Does a Federal Country Needs Federal Transfers when it has Labor Mobility?

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Does a Federal Country Needs Federal Transfers when it has Labor Mobility?[2]

UAbstract

The United States is recognized as a country where labor mobility between states is high. Usually, when some states experience periods of economic difficulties, people move to other states that offer better perspectives, which may alleviate depressions.

Despite of this flexibility in the labor market, the Federal Budget still grants some significative amount of aid to the states. Does this help do any good or is it even necessary when labor mobility is significative? In this paper we assess the efficiency of having federal transfers to states when workers' mobility is high. We use data for the 50 states of the USA and perform panel data analysis. We reach positive effects of federal transfers and migration in the relative performance of each state and also in the convergence of the states' income to the union's average. However, we note that the positive effect of migration is seen in lagged differences (short-run effect) and the federal transfers effect is seen in lagged levels (long-run effect). Moreover, quantitatively, the federal transfers have more effects than outmigration.

JEL Classification: H77, R23, C33.

Keywords: Internal Migration, Federal Transfers, Convergence, Panel Data.

1. INTRODUCTION

Labor mobility in the United States is usually high, so does the Federal Government still need to grant some aid to the states? We jointly analyze the effects of the two mechanisms on convergence of income by states. We address this problem considering the short-run dynamics.

Labor mobility may contribute to income convergence. However, when labor mobility is

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residual, national governments may contribute to convergence between poor and rich states. This is the aim of transfers from central governments to local authorities all over the world. However, the systems that govern the attribution of funds are often complex and influenced by asymmetric information and corruption and they represent a big burden on fiscal policy. In the USA, the system grants-in-aid paid out around 418 billion for such different aims as health, highways and education. Recently, a significant amount of funding was directed for some existing emergency preparedness programs.[3] Labor mobility in the United States is usually high, so does the Federal Government still need to grant this aid to the states?

In Table 1 and Figure 1 we present descriptive statistics that analyze the relation between federal transfers, internal migration and relative income in the USA. These figures are based on time-averaged cross-section data.

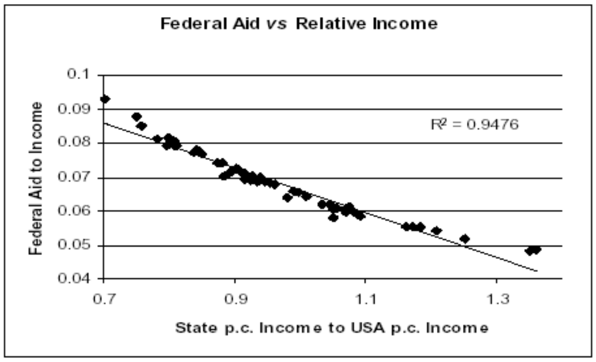
Table 1 - Overview of the Data

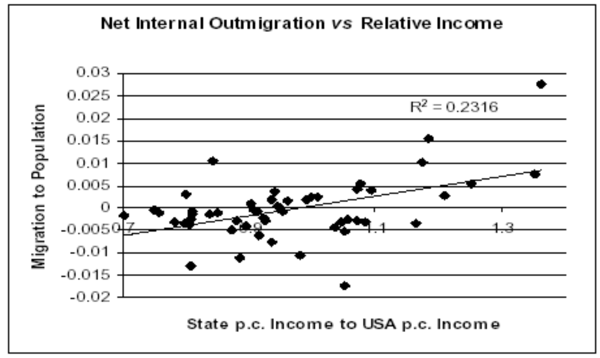
Variables	Average	S.D.	Min.	Max.
Relative Personal Income	0.96	0.15	0.70	1.36
Federal Transfers / Personal Income	0.07	0.01	0.05	0.09
Net migration / Population	0.00	0.01	-0.02	0.03

Sources: Consolidated Federal Funds Report, Bureau of Economic Analysis and Bureau of Census.

Figure 1: Contemporaneous Relationship between Transfers, Net (out) migration and Relative Income

3 See, for instance, Cato Institute (2004), Tax and Budget Bulletin, N.20 for the rise in expenditures in Grants and on political motivations. For a historical evolution of the Grants system see Canada (2003) and Boyd (1997).





The figures show that there is a strong correlation between federal transfers and relative income and a weaker association between internal (out) migration and relative income. The migration pattern confirm recent reports according to which population has migrate from the north to the south and from the east to the west (Franklin, 2003). This contemporaneous relationships makes our exercise most useful, because we are intending to evaluate the influence of transfers and migration in convergence and not the other way round. It is reasonable to conjecture however that the relative performance of the state influences both federal transfers and migration.[4]

In this article we test empirically the connection between transfers to the states, internal migration and convergence between states. This is an important question to study, since money from federal transfers, if proved inefficient, can be used for other purposes. This topic has also been a concern of other studies. On a theoretical level, Perotti (2001) develops a model and discusses the relationship between fiscal federalism and factor mobility and the implications of the results for the case of the European Union. Results suggest that a higher degree of centralization of social expenditures are inefficient, unless mobility of production factors is high. In a survey of the literature, Bodaway (2004) also addresses the relationship between transfers and migration. In particular, transfers are seen as a determinant of the efficiency in labor allocation across regions. Bodaway et al. (1998) analyze the fiscal externality that arises with fiscal policy decentralization when labor mobility is present. On the effect of labor mobility on convergence, Rappaport (2005) concluded that outmigration directly contributes to faster income convergence but also creates a disincentive for gross capital investment.

At the empirical level, literature about this topic is not very extensive and seems to have focused in the relationship between migration and convergence or between grants and migration. We divide the overview of literature into contributions focusing other countries and then we review evidence for the USA.

Some works study the effect of internal migration in convergence (Helliwell, 1996 to Canada, Saracoglu and Kirdar, 2006 to Turkey and Shioji, 2001 for Japan). Cashin and Sahay (1995) study the effects of grants and internal migration for convergence of the states of India, for the period between 1961-1991. They study this topic on the light of the Solow-Swan neoclassical growth model, by means of econometric techniques and analysis of correlations between variables. The analysis of the effects of the referred variables is done separately. Convergence of real *per capita* incomes has been achieved in that period. In the case of this country, internal migration does not play a significant role in achieving convergence, since its response to differences in states incomes is not very significative. Correlation between state *per capita* disposable income and state *per capita* net product at factor costs is analyzed in graphical terms. The difference between the two variables is the transfers from the center state. Transfers were more substantial to poorer states than to richer ones, in the period considered. However, dispersion of real *per capita* state income has widened, but more than dispersion of real *per capita* state disposable income, implying an efficient role for transfers in narrowing regional disparities.

For the United States, some concern has already arise about this issue, but, as well as internationally, some studies address the relation between transfers and convergence and others center the discussion on the relation between internal mobility and convergence of states. Sala-i-Martin and Sachs (1992) find that federal tax reductions contributes much more to insurance the state against regional economic shocks than an increase in federal transfers. The work of Chernick and Sturm (2005) is also centered on the first topic. Their study does not use federal aids, like ours, but welfare spending at the state level. They do not find any significative effect of that variable on growth. The work of Blanchard and Katz (1992) addresses the latter relation and find that internal migration is an important stabilization mechanism, whenever there is a negative demand or supply shock. Fishback, Horrace and Kantor (2005) discuss the impact of federal programs on internal migration on a county level, using an array of econometric techniques. Their reference period is the New Deal (1930-1940). They find a positive correlation between allocation of money to the states and internal migration to that states. Their concern is not about convergence nor stabilization, either it is about the causality between these two variables.

So our study comes to shed some light on the efficiency (or not) of having two stabilization or convergence instruments, like federal transfers and internal migration to achieve convergence between states, since, to our knowledge, no study has done this so far for the United States. This

[4] The correlation between migration and federal transfers is positive but not high (0.22).

paper is divided into four sections. In section two we present the data used in the estimations. Section three analyzes the empirical results, namely, we perform unit root tests to assess the stationarity of the series, discuss the effects of transfers and migration in convergence and also perform robustness tests to the results. Finally, in section four, we present the conclusions and comment on future work.

2. DATA

We have collected data for the 50 USA states and the District of Columbia between 1987 and 2004. These data come from different sources: personal income from the Regional Economic Accounts of the Bureau of Economic Analysis (BEA), federal transfers from the Consolidated Federal Funds Report, from 1983-2004, (CFFR) supplied by the Governments Division and finally, total population, states population, and internal migration by states from the Bureau of the Census, from 1987-2004. Data were subject to treatment in order to obtain the following variables:

1. relative *per capita* income (*ycv*) -this was obtained dividing state personal income *per capita* by the USA personal income *per capita*;[5]

2. transfers (*fed*1) -this is the total annual federal government transfers to each state as a proportion of the total personal nominal income of the state;

3. net internal migration (*mig*)-this is the net annual outflows of migrants from each state to other USA states as a proportion of the state population.

Two alternative measures of transfers from the Federal Government to states are used because a state price index is not available. Data from the CFFR are in actual dollars allocated to agents resident in the states. This measure represents the relative importance of the federal public funding in the state economy. However, it is not accounting for the purchasing power of those dollars in any particular state. Our measure tends to be an approximation of the value each federal dollar tend to have in each state. If all federal goods and services provided with these funds were bought inside the state, it is reasonable to assume that *fed*1 is a good measure of the importance they have in the state economy. For comparison, we also use an alternative measure of transfers (*fed*2) -this is the total annual federal government transfers to each state as a proportion of the total personal real income of the state. This measure assumes that when transferring funds the Federal Government incorporates a price evolution factor that is common to all states.

3. EMPIRICAL RESULTS

As we have noted earlier, we intend to evaluate the joint effect of federal transfers and migration in the convergence of USA states. These are not the only variables that potentially influence convergence, but they are alternative mechanisms to achieve convergence between states. We perform the following empirical strategy. First, we evaluate the possible existence of unit-roots in the convergence, transfers and migration series. This result will determine whether to proceed with cointegration techniques or with stationary econometrics. As we will conclude that we cannot reject the null of stationarity, we present both heterogeneous and pooled estimates for this relationship.

3.1 Unit Root Tests

As a first step in analyzing the data, we perform unit-roots tests proposed by Levin and Lin (1993) -LL thereafter -and by Im, Pesaran, and Shin (2003) -IPS thereafter, which test the null of no stationarity. As this last test permits heterogeneity of the autoregressive root under the alternative hypothesis and its finite sample properties are generally better than those of LL, we mostly rely on the IPS test. The results are presented in the Tables 2.1 and 2.2 and include tests with and without time demeaning and with and without trend.

Table 2.1 – Unit Root Tests (without trend)

[5] Personal income was deflated using the national consumer price index, as there are not state price indexes available. The same is done, among others, in Sala-i-Martin (1996).

	LL		IPS	
	standard	time demeaned	standard	time demeaned
ycv	-1.01	-1.14	-4.42***	-3.97***
fed_1	7.52	-0.56	11.47	-4.27***
fed_2	3.04	-0.64	4.04	-3.98***
mig	-13.99***	-15.50***	-18.11***	-19.52***

*,**, *** means that the null is rejected with a 10%, 5% and 1% significance, respectively.

LL - Levin and Lin (2002) ; IPS - Im, Pesaran, and Shin (2003)

Table 2.2 – Unit Root Tests (with trend)

	LL		IPS	
	standard	time demeaned	standard	time demeaned
ycv	-1.95*	-1.91*	-2.96***	-2.69***
fed_1	3.55	-3.88***	8.08	-8.17***
fed_2	-2.01**	-3.26***	-3.38***	-5.32***
mig	-13.18***	-14.07***	-19.31***	-20.26***

*** means that the null is rejected with a 1% significance

** means that the null is rejected with a 5% significance

* means that the null is rejected with a 10% significance

LL - Levin and Lin (1993) ; IPS - Im, Pesaran, and Shin (2003)

The analysis of the tables shows that the null of no-stationarity is broadly rejected for all variables. This implies that no cointegrating vector exists and we may proceed with stationary methods.

3.2 The Effect of Transfers and Migration in Convergence

3.2.1 The Effects by State

As we want to evaluate the heterogeneity of the effects, we present results recurring to the Sawmy Random Coefficients estimates. We thus estimate the following model:

$$\begin{aligned} ycv_{i,t} &= \alpha_i + \beta_{1,i} ycv_{i,t-1} + \beta_{2,i} t + \beta_{3,i} fed_{i,t-1} + \beta_{4,i} mig_{i,t-1} + \\ &\quad + \beta_{5,i} \Delta fed_{i,t-1} + \beta_{6,i} \Delta mig_{i,t-1} + \varepsilon_{i,t}, \text{ where} \\ t &= 1987, 1988, ..., 2004;\ i = 1, 2, ..., 51. \end{aligned}$$

In this exercise, some technical issues may rise. First, it is reasonable to assume that some reverse causality may occur between federal transfers and relative income and also between migration and relative income. In particular, federal transfers may be higher in some states because they are relatively poor and migration could essentially occur in poorer states. Second, we can also reasonably assume that some non-fixed factors omitted from the specification in (1) may influence relative income.

We try to deal with these technical issues in several ways in order to minimize their influence in our results. First, we consider the lagged influence and lagged differences of federal transfers and migration in the regressors vector.[6] We will also present results from Generalized Methods of Moments (GMM) and corrected Fixed-Effects (LSDV) estimators. To access an idea of different effects by state, we first present results from the Random Coefficients Model (RCM) developed by Sawmy (1970), with bootstrapped standard error to decrease the effect of the relatively poor small sample (in the T-vector) properties of the estimator.[7] We also present a column, when we indicate if a state is relatively poor or not. The classification of a state as relatively poor depends on its average personal income *per capita* from 1987 to 2004 being smaller than the national *per capita* average personal income in the same period.

Table 3 – Individual Coefficients from RCM Regression

[6] This can be written in a form of an ADL model, with the restriction that the contemporaneous regressors are not included in the regression, as we assume that contemporaneous effects (in the same year) are not plausible to occur. This can also be an example of an Error Correction Model (ECM), as it divides the contribution of regressors for the explanation of income into a "long-run" and a "short-run" effect.

[7] This estimator is also applied in Pesaran and Smith (1995) as a possible method in treating relationships between stationary series.

States	Poor?	$\beta_{3,i}$	$\beta_{4,i}$	$\beta_{5,i}$	$\beta_{6,i}$
	Y/N	$fed_{i,t-1}$	$mig_{i,t-1}$	$\Delta fed_{i,t-1}$	$\Delta mig_{i,t-1}$
Alabama	Y	0.28	0.66	-3.98	-0.69*
Alaska	N	0.53	0.22	-3.81*	-0.13
Arizona	Y	0.97	-0.43	-2.55**	0.45**
Arkansas	Y	1.39	0.48	1.43	0.25
California	N	2.24	-0.45	-2.41	0.12
Colorado	N	-1.24	0.03	-1.04	0.13
Connecticut	N	1.69	0.62	-3.65	-0.35
Delaware	N	4.07**	0.30	-0.91	0.13
D. Columbia	N	3.67***	-0.52*	3.92	0.50**
Florida	Y	0.92	-0.51	-2.98***	-0.10
Georgia	Y	-3.80***	-0.15	2.82***	0.00
Hawaii	N	2.87*	0.20	-9.43***	-0.16
Idaho	Y	-0.12	-0.59***	-0.17	0.31**
Illinois	N	-2.59**	0.49	8.54***	0.33
Indiana	Y	0.00	-0.19	1.66	0.20
Iowa	Y	2.95**	-0.96**	1.66	1.06***
Kansas	Y	-1.67	0.11	0.44	-0.19
Kentucky	Y	0.37	0.83**	0.03	-0.23
Louisiana	Y	-0.48	0.16	-3.99	-0.38
Maine	Y	1.42	-0.36	-2.08	0.28
Maryland	N	-0.35	-0.43	-7.01***	0.06
Massachusetts	N	-0.02	1.36***	-6.75***	-0.72**
Michigan	Y	-1.98	0.30	2.29	0.20
Minnesota	N	-0.28	0.85***	5.84***	-0.42*
Mississippi	Y	-0.07	0.12	0.10	-0.18
Missouri	Y	-0.66	0.28	2.57	0.09

Table 3 (cont.)	Poor?	$\beta_{3,i}$	$\beta_{4,i}$	$\beta_{5,i}$	$\beta_{6,i}$
States		$fed_{i,t-1}$	$mig_{i,t-1}$	$\Delta fed_{i,t-1}$	$\Delta mig_{i,t-1}$
Montana	Y	1.67	-0.43	-0.43	0.16
Nebraska	Y	1.13	-0.05	3.68	0.19
Nevada	N	-0.33	-0.15	1.20	-0.10
New Hampshire	N	1.12	0.08	-2.32	0.02
New Jersey	N	-0.18	0.84*	-5.19**	-1.03***
New Mexico	Y	0.06	-0.20	-1.28	0.01
New York	N	2.04	0.93*	-6.09***	-0.77**
North Carolina	Y	-1.33	0.47	0.10	-0.13
North Dakota	Y	0.38	-0.08	1.80	0.48
Ohio	Y	-0.39	-0.35	1.82	0.29
Oklahoma	Y	0.42	0.24	-2.97	-0.27
Oregon	Y	-2.36**	0.10	-0.89	0.08
Pennsylvania	Y	1.74*	-1.04**	-0.04	0.55*
Rhode Island	N	5.19***	-0.14	-3.30*	0.14
South Carolina	Y	-0.58	0.45	1.25	-0.11
South Dakota	Y	0.86	-0.39	4.23*	0.62*
Tennessee	Y	-0.73	1.46***	-0.78	-0.85**
Texas	Y	-1.17	-0.72	-0.89	0.62*
Utah	Y	-1.41**	0.09	0.02	0.14
Vermont	Y	2.22	0.05	-1.28	0.07
Virginia	N	2.05	0.04	-3.74*	-0.13
Washington	N	1.14	-0.34	-1.67	0.28
West Virginia	Y	0.27	-0.38	-5.20***	0.25
Wisconsin	Y	-1.01	0.11	1.11	-0.02
Wyoming	Y	2.44*	-0.10	-3.68**	0.10
Panel(1)		0.46	0.05	-0.86	0.01
t-stat		(1.32)	(0.43)	(-1.35)	(0.15)
Homog. Test			855***		

Note: A trend and a constant have been added to the regressions but coefficients are omitted from the table. (1) In the panel coefficients, bootstrapped standard errors are calculated with 1000 replications.

The overall effect of both federal transfers and migration is not significative. However, when considering the alternative federal transfers variable (*fed*2), the effect of federal transfers in lagged levels comes out to be positive and statistically significant. As expected, some states benefit from federal transfers and some others benefit from migration. The overall picture can be drawn as follows. Seven states benefit from lagged federal transfers (Delaware, D. Columbia, Hawaii, Iowa, Pennsylvania, Rhode Island and Wyoming), while three of them also present a negative effect of lagged differences in the federal transfers (Hawaii, Rhode Island, Wyoming). Four states present a negative effect of transfers in relative income (Georgia, Illinois, Oregon and Utah), while two of them also benefit from lagged differences in transfers (Georgia and Illinois). This may indicate that the short run effect may act on the contrary of the long-run effect in a non-negligible proportion of states with significant effects. Moreover, two additional states (Minnesota and South Dakota) present positive effects of lagged differences in transfers and nine other states (Alaska, Arizona, Florida, Maryland, Massachusetts, New Jersey, New York, Virginia and W. Virginia) present negative effects of lagged differences in federal transfers. Considering only the statistically significant results, positive effects of federal transfers occur mainly in the long run (in lagged levels) and negative effects occur mainly in the short run (in lagged differences).

Concerning the effects of migration, there are four states (D. Columbia, Idaho, Iowa, Pennsylvania) in which migration presents a negative effect, all of them also present a short-run positive effect. There are three additional states (Arizona, South Dakota and Texas) with positive short-run effects but with insignificant effects in the long-run. There are six states (Kentucky, Massachusetts, Minnesota, N. Jersey, N. York and Tennessee) with positive effects in the long run, but all except one (Kentucky) with negative short-run effects. There is a state (Alabama) with a negative short-run effect of migration. Overall, effects of migration appear more in the short-run than in the long-run. Due to small time-series in the panels of the sample (18 years), we must be cautious with the analysis of individual effects. Although we are aware of the problem, it is by now the best way to have an idea of the individual effects of migration and federal transfers.

If migration is dropped from the regression, lagged difference of federal transfers would come out to have a negative and significant effect in the whole panel. If federal dollars are omitted, migration continues to have a non-significant relationship with relative income.

Concerning the effect of labor mobility (migration) and federal transfers in decreasing the gap between rich and poorer states, we can conclude that generally, federal transfers act in order to favour relatively rich states (four out of seven states with positive significant results of this variable are rich and three out of four states with negative effect are poor). On the contrary, (out) migration acts in order to favour the relatively rich states (positive effects are seen in six states, four of them are relatively rich and three out of four states with negative significant effects are poor). Thus, we can tentatively say that federal transfers tend to contribute to convergence but migration tends to contribute to divergence. Note that this conclusion was taken using results only in lagged levels. In lagged differences, as we have already seen, effects seem to be opposite.

In the next section, we assume homogeneity of slope coefficients (although allowing for state specific effects -both time invariant and time variant) and present results that overcome the small sample properties of the individual ones.

3.2.2 Robust Homogeneous Effects

In this section, we intend to deal with the endogeneity of right-hand-side variables, namely caused by reverse causality and eventually omitted variables. The appropriate methods to deal with this are the system Generalized Methods of Moments (GMM) estimator developed by Blundell and Bond (1998) and a corrected fixed effects estimator developed by Bruno (2005a,b) -LSDVC. We also show results on an autocorrelation corrected panel data estimator that allows for specific AR(1) coefficients in each panel and on a Random Effects (RE) estimation through maximum likelihood. The total number of observations in the tables is 816 if equation is in levels (OLS, RE and GMM) and 765 if the equation is in differences (LSDVC).[8]

The analysis is conducted presenting different types of estimators, with different assumptions about the underlying data process. This approach conducts us to very robust effects of federal transfers (in levels) and migration (in lagged differences) in relative income (see Table 4 below). However some other interesting results differ across estimators, which makes useful a comparison between the underlying assumptions of each estimator. All of these estimators, although assuming homogeneous slopes, allow for some type of heterogeneity. The OLS estimator, with the Prais-Winter correction, corrects for panel specific autocorrelation, and allows for different autocorrelation processes in each state; however it is not correcting for specific state time-invariant effects nor endogeneity of regressors due to reverse causality, omitted variables and measurement errors. The RE estimator corrects for the existence of state time-specific effects that are not allowed to be correlated to the regressors. The LR tests we present in the tables tend to indicate that the variance of the time-specific effects are not significantly different from zero. However, as the recent econometric literature on homogeneous stationary panels (Blundell and Bond, 1998; Judson and Owen, 1999) points out that GMM and corrected fixed-effects estimation are appropriate for macroeconomic analysis, we also present these results. The GMM estimator is thought to be robust to general sources of endogeneity and has been pointed out for growth analysis (Temple *et al.*, 2001) in which small time-series dimension is available. With high time-series T, the GMM estimator will tend to require so many instruments that an over-fitting bias can arise, which tend to increase the probability of acceptance in the coefficient tests.[9] Judson and Owen (1999) and Bruno (2005a), based on the Monte-Carlo analysis, argued in favor of a corrected Fixed-Effects estimator, result that is stronger as T gets bigger. There are only two differences if we used the *fed*2 variable instead of *fed*1. In RE estimation the lagged level of migration would be significantly negative and in LSDVC estimation, the coefficient on federal transfers lagged differences would be non-significant. As these are small changes, we only present results based on our benchmark measure of federal transfers.

Table 4 -Pooled Dynamic Panel Data Estimators

	OLS	RE	GMM	LSDVC	$LSDVC_1$
$Dep.Var.: ycv_t$	(1)	(2)	(3)	(4)	(5)
ycv_{t-1}	1.05***	1.04***	1.07***	2.85***	1.56***
	(47.9)	(120.3)	(72.8)	(a)	(a)
$trend$	-0.01***	0.00***	-0.00	0.02***	-0.00***
	(-2.76)	(7.04)	(-1.01)	(36.3)	(-2.59)
fed_{t-1}	1.50***	1.23***	1.66***	10.36***	–
	(3.31)	(7.05)	(5.49)	(48.4)	(–)
mig_{t-1}	-0.04	-0.07	-0.20*	-0.29***	-0.29***
	(-0.53)	(-1.43)	(-1.98)	(-5.73)	(-5.75)
$\Delta fed_{i,t-1}$	-0.88	-0.53	-1.09	-1.22***	-2.07***
	(-1.11)	(-1.38)	(-1.15)	(-2.65)	(-4.37)
$\Delta mig_{i,t-1}$	0.05	0.10**	0.17**	0.17***	0.16***
	(0.88)	(2.33)	(2.11)	(3.99)	(3.74)
R^2	0.99	–	–	–	–
LM test for $\sigma_{v_i} = 0$	–	0.20	–	–	–
Hansen	–	–	37.55	–	–
$AR(1)$	–	–	-3.61***	–	–
$AR(2)$	–	–	1.40	–	–
T	16	16	16	15	15

Notes: t-statistics based on robust variance-covariance in GMM and bootstrapped standard-errors in LSDVC; (a) means very high based on t-statistics. A constant (except in LSDVC) and a complete set of time dummies are introduced in regressions but omitted in the table.
OLS - Prais-Winsten estimates with panel-corrected standard errors, AR(1);
RE - Maximum Likelihood Estimation of Random Effects;
GMM - System Generalized Method of Moments;
LSDVC - Corrected Least Squares Dummy Variable.
* 10% significance; ** 5% significance; *** 1% significance.

[8] This happens because we initialize the Bruno (2005a,b) estimator with the Arellano and Bond (1991) estimator. The use of Blundell and Bond (1998) as a first stage estimator for LSDVC estimator would not change our conclusions (see Monte Carlo results in Bruno, 2005b). We use the most accurate approximation to the bias available in Bruno (2005a,b).

All estimates indicate a positive and highly significant effect of the lagged levels of federal transfers in the relative income of states and an also positive and high significant effect of lagged differences of migration in the relative income of states. In both system GMM and fixed-effects estimates, this effect is simultaneous with negative effects of lagged migration and of lagged differences in federal transfers. This tends to confirm the previous conclusion according to which the short-run effect acts in opposition to the long-run one. Some intuition can be provided on these results. It is natural to think that short-run (probably unexpected transfers) can be inefficiently allocated within states. However in the long-run, federal dollars tend to be efficiently allocated. Net Immigration causes a rise in the supply of state labor (and potentially human capital).[10] In the short-run, the outflow of new workers increase the relative income *per capita*. In the long-run, this is accommodated and (out) migration tends to decrease *per capita* income, as these workers and their human capital are not contributing to the productive activity of the state. To have an idea on how much federal transfers and net migration affect relative income *per capita*, we may say that a 1 standard deviation in federal transfers increase relative income in 0.1 (near 14% of the poorest state relative income) and a standard deviation increase in migration increase relative income in 0.003 (near 0.43% of the poorest state relative income). The relative increase in lagged differences in federal transfers would decrease relative income in 0.004 and the migration lagged differences would lead to a decrease of 0.002.

We test the sensitivity of results to the inclusion of Washington D.C.[11]. When excluding this district, the significance of Net Migration slightly decreases (particularly affecting the lagged level) but it remains significant at 10% levels. This exclusion has not affected the influence of federal transfers.

We have added other typical determinants of convergence to these regressions, in order to access the robustness of the results (see Table B.1). We introduce both the investment-capital ratio and educational attainment (high school graduate or more) in our regressions and concluded that results do not change much. The positive effects of both lagged levels are maintained and the negative short-run effect of migration is also maintained. The short-run effect of federal transfers turns out to be non-significant. The investment-capital ratio comes out to be positively significant in lagged levels and attainment is negatively related to relative income in lagged levels and positively related in lagged differences. These results tend to indicate that our conclusions are not being affected by

[9] A indication of an overfitting bias is an high probability of rejection in the Hansen test that tests the instruments validity.
[10] As migration flows from North to South and from East to West dominate, it is natural that they bring more human capital to the relatively poorest states.
[11] The Washington District of Columbia seems to be an outlier in migration (see Figure 1).

the omitted variables problem.

Moreover, we have tested the same relationship dropping the two regressors linked with migration. The result was a negative robust sign in transfers lagged differences, supporting only the short-run effect. This means that the positive effect of federal transfers is conditional on migration, which is an important result and supports our choice of studying both phenomenon together. When dropping federal transfers, the conclusion is that only the positive effect of migration lagged levels in GMM system estimator disappears. Thus, the short-term positive effect of migration does not tend to be conditional on federal transfers but the lagged effect is.

In conclusion, we reach positive significant and robust effects of federal transfers in the long-run and positive significant and robust effects of (out) migration in the short-run. This indicates that overall, federal transfers and net internal immigration are contributing to increase the relative income of states. However, the tentative conclusion we state in the previous section according to which these positive relationship of transfers and migration may be influenced by states that are relatively rich cannot be proved with these results. To assess an answer to this question, we made a transformation in the dependent variable that helps to reach a conclusion on this. We use the absolute value of *per capita* relative income.[12]

$$|ycv - 1| = \left| \frac{Y^{state}}{Y^{usa}} - 1 \right|,$$

where Y^{state} and Y^{usa} are respectively, the *per capita* personal income in the state and in the USA.

The variable defined in (2) measures how much the state is departing from the *per capita* federal income each year, whatever it is departing it to below or above. Higher dependent variable means divergence and low dependent variable means convergence. This is a measure of divergence. We state results on the same estimators than above.

Table 5 -Pooled Dynamic Panel Data Estimators

	OLS	RE	GMM	LSDVC
$Dep.Var.: \lvert ycv-1\rvert_t$	(1)	(2)	(3)	(4)
$\lvert ycv-1\rvert_{t-1}$	0.99***	0.99***	1.01***	2.18***
	(121.7)	(151.7)	(37.6)	(a)
$trend$	-0.00	-0.00	0.01***	0.00
	(-1.40)	(-0.09)	(2.15)	(0.71)
fed_{t-1}	-0.36***	-0.38***	-0.35**	-1.59***
	(-2.59)	(-5.10)	(-2.08)	(-7.64)
mig_{t-1}	-0.06	-0.08*	-0.06	-0.14***
	(-0.71)	(-1.67)	(-0.55)	(-2.84)
$\Delta fed_{i,t-1}$	-0.26	-1.06***	-1.13	-3.38***
	(-0.48)	(-2.84)	(-1.52)	(-7.34)
$\Delta mig_{i,t-1}$	-0.04	-0.06	-0.07	-0.12***
	(-0.60)	(-1.25)	(-0.80)	(-2.77)
R^2	0.98	–	–	–
LM test for $\sigma_{v_i}=0$	–	0.09	–	–
$Hansen$	–	–	37.98	–
$AR(1)$	–	–	-3.30***	–
$AR(2)$	–	–	1.19	–
T	16	16	16	15

Notes: t-statistics based on robust variance-covariance in GMM and based on bootstrapped standard-errors in LSDVC; (a) means very high t-statistics; A constant (except in LSDVC) and a complete set of time dummies are introduced in regressions but omitted in the table. Estimators and significance levels as in the Table 4.

Results in Table 5 make it clear that our tentative conclusion according to which federal transfers to states contributes to divergence (through a positive influence in the *per capita* income of the richer states) does not seem to be confirmed. In fact the coefficient on lagged levels of federal dollars transferred to states is significantly negative through different specifications, while in the fixed-effects estimator, the lagged levels and lagged differences of transfers are negatively significant. This means that transfers are contributing to shrink the differences between state income and federal income. Also the lagged level and lagged differences of net internal (out)migration are negatively significant, meaning that net (out)migration is also contributing to shrink the difference

[12] The null of a unit root in this alternative dependent variable was tested and rejected.

between income states and the federal average. This means that both federal transfers to states and net internal (out) migration from the state contribute to convergence of *per capita* income among the Union. On quantitative results we may say that a standard-deviation increase in federal transfers implies a rise of 1.6% in the approximation to the income Union average (convergence) while a standard-deviation rise in outmigration would imply a rise of 0.14% in the approximation to the income average. A rise in the lagged differences of federal transfers implies a rise of 0.68% in the convergence rate and a rise in net outmigration implies a rise of 0.14% in the convergence rate. This means that both in statistical significance and quantitatively the effects of federal transfers are higher than the effects of migration.

The previous conclusion according to which the effect of transfers is conditional on migration still verifies with this dependent variable. Also, when we drop federal transfers, migration tends to be non-significant in OLS and GMM estimators (as in the table) but it is significant in lagged differences in the LSDVC estimator with positive sign. Thus, as what happened with the benchmark dependent variable, the lagged level significant of migration sign that appears in the table above is also conditional on the effect of transfers.

Moreover, when we add investment-capital ratio and attainment to the regression, the negative effects of federal transfers (both in lagged levels and in lagged differences) and the positive effects of migration (both in lagged levels and differences) are maintained with high significance. The investment-capital ratio comes out to be significative with a positive sign in lagged levels and attainment is not statistically significant (see Table B.2).

When excluding the Washington D.C. from the sample, we note that the lagged level of migration loses its significance (both in RE and LSDVC) but the short-run positive coefficient reinforces its significance (both in GMM, where it becomes positive and highly significant and in LSDVC, where it reinforces its significance). The unique effect in federal transfers is that it looses significance in its GMM estimator of lagged levels. The same happens when we include attainment and investment-capital ratio in the regressions based on a sample without Washington D.C. We present these results in Table C.1. in the appendix. This means that the District is having impact on the lagged effects of transfers and migration, influencing the significance of its negative sign.

CONCLUSIONS

Using data of federal transfers to the states and from net internal migration in the United States, we study the relationship between these variables and income *per capita*.

We conclude that although effects could differ significantly across states, overall both federal transfers and migration positively determine the relative performance of the state in the long-run, although the migration positive long-run effect has proven to be dependent on the presence of Washington D.C. in the sample. Effects in the short-run tend to be opposite to those in the long-run. This article shows that federal transfers as well as net (out) migration contribute to convergence (decreasing the difference from states income and the federal average). However, the quantitative effect of federal transfers is higher than the quantitative effect of outmigration in attaining convergence. The significant effect of federal transfers to states is conditional on migration and under some conditions, the effect of migration is also conditional on transfers, results that support our option to jointly study federal transfers and migration. Robustness analysis revealed that federal transfers are more robust in lagged levels and migration is more robust in lagged differences in determining convergence. Thus, we answer ye*s* to the question of the article.

The determination of which states in particular benefit or not from transfers and migration may be object of further research as a small time-series is still available for federal transfers and migration. We also intend to study the effects of specific sub-items of transfers to convergence in future work, as grants, loans or wages.

REFERENCES

ARELLANO, M. and Stephen BOND (1991), "Some Tests of Specification for Panel Data: Monte Carlo evidence and an Application to Employment Equations", *Review of Economic Studies*, 58: 277-297.

BLANCHARD and Katz (1992), "Regional Evolutions", *Brookings Papers on Economic Activity*,1.

BLUNDELL, Richard and Stephen BOND (1998), "Initial Conditions and Moment restrictions in Dynamic Panel Data Models", *Journal of Econometrics*, 87:115-143.

BODAWAY, R. (2004), "The Theory and Practice of Equalization", *CESifo Economic Studies*, vol. 50 (1): 211-254.

BODAWAY, R., M. MARCHAND and M. VIGNEAULT (1998), "The Consequences of Overlapping Tax Bases for Redistribution and Public Spending in a Federation", *Journal of Public Economics* 68: 433-478.

BOYD, E. (1997), *American federalism, 1776 to 1997: Significant Events*, TThttp://usinfo.state.gov/usa/infousa/politics/states/federal.htm.

BRUNO, Giovanni (2005a), "Approximating the Bias of LSDV estimator for Dynamic Unbalanced Panel Data Models", *Economics Letter*, 87:361-366.

BRUNO, Giovanni (2005b), "Estimation and Inference in Dynamic Unbalanced Panel Data Models with a Small Number of Individuals", *Stata Journal*, 87:361-366.

CANADA, B. (2003), *Federal Grants to State and Local Governments: A Brief History*, Report for Congress, Congressional Research Service, The Library of Congress

CASHIN, Paul and Ratna SAHAY (1995), "Internal Migration, Center-State Grants and Economic Growth in the States of India", IMF Working Paper No. 66, July.

CATO INSTITUTE (2004), *Tax and Budget Bulletin*, n.20, May 2004.

CHERNICK, Howard and Paul STURM (2005), "Redistribution at State and Local level: Consequences for Economic Growth", December, *Mimeo*.

FISHBACK, Price V.; HORRACE, William C. and Shawn KANTOR (2005), "Do Federal Programs Affects Internal Migration? The Impact of the New Deal Expenditures on Mobility During the Great Depression", *NBER Working Paper 8283*.

FRANKLIN, R. (2003), "Domestic Migration Across Regions, Divisions and States: 1995 to 2000", *Census 2000 Special Reports*, U.S. Census Bureau.

GAROFALO, G.A, and S. Yamarik (2002), "Regional Convergence: evidence from a new State-by- State Capital Stock Series", *The Review of Economics and Statistics*, 84, pp. 316-323.

HELLIWELL, J. (1996), "Convergence and Migration Across Provinces", *Canadian Journal of Economics*, Special Issue, April.

JUDSON, Ruth and Ann OWEN (1999), "Estimating Dynamic Panel Data Models: A Guide for Macroeconomists", *Economics Letters*, 65:9-15.

LEVIN, A. and C. LIN (1993), "Unit-Root Tests in Panel Data: asymptotic and Finite Sample Properties", *UC San Diego Working-Paper 22-93*.

IM, K. M. Pesaran and Y. SHIN (2003), "Testing for Unit-Roots in Heterogeneous Panels", *Journal of Econometrics*, 115, 53-74.

KIVIET, J. F. (1995), "On Bias, Inconsistency and Efficiency of Various Estimators in Dynamic Panel Data Models", *Journal of Econometrics*, 68:53-78.

NICKEL, S. (1981), "Biases in Dynamic Models with Fixed Effects", *Econometrica*, 49:1417-1426.

PEROTTI, Roberto (2001), “Is a Uniform Social Policy Better? Fiscal Federalism and Factor Mobility”, *The American Economic Review*, June, 91, 3, pp. 596-610.

PESARAN, M. and R. SMITH (1995), “Estimating Long-Run Relationships for Dynamic Heterogeneous Panels”, *Journal of Econometrics*, 68, 79-113.

RAPPAPORT, J. (2005), “How does labor mobility affect income convergence?”, *Journal of Economic Dynamics and Control*, 29: 567-581.

SALA-I-MARTIN, Xavier (1996), “Regional Cohesion: evidence and theories of regional growth and convergence”, *European Economic Review*, 40, pp. 1325-1352.

SALA.I.MARTIN, Xavier and Jeffrey SACHS (1992), “Fiscal Federalism and Optimum Currency Areas: Evidence for Europe from the United States”, *in* M.B. Canzoneri, V. Grilli and P. R. Masson editors, *Establishing a Central Bank: Issues in Europe and Lessons from the U.S.*, Cambridge University Press.

SARACOGLU, S. and M. KIRDAR (2006), *Does Internal Migration Lead to Fast Regional Convergence in Turkey? An Empirical Investigation*, ERSA conference papers 784.

SAWMY, P. (1970), “Statistical Inference in Random Coefficient Regression Model”, *Econometrica*, 38, 2.

SHIOJI, E. (2001), “Composition Effect of Migration and Regional Growth in Japan”, *Journal of the Japanese and International Economies*, 15, 1:29-49.

TEMPLE, J., S. Bond and A. HOEfflER (2001), ”GMM Estimation of Empirical Growth Models”, *Mimeo*.

ANNEX A - DATA SOURCES

We use Attainment and Capital Stock in the robustness tests described in the text. Sources and description of this data follows. When necessary, we have made assumptions on the evolution of variables to fill the missing data. In Attainment, we assume averages between the contiguous years to fill in missing year. In Capital Stock, from 2001 to 2004, we have assumed that the average state growth rate of capital stock in the previous five years (from 1996 to 2001) is maintained in the next five years (from 2001 to 2006).

- *Attainment* -We use data from the Bureau of the Census, taken from the Census of the Population. We use the number of individuals, age 25 or older, who have completed four or more years of college.
- *Capital Stock* -We use data from Garofalo and Yamarik (2002), that produced estimates on gross investment in physical capital and the depreciation rate.

ANNEX B - RESULTS WITH ATTAINMENT AND CAPITAL STOCK

Table B.1 -Pooled Dynamic Panel Data Estimators

	OLS	RE	GMM	LSDVC
$Dep.Var.: ycv_t$	(1)	(2)	(3)	(4)
ycv_t	1.06***	1.06***	1.07***	2.66***
	(48.7)	(105.8)	(79.7)	(a)
$trend$	-0.01***	0.00***	-0.00	0.02***
	(-3.74)	(6.86)	(-1.01)	(35.1)
fed_{t-1}	1.66***	1.57***	1.74***	9.00***
	(3.73)	(7.53)	(5.58)	(38.9)
mig_{t-1}	-0.05	-0.09*	-0.18*	-0.17***
	(-0.55)	(-1.91)	(-1.82)	(-3.30)
k_{t-1}	0.06**	0.08***	0.08*	0.11***
	(2.52)	(0.03)	(1.69)	(3.32)
h_{t-1}	0.00***	0.00	0.00	-0.00***
	(3.27)	(1.63)	(0.35)	(-6.03)
$\Delta fed_{i,t-1}$	-0.94	-0.79*	-0.99	-0.31
	(-1.20)	(-1.78)	(-1.09)	(-0.65)
$\Delta mig_{i,t-1}$	0.06	0.12***	0.16*	0.09***
	(0.91)	(2.93)	(1.94)	(2.04)
Δk_{t-1}	-0.02	-0.03	-0.03	0.02
	(-0.79)	(-1.45)	(-1.36)	(0.85)
Δh_{t-1}	0.00	0.00	0.00	0.00***
	(0.73)	(1.16)	(1.20)	(6.41)
R^2	0.99	–	–	–
LM test for $\sigma_{v_i} = 0$	–	0.14	–	–
Hansen	–	–	31.07	–
$AR(1)$	–	–	-3.60***	–
$AR(2)$	–	–	1.48	–
T	16	16	16	15

Notes: As in Table 4.

Table B.2 – pooled Dynamic Panel Data Estimators

	OLS	RE	GMM	LSDVC
$Dep.Var.: \|ycv-1\|_t$	(1)	(2)	(3)	(4)
$\|ycv-1\|_{t-1}$	0.98***	0.99***	1.01***	2.20***
	(117.8)	(156.2)	(38.3)	(a)
$trend$	0.01***	0.00***	0.00**	0.00***
	(3.23)	(2.96)	(2.13)	(3.99)
fed_{t-1}	-0.44***	-0.44***	-0.43**	-1.61***
	(-2.79)	(-5.05)	(-2.21)	(-7.24)
mig_{t-1}	-0.07	-0.07	-0.07	-0.21***
	(-0.77)	(-1.45)	(-0.80)	(-4.14)
k_{t-1}	0.01	0.02	0.04	0.07**
	(0.48)	(0.75)	(1.05)	(2.06)
h_{t-1}	-0.00***	-0.00*	-0.00	-0.00
	(-2.79)	(-1.84)	(-0.52)	(-1.04)
$\Delta fed_{i,t-1}$	-0.22	-1.20**	-1.06	-3.59***
	(-0.40)	(-2.74)	(-1.46)	(-7.73)
$\Delta mig_{i,t-1}$	0.04	0.06	0.07	-0.10**
	(0.60)	(1.47)	(0.80)	(2.33)
Δk_{t-1}	0.00	-0.00	-0.01	0.01
	(0.08)	(-0.12)	(-0.53)	(0.54)
Δh_{t-1}	0.00	0.00	0.00	0.00
	(1.22)	(1.30)	(1.05)	(1.30)
R^2	0.98	–	–	–
LM test for $\sigma_{v_i}=0$	–	0.24	–	–
Hansen	–	–	24.88	–
$AR(1)$	–	–	-3.30***	–
$AR(2)$	–	–	1.16	–
T	16	16	16	15

Notes: As in Table 4.

ANNEX C - RESULTS WITHOUT WASHINGTON D.C.

Table C.1 -Pooled Dynamic Panel Data Estimators

	OLS	RE	GMM	LSDVC
$Dep.Var.: \|ycv-1\|_t$	(1)	(2)	(3)	(4)
$\|ycv-1\|_{t-1}$	0.98***	0.98***	0.93***	2.31***
	(101.6)	(153.9)	(30.3)	(a)
$trend$	0.00***	0.00***	0.01**	0.00***
	(3.12)	(3.55)	(2.27)	(6.58)
fed_{t-1}	-0.36***	-0.29***	-0.02	-1.24**
	(-3.00)	(-3.13)	(-0.10)	(-6.53)
mig_{t-1}	-0.06	-0.07	0.04	0.03
	(-0.73)	(-1.17)	(0.65)	(0.63)
k_{t-1}	-0.00	0.00	0.04	-0.01
	(-0.00)	(0.03)	(1.15)	(-0.40)
h_{t-1}	-0.00**	-0.00	-0.00	0.00
	(-2.39)	(-1.31)	(-1.03)	(0.15)
$\Delta fed_{i,t-1}$	-0.44	-1.31**	-1.00	-3.89***
	(-0.84)	(-2.16)	(-1.45)	(-9.61)
$\Delta mig_{i,t-1}$	-0.06	-0.09	-0.14***	-0.21***
	(-1.07)	(-1.57)	(-2.60)	(-4.89)
Δk_{t-1}	0.01	0.00	-0.01	0.04
	(0.52)	(0.41)	(-0.43)	(1.60)
Δh_{t-1}	0.00**	0.00**	0.00**	0.00**
	(2.18)	(2.10)	(2.35)	(2.44)
R^2	0.98	–	–	–
LM test for $\sigma_{v_i}=0$	–	0.24	–	–
Hansen	–	–	28.70	–
$AR(1)$	–	–	-3.18***	–
$AR(2)$	–	–	1.60	–
T	16	16	16	15

Notes: As in Table 4.