Trade Liberalization and Regional Reallocation of Credit

Aug, 2023

Abstract

This paper studies how bank branches' networks shape the regional reallocation of credit during and after trade liberalization and its impact on local labor markets. I show that areas highly impacted by tariff reductions experienced a large capital outflow, banks reduced their exposure to the shock during the policy transition period, and the local composition of banks influences the final allocation of credit. Conditional to trade shock, localities where their banks operate in more exposed areas witnessed a larger growth rate in the stock of loans compared to other regions. The inflow of capital due to reallocation through financial connected regions is associated with better labor-market outcomes in the non-tradable sector, which is consistent with an increase in credit supply for households impacting the local economy by demand heating. These findings add a relevant dimension of friction in trade shock adjustment by showing how credit reallocates depending on interregional financial ties.

Local specialization in economic activities imposes an unequal regional distribution of the effects of trade (Topalova, 2010; Autor et al., 2013; Kovak, 2013). Dix-Carneiro and Kovak (2017) documents the slow adjustment of local labor markets after trade liberalization due to geographical barriers to labor mobility and the slow reallocation of physical capital. This paper contributes to the debate by showing how credit is reallocated between regions through banking networks during and after trade liberalization and the impact of this financial connection between different areas on credit availability and labor market outcomes.

The event exploit here is the early 1990s trade liberalization in Brazil that reduced the import tariffs for most of the sectors by different magnitudes. Analysis is carried out at the regional and bank level, taking advantage of the difference in tariff changes, industry specialization between regions, and the heterogeneous credit exposure of banks in different parts of the country. For the local impact of trade liberalization, I follow the same empirical approach of Kovak (2013) that defined the regional shock as the exposure to sectoral tariff changes by the relevance to total employment of each tradable industry in each locality. From that, it is possible to evaluate the behavior of loan and term deposits by region before, during, and after the implementation of the policy. The results show that regions facing larger tariff declines experienced an immediate reduction in loan stocks and an increase in deposits compared to other regions right after the final implementation of trade liberalization. These results are in line with the literature that captures a strong relative deterioration in labor market outcomes in hard-hit regions, an immediate decline in firm openings, and an increasing effect over time in firms exits (Dix-Carneiro and Kovak, 2017). The estimates show that a region facing a 10 percentage points larger tariff reduction experienced 89.4 percentage points smaller credit growth rate from 1991 to 1995. This corresponds to the first and the year right after the new trade policy implementation, and the difference in tariff reduction is approximately the 10–90 percentile gap.

Next, to assess the potential impact of trade shocks on banks, I aggregate the changes in regional tariffs based on the proportion of the bank's total credit allocated to each specific region. Banks operating in hard-hit locations experienced a temporary reduction in credit compared to other banks immediately after the conclusion of trade liberalization in 1994, however, this effect fades quickly. In contrast, more exposed banks reallocate credit to less exposed regions shortly after the policy announcement in 1991. The temporary credit reduction by high-exposed banks appears once they were more likely to be intervened by the Central Bank in the first years

of the bank consolidation period triggered by the inflation stabilization policy put in practice in the same year of the trade liberalization final implementation. The bank consolidation process continued, but subsequent Central Bank interventions were not associated with bank exposure to trade shock. This reflects the impact of the trade shock on banks, but since the inflation control broadly reduced banks' revenues, the bank intervention or the credit decrease was no longer associated with the trade liberalization in the long run. These two findings demonstrate the importance of understanding the consequences of credit reallocation during the transition period and the effects of the trade shock-induced bank interventions that occurred after 1994.

Returning to the regional level, I show that the final redistribution of credit is highly determined by the bank branches' network prior to the trade liberalization announcement. For that, the bank exposure is calculated for each region, apart from the one that corresponds to the observation. For banks operating in each locality, this cross-regional bank exposure is added up to the regional level, based on the importance of each bank in terms of its share of total credit. This captures the effect of trade shock through banking networks. At first sight, the results could be interpreted as surprising, since regions with more exposed banks in other localities observe an increase in credit relative to other regions. Focusing on the dynamic of credit inflow, the loan stock growth in these areas occurs during the trade policy implementation between 1991 and 1994, and then we observe a momentary reduction on the effect magnitude reflecting the banking crisis after the stabilization plan launch, but returning to 1994 levels in the long run. This result reflects an anticipation of banks to the trade liberalization effects, reallocating credit since the policy announcement to less impacted regions. Localities that depend on more exposed banks in other regions take advantage of that and observe a relative increase of loans compared to other locations where their banks already operate in less impacted areas. This result dialogues with Camanho and Carvalho (2022) that demonstrates using the same banking data source that the presence of common banks across regions is important to determine the local lending co-movement in normal times, but it is not relevant along negative economic shocks precisely due to credit reallocation inside banks and across regions.

Together, these results describe the regional reallocation of credit after the trade liberalization experience in Brazil. Credit outflows from hard-hit areas together with the economic downturn induced by a decrease in labor demand in these areas (Kovak, 2013). The immediate and large effect of the trade shock must be interpreted in the Brazilian economic context where the conclusion of the trade liberalization

occurred together with very restrictive liquidity provision policies to stabilize prices. Stabilization immediately weakened banks that lost inflationary revenues, and, with a high interest rate, stimulated term deposits (Cysne and da Costa, 1996). However, the remaining results demonstrate that credit reallocation started just after the trade policy announcement and even before the stabilization plan, in which banks reduced its operations in hard-hit areas. Regions where their banks were very exposed in other localities observed a large inflow of credit as a result of the reduction in bank exposure. These facts highlights an important dimension of friction in capital mobility limiting the reallocation of credit according to banks' exposure to trade liberalization and their previous regional connections.

From the results of the credit reallocation, we also explore the effects of this transmission of the trade shock by baking networks on the labor market. I find that regions with more exposed banks in other localities, in addition to the credit-inflow experience, observed an increase in employment and wage bill in non-tradable firms. It was not possible to identify any results for tradable firms. This pattern is compatible with an increase in household debt pushing local demand, as discussed by Bahadir and Gumus (2016) and Mian et al. (2020).

This paper attempts to contribute to the literature documenting how credit reallocates between regions through banks' networks and its impacts in connected localities. This adds to the trade literature that focuses on understanding how economies adjust to trade shocks. Most of the work in this area emphasizes the relevance of reallocation of workers between sectors (e.g. Menezes-Filho and Muendler (2011); Autor et al. (2014); Dix-Carneiro and Kovak (2017, 2019)), despite the known relevance of capital mobility in the economic transition and its impact on final welfare gains (Dix-Carneiro, 2014; Artuc et al., 2022; Lanteri et al., 2023)[1]. The closest work to mine is Federico et al. (2023), which documents a friction in credit reallocation due to a general contraction of credit supply in banks with portfolios concentrated in sectors exposed to China competition after its entry into the World Trade Organization. In their case, banks reduce credit independently of the firm's sector or location. Their work differs from this, first by the institutional framework. Whereas the China shock evolves continuously over the years, the Brazilian trade liberalization is a discrete and well-defined event. Second, the trade liberalization in Brazil is announced and concluded with a gap of little more than four years. I show that despite the fact that

[1]Examples of studies looking at capital reallocation are Antras and Caballero (2009) and Lanteri et al. (2023)

credit shortens in more affected regions only after the completion of the trade policy, there is evidence that banks reallocate credit during the policy implementation period to less affected areas that each bank operates. Finally, different from them, I focus on total credit, including, in addition to firms, households. In respect to that, the improvement pattern in the non-tradable firms' employment, in regions that experienced an inflow of credit, is compatible with an increase in household credit heating the demand side of the economy.

The second and equally relevant research area related to this paper is the study of how shocks propagate through bank networks. The co-movement of lending across distant areas of a country in normal and crisis periods is discussed by Camanho and Carvalho (2022). Using the same bank data source as here, they demonstrate that in normal times, bank internal connections explain approximately 60% of the lending co-movement across regions, but this effect is weaker and nonsignificant during the 2008-2009 financial crisis. The lack of effect in this case is explained by within-bank credit reallocation when banks' ability to increase financing is constrained. Cortés and Strahan (2017) also bring evidence of credit reallocation by multi-market banks when faced with a local increase in lending demand after natural disasters. For the case of liquidity transmission in financial-connected areas in Brazil, Bustos et al. (2020) show that localities with common banks operating in regions positively affected by a new agricultural technology experienced an increase in credit supply. This effect is due to an increase in deposits in areas that experienced improvements in productivity that leak to connected regions, expanding the capital offer. Similarly, Gilje et al. (2016) exploited the discovery of oil and shale gas in the US to show that the increase in liquidity of banks operating in these localities flows into counties where these banks have branches. Sharing the same spirit, but exploiting a negative economic shock heterogeneously distributed across regions, I show that bank branches' networks are important to financial integration not only to distribute positive liquidity shocks but shaping the adjustment process after a national economic reform.

Finally, this paper is related to the literature on real effects of credit shocks. Bernanke (1983) argues that bank shocks increase the costs of financial intermediation affecting the real economy. Since then, empirical papers report on the transmission of bank health deterioration to firms as in Ashcraft (2005), Chodorow-Reich (2014) and Chodorow-Reich and Falato (2022), for example. Huber (2018) provide evidence of direct effects on firms connected to banks that suffer a negative shock, but also regional real effects through the decrease in aggregate demand in localities more

exposed to lending cuts. Here, I document that regions where experienced an inflow of capital after the trade shock are associated with better formal labor market outcomes for non-tradable firms. This result holds conditional to the same regional exposure to trade liberalization and is driven by different composition of banks and indicates that the real effects are probably operating through household credit that positively affects local demand (Mian et al., 2020).

The rest of the paper is organized as follows. Section 1 discusses the Brazilian trade policy reform and the measure of regional exposure to trade liberalization. Section 2 presents the data sources and summary statistics. Section 3 describes the empirical strategy, and Section 4 presents and discusses the results. Section 5 concludes.

1 Trade Liberalization

1.1 The Brazilian Trade Liberalization

The Brazilian trade liberalization experience began in the late 1980s and was concluded in the second semester of 1994. The first phase saw the partial elimination of tariff redundancies, special regimes, and additional taxes in 1988 and 1989, but only in March 1990 the just-elected president completely removed non-tariff barriers (Kume et al., 2003). These restrictions were replaced by tariff increases to provide the same protective structure, making import taxation levels the primary tool of trade policy and correctly reflecting the protection level faced by firms in different sectors in 1990 (de Carvalho, 1992).

In addition, a new foreign trade policy was announced in 1990 with a schedule of tariff reductions by sector to be concluded in 1995 (later brought forward to 1994). Figure 1 shows the change in the logarithm of tariffs plus one for each sector from 1990 to 1995. This approximation of percentage change is the measurement used in the empirical analysis and reveals a sizable variation in tariff cuts across sectors. These data are widely used in the literature assessing the impacts of trade liberalization in multiple dimensions[2] and are originally provided by (Kume et al., 2003).

The exchange of non-tariff barriers to import taxes in 1990 makes the baseline tariffs representative of sector protection defined decades earlier (Kume et al., 2003). Dix-Carneiro and Kovak (2017) shows that the tariff level in 1990 is strongly correlated with changes in tariff by sector (correlation coefficient -0.90) and the reduction

[2]For example: Dix-Carneiro and Kovak (2017) for labor markets, Dix-Carneiro et al. (2018a) for crime, Costa et al. (2023) for religion, and Ogeda et al. (2021) for electoral consequences.

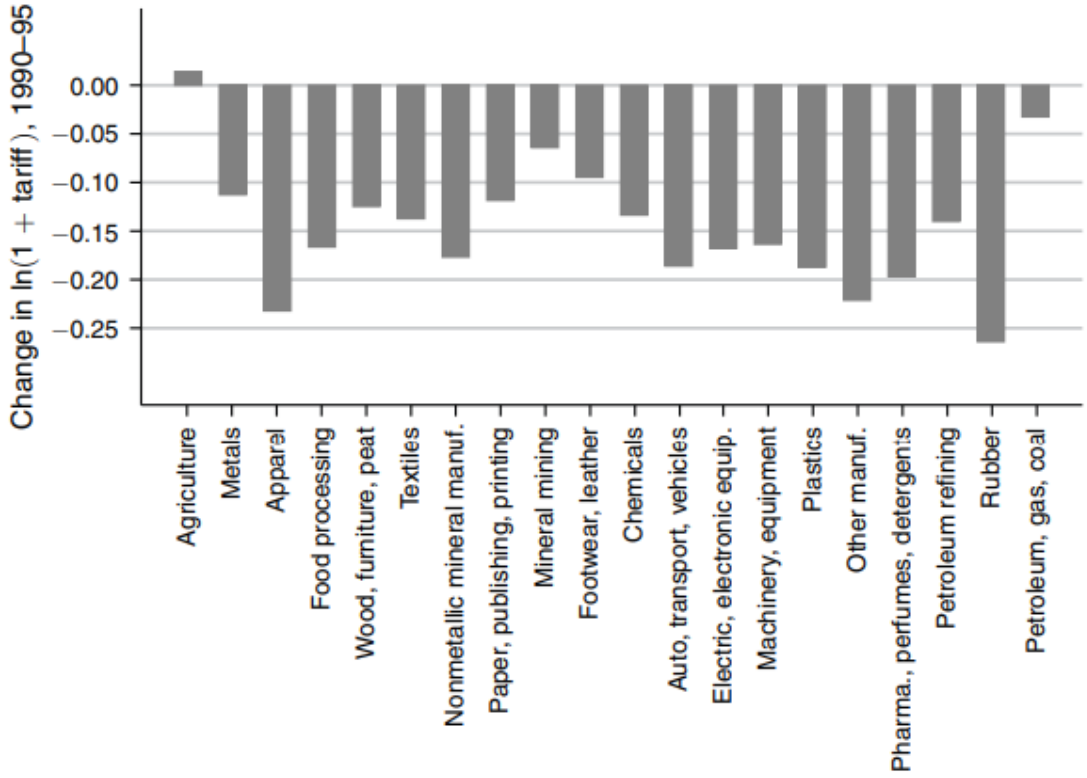


Figure 1. Chande in $\log(1 + tariff)$, 1990 – 1995

Source: Dix-Carneiro and Kovak (2017)

also homogenized the tariff levels across sectors. These features of the trade liberalization mitigate political influence concerns about its implementation and provide a sector-idiosyncratic shock that, combined with the sectoral distribution across different regions, allows us to measure the regional impact of the policy.

1.2 Regional Exposure to Trade Liberalization

By combining tariff reduction across sectors and the relevance of different types of industries in a locality, it is possible to construct a measure that captures the regional economic exposure to the trade liberalization policy. This paper follows Kovak (2013) interacting the sector-specific trade shock with the regional sectoral composition to measure the local economic shock induced by the tariff reductions, as follows:

$$RTR_r = -\sum_i \beta_{ir} d\ln(1+\tau_i), \text{ where } \beta_{ir} = \frac{\lambda_{ri}\frac{1}{\phi_i}}{\sum_j \lambda_{rj}\frac{1}{\phi_j}}$$

Where $d \ln (1 + \tau_i)$ represents the difference in the tariff rate for industry i between 1990 and 1995, the year just before and after the period of implementation of the trade liberalization. The weight β_{ri} corresponds to the initial labor share of the respective tradable industry i in the region r. The term λ_{ri} corresponds to the share of regional labor initially allocated in each industry and region, and ϕ_i is the cost share of non-labor factors.

This variable corresponds to the exposure of a region to tariff change depending on the local importance of each tradable sector employment that was heterogeneously affected by the policy. Kovak (2013) provides the formalization of this idea in a model of specific factors that incorporate a non-tradeable sector. He demonstrated that the aggregate labor demand is impacted by the composition of sectors price changes weighted by its relevance in total employment, and also that tradables and non-tradable sectors goods prices move together. In this way, the economic relevance of trade liberalization is fully captured by the effect on the tradable sector and corresponds to the decrease in labor demand in more affected industries. This is mapped by changes in sector prices (tariff changes) weighted by their regional share in total tradable sector employment.

2 Data

2.1 Regional Tariff Reduction

The analysis carried out in this paper focuses on micro-region level, which represents a set of contiguous municipalities with similar geographic and productive characteristics. This approach follows the literature using the Brazilian trade liberalization experience that has emerged since Kovak (2013)'s work. For the purpose of this paper, the data of the regional tariff reduction defined in Section 1 is from Dix-Carneiro et al. (2018b)[3]:

The data used by Dix-Carneiro et al. (2018a) for the calculation of this variable come from different sources: the tariff change is from Kume et al. (2003); the share of total labor in each tradable industry and region, λ_{ri}, was calculated using the 1991 Census; and the cost share of non-labor factors, ϕ_i, using National Accounts data from the Brazilian Statistical Agency (IBGE). The minus in the RTR_r formula facilitates the interpretation since regions that face larger tariff reductions correspond to more

[3]The authors constructed a variable named Regional Tariff Change. For ease of interpretation, I multiplied their measure by -1.

positive values. This variable is available for 412 micro-regions that are comparable areas from 1980 to 2010 and excludes the free-trade zone of Manaus since it was unaffected by tariff changes. Figure 2 plots the distribution of the regional tariff reduction across micro-regions.

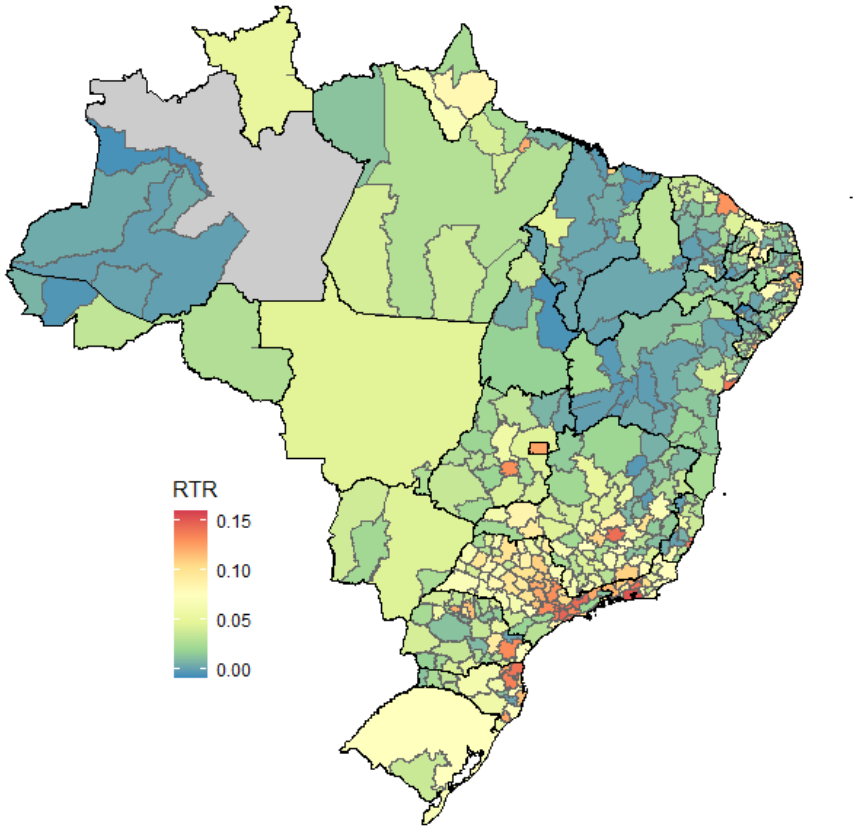


Figure 2. Regional Tariff Reduction

Notes: The figure displays the distribution of the Regional Tariff Reduction values (RTR_r) across micro-regions. Micro-regions are defined by IBGE and are slightly aggregated to account for changes in the borders between 1980 and 2010. The micro-region containing the Manaus Free Trade Area is excluded.

2.2 Bank Branches' Balance Sheet Information

The Brazilian Central Bank makes publicly available information on bank branch-level balance sheet on a monthly basis (ESTBAN). It is a report produced by banks and contains the position of each bank branch balance sheet accounts, such as total credit, term deposits, savings deposits, total assets, and others. From these data, it

is possible to aggregate information at the regional level.

Table 1 presents the descriptive statistics of balance sheet variables at micro-region level, conditional on having at least one bank operating in the period. Credit, loans, and loans for priority sectors are distinguished due to their particular nature. Credit accounts for all the amounts that the bank is due to receive in future payments, which is the sum of lending and financing operations and a balance account called other credit operations. These other credit values are similar-to-credit operations, such as payments to be received by honored guarantees, future contracts, and values paid in advance. Loans for the agriculture and real estate sectors are separated on the balance sheet because they are historically credit-incentivized sectors with earmarked credit, subsidized interests, or rules of minimum lending by banks. During the period under consideration, banks, including private ones, had to lend to these sectors a minimum percentage of their deposits. In addition, the two federal public banks concentrate credit in these sectors and manage them as instruments of public policy. Therefore, loans excluding real estate and agriculture are used as the outcome for most of the analysis, as the margin for adjustment for this type of credit is limited by strong government incentives to provide external finance to these sectors.

From the data, we observe that participation in regular loans increases in relevance compared to real estate and agricultural credit. This likely reflects the credit boom experienced in Brazil in the 2000s. On the other hand, we observe that the ratio of loans and term deposits is lower than one in 1995 reflecting the end of the high inflation period in 1994, followed by high interest rates that stimulated the increase in term deposits and limited the lending growth typically observed after successful price exchange-based stabilization policies (Calvo and Végh, 1999). Finally, the banking concentration is evident from 1995 to 2010, and it occurred first in the late 1990s and the first years of the 2000s with multiple bank failures and acquisitions after the inflation control that strongly hit banks' revenues, and more recently during the 2007-08 financial crisis.

2.3 Labor Market Data

The last data source is the *Registro Anual de Informações Sociais* (RAIS). The non-identified version is publicly available by the Ministry of Labor, and this data set covers the universe of formal firms and workers. From this it is possible to compute the total employment and wage bill by micro-region for the years 1986 to 2010. Table 1, Panel B shows the descriptive statics for total employment and wage bill by

Table 1. Banking and Labor Market Descriptive Statistics at Microregion Level

	1991	1995	2000	2010
Panel A: Banks				
Assets	2.75	9.16	7.99	16.56
(total assets - bi R$)	(21.78)	(83.7)	(75.57)	(158.1)
Credit	0.88	1.43	1.63	3.59
(total credit - bi R$)	(6.85)	(11.02)	(13)	(27.97)
Loans	0.26	0.58	0.66	2.07
(loans excluding agri and real state - bi R$)	(2.21)	(5.49)	(6.44)	(15.93)
Loans for priority sectors	0.18	0.51	0.43	0.7
(agri and real state loans - bi R$)	(1.11)	(2.88)	(1.86)	(3.69)
Term deposits	0.2	0.7	0.58	1.76
(term deposits - bi R$)	(2.02)	(6.74)	(5.48)	(16.27)
Branches	35.89	41.27	40.15	48.03
(Number of bank branches)	(114.73)	(130.71)	(141.75)	(177.94)
Total of banks in the sample	197	215	165	125
Total micro-regions	408	407	404	408
Panel A: Labor Market				
Formal wage bill	354.49	343.94	337.58	361.72
(annual - mi R$)	(2135.63)	(1895.72)	(1788.63)	(1626.21)
Formal employment	52.9	56.36	63.6	107.1
(active contracts in December ÷ 1000)	(251.87)	(245.52)	(249.92)	(384.09)
Total Micro-regions	412	412	412	412

Notes: Panel A displays the mean and standard deviation of the balance sheets of bank branches at the microregion level, assuming the presence of a branch in the given year. Assets are represented by the size of the balance sheet, while credit is represented by loans and other operations with future receipts or advances. Loans do not include lending for the real estate and agriculture sectors, while loans for priority sectors are the total lending for the agriculture and real estate sectors. All values are expressed in billions of Brazilian Reais at 2010 prices. Panel B displays the same statistics for wage bill in 2010 millions of Brazilian Reais at 2010 prices, and for total formal employment in thousands of active contracts in December of each year. All cases exclude the microregion containing the Manaus Free Trade Area.

micro-region.

The micro-region containing the Manaus Free Trade Zone is excluded from all cases in Table 1 because it is exempt from tariffs and was not impacted by the trade liberalization. For all 412 remaining microregions, labor market outcomes have been computed from 1988 onward. As some municipalities were not available in RAIS before 1990[4], the correspondent regions were also left out of the analysis when necessary and explicitly identified in the text.

[4]Four micro-regions that correspond to municipalities of the state of Tocantis created in 1990.

3 Empirical Strategy

The empirical strategy in this paper consists of three steps. First, I use the shift-share variable of regional exposure to import tariff reduction from Dix-Carneiro et al. (2018a) to assess the impact of trade liberalization on credit growth in different regions. Next, I construct a measure of bank exposure to trade liberalization by weighing the local trade shocks based on the banks' credit share in each locality. This step aims to assess how exposure to trade liberalization affects banks' outcomes and how they react to it. Lastly, to understand how capital flows across regions through banks' networks, I built a variable that accounts for the transmission of other regions' shocks depending on the relevance of each bank operating in the area and the exposure of these same banks in other localities hit by different tariff reduction intensity. This strategy allows us to understand whether localities facing similar trade shocks but differing in banks' external exposure take advantage of their bank composition, receiving credit from a potential asset reallocation from hard-hit areas, or whether they are negatively affected due to their exposure to weaker banks. Each of these strategies is detailed in sequence.

3.1 Regional Tarifff Reduction

Kovak (2013) presents a specific-factor model of regional economies that captures the change in regional labor demand from liberalization. The operationalization of this result is translated into the Regional Tariff Reduction (RTR_r), as discussed above in Section 1.

Following Dix-Carneiro and Kovak (2017), I use the specification below to evaluate the impact of the trade liberalization on banking outcomes in regions with different exposures to tariff reduction.

$$y_{rt} - y_{r,1991} = \theta_t RTR_r + \alpha_{st} + \gamma_t(y_{r,1990} - y_{r,1988}) + \epsilon_{rt} \tag{1}$$

In this equation, y_{rt} represents the outcome of interest (e.g. loan stock) for region r and time t. The estimate of the parameter θ_t represents the relative effect of trade liberalization on the growth rate of y_{rt}, between regions. As in the rest of the literature that uses the Brazilian trade liberalization experience, the regressions control for state-year fixed effects $\alpha_s t$ and for the pretrend represented, in this case, by the difference in the dependent variable between 1988 and 1990. Since many banks had regional operations, state-fixed effects are particularly pertinent in this

situation. I estimate equation 1 separately for each year between 1988 and 2010, so the parameter of interest represents the cumulative effect of the trade liberalization for each year.

This paper strictly reproduces the strategy used in most of the literature that explores this shock[5] and allows us to identify a discrete and well-defined change in trade policy that started in 1991 and was completed in 1994. Unlike the usual Chinese shock that promoted growth in trade, explored in Autor et al. (2013) or in Federico et al. (2023), it is possible to identify the dynamic of the trade shock without the confounding factors generated by the continuously evolving trade growth promoted by China.

3.2 Bank Exposure

Since trade liberalization led to different exposure to tariff reduction across regions, banks exposed in distinct areas across the country are likely to respond differently to the trade shock. To capture this, I built a shift-share variable at the bank level that weights the Regional Tariff Reduction (RTR_r) by the bank exposure in each region. The weights are defined as the share of total credit in each region as follows.

$$BE_b = \sum_r \sigma_{rb} RTR_r, \text{ where } \sigma = \frac{credit_{rb}}{\sum_r credit_{rb}}$$

Here, the regional tariff reduction defined in section 1 (RTR_r) is weighted by the credit share in each region r for each bank b. The idea is to measure the bank's exposure to the trade liberalization by the relevance of each region in which it operates that faced different tariff reductions. The weights are defined for 1991 following the same year basis of the RTR_r calculation by Dix-Carneiro et al. (2018a)[6]. I use this bank exposure measure in the specification below.

$$y_{bt} - y_{b,1991} = \delta_t BE_b + \mu_t(y_{b,1990} - y_{b,1988}) + \eta_{bt} \tag{2}$$

Equation 2 has the same logic as equation 1, going from region- to bank-level. On the left side, y_{bt} represents the outcome observed for bank b in year t. In this case

[5]For example: Dix-Carneiro and Kovak (2017), Dix-Carneiro et al. (2018a) and Ponczek and Ulyssea (2022).

[6]Note that we can replace the RTR in the BE formula and get $\sum_i s_{ib} d\ln(1-\tau_i)$, where $s_{ib} = \sum_r \sigma_{rb}\beta_{ir}$. In this way, we can return to the interpretation of exposure to tariff reduction where the relevance (shares) of the shocks corresponds to the combination of region exposure and bank exposure in that region.

δ_t is the parameter of interest that captures the bank response to trade liberalization and is calculated for each year separately, as before. In the regressions, controls for the logarithm of the bank's assets and the number of branches are included because the size of the bank is expected to influence outcomes and may be correlated with the bank's exposure to trade liberalization – larger banks operate in multiple regions, while small banks are concentrated in more urban and wealthy areas. For this specification, standard errors are clustered in groups according to their total assets.

3.3 Regional Bank Exposure

To comprehend how trade liberalization impacts regions through banks' networks, I construct another shift-share variable that captures the local bank exposure due to trade shocks in other localities. This approach estimates the regional impact of being exposed to banks that also operate in other regions that have experienced different tariff reductions. The consequences of that may be that areas dependent on credit of banks negatively impacted in other localities suffer more with their weakening, or else these areas might experience a relative inflow of capital due to credit reallocation to less affected areas. For that, I first construct a variable on the region-bank level that captures the Bank External Exposure (BEE_{br}) to Regional Tariff Reduction (RTR_r).

$$BEE_{br} = \sum_{j \neq r} \rho_{jb} RTR_j, \text{ where } \rho_{rb} = \frac{credit_{jb}}{\sum_{j \neq r} credit_{jb}}.$$

In the formula, $credit_{br}$ represents the credit stock of the bank b in region r, and RTR_r is the regional tariff reduction previously described. The sum is done across all the regions except for the observed one. The Bank External Exposure (BEE_{br}) represents the trade shock faced by each bank in each region caused by exposure to the trade shock in other localities. To reach the Regional Bank Exposure (RBE_r), I sum the bank-region shocks weighted by the share of total credit of bank b in region r, as follows:

$$RBE_r = \sum_b \omega_{br} BEE_{br} \text{ where } \omega_{br} = \frac{credit_{br}}{\sum_b credit_{br}}.$$

The Regional Bank Exposure (RBE_r) is the indirect impact of trade shocks through the network of banks' branches. More specifically, it is the tariff reduction weighted by a combination of the market share of each bank b in region r, the relevance of each region other than the observed ($j \neq r$) in the total external credit

stock of the bank b that operates in r, and the relevance of each sector i in each location j[7].

The equation for estimating the parameter associated with RBE_r is:

$$y_{rt} - y_{r,1991} = \Omega_t RBE_r + \psi_{st} + \pi_t(y_{r,1990} - y_{r,t}) + \nu_{rt} \tag{3}$$

The definitions of the variables and subscribes are the same as in the previous equations and Ω_r is the parameter of interest in this case. It represents the cumulative effect of the exposure of local banks to trade liberalization in other regions of the country. One concern about this variable is that regions with a similar sector composition may be exposed to the same banks. If that is the case, the shares to construct RBE_r are correlated with the bank-region shock by construction. To avoid this problem, in this part of the analysis, I run the equation 3 including RTR_r as a control variable in addition to the controls for pretends. For dependent variables such as wages and employment, we can use a wider difference for pretrends, from 1986 to 1990, while banking information is available until 1988. Figure 3 plots the distribution of regional bank exposure across micro-regions. It is important to clarify that when interpreting the coefficients associated with the regional bank exposure, one percentage point difference corresponds to the 20–80 percentile difference in the distribution of this variable. Note that the variation in this case is much lower than the regional tariff reduction reflecting the fact that the largest banks operate in multiple regions, many times at the national level. This reduces differences in banks' exposure to the trade shock, and at the same time, regions are exposed to similar banks. However, there is variation between regions even within the same state, as shown in Figure 3. Comparison between micro-regions of the same state is the source of variation to identify the effects of different regional bank exposures.

This section examines the Brazilian trade liberalization experience using an empirical approach that builds on the previous literature and extends it to comprehend the dynamics of capital flows across regions. As discussed in Dix-Carneiro and Kovak (2017), the greatest benefit of using the Brazilian trade liberalization episode is that it takes advantage of a discrete and clearly defined shock, which avoids the issue of gradual change in treatment over time, as is the case with studies focused on the

[7]We can rewrite RBE_r as $\sum_i \hat{s}_{ri} \ln(1+\tau_i)$, where $\hat{s}_{ri} = \sum_b \omega_{br} \sum_{j \neq r} \rho_{bj} \beta_{ji}$. This rewritten formula makes clear the interpretation that RBE corresponds to the regional exposure to tariff reduction, in which each sector shock is weighted by the combination of the relevance of each bank b in the region r and the exposure of these banks in other regions that were affected by different intensities of tariff reduction

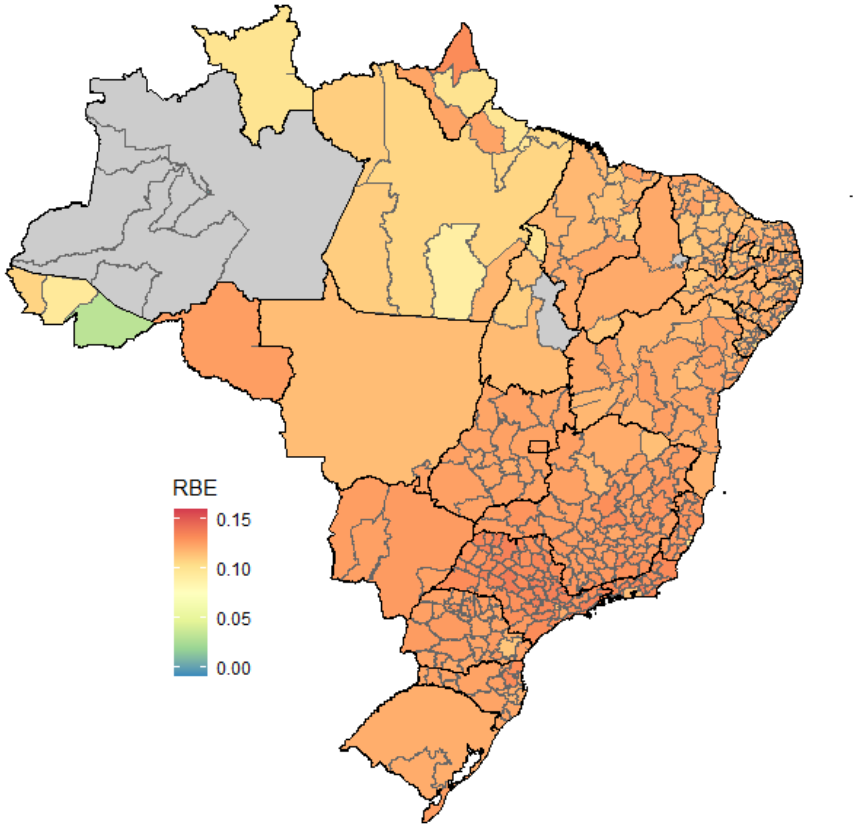


Figure 3. Regional Banking Exposure

Notes: The figure displays the distribution of the Regional Banking Exposure values (RBE_r) across micro-regions. Micro-regions are defined by IBGE and are slightly aggregated to account for changes in the borders between 1980 and 2010. The state containing the Manaus Free Trade Area and microregions without banking activity in 1991 were excluded.

Chinese increase in manufacturing exports. Additionally, this setup allows for an understanding of the effect of banks' exposure to the trade shock and its propagation in other regions through their network of branches. This final point seeks to elucidate how the regional connections of banks impose frictions in the process of trade liberalization adjustment.

4 Results

4.1 Regional Tariff Reduction

The effects of trade liberalization on regional loans[8] and term deposits are presented in Table 2 for selected years. The estimate for each year, from 1988 to 2010, is summarized in Figure 4 and describes the dynamic effects of regional tariff reduction.

Table 2. Regional Tariff Reduction: Effects on Financial Outcomes

Change in outcome	1991 – 1995		1991 – 2000		1991 – 2010	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: log loans						
(RTR_R)	-8.912***	-8.936***	-6.397***	-6.639***	-9.345***	-9.523***
	(0.8227)	(0.8172)	(1.389)	(1.288)	(1.511)	(1.413)
pretrend, 1988-1990		0.1789		1.822*		1.339
		(0.6401)		(0.9540)		(1.006)
Panel B: log term deposits						
(RTR_R)	8.216***	8.057***	8.747***	8.402***	4.459*	4.240
	(1.626)	(1.614)	(1.927)	(1.918)	(2.605)	(2.561)
pretrend, 1988-1990		1.199**		2.597***		1.645
		(0.5559)		(0.7083)		(1.024)
Panel C: $(loans - deposits)/assets$						
(RTR_R)	-1.423***	-1.424***	-1.387***	-1.390***	-2.162***	-2.182***
	(0.1400)	(0.1405)	(0.1825)	(0.1835)	(0.2814)	(0.2789)
pretrend, 1988-1990		0.0101		0.0210		0.1479
		(0.0790)		(0.1062)		(0.1006)
State fixed effects (26)	✓	✓	✓	✓	✓	✓
Observations	408	408	408	408	408	408

Notes: Regressions for microregions with at least one bank operating in 1991. Panel A shows the results for the change in the log of banks' loans stock for the indicated years. Panel B shows the results for the change in the log of banks' term deposits. Panel C shows the results for the change in capital outflow defined as the difference of loans and deposits, divided by bank assets. The even columns controls for change of the outcome from 1988 to 1990. Observation level r is microregion and standard errors are clustered for 87 mesoregions. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

The columns in Table 2 present the effect of the Regional Tariff Reduction on loans, term deposits, and capital inflow from 1991 to: 1995 in columns (1) and (2); 2000 in columns (3) and (4); 2010 in columns (5) and (6). This represents the first

[8] As described in section 2, the bank branch balance data distinguish loans to the real estate and agriculture sectors from loans to other firms and households. As multiple governmental policies have historically guaranteed external finance to real estate and agricultural businesses, I exclude these values from the analysis since they have limited adjustment capacity. Similar findings are achieved when the government bank Caixa Economica Federal, which concentrates the majority of real estate loans, is excluded.

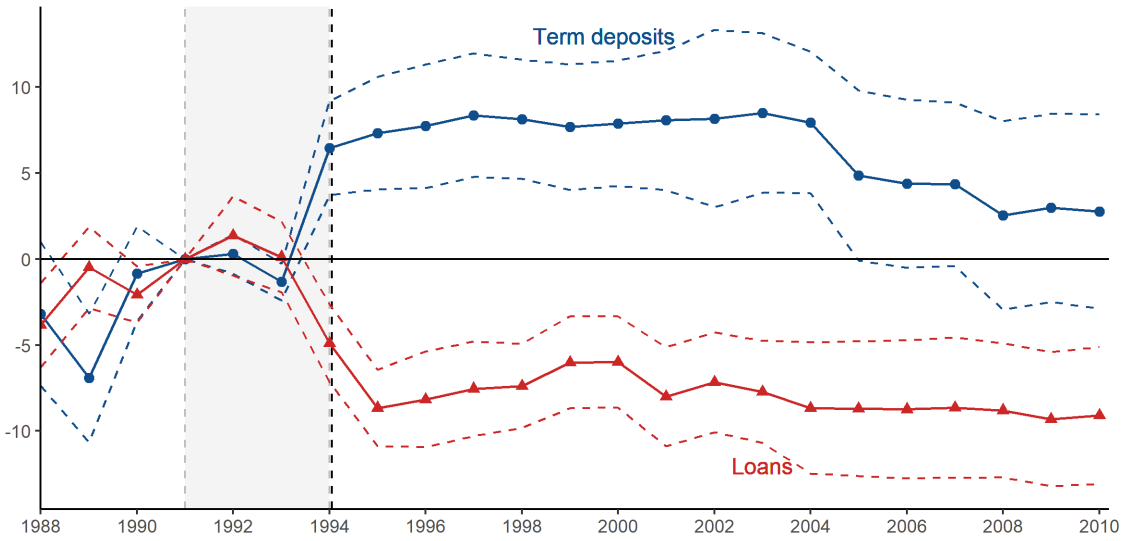


Figure 4. Regional Tariff Reduction Effects on Loans and Deposits

Notes: The graph shows the estimates of equation 1 for the Regional Tariff Reduction (RTR_r). Each point is a separate regression for 1988 to 2000. Triangles represent point estimates for the change from 1991 to the given year in the logarithm of regional loan stock, and circles represent point estimates for the change in the logarithm of regional term deposits. Dashed lines correspond to the 95% percent confidence intervals. Pretrends are included in the regression as a control variable, and the standard errors are adjusted for 87 mesoregions.

complete year after the final implementation of the new trade policy and selected years to describe the long-term dynamics. The coefficient estimated in column 2, Panel A of Table 2 indicates that a region facing a 10 percentage higher tariff reduction (close to the 10-90 percentile difference) experienced an 89.4 percentage point larger proportional decline in the stock of loans from 1991 to 1995. Table 2, Panel B shows the result for growth in term deposits, and the estimate from column 2 represents that for a 10 percentage points larger tariff reduction, on average, the regions observed a 80.6 percentage points larger growth rate in term deposits. The combination of these two previous results is described in Panel C by capital outflow – defined here as the difference of loans and deposits provided by the bank branches in region r, divided by the sum of total assets of the same branches. According to the findings, a larger regional tariff reduction resulted in a relative capital outflow, in the sense that these regions increased savings more than lending compared to others.

Figure 4 shows the results of the estimates of equation 1 for all years from 1988 to 2010 for loans and term deposits. It is possible to observe that the effect of the trade liberalization appeared immediately in 1994, the year of the policy's final

implementation, and was slightly attenuated for loans until 1999. The impact on term deposits has the opposite behavior in the short term and tends to zero effect in the long run.

Since I use the same empirical approach as Dix-Carneiro and Kovak (2017), we can compare the results presented with their findings. The worsening of loan provisions reflects the economic downturn experienced by regions more affected by the trade shock. They show that hard-hit localities saw lower growth rates for wage premiums and formal employment. Furthermore, along with worse labor market conditions, these localities also experienced a decrease in the number of establishments, with a stronger effect from 1999 onward. This result is driven by an immediate negative impact on firm openings and a steady increase in the rate of firm closures. The immediate effect on the opening of firms dialogues with the short-term effects of greater savings and less credit, while the slow deterioration of physical capital and the continuous worsening of the effects of labor market conditions is compatible with the disappearance of the long-term effects on deposits. The authors describe the slow dynamics of physical capital reallocation away from more impacted localities, while, in panel C of Table 2, we observe financial capital outflows from the most affected regions immediately after the completion of trade liberalization with sustained long-term effects.

The large magnitude of the effects presented in Table 2 must be interpreted within the economic context the country was going through. In 1994, the Brazilian government launched a stabilization plan to control high inflation. The success of the plan and the policies involved in its execution (such as very high interest rates) limited credit supply and encouraged savings in term deposits. Besides that, to limit the overheating of the economic activity induced by stabilization, in 1995 the government largely increased the deposit requirements for compulsory reserves in the central bank to reduce liquidity. The reduction of the point estimate absolute value for loans in 2000 in comparison to 1995 reflects the generalized credit shrink in the period, but, as expected, did not affect term deposits. Regarding the long-term effect decrease pattern on term deposits, it is likely to reflect the first consistent decrease in interest rates since the stabilization plan, from around 26% per year in 2004 to values close to 10% in 2010.

4.2 Impact on Banks and Inside Credit Reallocation

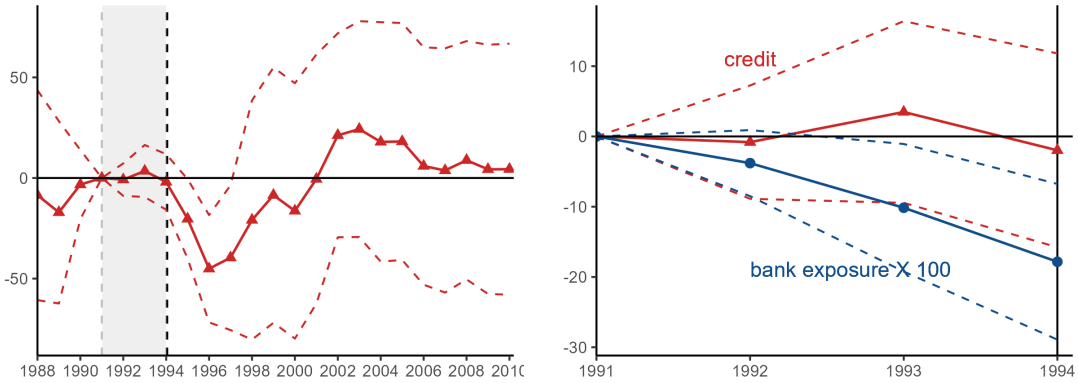
The relative worsening of economic activity in regions more affected by import tariff reductions potentially affected banks depending on their cross-regional exposure. Table 3 presents the estimates of equation 2 on the total credit of banks and Figure 5 (a) summarizes the same results for the years 1988 to 2010. Figure 5 (b) shows the results of the regression of equation 2 on the change in bank exposure (BE_b) between 1991 and the year indicated and repeat the estimates plotted in (a) for this shorter period. All results are limited to banks operating in 1991.

Table 3. Bank Exposure Effects

Change in log credit	1991 – 1996		1991 – 2000		1991 – 2010	
	(1)	(2)	(3)	(4)	(5)	(6)
BE_b	-34.51***	-45.10***	-7.829	-16.34	4.506	4.377
	(12.25)	(13.52)	(27.41)	(32.18)	(23.44)	(31.63)
log(*#branches*)		-0.6781		-0.8426		0.0160
		(0.5803)		(0.8148)		(0.8343)
log(*total assets*)		0.4768		0.4408		-0.7587
		(0.4718)		(0.5751)		(0.5660)
pretrend, 1988-1990		-0.0177		-0.0883		-0.0590
		(0.0453)		(0.0824)		(0.0895)
Observations	197	197	197	197	197	197

Notes: Regressions for banks operating in 1991. Estimates for the change in the log of banks' total credit for the indicated years The even columns controls for the logarithm for the number of bank branches and total assets in 1991 and the change of the outcome from 1988 to 1991. Standard errors are clustered for 30 groups of banks according to their total asset level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

From Figure 5 (a) we can observe that the total credit of more exposed banks suffered a proportional decrease compared to the others in 1995 and 1996. Table 4 shows that this result is driven by a higher probability of interventions in these banks in the early years after the final implementation of trade liberalization in 1994. As more banks stop operating, reflecting the consolidation of the banking system in the late 1990s, the estimates go to zero in the following years. To avoid the problem of multiple bank closures after trade liberalization, Figure 5 (b) limits the analysis for 1991 to 1994 to show that more exposed banks decrease proportionally more their operations in hard hit regions in the post-liberalization. Since many banks close and assume zero for the following years to calculate the dependent variable, the post-1994 results would mechanically present negative values since the difference in bank



(a) Total Credit, 1989 – 2010 (b) Credit and Bank Exposure, 1991 – 1994

Figure 5. Bank Exposure Effects on Total Credit and Credit Reallocation

Panel A and B display the points estimates, and the 95% confidence interval for equation 2. Panel (a) plots the results for banks' total credit from 1989 to 2010 and panel (b) plots the results for credit (triangles) and bank exposure times 100 (circles) for 1991–94 (trade policy transition period). All regressions include the logarithm for the number of bank branches and total assets in 1991 and the change in the result from 1988 to 1991. Standard errors are clustered for 30 groups of banks according to their total asset level

exposure in 1991 to zero in the year the bank closes would mechanically be larger for more exposed banks in the base line year, even if the closure was not correlated to the exposure. We can observe that banks more exposed to trade liberalization tend to reduce proportionally more, compared with less impacted banks, their operations in areas that were more affected by the policy even during the partial liberalization period. This is evidenced by comparing the lack of impact of bank exposure on credit in the years of the policy transition with the negative effects seen in the changes in bank exposure from 1991 to 1994. It appears that banks are able to anticipate the effects of trade liberalization before the final tariff reductions was implemented and adjust their credit allocations accordingly, even though there is no immediate impact on credit during the partial liberalization years.

Interpreting the results as a whole and in the economic context of the time, banks operating in hard-hit regions seem to immediately anticipate the effects of trade liberalization, increasing operations in areas that would be potentially less affected. However, in 1994 the government launched a price stabilization plan that reduced inflationary gains in the banking system, triggering a crisis and a period of consolidation in the sector that decreased the number of participants in this market (Cysne and da Costa, 1996). Initial bank closures appear to be associated with the effects of trade shocks, which explains the temporary effect on credit observed in Figure 5

Table 4. Central Bank Interventions

Y = 1 if intervention	1995 – 1996	1997–1999
	(1)	(2)
BE_b	2.374***	-0.3055
	(0.5678)	(0.9676)
log(*#branches*)	0.0547**	0.0290
	(0.0225)	(0.0224)
log(*total assets*)	-0.0506**	-0.0188
	(0.0219)	(0.0185)
Observations	197	197

Notes: Regressions for banks operating in 1991. The dependent variable is equal to one if the central bank intervened in the institution in the indicated year. Regressions controls for the logarithm of the number of bank branches and total assets in 1991. Standard errors are clustered for 30 groups of banks according to their total asset level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

(a) and the estimates in Table 4 for bank interventions. However, despite the absence of effects on credit provision by banks that concentrated operations in regions more affected by trade liberalization during the transition of the trade regime, the estimates plotted in figure 5 (b) indicate that these banks reallocate operations to potentially less affected localities. The next section provides more evidence of this behavior returning the analysis at micro-region level.

4.3 Credit Reallocation Through Banks' Networks

In continuation of the previous findings, Table 5 presents estimates for equation 3 in selected years, using changes in the logarithm of loans as the dependent variable. Additionally, Figure 6 displays the point estimates and their corresponding 95% confidence intervals for the years spanning from 1988 to 2010.

From the second column of Table 5, the estimate for Regional Bank Exposure (RBE_r) indicates that an increase of one percentage point in indirect exposure to the trade shock through banks' networks leads to a 23.9 percentage point rise in the regional loan stock. In particular, a one percent point difference in RBE_r corresponds to the 20th to 80th percentile range. In all cases, regions corresponding to the Manaus state were excluded from the analysis, which encompasses the micro-region containing the Manaus Free Trade Zone. Given the relevance of state-owned banks during that period, the exclusion of the free trade zone micro-region impacts regions

Table 5. Regional Bank Exposure Effects on Loan Stock

Change in outcome	1991 – 1995		1991 – 2000		1991 – 2010	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: log loans						
RBE_r	25.96***	23.85***	-6.173	15.08*	21.35**	25.51***
	(8.143)	(8.285)	(18.63)	(8.684)	(9.155)	(6.491)
RTR_r	-8.345***	-8.239***	-6.012***	-6.831***	-8.698***	-9.674***
	(0.6981)	(0.6888)	(1.032)	(0.8003)	(1.276)	(1.152)
pretrend, 1988-1990	-0.1171*	-0.1283**	-0.3863***	-0.2676***	-0.2341***	-0.2302***
	(0.0599)	(0.0588)	(0.1284)	(0.0820)	(0.0709)	(0.0753)
State fixed effects (26)	✓	✓	✓	✓	✓	✓
Unbanked regions	✓		✓		✓	
Observations	403	400	403	400	403	400

Notes: Dependent variable on log changes during the indicated period. All observations for the state of Manaus are dropped and columns (2), (4) and (6) exclude three regions without banks in any period of the sample. Observation level r is micro-region and standard errors are clustered for 87 meso-regions. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

of the state that are strongly linked to it. Furthermore, even-numbered columns exclude observations from micro-regions where banks were not operational during certain periods of the sample. This exclusion eliminates noisy observations arising from bank closures for any other reason, ensuring a more accurate assessment of the regional credit stock. In Figure 6, the increase in standard errors and the reduction in point estimates are likely to mirror the presence of noisy observations during the bank consolidation process that emerged during the late 1990s. Subsequently, the results stabilize, exhibiting values similar to those observed in 1994, reflecting the long-term effects in credit reallocation.

The estimates of RBE_r could be biased if regions with higher bank exposure were less affected by trade liberalization.[9] Moreover, it is also possible that banks specialize in certain sectors and concentrate in places with similar exposure to the trade shock, which would result in a positive correlation between these two variables. To address this potential confounding factor, I included RTR as a control variable in all columns. Upon accounting for this, the results for Regional Bank Exposure (RBE) indicate that regions hosting banks operating in other areas that were more exposed to the trade shock witnessed a relative increase in lending compared to other areas similarly exposed to the trade shock. This result aligns with the insights presented

[9]For example, if only one bank operates in all regions, RBE would be strongly correlated with the inverse of RTR.

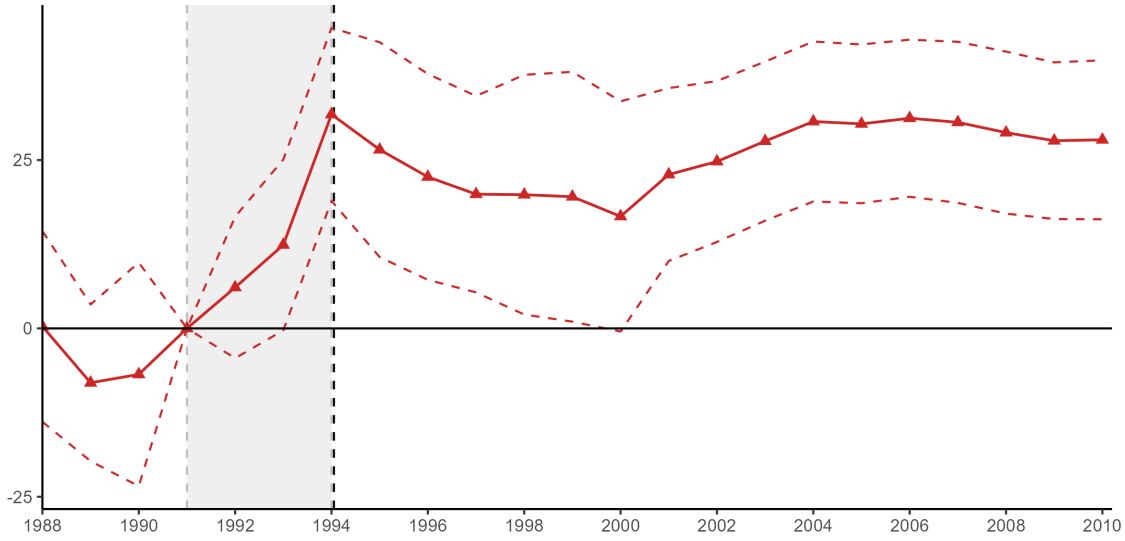


Figure 6. Regional Bank Exposure Effect on Loan Stock Growth

Notes: The graph shows the estimates of equation 3 for the Regional Bank Exposure (RBE_r). Each point is a separate regression for 1988 to 2000. Triangles represent point estimates for the change from 1991 to the given year in the logarithm of regional loan stock, and circles represent point estimates for the change in the logarithm of regional term deposits. Dashed lines correspond to the 95% percent confidence intervals. Pretrends are included in the regression as a control variable, and the standard errors are adjusted for 87 mesoregions.

in Figure 5, which display a neutral impact on bank lending for institutions with greater exposure to trade liberalization from 1991 to 1994 but a reduction in bank exposure to liberalization just after 1991. This pattern suggests that immediately after the announcement of the new trade policy, banks redirected their resources toward regions that would experience lesser effects from tariff changes, ultimately benefiting areas where their banks faced greater exposure to tariff reduction in other localities.

From column 4, compared to columns 2 and 6, the smaller estimate value for 2000 may also reflect the weakening of the banking system in Brazil after the new trade policy associated with inflation stabilization in 1994. This pattern is reflected in the bank-level results from the previous section in which higher bank exposure to the trade shock caused an immediate but temporary reduction in relative credit growth. Turning to the years of trade liberalization, from 1991 to 1994, the figure 6 shows an increase in loan stock growth associated with a higher external exposure of banks just after the announcement of trade liberalization until its final implementation. This pattern corroborates the idea of reallocation of credit to less exposed regions,

since the Regional Bank Exposure (RBE_r) is higher if the specific region depends on the credit of banks that are exposed in other locations affected by high levels of regional tariff reduction (RTR_r). Conditional on the same regional regional impact of the trade shock, the localities in which its banks operate in other regions hardly hit by the trade shock observe an immediate relative credit inflow. During the liquidity restrictive period from 1995 to 1999 we observe a smaller and noisy effect that recovers for 1994 similar values in the next years.

The effects of the regional tariff reduction (RTR_r), bank exposure (BE_b), and regional bank exposure (RBR_r) describe the dynamics of credit reallocation led by regional economic shocks induced by trade liberalization. Initially, I documented a relative decline in credit growth rates within regions subject to higher tariff reductions. In sequence, for banks operating in areas highly impacted by the trade shock, despite an initial transitory decline in credit, there was a consistent reduction in bank exposure during the years of partial liberalization. According to previous findings, it is shown that, conditional on (RTR_r), localities where banks were more externally exposed in other regions benefit from the inside-bank reallocation of credit, experiencing a higher capital inflow. These results describe the reallocation of credit through banks' networks and highlight the dependence on regional connections for capital mobility during the trade liberalization adjustment process. The next section explores the difference in bank composition that resulted in different rates of credit inflow to evaluate the impact on labor market performance.

4.4 Labor Market Effects of Credit Reallocation

The previous findings illustrate the redistribution of credit from high-impact to low-impact areas through the banking system. When exposed to the same level of tariff reductions, areas with banks in more exposed regions experienced an influx of credit due to the movement to decrease exposure in hard-hit areas by banks. Table 6 shows the estimates for Regional Bank Exposure (RBE_r) from equations 3 with local labor market outcomes as dependent variables. In sequence, Figure 7 displays the dynamic effects for the years 1986 to 2010 for tradable and non-tradable firms.

From Table 6, Panel A, we have the results for the difference in logarithms of the regional formal wage bill from 1991 to 2000 and 2010. Panel B shows the estimates when the difference in logarithms of formal employment is the dependent variable. Columns 4 and 2 include all the formal labor market in the analysis, while the remaining columns segregate by tradable and non-tradable firms. The estimate

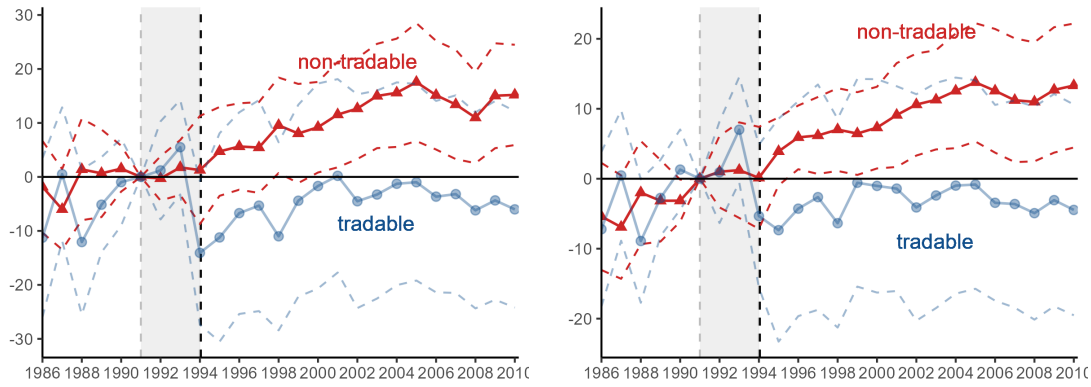
Table 6. Regional Bank Exposure Effects on Labor Market

Change in outcome	1991 – 2000			1991 – 2010		
	Total (1)	Tradable (2)	Non-tradable (3)	Total (4)	Tradable (5)	Non-Tradable (6)
Panel A: log wage bill						
RBE_r	8.530	-1.685	9.208**	10.82**	-6.009	15.20***
	(5.307)	(9.659)	(4.268)	(4.123)	(9.257)	(4.725)
RTR_r	-4.372***	-8.574***	-2.909***	-7.533***	-12.61***	-5.448***
	(0.7283)	(1.321)	(0.8478)	(0.9395)	(1.525)	(1.123)
pre-trend	-0.2311	-0.1588	-0.3396**	-0.2188	-0.2342*	-0.2189*
	(0.1428)	(0.1713)	(0.1486)	(0.1373)	(0.1235)	(0.1174)
Panel B: log employment						
RBE_r	6.472**	-1.025	7.307**	8.860***	-4.459	13.32***
	(2.834)	(7.756)	(2.969)	(3.341)	(7.659)	(4.506)
RTR_r	-4.493***	-8.368***	-2.760***	-5.734***	-10.45***	-3.667***
	(0.5173)	(1.097)	(0.6637)	(0.7737)	(1.212)	(0.9369)
pre-trend	-0.4475***	-0.1646	-0.5557***	-0.4284**	-0.2491*	0.4826***
	(0.1379)	(0.2079)	(0.1205)	(0.1706)	(0.1470)	(0.1468)
State FE	✓	✓	✓	✓	✓	✓
Observations	396	396	396	396	396	396

Notes: Dependent variable on log changes during the indicated period. Were excluded from the sample: all observations for the state of Manaus; three regions without banks in any period of the sample; four regions not identified in RAIS prior to 1988. Observation level r is micro-region and standard errors are clustered for 87 meso-regions. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

value from column 4 in panel B indicates that for regions facing a 1 percentage point larger tariff reduction, through their banks exposure in other localities, experienced a relative growth of 8.7 percentage points compared to other areas. Columns 5 and 6 suggest that the effect was completely driven by non-tradable firms. For the same reasons as in the previous section, all results control for the Regional Tariff Reduction (RTR_r) and pretrends defined as the difference in the dependent variable from 1886 to 1990. The point estimates and the 95% confidence interval for each year, 1986 to 2010, are plotted in Figure 7 and expose the long-term dynamic effect on formal wages and employment for tradable and non-tradable sectors. As we can observe, the effect of the external bank exposure reflects on better labor market outcomes for the non-tradable sector wilhe there is no significant result for the tradable firms. The effect starts right after the completion of trade liberalization in 1994 increasing in magnitude for ten years. The regressions includes the same observations in even columns of Table 5 except for four micro-regions not identified in RAIS prior to 1988.

Taking all the results together, the economic shock induced by trade liberalization



(a) Regional Log Formal Wage Bill (b) Regional Log Formal Employment

Figure 7. Regional Bank Exposure Effects on Labor Market

The graph shows the estimates of equation 3 for the Regional Bank Exposure (RBE_r). Each point is a separate regression for 1988 to 2010. The dependent variable in panel (a) is total earnings in the formal sector and panel (b) is total employment in the formal sector. Triangles represent the estimates for the non-tradable sector, and circles for the tradable. Dashed lines correspond to the 95% percent confidence intervals. Pretrends and Regional Tariff Reduction (RTR_r) are included in the regression as a control variables. Standard errors are adjusted for 87 meso-regions. ...

promoted an outflow of credit from high-impacted areas. Banks operating in more exposed regions were more likely to experience a Central Bank intervention in the first years after liberalization, but later interventions are not associated with the trade shock, resulting in only a temporary effect on credit reduction. Despite that, we can identify a consistent impact on bank exposure reduction during the partial liberalization period. The shift in regional lending allocation is in line with the credit inflow experienced by regions with banks operating in other severely affected areas. As banks ran away from these hard-hit areas, regions with more exposed banks benefited from capital reallocation and observed an influx of credit right after the new trade policy announcement in 1991. This trend continued until 1994 when a banking crisis started in Brazil. Finally, the same areas that experienced the credit inflow also observed an increase in employment and wage rate of growth in the non-tradable sector. This pattern in the labor market with better outcomes in the non-tradable sector, without effect on the tradable sector, is compatible with an expansion in household credit supply impacting labor outcomes through demand heating as discussed by Mian et al. (2020).

5 Conclusion

Trade liberalization affects regions differently due to regional specialization in certain types of industries. The literature shows that this unevenly distributed shock causes a reallocation of production factors, which are hampered by market-specific frictions. In the case of financial capital, the banks' branch network had a major influence on the redistribution of credit and in the regional impact of the trade policy. This study presented evidence that liberalization led to a credit outflow from areas that were most affected by the trade shock, and the redistribution depended on regional ties through banks' operations.

Banks operating in hard-hit regions reallocate credit, reducing lending in these areas relative to those less impacted. At this time, the bank branch network plays a significant role, and the difference in composition of these financial institutions affected how the final regional distribution of credit was conformed. Conditional on regional tariff reduction, areas dependent on banks operating in hard-hit regions were benefited by within-bank credit flow, consequence of their attempt to reduce the exposure to trade shock. These same regions that witnessed an increase in credit during the transitional period of the policy implementation also experienced an increase in the non-tradable sector employment consistent with a demand-driven economic heating caused by household credit boost.

These findings add a relevant dimension of friction in trade shock adjustment by showing how credit flows interregionally depending on bank branches' networks. This uneven distributed credit reallocation has real effects on the economy and highlights the importance of financial deepening as a source of mitigation of the negative impacts promoted by trade liberalization.

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