward looking as the exchange rate and the External Position, it will be very strong to assume a reverse causality phenomenon. But, at same time the endogeneity problems may persist due to the lagged dependent variable. A possible solution is to use the Arellano and Bond (1991) estimator. However, the Arellano and Bond (1991) estimator are valid only with N large and small T, the opposite of our database characteristic. If T is large, as in our case, dynamic panel bias becomes insignificant, and a more straightforward fixed-effects estimator works as Roodman (2009) appoints.[10]. So, given that the Arellano-Bond estimator does not apply in our case and also because we are dealing with lagged independent variables, we will use the usual country fixed-effects estimator. Nonetheless, as a robust exercise I will provide the equation (2) estimation with Arellano-Bond estimator and also with contemporaneous independent variables.

Equation (2) is, somehow, simple but it permits us to go through alternative specifications to explore how the commercial and the financial channels operates. For example, it is expected that the magnitude of the exchange rate movements might be crucial to determine the GDP impact. If so, a small exchange rate's depreciation may not be as important for the trade channel as a higher one. Thus, in Equation (3) we separate exchange rate movements at certain levels to check the importance of the magnitude to affect the GDP.

$$\Delta y_{it} = \alpha + \rho \Delta y_{it-1} + \delta_1 \Delta ner_{b,it-1} + \delta_2 \Delta ner_{a,it-1} + \phi_1 ExtPosition_{it-1} \Delta ner_{b,it-1} + \phi_2 ExtPosition_{it-1} \Delta ner_{a,it-1} + \lambda \Delta x_{it-1} + \varepsilon_{it} \quad (3)$$

where $ner_{a,it-1}$ and $ner_{b,it-1}$ are the exchange rate changes above and bellow the absolute terms of the its quartiles of each subgroup. Note that we keep both sides (above and bellow) in the estimation to capture the complementary effect of the changes analysed. Also, to preserve the degrees of freedom, we estimate one panel for each level of exchange rate change.

Another interesting issue to explore is the possible asymmetry in the exchange rate movements. Appreciation and depreciation of the exchange rate might have distinct effects in the GDP. In terms of Inflation, there is a wide literature proving the asymmetry in the exchange rate pass-through, however the literature is more restrict analysing the GDP's impact of appreciations and depreciation of the exchange rate. Thus, we estimate the following equation:

$$\Delta y_{it} = \alpha + \rho \Delta y_{it-1} + \delta_1 \Delta ner_{pos,it-1} + \delta_2 \Delta ner_{neg,it-1} + \phi_1 ExtPosition_{it-1} \Delta ner_{pos,it-1} + \phi_2 ExtPosition_{it-1} \Delta ner_{neg,it-1} + \lambda \Delta x_{it-1} + \varepsilon_{it} \quad (4)$$

where the subscript *pos* and *neg* means depreciations and appreciations of the exchange rate. The control variables x_{it-1} are the same of the other equations. With equation (4) we are able to explore how the commercial and financial channels works through appreciation and depreciation.

In sum, we have presented 3 types of dynamic panel equations with 4 subsets of countries. With those equations we pretend to explore not only the financial and the trade channel in the usual way, but also the asymmetries and magnitudes of the of exchange rate movement and its impact to the GDP. In the following section we show the estimations results.

[10]Roodman (2009) also appoints that the number of instruments in difference and system GMM tends to explode with T. As we are dealing with a large T we tend to have a huge number of instruments.

4 Results

In this section, We present the results of panel estimations for countries, categorized into subgroups based on geographic location, level of development, and bank position characteristics (i.e., net positive liabilities). Country fixed effects are applied in all estimations to control for specific country peculiarities. The tables presented below use GDP as the dependent variable, but additional estimations with GDP components—household consumption, government consumption, exports, and investment—as the dependent variable are available in Appendix A.

According to Table 1, exchange rate depreciation leads to an increase in GDP. This outcome aligns with the trade channel and is statistically significant across all analyzed subgroups. The financial channel carries a negative sign, suggesting that local exchange rate depreciation dampens domestic economic activity. This financial channel may operate through three pathways: (1) the balance sheet effect, (2) the increase in the cost of funding resources, and (3) potential currency mismatches. It is worth noting that the financial channel for the Net Positive group carries the opposite sign, implying that local depreciation boosts the economy. This observation underscores the importance of considering foreign claims within the financial channel and highlights the innovation of this paper in addressing both sides of banks' balance sheets. The main idea is that when foreign claims exceed liabilities, local depreciation can improve banks' balance sheets, potentially enhancing credit conditions within the economy.

Table 1 - Complete model - Equation (2)

	Dependent variable:				
	GDP				
	All	Latin	European	Advanced	Net positive
	(1)	(2)	(3)	(4)	(5)
GDP(-1)	0.731***	0.729***	0.628***	0.653***	0.672***
	(0.035)	(0.061)	(0.047)	(0.034)	(0.044)
NER(-1)	0.006	0.014*	0.031**	0.026***	0.027**
	(0.011)	(0.004)	(0.008)	(0.005)	(0.006)
External Position(-1)	−0.075	−2.428*	0.439	0.124	0.179*
	(0.112)	(0.576)	(1.861)	(0.113)	(0.069)
CPI(-1)	0.089	0.107	0.137	0.015	0.109
	(0.075)	(0.072)	(0.106)	(0.095)	(0.140)
CRB(-1)	0.019***	0.027	0.011**	0.013***	0.007
	(0.005)	(0.010)	(0.004)	(0.003)	(0.007)
Interest Rate(-1)	−0.062***	−0.134***	0.131	0.026	−0.065
	(0.011)	(0.011)	(0.075)	(0.047)	(0.093)
World GDP(-1)	0.294***	0.395**	0.312***	0.289***	0.342***
	(0.032)	(0.084)	(0.025)	(0.026)	(0.055)
Trend	0.000	−0.000	0.000***	0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dummy Covid	−0.007***	−0.005	−0.013**	−0.010***	−0.009**
	(0.002)	(0.005)	(0.003)	(0.002)	(0.002)
Observations	978	224	450	678	298
R^2	0.865	0.897	0.879	0.872	0.894
Number of countries	13	3	6	9	4

*Note: Robust standard errors in parentheses: *p<0.1; **p<0.05; ***p<0.01.*

Table 1 allows us to check which channel prevails following an exchange rate fluctuation. In Latin countries, the financial channel far outweighs the trade channel. In contrast, the financial channel appears to have little significance in Advanced and European countries, with the trade

channel being the sole factor impacting economic activity. This finding aligns with Kearns and Patel (2016), who also observed the financial channel's pronounced influence in emerging countries and the dominance of the trade channel in advanced countries.

Kearns and Patel (2016) also found the appropriate signs for the trade and financial channels. By summing the estimated coefficients, they determined which channel predominates. If we replicate this exercise using the data from Table 1, we find that the financial channel supersedes the trade channel in Latin American and Net Positive countries. This suggests that any gains from local currency depreciation through international trade could be counterbalanced by financial repercussions. However, it's worth noting that for net positive countries, the commercial gains are amplified by the financial channel.

The financial channel of the Net Positive subgroup (5) possesses several intriguing characteristics. For instance, the operation of the financial channel may not align with the pathways previously described, since foreign funding resources will invariably be affected in the same direction following a local currency depreciation. In this scenario, funding resources become more expensive, tightening credit conditions, especially if local banks habitually obtain resources in foreign currency. However, if claims in foreign currency exceed liabilities, the financial channel—through the balance sheet effect and currency mismatch might stimulate the economy following a local exchange rate depreciation. Therefore, we might observe three channels operating in the same direction for countries with more liabilities than claims, and two channels for Net Positive countries. This peculiarity might clarify why it could be possible to identify a negative sign in the financial channel for Net Positive countries if their banks typically source a substantial amount of their resources in foreign currencies.

Table 2 - Complete model - Arellano-Bond estimator - Equation (2)

	Dependent variable:				
	GDP				
	All	Latin	European	Advanced	Net positive
	(1)	(2)	(3)	(4)	(5)
GDP (-1)	0.788***	0.745***	0.670***	0.690***	0.669***
	(0.036)	(0.043)	(0.042)	(0.037)	(0.039)
NER(-1)	0.008	0.017***	0.030***	0.028***	0.031***
	(0.011)	(0.001)	(0.008)	(0.004)	(0.009)
External Position(-1)	−0.011	−1.679***	0.447	0.150*	0.229**
	(0.109)	(0.506)	(1.732)	(0.088)	(0.109)
CPI(-1)	0.245***	0.075	0.191*	0.065	0.216
	(0.089)	(0.079)	(0.099)	(0.092)	(0.154)
CRB(-1)	0.022***	0.032***	0.013***	0.016***	0.007
	(0.004)	(0.009)	(0.004)	(0.004)	(0.005)
Interest Rate(-1)	−0.012	−0.079***	0.033	0.089**	−0.002
	(0.014)	(0.017)	(0.090)	(0.041)	(0.033)
World GDP(-1)	0.246***	0.379***	0.302***	0.262***	0.332***
	(0.031)	(0.066)	(0.018)	(0.028)	(0.040)
Trend	0.000***	−0.000**	0.000***	0.000***	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dummy Covid	−0.008***	−0.005	−0.011***	−0.011***	−0.010***
	(0.002)	(0.004)	(0.003)	(0.002)	(0.002)
Observations	978	224	450	678	298
Number of countries	13	3	6	9	4

*Note: Robust standard errors in parentheses: *p<0.1; **p<0.05; ***p<0.01.*

Next, we use the Arellano-Bond estimator in equation (2) to control for potential endogeneity issues. We should remember that the use of Arellano-Bond estimator might not be reliable since our panel is short (not to many countries) and the periods analysed is quiet long (T large) which makes the country fixed-effects a more desirable estimator as pointed by Roodman (2009). However, we apply this estimator to assure that even using the Arrellano-Bond estimator the results remains stable.

In our case, the independent variables might not have endogeneity issues in the estimation since they are already lagged, but the lagged dependent variable can give us problems of endogeneity. In order to that we follow the standard strategy to instrument the potential issues of endogeneity: lag the dependent variable as long as the others independent variables are theoretically exogenous.

According to Table 2, the Latin American countries remains with the signs found in the estimation with the country fixed effects. The financial channel operates strongly in those countries and the trade channel is significant but less important. Curiously, we find a positive sign for the financial channel for the advanced countries, a movement that mimics what we have found for the net positive countries. In overall we have results very similar and with significance than those of Table 1.

Table 3 - Asymmetric movements - Equation(4)

	Dependent variable:				
			GDP		
	All	Latin	European	Advanced	Net positive
	(1)	(2)	(3)	(4)	(5)
GDP(-1)	0.730***	0.729***	0.630***	0.655***	0.667***
	(0.035)	(0.067)	(0.046)	(0.034)	(0.044)
NER pos (-1)	−0.000	0.033	0.041**	0.047***	0.010
	(0.021)	(0.019)	(0.010)	(0.007)	(0.007)
NER neg (-1)	0.014	−0.019	0.020*	0.001	0.052*
	(0.014)	(0.027)	(0.008)	(0.014)	(0.020)
External Position pos (-1)	0.130	−1.725	0.632	0.638***	0.362***
	(0.326)	(0.803)	(1.666)	(0.101)	(0.062)
External Position neg (-1)	−0.315	−5.099	0.259	−0.469**	−0.014
	(0.255)	(4.647)	(2.151)	(0.181)	(0.177)
CPI(-1)	0.093	0.098	0.131	−0.002	0.110
	(0.084)	(0.087)	(0.104)	(0.106)	(0.161)
CRB(-1)	0.019***	0.029	0.012**	0.014***	0.005
	(0.005)	(0.010)	(0.004)	(0.003)	(0.007)
Interest Rate (-1)	−0.061***	−0.138***	0.132	0.032	−0.061
	(0.011)	(0.009)	(0.075)	(0.045)	(0.096)
World GDP(-1)	0.294***	0.404**	0.310***	0.289***	0.342***
	(0.033)	(0.084)	(0.024)	(0.025)	(0.050)
Trend	0.000	−0.000	0.000***	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dummy Covid	−0.007***	−0.005	−0.014**	−0.011***	−0.009**
	(0.002)	(0.004)	(0.003)	(0.002)	(0.002)
Observations	978	224	450	678	298
R^2	0.865	0.898	0.879	0.873	0.895
Number of countries	13	3	6	9	4

*Note: Robust standard errors in parentheses: *p<0.1; **p<0.05; ***p<0.01.*

Another compelling characteristic involves the asymmetries of the financial and trade channels. In the case of exchange rate pass-through, the literature has found significant asymmetries between appreciation and depreciation of the exchange rate. Likely, appreciations and depreciations of the exchange rate might influence output in distinct ways. This is what we investigate in Table 3.

Table 3 reveals that only local currency depreciations are statistically significant for the trade channel in both the European and the Advanced subgroups. In these cases, appreciations of local currency may not affect economic activity. In fact, for the Latin countries, local currency movements do not influences GDP through the financial and trade channel. For the Advanced subgroup, the financial channel consistently has a positive impact on economic activity, a unique result that might be explained by the 'flight to quality' phenomenon. This concept suggests that when an event leading to currency depreciation occurs in advanced countries, it likely stems from a global event that also affects emerging countries. Such a scenario may facilitate a flight to quality, where capital flows from emerging to advanced economies.

The trade channel for the European countries is significant and shows the expected direction, while the financial channel is not significant. This finding may be attributed to the fact that European countries primarily trade among themselves and might face fewer financial restrictions, which could explain the results observed in Table 3. On the other hand, for the Net Positive countries, the trade and financial channels are significant only for appreciations and depreciations respectively. Interestingly, the GDP of Net Positive countries is negatively impacted by appreciations through the trade channel, and positively impacted by the financial channel when a depreciation occurs. These findings emphasize the importance of considering asymmetries in exchange rate movements when analyzing the trade and financial channels, and also demonstrate how these asymmetries are dependent on the characteristics of the group of countries analyzed.

Beyond the observed asymmetry, the magnitude of exchange rate movements could also play a crucial role in determining the impact of the channels explored in this paper. This introduces a form of non-linearity, enabling us to investigate whether larger exchange rate movements affect the economy differently than smaller movements. Consequently, we will estimate four models for each group of countries, considering the quartiles of exchange rate changes in the sample period in each of the subgroup of the countries.

Table 4 presents the results for Latin American countries. It's noteworthy that the magnitude of exchange rate changes are not statistically significant. This outcome may be attributed to the financial constraints faced by these countries' firms when significant local depreciation impacts emerging economies. In such situations, firms might be unable to augment their production due to restricted and costly lending operations as demonstrated by Kohn et al. (2020). Concerning the financial channel, any changes explain the GDP impact.

Table 4 - Latin Countries - Equation (3)

	Dependent variable:		
	GDP		
	1^{th} Quartile	2^{nd} Quartile	3^{rd} Quartile
	(1)	(2)	(3)
GDP(-1)	0.741***	0.742***	0.739***
	(0.049)	(0.048)	(0.051)
NER - below (-1)	−0.018	0.006	−0.021
	(0.106)	(0.034)	(0.024)
NER - above (-1)	0.016	0.016	0.024
	(0.010)	(0.012)	(0.019)
External Position - below (-1)	−0.521	−0.547	−0.484
	(0.235)	(0.269)	(0.285)
External Position - above (-1)	−0.417	−0.374	−0.454
	(0.452)	(0.427)	(0.426)
CPI(-1)	0.126	0.121*	0.118**
	(0.044)	(0.039)	(0.024)
CRB(-1)	0.023	0.023	0.023
	(0.011)	(0.011)	(0.011)
Interest Rate(-1)	−0.156***	−0.154***	−0.157***
	(0.015)	(0.014)	(0.015)
World GDP(-1)	0.388**	0.383**	0.389**
	(0.072)	(0.071)	(0.077)
Trend	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)
Dummy Covid	−0.006	−0.006	−0.007
	(0.004)	(0.004)	(0.004)
Observations	224	224	224
R^2	0.899	0.899	0.899
Number of countries	3	3	3

Note: The Quartiles are the following: 1^{th} *= 1.5%;* 2^{nd} *= 2.9%;* 3^{rd} *= 5.4%*

The results for European countries differ considerably from those of Latin America confirming that that the appreciation and depreciation of local currencies have diverse impact regarding the trade and the financial channels and those asymmetry depends on the characteristics of the groups of countries analyzed. As Table 5 indicates, while the financial channel appears to be less influential, the trade channel for significant exchange rate movements is substantial. Given that these countries typically encounter fewer financial constraints, they can enhance their exports under such circumstances. However, the trade channel exhibits the opposite sign for minor exchange rate changes, implying that local depreciation (appreciation) exerts a negative (positive) effect on GDP.

Table 5 - European Countries - Equation (3)

	Dependent variable:		
	GDP		
	1^{th} Quartile	2^{nd} Quartile	3^{rd} Quartile
	(1)	(2)	(3)
GDP(-1)	0.647***	0.639***	0.638***
	(0.041)	(0.046)	(0.050)
NER - below (-1)	−0.539***	−0.083	0.006
	(0.051)	(0.046)	(0.021)
NER - above (-1)	0.037***	0.036***	0.041***
	(0.006)	(0.004)	(0.006)
External Position - below (-1)	−0.012	−0.031	−0.002
	(0.109)	(0.053)	(0.040)
External Position - above (-1)	0.043	0.046	0.041
	(0.026)	(0.028)	(0.044)
CPI(-1)	0.144	0.236	0.162
	(0.092)	(0.130)	(0.112)
CRB(-1)	0.011**	0.009*	0.013**
	(0.004)	(0.004)	(0.004)
Interest_Rate(-1)	0.110	0.112	0.107
	(0.069)	(0.077)	(0.085)
GDP_G20(-1)	0.276***	0.293***	0.306***
	(0.021)	(0.022)	(0.024)
trend	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Dummy_covid	−0.014***	−0.015***	−0.013***
	(0.003)	(0.003)	(0.003)
Observations	450	450	450
R^2	0.883	0.882	0.880
Number of countries	6	6	6

Note: The Quartiles are the following: 1^{th} *= 1.1%;* 2^{nd} *= 2.5%;* 3^{rd} *= 4.3%*

The advanced countries exhibit results very similar to those of European countries, as shown in Table 6. The trade channel is only significant for larger movements in the exchange rate. For changes below the 2% threshold, the coefficient has the opposite sign, an odd outcome that may be largely attributable to global supply chains. These countries, with their industrial base tightly integrated into worldwide production chains, may see local currency depreciation raise the prices of imported industrial supplies, thus making their tradable goods and exports more expensive. It's curious that this process doesn't seem to apply in cases of larger exchange rate movements since the trade channel is positively significant above the threshold. Here, the trade channel could be enhancing the country's net exports through its conventional path. Regarding the financial channel, we find positive sign, for large movements in the exchange rate, an intriguing result.

Table 6 - Advanced Countries - Equation (3)

	Dependent variable:		
	GDP		
	1^{th} Quartile	2^{nd} Quartile	3^{rd} Quartile
	(1)	(2)	(3)
GDP(-1)	0.660***	0.655***	0.660***
	(0.033)	(0.035)	(0.036)
NER - below (-1)	−0.392***	−0.040	−0.003
	(0.112)	(0.030)	(0.011)
NER - above (-1)	0.028***	0.027***	0.033***
	(0.005)	(0.005)	(0.007)
External Position - below (-1)	0.013	0.009	0.013
	(0.021)	(0.020)	(0.019)
External Position - above (-1)	0.011	0.036*	0.025*
	(0.018)	(0.018)	(0.012)
CPI(-1)	0.006	0.032	0.026
	(0.098)	(0.108)	(0.100)
CRB(-1)	0.013***	0.012***	0.014***
	(0.003)	(0.003)	(0.003)
Interest Rate(-1)	0.029	0.024	0.021
	(0.047)	(0.049)	(0.049)
World GDP(-1)	0.275***	0.284***	0.285***
	(0.024)	(0.026)	(0.026)
Trend	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)
Dummy Covid	−0.011***	−0.011***	−0.010***
	(0.002)	(0.002)	(0.002)
Observations	678	678	678
R^2	0.875	0.874	0.873
Number of country	9	9	9

Note: The Quartiles are the following: 1^{th} = 1.1%; 2^{nd} = 2.4%; 3^{rd} = 4.3%

Lastly, we look at the Net Positive countries in Table 7. These countries don't exhibit any distinct pattern with the thresholds. The financial channel becomes non-significant, and the trade channel is only relevant for larger changes in the exchange rate.

Table 7 - Net Positive Countries - Equation (3)

	Dependent variable:		
	GDP		
	1^{th} Quartile	2^{nd} Quartile	3^{rd} Quartile
	(1)	(2)	(3)
GDP(-1)	0.677***	0.672***	0.676***
	(0.043)	(0.044)	(0.044)
NER - below (-1)	−0.186	−0.029	−0.008
	(0.154)	(0.053)	(0.018)
NER - above (-1)	0.021***	0.022**	0.027**
	(0.003)	(0.006)	(0.007)
External Position - below (-1)	−0.005	−0.010	−0.005
	(0.027)	(0.023)	(0.023)
External Position - above (-1)	−0.007	0.023	0.010
	(0.023)	(0.017)	(0.018)
CPI(-1)	0.093	0.104	0.105
	(0.124)	(0.165)	(0.139)
CRB(-1)	0.006	0.005	0.007
	(0.007)	(0.007)	(0.006)
Interest Rate(-1)	−0.080	−0.072	−0.075
	(0.107)	(0.105)	(0.104)
World GDP(-1)	0.337***	0.341***	0.342***
	(0.055)	(0.049)	(0.054)
Trend	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Dummy Covid	−0.009**	−0.010**	−0.009**
	(0.002)	(0.002)	(0.002)
Observations	298	298	298
R^2	0.897	0.896	0.894
Number of country	4	4	4

Note: The quartiles are the following: 1^{th} = 1.1%; 2^{nd} = 2.4%; 3^{rd} = 4.1%

5 Robustness exercise

In this section we use the Arellano-Bond estimator of equation (2) considering the contemporaneous impact of independent variables. We follow a standard strategies in order to instrument the potential issues of endogeneity: in the case of contemporaneous independent variable, we apply the domestic contemporaneous independent variables lags to instrument the estimation [11].In table 8 we show the results of equation (2) using the Arellano-Bond estimator:

As we can see, the Table 8 is very similar of Table 2 with the financial channel of Latin Countries negative and the Net Positive countries positive. The most significant difference between the results concerns to the trade channel is not statistically significant in any of the subgroups analyzed. This might due to the the fact that any exchange rate movement may takes time to hit the economic activity through the trade channel. This might due to the the fact that any exchange rate movement may takes time to hit the economic activity through the trade channel. However, the external position remains statistically significant as we have seen in the last section. This result opens a question where the financial channel may operates faster, for

[11] In those estimations we use a high number of instruments as usually is done for the Arellano-Bond estimator. However, we also performs estimations with much less number of instruments and the results remains the same in terms of conclusion. Those estimations are available upon request

some countries, than the trade channel.

Table 8 - Complete model with contemporaneous - Arellano-Bond estimator - Equation (2)

	Dependent variable:				
			GDP		
	All	Latin	European	Advanced	Net positive
	(1)	(2)	(3)	(4)	(5)
GDP (-1)	0.870***	0.871***	0.843***	0.843***	0.812***
	(0.017)	(0.026)	(0.015)	(0.022)	(0.031)
NER	0.004	0.004	−0.001	0.001	0.009
	(0.005)	(0.013)	(0.002)	(0.004)	(0.013)
External Position	0.118	−1.553***	−0.372	0.137	0.296**
	(0.156)	(0.204)	(1.027)	(0.131)	(0.118)
CPI	0.225***	0.162***	0.209**	0.107	0.294***
	(0.048)	(0.056)	(0.106)	(0.088)	(0.112)
CRB	−0.004	−0.007	−0.013***	−0.008***	−0.017***
	(0.005)	(0.008)	(0.002)	(0.003)	(0.006)
Interest Rate	−0.024***	−0.062***	−0.087*	−0.012	−0.025
	(0.007)	(0.011)	(0.046)	(0.038)	(0.024)
World GDP	0.404***	0.472***	0.438***	0.386***	0.399***
	(0.026)	(0.035)	(0.037)	(0.036)	(0.039)
Trend	0.000***	0.000	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dummy Covid	0.000	0.000	−0.000	−0.001	−0.004***
	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)
Observations	978	224	450	678	298
Number of countries	13	3	6	9	4

*Note: Robust standard errors in parentheses: *p<0.1; **p<0.05; ***p<0.01.*

Finally, it is worth noting that the financial channel for the European and the Advanced countries are not statistically significant. This results shows that the time might not be uniform to the groups analyzed and some particularities of the financial system and other issues should be considerate, an appointment that should be checked in future research. Notwithstanding, we have quiet similar results incorporating contemporaneous effects.

6 Conclusion

In this paper, we have explored the trade and financial channels of exchange rate movements. The trade channel is determined by the responses of international trade to fluctuations in the local currency. Typically, depreciations of local currency are expected to boost economic activity and appreciations to reduce GDP, primarily through the net exports. The financial channel, on the other hand, represents the balance sheet effects caused by exchange rate fluctuations. If banks are leveraged in dollars and fund their resources from abroad, any local currency depreciation might weaken their balance sheets, thereby slowing down economic activity. Moreover, domestic firms may face currency mismatches in their cash flow, which can also negatively impact the economy. These channels can interact since local firms may encounter financial constraints following depreciation events.

As the global economy becomes more financially integrated, the financial channel has gained increased attention. However, this focus has been mainly on the liability side of banks' balance sheets. This bias is justified as financial distress from stressful events can severely

impact countries with substantial foreign currency liabilities. Nonetheless, claims in foreign currency held by the banking system also play a role in the financial channel. If a country has a net positive position in foreign currency, a local currency depreciation might bolster the bank's balance sheet, thereby increasing the lending capacity of banks and possibly stimulating domestic economic activity.

In this study, we conducted panel estimations for both the trade and financial channels. The paper confirms the positive impact of currency depreciations through the trade channel. Our research introduces the novel approach of considering the asset side of banks' balance sheets in addition to their liabilities. We created a subgroup of countries with more assets than liabilities to investigate the role of these assets. We discovered that the financial channel for these net positive countries has a positive sign, indicating that a local currency depreciation enhances economic activity. Further analysis uncovered asymmetries between exchange rate appreciations and depreciations. For Latin countries, both the trade and financial channels were not significant for local currency depreciation and appreciation. This underscores that GDP in Latin countries is not affected differently by depreciation and appreciation. Nevertheless we found significant asymmetries for advanced countries, particularly in the financial channel.

Subsequently, we examined the size of exchange rate movements and their impact on economic activity. We selected five thresholds for exchange rate changes and discovered that the trade channel is significant only for substantial changes in Advanced and Net Positive countries. In contrast, for Latin countries, the magnitude of the exchange rate changes may not be important. In conclusion, this paper highlights the importance of considering the claims side of banks' balance sheets when analyzing the financial channel resulting from exchange rate fluctuations. Both appreciation and depreciation of local currency should be taken into account when studying the trade and financial channels, as should the magnitude of the exchange rate change, since results might be contingent upon these factors.

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Appendix A

Table A - Panel estimations - GDP components

Table A1 - Complete model - Private Consumption - Equation (2)

	Dependent variable:				
	All	Latin	PrivateC European	Advanced	Net positive
	(1)	(2)	(3)	(4)	(5)
PrivateC (-1)	0.764***	0.789***	0.637***	0.621***	0.679***
	(0.041)	(0.065)	(0.041)	(0.034)	(0.019)
NER(-1)	0.007	0.021	0.052***	0.031**	0.023*
	(0.010)	(0.024)	(0.008)	(0.012)	(0.007)
External Position(-1)	−0.036	−1.458**	1.394	0.147	0.243
	(0.131)	(0.202)	(1.303)	(0.196)	(0.132)
CPI(-1)	0.008	−0.002	0.224	0.120	0.093
	(0.063)	(0.123)	(0.134)	(0.106)	(0.194)
CRB(-1)	0.013	0.020**	−0.001	−0.001	−0.001
	(0.008)	(0.004)	(0.007)	(0.004)	(0.005)
Interest Rate(-1)	−0.033*	−0.120**	0.156*	0.102**	−0.032
	(0.018)	(0.012)	(0.072)	(0.040)	(0.088)
World GDP(-1)	0.233***	0.513	0.115**	0.146***	0.250*
	(0.057)	(0.197)	(0.031)	(0.026)	(0.106)
Trend	0.000	−0.000	0.000*	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dummy Covid	−0.013***	−0.005	−0.027***	−0.024***	−0.019***
	(0.003)	(0.009)	(0.003)	(0.003)	(0.003)
Observations	978	224	450	678	298
R^2	0.835	0.885	0.848	0.856	0.859
Number of countries	13	3	6	9	4

*Note: Robust standard errors in parentheses: *p<0.1; **p<0.05; ***p<0.01.*

Table A2 - Complete model - Government Consumption - Equation (2)

	Dependent variable:				
			GovernmentC		
	All	Latin	European	Advanced	Net positive
	(1)	(2)	(3)	(4)	(5)
GovernmentC (-1)	0.882***	0.825***	0.912***	0.928***	0.946***
	(0.029)	(0.045)	(0.026)	(0.017)	(0.015)
NER(-1)	0.006	0.009	0.025**	0.020***	0.030
	(0.007)	(0.004)	(0.009)	(0.005)	(0.018)
External Position(-1)	0.020	−3.988**	0.774	0.221**	0.201
	(0.108)	(0.690)	(0.719)	(0.074)	(0.101)
CPI(-1)	−0.094	−0.120	−0.072*	−0.081*	−0.065
	(0.057)	(0.054)	(0.035)	(0.036)	(0.082)
CRB(-1)	0.010*	0.012	0.019**	0.017***	0.016**
	(0.005)	(0.009)	(0.006)	(0.004)	(0.005)
Interest Rate(-1)	−0.010	−0.045	0.184**	0.116***	0.035
	(0.012)	(0.017)	(0.051)	(0.030)	(0.021)
World GDP(-1)	0.042	0.133	0.005	0.003	0.019
	(0.025)	(0.064)	(0.030)	(0.020)	(0.041)
Trend	−0.001	−0.005	−0.001	−0.000	0.001
	(0.002)	(0.004)	(0.003)	(0.002)	(0.003)
Dummy Covid	−0.003	0.011	−0.027***	−0.019***	−0.007
	(0.004)	(0.010)	(0.006)	(0.004)	(0.008)
Observations	978	224	450	678	298
R^2	0.757	0.813	0.805	0.821	0.838
Number of countries	13	3	6	9	4

*Note: Robust standard errors in parentheses: *p<0.1; **p<0.05; ***p<0.01.*

Table A3 - Complete model - Investment - Equation (2)

	Dependent variable:				
			Investment		
	All	Latin	European	Advanced	Net positive
	(1)	(2)	(3)	(4)	(5)
Investment (-1)	0.843***	0.870***	0.694***	0.756***	0.716***
	(0.037)	(0.055)	(0.062)	(0.065)	(0.071)
NER(-1)	0.004	0.039	0.024	0.006	0.009
	(0.017)	(0.028)	(0.032)	(0.022)	(0.037)
External Position(-1)	−0.322	−2.648	−6.787	−0.315	−0.109
	(0.349)	(3.930)	(8.556)	(0.261)	(0.409)
CPI(-1)	0.057	0.474	−0.738**	−0.511*	−0.072
	(0.231)	(0.428)	(0.204)	(0.248)	(0.302)
CRB(-1)	0.051***	0.051	0.045**	0.043**	0.001
	(0.016)	(0.037)	(0.016)	(0.017)	(0.011)
Interest Rate(-1)	−0.132***	−0.301**	0.320	0.091	−0.072
	(0.038)	(0.065)	(0.325)	(0.196)	(0.270)
World GDP(-1)	0.473***	0.835***	0.492***	0.455***	0.562**
	(0.072)	(0.049)	(0.044)	(0.035)	(0.148)
Trend	−0.000	−0.000	0.000*	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dummy Covid	0.008*	0.016	−0.008	0.001	−0.009
	(0.004)	(0.006)	(0.009)	(0.007)	(0.009)
Observations	978	224	450	678	298
R^2	0.806	0.892	0.667	0.719	0.656
Number of countries	13	3	6	9	4

*Note: Robust standard errors in parentheses: *p<0.1; **p<0.05; ***p<0.01.*

Table A4 - Complete model - Exports - Equation (2)

	Dependent variable:				
	Exports				
	All	Latin	European	Advanced	Net positive
	(1)	(2)	(3)	(4)	(5)
Exports (-1)	0.748***	0.789***	0.707***	0.741***	0.709***
	(0.024)	(0.034)	(0.018)	(0.024)	(0.017)
NER(-1)	0.071*	0.079*	0.086***	0.106***	0.101*
	(0.040)	(0.025)	(0.017)	(0.012)	(0.037)
External Position(-1)	0.234	5.287*	−1.824	0.252	0.310
	(0.308)	(1.743)	(3.628)	(0.200)	(0.408)
CPI(-1)	0.532**	0.701	0.623**	0.184	0.405
	(0.183)	(0.379)	(0.210)	(0.238)	(0.301)
CRB(-1)	0.048***	0.060**	0.041***	0.050***	0.066**
	(0.014)	(0.014)	(0.010)	(0.009)	(0.016)
Interest Rate(-1)	−0.044	−0.092	−0.509***	−0.389***	−0.462***
	(0.030)	(0.069)	(0.075)	(0.108)	(0.029)
World GDP(-1)	0.583***	0.249	0.803***	0.715***	0.805**
	(0.105)	(0.145)	(0.082)	(0.113)	(0.151)
Trend	0.000	−0.000*	−0.000	−0.000*	−0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dummy Covid	−0.013***	−0.007	−0.003	−0.007	−0.004
	(0.004)	(0.006)	(0.006)	(0.005)	(0.004)
Observations	978	224	450	678	298
R^2	0.848	0.808	0.897	0.876	0.856
Number of countries	13	3	6	9	4

*Note: Robust standard errors in parentheses: *p<0.1; **p<0.05; ***p<0.01.*

Appendix B

Table B - BIS Table A5 - Brazil - 1th quarter of 2019

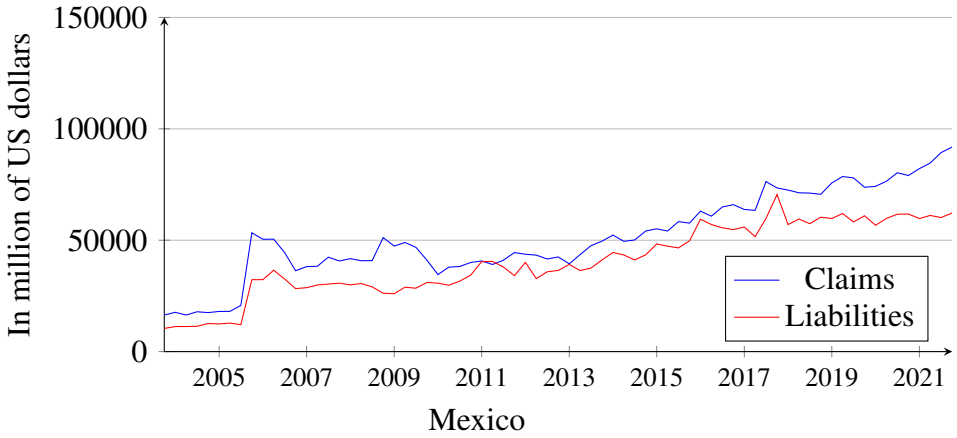
Banks located in Brazil

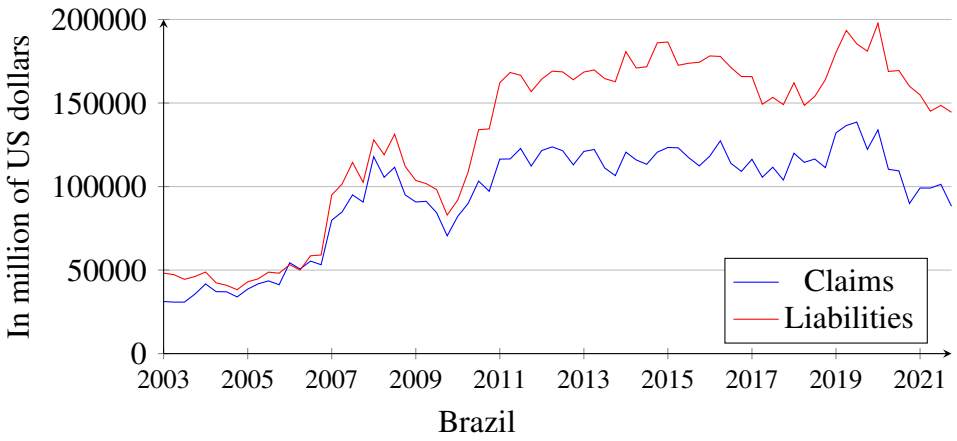
Positions reported by banking offices located in the specified country regardless of the nationality of the controlling parent
in millions of US dollars

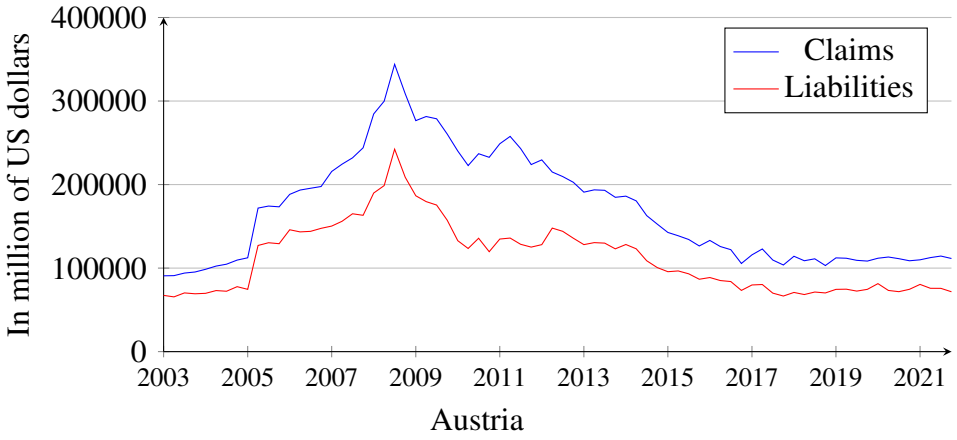
Brazil	Outstanding					
	Cross-border positions		Local positions		Unallocated positions by residence	
	Claims	Liabilities	Claims	Liabilities	Claims	Liabilities
	Q1 19	Q1 19	Q1 19	Q1 19	Q1 19	Q1 19
Total	**94,450**	**146,593**	**1,779,599**	**1,567,476**	**321**	**1,007**
By sector of counterparty						
Banks	91,397	145,626	654,557	129,409	321	976
Of which: intragroup [1]	57,355	55,169	...	...	...	...
Non-banks	3,053	967	1,125,042	1,438,067	\	31
Of which: non-bank financial	...	...	...	...	...	...
Of which: non-financial	...	...	...	...	...	...
Non-financial corporations	...	...	...	...	...	...
Households						
General government						
Unallocated	...	...	...	...	...	...
By currency						
Local currency	1,032	554	1,740,883	1,533,272	\	32
Foreign currencies	93,418	146,040	38,716	34,203	321	975
Of which: US dollar	69,973	128,364	36,814	31,166	179	889
Of which: euro	17,100	13,402	1,636	938	116	81
Of which: yen	1,039	1,062	202	83	1	3
Of which: pound sterling	1,121	972	43	140	10	2
Of which: Swiss franc	170	176	1	12	1	...
Of which: other currencies	4,015	2,064	20	1,864	14	0
By instrument						
Of which: loans and deposits	41,870	124,126	1,342,693	950,681	320	586
Of which: debt securities	3,247	13,877	269,774	396,880	\	421
By type of bank						
Domestic banks	...	...	...	...	...	...
Foreign banks' subsidiaries	...	...	...	...	...	...
Foreign banks' branches	...	...	...	...	...	...

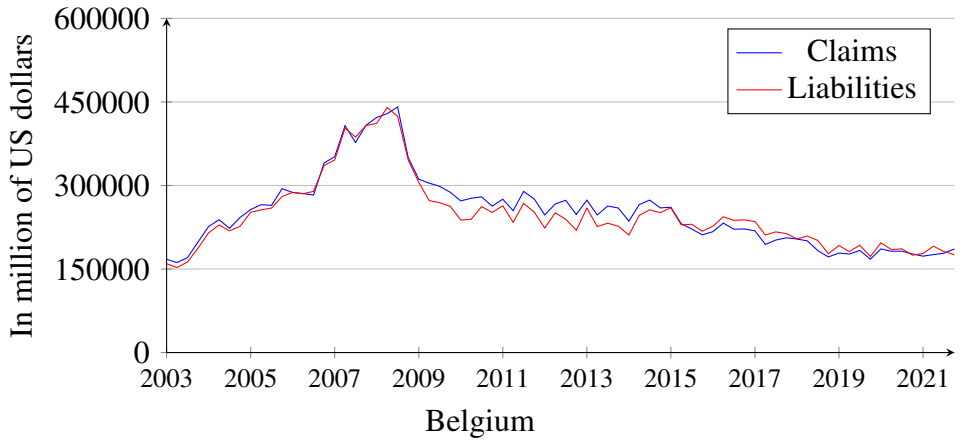
Appendix C

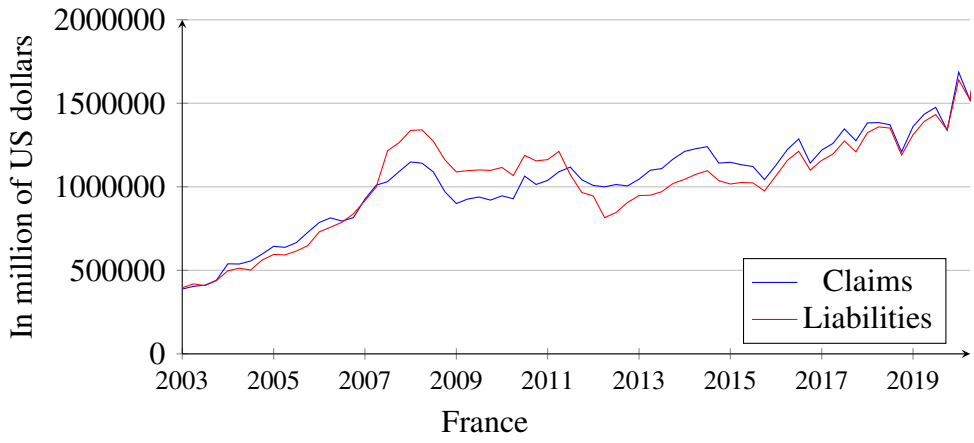
Figure C - Claims and Liabilities in foreign currency

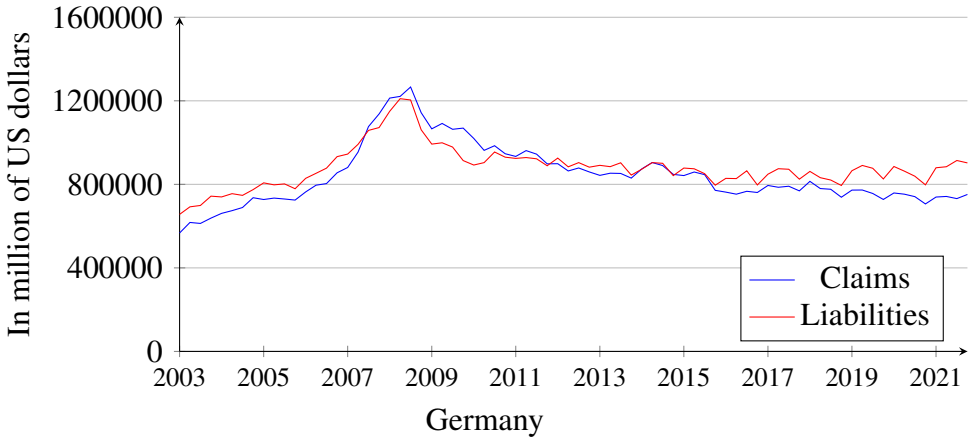


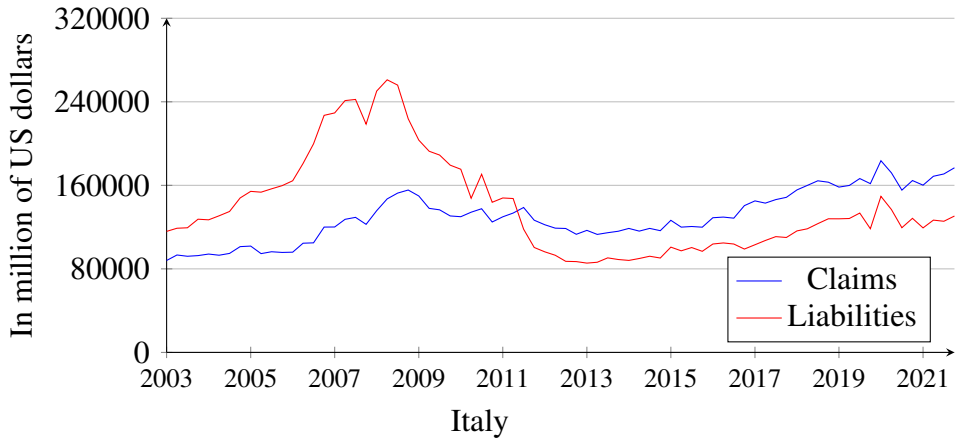




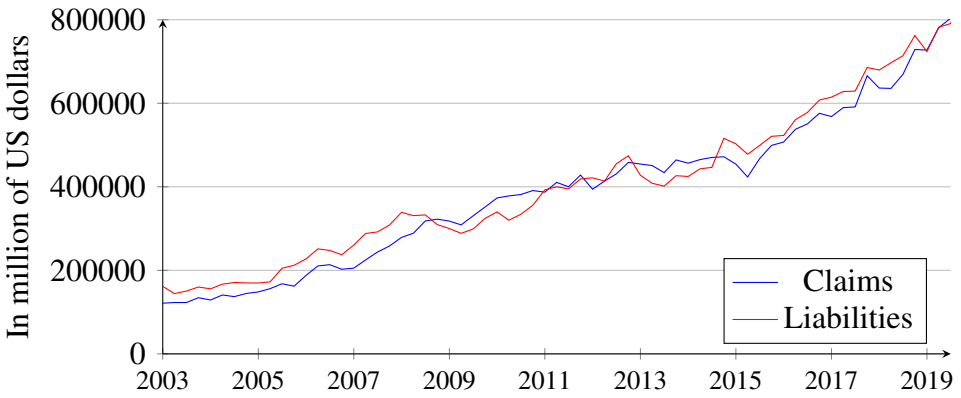

600000
450000
300000
150000
0
In million of US dollars
Claims
Liabilities
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
Belgium


2000000
1500000
1000000
500000
0
In million of US dollars
Claims
Liabilities
2003
2005
2007
2009
2011
2013
2015
2017
2019
France

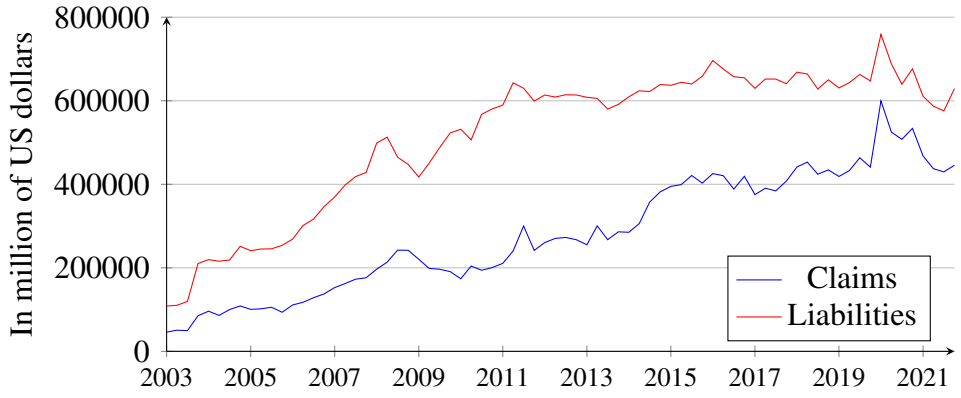

1600000
1200000
800000
400000
0
In million of US dollars
Claims
Liabilities
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
Germany



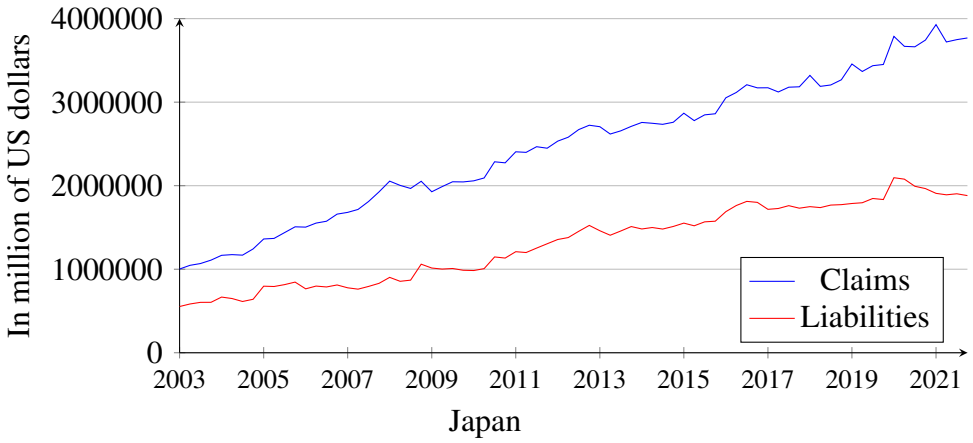
Italy

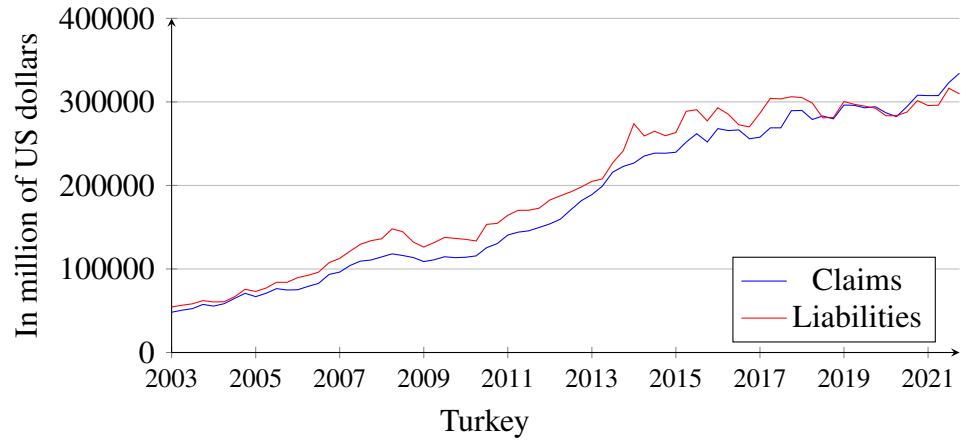


Canada



Australia


4000000
3000000
2000000
1000000
0
In million of US dollars
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
Claims
Liabilities
Japan


400000
300000
200000
100000
0
In million of US dollars
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
Claims
Liabilities
Turkey