

The Aggregate Effects of Credit and Reserve Requirements in Brazil

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Motivation

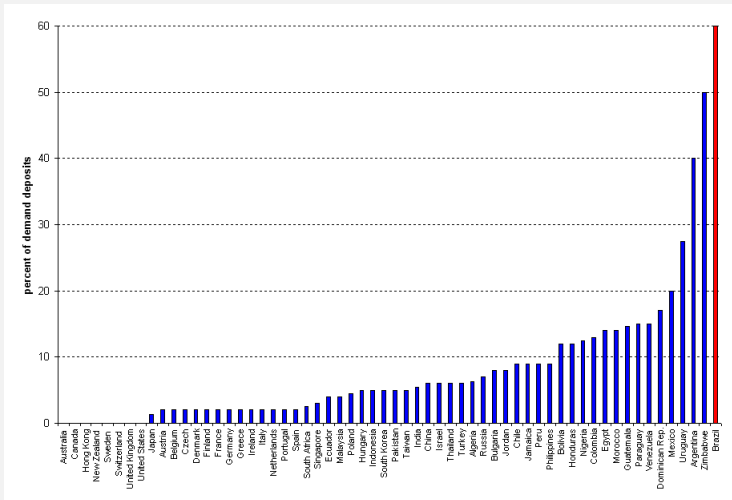
Table 1. Bank Spreads and Financial Depth Worldwide, Mean Values for 2000-05

Variable	Sample (91)	Developed (24)	Developing (47)	Latin America (20)	Brazil
Bank spreads (percentage pts)					
Over deposit rate	7.6	4.0	8.0	9.7	31.2
Over interbank rate	5.7	3.3	4.8	9.2	30.7
Over treasury bill rate	5.0	3.3	5.0	5.2	30.1
Financial depth (% of GDP)					
Private credit	52.8	99.5	38.2	31.2	21.6
Private debt market cap.	29.6	43.0	16.0	7.5	9.7
Stock market cap.	54.2	88.0	44.4	27.5	38.9

Main sources: Global Financial Data, IMF's IFS and World Bank Financial Structure Database

Motivation

Figure 1. Reserve Requirements in Selected Countries, 2002-2003 (Source: IMF)



Motivation

- Most LAC countries liberalized their credit markets in the 1990s or earlier
 - Kehoe, Kehoe *et al* (2002): Chile
 - Barajas *et al* (1999): Colombia
 - Lora (1997): Region
- Directed credit in Brazil still is a remarkable exception

Motivation

Table 2. The Allocation of Bank Deposits in Brazil, Average 2005-2006 (%)

Destination	Demand Deposits	Savings Deposits	Time Deposits	All (Legal)	All (Effective)
Reserve Requirement (1)	53.0	30.0	23.0	30.5	29.2
Non-Remunerated Base Rate	45.0			8.0	7.7
Remunerated Base Rate		20.0	15.0	14.0	13.7
Additional Remunerated Rate	8.0	10.0	8.0	8.5	7.8
Credit Requirement (2)	25.0	65.0		25.5	15.5
Rural Loans	25.0			4.5	9.0
Housing Loans (SFH)		52.0		17.0	6.0
Housing Loans (market)		13.0		4.0	0.5
Directed Allocation (1+2)	78.0	95.0	23.0	56.0	44.5
Free Allocation	22.0	5.0	77.0	44.0	55.5

Source: Central Bank of Brazil

Motivation

- Legal vs. effective requirements
 - There are exemptions on reserve requirements:
 - 65% of BB's savings deposits are allocated in rural loans (poupanca rural)
 - There are alternative ways to meet housing loan requirements such as credit letters, credits with FCVS and others

Motivation

Table 3. Bank Spreads and Loan Volumes by Commercial Banks, Averages 2001-2006

Segment	% of All Loans	% of Loans in the Sample*	Default Rate (% of category)**	Real Spreads (percentage pts)
Free loans	87.0	78.0	4.7	30.7
Directed loans	13.0	22.0	8.0	-6.7
Housing financing	6.0	9.0	12.0	-3.7
Rural financing	7.0	13.0	6.0	-9.2

(*) Sample excludes BNDES 2nd-tier loans, foreign currency loans, leases and credit card loans.

(**) 90 days or more past due loans.

Source: Central Bank of Brazil

Motivation

- **Leverage effect:** requirements reduce loanable funds in the free market
- **Price effects:**
 - *reserve tax* due to non-remunerated reserves
 - *cross-subsidy* due to credit requirements:
 - negative interest rate differential: *interest rate effect*
 - high monitoring costs: *cost effect*
 - high default rates: *default risk effect*

Road Map

- 1 Develop a structural GE model tailored to the Brazilian economy
- 2 Evaluate the quantitative effects of the requirements on:
 - Bank spreads
 - Financial intermediation
 - Allocations: GDP, employment, investment and consumption
- 3 Analyze the normative implications (welfare cost)
- 4 Discuss the results

Findings

- 1 Model explains about 80% of the actual spreads
- 2 Reserve tax explains almost 10% of the spread in the model
- 3 Cross-subsidy explains 30% of the spread in the model
- 4 Long-run positive effects from eliminating the requirements:
 - Banks spreads fall by 1/3
 - Credit-to-GDP ratio increases by 40%
 - GDP and consumption increase by 3%
- 5 Welfare gain is very large: almost 2.0% of annual consumption
 - R\$30 billion a year
 - R\$160 per capita per year

Main Assumptions

- 1 Two intermediate good sectors:
 - Sector 1 = subsidized (agriculture+housing)
 - Sector 2 = non-subsidized (services+manufacturing)
- 2 Final good producers
- 3 Competitive banking sector facing deposit rate r
- 4 Representative household (worker, capital owner, depositor)
- 5 Free mobility of inputs, perfect competition, perfect foresight
- 6 Model economy is closed and stationary

Intermediate Good Producers

- Production function: $y_{it} = K_{it}^{\alpha_i} h_{it}^{1-\alpha_i}$, $i = 1, 2$

- Financing mix:

$$K_{it} = [\theta_i l_i^\rho + (1 - \theta_i) k_{it}^\rho]^{\frac{1}{\rho}}, \quad \varepsilon_k = \frac{1}{1-\rho} \in (0, \infty)$$

- where

$$l_i = l_{it}^f + l_{it}^d, \quad l_{1t}^d \leq l_{dt}, \quad l_{2t}^d = 0$$

- Exogenous default rates: $1 - \pi_d > 1 - \pi_f$ (A1)

- No consumer credit market (A2)

Intermediate Good Producers

- Maximization problem:

$$\max_{\{l_{it}^f, k_{it}, h_{it}\}} \left\{ p_{it}y_{it} - w_t h_{it} - r_t k_{it} - \sum_{j=d,f} [\pi_j(1 + r_{jt}) - 1] l_{it}^j \right\}, i = 1, 2$$

- Optimal demands:

$$\pi_j (1 + r_{jt}) - 1 = p_{it} \alpha_i \theta_i \left(\frac{y_{it}}{l_{it}} \right) \left(\frac{l_{it}}{K_{it}} \right)^\rho \quad (1)$$

$$r_t = p_{it} \alpha_i (1 - \theta_i) \left(\frac{y_{it}}{k_{it}} \right) \left(\frac{k_{it}}{K_{it}} \right)^\rho \quad (2)$$

$$w_t = p_{it} (1 - \alpha_i) \frac{y_{it}}{h_{it}} \quad (3)$$

Banks

- Banks require labor to provide and monitor loans:

$$l_{jt} = A_j h_{jt}, \quad j = d, f$$

- Labor efficiency: $A_d \leq A_f$ (A3)
- Total labor demand by banks:

$$h_{bt} = h_{dt} + h_{ft} = \frac{l_{dt}}{A_d} + \frac{l_{ft}}{A_f} \quad (4)$$

- Market j marginal cost: $\eta_{jt} = w_t/A_j, \quad j = d, f$

Banks

- Banks are subject to reserve and credit policies
- Reserve policy:
 - Non-remunerated reserves: $\mu_{nr} \in [0, 1)$
 - Remunerated reserves: $\mu_r \in [0, 1)$
 - Total reserves: $\mu = \mu_{nr} + \mu_r \in [0, 1)$
- Credit policy:
 - Credit requirement: $\tau \in [0, 1)$
 - Lending rate ceiling: $r_d < r$ (A4)
- Leverage restriction: $\mu + \tau < 1$

Banks

- Maximization problem:

$$\max_{\{D_t, l_{jt}\}} \sum_{j=d,f} \{[\pi_j (1 + r_{jt}) - 1] l_{jt} - \eta_{jt} l_{jt} - (1 - \mu_r) r_t D_t\}$$

- Subject to:

$$l_{ft} + l_{dt} + R_t \leq D_t$$

$$l_{dt} \geq \tau D_t$$

$$R_t \geq \mu D_t$$

Banks

- Break even-condition:

$$r_{ft} = \frac{r_t + \eta_{ft} + (1 - \pi_f)}{\pi_f} + cs_t + rt_t \quad (5)$$

- cs = *cross-subsidy*:

$$cs_t = \frac{\tau}{1 - \tau - \mu} \left(\frac{r_t - \pi_d r_{dt}}{\pi_f} + \frac{1 - \pi_d}{\pi_f} + \frac{\eta_{dt}}{\pi_f} \right)$$

- rt = *reserve tax*:

$$rt_t = \frac{\mu_{nr}}{1 - \tau - \mu} \left(\frac{r_t}{\pi_f} \right)$$

Banks

- Spread on freely allocated loans:

$$s_{ft} = r_{ft} - r_t = \frac{(1 - \pi_f)(1 + r_t) + \eta_{ft}}{\pi_f} + cs_t + rt_t$$

- Spread components:
 - 1 First term: *undistorted spread*
 - 2 Second term: *cross-subsidy*
 - 3 Third term: *reserve tax*

Final Good Producers

- Production function: $y_t = [\theta y_{1t}^\sigma + (1 - \theta)y_{2t}^\sigma]^{1/\sigma}$

$$\varepsilon_y = \frac{1}{1 - \sigma} \in (0, \infty)$$

- Maximization problem: $\max_{\{y_{1t}, y_{2t}\}} \{y_t - p_{1t}y_{1t} - p_{2t}y_{2t}\}$
- Optimal demands:

$$p_{1t} = \theta \left(\frac{y_t}{y_{1t}} \right)^{1-\sigma} \quad (6)$$

$$p_{2t} = (1 - \theta) \left(\frac{y_t}{y_{2t}} \right)^{1-\sigma} \quad (7)$$

Households

- Household Problem:

$$\max_{\{a_{t+1}, h_t\}} \sum_{t=0}^{\infty} \beta^t [\log c_t + \phi \log(1 - h_t)]$$

- Flow budget constraint:

$$c_t + a_{t+1} = (1 - \delta)a_t + r_t a_t + w_t h_t$$

$$a_t = D_t + k_{1t} + k_{2t}$$

Households

- Labor-leisure choice:

$$\frac{\phi c_t}{1 - h_t} = w_t \quad (8)$$

- Capital euler equation:

$$\frac{c_{t+1}}{c_t} = \beta (1 + r_{t+1} - \delta) \quad (9)$$

Equilibrium

- Allocations:

- ① Households: $\{a_{t+1}, c_t, h_t\}_{t=0}^{\infty}$

- ② Intermediate good producers: $\{h_{it}, k_{it}, l_{it}^f\}_{t=0}^{\infty}$, $i=1,2$

- ③ Final good producers: $\{y_{1t}, y_{2t}\}_{t=0}^{\infty}$

- ④ Banks: $\{h_{bt}, D_t\}_{t=0}^{\infty}$

- Prices: $\{w_t, r_t, r_{ft}, p_{1t}, p_{2t}\}_{t=0}^{\infty}$

- Policies: $\{\mu_{nr}, \mu_r, \tau, r_{dt}\}_{t=0}^{\infty}$

- Such that given these prices and policies

- ① All first-order conditions are satisfied (eqs. 1 to 9)

- ② All markets clear

Equilibrium

Market clearing conditions:

Loan market:
$$l_{ft} = l_{1t}^f + l_{2t}^f = (1 - \tau - \mu)D_t$$

Capital market:
$$a_t = D_t + k_{1t} + k_{2t}$$

Labor market:
$$h_t = h_{1t} + h_{2t} + h_{bt}$$

Intermediate goods market:
$$y_{1t} = [\theta_1(l_{1t}^f + \tau D_t)^\rho + (1 - \theta_1)k_{1t}^\rho]^{\frac{\alpha_1}{\rho}} h_{1t}^{1-\alpha_1}$$

$$y_{2t} = [\theta_2(l_{2t}^f)^\rho + (1 - \theta_2)k_{2t}^\rho]^{\frac{\alpha_2}{\rho}} h_{2t}^{1-\alpha_2}$$

Final good market:
$$c_t = [\theta y_{1t}^\sigma + (1 - \theta)y_{2t}^\sigma]^{1/\sigma} + (1 - \delta)a_t - a_{t+1}$$

Model Statistics

- Spread and its components:

$$s_{ft} = \frac{(1 - \pi_f)(1 + r_t) + \eta_{ft}}{\pi_f} + cs_t + rt_t$$

- Bank total marginal (=average) cost:

$$\eta_t = \tau \eta_{dt} + (1 - \tau - \mu) \eta_{ft}$$

- Credit-to-GDP ratio:

$$\frac{l_{ft} + l_{dt}}{y_t} = (1 - \mu) \frac{D_t}{y_t}$$

Comparative Statics

$$\frac{\partial s_f}{\partial \tau} = \frac{1}{1 - \tau - \mu} \left(\frac{1 - \mu}{\tau} cs + rt \right) > 0$$

$$\frac{\partial s_f}{\partial \mu_{nr}} = \frac{1}{1 - \tau - \mu} \left(cs + \frac{1 - \mu_r - \tau}{\mu_{nr}} rt \right) > 0$$

$$\frac{\partial s_f}{\partial r_d} = -\frac{\tau}{1 - \tau - \mu} \frac{\pi_d}{\pi_f} < 0$$

$$\frac{\partial}{\partial \mu_{nr}} \left(\frac{\partial s_f}{\partial \tau} \right) = \frac{\partial}{\partial \tau} \left(\frac{\partial s_f}{\partial \mu_{nr}} \right) = \frac{1}{1 - \tau - \mu} \left(\frac{\partial s_f}{\partial \tau} + \frac{\partial s_f}{\partial \mu_{nr}} \right) > 0$$

Sector Identification

Table 4. Sectoral Bank Credit and Output, averages 2001-2006 (percent)

Shares	Construction (a)	Agriculture (b)	Sector 1 (a+b)	Sector 2
Sector Loans/Total Credit	10.0	18.0	28.0	72.0
Directed Loans/Sector Loans	95.0	73.0	80.0	0
Directed Loans/Total Credit	9.0	13.0	22.0	0
Credit-to-GDP ratio	33.0	48.0	42.0	18.0
Value added	6.5	5.5	12.0	88.0
Capital income	40.0	45.0	42.3	42.0

(*) Total credit excludes BNDES 2nd-tier loans, foreign currency loans, leases and credit card loans

Model Parameters

Table 5. Baseline Parameters

Symbol	Description	Value	Symbol	Description	Value
Preferences			Banking Technology		
β	Time discount factor	0.96	A_d	Labor efficiency - directed loans	12.3
ϕ	Leisure weight	1.56	A_f	Labor efficiency - free loans	12.3
Goods Technology			$1 - \pi_d$	Default rate - directed loans	0.08
θ	Sector 1 VA share	0.12	$1 - \pi_f$	Default rate - free loans	0.047
α_1	Sector 1 k income share	0.42	Policy Parameters		
α_2	Sector 2 k income share	0.42	μ_{nr}	Non-remunerated reserve rate	0.08
δ	Depreciation rate	0.06	μ_r	Remunerated reserve rate	0.14
θ_1	Sector 1 leverage ratio	0.27	τ	Directed loans requirement	0.155
θ_2	Sector 2 leverage ratio	0.12	r_d	Directed loans ceiling rate	0.03
ρ	Curvature of K aggregator	0			
σ	Curvature of y aggregator	$-\infty$			

Unobservable Parameters

- 1 Curvature of the capital aggregator ρ :
 - Set to match the credit-to-GDP ratio
 - Implied $\varepsilon_k = 1/(1 - \rho)$ is close to unitary (Cobb-Douglas)
- 2 Curvature of the final good production function σ :
 - Sectors 1 and 2 are rather complements than substitutes
 - Perfect complements in the baseline calibration
- 3 Labor efficiency A_d and A_f :
 - Set $A_f = A_d = A$
 - Set A to match the actual bank average cost
 - average cost_{data} \approx cost / (loans + securities + other liquid assets)

Model Meets Data

Table 6. Model vs. Data

Variable	Data	Baseline Model
Bank spread (1+2+3) (percentage points)	31.0	23.5
1. Undistorted spread	na	14.7
2. Reserve tax	na	1.6
3. Cross-subsidy (a+b+c)	na	7.2
a. Interest rate effect	na	2.2
b. Default risk effect	na	2.4
c. Cost effect	na	2.6
Financial Ratios (percent)		
Sector 1's share of total credit	28.0	27.3
Credit-to-GDP ratio	20.0	20.9
Bank average cost	6.2	6.2

Long-Run Implications

Table 7. Aggregate Effects of Credit and Reserve Requirements

Variable	Baseline	Undistorted ($\tau = \mu = 0$)
Bank spread (1+2+3) (percentage points)	23.5	15.1
1. Undistorted spread	14.7	15.1
2. Reserve tax	1.6	0
3. Cross-subsidy	7.2	0
Financial Ratios (percent)		
Sector 1's share of total credit	27.3	26.9
Credit-to-GDP ratio	20.9	29.5
Bank average cost	6.2	9.2
Growth Rates Relative to Baseline (percent)		
Employment	-	1.0
Investment	-	2.9
Output	-	3.0
Consumption	-	3.0

Transition Dynamics

- The wage effect on the cost of financial intermediation

$$\begin{aligned}\Delta\eta &= \eta(0,0) - \eta(\tau, \mu) \\ &= \frac{w(0,0)}{A_f} - \left(\frac{\tau}{A_d} + \frac{1 - \tau - \mu}{A_f} \right) w(\tau, \mu) \\ &\geq 0\end{aligned}$$

- for $A_d = A_f = A$:

$$\Delta\eta = \frac{w(0,0) - (1 - \mu)w(\tau, \mu)}{A} > 0$$

Transition Dynamics

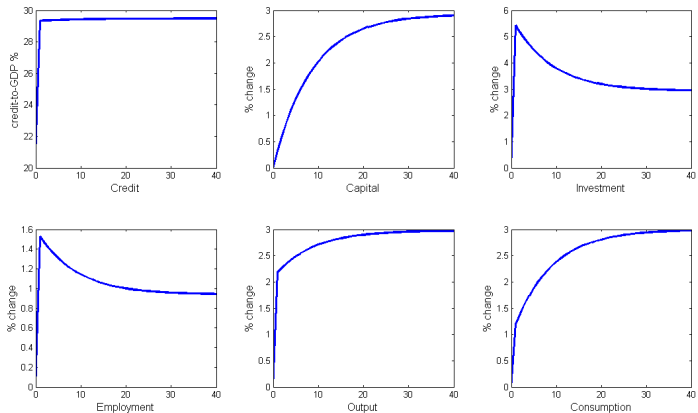


Figure 2. Transition Paths ($\tau = \mu = 0$)

Transition Dynamics

Table 8. Effects on Spread & Welfare Gain

	Bank Spread	Welfare Gain
	percentage points	consumption variation (%)
$\tau = 0$	16.3	0.05
$\mu_{nr} = 0$	21.1	0.52
$\mu_r = 0$	21.1	1.11
$\tau = \mu_r = 0$	15.1	0.50
$\tau = \mu_r = 0$	16.0	1.29
$\mu_{nr} = \mu_r = 0$	19.6	1.48
$\tau = \mu_{nr} = \mu_r = 0$	15.1	1.63

Transition Dynamics

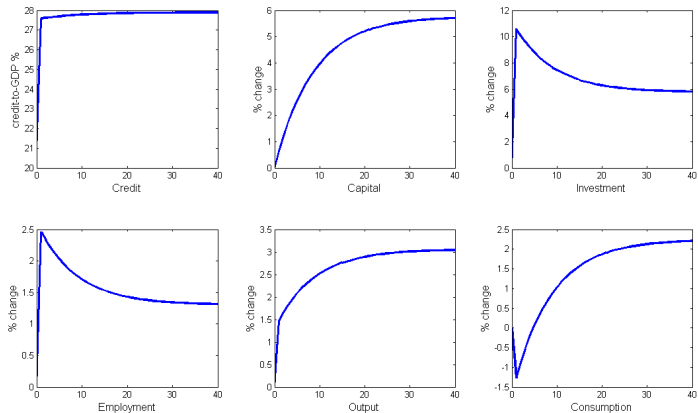


Figure 3. Transition Paths ($\tau = 0$)

Transition Dynamics

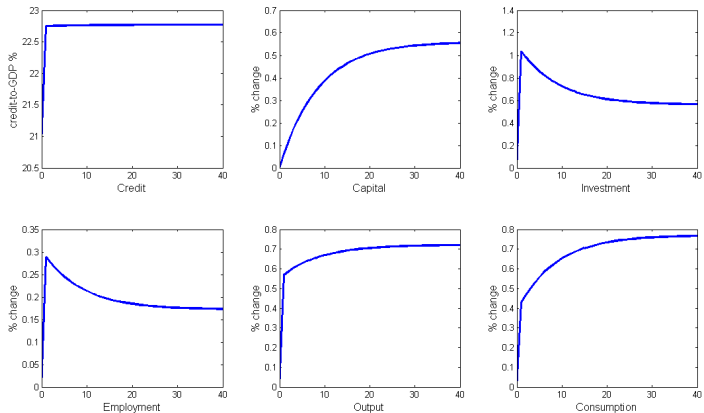


Figure 4. Transition Paths ($\mu_{nr} = 0$)

Transition Dynamics

- Is the benchmark welfare gain small or large?
 - Lucas (1990): welfare gain from eliminating capita tax is about 1% of consumption for the U.S.
 - Gourinchas and Jeane (2006): welfare gain from moving from financial autarky to perfect capital mobility is 1% of consumption for a typical non-OECD country
 - Additionally, closed economy assumption underestimates welfare gain

Sensitivity Analysis

Table 9. Capital Structure, Production Structure and Welfare Gain

		Low	Baseline	High
		$\varepsilon_k = 0.5$	$\varepsilon_k = 1$	$\varepsilon_k = 2$
Baseline	$\varepsilon_y = 0$	1.82	1.63	1.49
Unitary	$\varepsilon_y = 1$	1.44	1.34	1.19
High	$\varepsilon_y = 2$	1.43	1.27	1.18

Welfare gain = % of current consumption

Sensitivity Analysis

Table 10. Lending Efficiency, Bank Spread and Welfare Gain

Variable	Baseline	Low
	$A_d = A_f$	$A_d = .5A_f$
Bank spread with policy (1+2+3)	23.5	23.5
1. Undistorted spread	14.7	13.0
2. Reserve tax	1.6	1.6
3. Cross-subsidy	7.2	8.9
Interest rate effect	2.2	2.2
Default risk effect	2.4	2.4
Cost effect	2.6	4.3
Bank spread if $\tau = 0$	16.3	14.6
Welfare gain if $\tau = 0$	0.00	0.53
Bank spread if $\tau = \mu = 0$	15.1	13.4
Welfare gain if $\tau = \mu = 0$	1.63	2.31

welfare gain = % of current consumption; spread = percentage points

Sensitivity Analysis

Table 11. Non-binding Ceiling Rate, Bank Spread and Welfare Gain

Variable	Baseline	Non-binding
Spread on directed loans	-7.0	19.2
Spread on free loans (1+2+3)	23.5	16.3
1. Undistorted spread	14.7	14.7
2. Reserve requirement effect	1.6	1.6
3. Cross-subsidy	7.2	0
Welfare gain if $\tau = 0$	0.00	0.00
Welfare gain if $\mu_{nr} = 0$	0.52	0.34
Welfare gain if $\mu_r = 0$	1.11	0.90
Welfare gain if $\tau = \mu = 0$	1.63	1.15

welfare gain = % of current consumption; spread = percentage points

Sensitivity Analysis

- Assume Cournot competition with N identical banks
- The lending rate in the symmetric equilibrium is given by:

$$r_f \left(1 + \frac{1}{N\varepsilon_f(r_f)} \right) = \frac{r + \eta_f + 1 - \pi_f}{\pi_f} + cs + rt$$

- where the baseline elasticity of demand ε_f is:

$$\varepsilon_f(r_f) = \frac{-\pi_f r_f}{\pi_f(1+r_f) - 1} \left(\frac{1}{1 - \tau - \mu} \right) \left(\frac{f_1}{1 - \alpha_1 \theta_1} + \frac{f_2}{1 - \alpha_2 \theta_2} \right)$$

$$f_i = \frac{I_i^f}{D}, i = 1, 2$$

Sensitivity Analysis

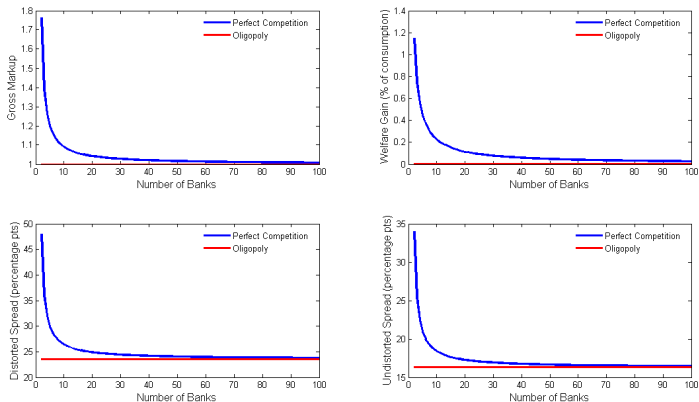


Figure 4. Bank Competition, Bank Spread and Welfare Gain ($\tau = 0$)

Sensitivity Analysis

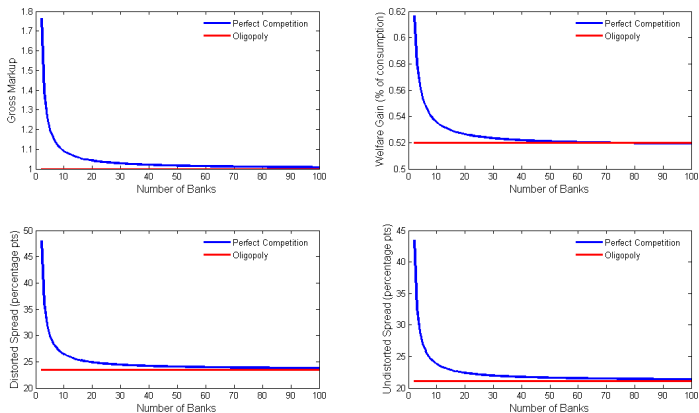


Figure 5. Bank Competition, Bank Spread and Welfare Gain ($\mu_{nr} = 0$)

Sensitivity Analysis

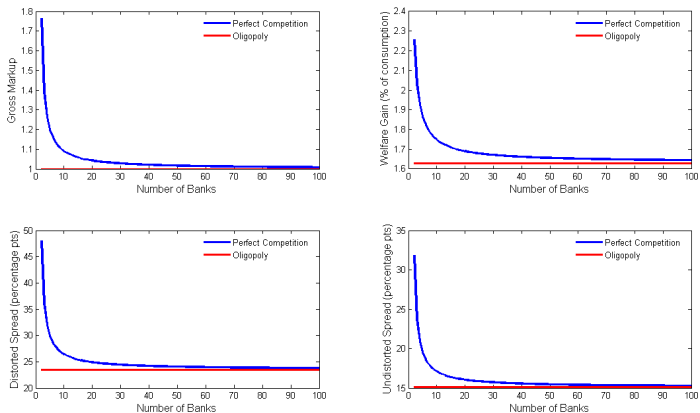


Figure 6. Bank Competition, Bank Spread and Welfare Gain ($\tau = mu = 0$)

Reserve requirements: What for?

- Many countries phased out mandatory reserves (Australia, Canada, New Zealand, UK)
- Widespread use of short-term interest rate as monetary policy tool
- Financial innovations create substitutes close for reservable bank funds
- Perverse tax on depository institutions

Missing the Target: Housing Credit

- Main beneficiaries are middle-class home-buyers (World Bank, 2005)
- Existing housing deficit amounts to 8 million homes
- Mortgage lending is among the lowest in Latin America

Missing the Target: Housing Credit

Table 11. Depth of Mortgage Lending in Latin America

Variable	% of GDP	% of total credit
United States	79.6	87.2
Panama	24.4	26.4
Chile	10.8	17.7
Bolivia	8.6	16.3
Colombia	7.0	25.0
Uruguay	7.0	15.7
Argentina	4.0	15.0
Peru	2.9	9.5
Mexico	2.1	3.5
Brazil	2.0	5.4

Sources: IDB (2005) and Central Bank of Brazil

Missing the Target: Rural Credit

- Many beneficiaries are wealthy/large farmers (World Bank, 2005)
- Subsidies inflate land value, which increases wealth inequality
- Rural loans failed to increase farming production/productivity

Missing the Target: Rural Credit

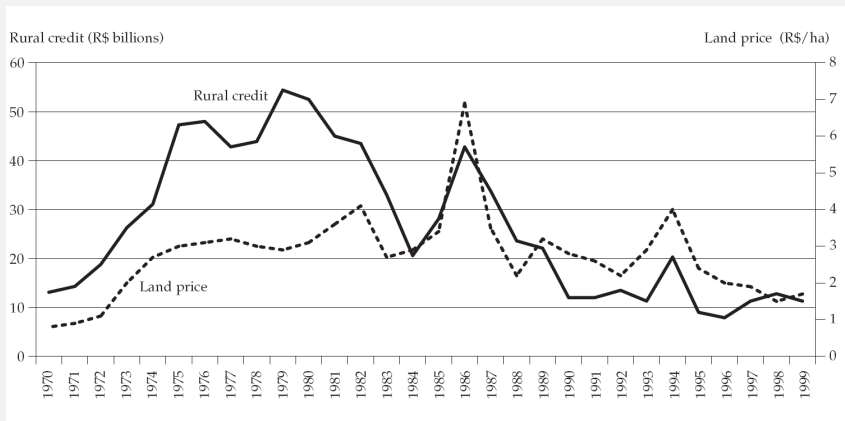


Figure 3. Rural Credit and Land Price (Source: World Bank, 2005)

Missing the Target: Rural Credit

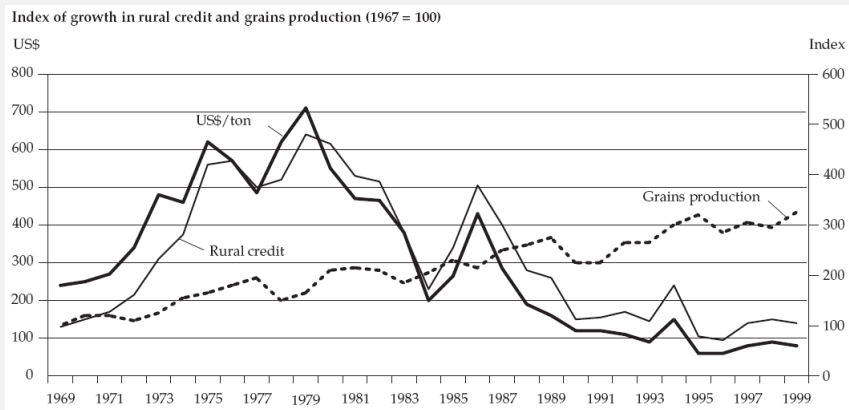


Figure 4. Rural Credit and Agricultural Production (Source: World Bank, 2005)

Missing the Target: Rural Credit

Table 12. Rural Credit and Agricultural Productivity

Year	Productivity (tons/ha)	Loan Amount (R\$'000/ha)	Loan Amount (R\$'000/ton)
1979	1.49	389.8	350.0
1986	na	312.4	229.6
1994	1.95	179.5	90.3
1999	2.48	90.7	40.9

Source: World Bank (2005)

Literature Review: Banks Spreads

- **What about market structure?**
 - There is entry: foreign banks control 1/3 of the credit market
 - Econometric studies: Brazilian banks are fairly competitive, according to **Belaisch (2003)** and **Nakane (2001)**

Literature Review: Bank Spreads

- **What about bank-level variables:**
 - Bank size, liquidity, market share, leverage?
- **What about other macro variables:**
 - Inflation, country risk, taxation, GDP growth?
- **Nakane et al (2002):** they alone cannot account for the large spread levels

Literature Review: Reserve Policy

- **Puga (1998)**: changes in reserves help to explain short-run movements in bank spread and output
- **Cardoso (2003)**: a rise in reserves increases bank seigniorage and hence bank spreads
- **Rodrigues and Takeda (2004)**: changes in reserve requirements affect levels and dispersion of lending rates
- **Costa and Nakane (2005)**: reserve requirements account for one-tenth of spread levels
- **Nakane, Rocha and Takeda (2005)**: reserve requirements have negative effects on the supply of free credit

Literature Review: Credit Policy

Brazil

- **Costa and Nakane (2005)**: the *interest rate effect* explains about one-tenth of the spread levels

Latin America

- **Kehoe, Kehoe et al (2002)**: Mexico
 - Mexico had a large credit program in the 1980s
 - Performed worse than free credit markets (e.g. Chile)
- **Barajas et al (1999)**: Colombia
 - Subsidized credit amounted to 16% of total credit
 - Bank spreads fell after elimination of the program in late 1980s

Literature Review: Credit Policy

East Asia

- **Cho and Vittas (1995,1996): Japan and Korea**
 - Credit programs had a positive effect on economic growth
 - Keys factors:
 - ① Focus on technology-intensive and highly competitive firms
 - ② Subsidies had limited duration (reduced rent-seeking behavior and increased loanable funds to new-comers)
- **Kwack (1984): Korea**
 - Program led to serious misallocation of resources across sectors
 - Non-subsidized sectors faced shortage and high cost of capital

Final Remarks

- Contributions:
 - 1 Shed new light on the high Brazilian bank spreads
 - 2 Quantify the macro effects of two important bank regulations
 - 3 Provide a welfare analysis of credit and reserve policies
- Extensions:
 - 1 Endogeneize loan contracts and default rates
 - 2 Introduce the consumer credit market
 - 3 Incorporate the productivity channel
 - 4 Investigate the political economy implications