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Should the Federal Government Reallocate Funds within Federal Transfers?

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Abstract

Federal transfers in the USA comprises some components such as retirement and disability payments for individuals, other direct payments for individuals or organizations, grants, procurement contracts, and wages. It is recognized that one of the goals of federal transfers is to alleviate difficult times within states. Is the composition of federal transfers budget having an optimal effect on the business cycle or should the federal government re-allocate some expenditures? In this paper, we argue that federal government may better enhance cyclical output if some reallocation is made from direct payments for individuals to direct payments for organizations, grants, and procurement contracts.

JEL Classification: $H77$, $E32$, $E61$, $C33$, $O51$.

Keywords: Components of Federal Transfers, Cyclical Output, Panel Data, GMM.

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1 Introduction

Federal Transfers in the USA comprises such components as retirement and disability payments for individuals, other direct payments for individuals or organizations, grants, procurement contracts, and wages. It is recognized that one of the goals of federal transfers is to alleviate difficult times for the states. Is the composition of federal transfers budget having an optimal effect on the business cycle of the states or should the federal government reallocate some expenditures? We provide an answer to this question in this article.

National governments may use transfers to regional or state governments with the objective of improving convergence between poor and rich states or as a stabilization mechanism. As Bayoumi and Manson (2000) put it: "Regional flows of federal taxes and transfers within the United States and Canada are used to analyze long-term fiscal flows (the redistributive element) and short-term responses to regional business cycles (the stabilization element)." In this letter, we focus on the second element.

Most previous work focused on the relationship between federal transfers and migration or federal transfers and convergence (e.g. Kaufman et al., 1997 for Canada, Cashin and Sahay, 1995, for India and Obstfeld and Peri, 1998, for a comparison between countries). For the United States, some concern has already arise about the effect of transfers both on long-run growth and on cyclical convergence, but the focus is mostly on its connection with long-run growth (e.g. Chernick and Sturm, 2005 and Holtz-Eakin and Schwartz, 1995). However, some previous studies had already concerns about the short-run stabilization qualities of transfers. Sala-i-Martin and Sachs (1992) find that federal tax reductions contributes much more to insure the state against regional economic shocks than an increase in federal transfers. Asdrubali et al. (1996) study the channels of risk sharing between the states of the US, and find that the federal government contributes 13 percent to the smoothing of shocks to the gross state product.

However, the role of the components of federal transfers to the states in each state

business cycle (or cyclical output) is still uncovered. We are concerned with the impact of each component of federal transfers on the business cycle, given that the total amount transferred to the state remains constant. Thus we suggest forms of reallocating federal transfers in order to improve the cyclical output, which has clear policy implications.

Our study comes to shed some light on the efficiency of the composition of the federal transfers budget as a mechanism of avoiding or alleviating recessions within states. This paper is divided in four sections. In section two we present the data, methods, and specification used in the estimations. Section three presents our results. Finally, in section four, we present our conclusions.

2 Data and Methods

2.1 Data

We have collected annual data for the 50 USA states between 1993 and 2004 (600 observations), excluding the Washington District of Columbia. We use several sources to obtain the data needed for this study. Federal transfers and each of the sub-components were obtained from the Consolidated Federal Funds Report (CFFR) on-line edition.[1] Gross state product and gross domestic product are from the Regional Economic Accounts of the Bureau of Economic Analysis (BEA). Finally, total US population and population for the states were taken from the Census Bureau.

Data were subject to treatment in order to obtain the following main variables:

1. *Per capita* state cyclical output (yc) - this variable is the cyclical component of the state *per capita* output. Gross state product at 2000 prices, from the Bureau of Economic Analysis (BEA), is used for output (in logs), and was detrended using the Hodrick-Prescott (HP) filter with a smoothing parameter of 100, as usual in annual

[1] Data is available online at http://harvester.census.gov/cffr/index.html.

data. Cyclical output for each state is obtained by subtracting from the real output series the output trend obtained from the HP filter.

2. *Per capita* union cyclical output (yc_usa) - this variable is the cyclical component of the union *per capita* output. Gross domestic product at 2000 prices is used for output (in logs), and was detrended using the HP filter with a smoothing parameter of 100, as usual in annual data. Cyclical output for USA is obtained by subtracting from the real output series the output trend obtained from the HP filter.

3. Transfers (fed) - this is the total annual federal government transfers to each state (in logs).

4. Component (dr, do, dx, gg, pc, sw) - this is the share of each component in the total amount transferred to each state. Each component designation is described in Table 1 below.

In Table 1 we present descriptive statistics for the variables described above, namely, averages, standard deviation (S.D.), minimum (Min.) and maximum (Max.) values. These figures are based on time-series cross-section data.

Table 1 - Overview of the Data

	Average	S.D.	Min.	Max.
Variables				
State Cyclical Output per Worker (yc)	0.003	0.020	-0.063	0.065
Union Cyclical Output per Worker (yc_usa)	0.002	0.014	-0.021	0.026
Federal Transfers (fed)	23.518	1.012	21.133	26.172
Disability and Retirement Payments (dr)	0.342	0.040	0.116	0.437
Other Direct Payments for Individuals (do)	0.177	0.038	0.060	0.261
Direct Payments to other than for Individuals (dx)	0.033	0.038	0.004	0.282
Grants (gg)	0.210	0.047	0.083	0.414
Procurement Contracts (pc)	0.121	0.067	0.034	0.390
Salaries and Wages (sw)	0.116	0.047	0.053	0.351

Data Sources: CFFR, Bureau of Economic Analysis (BEA), and Census Bureau.
Authors' own calculations.

2.2 Specification

As we have noted earlier, we intend to evaluate the effect of the composition of federal transfers in the cyclical output of USA states. A particularly important variable to take into account is investment in physical capital, as this is the traditional source of short-run convergence.[2] Since we are not concerned with long-run growth, the usual determinants of economies long-run performance, such as human capital or technology, are not included in the regressions. As the state cyclical output may be influenced by nationwide cyclical output, we introduce this variable in the regression. However, the used method, that we detail below, is robust to further omitted variables that we are not introducing in the regression.

We use the following alternative specifications, with different lag structures that we explain below:

$$yc_{i,t} = \alpha + \beta_1 yc_{i,t-1} + \beta_2 i/k_{i,t-1} + \beta_3 yc\_usa_{i,t} + \beta_4 fed_{i,t-j} + \beta_5 comp_{i,t-j} + \upsilon_i + \varepsilon_{i,t} \quad (1)$$

where $t = 1993, ..., 2004$; $i = 1, 2, ..., 50$, $j = 1, ..., 5$ is the number of lags considered, *comp* is one of the six components of federal transfers, i/k is the investment-capital ratio that we use as a control, υ_i is the fixed-effect by state, and $\varepsilon_{i,t}$ is the error term.[3] As one of the main issues in this empirical study is causality, we implemented regressions with different lag structures. As it is evident from the specification above, we consider each component share of federal transfers (retirement/disability payments for individuals (dr), other direct payments for individuals (do), direct payments to other than for individuals (dx), grants (gg), procurement contracts (pc), and salaries and wages (sw)), together with the total amount of transfers, so that the interpretation of β_5 is the effect of *comp* on the business cycle, given that the total amount of federal transfers is fixed. In consequence an increase

[2] In the Solow Model for example, the unique source for transitional dynamics is the investment rate.

[3] Data for investment and the capital stock are from Garofalo and Yamarik (2002), with adjustments for the period 2002-2004.

in *comp* must be compensated by a decrease in some other component.

2.3 Econometric Approach

One of the most serious problems when studying the relationship between federal transfers and cyclical output is the endogeneity of the right-hand-side variables, caused by possible reverse causality, omitted variables, and measurement errors. Particularly the two first problems can seriously affect these relationships. The amount of transfers given to the states can be determined by its level of income or its relative position in the business cycle, but it can also further determine the evolution of the cycle. Also, the quantity of procurement contracts for example may be dependent on the stage of the cycle, as well as the value of direct transfers for individuals or companies. We deal with the problem of causality in two ways: we consider lags in the econometric specification, as explained above and we consider an econometric approach robust to causality.

In order to deal with the various types of endogeneity of right-hand-side variables described above, in an application where the dependent variable is not so persistent, the appropriate method is the Generalized Method of Moments (GMM) developed by Arellano and Bond (1991). Under the assumptions that: (a) the error term is not serially correlated and (b) the explanatory variables are weakly exogenous (i.e., the explanatory variables are assumed to be uncorrelated with future realizations of the error term), the GMM dynamic panel uses the following moment conditions: $E[yc_{i,t-s}\Delta\varepsilon_{i,t}] = 0$ and $E[X_{i,t-s}\Delta\varepsilon_{i,t}] = 0$, for $s \geq 2; t = 3, ..., T;\ i = 1, ..., N$, where X is the complete matrix of covariates included in (1). These moment conditions indicate that the level of past values for cyclical output and federal transfers should not be correlated with contemporaneous differences in non-observed determinants of the cycle. Take as an example the possibility that the potential omitted variable "political influence of the state politicians in Washington D.C." increases from 2003 to 2004. Is it natural to think that this change influences the transfers received in the state in

2001? The answer to this question is "No"! We consider the highest number of instruments given that it is below or close to 50 (the number of states) to allow the highest efficiency but small overfitting bias. On this, we follow the suggestion of Bowsher (2002). As previous references also did, we collapsed the instrument matrix.

Consistency of the GMM estimator depends on the validity of the instruments. To address this issue we consider two specification tests: the first is the Hansen test of over-identifying restrictions, which tests the overall validity of the instruments (the null is that the instruments are valid); the second is the second-order autocorrelation test for the error term, which tests the null according to which there is no second-order autocorrelation. In general, all the specification tests indicate that the instruments used are valid.

3 What Kind of Transfers are Best for the Business Cycle?

In this section we present the results from the regressions. In order to compare results, we first did $\beta_2 = 0$, which implies coefficients for other variables for any value of the investment/capital ratio. Then we included the investment-capital ratio in the regressions and obtain coefficients for which the investment/capital ratio is made constant. We present the main results in the following figures. The bars in the graphs represent coefficients on different components of federal transfers. When a number is above or below the bar indicates that the coefficient is statistically significant at 1% (bold) 5% (bold italic) and 10% (bold grey). In the x-axis, we show results for each component for regressions in each one of them can have between 1 to 5 lags. Figure 1 presents results from regressions with $\beta_2 = 0$ and Figure 2 presents regressions in which i/k is introduced in the regressions and a coefficient for this variable is estimated. Overall, we ran 60 regressions (6 components times 5 different lag structures, with and without the investment-capital ratio variable, i.e.,

restricted and non-restricted regressions). In those regressions we always reject order one autocorrelation test in differences (at least at the 5% level), as expected. The null of the order two autocorrelation test in differences is rejected in a minority of regressions. Rejections occur in some unrestricted regressions: all regressions with lag five, the regressions with *dx*, *gg*, and *sw* lagged 2 periods, the regressions with *dr*, *pc*, and *sw* lagged 3 periods and regression with *sw* lagged 4 periods (13 regressions). Moreover, the Hansen tests rejects sometimes in the restricted regressions (also in 13 regressions: *do* with lag 2, *do*, *dx*, *gg*, and *sw* with lag 3 and 4, *dx*, *gg*, *pc*, and *sw* with lag 5). However, the Hansen test p-values remain at smaller and medium values, never indicating a problem with overfitting bias. When some specification test fails in regressions where coefficients are significant, the coefficients appear within a dash-lined box. These exceptions to specification validity do not affect our main results.

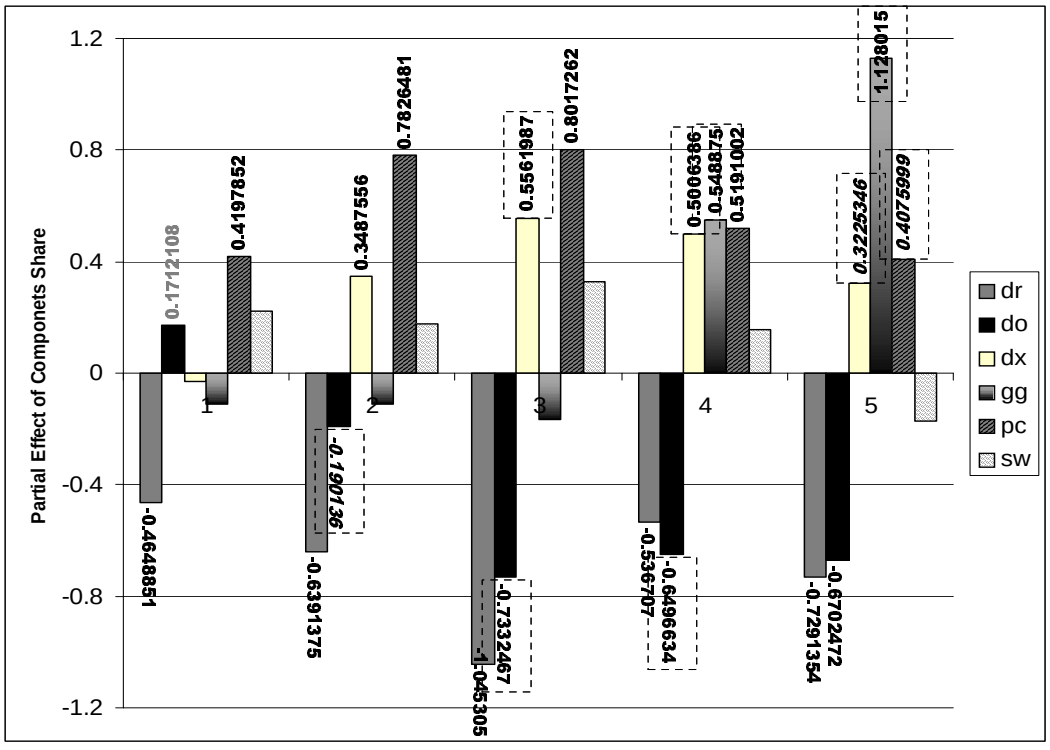

Figure 1: Coefficients on lagged values for components of transfers - restricted regressions

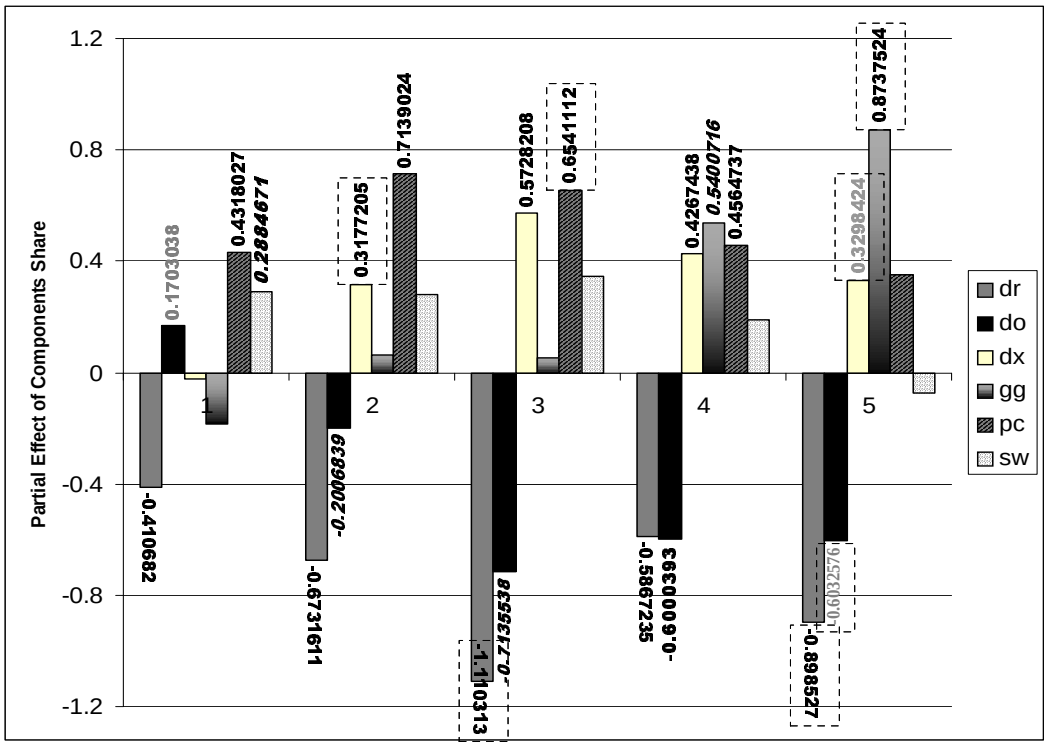

Figure 2: Coefficients on lagged values for components of transfers - unrestricted regressions

From the figures analysis, we obtain that for all investment-capital ratios, disability retirement payments (dr) always decrease cyclical output which is indicated by statistically significant coefficients. Other payments to individuals (do) also presents significant negative effects for all regressions after lag 2. For direct payments for others than individuals (dx), one should expect positive effects two, three, four, and five years after the shock. However, taking the specification tests into account only the result for lag 2 is valid. Grants (gg) show positive effects on business cycles after four and five years, but regressions in which they appear did not pass the specification tests. It seems that procurement contracts (pc) have a stable and significantly positive effect in cycles. Salaries and wages (sw) does not have any influence in the cyclical output.

When the investment-capital ratio is held constant, the exogeneity assumption of instruments can be accepted in a higher number of regressions. As we can see on Figure 2, the significant results that appeared in dashed boxes decrease. We will stress some differences

in the level of significance compare to the results shown in Figure 1. Disability retirement payments (dr) continue to have an overall negative effect through the different lag structure of the specifications. The same happens with direct payments for others than individuals (do) after the lag 2 specification. There are also no changes in the significance levels of direct payments for others than individuals (dx), when compared to the analysis of Figure 1, which means that this component seems to have a positive influence in the business cycle. Procurement contracts (pc) continues to always present highly significant and positive coefficients but only until lag 4. Wages and salaries (sw) appear with a positive sign. With grants (gg), the only significant results appear four and five years after the change, as in the first figure.

As a policy conclusion, we can say that reallocations should be made from disability retirement payments (dr) and direct payments for individuals (do) to direct payments for other than individuals (dx), grants (gg), and essentially procurement contracts (pc).

In the Appendix we present Tables A1 to A5 with non-restricted regressions, in which we present regressions for $j = 1$ to $j = 5$.[4] In the tables, we can also note that the investment/capital ratio is almost always statistically significant, stressing the importance of investment in physical capital in the short-run adjustment of the states. The total amount of federal transfers to the states shows a non-significant influence in the business cycle, in a majority of regressions. However, when it is significant, it seems to have a negative effect, which indicates that the total amount of dollars transferred to the states are ineffective in alleviating regressions. The log of the total amount of federal transfers to each state is introduced to held this variable constant as we analyze the effects of each component, since we are studying allocations.[5] We should also note that the lagged cyclical output (yc_{t-1}) as well as the nationwide cyclical output (yc_usa_t) present always highly significant and

[4]Other tables for restricted regressions are available upon request. We do not present the entire tables within the text to focus our analysis on the results for the variables of interest.

[5]This result could lead us to think about the empirical growth literature and its results about the negative effects of government expenditures on economic growth.

positive coefficients.

4 Conclusions

We analyze the effect of each of the federal transfers components on the business cycle of the states of the USA. We ask if there is some better allocation to do, in terms of the distribution of money across the components of federal transfers, given the amount of dollars transferred by the USA federal government to the states in order to positively affect the business cycles of the state.

We draw some policy implications, namely, we can say that reallocations should be made from disability and retirement payments (dr) and direct payments for individuals (do) to direct payments for other than individuals (dx) and essentially procurement contracts (pc). So according to our analysis of the components of federal transfers the most promising one to positively influence the business cycle of a given state is procurement contracts.

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A Regression Results - Non-Restricted Regressions

Table A1 - Effects of Transfers and its Components Shares on the Cycle (Lag 1)

Comp =	dr	do	dx	gg	pc	sw
$Dep.Var.: yc_t$	(1)	(2)	(3)	(4)	(5)	(6)
yc_{t-1}	0.304***	0.199***	0.199***	0.196***	0.232***	0.212***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
yc_usa_t	0.670***	0.551***	0.553***	0.569***	0.632***	0.586***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
i/k_{t-1}	0.451***	0.537***	0.506***	0.559***	0.550***	0.578***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
fed_{t-1}	-0.059***	-0.052***	-0.049***	-0.040***	-0.054***	-0.035***
	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.005)
$comp_{t-1}$	-0.411**	0.170*	-0.024	-0.183	0.432***	0.288**
	(0.000)	(0.054)	(0.806)	(0.307)	(0.000)	(0.047)
Hansen (p-value)	0.390	0.384	0.418	0.449	0.388	0.377
$AR(1)$ (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
$AR(2)$ (p-value)	0.575	0.535	0.437	0.604	0.630	0.503
Number of Obs	500	500	500	500	500	500

Notes: p-values of t-tests based on Robust Variance-Covariance Matrix estimated by GMM reported in parentheses. * 10% significance; ** 5% significance; *** 1% significance.

Table A2 - Effects of Transfers and its Components Shares on the Cycle (Lag 2)

Comp =	dr	do	dx	gg	pc	sw
$Dep.Var.: yc_t$	(1)	(2)	(3)	(4)	(5)	(6)
yc_{t-1}	0.313***	0.199***	0.225***	0.200***	0.240***	0.233***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
yc_usa_t	0.722***	0.604***	0.612***	0.565***	0.711***	0.596***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
i/k_{t-1}	0.424***	0.425***	0.404***	0.451***	0.410***	0.475***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
fed_{t-2}	-0.051***	-0.048***	-0.057***	-0.054***	-0.030**	-0.027
	(0.000)	(0.000)	(0.000)	(0.002)	(0.015)	(0.125)
$comp_{t-2}$	-0.673***	-0.201**	0.318***	0.065	0.714***	0.279
	(0.000)	(0.021)	(0.001)	(0.702)	(0.000)	(0.201)
Hansen (p-value)	0.292	0.277	0.313	0.305	0.390	0.278
$AR(1)$ (p-value)	0.000	0.001	0.001	0.001	0.001	0.000
$AR(2)$ (p-value)	0.180	0.122	0.057	0.081	0.553	0.077
Number of Obs	450	450	450	450	450	450

Notes: p-values of t-tests based on Robust Variance-Covariance Matrix estimated by GMM reported in parentheses. * 10% significance; ** 5% significance; *** 1% significance.

Table A3 - Effects of Transfers and its Components Shares on the Cycle (Lag 3)

Comp =	dr	do	dx	gg	pc	sw
$Dep.Var.: yc_t$	(1)	(2)	(3)	(4)	(5)	(6)
yc_{t-1}	0.344***	0.224***	0.206***	0.238***	0.297***	0.274***
	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)
yc_usa_t	0.769***	1.037***	0.752***	0.699***	0.757***	0.722***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
i/k_{t-1}	0.372***	0.241**	0.357**	0.291**	0.236*	0.337***
	(0.001)	(0.029)	(0.003)	(0.013)	(0.072)	(0.002)
fed_{t-3}	-0.006	-0.023	-0.058***	-0.029	0.007	0.004
	(0.813)	(0.155)	(0.001)	(0.147)	(0.739)	(0.866)
$comp_{t-3}$	-1.110***	-0.714***	0.573***	0.051	0.654***	0.347
	(0.000)	(0.000)	(0.001)	(0.815)	(0.000)	(0.152)
Hansen (p-value)	0.614	0.231	0.276	0.205	0.298	0.184
$AR(1)$ (p-value)	0.001	0.003	0.002	0.004	0.000	0.001
$AR(2)$ (p-value)	0.066	0.404	0.191	0.166	0.060	0.081
Number of Obs	400	400	400	400	400	400

Notes: p-values of t-tests based on Robust Variance-Covariance Matrix estimated by GMM reported in parentheses. * 10% significance; ** 5% significance; *** 1% significance.

Table A4 - Effects of Transfers and its Components Shares on the Cycle (Lag 4)

Comp =	dr	do	dx	gg	pc	sw
$Dep.Var.: yc_t$	(1)	(2)	(3)	(4)	(5)	(6)
yc_{t-1}	0.314***	0.427***	0.296***	0.396***	0.328***	0.362***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
yc_usa_t	0.645***	0.792***	0.709***	0.668***	0.600***	0.581***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
i/k_{t-1}	0.371***	0.258*	0.269**	0.254**	0.250*	0.372***
	(0.007)	(0.067)	(0.035)	(0.036)	(0.062)	(0.001)
fed_{t-4}	0.005	-0.002	-0.017	-0.044**	0.018	0.003
	(0.830)	(0.919)	(0.302)	(0.029)	(0.372)	(0.918)
$comp_{t-4}$	-0.587***	-0.600***	0.427**	0.540**	0.256***	0.191
	(0.000)	(0.000)	(0.023)	(0.026)	(0.001)	(0.406)
Hansen (p-value)	0.218	0.149	0.145	0.233	0.192	0.170
$AR(1)$ (p-value)	0.003	0.005	0.004	0.004	0.004	0.002
$AR(2)$ (p-value)	0.129	0.142	0.100	0.114	0.318	0.076
Number of Obs	350	350	350	350	350	350

Notes: p-values of t-tests based on Robust Variance-Covariance Matrix estimated by GMM reported in parentheses. * 10% significance; ** 5% significance; *** 1% significance.

Table A5 - Effects of Transfers and its Components Shares on the Cycle (Lag 5)

Comp =	dr	do	dx	gg	pc	sw
$Dep.Var.: yc_t$	(1)	(2)	(3)	(4)	(5)	(6)
yc_{t-1}	0.311***	0.384***	0.306***	0.376***	0.247***	0.279***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
yc_usa_t	0.451***	0.428***	0.539***	0.465***	0.563***	0.584***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
i/k_{t-1}	0.561***	0.446**	0.591***	0.386***	0.395**	0.517***
	(0.000)	(0.033)	(0.000)	(0.000)	(0.012)	(0.000)
fed_{t-5}	-0.003	-0.026	-0.066***	-0.106***	-0.011	-0.054
	(0.913)	(0.330)	(0.001)	(0.000)	(0.678)	(0.155)
$comp_{t-5}$	-0.899***	-0.603***	0.330**	0.874***	0.350**	-0.072
	(0.000)	(0.000)	(0.033)	(0.000)	(0.040)	(0.833)
Hansen (p-value)	0.277	0.225	0.239	0.156	0.182	0.190
$AR(1)$ (p-value)	0.001	0.002	0.001	0.003	0.002	0.000
$AR(2)$ (p-value)	0.051	0.045	0.035	0.092	0.065	0.034
Number of Obs	300	300	300	300	300	300

Notes: p-values of t-tests based on Robust Variance-Covariance Matrix estimated by GMM reported in parentheses. * 10% significance; ** 5% significance; *** 1% significance.