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The aim of this work is to identify convergence clubs in 17 Latin American countries in terms of GDP per capita during the period 1990-2014. To do this we apply the methodology developed by Phillips-Sul in order to identify the different convergence clubs on the path of growth in the Latin American economy over this period. The empirical results strongly support the existence of convergence clubs, indicating that the Latin American economy consists of four groups, each converging toward its own steady-state path, with two countries being divergent.

Keywords: Convergence, club convergence, log t test, Latin America

JEL codes: C33, O40, O47

I. Introduction

The convergence processes for different sets of countries around the world have been analysed from the perspective of growth theories. Neoclassical growth models (Solow, 1956; Swan, 1956) predict a convergence process among economies based on the existence of decreasing returns in capital accumulation; thus, the growth rate of capital per worker for countries with a lower initial capital endowment tend to be greater than the rate for countries with a higher initial capital stock. This allows them to grow at a faster rate than the more developed economies and hence, over the long run, they are able to catch up with them.

The absolute or unconditional beta convergence hypothesis regards countries as converging to common steady-state equilibrium regardless of the initial conditions, while the conditional convergence hypothesis represents convergence to a common steady state independent of the initial conditions, though only among countries that share common structural characteristics (technology, savings, or population growth rates). Growth theories also lead to the convergence club hypothesis by allowing multiple steady-state equilibriums (Durlauf and Johnson, 1995). There are diverse theoretical arguments for

explaining the emergence of convergence clubs, such as threshold externalities in the accumulation of human capital (Azariadis and Drazen, 1990), heterogeneity in resource endowments (Galor, 1996) and differences in the technological capabilities of countries (Howitt, 2000; Howitt and Mayer-Foulkes, 2005; Stokke, 2008), among others.

The real income convergence process among Latin American countries has been explored in some empirical studies using different methodologies as well as sample sizes and periods. However, this empirical body of literature is scarce in relation to other regions of the world (Martin and Vazquez, 2015), showing mixed results. Some papers analysing convergence processes across Latin American countries in recent decades indicate the existence of per capita income convergence for the region as a whole (Dobson and Ramlogan, 2002; Galvão and Gomes, 2007). Similar results are found for samples of countries with integration agreements (Holmes, 2005; Sperlich and Sperlich, 2014) or for geographical areas (Galvão and Gomes, 2007). In contrast, other papers find no evidence of a full convergence process for the region (Holmes, 2005; Dabús et al., 2014). Indeed, a few papers suggest the existence of groups of Latin American economies converging to the same steady state, though different for each group or convergence club (Blyde, 2006; Rodríguez-Benavides et al., 2014; Martin and Vazquez, 2015; King and Ramlogan-Dobson, 2016).

The objective of this paper is to examine the patterns of convergence in per capita income for Latin American economies. Specifically, we analyse whether there has been full convergence among 17 Latin American countries or if, instead, there has been a club convergence process among them during the 1990-2014 period.

For the empirical analysis, a non-linear factor model developed by Phillips and Sul (2007) is applied. This methodology, the log t test, avoids the weaknesses of other convergence estimation procedures (Bartkowska and Riedl, 2012; Monfort et al., 2013).

While other procedures cluster the economies a priori without using any specific method, the log t test (Phillips and Sul, 2007) does it endogenously, grouping by unspecified factors that determine the formation of convergence clubs. Moreover, with this procedure it is also possible to estimate the speed of the convergence parameter, which can be used to differentiate the relative convergence empirically.

The paper contributes to the existing literature by providing evidence for the presence of a club convergence process across Latin American countries over the last two decades, and by identifying the countries that form each club. It also identifies the relative transition path of each club with respect to the panel data average and to those of the different countries within each club.

The paper is organised as follows: Section 2 describes the data; Section 3 identifies the per capita income convergence clubs; finally, conclusions are drawn in Section 4.

II. Data

The countries included in the empirical analysis are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.[1]

The data used to measure income per capita are Gross Domestic Product per capita (GDPpc) at constant 2010 prices in dollars obtained from the Economic Commission for Latin America and the Caribbean (ECLAC).

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[1] The sample is composed of Central and South American countries although Belize, Guyana, and Surinam were excluded from our sample because of their small economic size (they only represented about the 0.2% of the Latin America GDP in 2014).

III. Empirical Analysis

When the log t test is applied to GDPpc for these 17 Latin American countries from 1990 to 2014, the hypothesis of overall convergence is rejected at the 5% significance level. Thus, we can conclude that these Latin American countries did not converge to the same steady equilibrium in terms of GDPpc.

Table 1 shows the empirical results, which indicate the presence of four clubs and two divergent countries, Ecuador and Nicaragua. It also includes the countries that comprise each club and the estimated parameters. Figures 1 and 2 present the relative transition path curves for the four clusters and for each country within its own club, respectively.[2]

[Table 1 near here]

As a whole, the estimated growth paths (Fig. 1) show the formation of four differentiated clubs that do not seem to tend toward convergence over the period in question, as observed by the stroke of the transition paths. The relative transition paths of clubs 1 and 2 (Fig. 1) are above the average, tending to separate slightly. These two clubs exhibit the highest cohesion within clubs (Table 1 and Fig. 2). The relative transition paths of clubs 3 and 4 (Fig. 1) are below the average, and tend to be equidistant throughout the period.

[Figure 1 near here]

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[2] The relative transition path curve draws an individual path for each country relative to the average panel of data; it measures the trajectory of each country from a starting position relative to the path of common growth. When there is a common path of growth between countries, it could give a convergence club within the set of countries and, in the same way, could trace the path of common growth of the club on the data panel.

Club 1 is formed by South America's Southern Cone countries, Argentina, Chile, and Uruguay, plus Brazil and Panama. The estimated speed of convergence for the club (α)[3] is 0.0534. The group shows a medium degree of convergence among the four clubs (t= 0.5849). Within club 1, Panama shows a clear growing trend approaching the average of the club, while Chile shows a slight growing trend; Uruguay and Argentina showed similar transition paths during the period until 2008, when they began to separate, while Brazil, which started above the club average at the beginning of the period, exhibits a decreasing transition path (Fig. 2).

Club 2 contains three Andean Region countries, Colombia, Peru, and Venezuela, plus Mexico and Costa Rica. This group presents the highest speed of convergence (0.1563) and the highest degree of convergence (t=1.4487). Figure 2 shows that Peru and Costa Rica exhibit an increasing trend, although the former is still below the club's average; Mexico and Venezuela, although above the average, show a decreasing transition curve, and Colombia has a stable below-average transition path.

Club 3 contains El Salvador and Paraguay. The fact that β in club 3 is negative but not significantly different from zero ($t > -1.65$) suggests that this is the weakest convergence club (Fig. 2). Club 4 consists of two Central American countries (Guatemala and Honduras) and one South American country (Bolivia). This group exhibits a medium degree of convergence (t=0.3440), with Bolivia showing a growing trend and Guatemala a decreasing trend, and both approaching the average, while Honduras shows a slight decreasing trend diverging from the club's average (Fig. 2). The estimated speed of convergence for this club is 0.0373.

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[3] The coefficient "β" provides a scaled estimator of the speed of convergence parameter α, specifically, $\beta=2\alpha$. See Appendix B, Phillips and Sul (2007).

[Figure 2 near here]

IV. Conclusions

This paper analyses the income convergence patterns across 17 Latin American countries from 1990-2014 using the log t test methodology developed by Phillips and Sul (2007). This methodology allows convergence clubs to be determined endogenously, and offers clear advantages over other convergence estimation procedures.

The results suggest the existence in the sample of four convergence groups of Latin American countries with different degrees and speeds of convergence, and two diverging countries. The clubs do not appear to be tending to converge in the period analysed. Conversely, it seems that the two clubs with the richest countries, which encompass 10 countries, are tending to separate from the other groups of countries. Moreover, both clubs show the greatest cohesion within clubs.

Finally, it seems that regional agreements or geographical location may not play a key role in the formation of clubs. Therefore, an in-depth study of the factors that could explain the formation of convergence clubs in Latin American countries would be necessary, especially if measures are to be implemented to improve economic cohesion in the region.

Disclosure Statement

No potential conflict of interest was reported by the authors.

References

Azariadis, C. and Drazen, A. (1990) Threshold externalities in economic development, *Quarterly Journal of Economics*, **105**, 501–26.

Bartkowska, M. and Riedl, A. (2012) Regional convergence clubs in Europe:

Identification and conditioning factors, *Economic Modelling*, **29**, 22–31.

Blyde, J. (2006) Latin American clubs: Uncovering patterns of convergence, MPRA Paper No. 21320.

Dabús, C., Delbianco, F. A. and Zinni, M. B. (2014) No convergencia en América Latina, *Estudios Económicos*, **31**, 57–80.

Dobson, S. and Ramlogan, C. (2002) Economic growth and convergence in Latin America, *Journal of Development Studies*, **38**, 83–104.

Durlauf, S. N. and Johnson, P. A. (1995) Multiple regimes and cross-country growth behavior, *Journal of Applied Econometrics*, **10**, 365–84.

Galor, O. (1996) Convergence? Inferences from theoretical models, *Economic Journal,* **106**, 1056–69.

Galvão Jr., A. F. and Reis Gomes, F. A. (2007) Convergence or divergence in Latin America? A time series analysis, *Applied Economics*, **39**, 1353–60.

Holmes, M. (2005) New evidence on long-run output convergence among Latin American countries, *Journal of Applied Economics*, **8**, 299–319.

Howitt, P. (2000) Endogenous growth and cross-country income differences, *American Economic Review*, **90**, 829–46.

Howitt, P. and Mayer-Foulkes, D. (2005) R&D, implementation and stagnation: A Schumpeterian theory of convergence clubs, *Journal of Money Credit and Banking*, **37**, 147–77.

King, A. and Ramlogan-Dobson, C. (2016) Is there club convergence in Latin America?, *Empirical Economics,* **51**, 1011–31.

Martin, V. and Vazquez, G. (2015) Club convergence in Latin America, *The BE Journal Macroeconomics*. **15**, 791-820.

Monfort, M., Cuestas, J. C. and Ordóñez, J. (2013) Real convergence in Europe: A cluster

analysis, *Economic Modelling*, **33**, 689-94.

Phillips, P.C.B. and Sul, D. (2007) Transition modeling and econometric convergence tests, *Econometrica*, **75**, 1771-855

Rodríguez-Benavides, D., López-Herrera, F. and Venegas-Martínez, F. (2014) Are there economic convergence clubs in Latin America?, *Journal of Economics and Development Studies*, **2**, 113-23.

Solow, R. M. (1956) A contribution to the theory of economic growth, *Quarterly Journal of Economics*, **70**, 65–94.

Sperlich, Y. and Sperlich, S. (2014) Income inequality in the South–South integration, *Journal of Economic Integration*, **29**, 726-58.

Stokke, H. (2008) Productivity growth and organizational learning, *Review of Development Economics,* **12**, 764-78.

Swan, T. W. (1956) Economic growth and capital accumulation, *Economic Record*, **32**, 334–61.

Table 1. Convergence clubs classification (1990-2014).

Club	No. of countries	β Coefficient	t Statistic	Countries
Club 1	5	0.1068	0.5849	Argentina, Brazil, Chile, Panama, Uruguay
Club 2	5	0.3126	1.4487	Colombia, Costa Rica, Mexico, Peru, Venezuela
Club 3	2	-0.2881	-0.1113	El Salvador, Paraguay
Club 4	3	0.0745	0.3440	Bolivia, Guatemala, Honduras
Non-converging countries: Ecuador and Nicaragua				

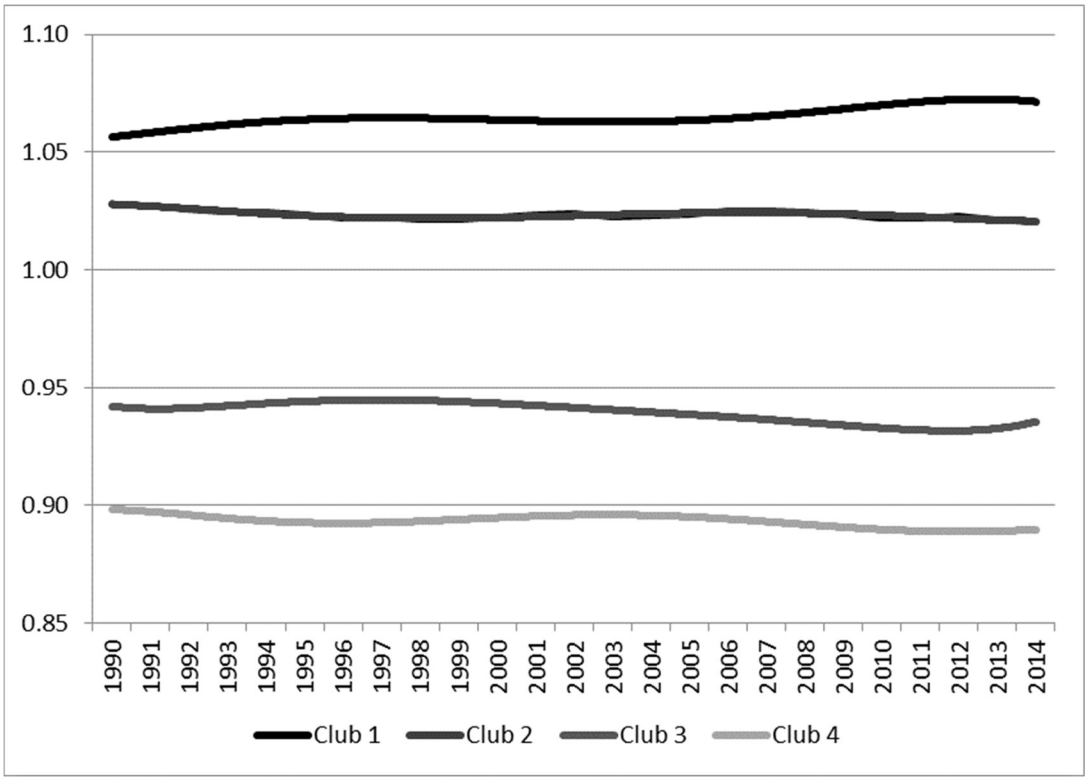

Figure 1. Transition paths across the clubs (1990-2014).

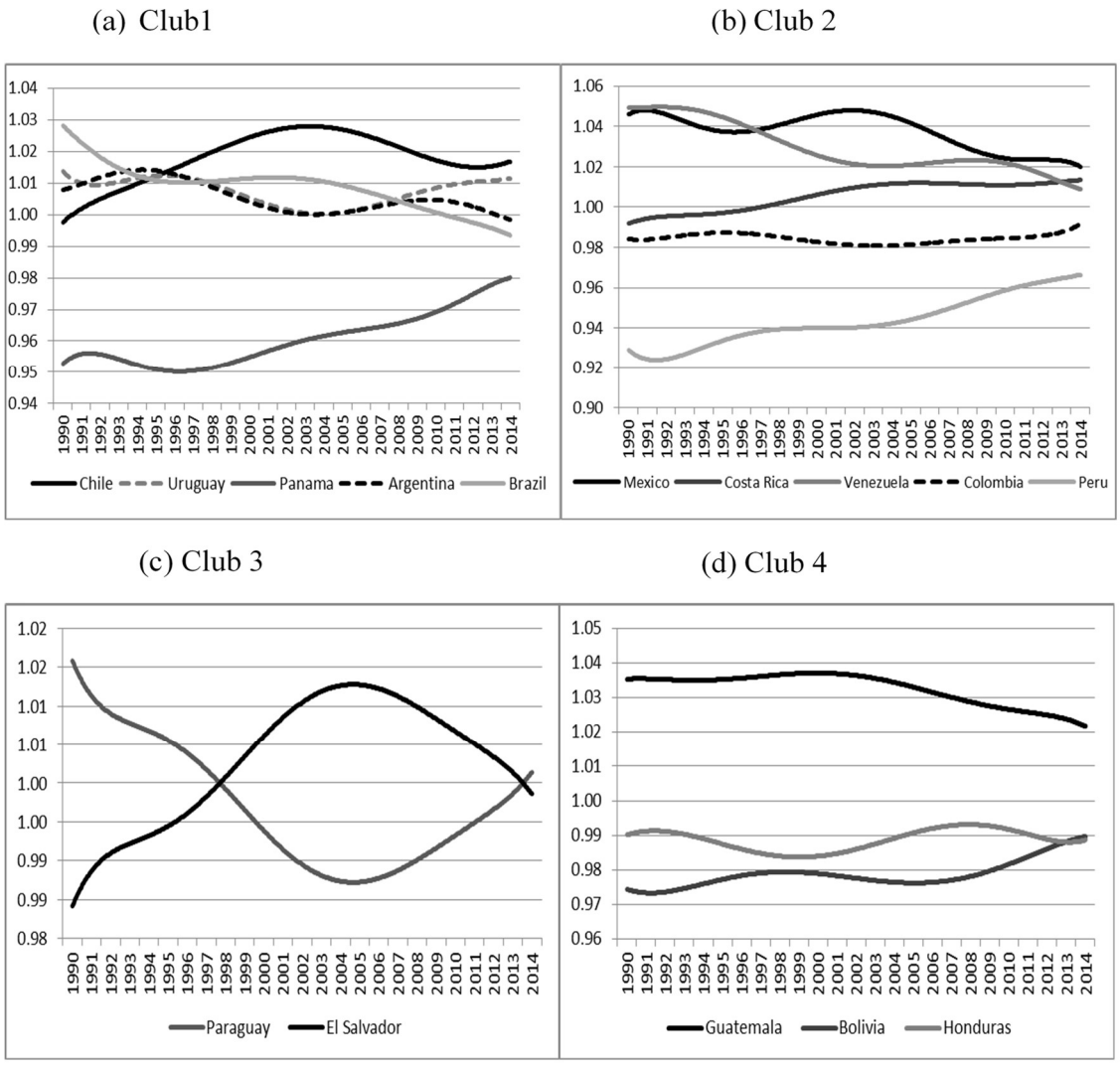

Figure 2. Transition paths for countries within their own club (1990-2014).