Inflation and the Two Sides of Banks: How Disinflation Replaces Liquidity with Lending *

Jiageng Liu† MIT

Tomás da Nóbrega‡ Insper

November 19, 2025

Abstract

We study how inflation differentially affects banks' two lines of business, liquidity management and loan making. After a large disinflation episode without fiscal adjustment or banking reforms, banks' deposit-side revenue decreased, interbank lending shrunk, and banks made more loans, as we show with high-frequency bank data. Deposit collection and liquidity management were highly rewarded during high inflation, and net interest margin decreased by two-thirds after the stabilization. Using a difference-in-differences (DiD) design, we show that banks more productive in loan making grew, and those more reliant on liquidity management shrunk or closed. Banks pricing became more responsive to the benchmark rate. Industries more dependent on external funding grew more after disinflation, which suggests that stable prices helps growth via the lending channel that can be otherwise crowded out by liquidity management. Large heterogeneity in banks' lending and deposit rates during high inflation suggests that the differential financial sophistication is a mechanism of monetary non-neutrality.

Keywords: Inflation, Banking, Monetary policy, Lending channel

JEL Codes: E52, G21, E44

*We thank Marco Bonomo, João Manuel de Mello, Maílson da Nóbrega, Ruy Ribeiro, Bernado Ricca, Antoinette Schoar, and Emil Verner for many valuable suggestions. We thank Eliseu Martins for sharing the accounting framework before the reform. We thank seminar participants at MIT Brownbag and Insper for many helpful comments. All remaining errors are our own.

†Sloan School of Management, MIT. Email: jiageng@mit.edu

‡Insper. Email: tomasrn@al.insper.edu.br

Of the maxims of orthodox finance none, surely, is more anti-social than the fetish of liquidity, the doctrine that it is a positive virtue on the part of investment institutions to concentrate their resources upon the holding of "liquid" securities.

(John Maynard Keynes, 1936, p.155)

In classical banking theory, banks transform short-term deposits into long-term loans. Contracts are written in real terms for both deposits and loans, so the monetary policy does not play a direct role. However, most financial contracts are nominal or only imperfectly indexed in the real world. Even when contracts are formally indexed, adjustment typically happens at discrete dates and often with backward-looking rules, so precise hedging of inflation is hard to achieve in practice. Inflation therefore influence banks whenever firms cannot fully plan their productions in nominal terms or depositors cannot fully anticipate the real value of their savings. Banks can manage liquidity better than their clients, so liquidity mismatch allows banks to create value for either side of their business.

When inflation is not fully anticipated or cannot be fully hedged, liquidity management comes at two real costs. First, it creates a redistribution between those who have different liquidity needs or skills to hedge their needs against inflation risks, as studied in Auclert (2019) and Brunnermeier et al. (2025). Second, since banks serve both depositors and lenders as the same entity, lucrative liquidity management may crowd out loan making business. This liquidity theory of banks dates back to Keynes (1936) and is formalized in Diamond and Rajan (2001, 2006), Kashyap, Rajan, and Stein (2002), for example. While the theoretical argument is well understood, empirical evidence remains sparse to our knowledge. Part of the reason is that inflation and monetary policy do not happen in a vacuum. Liquidity shocks on the economy level typically accompany real shocks, fiscal adjustments, and banking regulation changes. These variables often operate through channels not specific to banks and confound the real effect of monetary policy through banks.

We study a unique disinflation episode to directly test the liquidity theory of banks. After a decade of chronic inflation, the Brazilian government successfully implemented a monetary

reform (the Real Plan, *Plano Real*) in 1994 that rapidly quelled inflation. The gist of the reform was a monetary twist: first to replace the widespread price indexation practices with a parallel quoting unit, and then to change the quoting unit to a new currency known as Real. Before the Real Plan, the government implemented significant fiscal adjustment in 1990 that paved the way for the success, but never controlled inflation itself even after five failed attempts, so the 1994 success was rather unexpected. In reality, inflation dropped to normal level within a few months, and has stayed low since then.

We analyze high-frequency administrative data of all commercial banks' balance sheets and income statements in Brazil over this period. We complement the analysis of bank accounting with data on industrial outputs and bank employments.

We show three lines of evidence consistent with the liquidity theory of banks. The 1994 reform, while not targeted at banks, transformed banks' main business models from deposit collection and liquidity management to loan making.

First, banks received real yields for holding demand deposits before the disinflation shock. The yield, known as inflation profits, was a major source banks' value-added and disappeared after the reform. Demand deposits did not fully hedge against inflation, but they still provided partial protection to households: keeping money inside the banking system was costly but markedly better than holding cash. Households scrambled to move their wages and savings to inflation-protected assets through banks, but as they still used cash as means of payments in their wages and consumption, they must accept that inflation eroded the real value of their savings. Banks were compensated for transactional services by the deposit yield. After disinflation, banks moved to increase service fees to compensate.

Second, banks more actively participated in the interbank lending (overnight repo) market during high inflation and scaled down their positions after disinflation. Any cash on banks' balance sheet would quickly depreciate in value during high inflation, so the priority of banks was to lend to safe borrowers like other banks as soon as possible. Private commercial banks, the main subject of our study, lent on the repo market to gain exposure to

inflation-protected assets. Repo market protect participants from duration risk, which is particularly relevant under inflation when the short-term rate is more volatile.

Deposit inflation and liquidity management together accounted for the lion share of banks' profit margin during inflation, and they were disproportionally impacted by the reform. As a result, the net interest margin (NIM) of all Brazilian private commercial banks shrunk from 22% in 1993 to 6.7% in 1995, a level more comparable to 4.2% found in commercial banks in contemporaneous U.S.

Finally, banks started making more loans after losing these major sources of income. We find that the stock of loans increased 44%, from 38 billion Real (27% of total assets) to 55 billion Real (34% of total assets) after the reform in the real value. At the same time, the share of overnight repo assets dropped from 32% of total assets to 23%. Loans became more profitable, with the real excess yield on bank loans increasing from -12% in 1993 to +16% in 1995. The total loan portfolio had a negative real excess yield (relative to the repo rate) during inflation, consistent with the debt-inflation channel documented in Brunnermeier et al. (2025). The channel was shut down with disinflation.

Many banks adapted slowly and some even failed after the reform. The number of banks decreased from 270 in early 1994 to 220 by 2000. In a Bartik-style difference-in-difference design, we sort banks on the pre-shock exposure to repo operations and loan making, and show that banks more exposed to repo decreased in NIM value, and vice-versa for banks more exposed to loan making.

Then, we analyze the relationship of the banking system with the economy. We estimate the transmission of short-term risk-free rate to bank rates and find that disinflation significantly strengthened the pass-through mechanism. We use the risk-free benchmark and test its transmission to funding and lending rates. While the return on overnight liquidity assets tracked the benchmark one-to-one throughout the entire period, the transmission to the other business lines were distorted by inflation. In the pre-period reform, pass-through to funding costs was low, reflecting the banks ability to capture inflation rents by paying

negative real returns on deposits.

Stabilization realigned these prices with the cost of money. We document that after the Real Plan, the short-run sensitivity of funding costs to the interbank rate increased, forcing banks to compete for deposits at market-based rates. Similarly, on the asset side, the long-run alignment between loan rates and the risk-free benchmark tightened significantly. This evidence suggests that price stability plays an important role for the lending channel of monetary policy to function effectively: once inflation stabilized, bank pricing on both sides of the balance sheet became more responsive to the aggregate cost of liquidity.

On the mechanism, we show that a large cross-sectional variation in both banks' funding costs and loan income reduced to a small margin after the shock, which suggests that an unstable monetary base interacts with heterogeneous demand for liquidity and creates a real wedge between banks and their clients. In line with the uncertain liquidity demand, there was also large time-series variation in interbank lending rate. Banks also respond by shifting their demand for technology and labor. Using employment data, we see that the share of customer-facing employees under the title of clerks and assistants declined relative to analysts and managers.

Banks' shift to lending had a real effect on the economy. Following Rajan and Zingales (1998), we show that industries most dependent on external finance (pharmaceuticals, plastics, electrics and electronics) grew 40% more than those least dependent (tobacco, leather, clothing) after the reform.

The rest of paper goes as the follows. Section 2 provides an overview of the institutional setting in Brazil and the Real Plan. Section 3 lists the data sources and variable construction. Section 4 show how bank business transform under disinflation. Section 5 concludes.

Related Literature Our paper connects three strands of research: theories of banks as liquidity providers, monetary policy and the banking sector, and studies of bank as a business. First, we build on the literature that views banks as institutions that jointly provide liquidity

and credit. Classic models explain banks as liquidity insurers for depositors (Diamond and Dybvig, 1983), and later work emphasizes that banks' ability to extract and pledge value from illiquid loans depends on their fragile, demandable capital structure (Diamond and Rajan, 2000, 2001). Kashyap, Rajan, and Stein (2002) models banks as joint providers of loans and transactions deposits and highlight the complementarity. Our contribution is to show empirically that these two lines of business respond very differently to monetary policy shocks.

Second, we speak to the extensive empirical work on the "credit" and "deposits" channels of monetary transmission. Kashyap and Stein (2000) show that less liquid banks contract lending more after tightening, and more recently, Drechsler, Savov, and Schnabl (2017) documents a deposit channel of monetary policy acting on the real economy through the deposit spread from the policy rate. Our paper is close to Agarwal and Baron (2024) that show that high inflation restricts banks' intermediation capacity as households move toward inflation protection. Our results are complementary as we study the effect of a clean shock to inflation free of other policy confounders.

Third, our work relates to studies of bank business model and profitability. We analyze bank business in a similar manner as Egan, Lewellen, and Sunderam (2022) and DeMarzo, Krishnamurthy, and Nagel (2024), who estimate the value of banks attributable to deposits and loans. Our results speak to the tight connection between the two lines that could bring down some banks. Our results also draw historical parallels to highly profitable banks during turbulent times, documented in Weimar Germany in 1910s (Feldman, 1997; Brunnermeier et al., 2025) and in nationalist China in 1940s (Chang, 1958), among others. We show that even in a more modern period with widespread adoption of technology (e.g., over 80% of Brazilian households owned a TV in 1990), nominal contracts would still create value for banks during inflation.

2 Institutional Setting

The 1994 monetary reform known as the Real Plan in Brazil stands out from other disinflation episodes for three main reasons. First, the reform was mainly a monetary twist aimed to re-anchor inflation expectation. There was little change to fiscal policies or foreign exchange conditions in Brazil around the same time. Therefore, we can test our main idea without aggravated concerns about confounding variables such as changes to investment opportunities and fluctuation of capital flows that often accompany disinflation shocks. Second, the effect was sudden and unexpected, as the currency change happened one and a half years ahead of policymakers' plan, and the inflation precipitated to normal level within two months. Finally, by 1994, Brazil had adopted information technologies and modern regulatory frameworks including the Basel I Accord, which makes the case more comparable to modern banking markets. In this section we discuss relevant facts around the reform. Readers are referred to Garcia et al. (2018) for more historical details.

2.1 Policy background

We first briefly review the historical background leading up to the reform. Before the Real Plan in 1994, Brazil had experienced more than a decade of chronic inflation. Price freezes were the main policy tool which always broke down within a few months. The Central Bank of Brazil lack independent monetary policy capacity. Local governments created money supply through so-called movement accounts at the state-owned Bank of Brazil. The paradigm changed significantly after the 1989 election, when the newly elected president Fernando Collor implemented harsh fiscal and monetary reforms including freezing assets, cutting subsidies, and dismissing public sector employees. The reform received public support, though some measures were reversed after the Congress impeached and removed Collor for corruption charges in 1992. His vice president succeeded his position and continued most of Collor's policies along with the Minister of Finance, Fernando Henrique Cardoso. Thanks to the success of the policy, Cardoso won the late 1994 election and was re-elected in 1998.

By early 1994, the fiscal conditions of Brazil had improved and the government bond yield continued to decrease. However, inflation still plagued the economy. This was facilitated by various indexation practices. Wages and prices were commonly indexed to the IPCA (the extended consumer price index). Financial contracts were commonly indexed to the TBF (the basic financial rate), which was renamed SELIC in 1999. The government published these indices on a monthly basis. In our study, we use the SELIC rate which is the realized rate of interbank overnight repo agreements with the government bond as the collateral.

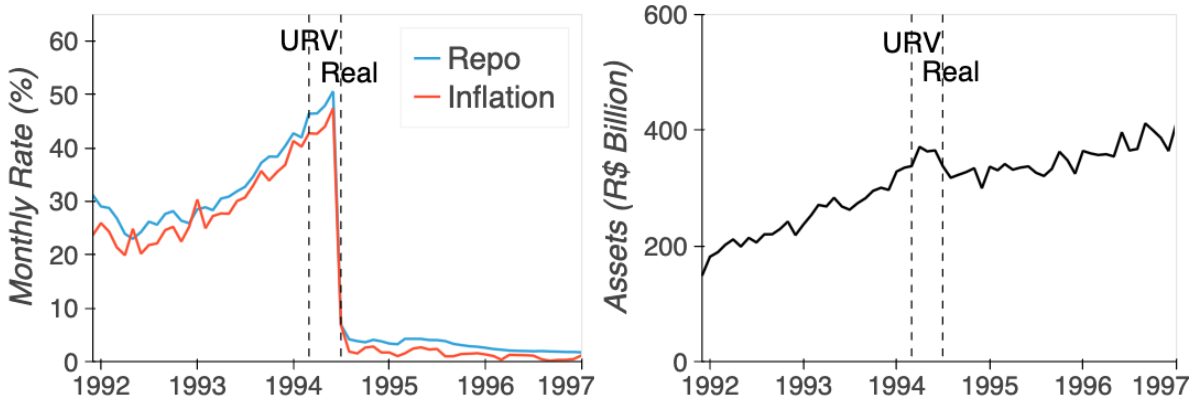
In the banking market starting in 1988, Brazil adopted the Basel I accord, eased banking regulations, and opened up the financial market to more foreign capital. The change along with the inflation induced the entry of many banks. The number of banks grew from 150 in 1988 to 270 in 1994. By 1994, banks' total assets reached 400 billion USD. State-owned banks account for half of the assets, and the rest are private banks.

2.1.1 The Real Plan

The Real Plan, named after the new currency Brazilian real (BRL), happened in two stages. In March 1994, the Ministry of Finance announced that prices shall be listed both in the old currency, cruzeiro novo, and in URV, *Unidade Real de Valor* (Real Unit of Value). URV was a parallel quoting unit whose value is nominally set to be the same as US dollars, effectively replacing the indexation policy. The conversion rate between URV and the old currency was reset every day, but payments were still made in the old currency. On July 1, 1994, the new currency of BRL was minted with the value equal to the URV, and payments were switched to be in BRL exclusively. In the first months after the currency switch, the exchange rate was effectively kept at one BRL per U.S. dollar, with the Central Bank managing a de facto peg through its interventions in the foreign-exchange market. Other than the monetary switch, the Real Plan follows closely the existing policies announced in the previous reform, including opening to foreign trade and capital and continuing privatization of state-owned firms. Thus the URV-real transition was the only main policy change over 1994.

The policy proved highly successful. We plot the monthly inflation rate and bank total

Figure 1: **Financial conditions in Brazil around the reform.** The left panel plots the repo rate, also known as the *Selic-over* rate (blue) and the monthly official inflation rate (red) around the Real Plan. The rates are in monthly percentage points. The right panel plots the total assets of all private commercial banks in Brazil in Brazilian Real in July 1994, when the value of Real was set equal to USD. The dashed lines indicate the two stages of the Real Plan. The line labeled "URV" is the time URV became the quoting unit used in parallel to the old currency. The dashed line labeled "Real" is the time when Real was minted with 1 BRL = 1 URV.



assets in Figure 1, where we indicate the two stages of the Real Plan. As it shows, the disinflation happened rapidly. After the second stage of the reform, the inflation rate dropped from 47% per month to 1.9% in the span of two months, and the currency regime lasts until today. In the right panel, we plot the total assets of all private commercial banks in real terms, which confirms that no substantial changes happened to the banking market around this episode.

The left panel of Figure 1 also displays the overnight interbank repo rate (Selic-over), which we use as our summary measure of monetary conditions. The Central Bank started to announce an explicit interest-rate target in July 1996; before, it managed liquidity through repos in government securities, so the Selic-over reflected high and volatile nominal conditions under chronic inflation. Following the URV–real transition, the level and volatility of the Selic-over decline sharply together with inflation. Throughout the paper we treat the realized Selic-over as our policy-rate indicator.

The success of the plan was rather unexpected. Five previous reforms had failed to control inflation, including two implemented by the same Collor-Franco government. The

URV was criticized as unsubstantial compared to previous fiscal measures. The designer of the Real Plan anticipated that inflation would not come down in two years instead of two months.

After the Real Plan, banks that relied on inflation profits started to fail. The government initiated programs (PROER and PROES) to provide liquidity to troubled private banks and restructured and privatized some state-owned banks. By 2000, the number of banks had decreased from 270 to 220. The share of assets owned by private banks remained around 50% throughout this period.

3 Data and Measurement

Our main data source is *COSIF* (*Plano Contábil das Instituições do Sistema Financeiro Nacional*, Accounting Plan for Institutions of the National Financial System), which covers monthly balance sheets and income statement for all commercial banks operating in Brazil since 1988. These data are publicly available from the Central Bank of Brazil and constitute the main regulatory accounting system used to monitor financial stability and ensure the reliability.

COSIF provides detailed information on both the asset and liability sides of banks' balance sheet, allowing us to track their main business activities. On the asset side, we observe cash, overnight positions, loans, leases, securities, and other investments. On the liabilities side, we observe deposits, outstanding loans, and equity. The income statement covers revenues and expenses, including breakdown for intermediation activities, including in particular, revenue of operations in credit, overnight, and funding. These data allow us to reconstruct the evolution of banks' business models around the the Real Plan. COSIF accounts are reported in nominal terms, in the currency prevailing at the time. We restrict our analysis to the 1991-1998 period and convert the data to Brazilian real (BRL) in July 1994. Since Real was introduced as a new currency, its value was equal to contemporaneous US dollar, or about $2.2 in 2025 dollar.

COSIF reports cumulative income statement that are incorporated to the balance sheet twice a year, by end of June and by the end of December. We construct monthly profit-and-loss measures by taking the first difference of the total stock in those accounts, except January and July, when the balances are reset.

In our analysis we exclude state-owned and policy banks whose income and expenses were heavily influenced by public credit programs rather than market activity. In particular, we exclude three types of banks: state-owned banks such as *Banco do Brasil* (Bank of Brazil) and *Caixa Econômica Federal* (Federal Savings Bank), policy banks such as *BNDES* (Brazilian Development Bank), and state-level government banks like *Banespa* (Bank of the State of São Paulo). The remaining sample includes all private commercial banks operating during the period.

Despite its granularity, COSIF data also present some limitations. First, it lacks non-accounting dimensions such as contract-level interest rates, loan maturities, and credit ratings. Also, bank revenues are clearly attributed to different asset classes, but on the funding side, funding costs for demand deposits, time deposits, and repos are aggregated. This aggregation constrains the identification of the precise channels driving changes in the funding margin.

In Table 1, we provide summary statistics of banks assets and liabilities one year before the Real Plan (1993) and one year after (1995). Comparing the two cross-sections, we see that the average bank's overnight assets decreased, loan assets increased, and the short-term liabilities (deposits) also increased. We expand the exposition later.

We also use macroeconomic data such as the consumer price index (IPCA) and average Selic-over rate. The Selic-over is the size-weighted average rate of daily loan agreements between financial institutions backed by Brazilian government bonds. In our analysis we regard Selic-over as the risk-free rate of the economy and compute spreads relative to that rate. We plot the two rates and the total bank assets in COSIF in Figure 1.

To complement the bank accounting data, we use data on industrial output data from

the 20th Century Statistics by the Brazilian Institute of Geography and Economics (IBGE)[1]. We also use data on bank employment and employee titles from the Annual Report of Social Information (RAIS).

Table 1: Banks' balance sheets. The top panel reports the summary statistics of balance sheet data for private commercial banks in Brazil in the year 1993, before the reform. The bottom panel repeats in the year 1995, after the reform. Monthly accounting variables are averaged on the bank level for each year. All units are in July 1994 Real, when 1 Real was set equal to 1 US Dollar.

Panel A: Banks in 1993

		N	Mean	Std	10%	50%	90%
Assets	Overnight	236	184M	383M	744K	27M	508M
	Loans	236	161M	466M	294K	14M	361M
	Non-Loan Credit	236	108M	294M	197K	8.1M	258M
	Securities	236	71M	211M	121K	11M	134M
	Other Assets	236	66M	267M	65K	3.5M	134M
Liabilities	Short Term	236	321M	824M	855K	51M	728M
	Medium Term	236	112M	288M	0	2.4M	298M
	FX	236	48M	142M	0	0	133M
	Intermediation	236	27M	72M	0	1.2M	88M
	Other Liabilities	236	69M	209M	406K	6.7M	153M

Panel B: Banks in 1995

		N	Mean	Std	10%	50%	90%
Assets	Overnight	238	177M	568M	931K	13M	437M
	Loans	238	231M	789M	370K	18M	500M
	Non-Loan Credit	238	125M	307M	261K	7.9M	342M
	Securities	238	81M	190M	113K	10M	200M
	Other Assets	238	104M	430M	252K	6.7M	159M
Liabilities	Short Term	238	408M	1.2B	1.5M	35M	955M
	Medium Term	238	138M	400M	0	4.9M	329M
	FX	238	59M	150M	0	133K	187M
	Intermediation	238	20M	68M	0	734K	43M
	Other Liabilities	238	74M	245M	586K	6.9M	142M

[1]See https://seculoxx.ibge.gov.br/economicas/tabelas-setoriais/industria

4 Results

We present results of the disinflation on banks as the follows. In Section 4.1, we show that the net interest margin of banks rapidly shrunk after disinflation, and we decompose the drop into three components: loan yields, overnight repo returns, and funding costs. Section 4.2 shows that the shock also shrunk the cross-sectional variation in the yields of the three components, and Section 4.3 shows a tighter transmission of monetary policy to bank rates. We supplement the evidence on yields and costs with analysis of asset composition change in Section 4.4 and show bank adjustment frictions in Section 4.5. Finally, we discuss the real effect in Section 4.6.

4.1 Bank Margins

Following the recent literature such as Drechsler, Savov, and Schnabl (2021), we measure bank profitability with the *net interest margin* (NIM) using balance sheet data as

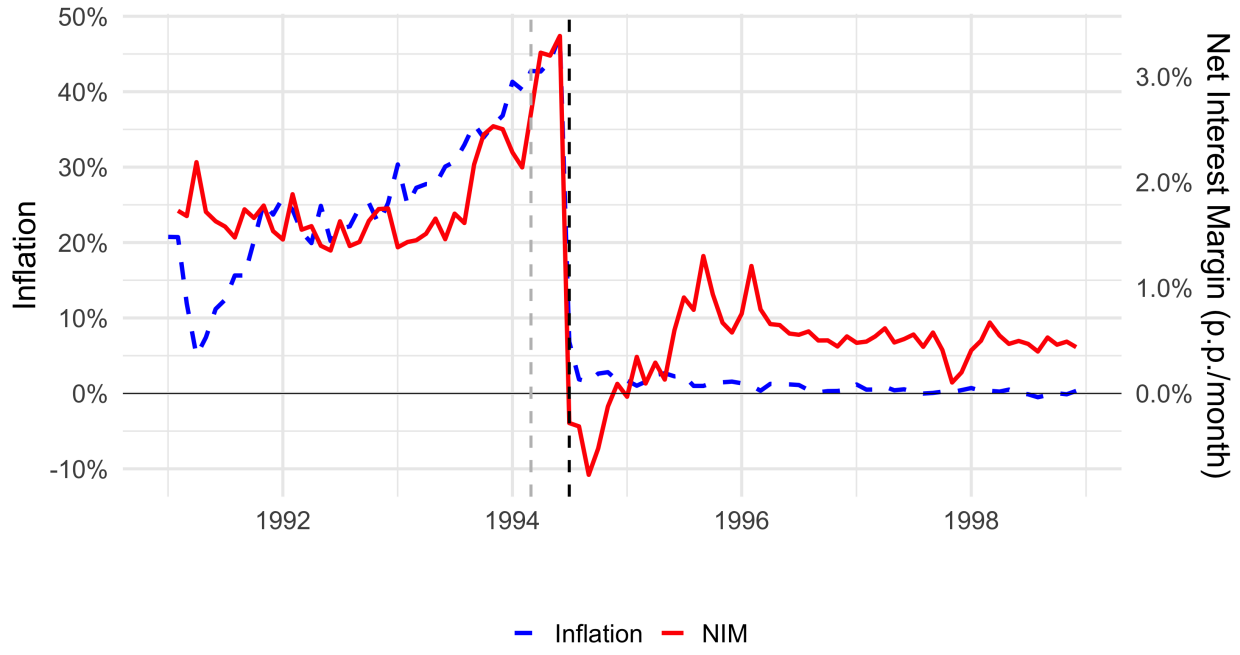
$$NIM_{t+1} = \frac{\text{Interest Revenue}_{t\to t+1} - \text{Funding Cost}_{t\to t+1}}{\text{Remunerated Assets}_t}.$$

This is a measure of spread between lending/investments and the cost of funding. It captures the ability of a bank to transform savings into credit efficiently. Also, it isolates intermediation margins from other sources of revenue and cost of bank, i.e. service fees, trading costs, labor expenses etc. Details of the accounts used can be found in Appendix A.

In Figure 2 we show the net interest margin decreased by about two-thirds after the Real Plan. This figure contains the size-weighted average of the net interest margin, which moved from around 1.5% per month before the Real Plan to around 0.5% post the Real Plan.

The plot suggests a sharp compression in intermediation margins following stabilization. During hyperinflation years, banks earned exceptionally high nominal revenues from short-term investments and overnight lending, while the real cost of funding was often negative. The the Real Plan, by anchoring inflation and reducing nominal interest rate volatility

Figure 2: **Inflation and Bank Margins.** This figure plots the monthly inflation rate (blue dashed line, left axis) and private commercial banks' net interest margin (red solid line, right axis) around the time of the reform. The NIM is defined as the intermediation revenues minus intermediation costs, divided by remunerated assets. Accounts used are defined in Appendix A.



eliminated this source of easy profitability.

As inflation declined, the spread between lending rates and deposit costs increasingly reflected standard components such as credit and liquidity risk, rather than inflation-related distortions. In this new environment, Brazilian banks relied relatively less on inflation-driven gains and relatively more on traditional intermediation margins tied to efficiency and risk management.

This aggregate evidence motivates our next step: decomposing the intermediation margin into its underlying components—loan yields, overnight returns, and funding costs—to identify which parts of the banking business model were most affected by stabilization.

4.1.1 Decomposition of NIM

To understand the decline in net interest margin, we decompose banks' intermediation business their main business components. The classic banking model, dating back to Diamond

and Dybvig (1983) revolves around maturity transformations: funding long-term illiquid loans with short term deposits, with particular attention to the deposits business in recent papers (Drechsler, Savov, and Schnabl, 2017). However, we know that banks also engage in liquidity positions through interbank markets and government securities. We therefore examine separately, yields on loans and overnight operations (asset side of intermediation) and cost of funding (liability side). These components reveal where profitability was generated before stabilization and what happened after.

COSIF data allows us to match stock and flow accounts to compute business-specific nominal yields. For instance, *Credit Operations* balance sheet item can be matched to *Credit Income* entry in the profits and loss statement, enabling calculation of a loan yield. We group *credit* and *leases* into loans, short term interbank placements into overnight, and, for completeness, include a smaller category of securities. Because securities typically represent less than 10% of bank assets and are noisier, our analysis focuses primarily on loans and overnights. In Appendix A we show the detailed mapping accounts.

We begin by computing the nominal yield of each business:

$$y_{t+1}^{N,asset} = \frac{\text{Revenue}_{t\to t+1}^{asset}}{\text{Stock}_{t}^{asset}}, \quad asset = \{loan, overnight, securities\}$$

On the funding side, the connection between costs and liabilities is less direct, since the COSIF frameworks reports two broad categories of intermediation expenses: *Funding Expenses* and *Obligation Expenses* related to several liability items. We therefore construct an aggregate funding cost by matching these expense accounts to liabilities that clearly generate financing obligations: *Deposits*, *Repo Obligations*, *Negotiable Debt Instruments* and *Obligations for Loans and Transfers*.

In this analysis, deposits are included in their entirety, even though part of them are non-remunerated. This inclusion is intentional. During inflationary periods, non-interest-bearing deposits represent a central source of cheap funding and were an important driver of bank profitability. Excluding them would understate the effective funding advantage banks

enjoyed.

Our definition is conservative in the sense that it omits ambiguous items that only partially correspond to funding costs, such as *Interfinancial Relations*, yet it considers the full deposit stock as a core component of banks' intermediation strategy. If we expanded the liability base further, the implied cost of funding would fall even more, reinforcing the finding that pre-stabilization funding was extraordinarily cheap in real terms.

The nominal funding cost is:

$$c_{t+1}^{N,fund} = \frac{\text{Cost}_{t\to t+1}^{fund}}{\text{Stock}_{t}^{fund}}$$

We verified the robustness of these definitions through sensitivity analyses that varied the account selection. The main results are stable. The only material difference arises when provisions for credit losses are included in the asset stock. Because some banks report provisions exceeding total credit, which can mechanically yield negative asset values, we exclude provisions for credit losses in all subsequent computations.

To make returns comparable over time, we deflate nominal yields and costs using observed inflation rate π_{t+1}:

$$y_{t+1}^{asset} = \frac{1 + y_{t+1}^{N,asset}}{1 + \pi_{t+1}} - 1, \quad c_{t+1}^{fund} = \frac{1 + c_{t+1}^{N,fund}}{1 + \pi_{t+1}} - 1,$$

Finally, we express each component relative to the real risk-free, computed by converting the nominal Selic-over rate $r_{t+1}^{N,f}$ to real rate r_{t+1}^{f}. This allows us to quantify the value generated above or below a market benchmark:

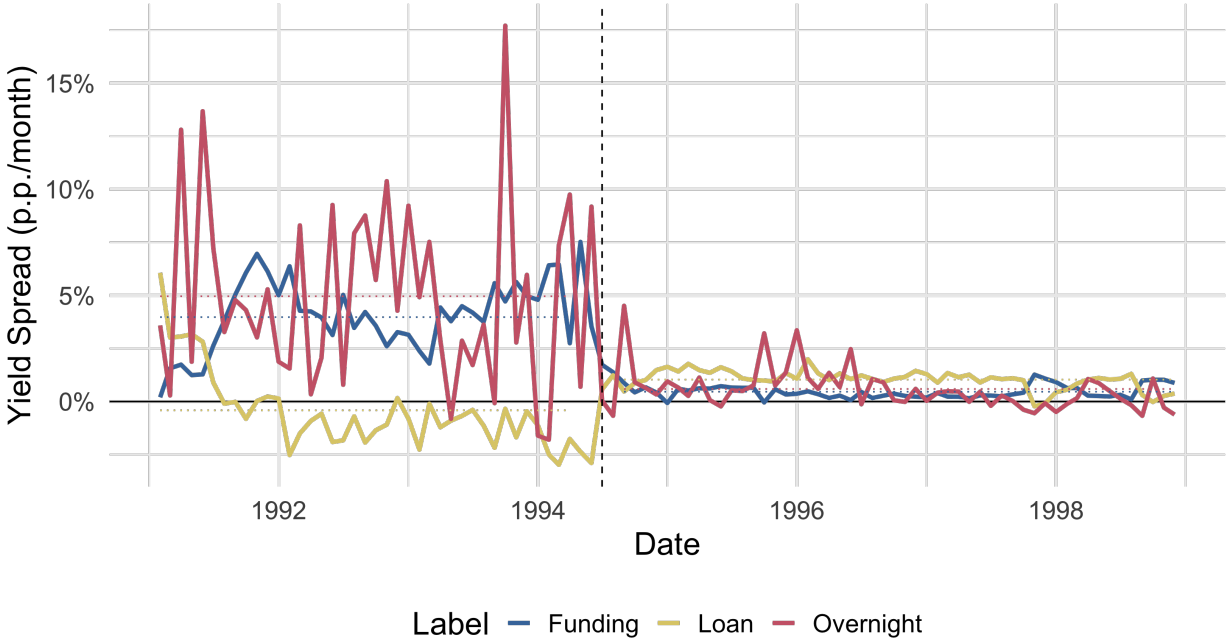
$$\text{spread}_{t+1}^{asset} = y_{t+1}^{asset} - r_{t+1}^{f}, \quad \text{wedge}_{t+1}^{fund} = r_{t+1}^{f} - c_{t+1}^{fund}$$

The *spread* measures a premium banks earn on their asset returns relative to the risk-free rate, while the *wedge* measures cheapness of funding, how much less a banks pay relative to

the market rate. A positive spread or wedge indicates value creation for the bank beyond the risk-free rate.

Figure 3 shows the asset-weighted spreads for the banking sector during 1991-1998 period, with the dashed line indicating the beginning of the Real Plan. The figure reveals a clear regime shift.

Figure 3: **Spreads and Funding Wedge.** This figure plots the spreads of loan yields and overnight yields with respect to the real risk-free, and the funding wedge between risk-free and funding cost. Loan yields are define by credit and leases revenues divided by total stock of credit and leases. Overnight are interbank liquidity revenues divided by interbank liquidity placements. Funding cost are funding and obligation expenses divided by liabilities accounts related to the expenses.



Before stabilization, funding wedge was large and positive: banks paid rate below the risk-free benchmark, often negative in real terms. This cheap funding (an inflation subsidy) allowed banks to engage in overnight operations that yielded high returns, above the risk-free rate, reflecting demand for short-term liquidity funding during inflation. When nominal prices are changing rapidly, cash-flow management and liquidity becomes a valuable service that banks were able to provide.

After the Real Plan, both effects diminished sharply. The funding wedge nearly disap-

peared as deposits rate rose in real terms, while overnight spreads converged to zero.

Interestingly, before stabilization, loans were not yielding above the risk-free rate; returns were positive in real terms but insufficient to match the risk-free return. This pattern indicates that loans were not the main source of banks' margins in this period, with pre-reform profitability instead coming largely from raising funds cheaply and investing them in short-term overnight assets. Several mechanisms are consistent with this evidence, including financial repression, regulatory constraints on lending and deposit rates, and the use of loans to support broader relationship or deposit-generation strategies. We view these as potential explanations and keep them in the background for our empirical analysis.

Profitability of loans increased after the Real Plan, and became the most relevant intermediation product of banks after the Real Plan. Banks profitability moved from deposits and overnight spread into loans.

The decomposition shows that the decrease of the net interest margin happened because two very profitable inflationary rents–deposit and overnights virtually disappeared after the Real Plan. On the other hand, loans increased in profitability and became the most relevant margin for banks–nevertheless, the increase was not enough to overturn the reduction and the net effect indicate reduced overall profitability.

4.2 Cross-sectional Yield Spread

While the average spreads help identify where profitability originated, they omit difference across institutions. To better understand how the stabilization affected the distribution within the banking sector, we examine the dispersion of loan yields, overnight yields and funding costs before and after the Real Plan.

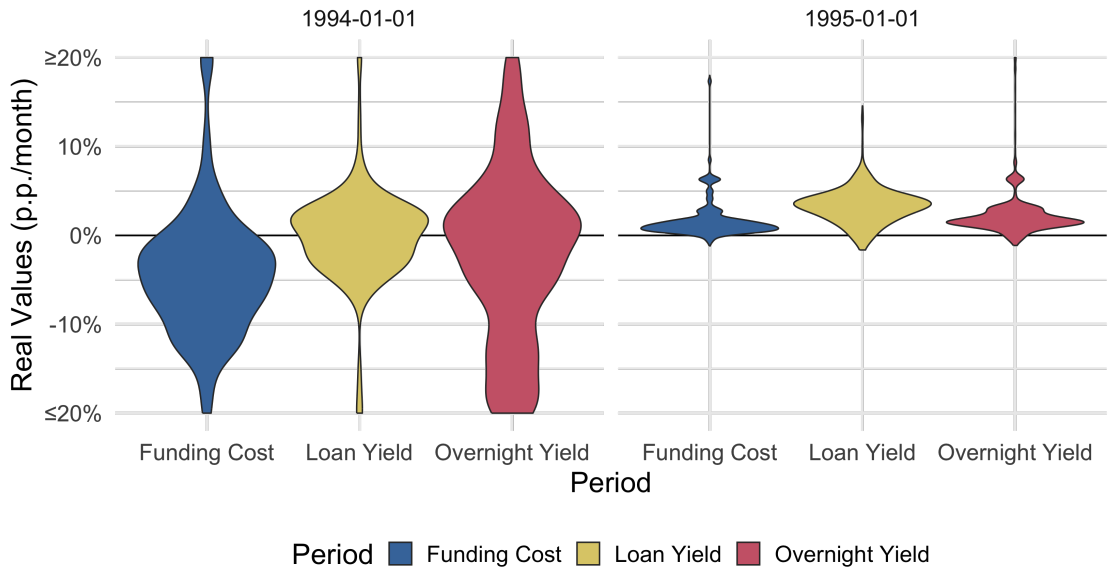
Figure 4 plots the weighted distribution of the different yields and the funding cost for two representative dates, January 1994 (Pre-Reform) and January 1995 (Post-Reform). The figure is consistent for other windows. Before stabilization, banks exhibited wide heterogeneity in both funding and asset returns. Some institutions earned exceptionally high overnight

and loan yields, while other barely achieved positive real returns and many had negative real returns. Funding costs were not only low on average but also highly dispersed, with many banks enjoying negative real costs–effectively being paid to hold deposits in real terms.

After the Real Plan, the distributions converged. The spread of funding costs narrowed around zero, and loans and overnight yields clustered more tightly. The real rates became mostly positive, which means a few banks were losing on loans/overnight and almost all banks were spending real costs of funding on deposits. Once inflation risk vanished, banks faced similar nominal and real interest rate conditions, leaving less room for heterogeneity in pricing and portfolio composition.

In economic terms, stabilization made the sector more homogeneous and competitive. The disappearance of two inflationary rents (i) imperfect matching of deposits with inflation (particularly non remunerated deposits) and (ii) high-yield overnight assets, forced banks to rely increasingly on traditional lending margins.

Figure 4: **Dispersion of Funding Cost and Yields on Overnights and Loans.** This figure shows violin plots for deposit costs, loan yields and overnight yields, all in real terms reported as percentage points per month. Loan yields are define by credit and leases revenues divided by total stock of credit and leases. Overnight are interbank liquidity revenues divided by interbank liquidity placements. Funding cost are funding and obligation expenses divided by liabilities accounts related to the expenses.



The contraction in dispersion also suggests that risk-free rate transmission may have become more uniform after the stabilization. When inflation was high, banks differed widely on their sources of profits. With a stable nominal anchor, these differences diminished, suggesting strong co-movement of the yields with nominal rates.

4.3 Short-term Risk-free Rate Transmission

The heterogeneity hints that short-term risk-free might correlate differently before and after the shock [2]. Since our object of interest is the relationship between nominal monetary conditions, we consider nominal variables in the regression. Specifically, we estimate

$$y_t^{N,j,i} = \beta_1 \text{Selic}_t + \beta_2 \text{Post}_t + \beta_3 (\text{Selic}_t \times \text{Post}_t) + \alpha_t + \varepsilon_{i,t}, \;\; j \in \{\text{funding, loan, overnight}\}$$

where $y_t^{N,j,i}$ is the nominal yield, Selic_t is the nominal risk-free rate and Post_t is a dummy equal to 1 after the implementation of the Real Plan. Each bank is indexed by i and the bank fixed effect is captured by α_t. The regression is weighted by each bank's size at t and we cluster the standard-errors by date and bank.

Clustering by bank accounts for serial correlation and heteroskedasticity in the residuals within each institution—shocks to a bank's funding or lending conditions are likely to persist over time. Clustering by date, in turn, controls for common shocks across banks on the same month. Two-way clustering therefore provides robust inference in the presence of both cross-sectional and temporal dependence in the residuals, which are inherent to banking panel data and macro shocks like the the Real Plan.

In this regression, the monetary policy correlation is measure by β_1 before the Real Plan and $\beta_1 + \beta_3$ after. If the inflation is neutral, then $\beta_3 = 0$. A tight connection between the $y_t^{N,j,i}$ and Selic is capture by either $\beta_1 \to 1$ or $\beta_1 + \beta_3 \to 1$. And β_2 allows the regression to fit a change in the intercept in the pre and post-periods.

[2] As discussed earlier, Brazilian Central Bank started to set monetary policy targets in July 1996. Over the period of our analysis, the Central Bank operated the short-term risk-free rate in the interbank liquidity market.

Table 2: Sensitivity of Bank Yields to the Selic Rate (Levels). This table reports estimates of $y_t^{N,j,i} = \beta_1 \text{Selic}_t + \beta_2 \text{Post}_t + \beta_3(\text{Selic}_t \times \text{Post}_t) + \alpha_i + \varepsilon_{i,t}$ for funding, loan, and overnight rates $j \in \{\text{funding, loan, overnight}\}$. $y_t^{N,j,i}$ is the nominal yield of bank i on instrument j at month t, Selic_t is the overnight risk-free rate, and Post_t is an indicator equal to one after the Real Plan. All regressions are weighted by bank assets and include bank fixed effects; standard errors are two-way clustered by bank and date.

	Funding (1)	Loan (2)	Overnight (3)
Selic	0.8322***	0.8414***	0.9985***
	(0.0360)	(0.0350)	(0.1452)
Post	0.0071	-0.0278***	-0.0484
	(0.0072)	(0.0103)	(0.0438)
Selic × Post	-0.1080*	0.1655*	0.1956
	(0.0637)	(0.0989)	(0.2335)
Observations	18,938	17,965	19,198
R^2	0.80719	0.79277	0.25747
Within R^2	0.78019	0.77315	0.13795
Bank fixed effects	✓	✓	✓

Table 2 presents the results. Overnight moves very closely to the selic rate with $\beta_1 = 0.9985$ and $\beta_3 = 0$. It shows what we expected. Loans move less, with a coefficient at $\beta_1 = 0.8414$. However, after the Real Plan $\beta_3 = 0.1655$ indicates that pass through became tighter. Funding cost, on the other hand, are the least correlated with selic at $\beta_1 = 0.8322$ and is less correlated after stabilization ($\beta_1 + \beta_3 = 0.7242$).

To complement the level specification, we also estimate a regression in first differences:

$$\Delta y_t^{N,j,i} = \beta_1 \Delta\text{Selic}_t + \beta_2 \text{Post}_t + \beta_3(\Delta\text{Selic}_t \times \text{Post}_t) + \alpha_t + \varepsilon_{i,t}, \quad j \in \{\text{funding, loan, overnight}\}$$

Following Drechsler, Savov, and Schnabl (2017), this "delta" specification focuses on the short-run transmission of monetary policy to banks' balance sheet components. By expressing all rates in changes rather than levels, the regression absorbs slow-moving differences in average levels across institutions and isolates the contemporaneous co-movement between banks' nominal rates and the policy rate.

Relative to the level specification, this approach removes potential biases arising from persistent bank-specific pricing gaps or long-run trends captured in the fixed effects. Consequently, β_1 measures the instantaneous pass-through of monetary policy to bank i's nominal yield before the the Real Plan, while $\beta_1 + \beta_3$ captures the same sensitivity after stabilization. In contrast, the coefficients from the level regressions reflect long-run relationship between the Selic and the corresponding rates, incorporating both persistent and transitory components.

Table 3: Sensitivity of Bank Yields to Changes in the Selic Rate (First Differences). This table reports estimates of $\Delta y_t^{N,j,i} = \beta_1 \Delta\text{Selic}_t + \beta_2 \text{Post}_t + \beta_3(\Delta\text{Selic}_t \times \text{Post}_t) + \alpha_i + \varepsilon_{i,t}$ for funding, loan, and overnight rates $j \in \{\text{funding, loan, overnight}\}$. $\Delta y_t^{N,j,i}$ and ΔSelic_t are monthly changes in the corresponding nominal yields and in the Selic rate. β_1 captures pre-Real Plan pass-through in changes, and $\beta_1+\beta_3$ the post-Real Plan pass-through. All regressions are weighted by bank assets and include bank fixed effects; standard errors are two-way clustered by bank and date.

	Funding (1)	Loan (2)	Overnight (3)
Delta Selic	0.7145***	0.8526***	1.491**
	(0.1024)	(0.0851)	(0.6407)
Post	-0.0030	0.0005	-0.0022
	(0.0032)	(0.0023)	(0.0071)
Delta Selic × Post	0.1798*	0.0794	-0.3714
	(0.1047)	(0.0856)	(0.6498)
Observations	18,660	17,695	18,917
R^2	0.26920	0.29128	0.07377
Within R^2	0.26207	0.28911	0.01490
Bank fixed effects	✓	✓	✓

We can see that the short run effects compliment the analysis observed in the levels. The short-run pass through to funding increases from $\beta_1 = 0.7145$ to $\beta_1 + \beta_3 = 0.8943$. This contrasts with the level results (decrease in correlation over time) and suggests the stabilization improved the size of pass-through to funding costs even if long-run co-movement is on a lower level after the Real Plan.

The loans show strong contemporaneous pass-through with $\beta_1 = 0.8526$ and statistically

insignificant increase after the reform. In levels, the post-reform is economically and statistically meaningful. Taken together, the results indicate that stabilization mainly strengthened the long-run alignment of loan rates with policy, while short run sensitivity was already high.

In deltas, the overnight component coefficient exceeds one ($\beta_1 = 1.491$) and statistically insignificant decrease after the reform. These estimates are consistent with the levels finding, suggesting the overnight rate move fast and roughly one-for-one with the selic rate.

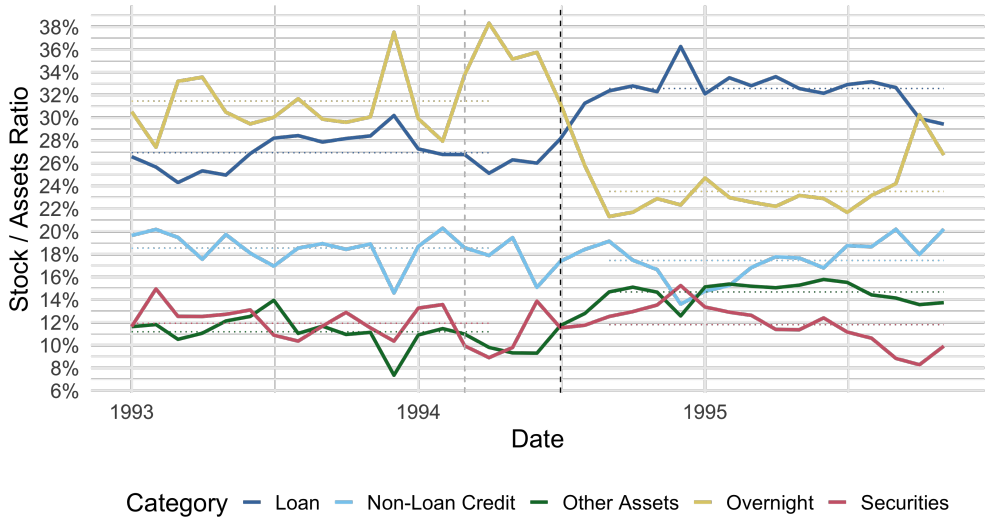
4.4 Balance Sheet Reallocation

When banks faced the sharp drop in margin, in particular the shrinking revenue from deposits, they adjusted their balance sheet following the implementation of the Real Plan. The stabilization did not only shift margins, it impacted how banks behaved.

On the asset side, banks shifted away from short-term liquidity operations and toward credit intermediation. Figure 5 shows that before the reform, overnight positions accounts for roughly 32% of total current assets, the largest single category. After stabilization, their share fell to about 25%. In contrast, loans (credit and leases) rose from around 26%to 33%, becoming the dominant component of banks' earning assets. This pattern is consistent with the disappearance of inflation-induced demand for liquidity management services: when prices stabilized, the incentive to park funds in overnight instruments weakened, and banks reoriented their portfolios toward longer-maturity, higher-duration credit assets.

The liability side of the balance sheet remained remarkably stable as we show in Figure 6. Short term liabilities, including demand deposits, continued to represent about 55%of total liabilities before and after the reform, which may suggest a lack of alternatives to bank services. However, profitability drastically decreased and pushed banks to change their deposit service offering. As we show in the left panel of Figure 7, banks started to charge higher service fees on their deposits. We also see a lower share of bank employment under the titles of clerks and assistants–positions associated with depositor-facing services. Analysts and managers, more likely to work on evaluating and monitoring loans, accounted for a larger

Figure 5: **Bank Current Assets.** This figures shows total amount of each asset item comprising the current assets. For each category, we sum the monthly total amount allocated and divide by the total current assets. Loans include credit and lease operations and exclude provisions for loss. Non-loan credit contains FX receivables, intermediation and brokerage, accrued revenues and guarantees. Overnight are interbank liquidity assets. Securities includes positions in derivatives. Other assets include availabilities, interdependence relationships, interfinancial relations and "other assets" account. Details of grouping are in Appendix A.



share of employment.

Figure 6: **Bank Liabilities.** This figures shows total amount of each liability item. For each category, we sum the monthly total amount allocated and divide by the total liabilities. Details of grouping are in Appendix A.

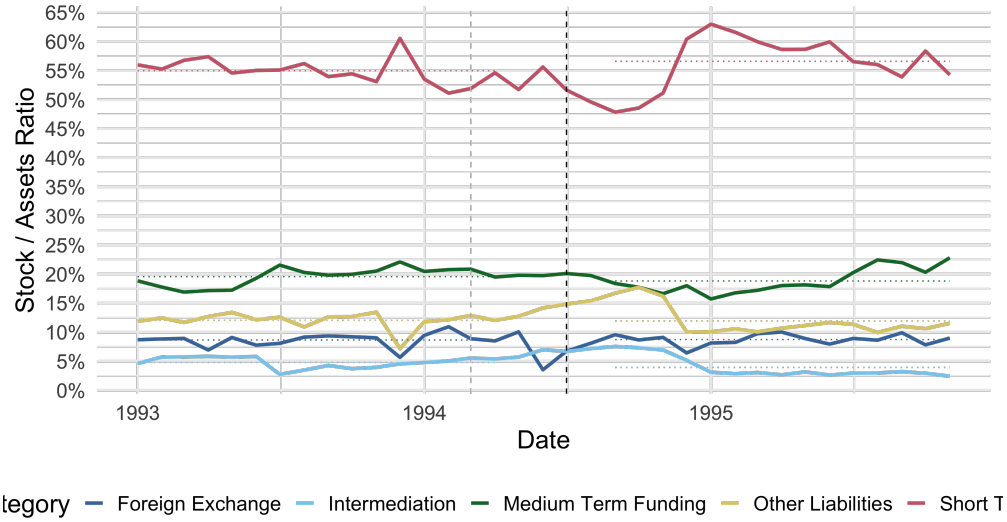
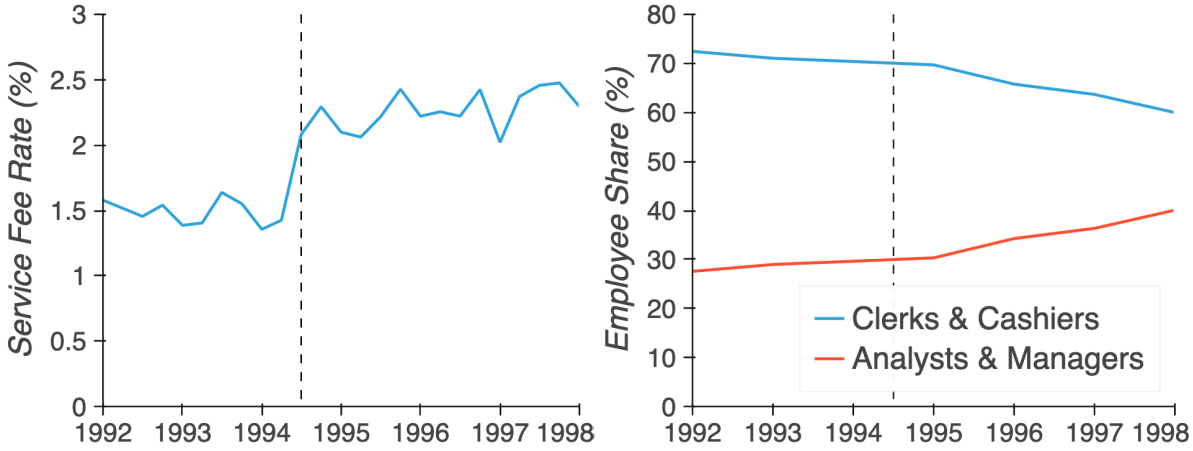


Figure 7: **Service Fees and Employment Composition.** The left panel plots the annualized weighted average deposit service fees on the total liabilities of private commercial banks. The right panel plots the share of employees at the two largest private commercial bank, Itaú and Bradesco, who held titles equivalent to clerks and cashiers, versus analysts and managers.



These compositional changes sheds light on the broader adjustment in the financial system: the transition from a liquidity-based to a credit-based intermediation model. Under hyperinflation, profitability came from managing short-term flows and exploiting the inflation tax on deposits plus overnight yields. Once stabilization removed that source of income, banks sought returns through traditional lending, risk assessment, and maturity transformation, the core functions of financial intermediation in developed economies.

This reallocation had real economic consequences. By increasing their exposure to loans, banks deepened their connection with the productive sector, expanding the availability of credit to firms and households. It also made the system more sensitive to credit risk and monetary policy, setting the stage for the modern banking market that characterized Brazil in the late 1990s and early 2000s.

4.5 Adjustment Frictions

Banking is a specialized industry. In particular, we expect banks to accumulate capital, both physical and intangible, for a specific business model. Pivoting takes effort and time. If a bank relied more on interbank lending, it was likely more invested in that business and

would face a steeper challenge after stabilization compressed that margin. On the other hand, banks that were more loan reliant would thrive under the new conditions.

To fix ideas, we define business intensity for each bank. Specifically, for bank i each month of 1993 we compute

$$\text{Share}_{it}^{\text{asset}} = \frac{\text{Stock}_{it}^{\text{asset}}}{\text{Toal Assets}_{it}}, \quad \text{asset} \in \{\text{Overnight}, \text{Loan}\},$$

then we average over the year and normalize the score to obtain each banks average reliance on overnights, s_i^{O} and reliance on loans, s_i^{L}. We define the intensity in 1993 to avoid any anticipation effects, as the Real Plan was announced in early 1994. The normalization allows us to interpret the results in terms of standard deviations.

We then estimate the regression

$$\text{NIM}_{it} = \sum_{\tau \in \mathcal{T}} \beta_\tau \left[\mathbf{1}\{t = \tau\} \cdot s_i^j \right] + \alpha_i + \lambda_t + \varepsilon_{it}$$

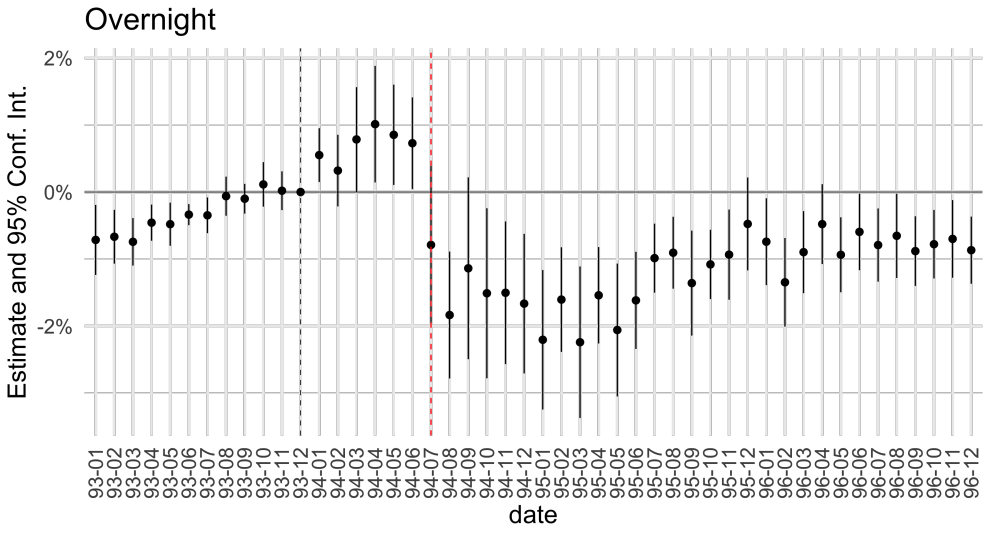
where α_i and bank fixed effects, λ_t are date fixed effects. The reference month is December 1993. We estimate the regression weighted by total asset size in 1993 and standard errors are clustered by bank and month.

In Figure 8 we show results for overnight intensity. Banks that relied on overnight was a relevant part of the balance sheet lost net interest margin with respect to their peers. The effect is more pronounced in the twelve months after the implementation, but the effect is never fully recovered.

Particularly, we observe an upward pre-trend in the pre-period which correlates with the rising inflation rate and the increasing importance of interbank lending. Since overnight loans were particularly profitable in the pre-period, banks that relied on it were more profitable.

In Figure 9 we show the results for loans. After stabilization, we observe the banks that had had more loan in the balance sheet gained margin compared to the peers. Recall we sort banks in December 1993, and the profitability is remarkably similar through 1994 before the

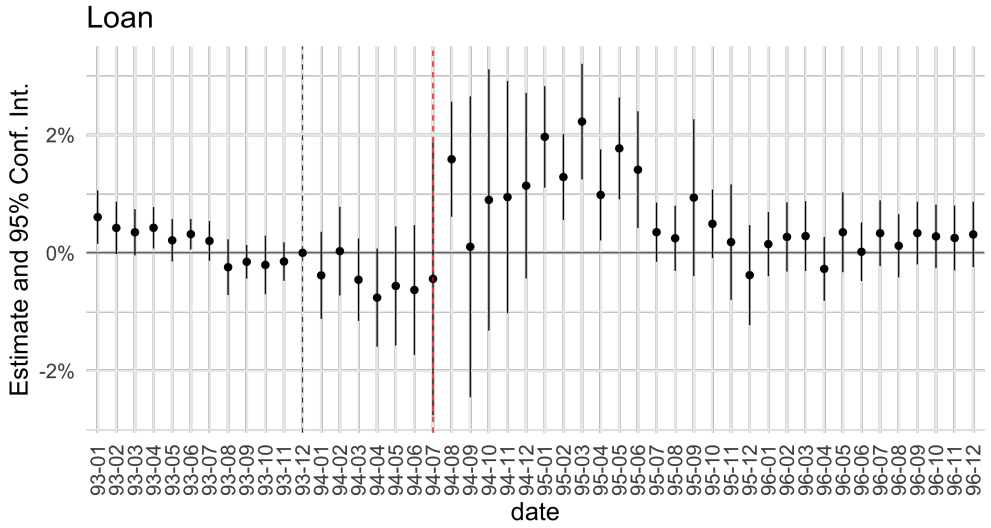
Figure 8: **Overnight Event Study.** Event-study estimates of the effect of overnight-business reliance on net interest margins (NIM). The plot shows coefficients from a regression of NIM on interactions between month indicators and each bank's standardized 1993 overnight-intensity score, with bank and month fixed effects. Banks more exposed to overnight operations experienced a persistent decline in NIM after the Real Plan stabilization. The loss is largest in the first year following the reform and is not recovered in the medium run. Positive pre-trends reflect that overnight-reliant banks earned above-average margins prior to stabilization.



stabilization.

Taken together, the cross-sectional patterns confirm that the Real Plan reshaped the distribution of bank profitability in a manner consistent with their pre-reform business models. Banks that had specialized in overnight operations (highly profitable under hyperinflation) faced a structural and persistent erosion of margins once stabilization removed the inflation tax on demand deposits. In contrast, banks with a balance-sheet structure oriented toward traditional lending were positioned to benefit from the new environment and expanded their margins relative to peers. These asymmetries highlight that the reform did not simply lower aggregate margins; it reallocated them across institutions depending on accumulated expertise and asset-side exposure. The evidence reinforces our central interpretation: stabilization rewarded banks whose capabilities were aligned with a low-inflation credit economy while penalizing those specialized in the overnight-driven business model of the high-inflation era.

Figure 9: **Loan Event Study.** Event-study estimates of the effect of loan-business reliance on net interest margins (NIM). The plot shows coefficients from a regression of NIM on interactions between month indicators and each bank's standardized 1993 loan-intensity score, with bank and month fixed effects. Following the Real Plan, banks with greater exposure to loan activities gained NIM relative to peers. Profitability is similar across banks prior to July 1994—consistent with the sorting based on December 1993 balance sheets—after which loan-reliant banks benefit from the shift in asset-side margins.



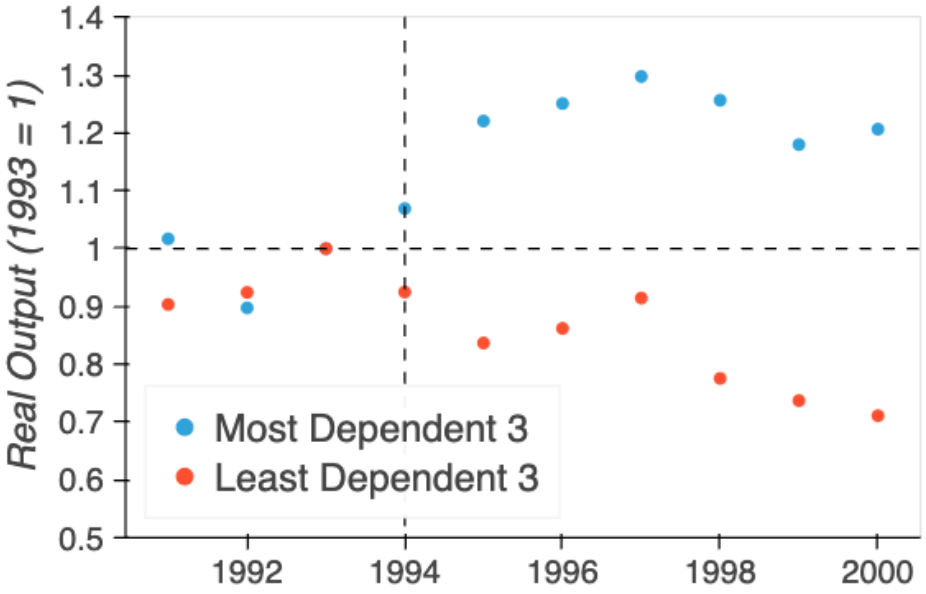
4.6 Real Effect

Finally, we provide preliminary evidence that the disinflation shock facilitated growth when banks find themselves in a more suitable monetary environment to extend loans. We follow Rajan and Zingales (1998) and study the outputs of finance-dependent industries. The finance dependence measure is the capital expenditures minus cash flow from operations and divided by capital expenditures. More finance-dependent industries require the use of funds from external sources such as bank loans, so when loans account for a larger share of assets, we expect these industries to grow more. From their paper, we take the three most reliant industries (pharmaceuticals, plastics, and computing), find their output from IBGE Annual Statistics of Brazil, and normalize the real value of their outputs to be 1 in 1993. We repeat the same for the three least reliant industries (tobacco, leather, footwear and apparel), and plot the two time-series in Figure 10.

We see that outputs of the most reliant industries grew rapidly since 1994 and stayed high

until the 1998 crisis, whereas the least dependent industries stayed flat. This result supports the claim that the shift in banks' business models supported the growth of finance-dependent industries. It also helps address concerns that the loan/overnight dynamics found in previous sections may have been driven by relabeling of interbank lending as loans. Interestingly, the industry outputs reacted very quickly, with the effect almost fully realized by 1996. We find it to be driven by electrics and electronics.

Figure 10: **Real Effect.** This plot shows the yearly industrial outputs of the top three most finance-dependent industries (pharmaceuticals, plastics, electrics and electronics) and the three least finance-dependent industries (tobacco, leather, footwear and apparel) found in Rajan and Zingales (1998). Each group's outputs are converted to July 1994 Real and normalized to be one in 1993.



5 Conclusion

In this paper, we show that a rapid disinflation shock associated with the Real Plan changed the business model of Brazilian banks from "inflation" to "information". During high inflation, banks focused on liquidity: their asset stock, profits, and focus were concentrated in nominal deposits and interbank lending. After stabilization, banks' role shifted toward information-intensive loan issuance. The short-term risk-free rate (Selic-over) became more tightly linked to bank pricing, and industries more dependent on external finance grew more, highlighting

a real effect of disinflation operating through the banking system.

Our results document that inflation can make liquidity management unusually profitable, crowding out loan-making and weakening the pass-through of monetary conditions to credit. When inflation falls, this composition of bank business reverses: margins on liquidity shrink, the relative return to screening and monitoring borrowers rises, and bank intermediation becomes more loan-centered.

After roughly two decades of low and stable inflation in most advanced economies, the post-COVID period brought a sharp inflation surge, rapid growth in bank deposits, and one of the fastest monetary tightening cycles in recent U.S. history[3]. Many forces were at work in the recent episode, but our evidence from Brazil's disinflation shows how inflation and the remuneration of deposits shape banks' incentives to provide liquidity versus loans, and how those incentives feed back into monetary-policy transmission.

[3]The total deposits at U.S. commercial banks rose by more than 20% between end-2019 and end-2020, and inflation in the U.S. in November 2021 reached 14.9% for durable goods, 10.7% for consumable goods and 3.8% for services. Federal Funds Rate peaked at 5-5.25%.

References

Agarwal, Isha and Matthew Baron. 2024. "Inflation and Disintermediation." *Journal of Financial Economics* 160:103902.

Auclert, Adrien. 2019. "Monetary Policy and the Redistribution Channel - American Economic Association." *American Economic Review* .

Brunnermeier, Markus, Sergio Correia, Stephan Luck, Emil Verner, and Tom Zimmermann. 2025. "The Debt-Inflation Channel of the German (Hyper-)Inflation." .

Chang, Kia-ngau. 1958. *The Inflationary Spiral; the Experience in China, 1939-1950*. [Cambridge] Technology Press of Massachusetts Institute of Technology.

DeMarzo, Peter M., Arvind Krishnamurthy, and Stefan Nagel. 2024. "Interest Rate Risk in Banking."

Diamond, Douglas W. and Philip H. Dybvig. 1983. "Bank Runs, Deposit Insurance, and Liquidity." *Journal of Political Economy* 91 (3):401–419.

Diamond, Douglas W. and Raghuram G. Rajan. 2000. "A Theory of Bank Capital." *The Journal of Finance* 55 (6):2431–2465.

———. 2001. "Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking." *Journal of Political Economy* 109 (2):287–327.

———. 2006. "Money in a Theory of Banking." *American Economic Review* 96 (1):30–53.

Drechsler, Itamar, Alexi Savov, and Philipp Schnabl. 2017. "The Deposits Channel of Monetary Policy." *The Quarterly Journal of Economics* 132 (4):1819–1876.

———. 2021. "Banking on Deposits: Maturity Transformation without Interest Rate Risk." *The Journal of Finance* 76 (3):1091–1143.

Egan, Mark, Stefan Lewellen, and Adi Sunderam. 2022. "The Cross-Section of Bank Value." *The Review of Financial Studies* 35 (5):2101–2143.

Feldman, Gerald D. 1997. *The Great Disorder: Politics, Economics, and Society in the German Inflation, 1914-1924*. Oxford University Press, USA.

Garcia, Marcio G. P., João Ayres, Diogo Guillen, and Patrick J. Kehoe. 2018. "The Fiscal and Monetary History of Brazil: 1960–2016." *SSRN Electronic Journal* .

Kashyap, Anil K., Raghuram Rajan, and Jeremy C. Stein. 2002. "Banks as Liquidity Providers: An Explanation for the Coexistence of Lending and Deposit-taking." *The Journal of Finance* 57 (1):33–73.

Kashyap, Anil K. and Jeremy C. Stein. 2000. "What Do a Million Observations on Banks Say about the Transmission of Monetary Policy?" *American Economic Review* 90 (3):407–428.

Keynes, John M. 1936. *The General Theory of Employment, Interest and Money*. Macmillan. 14th edition, 1973.

Rajan, Raghuram G. and Luigi Zingales. 1998. "Financial Dependence and Growth." *The American Economic Review* 88 (3):559–586.

Appendix

Appendix A: Accounts Used

Accounts in the COSIF database are identified by 8-digit numbers. The first digit indicates the main account, the second number indicates the first sub-account, and so on. The last digit is the check digit that carries no particular meaning. The publicly available database covers data for the top three levels of accounts. The structure is hierarchical and accounts are aggregates of sub-accounts. For instance, account 1 contains the sum of 11, 12, etc. Account 11 contains the sum of 111, 112, etc.

Account 1 covers current assets and Account 2 covers permanent assets. Account 4 contains liabilities accounts and 6 equity accounts. Income statement information is found in Accounts 7 (revenues) and 8 (costs). We focus on Accounts 71 and 81, which are operational revenues and costs. Accounts 3 and 9 are managerial control accounts off balance sheet, for assets and liabilities respectively. There is not an Account 5.

Revenue and cost accounts (numbered 7 and 8) are cumulative, and by regulation they must be cleared at the end of June and the end of December. So we take the first difference to compute the monthly revenue and cost, with exception to January and July that we take in levels.

We measure assets on a gross basis and exclude loan-loss provisions from our balance sheet quantities and yield denominators. Provisions reduce total assets and, in our data, occasionally drive "net loans" below zero. Including provisions would mix expected loss buffers with the scale of intermediation and inject policy- and cycle-driven discretion into the asset base (provisions ruling, managerial decisions). Using gross accounts keeps the level of intermediation separate from expected loss and yields a more stable, comparable scale across banks and regimes.

Table A1: Accounts Used in NIM Decomposition

Account Name	**COSIF Code**	**Portuguese Original Name**
Revenue Accounts		
Credit Operations Income	71100001	Rendas de Operacoes de Credito
Lease Income	71200004	Rendas de Arrendamento Mercantil
Interbank Liquidity Income	71400000	Rendas de Aplicacoes Interfin. de Liquidez
Securities Income	71500003	Rendas Com Tit. e Val. Mob. e Instr. Fin. Deriv.
Cost Accounts		
Funding Expenses	81100008	(-) Despesas de Captacao
Obligation Expenses	81200001	(-) Despesas de Obr. Por Empr. e Rep.
Leasing Expenses	81300004	(-) Despesas de Arrendamento Mercantil
Securities and Der. Expenses	81500000	(-) Desp. Tit. e Val. Mob. e Instr. Fin. Deriv.
Remunerated Assets		
Interbank Liquidity Placements	12000005	Aplicacoes Interfinanceiras de Liquidez
Securities and Derivatives	13000004	Tit. e Val. Mob. e Instr. Fin. Deriv.
Credit Operations	16000001	Operacoes de Credito
(-) Provisions for Credit Op.	16900008	(-) Prov. Para Operacoes de Credito
Leasing Operations	17000000	Operacoes de Arrendamento Mercantil
(-) Provisions for Leasing Op.	17900007	(-) Prov. Para Operacoes de Arr. Mercantil

Table A2: Accounts Used in Yields of Different Businesses

Account Name	COSIF Code	Portuguese Original Name
	Overnight Yields	
Revenue Account		
Interbank Liquidity Income	71400000	Rendas de Aplicacoes Interfin. de Liquidez
Asset Account		
Interbank Liquidity Placements	12000005	Aplicacoes Interfinanceiras de Liquidez
	Loans Yields	
Revenue Accounts		
Credit Operations Income	71100001	Rendas de Operacoes de Credito
Lease Income	71200004	Rendas de Arrendamento Mercantil
Asset Accounts		
Credit Operations	16000001	Operacoes de Credito
(-) Provisions for Credit Op.	16900008	(-) Prov. Para Operacoes de Credito
Leasing Operations	17000000	Operacoes de Arrendamento Mercantil
(-) Provisions for Leasing Op.	17900007	(-) Prov. Para Operacoes de Arr. Mercantil
	Securities Yields	
Revenue Accounts		
Securities Income	71500003	Rendas Com Tit. e Val. Mob. e Instr. Fin. Deriv.
Asset Accounts		
Securities and Derivatives	13000004	Tit. e Val. Mob. e Instr. Fin. Deriv.

Table A3: Accounts Used in Funding Costs

Account Name	COSIF Code	Portuguese Original Name
Cost Accounts		
Funding Expenses	81100008	(-) Despesas de Captacao
Obligation Expenses	81200001	(-) Despesas de Obr. Por Empr. e Rep.
Liabilities Accounts		
Deposits	41000007	Depositos
Repo Obligations	42000006	Obrigacoes Por Operacoes Compromissadas
Negotiable Debt Instruments	43000005	Rec. Ac. Camb., Letras Imob., Hipot., Deb. e Sin
Obligation for Loans and Transfers	46000002	Obrigacoes Por Emprestimos e Repasses

Table A4: Accounts Used in Assets Decomposition

Account Name	**COSIF Code**	**Portuguese Original Name**
Overnight		
Interbank Liquidity Placements	12000005	Aplicacoes Interfinanceiras de Liquidez
Securities		
Securities and Derivatives	13000004	Tit. e Val. Mob. e Instr. Fin. Deriv.
Loans		
Credit Operations	16000001	Operacoes de Credito
(-) Provisions for Credit Op.	16900008	(-) Prov. Para Operacoes de Credito
Leasing Operations	17000000	Operacoes de Arrendamento Mercantil
(-) Provisions for Leasing Op.	17900007	(-) Prov. Para Operacoes de Arr. Mercantil
Non-Loan Credit		
Other Credits	18000009	Outros Creditos
Other		
Availability	11000006	Disponibilidades
Interdependence Relationships	15000002	Relacoes Interdependencias
Iterfinancial Relationships	14000003	Relacoes Interfinanceiras
Other Values and Assets	19000008	Outros Valores e Bens

Table A5: Accounts Used in Liabilities Decomposition

Account Name	**COSIF Code**	**Portuguese Original Name**
Short Term		
Deposits	41000007	Depositos
Repo Obligations	42000006	Obrigacoes Por Operacoes Compromissadas
Medium Term		
Negotiable Debt Instruments	43000005	Rec. Ac. Camb., Letras Imob., Hipot., Deb. e Sim.
Interbank Transfers	44300003	Repasses Interfinanceiros
Obligation for Loans and Transfers	46000002	Obrigacoes Por Emprestimos e Repasses
FX		
FX Portfolio	49200005	Carteira de Cambio
Intermediation		
Intermediation Of Values	49500004	Negociacao e Intermediacao De Valores
Other Liabilities		
Interfinancial Relations	44000004	Relacoes Interfinanceiras
Interdependence Relationships	45000003	Relacoes Interdependencias
Derivative Financial Instruments	47000001	Instrumentos Financeiros Derivativos
Collection And Collection Of Taxes And The Like	49100002	Cobranca e Arrec. De Tributos e Assemelhados
Social And Statutory	49300008	Sociais e Estatutarias
Tax And Social Security	49400001	Fiscais e Previdenciarias
Resources For Specific Destination	49600007	Recursos Para Destinacao Especifica
Special Operations	49700000	Operacoes Especiais
Miscellaneous Obligations	49800003	Obrigacoes Diversas
Several	49900006	Diversas