

Tax Reform, Income Distribution and Poverty in Brazil: an Applied General Equilibrium Analysis

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ABSTRACT: This case study considers two frequently advocated approaches to reducing indirect taxation in Brazil: reduction in taxes on food; reduction in taxes on intermediate inputs to agriculture. To assess the effects of both on income distribution poverty levels, a bottom-up general equilibrium model of Brazil (TERM-BR) is linked to a microsimulation model. It is shown that one of the favoured policies is more poverty reducing, the other more income inequality reducing. Perhaps even more importantly, the analysis demonstrates that the two policies lead to very different outcomes in terms of inter-state transfers; a major political barrier to reform in a federal state.

Keywords: CGE; indirect tax; food; agriculture; regional; Brazil

1. INTRODUCTION

Tax reform is a recurrent subject in Brazil. In the last eleven years the debate upon this theme increased, due to the frequent diagnostics pointing to the inefficiency of the Brazilian tax system, mainly the indirect tax system. Since then the need of a broad reform has been recognized by the society, even though there is no general agreement about how to do this reform. As a consequence of that, since the 1990 decade many different proposals were sent to the congress.¹ The main point on the debate about the Brazilian indirect tax system reform has been the centred on economic efficiency issues, as well as in its regional impacts, with less attention being paid to the welfare and distributive effects.² These effects, however, can be important, since the indirect tax affect not only consumption, but also employment, through its effect on economic activity. In empirical studies the potential regional effects of changes in the tax system and other distributive effects have seldom been considered. In this respect it is evident the lack of formal analytical instruments for the analysis. The objective of this paper is to address the potential distributive impacts of changes in the Brazilian indirect tax system, through the simulation of two different indirect tax policies scenarios, with the aid of a general equilibrium and micro-simulation model tailored for distributional analysis. The reference year for the analysis is 2001.

2. THE BRAZILIAN TAX SYSTEM AND POVERTY IN BRAZIL: HIGHLIGHTS

It has been argued that the Brazilian Tax System is complex, expensive, economically inefficient, and socially unfair. Data from the Brazilian National Accounting System show that the total tax burden in Brazil mounted to 33.4% of GDP in

2001. From this total, 68.06% was appropriated by the federal government, 27.48% by the states, and 4.46% by the municipal governments. The share of indirect taxes in the total tax burden in the Brazilian economy in 2001 was 69.85%, while direct taxes accounted for 30.15%. These numbers highlight the importance of indirect taxes on the Brazilian economy. The main indirect tax is the ICMS, a state value added tax, which accounts for 23.45% of total tax burden in Brazil in 2001. This distribution remained fairly stable until 2009, as can be seen in Gobetti and Orair (2010).³

In terms of regional distribution, the poorer states in North and Northeast Brazil pay proportionately more indirect than direct taxes (respectively 5% and 15% of total indirect taxes, compared to 3% and 10% of total direct taxes). The richer Southeast states, on the contrary, pay proportionately more direct taxes (65% of the total) compared to indirect taxes (57% of the total). The incidence of these indirect taxes on food raises concerns about its impact on poverty.

Although a middle income country, Brazil still has a very unequal income distribution. Grouping household income classes according to the Brazilian Households Expenditure Survey (POF) such that POF[1] is the lowest income class, and POF[10] the highest, it can be seen that, in year 2001, the first 5 income classes, while accounting for 52.6 percent of total population in Brazil, get only 17 percent of total income. The highest income class, on the other hand, accounts for 11 percent of population, and about 45 percent of total income. The Gini index associated with the income distribution in Brazil in 2001, calculated using an equivalent household basis is 0.58, placing Brazil's income distribution among the world's worst.⁴ Unemployment rate is also relatively higher among the poorer classes. With a poverty line defined as one third of the average

household income⁵ about 30.8 percent of the Brazilian households in 2001 would be poor⁶, or 34.5 million out of 112 million households in 2001. This general poverty and inequality picture also has an important regional dimension, because economic activity is located mainly in the South-East region. This is particularly true of manufacturing; agriculture is more dispersed among regions. The states in the North region account for 8 percent of total population (7 percent of the poor), compared to 23.5 percent for the Northeast (48 percent of the poor), 45 percent in the Southeast (30 percent of the poor), 16 percent for South (9 percent of the poor), and 7.2 percent for the Centre-West (6 percent of the poor). In the Southeast region the state of São Paulo alone accounts for 22.9 percent of total Brazilian population. Poverty is disproportionately high in the Northeast region.

3. METHODOLOGY

A computable general equilibrium model of Brazil is used to assess the potential impacts of changes in the tax system on poverty and income distribution. It's a static inter-regional (27 regions) and bottom-up general equilibrium model of Brazil (TERM-BR) linked to a micro-simulation model. The TERM-BR is a linearized model, whose solution is calculated in percentage change of the variables. The micro-simulation model is a non-behavioural model, described in detail in Ferreira-Filho and Horridge (2004). The micro database contains 263,938 adults, grouped in 112,055 households, with information on wage by industry and region, and personal characteristics such as the ownership of land, type of work, years of schooling, sex, age, position in the family, and other socio-economic characteristics. The two models are run in a sequential way, in a system that guarantees consistency between results (see Ferreira-Filho and Horridge, 2004, for further details).

4. SIMULATION AND RESULTS

The change from the actual tax system in Brazil to a system more based on direct taxes has been recently advocated by Soares *et al.* (2009).⁷ In this paper two alternative scenarios were analyzed in order to assess the effects of indirect tax rate reductions on poverty and income distribution in Brazil, both of them frequently advocated by particular interest groups in the country. In the first scenario (Experiment 1) a 50% reduction in the indirect tax rates of the main household consumption products was implemented. The second one (Experiment 2) halved the indirect tax rates over the main inputs used in Agriculture, in order to assess the importance of this for food prices.

The two above mentioned scenarios were implemented under a long run closure. Under this closure the capital stocks by industry were

endogenous, varying driven by a fixed rate of return. Investment by industry follows capital accumulation. The labour force is free to move between regions and sectors, driven by regional real wages changes. Total employment is fixed nationally, which in a comparative-static model means that its long run level is assumed to be unaffected by the policy. Government consumption was kept fixed both at national and regional levels. A "budget neutral" policy is achieved through an endogenous adjustment in the income tax rate, so that the nationwide total tax collection is kept constant. A direct (income) tax transfer mechanism is put into action to compensate the states for the loss in indirect tax collection, with the national (unique) income tax rate endogenously adjusting to ensure the fiscal neutrality.. The household real consumption is endogenous, both at national and regional levels. And, finally, the Balance of Trade/GDP ratio is exogenous.

In what follows, some general and distribution results are presented. A detailed discussion including regional results can be found in Ferreira-Filho *et al.* (2007). Some aggregated results are presented in Table 1, below. In the table, FGT refers to the Foster-Greer-Torbecke index (Foster *et al.*, 1984).

Table 1 Model results

	Experiment	
	1	2
Indirect tax collection loss (millions R\$)	-7,009.0	-2,185.0
Poor households (%)	-0.86	-0.46
Poor persons (HR) (%)	-0.91	-0.51
Average poverty gap	-1.46	-0.63
Average squared poverty gap (FGT)	-1.40	-0.64
GINI index	-0.04	-0.06
Households leaving poverty (count)	-135,552	-76,882

As can be seen from Table 1, the best result in terms of overall poverty reduction appears in Experiment 1 (reduction of indirect taxes on food), which would cause a 0.91% fall in the headcount ratio (measured in terms of persons). The average poverty gap would also decrease more in Experiment 1. This index has a high value for the poorest household income classes in Brazil (which is in part related to the small results observed upon poverty in the simulated scenarios). It indicates an improvement in income of the poorest, even though this improvement is not enough to generate a massive movement across the poverty line.

The GINI index would improve (fall) in the two experiments. The changes are very small, as is usually the case with this index.⁹ Note that the FGT index, which is sensitive to both changes in the extent of poverty and income distribution, also falls in both scenarios. The change in poverty can

also be analyzed by household income class, as is shown in Table 2.

Table 2 Model results: Variation in the number of poor households, by income class

Income class	Experiment 1		Experiment 2	
	Real income	Households (count)	Real income	Households (count)
(poorest)				
1 POF[1]	2.46	-12,928	0.824	-6,817
2 POF[2]	2.06	-8,770	0.637	-5,245
3 POF[3]	1.94	-39,098	0.635	-14,963
4 POF[4]	1.75	-42,576	0.589	-27,733
5 POF[5]	1.65	-32,065	0.553	-23,741
6 POF[6]	1.54	-5,090	0.524	-1,713
7 POF[7]	1.32	1,340	0.458	751
8 POF[8]	1.03	1,413	0.395	924
9 POF[9]*	1.06	1,233	0.383	850
10 POF[10]	0.70	989	0.294	825
(richest)				
Total (households)	-	-135,552	-	-76,862

The numbers in Table 2 are respectively percentage changes in the real income of households and the total number of households leaving poverty, by household income class. As it can be seen, Experiment 1 generates the largest real income increase, as well as the largest fall in poverty, as evaluated by the HR (135,552 households; 573,591 persons). This is, however, only a small fall, if one takes into account that the total number of poor person in Brazil in 2001 was around 60 million people.

Experiment 1, however, even though the best scenario in terms of poverty alleviation, is also the scenario which would generate the greater fall in indirect tax collection in the poorest states, which are typically less industrialized and rely heavily on food production as a source of tax income. If these states were to be compensated by the fall in indirect taxes collection, a greater amount of income would have to be transferred through the direct tax system from the Southeast region to the other regions, mostly the Northeast, which sheds doubts on the political feasibility of that policy.¹⁰ For the sake of comparison, the indirect tax collection reduction in Experiment 2 would be one third of that observed in Experiment 1.

5. CONCLUSIONS

The policies analyzed in this paper have different potential for distributive effects. The reduction in indirect taxes on food seems to be the most promising in terms of poverty alleviation, since it generated the largest real income increase in the country. Due to the importance of the food sector in the Brazilian economy, this is also the policy that generates the larger positive effect on economic activity, with the best results on the

poverty and inequality indicators.

The fall in indirect tax collection of this kind of policy, however, sheds doubts about its feasibility. The policy seems to be too expensive (twice as much considering the 2005 values), in terms of indirect tax revenue loss, when compared to the direct transfer policies underway in Brazil.¹¹ It seems too much, even if one takes into account that the administrative costs of the transfer policies are not included in the calculations (or all the inefficiencies that usually arise). Another important point to be noted here is that it would be hard to get a general agreement among states to implement these policies, since the tax revenue loss is unevenly spread among them. The poorer states would face a proportionally larger fall in indirect tax collection than the richer states which, in the case of a compensatory policy through income taxes, would have to be net contributors to the poorer states.¹²

The tax reduction in intermediate inputs used in Agriculture does not generate any remarkable result regarding welfare improvement for the poor, but is much less expensive than the previous policy. The results are, however, more evenly spread around the country, which generates the largest fall in the GINI index, when compared to the other experiments. This kind of policy, then, is found to be more income inequality reducing than the first policy, which would be more poverty reducing. The differences, however, are very small to support further conclusions, and more research would be recommended on this issue.

The cost of general tax reducing policies and the way the burden is distributed among the regional governments is found to be a very important political issue, since indirect taxes accrue to the state governments, who would have to bear the reduction in tax collection. The tendency of the Brazilian federal government to fund direct transfer policies instead of trying to promote indirect tax reductions seems to be a way of overcoming these political difficulties, targeting the poorest directly.

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Notes

¹ This process started in 1995, with the arrival on the congress of a Proposal of Constitutional Amendment, authored by the Executive, the PEC 175/95. For further details see Rezende (1996), Afonso *et al.* (1998), Lima (1999), Varsano (2002), and Barbosa and Barbosa (2004).

² A detailed literature review on this topic can be found in Santos (2006).

³ After falling slightly from 2001, the total tax burden as a share of GDP start to increase again after year 2004, reaching 34.28% of GDP in 2009 (Gobetti and Orair, 2010). Other

studies about the Brazilian tax system can be found in Amaral (2010), Receita Federal (2004), Rocha (2002). Studies relating the income tax and income distribution can be seen in Hoffmann (2002) and Soares *et al.* (2009).

- 4 The GINI index has improved recently, but is still very high.
- 5 This poverty line is equivalent to US\$ 48.00 per month in 2001.
- 6 Barros *et al.* (2001), working with a poverty line that takes into account nutritional needs, find that 34 percent of the Brazilian households were poor in 1999.
- 7 As another example, project of law PL 6214/2005 deals with reductions in PIS/PASEP and COFINS (indirect taxes) on imported and domestic traded products of the "basic" consumption bundle.
- 8 This is also the hypothesis used in Soares *et al.* (2009).
- 9 Ferreira *et al.* (2006) show that the GINI index fell by 6.62% between 1990 and 2004 in Brazil.
- 10 The aggregated income tax rate would have to be increased by 7% to compensate for the fall in indirect tax collection.
- 11 The value spent with the direct transfer programs in 2009 was R\$12.4 billion.
- 12 The average direct tax rate would have to increase about 7% in order to compensate the fall in indirect taxes.

REFERENCES

- Afonso, J R, Rezende F and Varsano R (1998) 'Reforma tributária no plano constitucional: uma proposta para o debate', Texto para Discussão 606, Instituto de Pesquisas Econômicas Aplicadas (IPEA), Brasília.
- Amaral G L, Olenike J E, Amaral L M F and Steinbruch F. (2010) *Carga tributária brasileira 2009 e revisão de períodos anteriores*, Curitiba: Instituto Brasileiro de Planejamento.
- Barbosa F de H, Barbosa A L N de H (2004) 'O sistema tributário no Brasil: reformas e mudanças', In Biderman C, P Arvate (Eds.) *Economia do setor público no Brasil*, Rio de Janeiro: Elsevier, 291-317.
- de Barros R P, Henriques R and Mendonça R (2001) *A estabilidade inaceitável: desigualdade e pobreza no Brasil*, Rio de Janeiro: IPEA.
- Ferreira F G, Leite P G and Litchfield J A (2006) 'The rise and fall of Brazilian inequality: 1981-2004', World Bank Policy Research Working Paper 3867, World Bank, Washington D.C..
- Ferreira Filho J B S, Santos C V and Lima S M P (2007) 'Tax reform, income distribution and poverty in Brazil: a general equilibrium analysis', MPIA Working Paper 2007-26, Poverty and Economic Policy Research Network – PEP-NET, Québec.
- Ferreira Filho J B S, Horridge M (2004) 'Economic integration, poverty and regional inequality in Brazil. Melbourne', General Working Paper, G-149, Centre of Policy Studies, Monash University, Melbourne. <<http://www.monash.edu.au/policy/ftp/workpapr/g-149.pdf>>
- Foster J, Greer J and Thorbecke E (1984) 'A Class of Decomposable Poverty Measures', *Econometrica*, 52(3), 761-765.
- Gobetti S W and Orair R O (2010) 'Estimativa da carga tributária de 2002 a 2009', Nota Técnica no. 16, Instituto de Pesquisa Econômica Aplicada (IPEA) / Diretoria de Estudos e Políticas Macroeconômicas (DIMAC), Brasília.
- Hoffmann R (2002) 'Efeito potencial do imposto de renda na desigualdade', *Pesquisa e Planejamento Econômico*, 32(1), 107-113.
- Lima E C P (1999) 'Reflexão sobre tributação e reforma tributária no Brasil', *Planejamento e Políticas Públicas*, 20, 129-160.
- Receita Federal (2004) 'O imposto de renda das pessoas físicas no Brasil', Estudos Tributários no. 14, Receita Federal, Brasília.
- Rezende F (1996) 'Propostas de reforma do Sistema Tributário Nacional', Texto para Discussão 420, Instituto de Pesquisas Econômicas Aplicadas, Brasília.
- Rocha S (2002) 'O impacto distributivo do imposto de renda sobre a desigualdade de renda das famílias', *Pesquisa e Planejamento Econômico*, 32(1), 74-105.
- Santos C V (2006) *Política tributária, nível de atividade econômica e bem estar: lições de um modelo de equilíbrio geral computável*, Doutorado, CD-ROM, Piracicaba: ESALQ/USP.
- Soares S, Silveira F G, Santos C H *et al.* (2009) 'O potencial distributivo do Imposto de Renda Pessoa Física (IRPF)', Texto para Discussão no. 1433, Instituto de Pesquisa Econômica Aplicada (IPEA), Brasília.
- Varsano R (2002) 'Sistema tributário para o desenvolvimento', In Castro A C (Ed.) *Desenvolvimento em debate: Painéis do desenvolvimento brasileiro - I. Mauad*, Rio de Janeiro: BNDES, 231-250.