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Sección ARTÍCULOS

The role of federal transfers in regional convergence in human development indicators in Argentina *

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ABSTRACT: We analyse regional convergence between Argentine provinces in well-being indicators for the period 1970-2001. More specifically, we examine the role of regional public policy in reducing the development gap between the provinces. We find strong evidence of conditional convergence in well-being indicators. However, we find no evidence that redistributive transfers from the federal government to the provinces have had a positive effect on convergence in these indicators. In fact, we find that for some schooling, health and housing measures, the effect of federal transfers on improvement rates might have been contrary to what was expected.

Classification JEL: H77; O15.

Keywords: Regional convergence; Human development; Fiscal transfers; Argentina.

Efectos de las transferencias federales sobre la convergencia regional en indicadores de desarrollo humano en Argentina

RESUMEN: Se analiza la convergencia regional entre las provincias argentinas en indicadores de bienestar para el periodo 1970-2001. En particular, se estudia el rol de la política pública regional en la reducción de la brecha de desarrollo entre provincias. Los resultados muestran una fuerte evidencia de convergencia condicional en indicadores de bienestar. Sin embargo, no se encuentra evidencia que las transferencias redistributivas desde el gobierno federal hacia las provincias hayan

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tenido un efecto positivo sobre la convergencia de estos indicadores. Más aun, se obtiene que para algunos indicadores de educación, salud y vivienda, el efecto de las transferencias federales podría haber sido el opuesto al que se esperaría.

Clasificación JEL: H77; O15.

Palabras clave: Convergencia regional; desarrollo humano; transferencias fiscales; Argentina.

1. Background and motivation

One of the central goals of a federal form of government is to help ease the regional disparities in social and economic outcomes between the sub-national jurisdictions. To this end, most federal countries have specific financial arrangements between the different tiers of government aimed at ensuring homogeneous levels of public goods provision across the different jurisdictions. In most cases, these arrangements involve some form of tax-sharing and intergovernmental transfers according to different criteria but usually there are both devolutive and redistributive considerations [1]. An important question is whether these intergovernmental financial arrangements are in fact bridging the development gap between rich and poor regions. In this paper we examine the impact of decentralized public policy on regional development by focusing on its effect on a set of well-being indicators rather than on economic performance measures.

Our contribution is twofold: firstly, unlike previous studies for Argentina, we analyse regional convergence in measures of well-being and human development rather than focusing on economic performance; and secondly, we analyse the effect of decentralized fiscal policy on regional convergence (or the lack thereof) across regions in well-begin indicators.

[1] Most federal countries have designed specific schemes for articulating financial linkages between the different levels of government in multi-tiered systems. In Brazil, both regional states and municipalities receive transfers from the federal government. In Australia, federal transfers are critical to state budgets representing as much as 50% of total revenues. The largest transfer is that corresponding to the proceeds of the goods and services tax (GST) followed by other specific transfers. Similarly, the unconditional Equalization Transfer in Canada accounts for more than 80% of total federal transfers to the provinces. In Argentina, by and large intergovernmental fiscal relations are channelled through the *Régimen de Coparticipación Impositiva* which introduces criteria for vertical —primary—and horizontal —secondary— distribution of funds. Not only federal countries have inter-governmental financial arrangements in place. Non-federal, fiscally decentralised countries have often similar arrangements between the central government and the territorial or local units. This is the case of Colombia a politically-unitary country whose territorial divisions —*departamentos and municipios*— receive earmarked transfers from the national government to finance decentralized spending. Another country where the role of transfers from the central government has become increasingly important is China, particularly after the introduction of the Tax-Sharing System (TSS) reform in 1994 which was aimed at improving the efficiency of sub-national spending and reducing horizontal inequalities. Other unitary countries like Portugal and Chile have also increased their degree of fiscal decentralization in recent years.

While this topic has often attracted the attention of scholars, it has only in recent years become more actively researched due to several reasons. Firstly, the fact that several countries have moved towards more fiscally decentralized schemes in the last 30 years has prompted scholars to analyse this topic in more detail. Additionally, the growing importance of regions as clusters of economic activity has also highlighted the relevance of inter-governmental financial relations. Finally, although only a small number of countries are *de-iure* federations, they use up around half of the earth's surface area and their citizens make up more than 40% of the world's population [2]. Furthermore, a large part of the literature is focused on studying the economic and political determinants of federal transfers while the strand that focuses on the economic and social effects of transfers has been given less attention. Our paper contributes to this latter literature by means of investigating the role of federal transfers in regional convergence across a wide range of social and well-being indicators.

The paper is organized as follows. The next section surveys some related literature. Section 3 provides a brief background of the system of inter-governmental financial arrangements in Argentina. Section 4 describes some of the theoretical insights that motivate the choice of our approach. In section 5 we describe the methodology, data and analyse the distributional dynamics of the selected indicators. Section 6 lays out the econometric specification and proceeds to estimation of the baseline models. Section 7 concludes.

2. Related literature

The relationship between federal transfers and economic convergence –convergence in GDP- has been profusely studied in the empirical literature. Coulombe and Lee (1995, 1998) and Kaufman *et al.* (2003) find a positive effect of transfers on convergence for Canadian provinces while Rodriguez (2006) finds no significant effect. The evidence is not conclusive for the Australian case either. While Ramakrishnan and Cerisola (2004) conclude that there is no significant impact of transfers on convergence in economic outcomes during the 90's decade, Rangarajan and Srivastava (2004) find that transfers are associated with regional economic convergence. In a recent study, Martínez-Vazquez and Timofeev (2010) find a negative effect of federal transfers on regional economic convergence in the Russian Federation. Similarly, Bagchi (2003) finds that regional disparities have increased in India during the last 50 years despite the persistence of federal transfers to the regions. Some recent studies (Maciel *et al.*, 2008; de Oliveira, 2008) suggest that transfers to states and municipalities have had a positive effect on the process of regional convergence in Brazil [3.] Other studies

[2] This recent interest on the effect of inter-governmental transfers has also been fuelled by the experiences of some of the most heavily populated countries which, are either federal by law (India and the Russian Federation) or share some trademark federalist traits.

[3] It should be noted, however, that while convergence across Brazilian regions seems to have taken place at different sub periods in recent decades, there is no evidence of long-term trend towards regional convergence.

have examined the role of transfers on regional convergence in quasi-federal countries —i.e. similar to *de-facto* federations—. Recent contributions include work on China by Shuanyou and Hongxia (2003), Heng (2008), and Candelaria *et al.* (2009) which find that inter-governmental transfers have not been beneficial towards easing regional inequalities in recent decades. Ferreira Dias and Silva (2004) finds no significant association between central transfers and regional convergence for Portugal.

There are several empirical studies on regional economic convergence in Argentina [Elías (1995); Elías and Fuentes (1998); Willington (1998); Utrera and Koroch (1998; 2000); Garrido *et al.* (2002); Marina (2001); Ramón-Berjano (2002); Figueras *et al.* (2003); and Figueras *et al.* (2004)]. By and large, these studies reject the hypothesis of absolute convergence across Argentine provinces while they find some support for the conditional convergence hypothesis —i.e. the evidence suggests Argentine provinces tend to converge to their own stationary state—. In other words, once one accounts for control variables that reflect differences between the regions other than the level of the variable of interest in the convergence equation —this variable is the literacy rate in Utrera and Koroch (2000) but often the investment-to-GDP ratio and the population growth rate are also used—, the coefficient for the GDP variable becomes significant [4]. Somewhat surprisingly, none of these studies test the convergence hypotheses in relation with well-being standards which may be related not only with economic strength but also with the amount of federal transfers that the regions receive.

This is all the more relevant since, in recent years, a growing number of studies have focused on convergence in well-being standards in various countries [Easterly (1999); Easterlin (2000); Kenny (2005); Branisa and Cardozo (2009) and Royuela and García (2010)] [5]. We follow this line of work in this paper and add to this growing literature by presenting the Argentine case. Our main goal is to evaluate the extent to which public policy from the central government has contributed to alleviating regional disparities in well-being standards in Argentina. We are only aware of one previous study that analyses convergence in such terms. Porto (1994) finds evidence of absolute convergence in well-being indicators but no evidence of absolute converge in income. Interestingly, the author finds a positive effect of redistribute fiscal policy on convergence in well-being measures.

[4] Other papers analyse convergence by different economic activities (Figueras *et al.,* 2003 and Figueras *et al.,* 2004) and also the extent to whether σ-convergence has taken place (Russo and Ceña Delgado, 2000).

[5] It is often argued that the correlation between income measures and development measures is hardly straightforward and linear. Furthermore, some authors observe that while convergence in income has often proved difficult to achieve between developed and developing countries, the gaps in human development and well-being indicators have been gradually decreasing.

3. Tax-sharing and inter-governmental federal transfers in Argentina

Argentina is politically organized as a federal country with three tiers of government: a central government (the federal level), 23 mid-level governments (the provincial level) and 2259 local governments (the local level). Although technically a local government, the Ciudad Autónoma de Buenos Aires is often considered as another mid-level jurisdiction due to its fiscal and political autonomy and to the fact that it has political representation in the national Congress.

Inter-governmental financial relations in Argentina are articulated through a tax-coordination scheme known as *Régimen de Coparticipación Impositiva*. Given that tax collection is highly centralized, while public expenditure is more evenly distributed between the three levels of government, this scheme introduces a mechanism of compensating the provinces and municipalities for the delegation of tax collection on the national level. In other words, this mechanism seeks to alleviate (at least partially) the vertical fiscal imbalance arising due to the mismatch between expenditure and revenue for the different levels of government. The principles governing the distribution of the Co-participation fund are outlined in the National Constitution, and reflect both devolutive —according to the distribution of public services between the different levels— and redistributive —attending to differences in economic standards and development between the different sub-national units— criteria [6]. Table 1 shows the evolution of the spending and revenue shares of the two levels of government for four years covering our period of analysis. It can be seen that despite significant fluctuations in the federal and provincial shares, the vertical imbalance has been a persistent feature within the federal architecture. An example of these imbalances is the increasing share of federal transfers into provincial current revenues, which in the 30 years period covered by our analysis increased by 12%, achieving more than 60% of total current revenues. This figures have increased even further in recent times.

In practice, there are several channels through which this tax-sharing system introduces biases and distortions that conspire against the goals of narrowing both the vertical and horizontal fiscal gaps. Firstly, there are several important taxes which are not part of the tax-sharing scheme —most importantly export and import tariffs and labour taxes—; many others which are subject to significant deductions before adding

[6] The specific criteria and transfer shares are defined in the *Ley Nacional* 23548 which establishes two stages for the distribution of the Co-participation fund. The first stage, known as the primary distribution, specifies transfer shares for the Federal level (42.34%) and the Provincial level including the local level (56.66%). The remainder (1%) goes to the Federal level as part of a fund to meet extraordinary circumstances in the sub-national units. The second stage is known as the secondary distribution and specifies the share of each province within the amount allocated to the Provincial level. The coefficients for each province in the secondary distribution do not follow strictly criteria based on population or transferred competences but also incorporate a significant redistributive criterion. This means that rich and populated provinces like Buenos Aires, Cordoba, and Mendoza have coefficients smaller than their shares in the country population.

up to the Co-participation fund; and a few others which have a specific assignment. Secondly, there are strong underlying incentives to preserve the *status quo* concerning the redesign of the tax-sharing system attending to the past and present shortcomings of the system to overcome regional inequalities. These incentives are closely linked with the way political power is organized and distributed in federal Argentina. Finally, in the last 30 years, several public services have been decentralized to the provinces while the criteria and coefficients specified in the legal documents have not been modified to reflect the new situation. Moreover, some important new taxes have been introduced although the proceeds of its collection do not go into the resource pool [7].

Due to these provisions, the working of the tax-sharing system in Argentina is far from being a standardized and streamlined process. In fact, it is useful to understand the tax-sharing system and particularly the «devolution» of taxes to provincial governments as involving two types of transfers from the national government: auto-

Table 1. Spending and revenue by level of government

Public expenditure (% GDP)				
	Total	*Federal*	*Provinces*	*Provinces/Total*
1970	23.75	15.76	7.99	33.64
1980	31.38	22.13	9.25	29.48
1990	27.96	19.12	8.84	31.62
2000	34.83	23.91	10.92	31.35
Public revenues (% GDP)				
	Total	*Federal*	*Provinces*	*Provinces/Total*
1970	21.93	17.50	4.43	20.20
1980	22.44	17.14	5.30	23.62
1990	18.24	14.11	4.13	22.64
2000	26.74	20.68	6.06	22.66
Provinces: % of Total current revenues (Constant 2001 values)				
	Own tax revenues	*Own non-tax revenues*	*Total own current revenues*	*Transfers from Federal Government*
1970	36.92	8.26	45.19	54.81
1980	35.22	11.01	46.23	53.77
1990	26.83	11.59	38.43	61.57
2000	28.41	10.00	38.41	61.59

Note: Exclude Municipalities and City of Buenos Aires. Source: Porto (2004).

[7] The vertical fiscal imbalance worsened in the late 70's and throughout the 80's, and even more during the 90's when several important public services —health, education— were transferred from the nation to the provinces. While some *de facto* provisions were introduced into the tax-sharing scheme to further compensate the provinces for these new functions, in practice these fell short of achieving the goal of reducing the vertical fiscal imbalance.

matic and non-automatic. Automatic transfers, in turn, can be general —tied to general taxes and for general purpose-expenditures— or specific —tied to specific taxes and for specific expenditures—. In both cases, the distribution of these transfers is ruled by criteria established by law as discussed above. Non-automatic transfers, on the other hand, are not related with any general or specific taxes and are given out at the will of the ruling administration. Its distribution is essentially based on political criteria or on extraordinary circumstances.

4. Fiscal transfers, public expenditure and the Dutch disease

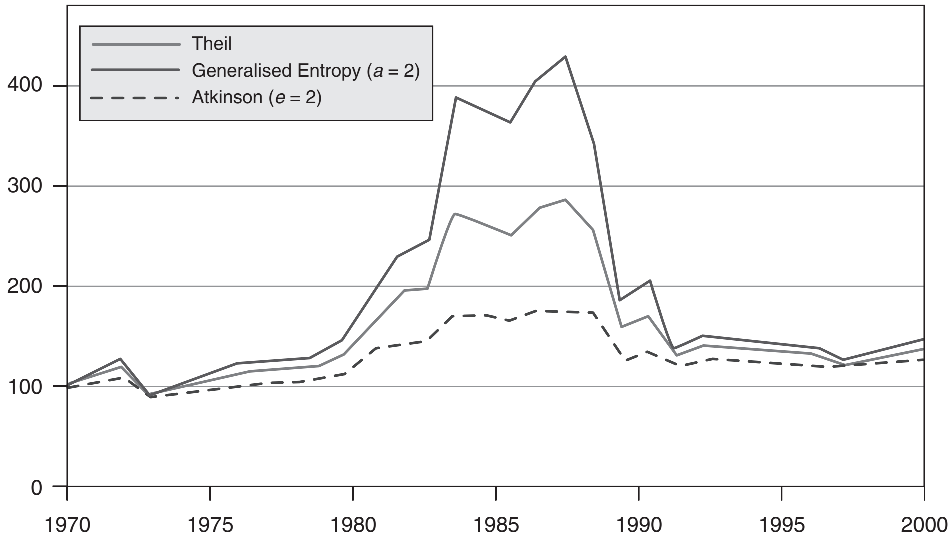
As mentioned earlier, the evidence suggests that Argentina provinces are not converging (in absolute terms) in economic conditions (Porto, 1994, 1996; Elías, 1995; Utrera and Koroch, 1998; Marina, 2001; and Ramón-Berjano, 2002). In fact, not only have most relevant studies failed to find a negative and significant sign for the β coefficient, but also this can be quickly, albeit less rigorously, perceived from the trends presented in figure 1, where we present the evolution of three inequality measures of GDP per capita. After a reduction in the first half of the 1970s, all measures increased substantially until the mid/late eighties, after which there was an important reduction as the country was leaving behind a period of very high inflation which ended in an hyperinflation episode in 1989, and to a lesser extent another one in 1991. However, the reduction observed in the nineties was not large enough to compensate completely for the deterioration observed until the late eighties. This evidence would actually suggests that there has been a worsening in regional income inequalities over the last four decades, which is in line with all the previous literature cited earlier.

However, it is possible that, while the income gap between the provinces has not been reduced, provinces have come closer in terms of other indicators which may reflect well-being and living standards more adequately. This is particularly relevant to us in this paper since we are most interested in studying the role of public policy in helping overcome long-standing differences in development levels. More specifically, since federal public policy, in this paper measured strictly in terms of transfers per capita to the regional governments, is likely to affect public spending by the regional governments, it is possible that some development variables —like infant mortality rates, educational levels and child undernourishment— are also affected to some extent.

Automatic transfers can be considered as a form of an unconditional grant to the governments in that there are no restrictions on how the money is ultimately allocated. But since they account for a large part of provincial revenues, these are often used to finance public expenditures and other purposes. However, even if these transfers increase public spending, there is no guarantee that they will effectively contribute to higher incomes or better living standards. Furthermore, the fact that these transfers are automatic and unconditional may pose additional problems due a possible weakening of accountability incentives by the provincial governments [8]. Additionally, because of

[8] In this sense, other transfers, such as capital or extraordinary transfers, may be associated with greater external control and/or tighter accountability constraints. On the other hand, since these transfers

Figure 1. Inequality measures of provincial GDPs per capita (Index 1970 = 100)



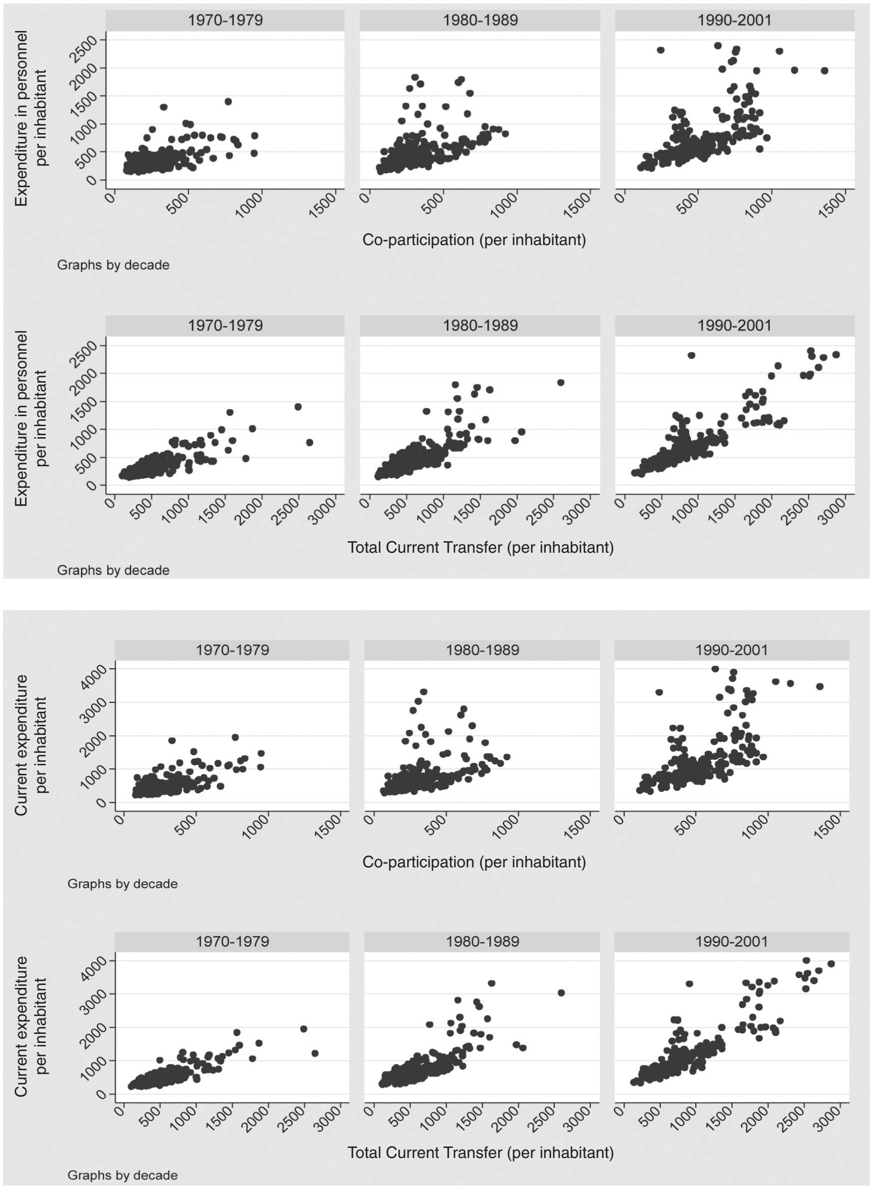
their nature, these transfers are designed to include some redistributive component in their allocation which is meant to reduce regional inequalities across various dimensions; given that these transfers have been persistently higher for some of the poorer regions, it is desirable to analyse their effectiveness in terms of selected measures.

The theoretical underpinnings of the previous considerations are rooted in the traditional literature of the so-called transfer paradox in a static setting (Brecher and Bhagwati, 1982; Bhagwati *et al.*, 1983; Yano, 1983) and in a dynamic setting (Galor and Polemarchakis, 1987; Haaparanta, 1989; and Cremers and Sen, 2008) and the more recent political economy of federalism and inter-governmental transfers. A recent literature has also suggested that this phenomenon may be associated with a Dutch-disease-like phenomenon working at the sub-national level (McMahon, 1996; Paldam, 1997; Capello and Figueras, 2007). More specifically, we argue that it is possible that unconditional transfers from the central government are used in a way that provides spending capacity for the regional governments but affects the possibilities for long-term growth due to the adverse incentives it creates for private investment and production. One application of this phenomenon focusing on its impact on the regional labour markets is Capello *et al.* (2009) who find that a higher level of transfers per capita increases the wage premium paid by the public sector relative to the private sector, which leaves the latter facing a stronger pressure in the regional job market.

As can be clearly seen from the scatter plot in figure 2, high transfers per capita are associated with higher current public expenditure and higher expenditure in per-

are often discretionary and, in many cases, politically motivated, the implications for accountability may not be that straightforward.

Figure 2. Transfers and Public Expenditure



sonnel, although the relationship appears to have increased over time, and it looks like more evident in the case of Total Current Transfers [9]. In table 2 we show the results

[9] Even an stronger positive correlation is found if transfers and expenditures are normalized by provinces' GDP.

Table 2. Federal Transfers and Public Expenditures $\ln\left(EXP_{it}\right)=\alpha+\sum_{d}\beta_{d}\left(d_{d}\times\ln\left(TR_{it}\right)\right)+\phi_{t}+\eta_{i}+u_{it}$

Dependent variable: expenditure in personnel (per inhabitant)														
In(COPpc) × $d_{1970-1979}$	–0.1895 (0,142)	0.6556** (0.35)	0.2728*** (0.044)	0.2897*** (0.040)	0.6735*** (0.011)	0.2290*** (0.024)	0.2942*** (0.023)							
In(COPpc) × $d_{1980-1989}$	0.0101 (0.128)	0.6819*** (0.029)	0.3138*** (0.042)	0.3451*** (0.036)	0.6962*** (0.011)	0.2309*** (0.028)	0.3389*** (0.027)							
In(COPpc) × $d_{1990-2001}$	0.0733 0.098)	0.6974*** (0.026)	0.3823*** (0.052)	0.4513*** (0.045)	0.7982*** (0.011)	0.3191*** (0.034)	0.4507*** (0.036)							
In(TCTpc) × $d_{1970-1979}$								0.0747 (0.115)	0.5278*** (0.027)	0.3042*** (0.033)	0.3150*** (0.032)	0.5663*** (0.007)	0.3055*** (0.022)	0.3127*** (0.020)
In(TCRpc) × $d_{1980-1989}$								0.2377** (0.085)	0.5992*** (0.024)	0.3147*** (0.030)	0.3286*** (0.027)	0.667*** (0.009)	0.2699*** (0.025)	0.3008*** (0.021)
In(TCTpc) × $d_{1990-2001}$								0.3246*** (0.098)	0.7036*** (0.023)	0.4804*** (0.038)	0.4994*** (0.035)	0.7942*** (0.008)	0.5144*** (0.030)	0.4973*** (0-026)
Observations	736	736	736	736	736	736	736	736	736	736	736	736	736	736
R-squared	0.838							0.850						
Number of provinces	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Dependent variable: Total current expenditure in personnel (per inhabitant)														
In(COPpc) × $d_{1970-1979}$	–0.0923 (0.112)	0.5409*** (0.036)	0.2819*** (0.045)	0.2569*** (0.041)	0.6947*** (0.012)	0.2677*** (0.029)	0.1674*** (0.021)							
In(COPpc) × $d_{1980-1989}$	0.0432 (0.117)	0.5552*** (0.030)	0.3340*** (0.041)	0.3200*** (0.035)	0.6353*** (0.012)	0.2554*** (0.023)	0.2404*** (0.020)							
In(COPpc) × $d_{1990-2001}$	0.1195 (0.104)	0.6299*** (0.027)	0.4011*** (0.0509	0.3996*** (0.044)	0.7520*** (0.011)	0.3432*** (0.031)	0.3274*** (0.025)							
In(TCTpc) × $d_{1970-1979}$								0.1818 (0.110)	0.4911*** (0.028)	0.3139*** (0.031)	0.3103*** (0.031)	0.5912*** (0.011)	0.3510*** (0.019)	0.2803*** (0.018)
In(TCRpc) × $d_{1980-1989}$								0.2992*** (0.088)	0.5670*** (0.025)	0.3629*** (0.028)	0.3716*** (0.027)	0.6191*** (0.013)	0.3627*** (0.018)	0.3216*** (0.015)
In(TCTpc) × $d_{1990-2001}$								0.3856*** (0.096)	0.7028*** (0.023)	0.4765*** (0.036)	0.4886*** (0.034)	0.7679*** (0.013)	0.5122** (0.026)	0.4667*** (0.023)
Observations	736	736	736	736	736	736	736	736	736	736	736	736	736	736
R-squared	0.885							0.899						
Number of provinces	23	23	23	23	23	23	23	23	23	23	23	23	23	23

Estimator	FE	FGLS	FGLS	FGLS	FGLS	FGLS	FGLS	FE	FGLS	FGLS	FGLS	FGLS	FGLS	FGLS
Heteroskedasticity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cross-sectional correlation	No	No	No	No	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
AR(1) Autocorrelation	No	No	Yes (C)	Yes (P)	No	Yes (C)	Yes (P)	No	No	Yes (C)	Yes (P)	No	Yes (C)	Yes (P)

EXP and *TR* are. respectively, public expenditure and federal transfers per inhabitant for province *i* in year *t;* transfers are measured by co-participation per inhabitant (COPpc) or total current transfers per inhabitant (TCTpc); d_d are three dummy variables to distinguish between the following periods: 1970-1979, 1980-1989, and 1990-2001; ϕ_i and η_i are timed and provinces fixed effects respectively. C: AR(1) common to all cross sections. P: AR(1) specific to each cross section. *** $p < 0.01$, ** $p < 0$-05, * $p < 0.1$.

from the estimation of a very parsimonious model of public expenditure on Federal transfers. As expected from the evidence in figure 2, in most cases there is a positive relationship between the two variables, with this relationship being significant when the model is estimated by Feasible Generalised Least Squares (FGLS) allowing for the presence of heteroskedasticity and an error structure with cross-section and/or AR(1) correlations [10]. It is also possible to observe that the econometric results indicates that over time there has been an increase in the degree of correlation between transfers and expenditures [11].

5. Methodology and data

There are essentially two different approaches to measuring convergence. The original approach, due to Barro (1991), Barro and Sala-i-Martin (1991, 1992) and Sala-i-Martin (1996), is concerned with both β- and σ-convergence. This approach, also known as the classical approach to convergence tests for β-convergence by regressing the average growth rate of the variable of interest on its initial value. A negative and significant coefficient indicates the existence of convergence [12]. On the other hand, σ-convergence studies how the dispersion of the variable of interest evolves over time. If the coefficient of variation tends to decrease over time, there is evidence of σ-convergence. The second approach is known as the distributional approach to convergence and it originated with the work of Quah (1993, 1996, 1997). Rather than exploring measures of position and dispersion, this approach focuses on the distributional dynamics of the data. The specific methodology consists in estimating kernel densities for variables relative to the national average.

Data come from different sources. Human development and well-being indicators are from the *Censo Nacional de Población y Vivienda* for the years 1970, 1980, 1991 and 2001, and from the *Dirección de Estadísticas e Información de Salud, Ministerio de Salud de la Nación*. Data on transfers from the Federal Government to the Provinces are from the database compiled by the *Economic Department of Universidad Nacional de La Plata*. A full description of variables, sources, and time coverage are in the Appendix A. In Appendix B there is a set of descriptive statistics.

Before testing for β-convergence using an econometric model, in table 3 we report the evolution of the coefficient of variation for the different variables. In this case is possible to observe that the dispersion in the distribution has decreased over time for the cases of primary and secondary school enrolment, life expectancy, infant mortality, household-owners, and housing overcrowding, while it has increased

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[10] We thanks to an anonimus referee for sugesting thise approach.

[11] The three dummy variables for the periods 1970-1979, 1980-1989, and 1990-2001, are calculated, roughly, one for each of the three decades covered by our analysis.

[12] This approach is used to test for both absolute and conditional convergence. The β-convergence approach was initially derived from a neoclassical growth model, however its use has been widespread to analyze other variables without necessarily having a proper theoretical support. As mentioned earlier, examples for the case of convergence in well-being indicators are Easterly (1999), Easterlin (2000), Kenny (2005), Branisa and Cardozo (2009), and Royuela and García (2010).

for illiteracy, unsatisfied basics needs, maternal mortality, and deficient dwellings. It can also be observed that, aside from the cases of primary school enrolment and household-owners, there has been an increase in the dispersion for all the indicators from 1991 to 2001, despite the fact that the average per capita transfers during this period was higher for most of the provinces.

Table 3. Coefficients of variation and confidence intervals

		1970	*1980*	*1991*	*2001*
Illiteracy rate	Cv	46.74	47.27	51.15	54.33
	95% CI	35.36-57.82	34.66-61.70	38.69-66.63	41.15-70.75
Primary school enrolment ratio	Cv	5.15	2.97	2.12	1.29
	95% CI	3.85-6.74	1.68-4.53	1.24-3.28	0.83-1.85
Secondary school enrolment ratio	Cv	24.76	15.30	14.38	14.24
	95% CI	19.40-31.62	11.34-20-13	11.08-18.70	11.48-17.84
Life expectancy at birth	Cv		3.30	1.75	2.03
	95% CI		2.54-4.24	1.40-2.20	1.60-2.60
Maternal mortality rate	Cv		48.48	67.37	75.32
	95% CI		37.08-61.98	48.58-93.25	56.86-101.13
Infant mortality rate	Cv		26.35	22.01	29.05
	95% CI		20.69-33.72	17.29-27.90	23.07-36.86
Unsatisfied basic needs	Cv		34.19	36.71	37.13
	95% CI		25.18-44.57	29.85-45.41	30.89-45.14
Percentage of deficient dwellings	Cv		40.45	62.99	65.39
	95% CI		32.62-50.16	32.25-112.90	47.97-90.05
Ratio of housing overcrowding	Cv		47.57	44.28	52.03
	95% CI		36.62-60.90	33.28-56.93	41.66-64.90
Household-owners as percentage of total households	Cv		14.56	6.46	6.22
	95%CI		12.11-17.58	5.44-7.83	4.85-7.98

The coefficient of variation is defined as the ration between the standard deviation and the arithmetic mean of the variable. Due to the small sample size, we report bootstrapped confidence intervals using a bias-corrected and accelerated (BCa) percentile confidence approach. The number of replications is 999.

6. Testing for β-convergence

Although it is often customary to test for both absolute and conditional convergence, in this paper we are mostly interested in testing for the latter[13]. The reason

[13] In most cross-national convergence studies starting with Barro (1991), there are usually controls for variables that could potentially affect the steady states of different countries such as the ratio of investment to GDP, and the like.

is that despite the fact that the distinction between absolute and conditional convergence becomes less relevant at the state/regional level (Barro and Sala-i-Martin, 1992), there are sharp differences in the level of federal transfers to the Argentine provinces. Since these transfers are a key source of income for the provinces, it is likely that the level of transfers, particularly the average level of transfers to the region for a given period, could affect its steady state.

Our baseline equation is a standard convergence equation expanded to include our variable of interest:

$$\Delta Y_{i,t,t-j} = \alpha + \beta \ln\left(Y_{i,t-j}\right) + \gamma \ln\left(TR_{i,t-j+1,t}\right) + \phi_t + \eta_i + \varepsilon_{i,t} \qquad (1)$$

where $\Delta Y_{i,t,t-j}$ is the average annual growth rate of variable Y between censuses in years t and $t-j$ for province i; $Y_{i,t-j}$ is the value of variable Y in the initial year $t-j$ for province i; ϕ_t and η_i are time and province fixed effects, while $\varepsilon_{i,t}$ is an error term. With regards to the Transfer variable, $TR_{i,t-j+1,t}$ is measured by the cumulated per capita transfers between $t-j+1$ and t $\left(TR_{i,t-j+1,t} = \sum_{h=t-j+1}^{t} TR_{i,h}\right)$.

In the two upper blocks of table 4 we report the estimates of equation (1) when using a fixed effect model. However, considering some of the criteria followed to distribute transfers among provinces, it could be the case that the level of transfers is not exogenous, so we estimate equation (1) also using an instrumental variable estimator (IV). Taking into account the positive relationship between transfers and public expenditure as reported in table 2, we use total current expenditure and expenditure in personnel, per inhabitant, as instruments. The results from the IV estimations are reported in the two lower blocks of table 4. As we can see form the Hansen test, in almost all cases we do not reject the null about the validity of the instruments.

Prior to the interpretation of our results, it is important to note the different scaling and measurement of the human development variables. In some cases, as with primary and secondary school enrolment, life expectancy, and household-owners a higher value implies an improvement alongside these dimensions. For all the other cases, illiteracy, unsatisfied needs, maternal and infant mortality, deficient dwellings and housing overcrowding since these measure the ratio of the population with specific deficits to the total population, a higher value implies a deterioration of this variable. This has implications for the interpretation of the coefficients. Firstly, for the β-coefficient, regardless of whether higher or lower values represent improvements, the regression coefficient on the initial value of the variable has to be negative for convergence to exist [14].

[14] This can be illustrated with a simple example. Suppose Y is the variable we are interested in testing for convergence where a higher value implies a better performance. Then, convergence would require *lower* initial values for Y to be associated with *higher* positive growth rates (higher ΔY). Suppose now Y is a variable where a lower value implies a better performance. Then, convergence would require *higher* initial values for Y to be associated with *lower* negative growth rates (lower $-\Delta Y$) —or higher growth rates in absolute value. In both cases, we see that the implied sign is

From table 4, we have that the β-coefficient in almost all the regressions is negative and statistically significant suggesting that provinces with initial worse standards of well-being and human development have improved at a faster pace than provinces with higher standards across these dimensions. With regards to the role of federal transfers, the results are much less robust, as well as there is a large heterogeneity across the different variables.

For the education variables, we expect a positive sign for the school enrolment rate (primary and secondary) variables and a negative one for the illiteracy rate. As reported in table 4, for the illiteracy rate, the estimated coefficients are almost always not significant, and also there is no clear pattern about their sign. For the school enrolment variables, the coefficients are also mostly not statistically significant. Moreover, contrary to what is expected when they are significant the estimates are negative.

With regards to the health variables, here we expect a positive sign for life expectancy and a negative coefficient for maternal and infant mortality. For life expectancy, even when the coefficients are positive in 3 out of 4 cases, they are always not significant. For maternal mortality in all cases, and in 2 out of 4 cases for infant mortality, we obtain the opposite sign, however they are mostly not significant, specially in the case of infant mortality.

For the housing variables, we expect a positive sign for the proportion of household-owners and a negative coefficient for the other three variables: unsatisfied basic needs, deficient dwellings and housing overcrowding. For unsatisfied basics needs there is no clear pattern with regard the sign of the coefficients, negative when using the FE estimator and positive when using the IV estimator, however in the only case we obtain a significant estimate, the coefficient is, as expected, negative. For housing overcrowding, once again, we do not have conclusive evidence about the direction of the effect played by federal transfers, with the four estimates rendering coefficients not statistically significant. For deficient dwellings, as in the case of unsatisfied basic needs, the results fail to produce coefficients with the same signs, positive when using a FE estimator and negative for the IV estimator, and in the only case the estimate is significant the coefficient is positive. Finally, for house hold-owners, 3 out of 4 estimates are significant, but most important in the four cases we obtain, at odds with what is expected, a negative estimate.

A characteristic of socio-economic variables in Argentina, is the existence of a long-run and relatively stable regional pattern. Maps 1 to 10 show the value of each indicator for each province at the initial and final years of our sample. For each indicator, provinces are grouped into five quintiles. As it is possible to observe, there is a relative clear regional structure, with north-west and north-east provinces showing the worst performance. For the largest provinces, Buenos Aires (BUE), Córdoba (CBA), Mendoza (MZA), and Santa Fe (SFE), their rankings usually put them among those

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negative. Now, suppose X is a control variable, as public transfers in our case. If Y is a variable where a higher value implies a better performance, then a *positive* coefficient on X implies that a *higher* X is associated with a *higher (positive)* ΔY (improvements in Y over time). Contrarily, if Y is a variable where a lower value implies a better performance, then a *negative* coefficient on X implies that a *higher* X is associated with a *lower (negative)* ΔY (improvements in Y over time).

Table 4. β-conditional convergence

	Illiteracy rate		*Primary school enrolment ratio*		*Secondary school enrolment ratio*		*Life expectancy at birth*		*Maternal mortality rate*	
Y(t-j)	–4.8307** (1.778)	–4.4501** (1.921)	–7.3696*** (1.399)	–7.6149*** (1.454)	–7.5228*** (0.957)	–7.7440*** (0.869)	–7.2209*** (1.589)	–6.7537*** (2.053)	–11.8013*** (1.068)	–13.7114*** (1.233)
ln(coparticipation)	0.4505 (0.634)		–0.3287** (0.134)		–3.2829*** (0.632)		0.3033 (0.201)		73.0520*** (21.196)	
ln(total current transfers)		–0.4168 (0.906)		–0.3010* (0.146)		–1.7912 (1.296)		0.0361 (0.258)		11.0801 (10.577)
Observations	67	67	69	69	69	69	46	46	44	44
R-squared	0.831	0.830	0.942	0.938	0.935	0.920	0.587	0.549	0.848	0.768
Number of provinces	23	23	23	23	23	23	23	23	22	22
Estimator	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE
	Infant mortality rate		*Unsatisfied basic needs*		*Deficient dwellings*		*Housing overcrowding*		*Household-owners*	
Y(t-j)	–13.6061*** (2.330)	–13.5256*** (2.330)	–9.9596*** (1.482)	–11.5275*** (2.148)	–16.1165*** (2.616)	–15.3213*** (2.434)	–5.0896* (2.831)	–4.3559 (2.688)	–8.2811*** (0.566)	–9.1181*** (0.512)
ln(coparticipation)	0.3558 (1.517)		–2.7027* (1.511)		9.6679 (6.827)		–2.3566 (2.008)		–1.6432*** (0.359)	
ln(total current transfers)		0.1304 (3.184)		–0.5723 (1.944)		9.7807* (4.889)		0.5933 (2.337)		–1.6043*** (0.477)
Observations	46	46	46	46	46	46	46	46	46	46
R-squared	0.570	0.570	0.777	0.756	0.920	0.922	0.793	0.785	0.953	0.953
Number of provinces	23	23	23	23	23	23	23	23	23	23
Estimator	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE

	Illiteracy rate		*Primary school enrolment ratio*		*Secondary school enrolment ratio*		*Life expectancy at birth*		*Maternal mortality rate*	
Y(t-j)	–7.9081* (4.184)	–3.6164* (1.951)	–6.9393*** (1.603)	–7.7492*** (1.299)	–6.9997*** (1.893)	–7.4670*** (1.658)	–6.3473*** (1.742)	–5.2992** (2.652)	–13.1847*** (1.420)	–13.7239*** (1.033)
ln(coparticipation)	5.5239 (6.575)		–0.6748 (0.613)		–12.9650 (9.133)		–0.3517 (0.700)		21.1671 (48.108)	
ln(total current transfers)		–3.6533 (2.996)		–0.0536 (0.489)		9.5363 (8.595)		0.8744 (1.259)		7.3849 (35.107)
Observations	66	66	69	69	69	69	46	46	44	44
R-squared	0.545	0.760	0.934	0.936	0.780	0.806	0.407	0.264	0.800	0.766
Number of provinces	22	22	23	23	23	23	23	23	22	22
Estimator	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV
R-squared (First Stage)	0.808	0.848	0.791	0.836	0.781	0.838	0.925	0.898	0.987	0.898
Hansen test (p-value)	0.806	0.671	0.095	0.056	0.895	0.113	0.110	0.447	0.932	0.733
	Infant mortality rate		*Unsatisfied basic needs*		*Deficient dwellings*		*Housing overcrowding*		*Household-owners*	
Y(t-j)	–15.4456*** (3.111)	–11.4999*** (4.301)	–13.4844*** (3.103)	–11.8406*** (2.104)	–11.3201** (4.403)	–13.6307*** (4.286)	–3.5109 (2.908)	–4.5189 (3.300)	–8.0060*** (0.597)	–9.7158*** (0.820)
ln(coparticipation)	5.9957 (8.678)		2.7826 (4.715)		–21.8105 (17.061)		2.7936 (5.392)		–2.4885** (1.020)	
ln(total current transfers)		–7.2870 (14.507)		0.4892 (4.766)		–14.6114 (27.995)		–7.9505 (10.412)		–4.7781 (3.417)
Observations	46	46	46	46	46	46	46	46	46	46
R-squared	0.522	0.482	0.687	0.752	0.846	0.867	0.753	0.665	0.948	0.874
Number of provinces	23	23	23	23	23	23	23	23	23	23
Estimator	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV
R-squared (First Stage)	0.928	0.908	0.952	0.908	0.934	0.900	0.930	0.895	0.936	0.898
Hansen test (p-value)	0.533	0.477	0.750	0.415	0.617	0.345	0.347	0.527	0.150	0.178

All regressions include time and provinces fixed effects.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors between brackets.

with a better performance, while the City of Buenos Aires (CABA) is in almost all cases among those with the best indicators. The southern provinces, Chubut (CHU), La Pampa (LPA), Neuquén (NQN), Río Negro (RNG), Santa Cruz (SCR) and Tierra del Fuego (TDF) show the most important improvements between the initial and final years of our sample, while for the remaining provinces (centre-east, centre-west) their relative positions vary according to the indicator we look at.

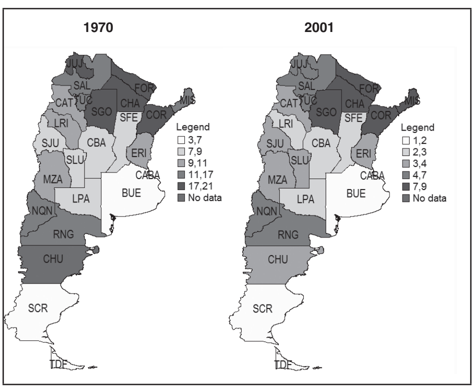
To take into account for this apparent regional behaviour, we estimate also the following panel data spatial error model (SEM):

$$\Delta Y_{i,t,t-j} = \alpha + \beta \ln\left(Y_{i,t-j}\right) + \gamma \ln\left(TR_{i,t-j+1,t}\right) + \phi_t + \eta_i + \varepsilon_{i,t}$$
$$\varepsilon_{i,t} = \lambda W \varepsilon_{i,t} + u_{i,t} \qquad (2)$$

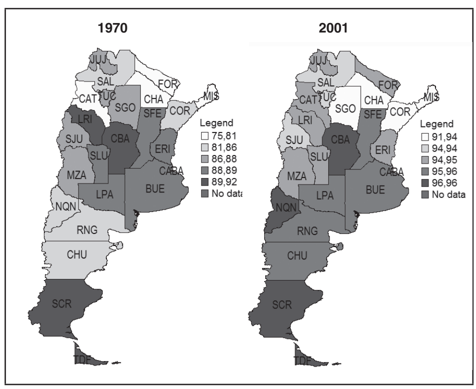
where W is a spatial matrix for the idiosyncratic error component. The matrix W is constructed using geospatial data, more specifically a dataset that contains the coordinates for the boundaries for 21 provinces. Due to the lack of data for Chubut and Tierra del Fuego, these two provinces are excluded from the model.

In table 5 we report the results from the SEM model. As in the case of the other two estimators, we obtain evidence of conditional convergence, with the estimates being significant in all cases. With regards to the role of transfers from the Federal Government to the provinces, we obtain coefficients that are statistically significant in the case of primary and secondary school enrolment, unsatisfied basic needs, maternal mortality, deficient dwellings, and household-owners. However, in line with the previous results, in all but one occasion, deficient dwellings when using co-participation transfers, the coefficients have the opposite sign to what would be expected.

Map 1. Illiteracy rate [15]

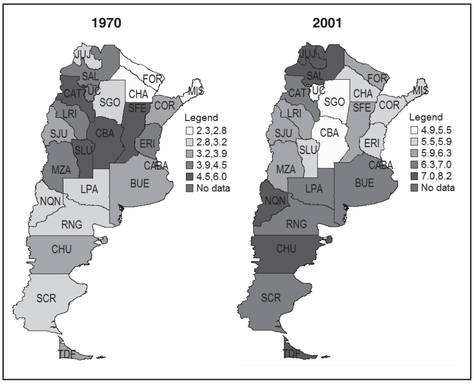


Map 2. Primary school enrolment rate

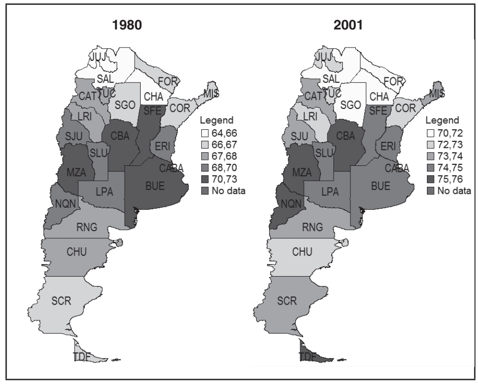


[15] See Table A.2 in Appendix A for a description of the codes corresponding to the name of each province.

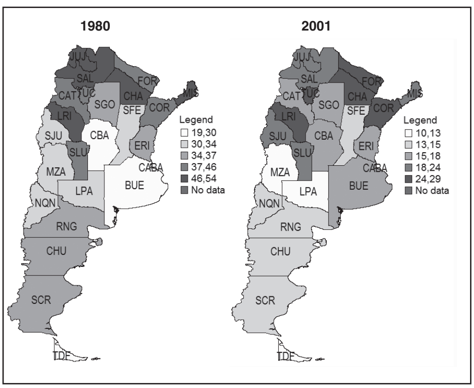
Map 3. Secondary school enrolment rate



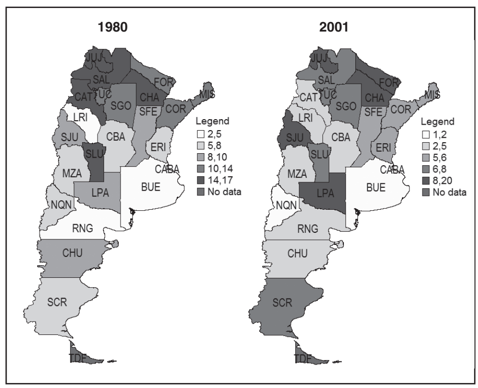
Map 4. Life expectancy



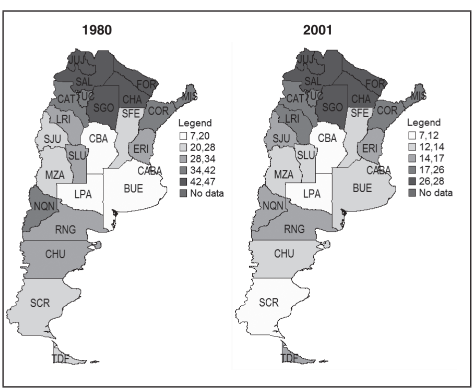
Map 5. Infant mortality rate



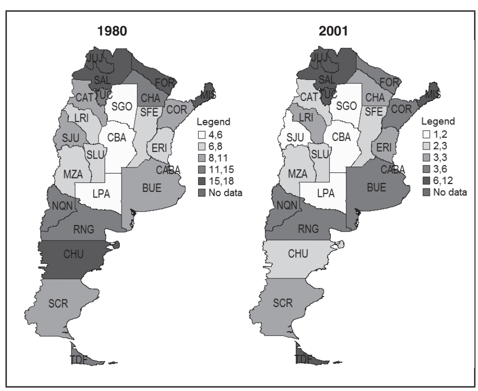
Map 6. Maternal mortality rate



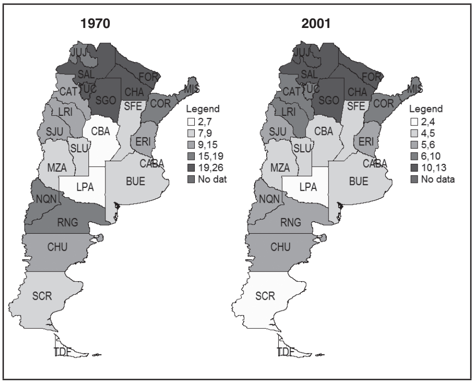
Map 7. Unsatisfied basic needs rate



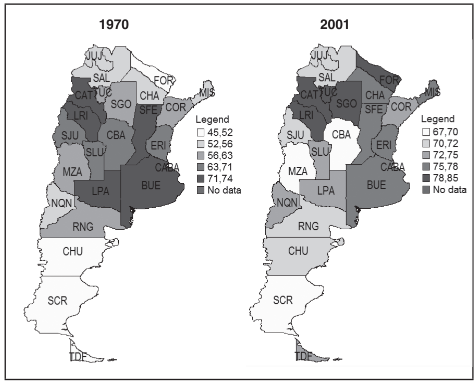
Map 8. Percentage of deficient dwellings



Map 9. Housing overcrowding rate



Map 10. Household-owners as percentage of total households



7. Concluding remarks

There are several conclusions that we draw from the analysis in this study. Firstly, the evidence suggests that there has been a convergence process between the Argentine provinces in the levels of different socio-economic and well-being standards. Although the evidence suggests that there is absolute convergence in some indicators, we found better support for the hypothesis that provinces have tended to converge to their own stationary states.

Concerning the role of public policy towards regional governments, the evidence suggests that federal fiscal transfers have not had most of an impact on the rates at which provinces improve their well-being standards. In fact, if anything, we find that fiscal transfers are negatively correlated with these improvement rates for a few indicators. This seems to be the case with some educational variables (primary and secondary school enrolment rates), health-related (rate of maternal mortality) and housing standards (deficient dwellings and household-owners rates).

These results provide partial support to our theoretical presumption on the negative effects of transfers per capita. Regardless of any positive spillovers effects associated with untied current transfers per capita to the provinces (possibly through greater spending capacity due to higher public employment and wages), the evidence presented here does not seem to support the idea that fiscal federal transfers are allocated to the type of public spending that improves well-being and human development in a long-run perspective. However, they left us without a convincing empirical explanation behind the convergence process that we find for all the variables we considered here. Among possible plausible explanations, it is the role of conditional tied cash transfers, such as funding from the Federal government for specific programs aimed at improving welfare indicators, particularly to benefit those jurisdictions with lower levels of development. Also, since the 1990s current transfers have lost importance at the expense of capital transfers, over which provinces have a lower degree of

Table 5. β-conditional convergence
Spatial Error Model

	Illiteracy rate		*Primary school enrolment ratio*		*Secondary school enrolment ratio*		*Life expectancy at birth*		*Maternal mortality rate*	
Y(t-j)	–6.9633*** (1.694)	–7.2324*** (1.701)	–7.4115*** (1.463)	–7.5896*** (1.577)	–8.2590*** (0.760)	–8.3573*** (0.778)	–8.2274*** (1.671)	–7.6124*** (1.463)	–12.6497*** (0.991)	–13.8721*** (1.286)
ln(coparticipation)	0.2319 (0.996)		–0.3742 (0.218)		–2.4525*** (0.814)		–0.8229 (0.512)		53.4646** (19.418)	
ln(total current transfers)		0.7117 (0.898)		–0.2830* (0.140)		–2.1933** (0.932)		–0.1784 (0.169)		9.7152 (6.551)
Lambda	0.2850 (0.208)	0.3382 (0.213)	0.3817*** (0.079)	0.4117*** (0.106)	0.3107* (0.157)	0.2636 (0.153)	0.3378* (0.179)	0.4775*** (0.158)	–0.8183*** (0.194)	–0.7832*** (0.234)
Observations	63	63	63	63	63	63	42	42	42	42
R-squared	0.133	0.142	0.801	0.801	0.553	0.540	0.099	0.365	0.111	0.286
Number of provinces	21	21	21	21	21	21	21	21	21	21
	Infant mortality rate		*Unsatisfied basic needs*		*Deficient dwellings*		*Housing overcrowding*		*Household-owners*	
Y(t-j)	–14.6139*** (2.390)	–13.8955*** (2.516)	–8.0760*** (1.224)	–8.6042*** (1.351)	–20.7279*** (2.102)	–20.0000*** (2.257)	–6.2219*** (2.101)	–6.4457*** (2.113)	–8.4898*** (0.465)	–8.9077*** (0.711)
ln(coparticipation)	5.8722 (6.724)		6.5063*** (2.209)		–33.9218** (13.136)		7.1544 (6.071)		–4.0485** (1.511)	
ln(total current transfers)		0.3431 (3.245)		0.4026 (0.976)		8.1221* (4.022)		2.7458 (1.928)		–1.4063** (0.608)
Lambda	–0.4008* (0.229)	–0.3810 (0.256)	–0.0244 (0.211)	0.0689 (0.210)	0.2460 (0.259)	–0.0734 (0.228)	0.3770*** (0.124)	0.3938** (0.152)	–0.4614 (0.272)	–0.0927 (0.173)
Observations	42	42	42	42	42	42	42	42	42	42
R-squared	0.014	0.031	0.011	0.048	0.164	0.582	0.126	0.079	0.001	0.081
Number of provinces	21	21	21	21	21	21	21	21	21	21

All regressions include time and provinces fixed effects.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors between brackets.

autonomy when deciding about its use. Unfortunately we do not have access to these types of transfers for a period of time as we have discussed here.

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Appendix A

A.1. Variable definitions, description, and data sources

Variable	*Definition*	*Period*	*Source*
Illiteracy rate	Percentage of population aged 14 or older who lacks the ability to read and write.	1970, 1980, 1991, 2001	National Census, INDEC
Primary school enrolment ratio	Ratio of population between 6 and 12 years attending primary school to total population between 6 and 12 years	1970, 1980, 1991, 2001	National Census, INDEC
Secondary school enrolment ratio	Ratio of total enrolled students in secondary schools to total population	1970, 1980, 1991, 2001	National Census, INDEC
Life expectancy at birth	Estimated average life expectancy of newborns from a given population at a given year This calculation holds mortality rates by age fixed at the time of birth.	1980, 1991, 2001	National Census, INDEC
Maternal mortality rate	Defined as the ratio of the number of maternal deaths during pregnancy and childbirth per 10000 live births.	1980, 1990, 2001	Dirección de Estadísticas e Información de Salud, Ministerio de Salud de la Nación
Infant mortality rate	Ratio of the number of deaths of child under one (1) year of age per 1000 live births.	1980, 1991, 2001	Dirección de Estadísticas e Información de Salud, Ministerio de Salud de la Nación
Unsatisfied basic needs	Percentage of households with any of the following: 1) Overcrowding in housing conditions -more than three (3) persons per room; 2) Deficient dwellings; 3) Deficient sanitary conditions; 4) School non-attendance -at least one child aged 6-12 does not attend school	1980, 1991, 2001	National Census, INDEC
Deficient dwellings	Ratio of the number of deficient dwellings (shacks, tents, mobile homes) to the total number of dwellings	1980, 1991, 2001	National Census, INDEC
Housing overcrowding	Ratio of households with more than three (3) persons per room to the total number of households.	1980, 1991, 2001	National Census, INDEC
Household-owners as percentage of total households	Ratio of households whose members have ownership of both dwelling and land to the total number of households.	1980, 1991, 2001	National Census, INDEC
Transfers	Transfers per capita. Defined as the amount of resources transferred from the National to the regional level corresponding to the *Regímen de Coparticipación* and Total Current Transfers in prices of 2001.	1970-2001	Departamento de Economía de la Universidad Nacional de La Plata

A.2. Codes used in Maps 1 to 10

Province Name	*CODE*	*Province Name*	*CODE*	*Province Name*	*CODE*
Buenos Aires	BUE	Jujuy	JUJ	San Juan	SJU
Catamarca	CAT	La Pampa	LPA	San Luis	SLU
Chaco	CHA	La Rioja	LRI	Santa Cruz	SCR
Chubut	CHU	Mendoza	MZA	Santa Fe	SFE
Corrientes	COR	Misiones	MIS	Santiago del Estero	SGO
Córdoba	CBA	Neuquén	NQN	Tierra del Fuego	TDF
Entre Ríos	ERI	Río Negro	RNG	Tucumán	TUC
Formosa	FOR	Salta	SAL		

Appendix B

B.1. Descriptive statistics by year

		Illiteracy rate	*Primary school enrolment*	*Secondary school enrolment*	*Life expectancy*	*Maternal mortality*	*Infant mortality*	*Unsatisfied basic needs*	*Deficient dwellings*	*Housing overcrowding*	*Household-owners*	*Transfers*
Mean	**1970**	11.75	85.14	3.55								231.27
	1980	9.36	92.64	4.70	67.31	9.18	37.66	31.97	10.39	13.27	59.93	424.02
	1991	5.90	95.38	7.32	70.67	7.16	25.43	22.61	3.52	10.10	65.18	514.60
	2001	4.07	94.60	6.26	73.19	6.42	17.33	17.83	3.88	6.36	74.51	473.78
	Overall	7.71	91.94	5.46	70.39	7.59	26.81	24.14	5.93	9.91	66.54	410.92
Minimum	**1970**	3.20	74.60	2.25								90.72
	1980	2.40	83.30	3.16	64.18	1.80	20.30	18.80	4.79	5.82	45.40	161.50
	1991	1.20	88.50	5.71	68.37	2.20	15.60	12.00	2.03	4.00	58.71	153.26
	2001	0.70	90.90	4.88	69.97	1.00	10.10	9.20	1.25	1.79	66.88	147.91
	Overall	0.70	74.60	2.25	64.18	1.00	10.10	9.20	1.25	1.79	45.40	90.72
Maximum	**1970**	20.90	90.80	4.80								595.42
	1980	17.70	95.50	5.67	71.28	17.40	54.20	46.80	18.36	25.54	74.10	922.61
	1991	12.30	98.10	9.82	72.79	21.80	33.20	34.30	12.91	18.10	73.50	916.26
	2001	9.00	96.20	8.17	75.24	19.70	28.90	28.00	12.15	13.26	85.39	1157.69
	Overall	20.90	98.10	9.82	75.24	21.80	54.20	46.80	18.36	25.54	85.39	1157.69
Standard Deviation	**1970**	5.07	4.25	0.77								102.02
	1980	4.03	2.71	0.65	1.98	4.29	9.09	9.53	3.95	5.72	8.82	181.36
	1991	2.77	2.05	1.07	1.20	4.57	5.21	7.57	2.23	4.06	4.29	216.99
	2001	2.05	1.23	0.88	1.42	4.62	4.79	6.21	2.56	3.12	4.59	223.13
	Overall	4.67	4.91	1.68	2.88	4.58	10.67	9.77	4.35	5.21	8.65	214.02
Skewness	**1970**	0.19	–0.70	0.12								1.89
	1980	0.29	–1.85	–0.50	0.38	0.07	0.26	0.11	0.38	0.34	0.12	1.14
	1991	0.57	–1.78	0.61	0.01	1.47	–0.11	0.31	3.42	0.34	0.18	0.45
	2001	0.69	–1.22	0.47	–0.44	1.56	0.75	0.45	1.61	0.67	0.26	1.29
	Overall	0.88	–1.37	0.23	–0.33	0.95	0.71	0.60	1.14	0.77	–0.39	1.05

Note: see Table in A.1 in Appendix A for a description of variables, units of measure and sources.

B.2. Descriptive statistics by province

Province	Descriptive measure	Illiteracy rate	Primary school enrolment	Secondary school enrolment	Life expectancy	Maternal mortality	Infant mortality	Unsatisfied basic needs	Deficient dwellings	Housing overcrowding	Household-owners	Transfers
Buenos Aires	Mean	3.30	92.45	5.39	72.01	2.87	22.53	15.87	5.55	5.82	74.22	147.16
	Minimum	1.70	88.20	3.89	69.96	2.10	15.00	13.00	2.08	3.98	71.38	125.97
	Maximum	5.00	96.40	6.75	73.99	4.30	28.40	19.90	9.94	7.57	78.02	161.50
	St. Deviation	1.48	4.06	1.52	2.01	1.24	6.85	3.59	4.01	1.79	3.42	15.19
	Skewness	0.08	–0.05	–0.03	–0.07	0.70	–0.42	0.53	0.40	–0.09	0.47	–0.70
Catamarca	Mean	6.55	91.33	6.07	70.37	8.40	29.73	26.87	4.72	11.05	73.43	635.89
	Minimum	3.20	80.20	4.46	67.11	3.70	15.50	18.40	2.06	7.48	69.71	280.28
	Maximum	9.50	95.20	7.62	73.38	13.60	41.90	37.60	8.11	14.28	79.90	916.26
	St. Deviation	2.99	7.42	1.38	3.14	4.97	13.32	9.80	3.09	3.41	5.62	274.39
	Skewness	–0.11	–1.15	–0.05	–0.14	0.18	–0.28	0.40	0.41	–0.19	0.68	–0.39
Chaco	Mean	14.98	84.80	4.46	67.92	13.90	36.83	35.20	5.46	16.04	65.88	383.56
	Minimum	9.00	74.60	2.68	64.77	11.80	24.00	27.60	2.61	10.32	54.50	170.73
	Maximum	20.90	92.80	5.80	69.97	15.90	54.20	44.80	10.67	21.29	77.92	522.28
	St. Deviation	5.34	7.83	1.46	2.77	2.05	15.60	8.77	4.52	5.50	11.72	155.59
	Skewness	–0.01	–0.40	–0.28	–0.61	–0.09	0.49	0.40	0.70	–0.15	0.10	–0.64
Chubut	Mean	4.25	91.48	5.70	69.82	4.40	22.33	20.87	7.06	9.11	61.33	361.68
	Minimum	3.50	82.80	3.22	66.71	2.30	13.10	13.40	2.62	4.95	50.60	264.78
	Maximum	5.00	96.60	7.90	72.16	8.50	34.80	29.80	15.40	12.79	71.55	436.55
	St. Deviation	1.06	6.25	2.20	2.81	3.55	11.21	8.30	7.23	3.94	10.49	72.53
	Skewness	0.00	–0.72	–0.11	–0.46	0.71	0.49	0.31	0.70	–0.22	–0.09	–0.47
Corrientes	Mean	12.93	90.30	5.14	69.30	8.03	32.20	30.50	5.72	13.11	66.36	345.84
	Minimum	7.20	83.00	3.70	65.79	5.40	23.50	24.00	3.14	8.66	58.50	242.99
	Maximum	18.30	94.20	6.23	72.03	9.80	44.60	40.60	9.29	17.77	74.81	410.71
	St. Deviation	5.08	5.11	1.08	3.19	2.32	11.03	8.87	3.19	4.56	8.17	72.16
	Skewness	–0.07	–0.87	–0.48	–0.43	–0.59	0.55	0.62	0.52	0.08	0.13	–0.81
Córdoba	Mean	4.60	94.43	5.60	72.99	3.20	20.90	14.43	3.23	5.27	65.81	227.81
	Minimum	2.30	90.30	4.80	71.28	2.40	16.20	11.10	1.60	3.86	61.30	128.26
	Maximum	7.00	96.60	7.15	74.90	4.80	24.20	19.40	5.82	6.34	69.43	282.11
	St. Deviation	2.10	2.82	1.06	1.82	1.39	4.18	4.38	2.27	1.27	4.14	69.87
	Skewness	0.05	–0.99	1.02	0.20	0.71	–0.55	0.59	0.64	–0.45	–0.38	–0.85

B.2. *(continue)*

Province	*Descriptive measure*	*Illiteracy rate*	*Primary school enrolment*	*Secondary school enrolment*	*Life expectancy*	*Maternal mortality*	*Infant mortality*	*Unsatisfied basic needs*	*Deficient dwellings*	*Housing overcrowding*	*Household-owners*	*Transfers*
Entre Ríos	Mean	6.93	93.03	5.40	71.37	4.70	24.63	19.93	4.52	7.45	71.01	325.23
	Minimum	3.40	87.70	3.93	68.43	4.20	14.90	14.70	2.39	4.70	68.00	171.69
	Maximum	10.60	95.90	6.94	74.08	5.20	35.80	27.90	8.00	10.06	76.08	420.67
	St. Deviation	3.17	3.66	1.26	2.83	0.50	10.52	7.01	3.04	2.68	4.42	111.58
	Skewness	0.06	–0.95	0.10	–0.15	0.00	0.25	0.61	0.65	–0.10	0.67	–0.68
Formosa	Mean	12.10	89.18	5.03	68.86	16.20	30.50	36.37	7.66	18.97	65.22	554.28
	Minimum	6.80	78.40	2.25	66.41	12.90	24.50	28.00	3.44	13.26	47.20	239.11
	Maximum	18.60	94.20	7.33	70.80	21.80	38.10	46.80	15.65	25.54	79.22	803.16
	St. Deviation	5.19	7.46	2.18	2.24	4.88	6.94	9.57	6.93	6.19	16.38	250.17
	Skewness	0.30	–0.92	–0.32	–0.40	0.67	0.40	0.38	0.70	0.25	–0.42	–0.33
Jujuy	Mean	11.15	93.10	6.55	68.35	15.00	34.33	34.93	10.34	14.69	61.73	383.83
	Minimum	5.40	86.90	2.79	64.18	10.40	18.40	26.10	5.18	10.48	51.80	277.59
	Maximum	18.10	95.90	9.82	72.50	19.70	51.40	45.10	18.36	18.18	71.65	487.43
	St. Deviation	5.66	4.17	3.02	4.16	4.65	16.53	9.57	7.04	3.90	9.92	93.98
	Skewness	0.25	–1.10	–0.22	–0.01	0.04	0.13	0.25	0.62	–0.32	0.00	–0.03
La Pampa	Mean	5.70	93.48	5.04	71.59	6.27	21.07	13.33	2.74	4.22	71.89	521.82
	Minimum	3.00	87.70	3.03	68.43	3.40	12.40	9.20	1.27	2.34	69.18	319.57
	Maximum	8.60	96.30	6.55	74.78	7.90	30.30	18.80	4.79	5.82	74.98	634.91
	St. Deviation	2.46	3.94	1.69	3.18	2.49	8.96	4.94	1.83	1.75	2.92	139.53
	Skewness	0.10	–1.01	–0.24	0.01	–0.69	0.12	0.46	0.52	–0.29	0.24	–0.93
La Rioja	Mean	5.80	93.38	6.02	70.05	5.33	32.17	24.20	4.41	9.65	74.16	614.67
	Minimum	2.70	88.90	4.40	67.22	1.80	23.50	17.40	3.20	7.06	69.14	310.73
	Maximum	9.30	95.80	7.95	72.54	10.80	45.80	31.60	6.59	11.79	79.25	824.56
	St. Deviation	2.91	3.06	1.49	2.68	4.80	11.95	7.12	1.89	2.40	5.06	216.70
	Skewness	0.17	–0.98	0.34	–0.23	0.62	0.63	0.15	0.69	–0.33	0.02	–0.70
Mendoza	Mean	6.48	92.55	5.50	72.75	5.20	22.50	16.27	3.22	6.16	63.08	235.93
	Minimum	3.60	85.70	4.42	70.58	3.90	12.10	13.10	1.63	4.50	60.70	190.07
	Maximum	9.50	96.30	7.01	74.95	6.00	31.80	20.40	5.98	7.10	66.88	259.51
	St. Deviation	2.67	4.77	1.25	2.18	1.14	9.90	3.74	2.40	1.44	3.33	31.14
	Skewness	0.06	–0.89	0.27	0.03	–0.65	–0.20	0.44	0.68	–0.69	0.64	–1.03

B.2. *(continue)*

Province	*Descriptive measure*	*Illiteracy rate*	*Primary school enrolment*	*Secondary school enrolment*	*Life expectancy*	*Maternal mortality*	*Infant mortality*	*Unsatisfied basic needs*	*Deficient dwellings*	*Housing overcrowding*	*Household-owners*	*Transfers*
Misiones	Mean	11.28	88.60	4.57	69.25	8.47	34.53	30.90	7.98	10.70	64.63	298.57
	Minimum	6.70	80.60	2.66	65.57	5.30	19.60	23.50	3.54	6.16	52.10	193.67
	Maximum	16.40	92.40	5.71	72.69	10.80	51.90	39.20	14.60	14.54	77.21	368.05
	St. Deviation	4.26	5.40	1.39	3.57	2.84	16.29	7.89	5.84	4.23	12.55	74.10
	Skewness	0.16	–1.07	–0.66	–0.12	–0.49	0.27	0.21	0.59	–0.30	0.01	–0.76
Neuquén	Mean	8.80	91.78	5.53	71.59	4.93	20.10	22.83	6.34	11.01	62.94	370.02
	Minimum	3.90	82.50	2.79	68.13	1.00	13.00	15.50	3.58	5.11	54.10	306.24
	Maximum	14.80	96.90	7.91	75.24	7.60	31.70	33.90	11.24	17.13	71.92	440.19
	St. Deviation	4.86	6.54	2.36	3.56	3.48	10.13	9.75	4.25	6.01	8.91	58.64
	Skewness	0.27	–0.82	–0.15	0.10	–0.58	0.66	0.60	0.69	0.06	0.03	0.14
Río Negro	Mean	8.78	91.08	5.24	70.82	3.17	24.83	23.20	6.86	10.39	61.98	368.27
	Minimum	4.20	80.70	2.83	67.73	2.60	14.70	16.10	3.43	4.84	56.40	235.30
	Maximum	14.50	96.90	7.43	73.86	3.60	35.70	32.80	13.29	16.23	70.10	437.66
	St. Deviation	4.56	7.35	2.17	3.07	0.51	10.52	8.63	5.57	5.70	7.19	92.65
	Skewness	0.32	–0.80	–0.09	–0.03	–0.45	0.13	0.49	0.70	0.09	0.57	–0.89
Salta	Mean	10.30	91.10	6.40	68.46	12.10	34.70	34.60	9.60	15.74	60.91	322.41
	Minimum	5.20	82.90	4.08	64.58	6.50	19.10	27.50	4.82	11.95	52.10	215.39
	Maximum	16.00	94.50	9.13	71.88	17.40	52.10	42.40	16.81	19.05	70.89	388.98
	St. Deviation	4.84	5.50	2.25	3.67	5.46	16.57	7.47	6.36	3.57	9.45	75.27
	Skewness	0.14	–1.11	0.22	–0.23	–0.10	0.20	0.17	0.60	–0.23	0.22	–0.81
San Juan	Mean	6.15	92.65	5.61	70.87	7.80	24.50	19.17	4.38	7.55	64.82	420.97
	Minimum	3.20	86.60	3.44	67.84	5.80	18.80	14.30	1.61	5.58	61.39	232.15
	Maximum	8.90	96.20	7.90	73.63	8.90	30.10	26.00	9.46	9.47	70.27	561.99
	St. Deviation	2.65	4.18	1.85	2.90	1.73	5.65	6.09	4.41	1.95	4.77	146.17
	Skewness	–0.07	–0.91	0.11	–0.17	–0.70	–0.03	0.53	0.70	–0.05	0.64	–0.42
San Luis	Mean	6.13	92.73	5.52	71.06	8.80	27.87	19.80	4.31	7.49	67.65	513.93
	Minimum	3.20	87.70	4.58	68.32	6.00	17.80	13.00	2.19	4.58	61.12	263.27
	Maximum	8.40	95.20	6.48	74.06	13.80	37.20	27.70	7.08	8.98	75.24	700.38
	St. Deviation	2.59	3.40	0.78	2.88	4.34	9.72	7.41	2.51	2.52	7.12	184.24
	Skewness	–0.16	–1.05	0.04	0.17	0.69	–0.14	0.27	0.44	–0.71	0.27	–0.55

B.2. *(continue)*

Province	*Descriptive measure*	*Illiteracy rate*	*Primary school enrolment*	*Secondary school enrolment*	*Life expectancy*	*Maternal mortality*	*Infant mortality*	*Unsatisfied basic needs*	*Deficient dwellings*	*Housing overcrowding*	*Household-owners*	*Transfers*
Santa Cruz	Mean	3.48	94.93	6.06	69.64	6.73	22.93	16.00	5.80	5.60	58.92	749.24
	Minimum	1.60	90.70	2.86	65.57	6.10	14.50	10.10	3.40	2.97	51.00	595.42
	Maximum	5.80	97.70	9.15	72.93	7.10	34.40	22.70	10.59	7.94	67.05	869.72
	St. Deviation	1.87	2.98	2.66	3.74	0.55	10.29	6.34	4.15	2.50	8.03	114.73
	Skewness	0.29	–0.77	–0.06	–0.36	–0.68	0.49	0.23	0.71	–0.22	0.05	–0.47
Santa Fe	Mean	4.98	93.60	5.42	72.31	5.37	23.60	15.30	3.75	6.23	71.78	233.51
	Minimum	2.70	88.70	4.63	70.47	3.10	14.30	11.90	2.03	4.14	69.36	145.28
	Maximum	7.20	96.20	6.54	74.17	8.30	34.30	20.00	6.88	8.14	75.48	280.72
	St. Deviation	2.05	3.39	0.94	1.85	2.66	10.07	4.20	2.71	2.01	3.26	63.14
	Skewness	–0.03	–0.92	0.25	0.02	0.43	0.25	0.51	0.70	–0.16	0.61	–0.76
Santiago del Estero	Mean	11.68	91.43	4.25	69.12	9.47	26.37	35.20	3.06	14.63	72.76	397.66
	Minimum	6.60	86.80	2.93	66.01	7.10	14.80	26.20	1.25	9.97	59.40	151.97
	Maximum	16.70	93.30	6.03	71.53	13.10	35.10	45.80	5.24	19.91	85.39	540.43
	St. Deviation	4.50	3.09	1.47	2.83	3.19	10.44	9.90	2.02	5.00	13.01	170.87
	Skewness	–0.01	–1.13	0.28	–0.43	0.61	–0.46	0.29	0.32	0.23	–0.10	–0.88
Tierra del Fuego	Mean	1.88	95.05	5.78	70.19		15.70	22.20	12.54	4.11	61.09	749.06
	Minimum	0.70	90.80	3.24	65.57		10.10	15.50	12.15	1.79	45.40	90.72
	Maximum	3.20	98.10	8.17	74.84		20.30	25.60	12.91	6.53	72.12	1157.69
	St. Deviation	1.14	3.09	2.70	4.63		5.17	5.80	0.38	2.37	13.96	460.55
	Skewness	0.14	–0.61	–0.01	0.01		–0.34	–0.71	–0.13	0.08	–0.55	–0.83
Tucumán	Mean	7.40	92.25	5.23	70.28	6.60	31.70	27.23	7.17	12.95	68.85	289.78
	Minimum	3.90	85.80	3.97	67.40	3.60	24.50	20.50	2.56	7.51	60.50	168.03
	Maximum	11.20	95.10	6.94	72.42	10.40	42.00	36.60	12.73	19.03	78.47	366.15
	St. Deviation	3.35	4.33	1.24	2.59	3.47	9.15	8.37	5.15	5.79	9.05	86.39
	Skewness	0.09	–1.11	0.60	–0.48	0.40	0.55	0.52	0.33	0.20	0.25	–0.77

Note: see Table in A.1 in Appendix A for a description of variables, units of measure and sources.