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The Case of Argentina

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Abstract[*]

This paper analyzes sub-national revenues in Argentina. Following a discussion of the recent evolution of government revenues and their vertical imbalance, the paper then analyzes the most important taxes collected by federal, provincial and local governments. Subsequently considered are the determinants of sub-national revenues and the impact of the 2001-2002 crisis. It is found that automatic transfers improve collections of the cascade sales tax and the property tax by enlarging the disposable income of the private and public sector of the provinces favored by the regional redistribution of income, while discretionary transfers reduce own-source revenue effort and encourage public investment. The paper concludes by analyzing options to improve sub-national revenue mobilization and offering specific proposals, particularly in regard to improving the cascade provincial sales tax.

JEL classifications: H71, H77
Keywords: Sub-national revenues, Vertical imbalance, Transfers, Argentina

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1. Introduction

Argentina is a federal country where sub-national governments account for a relatively large share of government revenues and expenditures. Considering only those revenues defined and collected under full sub-national autonomy,[1] in 2009 the 24 Argentine provinces and approximately 2,200 municipalities collected about 6.4 percent of GDP, or one fifth of revenue, and accounted for about half of all government expenditures.[2] It follows that there is a vertical imbalance that is higher for provinces than for local governments and tends to be higher for small and poorer provinces. This gap is filled by an automatic revenue-sharing system of federal taxes that, in turn, most provinces share with their own local governments, and by discretionary transfers.[3]

Argentina's federalism has been criticized for the existence of soft-budget constrains combined with periodic bailouts of provinces by the federal government[4] and the lack of transparent criteria for the secondary distribution of federal taxes among provinces.[5] Moreover, institutional pitfalls, given the lack of incentives for political actors to strike cooperative agreements and the federal government's inability to make credible commitments, have led Argentina's federalism into the two extremes of excessive rigidity or an overly loose framework. As a consequence, sub-national governments have focused on continuous bids for additional resources instead of focusing on developing managerial efforts or improving their own-source revenues.[6]

While many studies have shown that the vertical imbalance of Argentine provinces is associated with high per capita expenditures and weak fiscal performance,[7] only a few studies

[1] Sub-national governments obtain revenues from different sources. In many cases they face constrains to define the tax rate or the tax base, which distorts the incentives and the citizens' perceptions about them. Therefore it is better to count as own-source revenues only those with substantial autonomy from the upper levels of government. See Ambrosiano and Bordignon (2006). Joumard and Kongsrud (2003), Blöchliger and King (2006) and Blöchliger and Rabesona (2009) show that in many OECD countries there is an important difference between revenues with substantial sub-national autonomy and the figures obtained from the OECD or GFS databases.

[2] See Artana (2007) for an explanation of the problems of using GFS data for Argentina. Provinces accounted for about two thirds of sub-national revenues (with autonomy) and for about 80 percent of sub-national expenses.

[3] Local governments also receive a fraction of their province own-source tax revenues. See López Murphy and Moskovits (1998) and Sanguinetti et al. (2001) for an analysis of provincial revenue-sharing schemes.

[4] See for example FIEL (1993, 2003), Fedelino and Ter-Minassian (2009), Weingast (2006), Nicolini et al. (2002), and Ahmad and Brosio (2008).

[5] See for example, FIEL (1993) and Tommasi (2002).

[6] See for example Saiegh and Tommasi (1999) and Tommasi (2002).

[7] See for example FIEL (1993) or Jones, Meloni and Tommasi (1997).

have attempted to estimate the impact of high vertical imbalances on own-revenue efforts.[8] Moreover, the incentives of local politicians to deliver better public services and sound fiscal policies may be undermined not only by the size of the vertical imbalance but also by its composition (i.e., unlike automatic transfers, discretionary transfers provide the federal government with an instrument to influence sub-national decisions). The composition of sub-national revenues matters as well. Property taxes and user fees, for instance, are more visible than other sources of local financing such as the turnover sales tax.

During the last decade other important changes also took place. First, the country suffered a major economic crisis, followed by a large important rebound with six consecutive years of high growth (from 2003 to 2008), a novelty in a country with volatile growth. Argentina's fiscal federalism underwent numerous changes during this period, and these changes must be explored in order to make proposals for improving sub-national revenue mobilization in the future.

Particularly notable among those changes was that revenues became more centralized as a consequence of changes in the tax mix that favored the federal government,[9] and every year since 2003 the Federal Executive has passed a budget with an underestimation of revenues. With the use of emergency powers that were delegated by Congress to the Executive in 2002 (and renewed every year until 2010) the president was able to allocate the excess revenues at will. Therefore discretionary transfers, which were 0.5 percent of GDP at the end of the 1990s, increased to an average of 1.7 percent of GDP in more recent years.

There were also important changes in revenues collected directly by the provinces. Resource-rich provinces enjoyed a windfall on the royalties collected from domestic producers.

[8] For example, Jones, Meloni and Tommasi (1999) found some evidence that provinces improved their collection of own-source revenues during the 1990s when they realized that the federal government had a tighter budget constraint imposed by the Currency Board. Baldrich (2010) estimated a two-period panel (1998 and 2002) with data from 22 Argentine provinces. His dependent variable is provincial own-source revenues (in absolute values and per capita terms) and his explanatory variables are the ratio of Central Government transfers to Own-source Revenue, the GINI coefficient, the provincial GDP as a proxy of the provincial tax base and the size of each province (measured by population). He found that own-source revenues increase when provinces have: i) better income distribution, income, ii) a bigger GDP, iii) a larger population, and iv) less dependence on Central Government grants.

[9] During the 2001-2002 macroeconomic crisis a tax on financial transactions and export taxes were reintroduced. Taxes on exports were not shared with the provinces until 2008, when a small share of revenues from the export tax on soybeans was distributed among the provinces. The federal government also receives a larger fraction of the tax on financial transactions than from other taxes (about 70 percent, compared to about 50 percent).

In spite of government controls on the domestic price of petroleum and natural gas, royalties doubled in a decade (from 0.3 percent in 1997-99 to 0.6 percent of GDP in 2007-09).

Most provinces have changed their own-source tax mix, reducing the taxation on property and increasing the revenues obtained from a turnover sales tax (even increasing tax rates in spite of the extra revenues that a booming economy produced). This may be a consequence of the difficulties of maintaining the tax base of the real estate tax in real terms because of money illusion, or simply because of other less-visible opportunities.

In spite of soaring revenues most provinces benefited from new bailouts in two ways:[10] i) the underestimation of official inflation since 2007 reduced the purchasing value of provinces' debt to the federal government; and ii) in 2009 the federal government replaced the inflation-linked debt of some provinces with long-term loans with a grace period and 6 percent annual nominal interest, which in light of the country's high inflation implies a substantial haircut in net present value.

The Central Government's tax revenues are high not only compared with the average Latin American country but also in relation to its potential tax base.[11] Moreover, most revenues are collected by the federal government, creating a high vertical imbalance that may discourage revenue effort at the sub-national level and increase the likelihood of federal bailouts.[12] Theory suggests that mobilizing sub-national revenues would make it possible to maintain the same overall revenue effort but at the same time improve the provinces' incentives to deliver better services and reduce the likelihood of future bailouts. Therefore, reforms should focus on efficiency and income distribution rather than raising additional revenues.

This paper is organized as follows. In Section 2 we show the recent evolution of government revenues in Argentina and the vertical imbalance. We then analyze from an economic perspective the most important taxes collected by the three levels of government. In Section 3 we look at the determinants of sub-national revenues and explore the impact of the 2001-2002 crisis and of higher federal transfers on the size and composition of the provincial own-source revenues. We found that automatic transfers improve the collections of the cascade sales tax and the property tax by enlarging the disposable income of the private and public sector

[10] In 2002, amidst a severe shortage of revenues, the federal government (the provinces' most important creditor) replaced dollar-denominated provincial liabilities with inflation-linked bonds with a low real interest rate.
[11] See Artana and Templado (2010).
[12] See Eichengreen and von Hagen (1996).

of the provinces favored by the regional redistribution of income, but discretionary transfers have a different impact: they reduce own-source revenue effort and encourage more public investment. This is consistent with the permanent income hypothesis and also with the attempt to protect the governor if the federal government decides to cut the money transferred to the province.[13] In Section 4 we analyze the political economy issues most related to a reform of sub-national taxes and conclude that tax reforms are very politically sensitive in Argentina. Finally, in Section 5 we analyze different options to improve sub-national revenue mobilization in Argentina and we make some proposals to improve it with a special focus on alternatives to improve on the cascade provincial sales tax. In the Appendixes we summarize our findings of a data envelope analysis of the relative efficiency of provincial tax agencies and some methodological issues and more details about our estimate of the effective tax rate of the cascade provincial tax.

2. Argentina's Tax System and its Recent Evolution

Table 1 shows the evolution of revenues and expenditures of the General Government, broken down by levels of government as estimated by the Ministry of Economy.[14] The data show a large increase in the state's share of the economy (about 12 percent of GDP in the last decade) and some decentralization of expenses from the federal government to subnational governments: for example, the federal government's share of total primary outlays declined from 56 percent in 2000 to 51 percent in 2009, while that of the provinces increased from 36 to 39 percent and that of local governments increased from 9 to 10 percent.

It should nonetheless be noted that official figures on revenues and expenditures have several shortcomings:

[13] From a political point of view, capital outlays are easier to reduce than current expenditures. It is also easier to raise own-source revenues rather than cutting the public sector wage bill if discretionary federal transfers are reduced.

[14] Data for local governments are available until 2006. We projected the figures for 2009 assuming a growth rate similar to that observed between 2006 and 2009 for a provincial variable that tracks better what happened at the local level. For example: i) we use the evolution of the collection of the provincial tax on vehicles to estimate municipal own-source taxes because it accounts for the largest share of what is included as local government taxes; ii) non-tax revenues and figurative contributions were assumed to follow the same path as provincial transfers to local governments; iii) expenses were projected using the evolution of the similar expense at the provincial level (e.g., salaries were projected with the same growth rate observed in the provincial wage bill).

- Some expenditures are not included. One notorious example is the provincial pension systems. Provinces include in current transfers the amount of money transferred to their pension systems to pay for their deficits, but do not show on a regular basis the total amounts spent on pensions and administrative expenses. Therefore, both revenues and expenditures are underestimated by an amount equal to employers' and employees' contributions to the provincial pension systems. For 2009 these were 1.80 percent of GDP. Therefore, total provincial revenues were 13.32 percent of GDP instead of the 11.52 percent of GDP reported in Table 1, and total expenditures were 15.93 percent of GDP instead of 14.13 percent of GDP (the deficit of 0.3 percent of GDP is included in current transfers). Note that for the federal public system there is not such a problem because all expenses are shown in the Social Security line.
- Provincial and municipal taxes include the automatic transfers that the provinces and local government receive from the revenue-sharing systems. For the purpose of our study it is necessary to show them separately from own-source taxes. This correction is done in Table 2 for the provinces.
- Own-source municipal taxes are included in non-tax revenues because they are called "user fees."

Table 1. Argentina: General Government (% of GDP)

	1993				2000			
	National Public Sector	Provinces and Buenos Aires City	Local Governments	TOTAL	National Public Sector	Provinces and Buenos Aires City	Local Governments	TOTAL
CURRENT REVENUES	**15.25%**	**7.64%**	**2.43%**	**25.33%**	**15.04%**	**8.51%**	**2.42%**	**25.97%**
Tax Revenues	13.64%	6.79%	1.19%	21.62%	12.94%	7.46%	1.07%	21.48%
Non Tax Revenues	1.57%	0.85%	1.25%	3.66%	2.10%	1.05%	1.34%	4.49%
Public Companies' Operating Surplus	0.04%	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%
CURRENT EXPENDITURE	**12.83%**	**8.54%**	**2.37%**	**23.74%**	**15.38%**	**10.00%**	**2.47%**	**27.84%**
Consumption	3.33%	7.18%	2.27%	12.77%	3.25%	7.84%	2.33%	13.42%
Interest Payments	1.23%	0.20%	0.01%	1.44%	3.40%	0.66%	0.04%	4.10%
Social Security	5.99%	0.00%	0.00%	5.99%	6.16%	0.00%	0.00%	6.16%
Current Transfers	2.04%	1.17%	0.09%	3.30%	2.42%	1.49%	0.10%	4.02%
Other	0.23%	0.00%	0.00%	0.23%	0.14%	0.00%	0.00%	0.14%
Public Utilities' Operating Deficit	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.01%
CAPITAL REVENUES	**1.24%**	**0.25%**	**0.04%**	**1.53%**	**0.16%**	**0.19%**	**0.03%**	**0.38%**
CAPITAL EXPENDITURE	**1.19%**	**1.60%**	**0.46%**	**3.26%**	**0.31%**	**1.25%**	**0.32%**	**1.88%**
TOTAL REVENUES	**16.49%**	**7.89%**	**2.48%**	**26.85%**	**15.21%**	**8.70%**	**2.44%**	**26.35%**
TOTAL EXPENDITURE	**14.03%**	**10.15%**	**2.83%**	**27.00%**	**15.69%**	**11.25%**	**2.79%**	**29.72%**
Figurative Contributions	**0.00%**	**1.74%**	**0.22%**	**1.96%**	**0.04%**	**1.70%**	**0.28%**	**2.02%**
Figurative Expenditure	**1.74%**	**0.22%**	**0.00%**	**1.96%**	**1.70%**	**0.32%**	**0.00%**	**2.02%**
GLOBAL RESULT	**0.73%**	**-0.74%**	**-0.13%**	**-0.15%**	**-2.14%**	**-1.17%**	**-0.07%**	**-3.37%**
PRIMARY RESULT	**1.96%**	**-0.54%**	**-0.12%**	**1.30%**	**1.27%**	**-0.51%**	**-0.04%**	**0.72%**

	2004				2009			
	National Public Sector	Provinces and Buenos Aires City	Local Governments	TOTAL	National Public Sector	Provinces and Buenos Aires City	Local Governments	TOTAL
CURRENT REVENUES	**18.03%**	**9.23%**	**2.23%**	**29.49%**	**23.52%**	**11.35%**	**2.68%**	**37.55%**
Tax Revenues	16.48%	8.07%	1.13%	25.68%	13.58%	10.08%	1.50%	25.16%
Non Tax Revenues	1.55%	1.16%	1.10%	3.81%	9.94%	1.27%	1.18%	12.39%
Public Companies' Operating Surplus	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CURRENT EXPENDITURE	**12.30%**	**8.73%**	**2.11%**	**23.13%**	**20.40%**	**11.78%**	**2.77%**	**34.95%**
Consumption	2.99%	6.64%	1.94%	11.57%	4.19%	9.69%	2.57%	16.45%
Interest Payments	1.29%	0.37%	0.01%	1.67%	2.44%	0.30%	0.01%	2.75%
Social Security	4.80%	0.00%	0.00%	4.80%	7.48%	0.00%	0.00%	7.48%
Current Transfers	3.18%	1.72%	0.15%	5.05%	5.84%	1.79%	0.19%	7.82%
Other	0.03%	0.00%	0.00%	0.03%	0.26%	0.00%	0.00%	0.26%
Public Utilities' Operating Deficit	0.00%	0.00%	0.00%	0.00%	0.19%	0.00%	0.00%	0.19%
CAPITAL REVENUES	**0.05%**	**0.22%**	**0.01%**	**0.28%**	**0.13%**	**0.17%**	**0.10%**	**0.40%**
CAPITAL EXPENDITURE	**0.93%**	**1.80%**	**0.33%**	**3.05%**	**2.39%**	**2.35%**	**0.69%**	**5.43%**
TOTAL REVENUES	**18.08%**	**9.45%**	**2.24%**	**29.77%**	**23.65%**	**11.52%**	**2.78%**	**37.95%**
TOTAL EXPENDITURE	**13.22%**	**10.53%**	**2.44%**	**26.19%**	**22.79%**	**14.13%**	**3.46%**	**40.38%**
Figurative Contributions	**0.05%**	**2.30%**	**0.24%**	**2.58%**	**0.02%**	**2.13%**	**0.51%**	**2.66%**
Figurative Expenditure	**2.30%**	**0.28%**	**0.00%**	**2.58%**	**2.13%**	**0.53%**	**0.00%**	**2.66%**
GLOBAL RESULT	**2.60%**	**0.94%**	**0.04%**	**3.58%**	**-1.25%**	**-1.02%**	**-0.17%**	**-2.43%**
PRIMARY RESULT	**3.89%**	**1.31%**	**0.05%**	**5.25%**	**1.19%**	**-0.72%**	**-0.15%**	**0.32%**

Source: Based on MECON Investment and Saving Account of the General Government and Own Estimates for Local Governments and GDP for 2009.

Notes: 1/ Figurative expenditures are transfers from one level of government to finance expenses of another level. They are registered as figurative contributions in the recipient government.

According to the Argentine Constitution, the federal government establishes and receives the revenues from taxes on trade (both on imports and on exports); the provinces collect direct taxes while indirect taxes are shared between both levels of government. However, the provinces may delegate the collection of direct taxes to the federal government, as has been the norm for many decades, and share the proceeds from direct and indirect taxes through a revenue sharing agreement. Each province is responsible for ensuring its municipalities have adequate revenue sources.

In practice, the federal government collects a large share of total taxes and then transfers a fraction of this collection to provinces that, in turn, transfer money to their local governments. In any case, in 2009, provinces' and municipalities' own-sources of revenues were about 6.5 percent of GDP, out of total government revenues of about 37.6 percent of GDP (see Table 2).[15]

As in most countries, tax revenues are the bulk of government revenues. During the 1990s tax revenues averaged about 22 percent of GDP, but by 2009 they were 50 percent higher. Most of this change took place at the federal level through a combination of new taxes and increases in effective tax rates. Provinces increased their collections of a turnover tax, but only to offset declining revenues from property taxes (Table 3).[16]

[15] Data on the composition of government revenues are not totally consistent with the data of Table 1, although the sources of information are both agencies of MECON.

[16] We show three-year averages to reduce the impact of one-off events. During 1997, 1998, 2007 and 2008 the economy was growing, while in 1999 and 2009 there was a recession.

Table 2. Argentina: General Government Revenues (% of GDP)

	1993	2000	2004	2009 3/	Variation 1993-2009	Share of total variation 1993-2009
Taxes on Income, Profits, & Capital	2.03%	3.98%	5.26%	5.24%	3.21%	27%
Taxes on Property	1.41%	1.62%	1.46%	1.36%	-0.05%	0%
Taxes on Goods and Services 1/	10.77%	11.16%	13.01%	15.27%	4.50%	37%
Taxes on International Trade	1.07%	0.73%	3.05%	3.68%	2.62%	22%
of which import duties	1.03%	0.70%	0.73%	0.71%	-0.32%	-3%
of which taxes on exports	0.01%	0.01%	2.29%	2.95%	2.94%	24%
Other Taxes	0.78%	0.59%	0.54%	0.48%	-0.30%	-2%
Total Taxes	16.05%	18.08%	23.32%	26.03%	9.98%	83%
Social Contributions to Public System	5.58%	3.40%	3.04%	7.11%	1.54%	13%
Social Contributions to Private pension	0.00%	1.48%	0.93%	0.00%	0.00%	0%
Total Taxes and Social Contributions	21.63%	22.97%	27.29%	33.14%	11.51%	96%
Other Revenues 2/	3.92%	4.63%	4.26%	4.45%	0.53%	4%
Total Government Revenues	25.55%	27.59%	31.54%	37.59%	12.05%	100%
Collected by:						
Federal Government	70%	64%	71%	75%	10.40%	86%
Provinces	15%	14%	13%	13%	1.11%	9%
Municipalities	5%	5%	4%	4%	0.09%	1%
Private Pension Funds	0%	5%	3%	0%	0.00%	0%
Other agencies	10%	12%	10%	8%	0.44%	4%

Notes:
1/ Revenues net of tax reimburses to exporters. Includes VAT, Excises, 100 percent of tax on financial transactions and provincial turnover tax
2/ Includes grants and municipal revenues.
3/ 2009 Nominal GDP estimated by FIEL
Source: Authors' calculations based on DNIAF-MECON and FIEL.

Table 3. Federal and Provincial Taxes (% of GDP)

	Average 1997-99	Average 2007-09
Federal	17.10%	26.38%
VAT	6.66%	7.56%
Excises	2.03%	1.66%
Personal assets	0.21%	0.33%
Income tax	3.22%	5.30%
Social Security	3.67%	5.53%
Export taxes	0.01%	2.97%
Taxes on imports	0.90%	0.81%
Financial Transactions	0.00%	1.87%
Other	0.40%	0.33%
Provinces	3.87%	4.48%
Turnover sales	2.18%	3.24%
Real State	0.63%	0.38%
Automobiles	0.31%	0.26%
Other	0.75%	0.60%
Other Provincial Revenues		
Shared Federal Taxes	5.73%	6.79%
Federal transfers	0.50%	1.69%
Other Provincial Own Source Revenues	0.74%	1.03%
Royalties	0.29%	0.59%
Memo items		
Provinces Total Revenues	10.84%	13.99%
Provincial Expenditures	11.91%	14.92%
Provinces Deficit	1.07%	0.93%

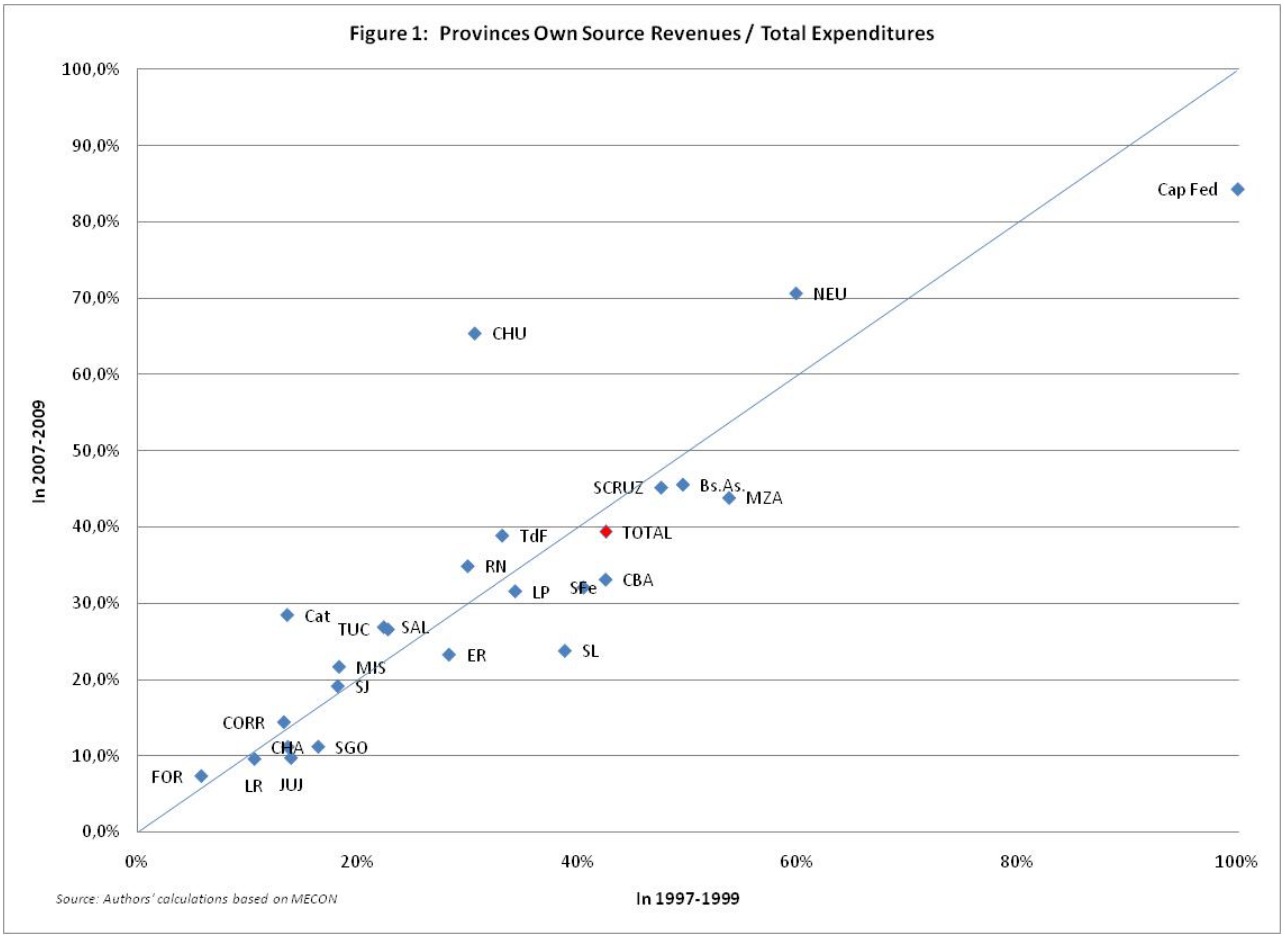
Source: Authors'calculations based on MECON.

Revenue collections became more centralized as well, with the federal government increasing its share from 69-70 percent in 1993 and 2000 to 75 percent in 2009.[17] During this time provinces reduced their deficits but did not eliminate them in spite of economic expansion. The average deficit of 9 percent of expenditures at the end of the 1990s was cut to 6 percent in 2007-2009, but some provinces had a deficit higher than the average, notably the emblematic

[17] Mandatory contributions to private pension funds were added to allow for a consistent comparison. Most workers opted to make contribution to private pension funds from mid 1994 to the end of 2008 when the government decided to nationalize them and forced all workers to contribute to the public pay-as-you-go system.

province of Buenos Aires with a deficit that averaged 10 percent of its expenditures during 2007-2009.

Vertical imbalances increased modestly, but with important differences across provinces (see Figure 1). For example, some oil-producing provinces that collect royalties reduced the vertical imbalance given the increase in the domestic prices of crude oil and natural gas at the producer level, while the five advanced provinces increased (modestly) their dependence on federal transfers.



In addition, the composition of provincial taxes changed with a substantial increase in turnover sales tax collections and a reduction in property taxes.[18] Although the tax bases are not the same, it is interesting to note that the collection of the provincial turnover tax as a share of

[18] A few small provinces transferred in the early 1990s the collection of taxes on real estate and automobiles to their municipalities.

the collection of the federal VAT increased from 33 percent in 1997/99 to 43 percent in 2007-09 while provincial collection of property taxes (on real estate and automobiles) fell from 307 percent of federal tax collection on personal assets in 1997/99 to 114 percent in 2007/09. This suggests that the change in the composition of provincial own-source taxes was a political decision rather than a consequence of alterations in the tax bases.

Provinces received more automatic transfers from the federal government through the different tax sharing agreements, but discretionary transfers multiplied by three (measured as a percentage of GDP). Although there are no major restrictions on how provinces can spend revenues obtained from tax sharing,[19] there are some restrictions on money received through discretionary transfers.

Unfortunately, data for local governments are not updated.[20] The last available year with a complete data set is 2000, and only a few municipalities provide updated information in their web pages. Sanguinetti, Sanguinetti and Tommasi (2001) showed that there is an important diversity among the 23 provinces[21] in local governments' share of consolidated sub-national expenditures, ranging from 8 percent to 32 percent. Their econometric analysis focused on the determinants of the large variation in per capita municipal expenditures. The main results were: a) higher transfers per capita lead to higher expenditures per capita (similarly to what was found in studies on the Argentine provinces), b) political variables had an impact (more

[19] One exemption is the transfers for education and health that accompanied the second stage of decentralization of these services that took place in the early 1990s. However, as their value was fixed in nominal terms it has eroded substantially in real terms.

[20] Data for the municipalities of the province of Buenos Aires (see table below) show that between 1997 and 2007 provincial property tax collections increased 83 percent, compared to a 71 percent increase in local governments' property tax collections. In the same period, collections of the cascade sales tax soared at the provincial level and also at the municipal level (although not all municipalities use sales as the tax base of their taxes on business).

In Arg$ million	1997	2007	% change
Province of Buenos Aires Own-source tax revenues			
Total Tax Revenues	4.510.174	13.029.150	189%
Cascade Sales Tax	2.113.650	8.506.267	302%
Property tax	667.295	1.224.293	83%
Automobiles	484.631	804.095	66%
Other	1.244.598	2.494.495	100%
Municipalities of the Prov of Buenos Aires Own-Source Tax revenues			
Total Tax Revenues	1.744.141	3.716.093	113%
Cascade Sales Tax	323.770	1.007.760	211%
Property tax	878.815	1.504.162	71%
Other	541.556	1.204.171	122%

[21] The City of Buenos Aires has no local governments.

decentralization of the local power reduces per capita expenditures), and c) the size of the local government, the economic activity or poverty had no impact on expenditures per capita. The authors did not explore the impact on own-source revenues.

The changes in federal and provincial revenues took place in a changing environment. The implosion of economic activity that followed after the default of the federal public debt, the large depreciation of the peso and the financial crisis of 2001-2002 encouraged the government to adopt emergency measures that increased centralization.[22] Centralization may have afforded an "insecure" political regime with leverage over sub-national governments.[23] Large exogenous shocks, moreover, may change the relative bargaining power of the different levels of government and in turn change tax policies.[24] The 2001-2002 Argentine crisis is an example. It created a political vacuum that the 2003 presidential election could not fill immediately given that the elected president obtained only 22 percent of the vote. The economic recovery, the possibility of adopting emergency measures without the approval of Congress and the use of discretionary transfers later allowed the government to gain political muscle.

The 2001-2002 macroeconomic crisis also brought to an end several fiscal agreements that had been signed between the federal government and the provinces. In particular, provinces regained freedom to set the tax rates and tax bases of the turnover sales tax and abandoned the path of gradual reduction of tax rates on primary production and manufacturing that had been agreed in the early 1990ss to reduce the cascade effect.[25]

2.1. Taxes Collected by the Federal Government

The federal government is de facto responsible for collecting most taxes in Argentina. Taxes on consumption consist of two types. The first is a consumption VAT at a general rate of 21 percent, with a higher rate of 27 percent for some utilities' sales to firms (in order to piggy back on their collection effort), and a much lower rate of 10.5 percent for some foods. Financial services are exempt as is customary in most countries. The second type consists of special excises on the consumption of fuels, tobacco and beverages, most of them ad valorem.

[22] Oates (1978) provided some evidence that in deep crises there is a tendency to centralize government responsibilities.
[23] Weingast (2006).
[24] Ambrosiano and Bordignon (2006).
[25] The federal financial transaction tax that was reintroduced in 2001 draws on the same base as the provincial cascade tax. This is an example of a tax externality not properly coordinated between the different levels of government.

There are several types of taxation of income flows. The first is a progressive personal income tax on labor and capital income, with a top marginal rate of 35 percent. The minimum exempt level is about twice the per capita income which, in contrast to developed countries, takes low medium-income families out of the tax base. In addition to income tax, labor income is taxed with social contributions that fund some services to formal workers although most benefits are not a direct function of the tax paid by employers and employees. They are therefore a tax on labor income at a proportional rate. Finally, firms' profits are taxed at a 35 percent flat rate; dividends are exempt. There is no indexation for inflation.

Another set of taxes applies to assets. A 1 percent tax on business assets is charged along with the business income tax, and firms can credit it against their liabilities in calculating income tax; this measure is effectively a minimum tax on income. A similar tax (*Impuesto a los Bienes Personales*) applies to individuals' property and certain financial assets, but it is a final tax that cannot be credited against the personal income tax. The rate structure for this tax on personal wealth is progressive, and the marginal rate is 0.75 percent. Only mortgages are allowed to be deducted from assets.

Several other taxes make important contributions to federal revenues. One is a tax on financial transactions at a combined rate of 1.2 percent, with an exemption for deposits used to pay monthly salaries.[26] This tax, which is similar to a turnover tax, distorts relative prices and penalizes domestic producers that cannot shift it to international prices. A second tax consists of import duties set according to the Mercosur common external tariff. Finally, all exports are taxed, though at different rates ranging from 4.8 percent for manufacturing to 37.5 percent for soybeans. Exports taxes represent a tax on production and a subsidy to local consumption.

With the exception of import duties and social security contributions, all revenues are shared with the provincial governments, but the primary distribution is different across taxes. It is lower for taxes on exports (only revenues received from exports of soybeans are shared with the provinces) and for the tax on financial transactions.

[26] Both debits and credits into bank accounts are taxed at 0.6 percent. One third of the rate on bank credits can be used as a tax credit for income tax purposes.

2.2. Taxes Collected by Provinces and Local Governments

As founders of the federal government, provinces delegated the collection of some taxes but retained taxing power. Municipalities collect taxes and user fees, but most "fees" are hidden taxes because they are not related to the services provided. Most revenues are obtained from a tax on sales (that mimics in most cases the provincial tax) and from taxes on real estate (that likewise mimic the provincial tax).

Each province and most local governments have their own tax administration department or agency (either centralized or decentralized). Some provinces agree to share information with the federal tax agency, but there are no joint audits.

Table 4 shows the composition of provincial revenues in 2009, but expressed as a fraction of local GDPs.[27] Data for the provinces are also grouped according to their level of development and population density. The importance of the state participation in the economy is negatively correlated with development and with population density. This is a consequence of the high regional distributional component of federal transfers that favors poor and sparsely populated provinces. For example, automatic federal transfers averaged only 3.8 percent of the GDP of the advanced and populated provinces, but jumped to 26.52 percent of GDP for the poorest provinces with low density (column 12). On one extreme there was the City of Buenos Aires with total revenues of 6 percent of its GDP, and on the other was Formosa with 59 percent of its GDP.[28]

There is much less variation in the collection of own-source tax revenues (from 3.8 percent of GDP to 4.9 percent for the averages of the four groups). This is especially the case for the most important tax of the provincial governments, *Ingresos Brutos* (the cascade sales tax, with revenues that average 2.9 percent in the group of poor and sparsely populated provinces to 3.7 percent of GDP in the richer and highly populated provinces) and also for the stamp tax (with revenues of about 0.4 percent of local GDP in the four groups). Real estate tax collections expressed as a fraction of provincial GDP are higher for provinces with high population density, suggesting that urban properties account for most collections of this tax.

[27] The weighted average is estimated as the total collection in pesos of the 24 provinces divided by the nominal National GDP. The sum of the 24 provincial GDPs has minor differences with the estimate of the National GDP.
[28] Estimates of provincial GDPs are not as reliable as the estimate of federal GDP.

Table 4. Provincial Revenues as % of Provincial GDP as of 2009

	Cascade Tax	Real State Tax	Tax on Motor Vehicles	Stamp Tax	Other Taxes	Total Own-Source Taxes	Royalties	Other Non-Tax Revenues	Total Non-Tax Revenues	Capital Revenues and Other	Total Own-Source Revenues	Automatic Transfers	Discretionary Transfers	Total Federal Transfers	Total Provincial Revenues
	1	2	3	4	5	6 = 1+2+3+4+5	7	8	9 = 7+8	10	11 = 6+9+10	12	13	14 = 12+13	15=11+14
Ciudad de Buenos Aires	3.55%	0.56%	0.43%	0.31%	0.06%	4.90%	0.00%	0.24%	0.24%	0.06%	5.20%	0.57%	0.12%	0.69%	5.89%
Buenos Aires	3.91%	0.36%	0.35%	0.34%	0.36%	5.32%	0.00%	0.21%	0.21%	0.10%	5.63%	3.80%	1.66%	5.45%	11.09%
Catamarca	1.75%	0.10%	0.16%	0.19%	0.00%	2.20%	0.68%	2.32%	3.01%	0.43%	5.64%	18.96%	1.51%	20.47%	26.11%
Córdoba	3.72%	0.43%	0.21%	0.24%	0.00%	4.59%	0.00%	0.71%	0.71%	0.27%	5.58%	7.80%	2.00%	9.80%	15.38%
Corrientes	1.59%	0.11%	0.00%	0.25%	0.00%	1.96%	0.10%	0.11%	0.21%	0.32%	2.49%	14.31%	1.49%	15.80%	18.30%
Chaco	3.08%	0.03%	0.00%	0.41%	0.69%	4.21%	0.00%	0.42%	0.42%	0.40%	5.03%	29.56%	11.98%	41.54%	46.57%
Chubut	2.74%	0.00%	0.00%	0.35%	0.09%	3.19%	6.49%	1.72%	8.21%	0.70%	12.10%	6.01%	1.81%	7.81%	19.91%
Entre Ríos	2.55%	0.64%	0.42%	0.38%	0.48%	4.47%	0.88%	0.25%	1.12%	0.46%	6.06%	15.32%	4.49%	19.81%	25.87%
Formosa	2.47%	0.04%	0.00%	0.33%	0.15%	2.99%	0.27%	0.70%	0.98%	0.30%	4.26%	45.75%	9.29%	55.04%	59.31%
Jujuy	2.40%	0.12%	0.00%	0.30%	0.21%	3.03%	0.02%	0.34%	0.36%	0.32%	3.70%	22.39%	11.44%	33.84%	37.54%
La Pampa	3.77%	0.99%	0.56%	1.03%	0.09%	6.45%	1.13%	0.64%	1.77%	2.37%	10.59%	19.67%	3.99%	23.66%	34.25%
La Rioja	2.10%	0.07%	0.27%	0.07%	0.00%	2.51%	0.00%	0.19%	0.19%	1.75%	4.44%	29.42%	15.90%	45.32%	49.76%
Mendoza	3.08%	0.37%	0.43%	0.48%	0.03%	4.38%	2.05%	0.86%	2.92%	0.50%	7.80%	8.57%	1.95%	10.52%	18.32%
Misiones	2.80%	0.14%	0.04%	0.26%	0.02%	3.25%	0.46%	0.25%	0.71%	0.40%	4.36%	11.98%	4.14%	16.12%	20.49%
Neuquén	3.24%	0.21%	0.00%	0.39%	0.00%	3.83%	7.37%	5.05%	12.42%	1.43%	17.68%	5.30%	1.24%	6.54%	24.22%
Río Negro	3.22%	0.24%	0.46%	0.36%	0.01%	4.29%	2.28%	0.90%	3.19%	0.33%	7.81%	12.20%	2.55%	14.75%	22.56%
Salta	4.65%	0.05%	0.00%	0.63%	0.33%	5.67%	2.93%	0.60%	3.52%	0.59%	9.78%	21.59%	4.86%	26.44%	36.23%
San Juan	2.80%	0.31%	0.40%	0.31%	0.64%	4.46%	0.60%	0.63%	1.22%	1.19%	6.88%	24.46%	4.89%	29.35%	36.23%
San Luis	3.94%	0.27%	0.20%	0.41%	0.03%	4.85%	0.00%	0.35%	0.35%	0.64%	5.85%	18.32%	1.80%	20.13%	25.98%
Santa Cruz	3.97%	0.01%	0.00%	0.57%	0.00%	4.55%	8.78%	1.71%	10.49%	7.54%	22.59%	10.75%	11.29%	22.04%	44.63%
Santa Fe	2.92%	0.32%	0.00%	0.48%	0.02%	3.74%	0.00%	0.12%	0.12%	0.30%	4.16%	7.35%	1.29%	8.64%	12.80%
Santiago del Estero	2.38%	0.20%	0.10%	0.37%	0.53%	3.58%	0.02%	0.32%	0.33%	0.59%	4.51%	30.40%	9.17%	39.57%	44.08%
Tierra del Fuego	3.39%	0.00%	0.00%	0.15%	0.84%	4.39%	3.15%	1.70%	4.85%	0.72%	9.96%	11.94%	3.17%	15.11%	25.08%
Tucumán	7.05%	0.89%	0.39%	0.92%	0.20%	9.43%	0.00%	0.97%	0.97%	0.68%	11.08%	25.85%	7.71%	33.57%	44.64%
High Development and High Population Density	3.65%	0.42%	0.33%	0.34%	0.19%	4.92%	0.09%	0.29%	0.37%	0.14%	5.44%	3.80%	1.21%	5.01%	10.45%
High Development and Low Population Density	3.33%	0.19%	0.13%	0.43%	0.10%	4.18%	5.06%	2.25%	7.31%	1.76%	13.26%	10.00%	3.17%	13.16%	26.42%
Low Development and High Population Density	3.08%	0.34%	0.16%	0.40%	0.25%	4.22%	0.33%	0.35%	0.67%	0.43%	5.33%	18.29%	5.85%	24.14%	29.47%
Low Development and Low Population Density	2.88%	0.14%	0.15%	0.36%	0.31%	3.83%	0.99%	0.85%	1.84%	0.75%	6.41%	26.52%	6.52%	33.04%	39.45%
Weighted average	3.53%	0.38%	0.29%	0.35%	0.19%	4.74%	0.59%	0.49%	1.08%	0.34%	6.16%	6.767%	2.06%	8.83%	14.99%
Simple average	3.21%	0.27%	0.18%	0.40%	0.20%	4.26%	1.55%	0.89%	2.44%	0.93%	7.63%	16.76%	4.99%	21.75%	29.38%
Coefficient of variation	0.344	1.004	1.068	0.547	1.290	0.361	1.630	1.202	1.384	1.615	0.612	0.633	0.866	0.642	0.469
Minimum	1.59%	0.00%	0.00%	0.07%	0.00%	1.96%	0.00%	0.11%	0.12%	0.06%	2.49%	0.57%	0.12%	0.69%	5.89%
Maximun	7.05%	0.99%	0.56%	1.03%	0.84%	9.43%	8.78%	5.05%	12.42%	7.54%	22.59%	45.75%	15.90%	55.04%	59.31%

Note: High Development and High Population Density are: City of Buenos Aires, Buenos Aires, Cordoba, Mendoza and Santa Fe. High Development and Low Population Density: Chubut, La Pampa, Neuquen, Rio Negro, San Luis, Santa Cruz and Tierra del Fuego. Low Development and High Population Density are: Corrientes, Chaco, Entre Rios, Jujuy, Misiones and Tucumán. Low Development and Low Density are: Catamarca, Formosa, La Rioja, Salta, San Juan and Santiago del Estero.

Source: Authors' calculations based on MECON and provincial Bureaus of Statistics.

2.2.1 The Turnover Tax (Ingresos Brutos)[29]

The Argentine provinces had long used a tax on gross sales (*Impuesto a las Actividades Lucrativas*). When the VAT was introduced in 1975 at the Federal level, the provinces agreed to eliminate that tax, which enabled them to receive a share of VAT collections. VAT. However, the cascade tax was reintroduced under a new name (*Ingresos Brutos*) the cascade tax was reintroduced probably as a response to the high deficits that were pervasive at that time at all levels of government. In the early 1980s there was one failed attempt to reduce the cascade of the tax, and in the early 1990s the Federal government provided some incentives to provinces to reduce the cascade under the umbrella of two Fiscal Agreements (1992 and 1993). Provinces were supposed to exempt primary activities, manufacturing, construction and financial services. About 60 percent of the provinces complied with the exemptions on primary activities, manufacturing and construction but only a few extended the exemptions to financial services. During the 2000s the Fiscal Agreements were abandoned, and most provinces taxed those activities again.

Some provinces reduce tax rates for small firms and grant other exemptions either for development reasons (e.g., manufacturing located in industrial zones) or for distributional purposes (e.g., lower rates on some foods, transport and medicines). The fiscal loss for these special regimes is substantial (e.g., about 23 percent of 2010 collections in the province of Buenos Aires).[30]

The weighted average tax rate[31] increased from 1.60 percent in 2002 to 1.68 percent in 2010. Figure 1 shows the collections obtained by each province in 2008 expressed as a percentage of the provincial GDP and the weighted average tax rate estimated by IARAF for that year. It follows that there is a positive relationship between the rate and collections, but there are important differences in collections for relatively similar rates. This may reflect exemptions that were not considered in the estimate of the weighted average tax rate or differences in the enforcement of the tax (either differences in evasion or different contributions from the easier-to-

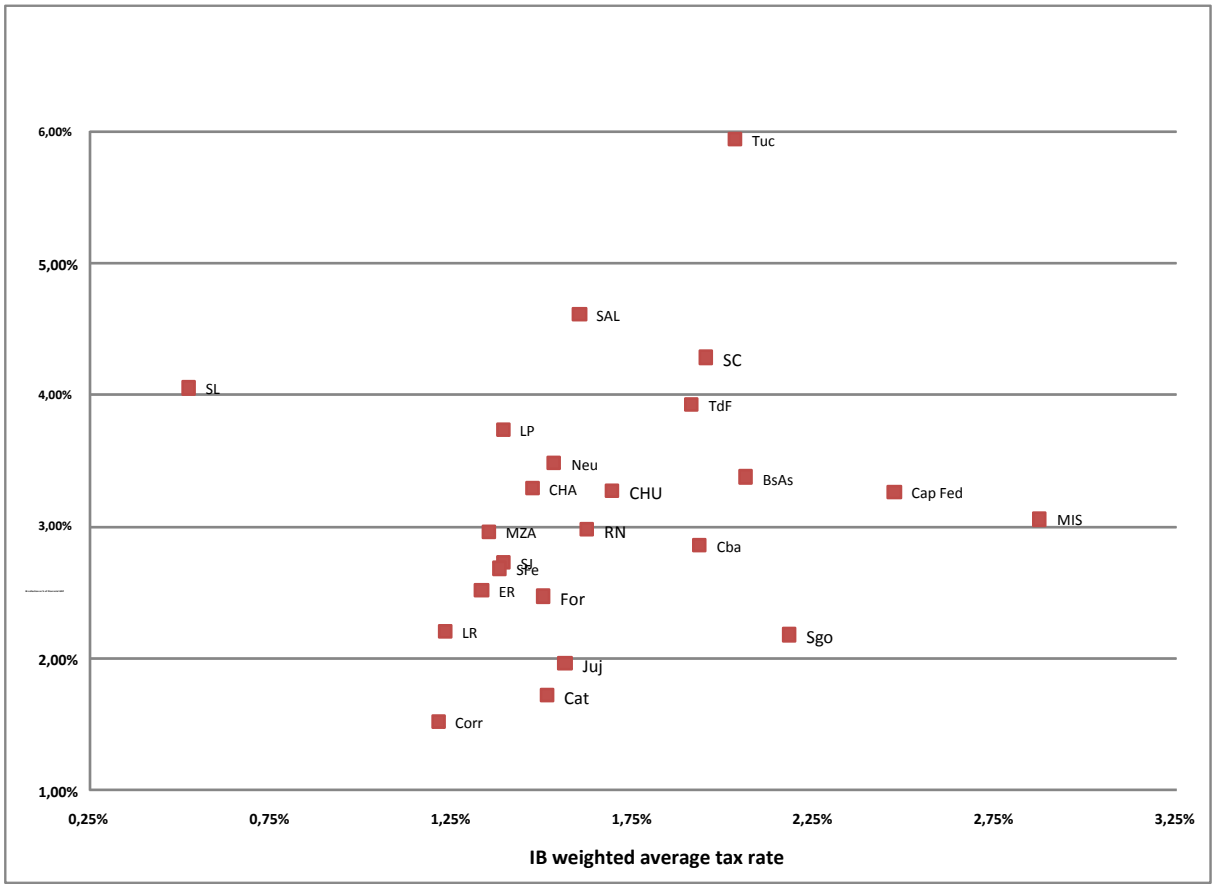
[29] This section is a summary of Artana et al. (2011).

[30] The province of Buenos Aires estimates the fiscal loss of tax exemptions and reduced rates in own-source taxes. For 2010, 65 percent of the estimated loss in *Ingresos Brutos* came from the exemption granted to small and medium firms and 35 percent from reduced rates and exemptions.

[31] The average rate for each province is estimated using the shares of each economic sector in provincial GDP and taking into consideration general exemptions (but not exemptions granted to specific firms such as those located in industrial parks). Therefore, the rates shown in Table 5 may overstate the rates charged in practice.

collect sources like money obtained from large taxpayers or from withholdings). In addition, the recent evolution of collections differed from one province to another. On one extreme, there is a group of seven provinces (Buenos Aires, Chubut, La Pampa, Neuquen, San Luis, Santa Cruz and Tucuman) with large increases between 1993 and 2009 (over 90 percent of GDP growth observed in their GDPs). On the other extreme, there are two provinces (City of Buenos Aires and Mendoza) with increases of less than 30 percent of GDP growth.

Figure 2. Revenue Collection of *Ingresos Brutos* and Tax Rate as of 2008



Source: Authors' calculations based on IARAF, MECON and estimates of provincial GDP.,

More recently, the distortions have become even worse, as illustrated by the following items:

- Substantial dispersion exists in legal tax rates for the same economic activity among different provinces. Table 5 summarizes the findings of IERAL and IARAF, two institutions that estimate the effective legal tax rates of taxes on

gross sales for the 24 provinces and a sample of municipalities.[32] It follows that there is a high dispersion across provinces of the rates for primary activities, manufacturing and construction in the provincial tax on gross sales. For utilities, commerce and financial intermediation the dispersion is lower, but average rates are higher.

Table 5. Dispersion of Tax Rates in Provincial and Municipal Cascade Sales Taxes by Economic Activity and Province, 2006

	Primary		Manufacturing & Construction Located in Same Province		Utilities		Commerce, Restaurants & Hotels		Financial Intermediation	
	Provincial Turnover Tax	Municipal Tax	Provincial Turnover Tax	Municipal Tax	Provincial Turnover Tax	Municipal Tax	Provincial Turnover Tax	Municipal Tax	Provincial Turnover Tax	Municipal Tax
Average rate in 24 province	0.49%	0.47%	0.78%	0.39%	2.38%	0.69%	2.67%	0.90%	2.69%	0.85%
Minimum rate	0.00%	0.00%	0.00%	0.10%	0.60%	0.05%	1.60%	0.25%	0.00%	0.05%
Maximun rate	2.00%	3.40%	2.30%	1.40%	3.40%	2.60%	4.40%	2.10%	4.40%	3.00%
Coefficient of variation	1.27	1.54	0.97	0.77	0.31	0.88	0.22	0.48	0.39	0.85

Source: Authors' calculations based on IARAF (2009) and IERAL (2006).

- The cascade has surely increased as a result of increasing the tax burden on primary, manufacturing, construction and financial services that are used as inputs in other economic activities. For example, the average rate on primary activities increased from 33 percent of the average rate of *Ingresos Brutos* in 2003 to 36 percent in 2010, and for manufacturing it rose from 50 percent of the average in 2003 to 60 percent in 2010.
- Twenty-one of the 24 provinces have a higher tax on manufacturers located in other provinces than those in their own territory. The difference in rates is substantial. For example, in the province of Buenos Aires the out-of-province rate is 3 percent, compared with 0.57 percent for in-province manufacturers; in Cordoba 3.50 percent compared with 0.46 percent; in the City of Buenos Aires 3 percent compared with 0.63 percent; and in Santa Fe 1.35 percent compared with 0 percent.[33] Provinces can enforce this through the *Convenio*

[32] These institutions follow since 2002 a sample of 100 municipalities that represent 60 percent of the population of the 23 provinces with local governments. Seventy percent of these municipalities have a tax on gross sales similar to the provincial tax. The other 30 percent uses the number of employees, size of the shop or other criteria to calculate the tax.

[33] See IARAF (2010a), which estimates that the weighted average tax rate for the 24 provinces for manufacturers located in other provinces more than doubles the rate for manufacturers located in the province.

Multilateral that distributes among provinces the collections of large taxpayers with sales in more than one jurisdiction. The difference in rates increases the cost for a firm located in the province that purchases inputs in other provinces, and it is a sort of internal barrier to trade because a firm "saves" in taxes by purchasing from local manufacturers.

- Withholdings became more pervasive.[34] In the 24 provinces there are more than 60 different withholdings regimes. Several are particularly important in the most developed provinces. The first is that credit card companies withhold 3 percent of payments made to retailers (in some provinces this is similar than the rate charged to retailers). Second, suppliers must withhold a percentage of the net of tax sale if the buyer is registered as a taxpayer in the province. The withholding acts as an advance on the tax that the buyer has to pay on its sales.[35] Third, most provinces have an agreement with Federal Customs to withhold 1.5 percent of imports. Finally, financial institutions are obliged by the provinces to withhold a percentage of bank deposits made by firms if they presume that the deposit was related to sales. In this case the withholding is made on sales including VAT when the tax base of the cascade tax is net of VAT. As these four withholdings are additive there is a non-negligible probability of suffering chronic excess withholdings that provinces are reluctant to reimburse. Moreover, as the regional distribution of purchases is likely to be different from the regional distribution of sales, many firms may have a credit with some provinces although on the aggregate they may have a balanced position. Only a few provinces permit the transfer of excess withholdings to other taxpayers.

The share of provincial and municipal sales taxes imposed on the producers of tradables is better thought as a tax on production given that Argentina is a price-taker in world markets.

[34] In 2010 withholdings accounted for 54 percent of total collections of *Ingresos Brutos* in the City of Buenos Aires and for 83 percent in the province of Buenos Aires. Firms paying through the Multilateral Agreement contributed 38 percent in the City and 13 percent in the province of Buenos Aires. Local taxpayers contribute less than 10 percent of total revenues, suggesting that most are small firms.

[35] At least six provinces, Buenos Aires, Cordoba, Corrientes, Misiones, Santa Fe and Tucuman, extend the withholding also to buyers who have no tax base in the province. In this case, the problem of "excess" taxation is more likely.

Therefore this share of the tax is likely to fall on income of labor and capital (including land). The tax on the non-traded part of goods and services sold in the domestic market is a tax on consumption at variable rates that depend on the cascade and the value added by the different stages on non-tradable production. With information on collections by sector of some of the large provinces, it can be concluded that on one extreme retail activities (including services) with no cascade effect may account for about 30% of total revenues, on the other extreme primary activities and manufacturing with maximum cascade effect may account for about 20%, and the remaining 50% is obtained from services (financial, transport) or construction that have a mix of final sales and intermediate sales. Therefore, the cascade is a problem in the tax as most of its revenues are obtained from activities that are inputs of other activities.

2.2.2 Tasa de Seguridad e Higiene *(Health and Safety Tax)*

Most municipalities have a tax on gross sales that mimics the provincial turnover tax, although at lower rates (see Table 5). However, the dispersion in rates for the same economic activity is usually higher for the municipal tax than for the provincial tax.[36]

When municipalities opt to use another base,[37] the tax (expressed as a percentage of sales) is usually lower. Average estimates from IARAF (2010a) are 0.23 percent of sales compared to 0.67 percent for the 70 percent municipalities that tax gross sales. Each municipality decides on the base to use. For example, 39 out of 43 municipalities of the province of Buenos Aires in the sample use gross sales; in Cordoba and Santa Fe the ratio is 7 out of 7; and in Mendoza it is 5 out of 7, while in Corrientes, San Luis, San Juan, Santa Cruz and Tierra del Fuego none of 2 local governments in the province's sample use gross sales as the base. The weighted average rate for the municipalities that taxed gross sales also increased from 0.58 percent of sales in 2003 to the abovementioned 0.67 percent in 2010.[38]

The economic analysis for the most frequent tax base is similar to the provincial tax on gross sales. When provinces opt to tax employment the analysis is similar to a tax on labor (likely to reduce formal employment and labor income in an open economy), and when they opt to use the size of the shop it looks similar to a tax on real estate (see below).

[36] But there is more uniformity across sectors. For example, the average tax rate for commerce is twice the rate of primary activities, while in *Ingresos Brutos* it is 5.4 times greater.
[37] Generally number of employees or size of the shop where the activity takes place.
[38] The increase may be overstated because the figures for 2003 published by IERAL (2004) apparently bundle together all municipalities, and it is likely that those using other bases than sales also had a lower rate at that time.

2.2.3 Taxes on Urban and Rural Real Estate

During the 1980s and 1990s some provinces shifted the collection of property taxes on urban real estate and automobiles to their local governments. All provinces calculate the tax on the assessed value of properties. In building the cadastre provinces usually rely on the characteristics of the property and their value. However, the valuation of old properties is not updated regularly, with the exception of their most visible characteristics.[39] Table 6 shows for selected provinces that the "typical" structure of the tax is: i) progressive rates for urban properties; ii) unused urban land is taxed at higher rates; and iii) tax rates on rural land are proportional in some provinces and progressive in others. There are subjective exemptions and also variations according to the location of the property. The tax on real estate in the most developed provinces is about 0.5 percent of market values.

[39] A Federal Law (26209/07) was enacted to create a Federal Cadastre Council made up of all the provincial cadastres (i.e., a single cadastre for the whole country), but no progress has occurred so far.

Table 6. Structure of Tax on Real Estate in Selected Provinces

	Urban properties with construction			Urban land			Rural land		
	Minimum rate on assessed value	Maximum rate on assessed value	Difference by zone (either by rate or valuation)	Minimum rate on assessed value	Maximum rate on assessed value	Difference by zone (either by rate or valuation)	Minimum rate on assessed value	Maximum rate on assessed value	Difference by zone (either by rate or valuation)
City of Buenos Aires /1	0.58%	2.16%	Yes	5.58%	10.58%	Yes	No rural land		
Province of Buenos Aires /2	0.38%	1.62%	Yes	0.38%	1.69%	Yes	1.01%	2.51%	Yes
Córdoba - Río Tercero /3 /4 /5	0.48%	0.94%	Yes	0.74%	1.32%	Yes	1.20%	1.20%	Yes
La Pampa /4 /5 /6	0.50%	1.40%	No	2.00%	2.00%	Yes	1.20%	1.20%	Yes
Neuquén /4	0.55%	1.62%	No	2.80%	2.80%	No	1.20%	2.50%	Yes
Santa Fe /4	0.49%	1.22%	Yes	na	na	na	0.65%	2.35%	Yes
Entre Ríos	0.60%	2.80%	No	3.80%	5.50%	No	0.80%	2.30%	No
San Luis /7 /8	0.60%	1.20%	Yes	1.80%	1.80%	No	0.90%	1.50%	No
La Rioja /5 /9	0.20%	0.70%	No	1.50%	1.50%	No	1.00%	1.00%	No
Misiones /4	0.60%	1.20%	Yes	1.50%	1.50%	Yes	1.20%	1.20%	Yes
Chubut /10	0.40%	0.40%	Yes	0.42%	0.48%	Yes	1.20%	4.80%	No
Río Negro /4 /11	0.51%	1.00%	No	1.01%	2.00%	No	0.51%	1.00%	No
San Juan /4	0.47%	0.75%	No	2.55%	3.00%	No	2.55%	3.00%	No

Notes: 1/ Includes all assessments on real estate: for street cleaning and public lighting, street repair ng of streets and to expand the subway network. The combined rate cannot exceed 1 percent of market value.
2/ In order to establish the taxable base for Urban property tax, the coefficient of 0.9 should be applied to the assigned fiscal value.
3/ Cordoba has two separate property taxes, collected by the province and the municipalities. In Rio Tercero, properties located in corners contribute an extra 20 percent, considering the shorter frontage.
4/ For Urban properties with construction and Urban land, annual minimum taxes are as follows: in La Pampa ($21), Neuquen ($25), Santa Fe ($10), Misiones ($5.5), Rio Negro ($37.5), San Juan ($25), Cordoba ($20) and Rio Tercero, Cordoba ($17).
5/ For Urban properties with construction, the following additional amounts have been fixed: in La Rioja (between $13 and $69) and Rio Tercero, Cordoba (between $ 3.5 and $11.5 for each front side meter of length).
6/ Awards for good contributor: deductions of between 5 and 10 percent, according to the number of years without breaches.
7/ Awards for good contributor: deductions of between 10 and 20 percent, according to the number of years without breaches.
8/ When there are improvements in properties, the rates on the increased tax base are 60 percent (urban land) and 80 percent (rural land).
9/ Properties with no fiscal valuation pay a flat tax of $37.5.
10/ Taxing on rural land is power of the provincial government, and on urban land of the municipalities. A third category of land, denominated “urban enlargement and valleys,” provides aliquots of between 0.01 and 1.50 percent.
11/ A surcharge of 50 percent has been set on properties with absentee owners.
Source: author’s calculations based on provincial tax codes.

As in other Latin American countries, the collection of property taxes is lower than the bills issued.[40]

Property may be taxed directly or indirectly through taxes on the income generated by it. In Argentina the imputed income from owned houses is not taxed with the income tax. Therefore, taxing the stock of real estate may correct for this bias. Moreover, as the property tax usually falls on the value of assets it is neutral with regards to the source of financing, while the income tax has a bias towards debt.[41] However, as the property tax also falls on rental housing and business real estate there is no correction of the distortions. The federal tax on personal assets also falls on the value of these properties and the transaction of properties is usually taxed with the stamp tax. Table 7 summarizes property taxation in Argentina.

Therefore, the justification for the property tax[42] does not lie in a correction (albeit imperfect) of distortions in the taxation of property income. Nor, given provincial-level taxation (with few exceptions), do efficiency concerns appear to justify the property tax as a user fee, at least for the large provinces.

Table 7. Taxation of Property Assets and Their Income in Argentina

	Taxation of assets 1/		Taxation of income flow		Taxation of capital gains		Taxation of transactions	
	Debt-Financed	Equity-Financed	Debt-Financed	Equity-Financed	Debt-Financed	Equity-Financed	Debt-Financed	Equity-Financed
Own House	Tp + Tpf	Tp + Tpf	Subsidy with ceiling	No tax	Exempt	Exempt	Ts	Ts
House for Rental	Tp + Tpf	Tp + Tpf	Subsidy with no ceiling because of inflation	> Ty because of depreciation at historical cost	Exempt	Exempt	Ts	Ts
Business real estate	Tp + Taf	Tp + Taf	Subsidy with no ceiling because of inflation	> Ty because of depreciation at historical cost	Ty on nominal change in value	Ty on nominal change in value	Ts	Ts
Agricultural land	Tp + Taf	Tp + Taf	Subsidy with no ceiling because of inflation	> Ty because of depreciation at historical cost	Ty on nominal change in value	Ty on nominal change in value	Ts	Ts

Notes: Tp: Provincial Tax on on urban land and buildings. Tpl: Provincial tax on rural land. Ts. Provincial Stamp tax. Ty: Federal Income tax. Tpf: Federal tax on Personal Assets. Taf: Federal Tax on Business Assets
1/ The Tax on Business Assets is creditable with the tax on business income.
Source: Authors' estimates.

[40] See De Cesare and Lazo Marín (2008) for a review of property taxes in Latin America.
[41] In Argentina equity is taxed once and debt is virtually tax free because the returns of most forms of savings are not taxed at the saver's level. In fact, as there is inflation of 20-25 percent, debt-financed assets are de facto subsidized. See Atkinson and Stiglitz (1980) for a proof. Families can also deduct the interest paid on mortgages up to Arg$ 20,000 a year (about US$ 5,000).
[42] Sepúlveda and Martínez-Vázquez (2009) make a comparative analysis of the advantages of collecting a property tax at the sub-national or at the national level of government.

The generalized use of a progressive-rate structure suggests that the goals of tax policy include equity and fairness. However, by taxing only real estate assets and with different criteria by province, it is not evident that vertical and horizontal equity concerns are correctly addressed.

2.2.4 Taxes on Motor Vehicles

Many countries tax the purchase, registration and use of motor vehicles. A possible explanation for this combination of taxes is an attempt to mitigate the risk of climate change. In fact, European countries are moving towards differentiating tax rates according to carbon emissions[43] in order to encourage consumers to purchase more efficient vehicles.[44] For example, in Germany passengers cars registered after July 1, 2009 pay an annual tax of Euros 1.84 per every 25 cm3 of cylinder capacity, while gasoline-powered cars registered before that date pay a tax of Euros 6.75 to 25.36 per 100 cm3; those running on diesel pay about 100 percent more. Other European countries use a registration tax based on fuel consumption, cylinder capacity or estimates of CO2 emissions. Only five countries use the price as the base of the tax (Denmark, Finland, Malta, the Netherlands and Slovenia), but in four of them it is combined with one of the other criteria mentioned before. Taxes on ownership are usually based on cylinder capacity, CO2 emissions or vehicle weight, especially for commercial vehicles.

In Argentina, the tax on automobiles may reach almost 4 percent of purchase price in the richer provinces (see Table 8), plus a 1 percent for registration fee.[45] While some provinces charge a proportional tax on the value of the car, others have a progressive rate structure, and commercial vehicles are usually taxed at lower rates. In addition, many provinces exempt old cars for equity reasons even though that contradicts fuel efficiency and environmental objectives.

The taxation of vehicles in Argentina has several problems. Taxing according to the value of the car is difficult to justify from an environmental point of view. Price is unlikely to be

[43] For a summary of car taxation in the EU see ACEA (2010).

[44] Fullerton and West (2002) proved that a single tax on gasoline use combined with a single tax per unit of engine size and a single subsidy to pollution control equipment are a first best policy if consumers are homogeneous. When consumers have different tastes (e.g., about engine size or driven miles) one would need a different tax rate for each consumer (which is not possible). In a second-best framework they prove that under plausible assumptions the tax on gasoline should increase and the tax on engines should decrease if consumers preferences for "miles" (i.e., driving more) are positively correlated with their preference for engine size (i.e., larger engines), which is likely to be the case.

[45] Argentina has a centralized federal registry that serves all provinces. For new vehicle registration the owner pays a fee of 1 percent of the market value of the car plus lump-sum fees for issuing the vehicle's title. The value of cars is updated regularly and is similar to the market price. When an old car is sold, the registry charges another percent of the value of the car for the transfer of ownership.

correlated with CO2 emissions or fuel consumption, and while the size of the engine is likely to lead to a higher price, there are many other attributes that will be taxed by using the value of the car as the tax base. In fact, since a higher price is usually associated with improvements in the quality of the car (e.g., safety), the Argentine tax is ultimately a tax on quality.

For the same reasons as mentioned above in the discussion of real estate tax, using a tax on vehicles to improve income distribution is questionable. A tax on all taxpayers' assets (like the federal tax on personal assets) is surely better. Even worse, as the tax rates are different across provinces this creates another obstacle to horizontal equity.[46]

Lower taxation on commercial vehicles is difficult to justify for environmental or equity reasons. A rationale may be found, however, in avoiding additional efficiency costs since commercial vehicles are an input of production. This possibility notwithstanding, in the case of buses and trucks lower tax rates add to subsidized prices on urban transport, which are pervasive in most Argentine cities.

Table 8. Structure of Tax on Motor Vehicles in Selected Provinces (% of Market Values)

	Taxation of Passenger Cars			Taxation of Commercial Vehicles		
	Minimum Rate	Maximun Rate	Exemption for Old Cars	Taxis and Vans	Trucks	Buses
City of Buenos Aires 1/	3.52%	3.52%	Yes more than 12 years	2.53%	1.38%	1.27%
Province of Buenos Aires	3.00%	3.90%	Transferred to municipalities	3.00%	1.50%	1.50%
Cordoba	1.20%	1.50%	Yes, before 1998	1.20%	1.07%	1.07%
Mendoza	2.30%	2.90%	Pay minimum fee of US$ 12			
San Luis	2.50%	2.50%	Pay minimum fee according to weight	2.50%	1.25%	1.25%
Santa Fe	2.00%	2.00%	Pay minimum fee of US$ 3	0.50%	1.50%	0.50%
Tucuman	2.00%	2.00%		2.00%	1.00%	
La Pampa	2.00%	3.00%	Yes, before 1990	2.30%	1.25%	2.10%
Catamarca	2.00%	2.00%	Pay minimum fee of US$ 10	2.00%	1.50%	1.50%
Jujuy	1.00%	1.00%	Pay minimun fee of US$ 7	1.00%	1.00%	1.00%
Neuquén-San Martín de los Andes	3.50%	3.50%	Yes, more than 20 years	2.30%	1.60%	1.60%
Entre Ríos	1.80%	2.30%	Pay minimum fee of US$ 7	2.00%	1.50%	0.50%
Misiones	2.00%	2.00%	Older than 16 years pay a minimum fee of US$ 5		0.80%	0.80%

1/ Includes a surcharge of 10% for the expansion of the subway network.
2/ Market values are estimated by the National Register based on information provided by insurance companies and car manufacturers.
Source: Authors' calculations based on provincial tax codes.

[46] Some variation in rates may be accepted so that the sub-national governments have autonomy, but the differences that exist in Argentina on a mobile tax base like cars are relatively large.

2.2.5 Stamp Tax on Some Contracts

This is a cascade tax on some contracts that differs from one province to another. The City of Buenos Aires has reintroduced the tax, which it had abolished during the 1990s. In many provinces most revenues are obtained from real estate transactions and from financial and insurance contracts.

In 2009 the 24 provinces collected about 0.36 percent of the country's GDP in stamp taxes, but in some provinces the collections (expressed as a percentage of local GDP) were much higher. For example, collections totaled 1.03 percent in La Pampa, 0.9 percent in Tucuman and about 0.6 percent in Salta and Santa Cruz.

2.2.6 Other Revenues

Some provinces tax labor or sales of utilities, and the 12 provinces that did not transfer their pay-as-you go pension system collect labor taxes on public employees. All provinces and municipalities collect user fees, although it is not clear whether they are set on a cost-recovery basis. User fees are related to different services such as the use of public cemeteries, court fees, road levies, driver licenses, and traffic violations, among others.

Resource-rich provinces collect royalties from mining, electricity and the production of crude oil and natural gas.[47] Most revenues from royalties are obtained from the production of crude oil and natural gas. The rate used to be 12 percent of the value of production, but recently some provinces agreed on different rates in bilateral negotiations with private firms to extend the concessions. In mining, the royalty is usually 3 percent.

The collection of royalties should have minimum administration costs because it is relatively easy to monitor output while the incentives to underestimate prices at the source can be controlled by the provinces by looking at market prices. However, there have been some problems with the estimate of the price discount that lower-quality petroleum carries in the market. More recently, provinces have relied on private firms to audit the price and quantity declared by oil and natural gas companies.

[47] McLure (2003) argues that there are good economic reasons for oil revenues to be centralized: the tax base is volatile and usually concentrated in a few regions of the country, there might be a temptation to reduce other local taxes or to undertake unprofitable public investment, and the compensation of losses for dry holes is not easy at the local level. See also, Fedelino and Ter-Minassian (2009).

Most provinces share the revenues obtained from royalties with their local governments with some regional distribution objective by allocating a fraction of revenues even to the municipalities that have no production.

Provinces and municipalities where oil and natural gas production takes place include oil companies in their cascade sales taxes, and the base is usually the same used for the computation of royalties.

3. The Impact of the 2001-2002 Crisis on the Level and Composition of Provincial Revenues

Previous studies[48] have found that the provincial cascade sales tax is more pro-cyclical than federal transfers. It is important to validate this result because it suggests that the problem of procyclical revenues may have been aggravated in recent years due to the increase in collections of this tax. If this is the case, a reform of own-source revenues or proposals to reduce the vertical imbalance would need to i) include tax bases less sensitive to the economic cycle or ii) be tied with credible fiscal responsibility laws.

Own-source provincial revenues and their composition changed during the last decade, and it is necessary to understand the main rationales for these changes to make proposals of reform. Provincial revenues depend on: i) local variables such as the evolution of the provincial economic activity and its structure, the degree of informality, poverty and income distribution; ii) exogenous variables such as the prices of natural resources (oil and natural gas, electricity), or automatic federal transfers that are calculated using a formula introduced in 1988 and unchanged since then; iii) political economy variables that influence the distribution of discretionary transfers among provinces; and iv) local decisions such as changes in tax rates or the decision not to use the same effort to collect a tax.

In the case of the property tax, for example, in an inflationary context it is necessary to update the values (tax base) of the different properties to avoid a deterioration of revenues in real terms. This indexation of the tax base is automatic in other taxes, such as the cascade sales tax and the automobile tax. The adjustment might be costly (as in the "menu cost" literature) or it might be politically exhausting. For taxpayers, in general the property tax is more visible than the cascade sales tax; in addition, changes in the property value have tax externalities, since the

[48] See Sturzenegger and Werneck (2006).

valuation is the basis for the tax on wealth at the national level; and finally, there might be political economy issues in provinces where property tax is shared with the municipal governments (i.e., the provincial government has to pay the political cost of changing the property value, but it will not appropriate all the benefits). In this context, governors and provincial congress might have opted not to make these "visible" changes and rely more on federal transfers or on "less-visible" taxes such as the cascade sales tax that is automatically linked to inflation and economic activity.

Another factor that might have affected own-source revenue effort and sub-national tax structure is the growing importance of discretionary transfers and the increase (in real terms) in royalties and automatic transfers. On the one hand, the increase in transfers increases sub-national government tax revenue as a share of local GDP for some provinces, because it allows the province to consume more (i.e., the provincial GNI is above its GDP) ,increasing the tax base for several taxes (such as the cascade sales tax, automobile tax, and real estate tax). Possibly important as well are the nature (automatic or discretionary) of the transfer and whether it is interpreted as temporary or permanent.

On the other hand, transfers might distort local governments' incentives to collect their own taxes, thus reducing their tax effort, particularly in areas that are more visible to taxpayers. This can be interpreted as a variant of the flypaper effect,[49] but one that occurs on the revenue side.

As regards the expenditure of sub-national governments, there is a vast literature analyzing the flypaper effect. This effect results when a dollar of exogenous grants-in-aid leads to significantly greater public spending than an equivalent dollar of citizen income (i.e. money sticks where it hits), Inman (2008). There has been a discussion in the literature whether this anomaly is due to econometric problems. The main concern is the misclassification of grants as exogenous aid (endogeneity of grants), that may produce biased estimators. The empirical literature on the flypaper effect is large, and in general when endogeneity issues are controlled for, the result holds, suggesting that the flypaper effect appears to be a real phenomenon.[50] The natural explanation of this effect is political economy or the recognition that own-source

[49] Baldrich (2010) provides some evidence that this is the case in Argentina.

[50] For example,Dahlberg et al. (2006) use a discontinuous element in one grant in Sweden to address the endogeneity problem and find evidence that there is a flypaper effect on the expenditure side but not on sub-national

revenues create distortions and federal transfers do not (at least from the recipient government's point of view, Végh and Vuletin, 2010).[51] Some authors argue that the effect could be a result of voters' asymmetric information or fiscal illusion (see for instance Courant, Gramlich and Rubinfeld, 1979; Oates, 1999; Filimon, Romer and Rosenthal, 1982; and Hines and Thaler, 1995). Inman (2008) suggests that rather than an anomaly, the flypaper effect is best seen as an outcome of political institutions and the associated incentives of elected officials. Following the analysis of Végh and Vuletin (2010) as it is logical for sub-national governments to spend more from grants than from additional distortionary own-source revenues, it is also logical that some provinces may opt to use the transfers to finance a reduction of their own taxes to reduce distortions or political costs.[52]

Summing up, revenues and their composition may be affected by the size of federal transfers, by asymmetric responses to external shocks and political factors,[53] or by the need to reduce deficits.

The econometric analysis has to deal with the problem of endogeneity of intergovernmental transfers. There is no such problem with automatic transfers in Argentina because they are calculated using formulas that have no relationship with any economic variable and are applied to revenues collected by the federal government from VAT, income taxes, excises and other taxes whose evolution has little to do with any provincial decision.[54] But there

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taxation. Acosta (2010) finds evidence of a flypaper effect in municipalities of the province of Buenos Aires, but the effect is lower when he takes into consideration the impact on the neighbor's decision.

[51] With data from Argentine provinces and Brazilian and US states, Végh and Vuletin (2010) provide some empirical evidence that there is no puzzle when one considers that raising local taxes is socially costly. It makes sense to spend more from intergovernmental transfers that have no efficiency cost than from local taxes. Their empirical evidence suggests that the flypaper effect is larger when local tax rates are higher.

[52] Second Generation Fiscal Federalism stresses the importance of the incentives faced by local policymakers. See Weingast (2006).

[53] Rattsö and Tovmö (2002) find evidence for Denmark that local governments have asymmetric responses to shocks by raising personal income tax rates when there are negative shocks (but they find no similar effect on property tax rates). They also find some evidence that socialist local governments rely more on property taxes than center-right local governments. Higher vertical imbalances may also provide more incentives to engage in corruption, and the composition of own-source revenues also matters. For example, Schleifer and Vishny (1998) conclude that local governments in Poland are more supportive of business and growth than in Russia because they rely more on revenues from property taxes, local taxes and fees more related to the growth rate of the region, and this provides incentives for local policymakers to foster growth instead of rent-seeking.

[54] Artana et al. (2010) provide some evidence that the improvement in the terms of trade and the increase of the Brazilian economy in US$ accounted for 50 to 75 percent of growth experienced in Argentina from 2003 to 2008. External factors had a key role in the growth performance of the country during this period.

is a problem with discretionary transfers[55] that might depend on the bargaining power of different levels of government.

Provincial characteristics differ in Argentina, and this may affect their potential tax bases. For example, more developed provinces or high-growth provinces should be able to collect more revenue from taxes on property as well as from the cascade sales tax; more transparency should reduce evasion in local taxes;[56] provinces differ in their economic structure with sectors that are more difficult to tax than others; income distribution and informality also differ across regions, etcetera. It is interesting to estimate whether each province is using most of its potential to collect its taxes.[57]

3.1. Estimates of Revenue Elasticity

Sturzenegger and Werneck (2006) argue that the elasticities of sub-national tax revenues to provincial GDP are very high in Argentina, higher than those of central government transfers. If this were the case, decentralization of tax revenues might increase revenue volatility. In particular, they find that sub-national revenues are strongly procyclical, where the tax component is uniformly more procyclical than the resources obtained from national sources (transfers). Among taxes, *ingresos brutos* display the highest degree of procyclicality, while property taxes, as expected, have very little relation with the business cycle. Their estimations are based on a provincial panel for the period 1992-2002.

Following a similar approach to Sturzenegger and Werner (2006), we estimate Income Elasticities of Revenues as:

$$(1) \qquad \log(y_{it}) = \beta_0 + \beta_1 \log(GDP_{it}) + u_i + \varepsilon_{it} \qquad \text{i=1…N} \quad \text{t=1…T}$$

where *y* are different measures of provincial revenues, *GDP* is provincial GDP (both measured in real terms) and *u* is a (provincial-level) fixed effect. The fixed effect captures average differences between provinces. We are interested in the size of β_1, which we call revenue elasticities. These

[55] Discretionary transfers are not new in Argentina's federalism. Nicolini et al (2002) found evidence that the ATN (Aportes del Tesoro Nacional) acted as an insurance to shocks during the period 1983-1997.

[56] Govinda Rao (2006) argues that many poor countries lack clear property rights and this reduces the potential revenues of the "prime candidate" for sub-national taxation. It is possible that delays in the distribution of property titles have affected the collection of property taxes in some Argentine provinces.

[57] For a discussion of what explain the cross country variation in revenues see Artana and Templado (2010). Gordon and Li (2009) and Keen and Simone (2004) provide some theoretical insights of why revenues and their composition differ across countries. Kenney and Winner (2006) provide an insight from a political economy point of view.

are not exactly income elasticities, because revenues are affected by multiple changes in tax rates and tax bases. Controlling for those changes is complex because there have been so many in the 20-year period we analyze, and some are difficult to identify empirically, such as administrative changes that affect revenues.

Table 9 shows the results for the period 1993-2009. The first regression in column (1) considers Total Provincial Revenues as the dependent variable and includes sub-national taxes, transfers from Central Government and non-tax revenues (the most important of them being royalties) as explanatory variables. The second column removes royalties from the explanation, showing that the procyclical behavior of revenues is not related to this component. Column (3) takes into account only sub-national tax revenues, and column (4) only Central Government transfers, showing that both dependent variables have similar elasticities (own-tax revenues have a slightly higher elasticity, but it is not significantly different from the elasticity for transfers). Column (5) and (6) break own-tax revenue of provinces into the cascade sales tax (5) and other taxes (6), showing that pro-cyclicality comes from the cascade sales tax.

Table 9. Income Elasticities of Provincial Revenues
(Provincial) Fixed Effect Estimation

	(1)	(2)	(3)	(4)	(5)	(6)
	Provincial Total Revenues	Provincial Own Tax Revenue+ Transfers	Provincial Own Tax Revenues	Total Transfers	Cascade sales Tax Revenue	Other (than Cascade sales) Provincial Tax Revenue
Log(GDP)	1.387***	1.334***	1.405***	1.373***	1.738***	0.768***
	(34.89)	(31.16)	(27.53)	(27.86)	(31.05)	(8.32)
Constant	-4.922***	-4.553***	-6.861***	-5.207***	-10.09***	-2.676***
	(-14.64)	(-12.57)	(-15.90)	(-12.49)	(-21.32)	(-3.43)
Observations	408	408	408	408	408	408
R-squared	0.761	0.717	0.664	0.67	0.716	0.153
F	1217.2	970.8	758	776.1	964.4	69.29

Notes:
t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 10 computes GDP elasticities for each of the main components of local tax revenues and for central government transfers. As in Sturzenegger and Werneck (2006) we find a very low elasticity for property tax and a high elasticity for cascade sale tax. Unlike Sturzenegger and Werneck, we open the elasticity for Central Government transfers in the two main components, finding a coefficient close to 1 for automatic transfers and a very high elasticity for discretionary transfers.

Elasticities might have changed in the 2000s compared to the 1990s. Simple scatter diagrams show clear differences only for Property Tax and Discretionary Transfers. To test whether the differences are statistically significant we estimate the same fixed effect model but including slope and constant dummies to distinguish the 1990s from the 2000s (dummy taking 1 for the Convertibility period of 1993-2001). The coefficient for slope dummy can be interpreted as the increment (or decrease if negative) in the elasticity value for the 1990s compared to the 2000s. Table 11 presents the results for these elasticities. The results are consistent with the scatter diagrams: overall provincial revenue elasticity (including or excluding royalties) has not changed significantly. The income elasticity of Central Government Transfers has increased and the elasticity of Provincial Own-tax Revenue has decreased in the 2000s compared to the 1990s, reversing the result found by Sturzenegger and Werneck: in the 2000s transfer elasticities have become more elastic than own-tax revenue. The decline in the elasticity of Provincial Tax Revenues is explained by the property and stamp taxes, since for the cascade sales tax there is not a significant change in elasticity. For central government transfers, the increase is significant for both automatic and discretionary transfers, although the greatest change is clearly in discretionary transfers.[58]

[58] The constant dummy we include in each regression captures the average change in the tax burden in the 1990s compared to the 2000s. The main changes are in discretionary transfers and property tax revenues

Table 10. Income Elasticities of Provincial Taxes
(Provincial) Fixed Effect Estimation

	(1)	(2)	(3)	(4)	(5)
	Sub-national Main Taxes			Transfers	
	Stamp Tax	Property Tax	Cascade sales Tax	Discretionary	Automatic
Log(GDP)	0.805***	0.199***	1.738***	3.057***	1.205***
	(6.47)	(2.76)	(31.05)	(16.46)	(27.34)
Constant	-4.053***	1.414**	-10.09***	-21.82***	-3.930***
	(-3.87)	(-2.27)	(-21.32)	(-13.89)	(-10.54)
Observations	379	306	408	408	408
R-squared	0.106	0.026	0.716	0.414	0.661
F	41.91	7.633	964.4	270.9	747.5

Notes:
t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Finally, if we include in the analysis a dummy for the year 2002, which was the year of the structural break (exit from Convertibility and major economic crisis) all the estimated elasticities are lower and the 2002 dummy is significant in all regressions, indicating that revenues decreased more than usual in that year. For example, for total transfers elasticity is reduced from 1.382 to 1.151 and for the cascade sales tax, from 1.53 to 1.249.[59]

Summing up, the empirical evidence suggests that the cascade sales tax is pro-cyclical, but elasticity using the entire period, or the 1992-2002 period used by Sturzenegger and Werneck, is biased upward due to the structural break. Controlling for the break tends to reduce estimated elasticity. Also important is the fact that sub-national tax revenues are not more pro-cyclical than central government transfers (they were in the 1990s, although the differences were not statistically significant, and the situation is reversed in the 2000s).

[59] Results are available from the authors.

Table 11.A. Income Elasticities of Provincial Revenues: 1990s vs. 2000s (Provincial) Fixed Effect Estimation

	Provincial Total Revenues	Provincial Own Tax Revenue+ Transfers	Provincial Own Tax Revenues	Total Transfers	Cascade sales Tax Revenue	Other (than Cascade sales) Provincial Tax Revenue
Entire Period	1.387	1.334	1.405	1.373	1.738	0.768
2000s	1.274	1.312	1.297	1.382	1.530	0.822
1990s	1.263	1.291	1.338	1.292	1.532	0.932
Significance of the difference			**	***		***

Table 11.B. Income Elasticities of Provincial Taxes: 1990s vs. 2000s (Provincial) Fixed Effect Estimation

	Sub-national Taxes			Transfers	
	Stamp Tax	Property Tax	Cascade sales Tax	Discretionary	Automatic
Entire Period	0.805	0.199	1.738	3.057	1.205
2000s	1.251	0.390	1.530	2.530	1.280
1990s	1.361	0.454	1.532	2.069	1.227
	**	***		***	***

Notes: * p<0.10, ** p<0.05, *** p<0.01. Different elasticities for the subperiods are obtained though slope dummies.

3.2 The Impact of Federal Transfers on Provincial Taxes

In this section we explore the determinants of the tax structure, and in particular we are interested in the role of federal government transfers. The stylized fact we want to explain is the change in provincial-level tax structure observed in the 2000s: cascade taxes gained weight and other taxes (particularly property taxes) lost weight at the same time that central government transfers became more discretionary. Two hypotheses are consistent with this structural change are: i) sub-national governments reduced tax pressure on more visible taxes (property tax) and/or ii) inflation (nonexistent in the 1990s) has favored taxes that are automatically indexed to inflation. Critical to the argument is the role of central government transfers; if they affect the local government own-source revenue effort, there is a sort of flypaper effect. If transfers distort local incentives, we should observe that provinces with larger increase in transfers distort their behavior the most.

The econometric model is:

$$(2) \qquad y_{it} = x_{it}\beta_k + \delta t_{it} + u_i + \varepsilon_{it} \qquad \text{i=1…N} \quad \text{t=1…T}$$

where y_{it} is either a measure of sub-national government effort (tax pressure) or a measure of tax structure, x_{it} is a vector of provincial characteristics, t_{it} are central government transfers and u_i are provincial specific effect (uncorrelated with ε_{it} but possibly correlated with x_{it} or t_{it}). Central government transfers in Argentina comprise two elements: automatic transfers, which are exogenous (determined by rules not linked to the cycle), and discretionary transfers, which are endogenous. Endogeneity contaminates the estimation of the parameters in the fixed effect OLS estimation. An alternative is to use Instrumental Variables which requires valid instruments.[60] We propose two instruments, related with political economy issues: i) Deputies' overrepresentation and ii) Senators' overrepresentation (defined according to the ratio of the number of national deputies/senators to the provincial population).[61,62]

First we analyze the tax structure, where our dependent variable is the share of the turnover tax (CT) and the share of property taxes (PT) on sub-national tax revenues. The CT is the most important tax for most of the provinces, representing on average 67 percent of own-source taxes; PT, on the other hand, represents on average just 10 percent of tax collection. The remainder consists of the stamp tax, automobile tax and other minor taxes.

Table 12 presents the results for the estimation of equation (2) by fixed effect. There is clearly a pattern: the fall in property tax share is associated with an increase in central government transfers (as a share of local GDP) and an increase in the inflation rate. Royalties do not have a significant effect on tax structure. It is interesting to note that discretionary and

[60] The two conditions for a valid instrument *z* are: i) it has to be correlated with the endogenous variable, and ii) it has to be a valid exclusion in the original equation (i.e., not directly affecting the variable *y*). A special concern when using instrumental variables is the presence of weak instruments (low partial correlation of *z* with *x*); therefore, as suggested in the literature, we will pay special attention to the first stage, and check robustness with alternative methods to the IV estimators (such as Limited Information Maximum Likelihood—LIML—estimators, which are more robust to weak instruments).

[61] We explored a third instrument: Color of Party, defined as the coincidence or not of the provincial government party with the national government (classification based on the opinion of political experts consulted), but it fails as an instrument.

[62] Our two instruments do have variation in time, although most of the explanatory power comes from the cross-section variation. The province with the largest increase in overrepresentation shows a change of 21 percent between 2009 and 1993, whereas the highest decrease is -27.7 percent. The two instruments explain between 20 and 35 percent of the cross-section variation between provinces in discretionary transfers (OLS regression year by year). In a fixed effect model for the entire period, the overall R2 is 0.27, with 0.43 for the R2 between variation and 0.12 for the R2 within variation.

automatic transfers tend to have the same sign. Table 13 reports the Instrumental Variable (IV) Fixed Effect Model estimations with similar qualitative results (although some parameters become not significant).

Table 12. Tax Structure, Fixed Effect Estimation

	(1)	(2)	(3)	(4)	(5)	(6)
	PT Share	CT Share	PT Share	CT Share	PT Share	CT Share
log(DT/GDP)	-0.0163***	0.0404***	-0.00916***	0.0228***	-0.00587***	0.0127***
	(-8.36)	(9.16)	(-4.56)	(5.12)	(-2.88)	(2.87)
log(AT/GDP)	-0.0369***	0.0133	-0.0270***	-0.0109	-0.0253***	-0.00951
	(-3.99)	-0.64	(-3.14)	(-0.57)	(-3.02)	(-0.52)
log(Roy/GDP)	-0.00707***	0.0130**	-0.0000421	-0.00423	0.0000593	-0.00508
	(-2.87)	(2.34)	(-0.02)	(-0.78)	(0.03)	(-1.01)
Log(GDP)			-0.0709***	0.173***	-0.0341***	0.0763***
			(-8.19)	(9.03)	(-3.37)	(3.47)
Provincial Inflation Rate					-0.0160***	0.0339***
					(-5.22)	(5.07)
Dum90s					0.00048	-0.0166*
					(0.12)	(-1.87)
Constant	-0.0981***	0.965***	0.601***	-0.747***	0.334***	-0.0168
	(-3.71)	(16.18)	(6.77)	(-3.79)	(3.50)	(-0.08)
Observations	408	408	408	408	408	408
R-squared	0.262	0.226	0.373	0.362	0.434	0.448
F	45.12	37.01	56.46	54	48.34	51.12

Notes:
t statistics in parentheses, * p<0.10, ** p<0.05, *** p<0.01
log(DT/GDP)= log of Discretionary Transfers as a ratio of provincial GDP
log(AT/GDP)= log of Automatic Transfers as a ratio of provincial GDP
log(Roy/GDP)= log of Royalties as a ratio of provincial GDP
Dum90s= 1 for 1993 to 2001

The results lead to the following conclusions:

- Economic activity and inflation increase the share of the cascade tax in own-source tax revenue but reduce the share of the property tax, as expected given that the tax base of the cascade tax is associated with the size of nominal GDP, while property taxation needs costly (and visible to the taxpayer) adjustments in the valuation of properties only to maintain its purchasing power in real terms.

- Discretionary transfers increase the share of the cascade tax and reduce the share of the property tax, while automatic transfers have no statistical significant effect on the share of the cascade tax but reduce the share of the property tax in some specifications of the model (column (1) in Table 13 and columns (1), (3) and (5) in Table 12). This evidence is consistent with the hypothesis that the "windfall" of discretionary transfers is partially used to reduce the share of the most visible property tax.[63] On the other hand, automatic transfers do not affect the tax structure, consistent with the idea that, because they are anticipated, they are incorporated into the budget process of each province.
- The dummy that takes a value of 1 in the 1990s and 0 otherwise is significant only for the cascade tax in Table 12 but with the expected sign in all specifications: there was an upward drift in the collections of this tax after the economic crisis. In the instrumental variable specification the dummy is not significant in all cases.
- The collection of royalties has an effect in the same direction as automatic transfers in columns (1) and (2) of Table 12, but once provincial GDP is included as a regressor royalties become non-significant.

The tax structure does not necessarily reflect the tax effort. To measure the tax burden we use collection of the cascade sales tax and property taxes as shares of provincial GDPs (both measured in logs, in order to have elasticities as our parameters of interest). The Hausmann endogeneity test (using Deputies and Senators overrepresentation as instruments) indicates that Discretionary Transfers are endogenous, therefore we report only the results for the instrumental variable estimators.[64]

[63] However, the estimated coefficients suggest a moderate to low effect. To see this, consider for instance the unweighted average discretionary transfers for the entire sample (2.36 percent of GDP) and the average share of cascade tax (67 percent of total own source revenues). An estimated coefficient 0.028 implies that an increase in one percentage point of GDP in discretionary transfers (i.e., increasing transfers from 2.36 percent to 3.36 percent) implies a one-percentage point increase in the share of the cascade tax, that is, an increase in the share of CT from 67 to 68 percent.

[64] Deputies and Senators overrepresentation variables explain overall 27 percent of the variation in the ratio of discretionary transfers to GDP, and they pass the Cragg-Donald test of weak instruments. Also according to the Kleibergen-Paap rk LM statistic the null hypothesis of under-identification is rejected at the 1 percent significance level.

Table 13. Tax Structure, Instrumental Variable (IV) Fixed Effect Estimation

	(1)	(2)	(3)	(4)
	PT Share	CT Share	PT Share	CT Share
log(DT/GDP)	-0.0155***	0.0197	-0.0171***	0.0283**
	(-2.72)	(1.58)	(-3.09)	(2.41)
log(AT/GDP)	-0.0201*	-0.00753	-0.0127	-0.0269
	(-1.92)	(-0.33)	(-1.23)	(-1.22)
log(Roy/GDP)	-0.000363	-0.00439	-0.000666	-0.00407
	(-0.15)	(-0.81)	(-0.28)	(-0.79)
Log(GDP)	-0.0589***	0.179***	-0.0247**	0.0633***
	(-4.42)	(6.15)	(-2.20)	(2.65)
Provincial Inflation Rate			-0.0148***	0.0322***
			(-4.62)	(4.71)
dum90s			-0.00488	-0.00914
			(-1.00)	(-0.89)
Observations	408	408	408	408
F	32.77	30.08	23.99	35.96

Notes:
t statistics for robust standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01
log(DT/GDP)= log of Discretionary Transfers as a ratio of provincial GDP
log(AT/GDP)= log of Automatic Transfers as a ratio of provincial GDP
log(Roy/GDP)= log of Royalties as a ratio of provincial GDP
Dum90s= 1 for 1993 to 2001

Table 14 shows the main results.[65] Real GDP and inflation rate at the provincial level affect tax effort in the same direction as tax structure: they reduce the tax pressure of property taxes but increase the tax pressure of cascade taxes. The dummy variable comparing the 1990s and 2000s shows that tax pressure (at the same level of transfers, GDP and inflation) was smaller in the 1990s than in the 2000s. Finally, in terms of Central Government transfers we find an asymmetric response: discretionary transfers tend to reduce the tax pressure on both property and cascade taxes (the effect is larger for the property tax, consistent with the previous finding of a reduction in its share of local tax revenue), whereas automatic transfers increase both.[66] This

[65] Since some provinces have delegated the property tax to municipalities, our property tax revenue figure might be measured with errors for these cases. To control for this, we run the models also excluding these provinces (Chubut, Formosa, Salta, Santa Cruz, Tierra del Fuego). The sign and magnitude of the estimated coefficient do not change, but the model using PT as dependent variable fits much better, suggesting measurement errors are not contaminating our estimates but increasing standard errors (results are available from the authors).

[66] The negative effect of discretionary transfers is positive if we do not control for endogeneity (just fixed effect estimations). Since:

$$plim\hat{\beta}_{OLS} = \beta + \frac{cov(x,e)}{var(x)}$$

apparent contradictory effect needs to be explained in more detail. Discretionary transfers seem to work as a free lunch, reducing the effort. On the other hand, the finding that automatic transfers do not affect tax structure but increase tax pressure might be related to the fact that most provinces receive more in automatic transfers than what they contribute to the revenue pool.[67] This regional redistribution of income helps to improve the standard of living (at least for some parts of the population) and to increase consumption, favoring the collection of property taxes and the cascade sales tax.

Table 14. Tax Structure, IV Fixed Effect Estimation

	(1) PT /PBI	(2) CT /PBI	(3) PT /PBI	(4) CT /PBI	(5) PT /PBI	(6) CT /PBI
log(DT/GDP)	-0.173	-0.177**	-0.231*	-0.154***	-0.239**	-0.149***
	(-1.25)	(-2.52)	(-1.94)	(-3.20)	(-2.05)	(-3.75)
log(AT/GDP)	0.592**	1.060***	0.920***	0.738***	1.039***	0.674***
	(2.06)	(7.25)	(4.21)	(8.36)	(4.77)	(9.07)
log(Roy/GDP)	-0.0435	0.102***	0.0526	-0.00828	0.0432	-0.0092
	(-0.81)	(3.75)	(1.02)	(-0.40)	(0.85)	(-0.53)
Log(GDP)			-0.742***	0.911***	-0.509**	0.273***
			(-2.67)	(8.13)	(-2.14)	(3.37)
Provincial Inflation Rate					-0.244***	0.196***
					(-3.59)	(8.50)
Dum90s					-0.258**	-0.0695**
					(-2.52)	(-1.99)
Observations	408	408	408	408	408	408
F	2.553	29.05	15.29	57.12	13.31	70.75
Anderson canon. corr. LM statistic	29.828	29.828	48.438	48.438	55.235	55.235
Cragg-Donald Wald F statistic	16	16	19.9	19.9	31.67	31.67
F	2.553	29.05	15.29	57.12	13.31	70.75

Notes:
t statistics in parentheses, * p<0.10, ** p<0.05, *** p<0.01
log(DT/GDP)= log of Discretionary Transfers as a ratio of provincial GDP
log(AT/GDP)= log of Automatic Transfers as a ratio of provincial GDP
log(Roy/GDP)= log of Royalties as a ratio of provincial GDP
Dum90s= 1 for 1993 to 2001

the results suggest that *cov(x,e)* is positive what implies discretionary transfers work in practice more like conditional than compensatory transfers in Argentina (unobserved effort in tax collection is compensated with additional transfers). Using instruments for automatic transfers (falsification of the endogeneity assumption) does not change the results of the estimated coefficient for this variable, which suggests the instruments are working well.

[67] Excluding the City of Buenos Aires, which requires a deeper analysis because the federal government pays part of the local services, 17 out of 23 provinces have a lower share on the country's GDP than their share in automatic federal transfers. If an estimate of the wage bill is used, the figure rises to 21 out of 23 provinces. Only the province of Buenos Aires (to a large extent) and Chubut are net payers to the rest of the provinces. If we exclude these two provinces from our regressions the elasticity of automatic transfers increases, suggesting part of the explanation is due to this effect.

3.3 The Effect of Federal Transfers on Provincial Expenditures

In this section we analyze the other side of the same coin: expenditures. We used the same specification but using as dependent variable the log of provincial total expenditure and log of provincial capital expenditures (both as a share of provincial GDP). Table 15 shows the results without controlling for endogeneity, where both types of transfers and the royalties have positive elasticities. Table 16 controls for endogeneity of the discretionary transfers, showing how the coefficient changes (i.e., they were formerly contaminated by endogeneity). In particular, the positive effect on total expenditures turns negative now, although it is close to zero (with elasticity of -0.07), whereas the elasticity of automatic transfers is still positive and high at 0.73. This shows that discretionary transfers are not used to increase total expenditures, but as shown above they decrease own-source revenue effort. For capital expenditures we find a positive result, suggesting that a shared of discretionary transfers is used for capital expenditures, but not for current expenditures.

The results suggest provinces react differently to central government transfers, depending on the nature of the transfer. Automatic transfers are consumed and, at the same time, they increase the tax bases of some provincial taxes, making possible higher revenues. This reaction is consistent with a permanent income shock. Discretionary transfers, however, are seen as temporary income.[68] Provinces use part of them to increase capital expenditures and another part to reduce own taxes. This reduction may be reversed later if the political game (or shortages of funds) force a reduction for the discretionary amounts received from the Federal government. This is a particular type of flypaper effect.

These empirical findings have important implications for proposals to improve sub-national revenue mobilization. It is advisable for provinces to reduce their reliance on discretionary transfers, and even better to replace them with allocations from other tax bases. If discretionary transfers are converted into automatic transfers they are likely to increase government expenditures with no reduction in the vertical imbalance.

[68] Unlike consumers, provinces have no incentive to save temporary income (discretional transfers) because this may trigger retaliation by the federal government, reducing the amounts transferred in the future. Saving in a provincial fund has no immediate political benefits, while the inauguration of infrastructure programs may be appealing to politicians at all levels of government. At the same time, provinces may try to finance current expenditures with more permanent sources of revenues to avoid greater dependency on the federal government in the future.

Table 15. Sub-National Expenditure, Fixed Effect Estimation
(Dependent variable: log expenditure on GDP)

	(1) Capital Exp.	(2) Total Exp.	(3) Capital Exp.	(4) Total Exp.	(5) Capital Exp.	(6) Total Exp.
log(DT/GDP)	0.107***	0.0346***	0.04	0.0345***	0.0721**	0.0427***
	(3.68)	(4.00)	(1.22)	(3.59)	(2.21)	(4.62)
log(AT/GDP)	1.346***	0.665***	1.251***	0.665***	1.147***	0.601***
	(9.82)	(16.29)	(9.33)	(16.10)	(8.57)	(15.81)
log(Roy/GDP)	0.0628*	0.01	(0.00)	0.01	0.01	0.02
	(1.72)	(1.04)	(-0.11)	(0.97)	(0.17)	(1.60)
Log(GDP)			0.676***	0.00	0.768***	(0.07)
			(5.02)	(0.02)	(4.75)	(-1.50)
Provincial Inflation Rate					0.113**	0.116***
					(2.29)	(8.30)
Dum90s					0.277***	0.153***
					(4.25)	(8.29)
Constant	0.41	7.028***	-6.259***	7.020***	-7.369***	7.278***
	(1.05)	(60.11)	(-4.53)	(16.49)	(-4.82)	(16.78)
Observations	408	408	408	408	408	408
R-squared	0.291	0.496	0.335	0.496	0.365	0.592
F	52.04	125.2	47.8	93.66	36.22	91.22

Table 16. Sub-national Expenditure: IV Fixed Effect Estimation
Dependent variable: log expenditure on GDP

	(1) Capital Exp.	(2) Total Exp.	(3) Capital Exp.	(4) Total Exp.	(5) Capital Exp.	(6) Total Exp.
log(DT/GDP)	(0.06)	-0.0663*	0.10	-0.0658**	0.144*	-0.0706**
	(-0.56)	(-1.84)	(1.09)	(-2.15)	(1.68)	(-2.47)
log(AT/GDP)	1.627***	0.835***	1.189***	0.775***	1.067***	0.727***
	(7.23)	(11.13)	(7.36)	(13.81)	(6.66)	(13.61)
log(Roy/GDP)	0.0911**	0.0284**	(0.00)	0.01	0.01	0.01
	(2.18)	(2.04)	(-0.04)	(0.47)	(0.29)	(0.77)
Log(GDP)			0.568***	0.190***	0.708***	0.03
			(2.77)	(2.66)	(4.06)	(0.44)
Provincial Inflation Rate					0.105**	0.128***
					(2.11)	(7.70)
Dum90s					0.311***	0.0995***
					(4.13)	(3.97)
Observations	408.00	408.00	408.00	408.00	408.00	408.00
R-squared	0.23	0.32	0.33	0.35	0.36	0.43
F	43.8	89.4	47.3	71.47	35.42	63.76

3.4 Are Provinces Exploiting Their Tax Bases?

It is interesting to analyze whether provinces are adequately exploiting their tax bases. There are different alternatives to do the analysis. One option is to use Stochastic Frontier Analysis (SFA). This technique was used for production functions and more recently it was adapted to revenue effort.[69] This is akin to our Data Envelope Analysis for provincial tax authorities (see Appendix 1), a process that is advisable when there are many "inputs" that influence the "output" and it is not clear which "production function" that links them. In this analysis, each province would be compared to the "efficient frontier."

Another option is a Regression-Based model where each province is compared with the average provincial tax effort. Both techniques, however, are imperfect in that a departure from the frontier or the average may simply represent a provincial decision to have a lower tax burden or the consequence of inefficiencies in collecting taxes. But given the information that we have and the purpose of the analysis we prefer a Regression-Based model for the following reasons:

- The SFA estimates the parameter of inefficiency from the errors in the equation. In our case there are heteroskedasticity, spatial correlation and autocorrelation that are better addressed with a Regression-Based model. The use of panel-corrected standard error corrects the variance-covariance estimation in order to account for these assumptions' failure. Such correction (especially for the spatial correlation) has not yet been developed in the context of the SFA.
- The SFA was originally designed for production functions where it is easier to include all inputs that affect production. When used to analyze the performance of tax revenues it is likely that many "inputs" will be missing for lack of information. More specifically, "inputs" related to tax administration are crucial in an SFA analysis because the main purpose of the exercise is to detect deviations from an efficient performance. In a regression-based analysis there is no attempt to separate a decision to collect lower taxes based on

[69] Pessino and Fenochietto (2010) use this technique at the national level.

society's preference for smaller government from lower collection due to poor tax administration.[70]

- In the case of fixed-effect panels, SFA is subject to the "incidental parameter problem" that affects the consistency property of the parameter estimations.[71] Some exercises to address this problem have been developed in recent years.[72] Moreover, the application of this recommended transformation does not protect the estimations from the particular error structure that we have in the data.

We use as dependent variable each province's total tax revenues per capita. As explanatory variables we use: local GDP per capita, deposits as percentage of local GDP, years of education of the population over 16 years, poverty index, the share of agro-industrial activities in GDP, royalties, mining (as a share of local GDP) and automatic transfers from the central government to each province.[73]

Table 17 shows the results for different alternatives. As expected, income, automatic transfers, deposits, and years of education (except the last years, where the sign is reversed and significance is lost) all have positive coefficients. Royalties are negative but statistically insignificant. Poverty has the expected negative sign and is significant. The agro-industrial and mining shares both show negative relations with tax collection, although mining shows a stronger relation. Two dummy variables were tried: one that captures the pre and post-Convertibility periods,[74] and another for the year 2002 to capture the impact of the economic crisis.

The results of equation (5), excluding the variables that are non-significant at 10 percent, are used to estimate revenue bands for each province and for each year. As of 2009 Catamarca,

[70] Esteller-Moré (2003) provides an example of the amount of information that is necessary to include, especially with regards to tax administration, which is not available for a panel of Argentine provinces.

[71] As Wang and Ho (2010) comment on the "true fixed-effect" model for SFA proposed by Greene: *"For a fixed-effect model, the number of fixed-effect parameters (also called incidental parameters since their values are usually not of direct interest) increases with the number of individuals (N). In this situation, the conventional asymptotic result, which relies on $N \to \infty$, cannot be applied and estimates of the incidental parameters are necessarily inconsistent for a fixed T (number of observations per individual). For many estimators, inconsistency may also contaminate the estimates of the model's other parameters; the issue is referred to as the incidental parameters problem…. For instance, for linear models with normal errors, the maximum likelihood estimator (MLE) of the slope coefficients is still consistent, but that of the variance-covariance matrix is inconsistent…"*

[72] See Wang and Ho (2010) and Chen, Schmidt and Wang (2011).

[73] The justification for including automatic transfers is that they increase the most provincial tax bases.

[74] This dummy is 0 from 1993-2001 and 1 from 2002 to 2009.

Formosa and Tucuman were collecting more than projected according to their characteristics; Chubut, San Luis and Santa Cruz were converging to the forecasting interval after some years of "excess" revenues. Entre Rios and Santa Fe were collecting less than projected, and Cordoba was converging after some years of "low" revenues. The difference is relatively high for Entre Rios and Santa Fe, with a shortage of about 15.[75]

Table17. Determinants of Local Revenues, Using Panel-Corrected Standard Errors[76]

Dependant variable: Total Provincial tax revenues per capita					
	Eq. 1	Eq. 2	Eq. 3	Eq. 4	Eq. 5
log(Prov. GDP in real terms pc)	0.750***	0.588***	0.591***	0.585***	0.912***
	(0.074)	(0.0733)	(0.0751)	(0.0776)	(0.115)
Log(Automatic transfers / Prov.GDP)	0.328***	0.237***	0.235***	0.232***	0.179***
	(0.0561)	(0.0574)	(0.0573)	(0.0576)	(0.06)
Log (Deposits/ Prov. GDP)	0.110***	0.0563***	0.0574***	0.0549***	0.0458**
	(0.0226)	(0.0207)	(0.0209)	(0.0209)	(0.0201)
Log (years of education)	0.482**	0.00947	0.0135	0.0347	-0.112
	(0.236)	(0.261)	(0.262)	(0.266)	(0.264)
Poberty	-0.949***	-1.188***	-1.188***	-1.189***	-0.911***
	(0.137)	(0.158)	(0.159)	(0.16)	(0.167)
Log(Royaties / Prov. GDP)			-0.00344	-0.00253	
			(0.0106)	(0.0108)	
Agroindustrial (Share of Prov. GDP)				-0.0328	-0.762*
				(0.33)	(0.393)
Mining (Share of Prov. GDP)					-1.121***
					(0.3)
d2002		-0.151***	-0.150***	-0.153***	-0.153***
		(0.0293)	(0.0293)	(0.0297)	(0.0287)
Convertibilty Dummy		0.162***	0.162***	0.164***	0.146***
		(0.0276)	(0.0276)	(0.0279)	(0.0274)
Constant	-12.96***	-11.04***	-11.16***	-11.14***	-13.92***
	(0.765)	(0.87)	(0.968)	(1.009)	(1.185)
Observations	325	325	325	320	320
Standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

[75] This may be a consequence of a decision to have lower taxes rather than a problem of efficiency. For example, Entre Rios and Santa Fe have relatively low weighted average rates in the cascade sales tax in Figure 2, and relatively low tax rates on automobiles in Table 7. Santa Fe also has a relatively low tax rate on urban properties in Table 5. But the two provinces also show inefficiencies in their tax administration, as shown in Appendix 1 in the Data Envelope Analysis.

[76] The model estimated shows evidence of heteroskedasticity, contemporaneously correlation, and autocorrelation. The use of panel-corrected standard error seems the most plausible estimation at this point. Fixed effects were captured with the inclusion of dummy variables for each province; for simplicity the estimation of these parameters is not shown in the table.

4. Sub-National Taxation and the Political Economy Game

4.1. Introduction

Analyzing sub-national revenue mobilization necessarily involves considering political economy issues, as the best normative design of a tax system will not be of interest if it cannot be implemented. From this perspective, several issues—in line with Stein et al. (2006)—should be considered:

1. As taxes have broad effects all over the economy, the number of players in the policymaking game is likely to be large.[77]
2. Taxation is subject to severe common-pool problems.[78]
3. Tax systems are hard to change in essence, although adjustments continuously occur. This reflects players' relative dominance and their ability/intention to achieve cooperation. The latter is more difficult, particularly when it is not known whether gains would on the whole offset losses; moreover, players are averse to losing revenues.
4. This high level of uncertainty increases the complexity of the Political Making Process (PMP).
5. Visibility and transferability vary among different taxes, and they always to the disadvantage of direct taxation. This effectively limits the range of instruments available.

The institutional design of a political system, along with the players involved and the phase of the economic cycle, will determine the probability of a major tax reform. A deep tax reform may also be catalyzed by a crisis, whether economic or political. Moreover, the probability of such a reform may increase during a fiscal adjustment program within an IMF agreement as political costs shift away from the government (Stein et al., 2006).

[77] Almost every actor in the political game has the chance to intervene in any major tax reform needed to mobilize subnational revenues, including business associations and unions.

[78] It may be viewed as a game in which each player wins or loses depending on his ability to extract more than he contributes to the pool of resources.

4.2 The Argentine Case

Policymaking in Argentina has been depicted as a "non-cooperative game in which each actor behaves opportunistically and tries to maximize short-term benefits" (Spiller and Tommasi, 2008). In this context, both economic performance and policymaking have been characterized by volatility. Reforms and counter-reforms have been common and particularly important in taxation and budgetary areas.[79]

From a political perspective, Argentina is a federal country where sub-national units preceded the foundation of the nation. Provinces tend to present limited democracies often controlled by political dynasties, restricted political competition, weak division of powers, and clientelistic political linkages, while frequently the same elites dominate media and business opportunities (Tommasi, 2002; Spiller and Tommasi, 2008; Gervasoni, 2009 and 2010a; FIEL, 2010; and Urbiztondo et al., 2009). Governors are the natural beneficiaries of this arrangement,[80] which makes them principal players in the political economy game—particularly during the last 20 years—even with strong presidents.

Governors' power notwithstanding, the country's fiscal organization, characterized by high vertical fiscal imbalances and soft budget constraints, makes governors strongly dependent on the funds collected by the federal government. Ardanaz, Leiras and Tommasi (2008) add that the importance of the provinces and the dominance of governors in national politics are mutually reinforcing factors: governors must be successful in achieving the national resources to finance increases in spending, which will be rewarded in elections.

At the same time, the Executive depends on governors for approval of nationwide economic policies in Congress. Bonvecchi (2010) argues that the distribution of resources from the common pool is the only trigger for reforms in all fiscal areas. Every reform is negotiated by the president and governors first. The latter mandates its legislators[81] to approve the bill to

[79] Former presidents Carlos Menem and Néstor Kirchner, for example, have undertaken important changes in national policies of exactly opposite sign, but utilizing the same political logic of exchanges with their "fellow provincial barons" (Ardanaz et al., 2010).

[80] Low levels of democracy are to be expected when sub-national units enjoy abundant central government transfers and subsidies and have a weak tax link with local citizens and businesses, because accountability from their constituencies is almost not necessary as they tend to be relatively rich vis-à-vis their societies and fiscally independent from them.

[81] Legislators always act as agents—normally of provincial party bosses—and have little involvement in drafting tax bills, which are designed by the Ministry of Economy and proposed by the Federal Executive.

receive compensations (e.g., discretionary transfers, provincial allocation of national programs and public works, provincially based tax exemptions) for this action.

Therefore, as Gibson (2007) concludes, the President and governors are mutually interdependent. This two-way relationship, however, is conditioned by the economic cycle. In good times, the game changes and governors may seem weak, while in the contracting phase of the cycle negotiations gain prominence. When presidents are unable to provide fiscal benefits to the provinces, governors use their power to block presidential initiatives and even design provincial policies contrary to those at the national level. Ultimately, the game continues and no actor appears in a position to develop win-win strategies, even in periods of strong growth.

As constitutional and electoral rules give the provinces a strong weight in the distribution of national power—they constitute districts for all national elective seats[82]—territorial interests tend to prevail in the decisions of political and social actors. Political integration of national parties has been decreasing during the last two decades, particularly since the early 2000s, making negotiations between the President and governors even more necessary—and difficult. In this context, it is very difficult to reach agreements on reforms, because interprovincial heterogeneity generates different sets of preferences with respect to national policies. Moreover, provincial representation in Congress is biased in favor of the least populated (and often financially vulnerable) provinces,[83] which can be co-opted in the legislative process at a low cost. Public spending and redistributive policies are consequently skewed in favor of them.

Although tax reforms are probably needed to generate space for new provincial tax assignment or even the replacement of existing provincial taxes, they are especially difficult to implement, requiring supermajorities in Congress. This requirement arises from three constitutional clauses: the division of tax sources between the provinces and the federal government; the procedural advantage on tax initiatives granted to the lower house, and the special majority required to introduce or change any earmarking of tax revenues. To achieve these special majorities, the National Executive needs to negotiate not only with over-represented and normally poor provinces, but also with large jurisdictions (Bonvecchi, 2010).[84]

[82] The only exception since the 1994 Constitutional reform is for the presidential election.
[83] Malapportionment is magnified as it is present not only in the Senate, which is the case in any federal country, but also in the House of Representatives.
[84] In this context, agents in the private sector react to policies with short-sighted views, as is the case for the national PMP as a whole. Argentina's business associations are highly heterogeneous, so each sector has strong incentives to negotiate separately and seek its own benefits. The instability seen in the political and business cycles is therefore

In summary, when considering the probability of tax reforms needed to mobilize sub-national revenues, it should be remembered that every attempt to change the federal revenue-sharing law was blocked by the provinces. Even the 1992 and 1993 agreements between the federal government and the provinces, which involved a huge transfer of resources to the latter, were finally reversed in areas involving taxation. Additionally, it is indispensable to consider the phase of the economic cycle.[85] A deep crisis would probably allow for structural changes. Otherwise, an expansionary phase of the cycle will be a requisite, as governors will be assured of not losing resources.

The present conjuncture is marked, in a context of increasing fiscal deficits, by intents of improving tax collection at the provincial level. In recent years, several provinces have introduced new taxes or have reintroduced older ones, increasing rates or the valuation of tax bases or reducing exemptions from existing taxes; most of the cases these decisions have hampered economic efficiency. In this situation some provinces will be less willing to introduce structural tax reforms.

5. Priorities for Reform

In every country there are trade-offs to reform sub-national revenues and even opposing views depending on the use of normative or positive theories.[86] These trade-offs may differ from one country to another but are particularly relevant for Argentina because political economy issues blocked previous proposals to reform both federal transfers and sub-national own-source revenues.[87] We first analyze the pros and cons of the different alternatives for sub-national own-

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accompanied by instability and fragmentation in businesses' representation. The phase of the economic cycle, the proximity to elections and the predominance of the Executive Power also alter the participation of businesses in the PMP. As Schneider (2005) characterized them, in Argentina business associations are weak. Compared with the business sector, labor unions' participation in the PMP is stronger, more homogeneous, more collective, longer-lasting, less linked to the economic cycle and more open. Unions normally obtain benefits in exchange for political support.

[85] In Argentina, according to Bonvecchi (2010), economic or policy shocks explain the recurrence and frequency of fiscal reforms and partly explain their type. In such circumstances, the federal government intends to centralize authority promoting reforms of tax, revenue-sharing and budgetary rules and policies. The results will depend on the relative strength of the other actors engaged. In any case, as Bonvecchi (2010) notes, since 1988 only about 30 percent of tax reforms (25 out of 83) at the federal government introduced structural changes in tax rules (created new taxes, extended tax bases, raised tax rates, or enabled the Executive to manage rates and/or bases on a discretionary basis).

[86] For example, Ambrosiano and Bordignon (2006), Fedelino and Ter-Minassian (2009), Ahmad and Brossio (2008).

[87] The political gridlock is evident: the 1994 reform of the Argentine Constitution mandated the implementation of a new revenue-sharing regime after 1996. So far no changes were agreed.

revenue assignment and then we make some proposals on how to improve sub-national revenue mobilization.

5.1 Sub-National Own-Revenue Assignment

Table 18 summarizes the pros and cons of different potential sub-national taxes. With the exception of three tax handles (a PIT surcharge, the business VAT and the Retail Sales Tax, or RST), the others are already in use in Argentina, either at the federal sub-national level. In the analysis we considered most of the tax attributes in relation to Argentina's structural characteristics (particularly its geographical heterogeneity, illustrated by differences in population density, natural resource endowments, income distribution and other features among the 24 provinces), the effective behavior of the Argentine tax system, its administration at the national and sub-national levels, and political economy issues.[88] Then we compared the results with modern tax assignment theory and international practice. In doing so, we arrived at two rankings (weighted/non-weighted) of the main and traditional tax handles (Table 19).[89] Given that the tax burden in Argentina is already high, the weights are biased towards efficiency attributes (Table 20).

We assume that each tax would be applied by provincial governments, which would autonomously manage rates and the administration of the taxes, while bases should be coordinated in some cases.

[88] Following Bird (2010) we added four columns with political economy issues which are unavoidable when thinking of changes in the tax structure.

[89] Rankings were constructed assigning 4 points to the best option up to 0 points in the case of the worse one. This means that, in the case of Revenue Potential (RP), 4 points go for High RP while 0 points go for Low RP; on the contrary, Low Corruption captures 4 points while High Corruption receives 0 points.

Table 18. Potential of Sub-national Tax Handles

	Revenue potential	Mobility of tax base	Potential efficiency costs	Sensitivity to cycle	Even distribu-tion of tax base	Costs of admin.	Compli-ance costs	Potential corruption	Political Acceptability		Local Account-ability
									Politicians	P. sector	
PIT	L/M	M	M	H	L	H	M/H	M/H	H	L	L/M
PIT surcharge	L/M	M	M	H	L	M	M	M	H	L	L/M
CIT	M/H	H	H	H	L	H	M	M/H	H	L	L
Payroll taxes	M/H	M	H	H	L	L	L	M	H	L	L
RST	M	M	M	H	L	H	L/M	M	L/M	L/M	M/H
VAT	H	M	M	H	L	M/H	L/M	L/M	L/M	L/M	M/H
Business VAT	M	M/H	H	H	L	M	M	L/M	M	L/M	M
Gross sales taxes	H	M	H	H	L	M	M/H	M	H	L	L
Excises	L/M	M/H	M/H	M	L	M	L	L	L/M	M/H	M
Property taxes	L/M	L	L	L	L	H	L	L	M	L	H
On financial transactions	H	M/H	H	H	L	L	L	L	H	L	L
Stamp taxes	L/M	M	H	M/H	L	L	L	L	H	L	L
Royalties	M/H	L	L/M	M/H	L	L/M	L	M	H	M	L
User fees	M	L/M	L	L	L/M	M	L/M	L	L/M	M	H

Source: Authors' estimates.

Table 19. Rankings of Sub-national Tax Handles

Weighted Ranking			Unweighted Ranking		
	Points	**Ranking**		**Points**	**Ranking**
User fees	31	1	User fees	31	1
Property taxes	29	2	Property taxes	29	2
Royalties	25	3	Royalties	25	3
VAT	20	4	Excises	18	4
Excises	18	5	On financial transactions	16	5
RST	17	6	VAT	20	6
Stamp taxes	17	7	Stamp taxes	17	7
On financial transactions	16	8	Payroll taxes	16	8
PIT surcharge	16	9	RST	17	9
Payroll taxes	16	10	PIT surcharge	16	10
PIT	13	11	Business VAT	13	11
Business VAT	13	12	Gross sales taxes	12	12
Gross sales taxes	12	13	PIT	13	13
CIT	8	14	CIT	8	14

Source: Authors' estimates.

Table 20. Weights of Tax Assignments

	Weight
Potential efficiency costs	191.9%
Mobility of tax base	127.9%
Even distribution of tax base	127.9%
Local Accountability	127.9%
Average	**100.0%**
Sensitivity to cycle	83.1%
Costs of administration	83.1%
Compliance costs	83.1%
Political Acceptability - Politicians	83.1%
Revenue potential	64.0%
Potential corruption	64.0%
Political Acceptability - Private Sector	64.0%

Note: Normalized to 100.
Source: Authors' estimates.

User fees, property taxes and royalties lead both rankings. **User fees**, underutilized in Argentina, are under the exclusive control of the Executive at each level of government. The technical advice is to set fees that cover their costs. **Royalties** collected by sub-national governments have several drawbacks (e.g., unevenly distributed tax bases and volatile revenues), but they receive higher ranks when other factors are added to the analysis. More important, according to the National Constitution *provinces have the original dominion over the natural resources existing in their territory*, so there is virtually no chance undertaking reforms in this area. However, as most provinces do not have the natural resources that are taxed with royalties it is necessary to explore other sources of revenues.

Property taxes are appropriate in terms of efficiency (particularly those on residential real estate as they are not exportable to other jurisdictions) even at the local level. They pose some challenges, however, when political economy considerations are included, as their high visibility that may discourage collection because of the lack of controls[90] or under-valuation of properties. They also have high administrative costs.[91]

A surcharge on the **personal income tax (PIT)** might be an alternative to residential property taxation, but it has several problems. First, the top marginal tax rate at the Federal level

[90] Some tax administrators mentioned to us that it is not politically feasible to confiscate properties even after a court ruling.
[91] Under-valuation is very frequent, particularly with respect to residential real estate.

is already high at 35 percent, leaving little room for a provincial surcharge on top of it. Second, evasion, elusion and a high-minimum exempt level explain why the Federal PIT collects only 1.7 percent of GDP; a 10 percent surcharge would yield a modest 0.2 percent of GDP, and a higher surcharge is likely to create efficiency problems. Finally, a surcharge on PIT needs coordination between provincial administrations and the Federal Tax Revenue Agency (AFIP), which is far from common practice.

In the case of **VAT**, which along with the cascade sales tax, financial transaction taxes and royalties is one of the sources with the greatest revenue potential, compliance costs are very low, while administrative costs will depend on which level of government deals with the collection. As long as the federal agency is already assuming this task and tax bases at the sub-national level are similar to the national one, administrative costs could be substantially reduced (in fact, the *Convenio Multilateral* already does so for the cascade sales tax).[92] On the other hand, efficiency costs are not high, particularly in comparison to alternatives such as the cascade sales Tax or Financial Transaction taxes). Accountability is also likely to be high. Nevertheless, when considering political economy issues there are some problems, as politicians[93] are not prone to change the current cascade sales tax. In any case, a destination VAT is preferable to an RST as it has higher revenue potential and lower administrative costs of administration; moreover, its debit-credit mechanism discourages evasion. Introducing **excise taxation** at the provincial level (on fuels, for example) may be a way to reduce the vertical imbalance.

Other options are less attractive due to efficiency considerations, or low revenue potential or from political economy issues.

5.2 Tax Administration and Compliance Costs

Appendix 1 shows that wide disparities exist among provincial tax agencies' collection costs. The lowest cost is about 1.1 percent of provincial own-source tax revenues, and the highest is 10 percent. The federal tax agency's collection cost is about 2 percent.

These differences, however, this may be a consequence of economies of scale. We performed a Data Envelope Analysis to find an "efficient" frontier, and 12 of the 22 cases depart

[92] Canadian experience shows that with good tax administration it is perfectly feasible to operate a VAT on a destination basis at the sub-national level.

[93] Interviews with heads of tax agencies and economic ministers in several provinces show reluctance to introduce a provincial VAT.

from the frontier, suggesting that there is some room to improve efficiency. This inefficiency pattern is more frequent for less advanced provinces but also for intermediate developed provinces such as Entre Ríos and Santa Fe. Coincidentally, these latter provinces also exhibit a revenue effort lower than expected.

A separate analysis conducted by FIEL suggests that taxpayers' compliance costs are on average about 1.43 percent of taxes paid and they are highly regressive (0.22 percent of the sales of large companies and 11 percent of the sales of small companies).

When the compliance cost for each level of government was considered, the Federal government accounted for 55 of the cost, while for the firms in the sample it received 88 percent of taxes paid. It follows that the compliance costs with sub-national taxes are very high compared to the taxes paid: 45 percent of total compliance costs for only 12 percent of taxes paid. The cascade sales tax is responsible for 16 percent of the total compliance cost and only contributes 9 percent of taxes paid.

5.3 Proposals

When making proposals to improve sub-national revenue mobilization we have to take into account both constraints on tax reform and some particularities of Argentina. Particularly notable considerations include the following:

- For most (if not all) tax handles there are important trade-offs involved in accomplishing the multiple objectives that are expected from the tax system (minimum distortions, support of efforts to improve income distribution, minimum compliance and administration costs and revenues for the government). When political economy factors are added this is even worse because some "bad" taxes may be valuable for politicians if they provide the government with important revenues and are not visible to the average voter.
- Usually, existing taxes are more accepted than new ones to the extent that some "learning by doing" is necessary.
- Improvements in the efficiency of tax administration in Argentina face some limitations from inflexible labor rules that protect their employees, even those that are not efficient.

- Both the General Government tax burden and the vertical imbalance of provinces are high in Argentina. Therefore, it would be advisable to raise own-source provincial revenues at the same time that the federal tax burden is reduced. One easy way out is a reduction of discretionary transfers, but this would likely meet resistance from the Federal government, which uses them to "control" powerful governors or to "buy" votes in the Congress.
- However, the analysis of previous sections shows that reducing discretionary transfers will improve provinces' own-source revenues, and that an eventual replacement by automatic transfers will be a bad alternative: it will not reduce the vertical imbalance, it will aggravate the perception that there is a soft budget constraint, and it will motivate an increase in government expenditures that may not be necessary.
- The timing for a reform is probably not good. Fiscal deficits at the provincial level are small and are being financed mostly by the federal government. In addition, there are no strong leaders besides the president of the country, and all levels of government have paid little attention to the problems of the current tax system. In fact, they have moved in the opposite direction by raising the share of the cascade sales tax at the expense of the property tax at the provincial level and at the federal level by maintaining "bad" taxes that were supposed to be temporary sources of financing to a government strapped for funds, even though that is no longer the case (e.g., the tax on financial transactions).

In this context we can think of reforms that are more ambitious (with lower chances of success) and other, less ambitious reforms that look more feasible, like the improvement of existing taxes. On the more ambitious front, we think that there is much to gain from replacing the Cascade Sales Tax with a provincial VAT that shares the same tax base as the federal VAT (to simplify its administration) while allowing each province to set its rate inside a band that will be agreed upon by all provinces. To guarantee that provinces will not go back to cascade taxation, it would be better to include a restriction on doing so under the new (and postponed) revenue-sharing arrangement among the federal government and the provinces.

The retail sales tax has several disadvantages compared with a VAT. For example, all revenues are obtained from retailers, which may be difficult to audit in Latin American countries. If the retailer is able to evade sales taxes the government loses all revenues, while with a VAT the government still collects some money from manufacturing. Moreover, it is difficult to tax only retail sales. Slemrod and Bakija (1996) quote empirical evidence from US states that show that about 40 to 50 percent of the revenues represent intermediate sales. The advantage of the RST is that exports are tax free, while with the VAT they might be de facto taxed (in spite of being zero-rated by law) by delaying the reimbursement of VAT credits.

But a provincial VAT has problems as well. To minimize distortions it has to be a tax on final consumption. One option is to tax inter-provincial sales, but this requires the province in which consumption occurs to reimburse firms for all VAT credits paid (including those paid to other provinces). Some provinces may be reluctant to reimburse taxes paid to other provinces, especially if they are strapped for funds. However, in Argentina, if provinces were ready to accept the same tax base as the federal VAT it would be possible to adopt a clearinghouse of VAT credits because the provincial VATs will be added to the invoice together with the federal tax. This would provide another source of information to reduce tax evasion and thus introduce the possibility of including the Federal government as an arbiter in the clearinghouse.[94]

Another option is to zero-rate interprovincial sales. The problem of carousel fraud that has affected the European Community is likely to be less severe given the existence of a Federal VAT.[95]

An eventual replacement of *Ingresos Brutos* by a less distortionary tax (Provincial VAT or RST) would need to solve complex political economy problems, as impacts on personal and regional income distribution might differ. To estimate the impact on the regional distribution of tax revenues we need to estimate the regional source of Federal VAT tax collection. This will provide us with an approximation of the revenues that each province would receive if it decided to replace the cascade tax with a piggyback on the Federal VAT (or with a retail sales tax with the same exemptions and rate reductions as the VAT). Appendix 2 provides an estimate of the

[94] The federal government is in charge of international trade. For imports, the situation is not greatly different from the withholdings of *Ingresos Brutos* made at Customs and sent later to each province. For exports, the federal government already reimburses credits on the federal VAT and could do the same for provincial VATs. In this case the ederal government will be one actor of the clearing house.

[95] Bird (2007) mentions that in the Canadian case a federal VAT provides additional guarantees.

effective rates on each good and service that is a necessary reference to assess the impact of a change towards a more uniform provincial VAT in the personal distribution of income.

The Federal VAT has a general rate of 21 percent, but some goods (usually food) are taxed at 10.5 percent, and many goods and services are exempt. The best proxy of the tax base is consumption. As this macroeconomic aggregate is not available at the geographical level, we estimated the shares of each jurisdiction by utilizing labor income (salaried and non-salaried) from the Permanent Households Survey (Encuesta Permanente de Hogares, INDEC), shown in column 1 of Table 21. In addition, it is necessary to distinguish goods taxed at different rates from exempt goods. Using the shares of each good and service in the expenditure survey we simulated the weighted average tax collection. To distribute it among the 24 provinces we used shares of the National Household Expenses Survey (Encuesta Nacional de Gasto de los Hogares) 1996/97 baskets, the latter available with the required disaggregation (Columns 2 and 3 of Table 6).[96] Table 21 compares the regional distribution of a provincial VAT that replicates the Federal VAT with cascade tax collections. On average, a surtax of 7.1 percent of the Federal VAT would be required to ensure the same revenues as the cascade tax, but there are important differences by province. Columns 8, 9 and 10 illustrate the case assuming that the provincial VAT replicates the Federal VAT, and Columns 11 to 13 assume that the provincial VAT is charged at a single rate of 21 percent on all taxed goods and services (although exemptions in the Federal VAT are maintained at the provincial level). The revenue shortfall or excess is estimated as a percentage of the collection of the cascade tax (therefore providing a rough estimate of the change in the tax rate necessary to maintain actual collections), or as a percentage of own-source revenues or total revenues (therefore providing an estimate of the change in other sources of revenues that is necessary to offset the impact of the replacement of the cascade tax). For example, six provinces could match current collections with a surcharge rate lower than 6 percent (compared to the average rate of 7.1 percent), and six other provinces need rates higher than 9 percent to maintain their collections.[97] Most of the winners are poor provinces that receive large transfers from the rest of the country (i.e., these provinces have large "current account deficits"), and about half of the losers are oil-producing provinces that would lose this easy-to-tax base when taxation is shifted from production to final consumption. Among the large provinces, the City of Buenos

[96] We also show the shares of each province in the economy's GDP (Table 21, column 4).
[97] These are rough estimates because they ignore changes in compliance.

Aires would lose revenue, a change reflecting the important contribution of financial services and of large firms under the Multilateral Agreement that have offices (and expenses) in the City.[98] Mendoza and the province of Buenos Aires would be modest gainers from the change.[99]

Unlike the cascade sales tax, that is not visible for consumers, both taxes on consumption have the advantage of being transparent to the end user. However, provincial rates that fluctuate inside an ample band are likely to create problems (at least for border transactions), and they are complicated from a political point of view. Therefore, it is likely that some compensation, financed by the rest of the country, would be necessary for the losing provinces. This is possible through amendments in the secondary distribution of the revenue sharing arrangement, but it is likely to be very demanding and would probably require a complete overhaul of the system, which is unlikely to be approved.

A replacement of the turnover by a provincial VAT would not reduce the vertical imbalance, but it could open a window to do that so the federal VAT rate were reduced, thus allow the provinces to have a higher provincial rate. Another option is to allow the provinces to introduce a surtax on some excises like those on fuels, or even to assume part of the Federal government's power of taxation.

[98] The difference between Cordoba (a loser) and Santa Fe (neutral) is striking.

[99] The differences between the estimates of columns 8 to 10 and columns 11 to 13 are minimal for each province. This shows that the gap between their actual collection of *Ingresos Brutos* and a provincial VAT cannot be filled by eliminating the multiple rates of the federal tax.

Table 21. Effective Turnover Tax Collection vs. Theoretical VAT, 2009: Millions of Current AR$ and Percentages

Province	Consumption	Taxed Consumption	Consumption Net of VAT Exemptions	GDP	Turnover Tax Collection			Turnover Tax Collection vs. Potential VAT Distribution			Turnover Tax Collection vs. Potential VAT Distribution Excluding Reduced Rates		
	Shares				Millions of AR$	Share	Required aliquot on VAT Base	As % of Turnover Tax	As % of Own Source Taxes	As % of Total Revenues	As % of Turnover Tax	As % of Own Source Taxes	As % of Total Revenues
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Misiones	0.71%	0.71%	0.71%	1.91%	597	1.51%	15.2%	53.11%	34.14%	7.27%	52.83%	33.96%	7.23%
San Luis	0.55%	0.55%	0.55%	0.83%	364	0.92%	12.0%	40.47%	27.24%	6.13%	40.58%	27.31%	6.15%
Neuquén	1.33%	1.36%	1.35%	2.30%	832	2.11%	11.1%	35.53%	6.51%	4.75%	36.00%	6.59%	4.81%
Santa Cruz	0.80%	0.82%	0.81%	1.04%	462	1.17%	10.2%	29.92%	5.26%	2.66%	31.28%	5.50%	2.79%
Córdoba	5.92%	5.92%	5.94%	7.50%	3,120	7.90%	9.5%	25.12%	16.73%	6.07%	24.92%	16.60%	6.02%
La Pampa	0.52%	0.52%	0.52%	0.64%	268	0.68%	9.4%	24.07%	8.58%	2.65%	23.86%	8.51%	2.63%
Tucumán	2.01%	1.97%	2.00%	1.22%	963	2.44%	8.8%	19.40%	12.02%	3.04%	17.97%	11.14%	2.82%
Salta	1.38%	1.35%	1.37%	1.21%	628	1.59%	8.4%	15.18%	7.22%	1.95%	13.68%	6.50%	1.76%
Entre Ríos	1.33%	1.33%	1.33%	2.11%	601	1.52%	8.2%	13.01%	5.47%	1.28%	12.52%	5.27%	1.23%
CABA	20.60%	20.08%	19.78%	22.92%	9,093	23.04%	8.1%	12.87%	8.78%	7.75%	14.18%	9.67%	8.54%
Río Negro	1.18%	1.20%	1.20%	1.38%	498	1.26%	7.5%	4.48%	1.85%	0.64%	5.17%	2.14%	0.74%
Santa Fe	6.76%	6.76%	6.80%	8.10%	2,646	6.70%	7.1%	-0.79%	-0.55%	-0.18%	-1.36%	-0.96%	-0.31%
Corrientes	0.83%	0.83%	0.84%	1.77%	316	0.80%	6.9%	-3.74%	-2.39%	-0.33%	-4.35%	-2.78%	-0.38%
Chaco	0.99%	1.03%	1.03%	1.12%	384	0.97%	6.8%	-5.40%	-3.30%	-0.36%	-5.88%	-3.60%	-0.39%
Mendoza	3.11%	3.12%	3.11%	3.24%	1,116	2.83%	6.5%	-10.36%	-4.08%	-1.74%	-10.16%	-4.01%	-1.71%
Buenos Aires	45.14%	45.48%	45.70%	35.55%	15,544	39.39%	6.2%	-15.46%	-10.74%	-5.45%	-16.03%	-11.13%	-5.66%
Chubut	1.66%	1.71%	1.68%	1.87%	573	1.45%	6.1%	-18.05%	-4.08%	-2.48%	-15.76%	-3.57%	-2.17%
Catamarca	0.54%	0.55%	0.56%	0.94%	184	0.47%	6.0%	-18.25%	-5.66%	-1.22%	-19.68%	-6.11%	-1.32%
Jujuy	0.71%	0.69%	0.71%	0.85%	229	0.58%	5.9%	-19.47%	-12.63%	-1.25%	-21.59%	-14.00%	-1.38%
Sgo.del Estero	0.74%	0.76%	0.77%	0.90%	240	0.61%	5.7%	-25.04%	-13.24%	-1.35%	-26.55%	-14.04%	-1.44%
Ta. del Fuego	0.93%	0.96%	0.94%	0.71%	270	0.68%	5.1%	-39.79%	-14.27%	-5.49%	-37.08%	-13.30%	-5.12%
Formosa	0.54%	0.56%	0.56%	0.52%	145	0.37%	4.7%	-51.47%	-29.79%	-2.14%	-52.16%	-30.18%	-2.17%
La Rioja	0.46%	0.47%	0.47%	0.46%	109	0.28%	4.2%	-68.35%	-32.32%	-2.89%	-70.38%	-33.28%	-2.97%
San Juan	1.29%	1.29%	1.29%	0.90%	282	0.72%	3.9%	-81.03%	-33.02%	-6.27%	-80.71%	-32.89%	-6.24%
Total	100.00%	100.00%	100.00%	100.00%	39,464	100.0%	7.1%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

(1) Shares were calculated from labor income according to the Household Permanent Survey (EPH, INDEC).
(2) Consumption net of Tax Exemptions and considering Reduced Rates
(3) Consumption net of Tax Exemptions
Source: Authors' estimates

A less ambitious proposal is to improve turnover by reversing some of the bad decisions that complicated the administration of the tax in recent years. In order to be credible, this will require an agreement like those signed in the early 1990s under the umbrella of the revenue-sharing system (and with financial penalties on provinces that do not comply). It is possible that some of the needed counter-reforms have constitutional support (e.g., the use of higher rates on manufacturers located in other provinces may be interpreted as a barrier on domestic trade that is forbidden by the Constitution). The elimination of some problems (like chronic excess withholdings) may be achieved if provinces agree that disputes with taxpayers are to be resolved by an interprovincial court (similar to dispute resolution under the Convenio Multilateral) but with a more important role for impartial judges rather than the Ministries of Economy of each province, the current practice under the *Convenio*. If primary activities and manufacturing are exempt from the tax and there is some coordination in the taxing of financial intermediation and transport, the cascade will be reduced substantially.[100]

With respect to taxation of real estate, it is possible to use a national cadastre (as proposed in 2007 but not yet implemented) to improve on some of the problems observed in recent years. In a more comprehensive reform the national cadastre would be solely responsible for the valuation of all properties in the country. This cadastre could be "owned" by the 24 provinces, but it would be less subject to local political interference by being accountable to the 24 governors and the Federal government. Moreover, a national cadastre can use the same criteria to value property nationwide and impose a minimum correction for inflation.[101] Provinces could undo the final effect of this decision on their voters by reducing the tax rate, but an external valuation would eliminate the fiscal externality that today encourages some provinces to underestimate the value of properties: for many properties the Federal government uses the fiscal value as the base of the tax on personal assets. To avoid a windfall benefit for the Federal government, it may be necessary to reduce the federal tax rate on properties located in provinces that agree to participate in the national cadastre, thus providing an incentive for provinces to adhere to the reform.

[100] It would be better to extend the exemption to financial activities and transport, but as they are important sources of revenue for some provinces this proposal is unlikely to receive much support.

[101] A permanent assessment of the market value of properties is very expensive. Therefore, some general indexation of tax value is necessary even with an efficient cadastre.

Appendix 1. Tax Administration Costs

Provincial Tax Offices in Argentina: Performance Assessment

Under the Argentine federal fiscal system, each province independently organizes its tax administration and collection. In practice, there are important similarities and differences among the 24 provincial governments. The taxes applied are very similar in nature, but their shares in total provincial tax revenues vary according to the characteristics of each province (population, business density, size of urban centers, etc). The provincial cascade sales tax (*ingresos brutos*) is the most important tax revenue source in every province, followed by either the property tax on real estate (urban and rural) or the stamp tax. Instead, operation and degree of administrative autonomy may differ significantly. For instance, in some provinces the tax authorities are organized as autarkic offices (agencies such as the ones in Buenos Aires City, AGIP, or Buenos Aires Province, ARBA) deciding on their own budget and reporting to the Provincial Ministry of Finance or Economy. In others, they are mere administrative branches, sometimes Provincial Directorates as in the case of Santa Fe or Mendoza, under the corresponding Ministry of Economy or Finance. Auditing of the tax offices by central provincial authorities proceeds also under different modalities as well.

In regard to their main operational functions, these offices collect taxes, handle the administration of tax forms and deal with contested tax claims by individuals and companies, use inspectors to verify and investigate tax forms, and impose fines. The cascade sales tax comprises more than 70 percent of tax revenue in most provinces. As mentioned in the main text, in 21 out of the 24 provinces the tax rate is higher on manufactured goods "imported" from other provinces than on those produced in their territory. The *Convenio Multilateral* signed by the provinces is the mechanism used to distribute collections from large taxpayers with sales in more than one jurisdiction among the provinces. Withholding mechanisms through credit card and banking operations or through large companies have also been increasing and are becoming pervasive in the system. Thus, the tasks of a typical tax office include surveillance of these ad hoc collection mechanisms. In some cases they also monitor revenues from royalties on natural resources. In the case of the property tax on real estate, some provinces have decentralized the collection to municipalities. Finally, a few provinces outsource legal services or tax collection to specialized private companies.

Table A1. compares provincial tax offices' performance, reporting in monetary terms the tax collection/total ratio of 21 cases comprising 13 of the 24 provinces (for some provinces we considered an average of several years). This indicator provides a rough measure of productivity (total output/total inputs).

These ratios exhibit a great deal of variation, which calls for an explanation. One factor influencing this result may be differences among units in operational performance. Also, as mentioned above, the scope of activities of each tax office may vary by province, resulting in a different mix of products and costs. Moreover, principal-agent relationship and the use of incentive regulations may play an important role. The next subsections will discuss and present a measure of relative efficiency of tax offices more rigorously. For this purpose we will summarize the international experience and provide our own estimates using the Data Envelopment Approach (DEA).

Table A.1. Provincial Tax Offices-Performance indicators

Tax Offices (DMUs)	Tax Revenues / Office Budget (ARG$)	
	Ratio	Ranking
1	72,2	2,0
2	10,1	20,0
3	58,7	5,0
4	14,5	19,0
5	56,6	6,0
6	30,8	14,0
7	52,4	7,0
8	87,3	1,0
9	41,0	10,0
10	38,7	11,0
11	37,1	12,0
12	42,5	9,0
13	45,1	8,0
14	68,7	3,0
15	36,9	13,0
16	26,6	16,0
17	61,4	4,0
18	20,4	18,0
19	23,5	17,0
20	10,1	21,0
21	28,7	15,0

Source: Authors' estimates based on provincial information. DMU: Decision Making Unit.
Note: A total of 10 tax offices are considered with data available for several years between 2005 and 2009. In the case of AFIP (National Tax Office) in 2009 this figure is ARG$ 52.

The International Evidence

Improving the operation of the public sector first requires an assessment of its efficiency and productivity. Most public sector activities, however, do not take place in a market context, and therefore measuring output in relation to inputs has proven a difficult task in itself. Moreover, in general, public administration techniques and bookkeeping practices are biased toward accounting for with inputs (budget), omitting clear references to outputs (services and their outcomes).

In particular, there is relatively little analysis of the efficiency of tax offices. Here we will gather some of the available evidence from four studies corresponding to Norway, Portugal, Belgium and Spain. One common feature of the studies considered here is that all of them have been restricted by the need to use pre-existing data, though in the Norwegian case the Directorate of Taxes had conducted a previous discussion about the definition of the most relevant measures of outputs and inputs regarding their tax offices. Another common feature is that labor input is a key component in the construction of all DEA exercises. In all cases wages are recognized as the dominant cost in the tax office budget, and other expenses are often allocated in proportion to labor input (space, computers, furniture, etc). Table A.2 reports the inputs and outputs used in each case.

In the Norwegian case, the study provides the DEA scores for tax offices, correcting them by a probabilistic method to make a statistical assessment of the efficiency estimates.[102] These authors find that small units tend to belong to the least efficient part of the efficiency distribution (technical efficiency). Their results suggest a potential output increase of 21-24 percent if all units become efficient.

In the Portuguese case only 10 out of 41 offices are efficient assuming CRS (Constant Returns to Scale). The number grows to 14 when VRS (Variable Returns to Scale) is allowed, showing that scale is a main factor of tax offices' efficiency. The author points out that some of the shortcomings of Portugal's tax offices stem from the following factors: chronic low levels of education among employees, excessive bureaucracy, endemic petty corruption, appointment of tax office managers prone to respond to politically dominant interest groups, and job tenure in the public sector that is not linked to performance. In this case allocative efficiency and

[102] They apply a "bootstrapping" method to correct for the bias of the DEA frontier that is a "non-parametric" estimation based on the best observed practice but is a biased estimate of the best "possible" practice.

productivity evolution is measured along with the standard technical efficiency. As a second step, a Tobit model is estimated to associate the efficiency scores with external factors that may influence the DEA results. It is found that efficiency is higher for urban tax offices, higher for offices in "rich" municipalities and higher for offices situated in municipalities with higher public expenditure.

Table A.2. Tax Office Efficiency: International Experience

Cases	Definition of inputs	Definition of outputs
Norway (2005): 98 tax offices under the Directorate of Taxes of the Ministry of Finance.	Total cost including labor and offices expenses	-Number of corporate tax returns. -Number of returns from non-incorporated business. -Number of complaints on tax assessments. -Number of false registrations detected by control activities. -Number of people relocated as tax-payers during the year.
Portugal (2007): 41 tax offices at the municipal level (all in Lisbon)	-Number of employees -Rents -Total taxed population by office	-Tax revenues by type of tax. -Clear-up rate of legal disputes by type.
Belgium (2002): 289 regional tax offices collecting personal income tax	Personnel expressed in full-time equivalents.	-Number of audited returns by taxpayer category. -Number of audited returns that led to an increase in the tax base by category.
Spain (2000): 15 regional tax offices	Number of tax inspectors/total personnel	-Number of actions performed to total taxpayers -Business taxpayers' debt/ Regional Gross Value Added

Source: Authors' compilation based on references.

The Belgian case uses both DEA and FDH (Full Disposal Hull) methods.[103] The DEA results under VRS show that only 10 percent of tax offices are on the efficiency frontier. Further analysis of the efficiency scores suggests that managerial skills, organizational designs and the presence of a Central Tax Office do matter, while the monitoring system within each Regional Directorate General is less important.

[103] The FDH frontier constitutes a closer envelope of the actual data as compared to DEA.

In the Spanish case, where only regional agencies specialized in business taxpayers were included, one third of the 15 offices, analyzed with DEA and a bootstrapping technique, were efficient. The average efficiency score is about 0.81.

The Data Envelopment Analysis (DEA)

DEA models are used for examining the relative efficiency of a set of similar decision-making units (DMUs), shown in Box A1 This method does not make any assumption regarding the functional relationship between input and output variables to measure performance. It is a benchmark tool used to calculate efficiency scores intended to produce a ranking of DMUs and identification of efficient units within the analyzed sample.[104] The idea behind this method is that studying the practices of the efficient units in relation to the less efficient ones may provide a number of useful recommendations to improve the operation of the offices.

[104] The DEA frontier is relative to the sample considered in the analysis. Without statistical distributional hypotheses, the DEA does not allow for random errors in the data assuming away measurement errors and the influence of other factors affecting outcomes.

Box A.1. Data Envelopment Approach

In the DEA the production structure is based on the production possibility set defined by enveloping the observations by a piecewise linear convex outer boundary, the *frontier transformation function.* Two alternative approaches are available in DEA to estimate the efficient frontier, one input-oriented and the other output-oriented. The following DEA model is an input-oriented model where inputs are minimized and the outputs are kept at their current levels

$$Min\ \theta - \varepsilon \left(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+ \right)$$

subject to (in the case of CRS)

$$\sum_{j=1}^{n} \lambda_j\, x_{ij} + s_i^- = \theta\, x_{i0} \qquad con\ i = 1, 2, \ldots\ldots\ldots\ldots, m$$

$$\sum_{j=1}^{n} \lambda_j\, y_{r\,j} - s_r^+ = y_{r\,0} \qquad con\ r = 1, 2, \ldots\ldots\ldots\ldots, s$$

$$\lambda \geq 0 \qquad con\ j = 1, 2, \ldots\ldots\ldots\ldots, n$$

where *j* represents the "*n*" DMUS; *i*, the "m" inputs; and y_r, the "s" outputs.

When assuming Variable Returns to Scale (VRS), the following restriction has to be computed:

$$\sum_{j=1}^{n} \lambda_j = 1$$

θ is the efficiency parameter for each of the "*j*" units, and "s^-" is the redundancy of inputs. Alternatively, "s^+" is the additional product for a given level of inputs; it is bounded between 0 and 1. DMUs with $\theta = 1$ are classified as efficient and will be the benchmark for the analysis.

Source: Based on Zhu (2009).

This approach is especially suitable in a setting of multiple inputs and outputs, where price information on outputs is not available and the production function relating outputs to inputs is unknown or uncertain, which is most often the case of bureaucratic processes such as those of public sector agencies when considered as "production units."

The boundary of the production possibility set *S* corresponds to the neoclassical notion of an efficient transformation function between inputs and outputs. There are two basic directions to go from an observation to the frontier: keeping outputs fixed and moving to the frontier by a

proportional reduction in inputs, or keeping inputs fixed and moving to the frontier by a proportional expansion of outputs. In input-oriented models, the DEA identifies technical inefficiency as the possibility to provide the same output with a proportional reduction of inputs. Output-oriented models are symmetrically defined by the possibility of increasing output using the same amount of inputs. Results are equivalent in terms of identification of inefficient DMUs, and selection of orientation depends on the nature of the production process and data availability. In the case of tax offices, the idea of cost control of bureaucratic administration suggests an input-oriented approach.

The analysis assumes that the DMUs included in the calculation have a degree of homogeneity which is adequate for DEA.

An index equal to one accounts for a technically efficient DMU. A measure less than one indicates a certain degree of inefficiency.

A standard procedure in the literature to understand the causes for the revealed differences has been to investigate possible explanatory variables by regressing efficiency or productivity scores on candidates for explanatory variables, i.e., variables in addition to the ones used as inputs or outputs.

A Draft Calculation for a Sub-Sample of Provincial Tax Collection Offices

The Data

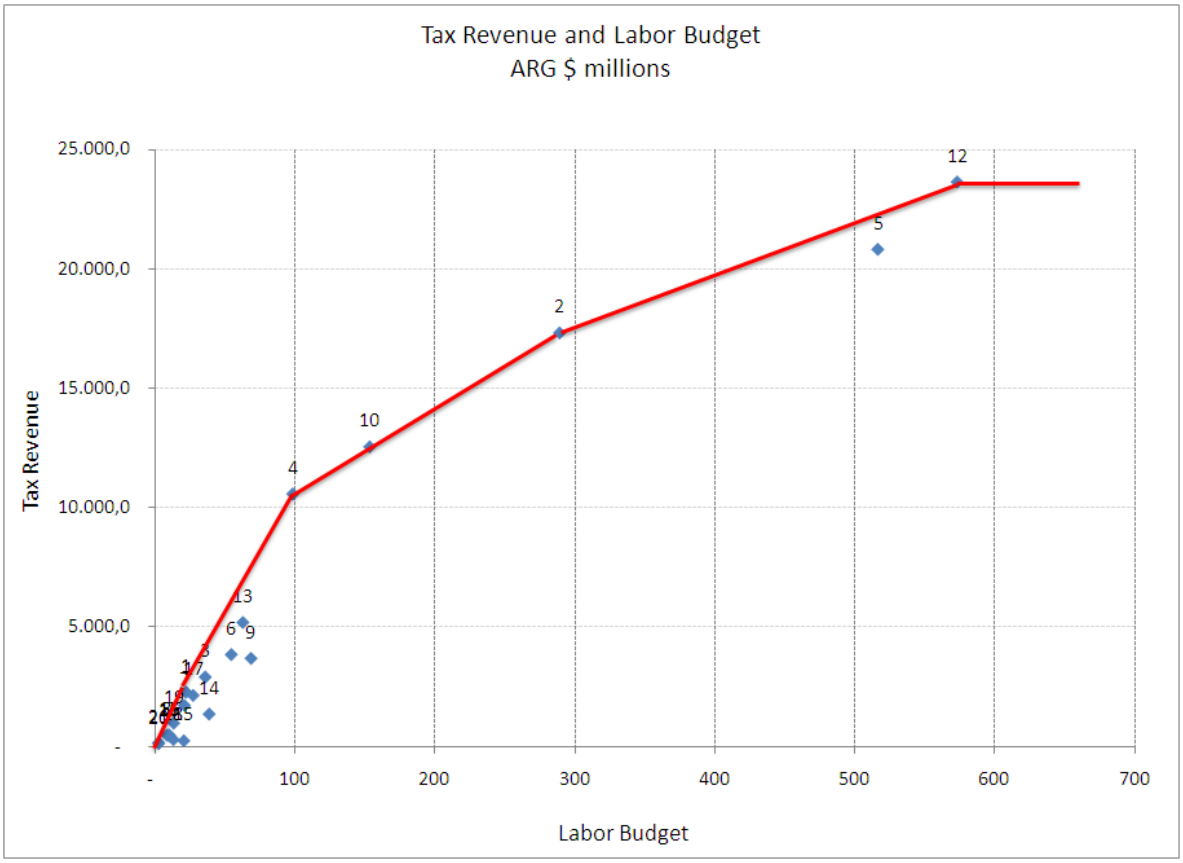
As in the previous reported cases, we selected two indicators of inputs related to labor, which is the most important component of tax offices' budgets. We selected only one output: total tax revenue.

The fruitful application of DEA, however, depends on DMUs' using resources on the same set of outputs. This means that the diverse scope of the tax collection offices in Argentine provinces could be the source of some inaccuracy in the present results. In this estimation no adjustment has been introduced in order to reflect differences of scope in operational responsibilities between offices. For instance, the Buenos Aires City tax office includes in its budget the labor costs of the City Statistical Office, while the Santa Fe tax office uses the common central informatics service for information processing, reducing costs but presumably reducing efficiency as well.

The Results

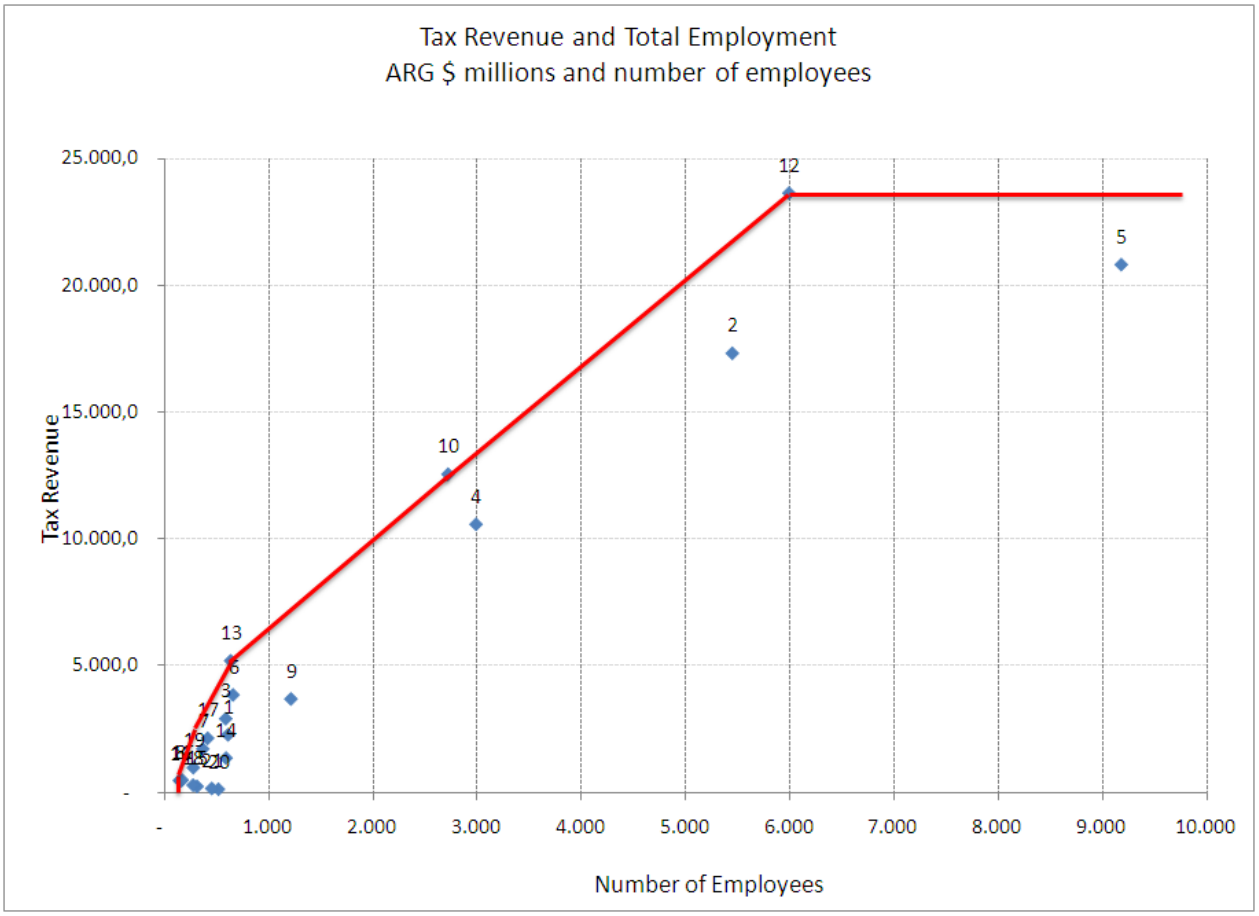
Figures A.1 and A.2 present our results for DEA of the Provincial Tax Offices, considering each of the inputs separately.

Figure A.1. Provincial Tax Offices



Source: Authors' compilation.

Figure A.2. Tax Offices



Source: Authors' compilation.

When considering both inputs together, nine DMUs (a tax provincial office in a selected year between 2005 and 2010) are located on the efficiency frontier (see Table A.3).

The simple average of the scores is 0.88, a bit higher than those observed in the international evidence, presumably due to a sample that is biased towards provinces that are currently larger and more developed.

Table A.3. Provincial Tax Offices: Data Envelope Analysis Of Input Oriented Efficiency-VRS

Provincial Tax Offices Data Envelope Analisys Input Oriented Efficiency - VRS	
Indicators	
´= 1	9
% < 1	57,14
Mean	0,88
Standard Deviation	0,18
S.D / Mean (%)	20,71
Min	0,46
Tax Offices (DMUs)	**Efficiency Scores θ**
1	1,00
2	1,00
3	0,92
4	1,00
5	0,86
6	0,84
7	0,98
8	1,00
9	0,59
10	1,00
11	0,87
12	1,00
13	1,00
14	0,46
15	0,47
16	0,95
17	0,95
18	0,61
20	0,95
21	1,00
22	1,00

Source: Authors' compilation.

The DEA model also provides the benchmarks for each inefficient case, calculated as a linear convex combination of efficient cases which may add information when analyzing the causes of their inefficiency (See Table A.4).

Table A.4. Benchmarks for Each DMU (l)

Benchmarks for each DMU (λ)

Tax Offices (DMUs)	Efficiency Scores θ	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Σ
1	1,00	1,0	-	-	-	-	-	-	0,0	-	-	-	-	0,0	-	-	-	-	-	-	-	-	1,0
2	1,00	-	1,0	-	-	-	-	-	-	-	0,0	-	0,0	-	-	-	-	-	-	-	-	-	1,0
3	0,92	0,5	-	-	-	-	-	-	0,2	-	-	-	-	0,3	-	-	-	-	-	-	-	-	1,0
4	1,00	0,0	-	-	1,0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,0	1,0
5	0,86	-	0,4	-	-	-	-	-	-	-	-	-	0,6	-	-	-	-	-	-	-	-	-	1,0
6	0,84	0,2	-	-	-	-	-	-	0,2	-	-	-	-	0,6	-	-	-	-	-	-	-	-	1,0
7	0,98	0,3	-	-	-	-	-	-	0,5	-	-	-	-	0,1	-	-	-	-	-	-	-	-	1,0
8	1,00	-	-	-	-	-	-	-	1,0	-	-	-	-	-	-	-	-	-	-	-	-	-	1,0
9	0,59	0,6	-	-	0,0	-	-	-	-	-	-	-	-	0,4	-	-	-	-	-	-	-	-	1,0
10	1,00	-	-	-	0,0	-	-	-	-	-	1,0	-	-	0,0	-	-	-	-	-	-	-	-	1,0
11	0,87	0,0	-	-	-	-	-	-	1,0	-	-	-	-	0,0	-	-	-	-	-	-	-	-	1,0
12	1,00	-	-	-	-	-	-	-	-	-	(0,0)	-	1,0	-	-	-	-	-	-	-	-	-	1,0
13	1,00	0,0	-	-	0,0	-	-	-	-	-	-	-	-	1,0	-	-	-	-	-	-	-	-	1,0
14	0,46	0,1	-	-	-	-	-	-	0,7	-	-	-	-	0,1	-	-	-	-	-	-	-	-	1,0
15	0,47	-	-	-	-	-	-	-	1,0	-	-	-	-	-	-	-	-	-	-	-	-	-	1,0
16	0,95	-	-	-	-	-	-	-	1,0	-	-	-	-	-	-	-	-	-	-	-	-	-	1,0
17	0,95	0,3	-	-	-	-	-	-	0,5	-	-	-	-	0,3	-	-	-	-	-	-	-	-	1,0
18	0,61	-	-	-	-	-	-	-	0,9	-	-	-	-	-	-	-	-	-	-	-	-	0,1	1,0
19	0,95	0,2	-	-	-	-	-	-	0,7	-	-	-	-	0,0	-	-	-	-	-	-	-	-	1,0
20	1,00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,0	0,0	1,0
21	1,00	-	-	-	-	-	-	-	0,0	-	-	-	-	-	-	-	-	-	-	-	-	1,0	1,0

Source: Authors' compilation.

Finally, we compare the ranking of the efficiency scores with the ranking corresponding to the productivity indicator built as Total Tax Revenue/Total budget cost. The results show that both rankings differ significantly (Table A.5). On the one hand, DEA allows for a more complete analysis of the average tax office performance as compared to our simple initial indicator of productivity. On the other, some important inputs may be missing. For instance, government administration and collection costs capture only a portion of the administrative costs of a tax system. Individuals and businesses also incur costs of paying and filing their taxes, and a complete estimate of administrative costs should include all three components.

Table A.5. Efficiency of Tax Offices in Argentina

Tax Offices (DMUs)	Tax Revenues / Office Budget (ARG$)		Efficiency Scores θ	
	Ratio	Ranking	θ	Ranking
1	72,2	2,0	1,0	1,0
2	10,1	20,0	1,0	2,0
3	58,7	5,0	1,0	3,0
4	14,5	19,0	1,0	4,0
5	56,6	6,0	1,0	5,0
6	30,8	14,0	1,0	6,0
7	52,4	7,0	1,0	7,0
8	87,3	1,0	1,0	8,0
9	41,0	10,0	1,0	9,0
10	38,7	11,0	1,0	10,0
11	37,1	12,0	0,9	11,0
12	42,5	9,0	0,9	12,0
13	45,1	8,0	0,9	13,0
14	68,7	3,0	0,9	14,0
15	36,9	13,0	0,9	15,0
16	26,6	16,0	0,9	16,0
17	61,4	4,0	0,8	17,0
18	20,4	18,0	0,6	18,0
19	23,5	17,0	0,6	19,0
20	10,1	21,0	0,5	20,0
21	28,7	15,0	0,5	21,0
Spearman's rank correlation coefficient				0,32

Source: Authors' compilation.

Appendix 2. An Estimate of the Effective Tax Rate of *Ingresos Brutos*

To evaluate a possible replacement of *Ingresos Brutos* it is necessary to: a) estimate the effective tax rate on each good and service that depends on the statutory tax rates and on the degree of cascading; b) estimate the impact on the personal and regional distribution of revenues of using a VAT (or retail sales tax) instead of the cascade tax.

Computing the Cascade of the Turnover Tax Rate

The value of production (VP) of sector i without taxes is:

<1> $$VP_i = \sum_{j=1}^{N} I_{ij} + M_i + VA_i$$

where *Iij* is the national input *j* used for the production of good *i* and *M* is the imported component in the production of *i*, both valued at purchase cost (but excluding the turnover tax and VAT), and *VA* is the value added by sector *i*. The (naïve) effective turnover tax collected from sector i (T) is:

<2> $$T_i = \left(\sum_{j=1}^{N} I_{ij}\left(1 + t_j\right) + M_i\left(1 + t_m^0\right) + VA_i\right)\left(1 + t_i^0\right) - VP$$

where t_i^0 is the statutory rate for the turnover tax on sector *i*, t_j is the effective turnover tax rate on input *j* and t_m^0 is the statutory turnover tax rate on imports (imports that enter directly into the production of good *I* do not have a cascade component). For simplicity we use a unique rate for all imported inputs aggregated in *M*, as it is the case in fact in Argentina. The previous expression can be rewritten using <1> as:

<3> $$T_i = \left(\sum_{j=1}^{N} I_{ij}\, t_j + M_i t_m^0 + VP\right)\left(1 + t_i^0\right) - VP$$

The effective tax rate is computed as the ratio of the tax paid by sector *i* to its value of production.

<4> $$t_i = \frac{T_i}{VP_i} = \left(\sum_{j=1}^{N} sh_{ij}\, t_j + sh_i t_m^0 + 1\right)\left(1 + t_i^0\right) - 1$$

Where *sh* denotes the share of input *j* or import *m* in the value of production of *i*. This expression has the interpretation of a direct and indirect effect:

<5> $$t_i = \underbrace{\left(\sum_{j=1}^{N} sh_{ij}\, t_j (1 + t_i^0) + sh_i t_m^0 (1 + t_i^0)\right)}_{\text{Cascade}} + \underbrace{t_i^0}_{\text{Direct Effect}}$$

Note that the effective tax rate is unknown and it is in both sides of the equations.

Calling *t* the vector containing all the tax rates, *S* the matrix of coefficients of local production (where each row corresponds to the share of all the national inputs used for the final production of a good), and S_m a vector with the share of imports in value of production for each sector, expression <5> can be rewritten in matrix form as:

<6> $$f(t\ ) = \left(D_{t^0}\, S\right) t + \left(D_{t^0}\, S_m\right) t_m^0 + t^0$$

which is a linear function of *t*. D_{t^0} is a diagonal matrix containing one plus the statutory turnover tax rate for each production sector in its diagonal; i.e., D_{t^0} =I+It^0 1′ where *I* is the *N*x*N* identity matrix and 1 is a *N*x1 vector of ones.

The effective tax rate vector is a fixed point of the previous expression (i.e., it is found when $(t^*) = t^*$). Since the fixed point exists and is unique for this linear function, we can solve by iteration. Alternatively, it can be solved algebraically as:

$$It\ \ - \left(D_{t^0}\, S\right) t = \left(D_{t^0}\, S_m\right) t_m^0 + t^0$$

$$\left[I - \left(D_{t^0}\, S\right)\right] t = \left(D_{t^0}\, S_m\right) t_m^0 + t^0$$

$$t = \left[I - \left(D_{t^0}\, S\right)\right]^{-1} \left[\left(D_{t^0}\, S_m\right) t_m^0 + t^0\right]$$

This is a naïve effective tax rate because the computation assumes that all of the tax is passed on to consumers. This expression is analogous to the one used by Varsano et al. (2001) (who also estimate the cascade effect of Brazilian taxes by using the input-output matrix).In this case the turnover tax is just a consumption tax at different effective rates. But some sectors cannot transfer taxes because they are price takers (especially for tradable activities). If the producer of a tradable good cannot transfer the price to the buyer the turnover tax becomes a production tax and cascade is reduced. For instance, in the extreme case that no one can pass on the tax, there is no cascade. To accommodate the fact that in some cases only a fraction of the tax can be passed on to consumers, we assume that there is arbitrage with the turnover tax on

imports, i.e., for sectors that are price takers the effective tax rate that is passed on to the next stage of the cascade will be t_m^0 (the turnover tax on imports, which do not have cascade).

To compute this effective tax rate call $\bar{D}$ an NxN diagonal matrix with ones in the diagonal except for the price taker sectors that contain t_m^0 (i.e., the matrix transforms *t* into a vector $\tilde{t}$ where the price taker sectors have t_m^0 tax rate), and $\underline{D}$ the matrix that selects the price taker sectors. We can solve it with an iterative method:

$$t_1 = \left(D_{t^0} S\right) t^0 + \left(D_{t^0} S_m\right) t_m^0 + t^0$$

So the depurated tax vector for the first stage of the iteration is:

$$t_1' = \bar{D}.t_1 + \underline{D}.t_0$$

to solve

$$t_{i+1} = \left(D_{t^0} S\right) t_i' + \left(D_{t^0} S_m\right) t_m^0 + t^0$$

where

$$t_i' = \bar{D}.t_i + \underline{D}.t_0$$

There is no closed-form solution, but a solution can be approached by iteration until $t_i \simeq t_{i-1}$. The intuition is that the effective tax rate vector that affects the final price is t_i' which means that in each stage of the iteration we force commodities effective tax rates to be t_m^0.

Finally, when using the Input-Output Matrix of Argentina, there is a matrix for inputs, and there are additional matrices that add transportation, wholesale and retail margin. When using the standard input-output matrix, which does not include these margins, the estimated cascade is at producer prices. Wholesale and retail activities are also taxed, and in general at higher tax rates, which implies that the cascade continues downstream.

Estimate of the Turnover Effective Tax on Consumption

We compute in this section the turnover tax component included in the final consumption of goods and services. The goods and services at producer level are later sold to other producers, exported or consumed domestically. In Argentina, exports of services are not in general exempt, but exports of goods are exempt (with the exception of the province of Misiones). There is nonetheless an implicit cascade component.

Exported products add to producers' transportation costs and reduce their profit margins. We assume these costs are born by the exporter and are therefore exempt from the turnover tax; this means that exported goods are subject to a producer tax given by the implicit tax rate included in the cascade.

We compute the effective producer tax rate paid by exporters of goods as:

X= Value of Production Exported at producer prices

t = Effective Tax Rate for this sector (as computed following the previous exercise)

*t*0 =Statutory Tax Rate for this sector

MgX= Value of Transportation and Wholesale Margins on Exports

tmg =Effective Tax Rate for Transportation and Wholesale Margins

*tmg*0 =Statutory Tax Rate for Transportation and Wholesale Margins

<7> $$\text{Effective Tax Rate on Exports} = \frac{X*(t - t_0) + MgX*(t_{mg} - t_{mg0})}{X + MgX}$$

For consumption, we need to make additional assumptions because we do not know the transactions involved in the commercial stage (wholesale and retail). The Input-Output Matrix of the National Account estimates independently the component of Transportation, Wholesale and Retail that goes on top of the cost at the producer level.[105] If the product goes first through wholesale and then through retail, it has a double effect on the cascade. For instance, in Buenos Aires Province the turnover tax rate on wholesale and retail is 3 percent for small firms. For instance, a product valued at $100 at the producer level with $20 of wholesale margin and $20 of retail margin would increase in effective tax rate from 2 percent at the producer level to 4.7 percent at the wholesale level and to 7.16 percent for the final consumer. But small shops compete with large and integrated retail companies, such as supermarkets, which means they cannot pass on all of the tax to consumers. Following the example of the Buenos Aires provinces, large firms in the retail and wholesale sectors are taxed at 4.5 percent (instead of 3 percent). It could be assumed that the lower of the two (small shop tax rate but with cascade versus large shop rate but without cascade) is binding in terms of incidence. We assume in our exercise that the large firm tax rate is the limit (meaning that only 4.5 percent is passed on to the consumer by small as well as large shops). We compute the effective tax rate on consumption as:

[105] See Appendix 1 for details on the input-output matrix.

C= Value of Production Consumed Domestically at producer price

t = Effective Tax Rate for this sector (as computed following the previous exercise)

t_0 =Statutory Tax Rate for this sector

MgC= Value of Transportation, Wholesale and Retail Margins on Consumption

t_c =Theoretical Tax Rate on Final Consumption

<8 > $$\text{Effective Tax Rate on Domestic Consumption} = \frac{[C*(1+t\ )+MgC]*(1+t_c)}{C+MgC}$$

Neuquen follows the same approach as Buenos Aires. Cordoba and San Luis also have tax regimes with general and reduced rates.

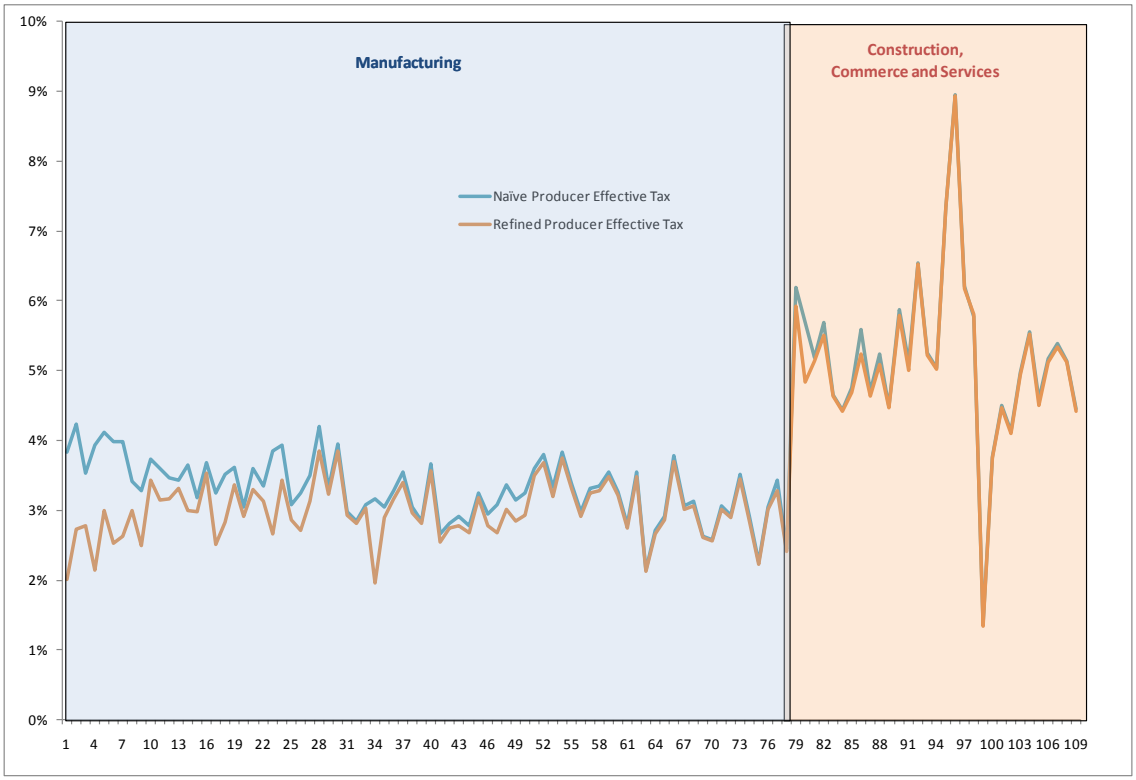
The Case of the Province of Buenos Aires

In this section we illustrate the results for the cascade and effective tax rate for Buenos Aires Province, which is among the most complex cases to compute.

In this province, the turnover tax rate for agriculture, mining and manufacturing is 1 percent for small firms and 3 percent for large firms. In the case of services the tax rate goes from 3 percent to 5.5 percent, depending again on the size of the firm.

For the production side of the cascade we use the rate for small firm, since the cascade for these firms does not exceed the 3 percent limit of large firms. In the case of transport, wholesale and retail on top of the producer price, we assume that these activities are integrated and pay the large firm tax rate (4.5 percent). Figure A.2.1 shows the relationship between the refined effective tax rate at producer prices where we assumed the effective tax rate of commodity produces cannot pass through any tax to consumers. As expected, this affects mostly the food sector and the primary sectors in manufacturing, which use commodities more intensively than others and add less value.

Figure A.2.1 Naïve vs. Refined Producer Effective Tax Rate by Sector, Turnover Tax, Buenos Aires



The same exercise yields a similar picture for different provinces, where services are in general more taxed.

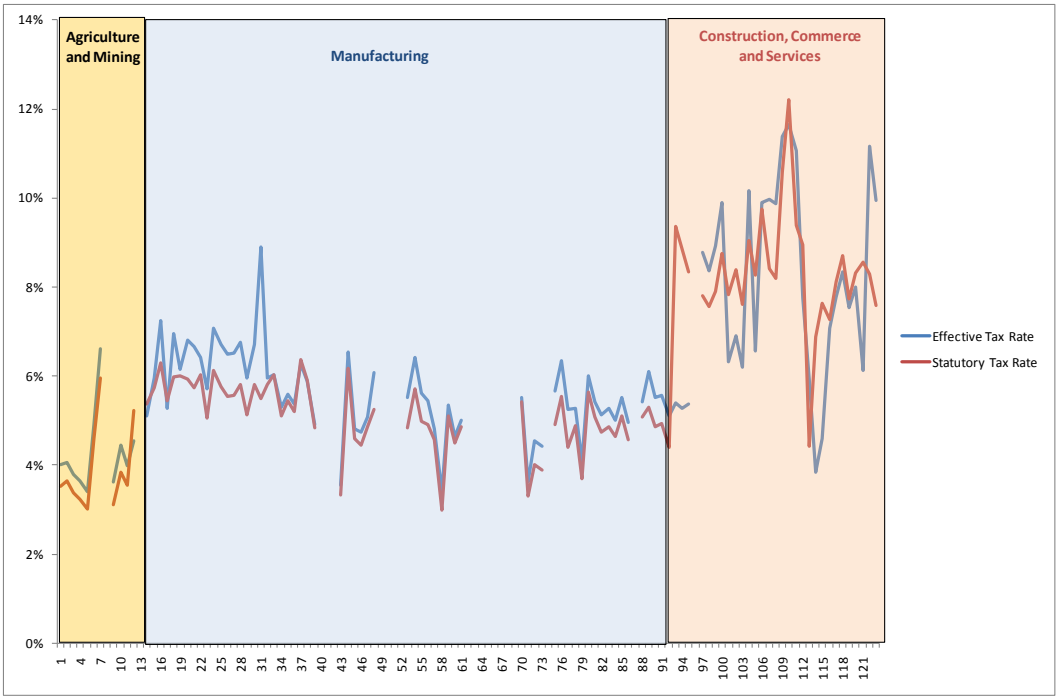
Using Effective instead of Statutory Tax Rates

In the previous exercise we use statutory tax rates, since all the provinces have exemptions and special regimes; a concern is that if we do not take into account the tax expenditures we overestimate the cascade and the equivalent tax to consumers. We compute the cascade at the producer level (i.e., without including the commercialization margin). The results show that using the small taxpayer statutory tax rate the measurement error is very small.[106]

[106] To explore more why the effective tax rate is more similar to the rate applied to small taxpayers we compute simple descriptive statistics. The results suggest the distributions are different, although the mean tax rate is similar: the distribution for the effective tax rate has more weight in both tails. This means that there are more sectors with high tax (sectors that are dominated by large taxpayers facing higher statutory tax rates) and more sectors with low tax. Since the effective tax rate is computed as the tax paid as a ratio of the sales reported to the tax agency, the

We then compute the implicit tax rate charged to final consumer, i.e., we add to the value of the goods at producer price plus the cascade of the wholesale and retail margin with the turnover tax rate (which generates the latter cascade), assuming there is no intermediate transaction in this last stage (which is consistent with the assumption that in each sector there are retail firms buying directly from producers, not allowing retail firms buying in the wholesale market to pass through to consumers the turnover tax on wholesale). Since effective and statutory tax rates for the last two stages are not very different, we obtain a similar result using either of them (Figure A.2.2).[107] The (simple) average implicit tax rate on final consumers using statutory tax rates is 5.9 percent, and that using the effective tax rate computed from provincial tax authority data is 6.2 percent.

Figure A.2.2. Implicit Tax Rate on Final Consumer
Effective Tax Rate vs. Statutory Tax Rate for Small Taxpayers



results is not driven by evasion but by exempted firms, that are not captured in our model using statutory tax rates. For more details see Artana et al. (2011).

[107] The sectors not shown in the figure are, according to the Input-Output matrix, selling only to other producers.

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