



Turnover Taxes and Productivity: Evidence from a Brazilian Tax Reform

Bruno Caprettini

This study uses a Brazilian tax reform to analyse the production loss caused by turnover taxes, a type of tax common in developing countries that distorts transactions between firms. It finds that removing a turnover tax led to a large expansion of Brazilian sectors that use intermediate inputs more intensively.

In developing countries, between one-third and two-thirds of the economy is informal, with activities unreported to the fiscal authority. In response to these high levels of informality, many countries prefer taxes that are easy to enforce, even though they might be inefficient for production. Turnover taxes are one common example of such schemes. Since they are levied on the full value of revenues (or turnover), they do not let firms inflate their costs to reduce tax liabilities, and for this reason they are thought to be hard to evade. However, turnover taxes are also inefficient, because they do not allow for deductions of the cost of intermediate inputs from the tax base, and thus create incentives to alter the optimal input mix.

This study uses a Brazilian tax reform to analyse the production losses caused by turnover taxes. Between 2002 and 2003 the Brazilian government converted two different turnover taxes into Value Added Taxes (VATs). Brazil is one of the few countries that has removed a turnover tax in recent years. Moreover, the country has a wealth of economic data covering both the years before and after the reform. Thus, these reforms provide a unique setting to study the effects of turnover taxes on economic activity, and their implication for aggregate productivity.

The 2002-3 Brazilian Tax Reform

This study focuses on two Brazilian taxes: the *Programa de Integração Social* (PIS: contribution for the social integration programme) and the *Contribuição para Financiamento da Seguridade Social* (COFINS: contribution for the funding of social security). PIS and COFINS are collected from every Brazilian firm, and until 2002 they were levied on the total value of turnover, with no deductions for the cost of intermediate inputs. Between December 2002 and December 2003 the Brazilian Federal Congress passed two separate laws that converted both PIS and COFINS into VATs. The reforms were designed to increase the competitiveness of the Brazilian manufacturing sector and to avoid a fall in fiscal revenues through a higher statutory tax rate.



Figure 1. Headlines of the *Folha de S. Paulo* after the two reforms. Right: the 2002 PIS reform is reported on the bottom-right corner of the page. Left: the 2003 COFINS reform made the headlines.

Data Collection

To investigate the effect of the tax reform on the manufacturing sector, the study utilized confidential data from the Brazilian yearly industrial survey. The survey has been carried out every year since 1996, and contains information on the activity of a sample of plants that is representative of the whole Brazilian manufacturing sector. These data were used to construct yearly measures of industrial production and employment for all manufacturing sectors. The Brazilian statistical office has also been collecting data on value and quantity of sales for each manufacturing good produced in Brazil since 2001, and the information from this product-level survey was used to construct a sector-level price index for the years 2001-2009.



Effect of the Reform on Manufacturing Sectors

The first set of results, documents the effect of the tax reform on manufacturing sectors. The reform reduced costs for all producers, by making it cheaper to buy inputs from external suppliers. Importantly, the effect was asymmetric across sectors. This is because sectors that buy more inputs on average from other sectors in the economy were more damaged by the turnover tax before 2002, and experienced larger cost reductions after the reforms. In turn, these larger cost reductions allowed these sectors to reduce prices and expand production more than sectors that used less intermediate inputs.

In order to provide evidence for these effects, the study uses the Brazilian input-output table to construct measures of "input intensity" summarizing each sector's reliance on intermediate inputs during production. These measures show that after 2002, sectors that rely more on intermediate inputs increased industrial sales and reduced prices more than sectors for which intermediate inputs are less important. The effect is large, and the estimates imply that textile manufacturers (the sector on the 25th percentile of the input intensity distribution) reduced prices by 15.2% less and expanded sales by 11.6% less than industrial machines producers (the sector on the 75th percentile of the same distribution).

In order to better document the timing of these changes, the effects of input intensity were estimated for every calendar year. The results are shown in Figure 2, which reports the yearly effect of input intensity on industrial sales, and in Figure 3, which reports the yearly effect on price indexes. Effects are measured relative to the first year in the sample (1996 for sales and 2001 for prices), and confirm that most of the increase in sales and the reduction in prices in high-input-intensity sectors took place after the year of the first reform.

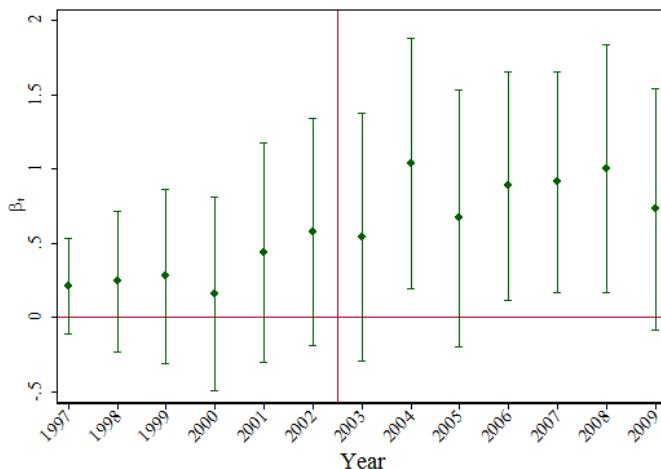


Figure 2. Dynamic Effect of Input-Intensity on the Sales of Manufacturing Sectors

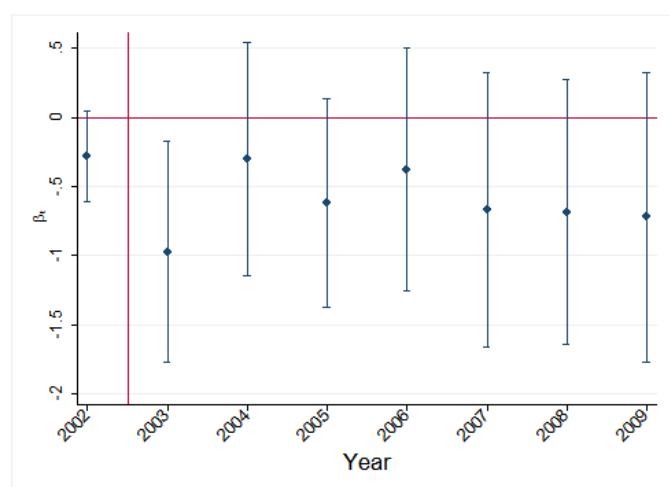


Figure 3. Dynamic Effect of Input-Intensity on the Prices of Manufacturing Sectors

Production Gains

The study also attempts to evaluate the production gains of the tax reform. The challenge of quantifying the production gains of eliminating a turnover tax is that, since this tax is paid on every transaction, its aggregate distortion depends on the average number of times inputs are exchanged. This is because when production is sequential and involves a chain of firms exchanging inputs along a production line, the distortions of a turnover tax "cascade" along the production chain and grow bigger as the production chain becomes longer.

Private Enterprise Development in Low-Income Countries

Figure 4 illustrates this point with an example. It plots the production gain of eliminating a turnover tax in an economy that produces a single final good. The figure shows how the production gain (shown on the vertical axis) depends on the share of gross output used as intermediate inputs in production (the input share: shown on the horizontal axis). For a given input share, the graph shows the change in production gains when inputs are exchanged sequentially only once (blue line) and twice (green line). As an illustrative example, take an input share equal to 43%: the input share observed in the aggregate Brazilian economy. Figure 4 indicates that for this input share the production gain of removing a 3.65% turnover tax is 3 times higher if inputs are exchanged twice than if inputs are exchanged only once. This is because when inputs are exchanged twice the turnover tax distorts two transactions rather than only one.

Calibrating a model in which sectors sequentially exchange inputs several times to the Brazilian economy finds that removing a 3.65% tax on turnover results in production gains equal to 3% of the total tax revenue when sectors exchange inputs an infinite number of times. Moreover, these gains realize even in relatively short production processes, as the gains of the reform when sectors exchange inputs only 4 times are 87% of those obtained in the infinitely long production chain.

Policy Implications

The results of this project have implications for tax design, especially in developing countries. Taxes on turnover are popular when the informal sector is large and tax capacity is low, because these taxes are easier to enforce than more complex tax schemes. As of 2012, 45 low- and middle-income countries had some form of turnover tax in place. Since turnover taxes are known to be inefficient, their diffusion must reflect a belief among policy makers that the benefits in terms of higher tax compliance more than offset the losses created by these taxes. These results suggest that the costs of turnover taxes are not negligible, but overall they are modest. This in turn may justify maintaining these schemes in cases in which informality is a major concern.

Moreover, the estimates for Brazil may be considered as an upper bound for the cost of turnover taxes in developing countries. First, Brazil at the end of the 1990s was relatively developed, and had a diversified economy in which sectors were connected in relatively complex value chains. To the extent that the economies of poorer countries have simpler production structures with fewer input-output linkages, the cost of a turnover tax is likely to be smaller. Second, the combined tax rates of the Brazilian PIS and COFINS were 3.65%. This rate is high when compared to turnover taxes observed elsewhere in the world. Rates of turnover taxes rarely exceed 1%, which means that the cost of turnover taxes levied in most developing countries is likely to be smaller than the one calculated for Brazil.

Moving Forward...

Turnover taxes are inefficient because they alter relative prices and distort production decisions. However, they may reduce aggregate productivity through a second, different channel—turnover taxes also create incentives for firms to integrate vertically and produce their own inputs, and this decision has the potential to reduce firms' productivity. To the extent that an inefficient level of vertical integration has large effects on firms' productivity, the overall impact of turnover taxes may be greater than the one estimated in this study.

The next step of this project is to explore the effect of turnover taxes on vertical integration. It will study whether firms were more willing to outsource the production of intermediate inputs after the reform made it cheaper to purchase them from other firms. Next, it will investigate whether this change in the organization of firms had an effect on their aggregate productivity.

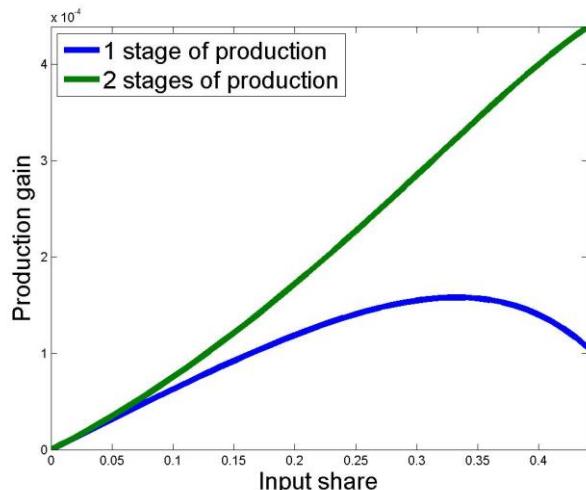


Figure 4. Production gain of removing a 3.65% turnover tax in an economy producing a single final good in different stages of production