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Hysteresis in LATAM. Assessing the long-term impact of monetary policy and LMI on unemployment during the 2010s

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Hysteresis in LATAM. Assessing the long-term impact of monetary policy and LMI on unemployment during the 2010s.

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Abstract

The aim of this paper is to investigate the existence of hysteresis in Latin American (LATAM) economies. Hysteresis refers to the effect that shocks and macroeconomic policies, such as monetary policy, can have in the unemployment equilibrium of the economy. Evidence from OECD economies has grown in recent years, however, existing literature for Latin American countries is very limited. We extend this incipient literature, by providing a formal test of the relationship between macroeconomic policies, in this case, monetary policy, and unemployment. To do so, we built a panel of ten countries, namely, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru and Uruguay, covering the period between 2010 and 2022. We test the hysteresis hypothesis using a Panel-ARDL approach controlling for key Labour Market Institutions (LMI), such as, benefits, labour taxation, union power and minimum wages. Our findings indicate that interest rates set by Central Banks, significantly affect unemployment in the long run, hence, providing support to the hysteresis hypothesis. As per our results 1% increase in interest rates lead to a rise in equilibrium between 0.40 and 0.79 percentage points. Furthermore, our results are robust to a battery of tests including alternative LMIs definitions, accounting for heterogeneity across economies, and changes to the geographical and time scope. We also use Instrumental Variables analysis to rule out endogeneity. Our findings question the consensus among Central Banks and international institutions, that monetary policy can be used to manage inflation and exchange rates at no cost for the real equilibria of the economy. Furthermore, our results question the renewed interest in labour market structural reforms in the region.

Keywords: Hysteresis, Unemployment, Monetary policy, LATAM, Panel ARDL.
JEL Classification E24, C33, N16, E02, E12
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Declaration of interest: None to declare.

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1. Introduction

The objectives of monetary policy in Latin American (LATAM) economies shifted dramatically after the Debt Crisis of the 1980s, moving away from supporting development, towards focusing on price stability. This policy shift translated into substantially higher interest rates, and institutional reforms, such as, the adoption of Central Bank independence in the 1990s, and inflation targeting in the 2000s and 2010s (Pérez Caldentey and Vernengo 2020, Jacome and Pienknagura 2026). This shift in policy might have contributed to achieve lower inflation in most LATAM economies, however, the costs of restrictive monetary policy for the real side of the economy, in particular the unemployment equilibrium, are not well understood (Pérez Caldentey and Vernengo 2020, Werner 2023a).

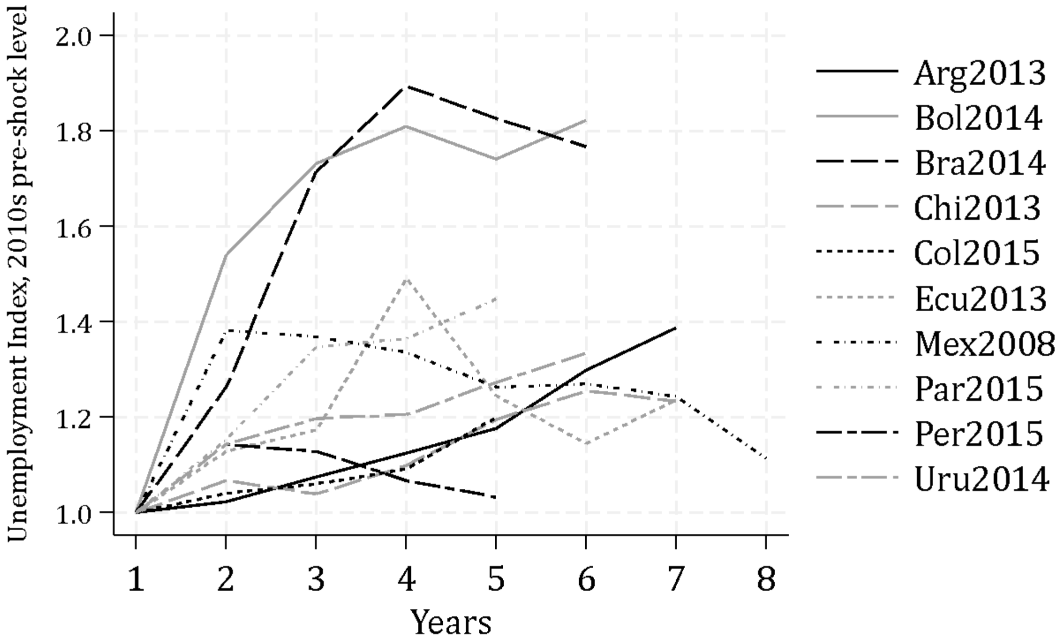


Fig 1. Unemployment persistence in 2010s

Central Banks and International Institutions generally down-play the cost of tighter monetary policies by arguing that their effects are short lived or transitory because interest rates cannot affect the unemployment equilibrium of the economy (Bogdanski, Tombini and da C. Werlang 2000, Esquivel, Kehoe and Nicolini 2020)[3]. However, we know that LATAM economies suffered long and persistent unemployment, consistent with changes in unemployment equilibrium, as a result of tighter monetary policy imposed by IMF stabilization plans in the 1990s and early 2000s (Ball, Roux Uribe and Hofstetter 2011, Mednik, Rodriguez and Ruprah 2012). In the 2010s, Monetary policy tighten up again, in this case in response to rising commodity prices (Daude 2012). Unemployment hikes in this period, as shown in Figure 1, were very persistent with the fastest economy returning to pre-shock levels needing five years. Similarly, unemployment has remained

[3] Similar arguments are made in OECD economies see (ECB 2004, 2021).

high after Covid amidst attempts to tame inflation caused by the pandemic with another wave of restrictive monetary policies (Werner 2023b). Hence, it seems reasonable to ask, whether monetary policy is having a persistent or long-lasting effect in unemployment, in other words, can interest rates modify the unemployment equilibrium of the economy? This phenomenon is usually referred to as hysteresis. This is a very relevant question today, as the inflationary pressures of the US-Iran war are starting to show, and Central banks are starting to weight their policy options.

Empirical literature from OECD economies suggest that monetary policy, do indeed have long-lasting effects on unemployment in line with the hysteresis hypothesis (Stockhammer and Klar 2011, Stockhammer and Sturn 2012). However, LATAM literature on hysteresis is limited, and, to the best of our knowledge there is no formal test of the relationship between monetary policy and unemployment equilibrium, see for example Ball et al. (2011) or Mednik et al. (2012). Our paper aims to extend hysteresis literature in LATAM economies by providing evidence of the long-run impact of monetary policy on unemployment for a panel of the ten largest LATAM economies, namely, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru and Uruguay. For this purpose, we build a dataset for the period 2010-2022, for which data is available on a consistent basis, and use a Panel ARDL approach, which allows us to test the hysteresis hypothesis without using a large time span that is simply not available for the region.

The rest of the paper is structured as follows. Section 2 presents our survey of existing literature. Section 3, presents our methodology. Section 4 discusses the key characteristics of the data used our analysis. Section 5 presents our estimation results and Section 6 summarizes the paper and discusses policy implications.

2. Literature review

The popular belief among Central Bankers in LATAM countries that tight monetary policy has no long-run impact on the labour market, see for instance, Bogdanski et al. (2000), Esquivel et al. (2020) or Arbogast, Van Doorslaer and Vermeiren (2024), draws from the widely accepted view of unemployment equilibrium proposed by Layard, Nickell and Jackman (1991), LNJ hereafter. In LNJ's model, the unemployment equilibrium of the economy is exogenous to demand, and it is exclusively determined by the institutional characteristics of the labour and goods market, although the labour market has received more attention[4]. Hence, according to LNJ, any employment cost of tighter monetary policy, to control inflation or defend exchange rates, should be short-lived as the economy eventually returns to an equilibrium which has not been modified.

The notion that unemployment equilibrium is exogenous to demand policies is challenged by the hysteresis hypothesis. The term hysteresis was initially used in the 1980s, to explain the persistence of unemployment in European economies (Blanchard and Summers 1986, Bean 1994). Several mechanisms have been proposed, Layard and

[4] Stockhammer and Sturn (2012) refer to this emphasis on the labour market side of the model as the "NAIRU story".

Bean (1989), and more recently Acharya et al. (2022), present an unemployment duration channel. Blanchard and Summers (1986) and Gali (2022) advocate for an insiders-outsider mechanism in wage bargaining. Whereas, Rowthorn (1995, 1999), Arestis and Sawyer (2005) and Dosi et al. (2018) argued that shocks constrain capital accumulation and productivity which in turn affect unemployment equilibrium[5]. Regardless of the exact mechanism, if the hysteresis hypothesis is correct, and macroeconomic policies can indeed modify the equilibria of the economy, costs of restrictive monetary policy are higher than previously thought as for instance argued by Ball (1999, 2009) or Arestis and Sawyer (2005).

The debate between proponents of the LNJ view and the hysteresis hypothesis has led to a vast empirical literature for OECD countries. On the one hand, advocates of the exogenous equilibrium approach argued, that evidence of a positive relationship between unemployment and Labour Market Institutions (LMI) in OECD panels provide support for LNJ's approach. See for example, Nickell (1997), Nickell, Nunziata and Ochel (2005) or Bassanini and Duval (2009). However, the robustness of these studies has been called into question by Blanchard and Wolfers (2000), Baker et al. (2007) and Baccaro and Rei (2007). On the other hand, advocates of the hysteresis hypothesis point out a growing literature where interactions between monetary policy and LMIs, see Blanchard and Wolfers (2000), or simply monetary policy can explain differences across countries and the evolution of unemployment in OECD economies (Ball 1999, 2009, Stockhammer and Klar 2011, Stockhammer and Sturn 2012).

The literature for LATAM economies presents a relatively abundant body of studies investigating what LMIs affect unemployment in line with the LNJ approach, which to some extent is comparable to the OECD literature, and yet, a very reduced body of literature assessing the hysteresis hypothesis. In the LMI literature, Heckman and Pages' (2004) panel of countries, is widely cited as providing evidence of the pernicious effect of LMI on employment[6], although this paper only finds evidence of social contributions reducing employment, and no influence of labour regulation. Similar results for regulation are reported in David, Komatsuzaki and Pienknagura (2021). Using microeconomic data we also find an extensive literature studying the links between LMIs and labour market flows. Morales and Medina (2017) find that cuts to labour taxation increase labour demand of Colombian firms, in line with Heckman and Pages (2004) results for payroll taxes. Evidence on benefits is very limited, but Ribe, Robalino and Walker (2012, Ch5) report a positive, albeit modest, elasticity of unemployment duration to benefits generosity. Cassoni, Allen and Labadie (2000) find that the re-introduction of unions in Uruguay reduced the elasticity of labour demand to wages and increased unemployment[7]. Whereas evidence for the minimum wage is mixed but suggests that it

[5] See Røed (1997) or Rodriguez-Gil (2017) for surveys of different hysteresis mechanisms.

[6] See the surveys in Cox Edwards (2012) and Duval and Loungani (2019).

[7] Most of the literature on unions in the region focus on its impact on distribution, see Kristensen and Cunningham (2006) or Freeman (2009).

could increase unemployment if it is set sufficiently high (Maloney and Mendez 2004, Terrell and Almeida 2008, Lemos 2009).

In contrast, existing literature on hysteresis for LATAM is very limited, although it generally provides support to the hysteresis hypothesis. We find three different approaches. First, studies of the statistical properties of unemployment and output, which find significant persistence or unit roots in these variables, see Libânio (2009) and Mednik et al. (2012). Second, country studies that show that the cyclical component of unemployment can modify its trend in Brazil and Mexico (Clavijo-Cortes 2023), or that unemployment duration affects unemployment equilibrium in Colombia (Cardona-Arenas and Sierra-Suarez 2024). Third, papers evaluating the impact of IMF stabilization plans in the region. Ball et al. (2011) document that increases on unemployment equilibrium of more than percentage points during 1990s and 2000s coincided in time with tightening of monetary policy, see also Vernengo (2004) or Belaisch et al. (2005). However, to the best of our knowledge, available literature for LATAM has not provided yet a formal statistical analysis of the link between monetary policy and unemployment equilibrium. Our paper aims to bridge this gap, by testing the relationship between interest rates set by the Central Bank and unemployment equilibrium. We test this hypothesis against a battery of LMI variables, which according to the literature might affect the unemployment equilibrium, that is, generosity of social protection, labour taxation, union power and minimum wages.

3. Methodology

To assess the existence of hysteresis in LATAM economies, we use the Dynamic Heterogeneous panel, or Panel ARDL accounting for cross-sectional dependence proposed by Pesaran (2006) and Chudik and Pesaran (2015). This approach is well suited to answer our research question as it separates the impact of monetary policy on unemployment fluctuations, captured by short-run estimates, from its impact on unemployment equilibrium, denoted by the long-run relationship. Thus, testing if interest rates enter the long-run relationship we can test the hysteresis hypothesis. This approach has the upshot that it avoids using five years averages of our variables, to separate unemployment equilibrium from fluctuations, as it is commonly done in OECD panels (Nickell et al. 2005, Stockhammer and Klar 2011). Using 5-years averages is not possible for LATAM countries due to data limitations.

Equation (1) presents the Pooled estimator version of the P-ARDL approach, which is the basis of our work:

$$\begin{aligned}\Delta u_{i,t} &= \rho\left(u_{i,t-1} - \beta'_z z_{i,t} - \beta'_r ri_{i,t}\right) + \\ &+ \sum_{j=1}^{p-1} \gamma_{i,j} \Delta u_{i,t-j} + \sum_{j=0}^{q-1} \left(\pi_j \Delta z_{i,t-j} + \phi_j\, \Delta ri_{i,t-j}\right) + \sum_{l=0}^{pT} \delta' \underline{x}_{t-l} + \varphi_i + e_{i,t}\end{aligned} \tag{1}$$

Where $u_{i,t}$ is the unemployment rate in period t for country i. $z'_{i,t}$, is a vector of variables capturing LMIs, which according to LNJ affect unemployment equilibrium. In our case, $z'_{i,t} = (ben_{i,t}, tud_{i,t}, tw_{i,t}, mw_{i,t})$, where ben denotes Benefits, tud Trade Union Density,

tw Labour taxation and mw Minimum wages. Whereas, $ri_{i,t}$, stands for real interest rates, and captures the influence of monetary policy. Δ denotes first difference. The first term of equation (1), $\rho(u_{i,t-1} - \beta'_z z_{i,t} - \beta'_r ri_{i,t})$ denotes the error correction term (ECM) or long-run relationship between unemployment, LMIs in $z_{i,t}$ and $ri_{i,t}$. Thus, β coefficients are key to answer our research questions. If β'_r is significant and positive, it implies that raises in interest rates increase unemployment equilibrium, in other words, monetary policy has a long-term impact on unemployment in line with the hysteresis hypothesis. If any coefficients in β'_z are significant, it would mean that some institutional characteristics of the labour market can affect unemployment in the long-run, as suggested per LNJ approach. For OECD economies, there is growing evidence that both, β'_r and β'_z are significant, see for instance, Stockhammer and Klar (2011) or Stockhammer and Sturn (2012). These results indicate that policy makers have a policy choice to reduce unemployment equilibrium, contrary to what is commonly argued by proponents of the LNJ approach.

The second term of eq (1), $\sum_{j=1}^{p-1} \gamma_j \Delta u_{i,t-j}$ denotes lags of changes in unemployment for country i with $t-j$ lags. The third term, $\sum_{j=0}^{q-1} (\pi_{i,j} \Delta z_{i,t-j} + \phi_{i,j} \Delta ri_{i,t-j})$ stands for the short-run influence on unemployment fluctuations of variables in vectors $\Delta z_{i,t}$ and $\Delta ri_{i,t}$, i.e., it provides information on the short-run dynamics of unemployment. The fourth term, $\sum_{l=0}^{pT} \delta'_{il} \underline{x}_{t-l}$, accounts for potential cross-sectional dependence in the panel, using cross-sectional averages of the dependent and independent variables, $\underline{x}_{t-l}$. Cross-sectionality is likely to occur in macroeconomic panels, where shocks in one economy can spill-over to their neighbors, failing to account for these spill-overs can bias estimates (Pesaran 2006) [8]. Finally, φ_i stands for countries Fixed Effects, and $e_{i,t}$ is the error term, which is assumed to have the standard properties.

We also estimate the PMG estimator, to allow for short-run heterogeneity across countries. This estimator provides country specific short-run coefficients, that is, in equation (1), we allow $\gamma_i \neq \gamma$, $\pi_i \neq \pi$, $\phi_i \neq \phi$ and $\delta'_i \neq \delta'$. The PMG estimator is more taxing on our degrees of freedom, but it can help unveil relevant effects that assuming homogeneity across countries might have hid. Thus, we use the PMG estimator to check the robustness of our Pooled results (Pesaran and Smith 1995, Pesaran, Yongcheol and and Smith 1999)[9]. We can rationalise this heterogeneity by arguing that structural determinants of unemployment equilibrium might be common, but drivers of short-run fluctuations might vary across countries.

[8] Lag order j for ui,t-j, zi,t-j, rii,t-j and l for xt-l varies across regressions. Choice for j and l were made after experimenting with several specifications in order to provide a parsimonious but rich dynamics to our estimations and to pass the relevant diagnostic tests.

[9] We were unable to use the third estimator of the PARDL approach, the Mean Group (MG) estimator as it also allows for long-run heterogeneity across-countries, that is, it also allows for country specific estimates of coefficients. However, our sample size did not allow computation.

Our empirical strategy proceeds in three steps. First, we test for cointegration using the Westerlund (2005) test[10]. This test has the advantage over other popular panel Cointegration tests, e.g. Kao or Pedroni, that it accounts for heterogeneity among the countries by testing the null of no-cointegration against cointegration in the whole panel, as well as, cointegration in some countries. Second, we quantify the impact that ri and LMI's included in $z_{i,t}$ have on the unemployment equilibrium by estimating equation (1) using the Pooled and PMG estimators. Third, we check the validity of our findings, by using alternative definitions of our benefits, taxation and unions' variables, as well as, Instrumental Variables to rule out endogeneity concerns.

4. **Data**

Our analysis uses data from ten LATAM economies, vis-a-vis, Argentina, Bolivia, Brazil, Colombia, Chile, Ecuador, Mexico, Paraguay, Peru and Uruguay, for the period between 2010-2022. The main sources of data are ILOStat, IMF's International Financial Statistics (IFS), the World Bank's World Development Indicators (WDI), and national sources that we use to fill gaps in the data.

Our dataset includes the following variables. Unemployment rates, ur, calculated as the ratio of unemployment to the labour force series from ILOStat. Unemployment reported in ILOStat, uses Labour Force Survey data according to ILO's definition of unemployment (person in working age out-of-work but available for and seeking employment), and it is constructed to ensure international comparability, hence, most suitable for our analysis[11]. Our measure of monetary policy is the real interest rates, ri, calculated as the difference between the Central Bank (CB) nominal interest rate and the inflation rate, and uses IMF IFS data for consumer price index and nominal interest rates. We control for four key LMIs identified in the literature as potentially affecting the unemployment equilibrium in the region. First, we measure the generosity of social protection systems with three benefits variables supplied by the World Bank denoting the proportion of household income that is received in terms of Social Insurance programmes, $ben1$, Social Protection and Labour Programmes, $ben2$, and Social Safety nets, $ben3$. Ideally, we would like to have a benefits measure that only accounts for unemployment benefits, as in the OECD literature, however, this data is only available for four countries in our sample, and the sample size is too small to produce any meaningful estimates. Having said that, $ben1$, $ben2$, and $ben3$ provide valuable information on available non-labour income, which according to LNJ can affect incentives to work, hence we use them to make an overall assessment of the effect of benefits on unemployment. $ben1$ is our preferred benefits variable, as it includes benefits associated with employment status, such injury, paid sick leave or maternity. $ben3$ is less related to employment status, as it includes non-contributory pensions, child and family allowances or disability benefits. On the other hand, $ben2$, includes payments derived from social programmes along with

[10] We also experimented with Westerlung (2007) Cointegration test, which accommodates for the presence of cross-sectionality as this issue appears in our panel. However, this test relies on country regressions, which in our case are not computable given that we have 12 observation per country.

[11] For further details, and descriptive statistics, see Table A1 and Table A2, respectively, in the appendix.

unemployment benefits and active labour market policies. However, labour programmes data varies significantly across countries making comparison with this variable difficult, plus the mix of passive and active labour market policies makes the interpretation of any estimations very difficult, as we cannot disentangle which factor dominates. These World Bank series on benefits are commonly used in the literature to measure benefits generosity, see for instance, Holzmann et al. (2011) and Robalino and Weber (2013).

Second, we measure labour taxation by calculating the proportion of wages that are levied in taxes. We have three measures depending on taxation considered. $tw1$, includes Income taxes paid by individuals, plus Payroll and Workforce taxes, plus Social Security contributions. $tw2$, is equal to $tw1$ minus individuals' income tax, and $tw3$ only includes Social Contributions. Taxation data is from IMF IFS, whereas wages and employment data are from ILOStat. $tw1$ is our most comprehensive measure, as it includes income tax from labour, however, it also includes income taxation on profits and capital gains, which are not necessarily related to employment. On the other hand, $tw2$ and $tw3$, only include taxes paid by individuals in employment, but they do not include all taxes paid by employed workers. Given that $tw1$ is the more encompassing measure we use it as our main variable, but we cross-check our results using $tw2$ and $tw3$. Third, we measure workers bargaining power, with trade union density, $tud1$, which captures the proportion of employees that are unionized. Our dataset also includes coverage of wage bargaining, wbc, which accounts for the proportion of employees covered by wage agreements. Both variables are available from ILOStat. wbc is only available for a small number of observations, 65, which makes analysis very unreliable, and we did not use it in our analysis below. For details on the design of wage bargaining in LATAM economies see O'Connell (1999), ILO (2008, ch4) and Lamarche (2015). Fourth, Minimum wage, mw, measures the degree of generosity of minimum wage legislation by taking the ratio of the statutory minimum wage to average wages. All data comes from ILOStat. ILO does not provide data for the median wage, which could provide an alternative measure of generosity. However, our measure of the ratio to the mean wage is commonly used in the literature, e.g. Kristensen and Cunningham (2006)[12].

Let's now have a look at the data used in our analysis. Figure 2 shows the evolution of unemployment rates in the ten countries of our sample between 2010-2022. We identify two groups of countries depending on their performance. The first group, shown in Fig2a, includes Argentina, Brazil, Colombia, Chile and Uruguay, who have suffered high unemployment rates of between 8 and 16%. Brazil and Colombia suffered the highest rates in this group with double digit unemployment even before COVID-19 hit their economies. In the second group, in Fig2b, we find Bolivia, Ecuador, Mexico, Paraguay and Peru. These countries have consistently recorded lower levels than the first group, with rates between 4-8%, but they also saw unemployment growing in the mid-2010s and

[12] All economies in our sample have minimum wage legislation, however, since ILO does not provide comparable series for all of them, we restricted our analysis to those available from ILO, that is, Argentina, Bolivia, Brazil, Colombia and Peru.

during Covid. Paraguay is the worst performer in this group with rates close to 8% since the mid-2010s.

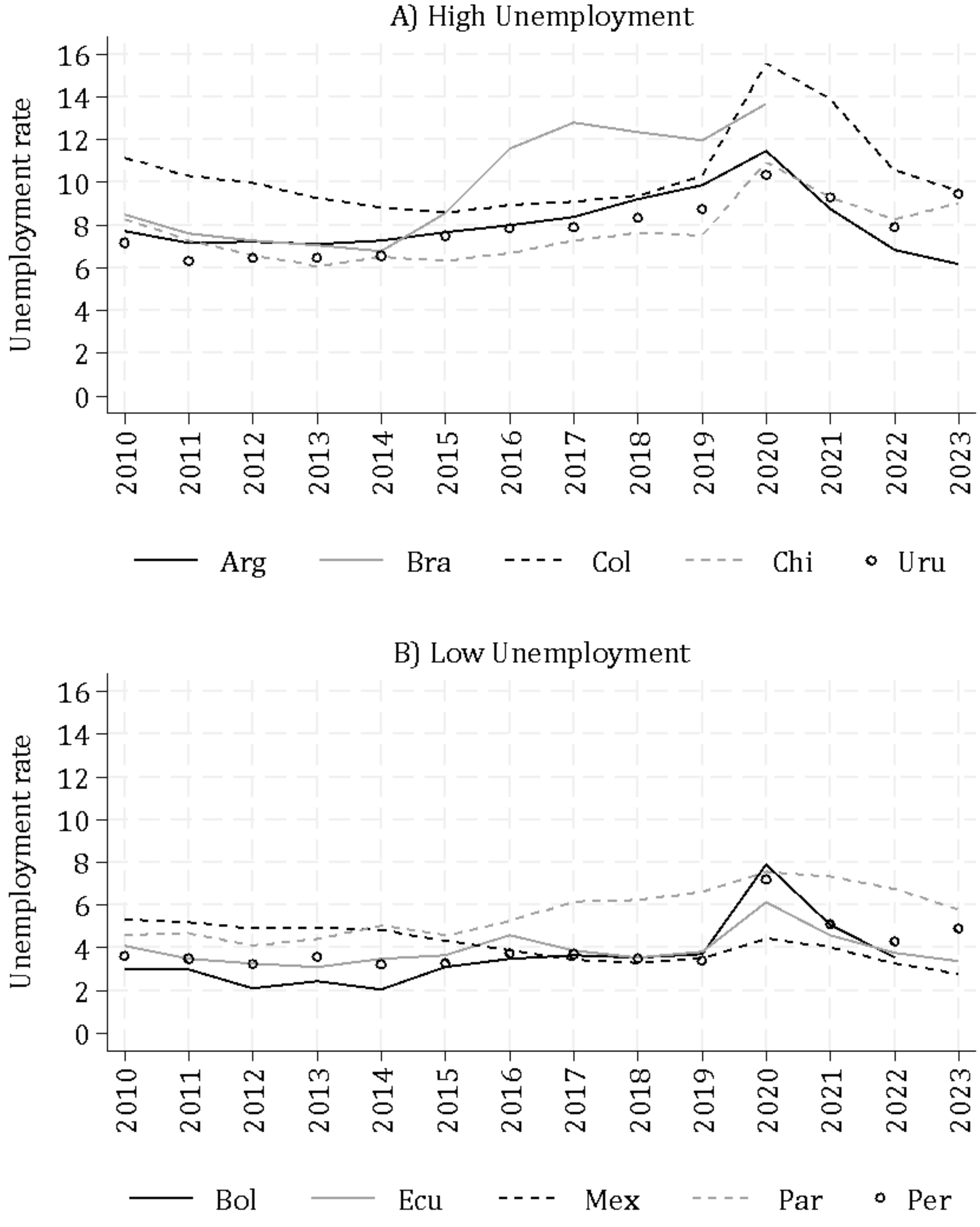


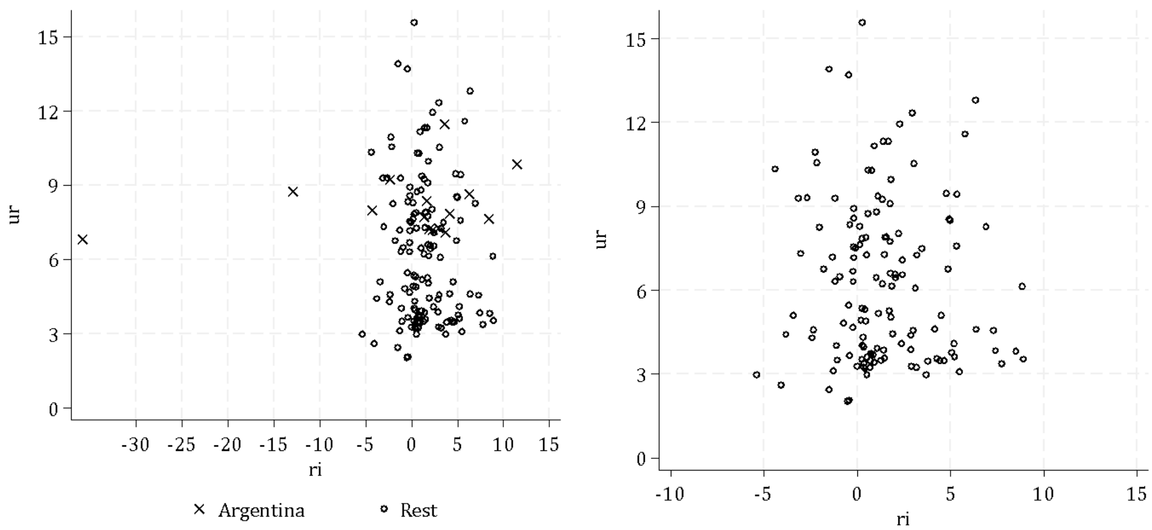
Fig 2. LATAM Unemployment 2010-2022

According to LNJ, differences in performance identified in Fig 2 are due to differences in institutions that govern the labour market, whereas, according to the hysteresis hypothesis, these differences are explained by different monetary policy stances. Table 1, provides a first assessment of these hypothesis by comparing the average value of each variable for countries in the High and Low unemployment groups that we have identified in Figure 2. High unemployment countries have much more generous benefits systems and minimum wages, as well as, higher taxation and union density, which according to LNJ would lead to a higher unemployment equilibrium. However, the real interest rate in the high unemployment group is also a lot greater, nearly five times, than in countries with low unemployment. Thus, it seems reasonable to suspect that monetary policy can affect the unemployment equilibrium in these economies as predicted by the hysteresis hypothesis.

Table 1. Variables by unemployment performance, 2010-2022

	High unemployment	Low unemployment
ri	2.446	0.531
$ben1$	40.32	22.35
$tw1$	28.74	6.400
$tud1$	15.73	2.673
mw	58.14	43.69

To further compare the influence of our variables on unemployment equilibrium, Figures 3 and 4 plot real interest rates and LMIs in our data against unemployment. Fig 3, presents our measure of real interest rates scattered against unemployment. In Fig 3a, we observe an apparent positive relationship between real rates and unemployment in line with the hysteresis hypothesis. Argentina presents some extreme values that could exaggerate this relationship, however, as we observe in Fig 3b, which excludes Argentina, higher real rates still appear to be associated with higher unemployment. We present the evolution of real interest rates for all countries in Fig A1 in the appendix.



(a) ri (b) ri Exc. Arg

Fig 3. Real Interest Rates and performance

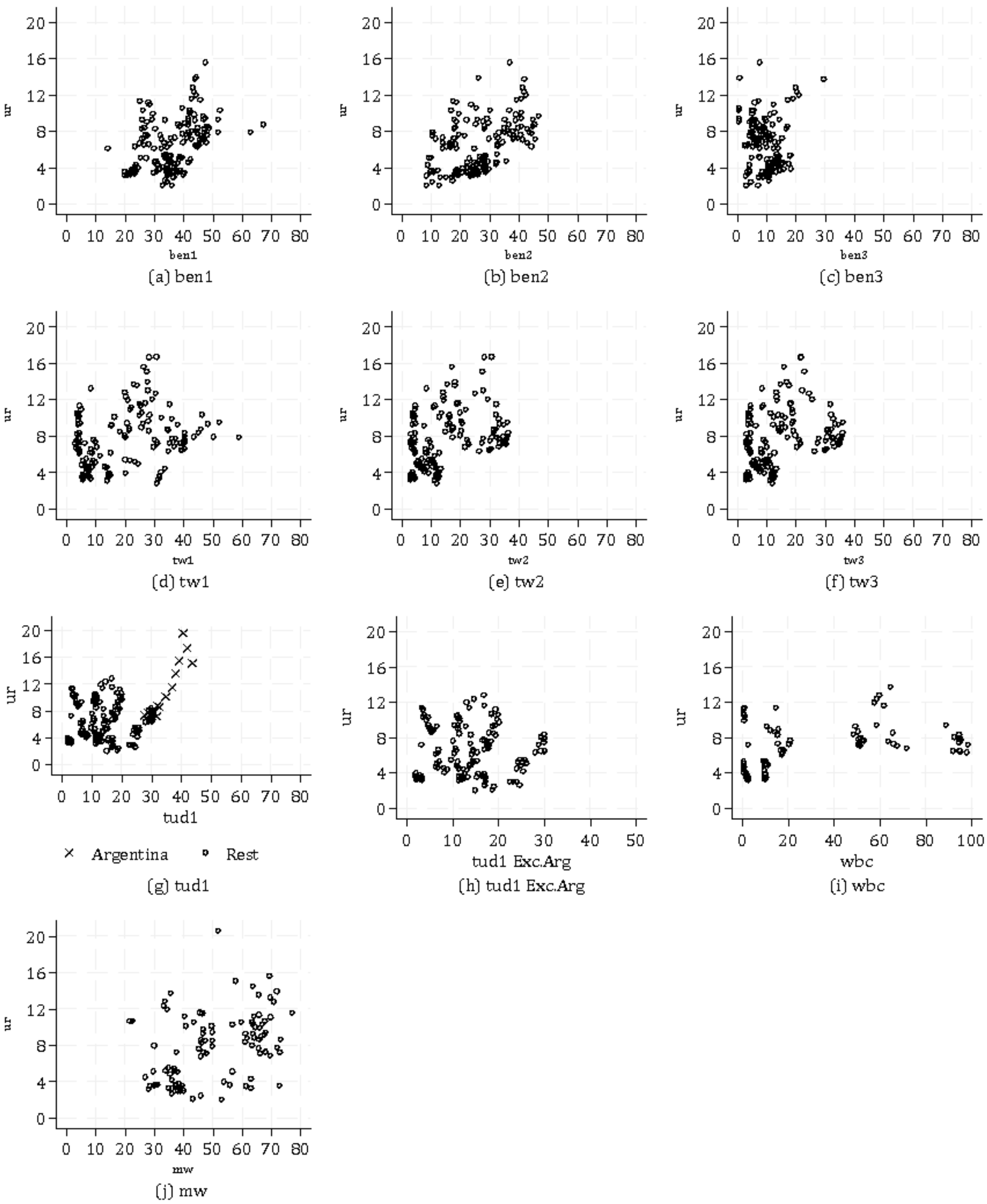


Fig 4. LMI and performance

Fig 4a, b and c, plots our three benefits measures against unemployment rates in our sample. In all cases there appears to be a positive relationship, as predicted by LNJ, although this is somehow stronger for *ben*1 and *ben*2. In Fig 4d, e and f, we plot *tw*1, *tw*2 and *tw*3 against unemployment. We also observe a positive relationship between our labour taxation measures and unemployment, in line with LNJ. In Fig 4g, we observe a positive relationship between union density and unemployment, as expected according to LNJ, however, Argentina's high levels of unionization could be distorting the picture, as once we remove this country, see Fig4h, the sign of the relationship is less clear. Similarly, in Fig4i, the relationship between coverage and unemployment is unclear. Fig 4j presents a mild positive relationship between unemployment and minimum wage. Figures A2, A3, A4 and A5, present the evolution of our benefits, taxation, union and minimum wages for each country.

Thus, it appears from our visual inspection of the data, that we cannot rule out an unemployment equilibrium determined by real interest rates and LMI, which would be consistent with the hysteresis hypothesis. We turn now to the analysis to formally investigate this possibility.

5. Results

5.1 Cointegration analysis

We start our analysis by testing for cointegration, to assess if there is an equilibrium relationship between unemployment, $ur_{i,t}$, real interest rates, $ri_{i,t}$, and our LMIs. Table 2 presents our results for the Westerlund's (2005) Variance Ratio test.

Table 2. Westerlund Cointegration test, p-values

	(1) *ur ri*	(2) *ur ben1 ri*	(3) *ur ben2 ri*	(4) *ur ben3 ri*	(5) *ur tw1 ri*	(6) *ur tw2 ri*	(7) *ur tw3 ri*	(8) *ur tud1 ri*	(9) *ur mw ri*
Variance ratio (whole panel)	.079*	.218	.204	.110	.124	.266	.112	.012**	.087*
Variance ratio (some countries)	.066*	.392	.238	.125	.028**	.053*	.028**	.020**	.186
Obs	209	151	151	144	137	137	137	142	95
Countries	10	10	10	10	9	9	9	9	5
Years	21	15	15	14	15	15	15	16	19

* $p < 0.10$, ** $p < 0.05$

We find cointegration between unemployment and real interest rates, see col (1), as the null of no-cointegration is rejected at 10%, for the whole panel, p −value= 0.079, and for some countries, p-value= 0.066. When we consider real interest rates, ri, and benefits ($ben1$, $ben2$, $ben3$) entering the vector, columns (2)-(4), we fail to reject the null of no-cointegration for all three benefits measures, for both versions of the test. These results suggest that $ben1, ben2$ *and* $ben3$ do not enter the unemployment equilibrium relationship, however, weighting tests results against theory, it seems reasonable not to rule out benefits in the analysis below. When we add labour taxation, columns (5)-(7), we only find evidence of cointegration in some countries at 10% with p-values equal to 0.028, 0.053, and 0.028 for $tw1$, $tw2$ and $tw3$ respectively. Results for union density are clearer, as we reject the null of no-cointegration at 5%, see col (8), for both versions of the test with p −values of 0.012 and 0.02, respectively. When we include the minimum wage we only find evidence of cointegration for the whole panel at 10% with a p-values= 0.087, see col(9). Results using the Kao and Pedroni cointegration tests provide broadly similar results, see Table A3. We also tested for cointegration by pairs of LMIs, but we found no cointegration when considering pairs of LMIs, see Table A4. We interpret cointegration results as indicating that unemployment is cointegrated with interest rates and one of our LMIs, most likely union power, $tud1$, although at this point we do not discard other possibilities.

5.2 Equilibrium determinants

Next, we estimate equation (1), to assess the impact of $ri_{i,t}$ and LMI's included in $z_{i,t}$, on the unemployment equilibrium. Following our cointegration test results we model (1) to control for one LMI at a time. Table 3 reports our results:

Table 3. Baseline

	(1) D.ur Pooled	(2) D.ur Pooled	(3) D.ur Pooled	(4) D.ur Pooled	(5) D.ur PMG	(6) D.ur PMG	(7) D.ur PMG	(8) D.ur PMG
Short-run								
ec	-0.152**	-0.073	-0.101	-0.092*	-0.146**	-0.030	-0.079	0.063
D.ri	-0.041	-0.020	-0.047	-0.027	-0.059**	-0.020	-0.065	-0.058
D.tud1			0.027				0.025	
L.dur				0.078				-0.073
Long-run								
ri	0.400**	0.691*	0.790**	0.594	0.276**	0.894**	1.431**	-1.619**
ben1	0.028				0.046			
tw1		0.068				0.330**		
tud1			0.362**				0.510**	
mw				0.115**				0.037
Obs	139	123	124	86	139	123	124	86
Countries	10	9	9	5	10	9	9	5
Years	14	14	14	17	14	14	14	17
AdjR2	0.78	0.67	0.64	0.68	0.65	0.58	0.36	0.33
t_{CD}	-1.087	-1.157	-0.538	-0.673	-0.954	-0.438	0.445	-0.093
	(0.277)	(0.247)	(0.591)	(0.501)	(0.340)	(0.661)	(0.656)	(0.926)
$\chi^2_{SC}(1)$	0.012	0.771	6.141	0.427	0.159	10.179	2.134	11.784
	(0.912)	(0.380)	(0.013)	(0.514)	(0.690)	(0.001)	(0.144)	(0.001)

* $p < 0.10$, ** $p < 0.05$, p −values for diagnostic tests in round brackets.

Note: In all regressions, lag order for $\Delta ri_{i,t-j}$ is $j = 0$. Regressions including $tud1$, $j = 1$ for $\Delta z_{i,t-j}$, zero otherwise. The term $\Delta u_{i,t-j}$ only appears in regressions including mw with $j = 1$.

All regressions include cross-sectional averages of unemployment, $\sum_{l=0}^{pT} \delta'_{i,l}\underline{x}_{t-l}$, in eq(1), with $l = 0$ to account for cross-sectional dependence, as earlier estimates without this term did not pass the CD-test. t_{CD} is statistic for Pesaran (2006)'s (2006) Cross-sectionality dependence (CD) Test and χ^2_{SC} the statistic for Woolridge's (2002) serial correlation test for Panel data.

Columns (1)-(4) present regressions using the Pooled estimator. The middle panel presents our estimates for the long-run relationship with unemployment, which is the main focus of our analysis. In all cases real interest rates, ri, enters the equilibrium relationship with the expected positive sign, and a coefficient ranging from 0.4 to 0.79, implying that an increase in real interest rates of 1% would increase the unemployment equilibrium by 0.4-0.79 percentage points. ri, is significant in all regressions, in line with the hysteresis hypothesis. The only exception is col (4) where ri and mw enter the cointegrated vector. In this regression, ri is still positive and take values in a similar range to previous regression, but the coefficient is insignificant, p −value= 0.263. However, this regression has the smallest of our sample sizes, 86 observations, and we take this result with caution. Regarding LMIs, all four LMI considered enter the cointegrated vector with a positive sign, but only $tud1$, in col(3), and mw in col(4), are significant with p −values= 0.018 and 0.02, respectively. These results indicate that only union density and the minimum wage might affect the unemployment equilibrium in the way that LNJ's model predicts.

Looking at the short-run dynamics, in the top panel of Table 3, the Error Correction term (ec), presents the expected negative sign, but coefficients are very small (-0.152, -0.073), implying that only between 7 and 15% of deviations from the unemployment equilibrium are corrected each year[13]. In fact, the coefficient for ec is only significant in Col (1) and (4). Thus, the unemployment equilibrium appears to be a weak anchor for the economy, as argued by Arestis and Sawyer (2005).

Pooled regressions reported in columns (1)-(4) pass the Cross-sectional Dependence (CD) test, as we fail to reject the null of weak dependence, with p −values well above 5% in all cases. CD results suggest that the interdependence between the economies in our panel are well-accounted for, preventing the bias that ignoring these spillovers can introduce. Regressions in columns (1)-(4) also pass the Wooldridge Serial Correlation (SC) test, except in the specification for $tud1$, col (3), where we reject the null of no-serial correlation with a p −value of 0.013. This Serial correlation persisted despite experimenting with several specifications and was only corrected when considering some heterogeneity among countries in the panel, i.e. when using the PMG estimator reported in col (7), which confirms the positive long-run relationship between ri and u as we discuss below. Adjusted-R^2 for Pooled estimations in col (1) and (4) suggest that our regressions have a good explanatory power, as our estimates explain between 64 and 78% of changes in unemployment for the panel.

Next, we provide a first evaluation of our estimates, by using the PMG estimator in columns (5)-(8). Results for PMG regressions are broadly in line with our pooled estimators[14]. In Col (5)-(7), the coefficient for real interest rates continues to be positive and significant ranging between 0.276 and 1.431, showing a consistent sign with our Pooled estimates in col (1)-(4), although estimates appear to be more volatile. It is worth noting that allowing some degree of heterogeneity for the regression containing $tud1$ in col (7), corrects serial correlation that we encounter in col (3), and confirms that ri also has a positive and significant impact on unemployment equilibrium when we control for union power with a coefficient equal to 1.431. Only our specification with mw, in col (8), contradicts Pooled estimates, as ri is now negative. However, this regression suffers of serial correlation, and we give more credibility to results in col (4), which pass both the CD and serial correlation tests.

[13] These estimates imply a very slow speed of adjustment, as 4.5 years are required to close half of the deviation.

[14] Regressions in Col (5)-(8) also pass the CD test in all cases. Adjusted-R2 for PMG regressions are slightly smaller that Pooled regressions, ranging between 0.33 and 0.65.

In columns (5)-(8), all LMI are positive, as above, but only $tw1$ and $tud1$ are significantly different from zero. Estimates for union density reinforce our findings from pooled estimates, suggesting that union power influences the unemployment equilibrium, but estimates for taxation need to be taken with caution as regression in col(6) suffer of serial correlation, and $tw1$ was insignificant in col(2) where this test is passed. On the other hand, estimates for the Error Correction term continue to be small implying very modest speed of adjustment of 3-14% per year, also in line with pooled regressions.

Thus, results for real interest rates in Table 3, provide support to the hysteresis hypothesis controlling for different LMIs and using different estimators, i.e. Pooled and PMG estimators. These findings confirm that unemployment persistence in the region reported by Mednik et al. (2012) is indeed the result of monetary policy affecting unemployment equilibrium, as already documented, but not formally tested by Ball et al. (2011). Further, our estimates extend country specific evidence in favour of hysteresis provided by Clavijo-Cortes (2023), Cardona-Arenas and Sierra-Suarez (2024).

Regarding LMIs, Table 3, suggests that only union power, measured by union density, $tud1$, significantly affects the unemployment equilibrium. Although it is worth noting that unions influence is more modest than that of monetary policy as the coefficient for $tud1$ is smaller than that of ri. These results confirm that micro-evidence for unions reported by Cassoni et al. (2000), do indeed have aggregate effects, and spread across the region. Future research should investigate if bargaining coordination in LATAM economies can mitigate the impact of union density, as it is reported for panels of OECD economies (Nickell 1997, Stockhammer and Klar 2011). Our results for benefits suggest that the impact on unemployment duration reported by Ribe et al. (2012, ch5) does not trickle to unemployment equilibrium[15]. Similarly, our findings for labour taxation contradict results reported by Heckman and Pages (2004) and Morales and Medina (2017). Whereas, results for minimum wages are in line with those reported for Brazil but in contrast with those for Colombia (Maloney and Mendez 2004, Lemos 2009), suggesting that as a whole the minimum wage in the region is too low to influence unemployment equilibrium.

5.3 Robustness analysis

Table 4 assesses the robustness of our findings by considering alternative definitions of benefits, taxation and unions' power. Our baseline specification in Table 3, accounts for social protection benefits using $ben1$, Table 4 considers two alternative measures of benefits, $ben2$, which includes benefits from labour and social programmes, and $ben3$, which only includes non-contributive benefits. However, both produce similar results to those for $ben1$ reported above. Col (1) and (5) present our Pooled and PMG estimator when using $ben2$. ri continues to significantly increase unemployment equilibrium with values ranging between 0.3 and 0.4. Whereas, estimates for $ben2$ are very small and

[15] We cannot discard that results for benefits might be due to low coverage and enforcement in the region (Ribe et al. 2012, ch5).

insignificant, consistent with findings for $ben1$ in Table 3. Results for $ben3$ in col (2) and (7) are in the same line.

To check our findings for taxation, we consider two alternative labour taxation variables. $tw2$, which only considers payroll taxes and social security, and $tw3$ that only accounts for payroll. Using $tw2$, in col (3) and col (8), ri is still positive and significant, and takes values of similar magnitude between 0.69 and 0.93 as those reported in Table 3. The labour taxation variable, $tw2$, is also insignificant as $tw1$. When we use $tw3$ we obtain similar results, see columns (4) and (9). Therefore, results with alternative labour taxation variables are also in line with those reported for $tw1$ in Table 3.

Table 4. Alternative ben, tw and union measures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	D.ur	D.ur	D.ur	D.ur	D.ur	D.ur	D.ur	D.ur	D.ur
	Pooled	Pooled	Pooled	Pooled	Pooled	PMG	PMG	PMG	PMG
Short-run									
ec	-0.147**	-0.140**	-0.076	-0.075	-0.135	-0.137**	-0.137**	-0.033	-0.031
D.ri	-0.042	-0.045	-0.021	-0.021	-0.103	-0.059**	-0.052*	-0.020	-0.020
Long-run									
ri	0.422**	0.472**	0.692**	0.692**	1.495	0.321**	0.302**	0.913**	0.936**
ben2	0.013					0.010			
ben3		-0.007					-0.034		
tw2			-0.014					0.212	
tw3				0.020					0.334*
wbc					-0.369				
Obs	139	131	123	123	65	139	131	123	123
Countries	10	10	9	9	7	10	10	9	9
Years	14	13	14	14	9	14	13	14	14
AdjR2	0.78	0.77	0.67	0.67	0.14	0.65	0.63	0.58	0.58
t_{CD}	-1.187	-1.510	-1.162	-1.168	-1.115	-1.155	-1.308	-0.869	-0.762
	(0.235)	(0.131)	(0.245)	(0.243)	(0.265)	(0.248)	(0.191)	(0.385)	(0.446)
$\chi^2_{SC}(1)$	0.081	0.163	0.475	0.564	4.329	0.434	0.354	5.059	6.890
	(0.775)	(0.686)	(0.491)	(0.453)	(0.037)	(0.510)	(0.552)	(0.024)	(0.009)

* $p < 0.10$, ** $p < 0.05$, p −values for diagnostic tests in round brackets.

Note: Note: In all regressions, lag order for $\Delta ri_{i,t-j}$ and $\Delta z_{i,t-j}$ is $j = 0$.

All regressions include cross-sectional averages of unemployment, $\sum_{l=0}^{pT} \quad \delta'_{i,l}\underline{x}_{t-l}$, in eq(1) with $l = 0$ to account for cross-sectional dependence, as earlier estimates without this term did not pass the CD-test. t_{CD} is statistic for Pesaran (2006)'s (2006) Cross-sectionality dependence (CD) Test and χ^2_{SC} the statistic for Wooldridge's (2002) serial correlation test for Panel data.

We also checked if our results from Table 3 are robust to changes to the geographical scope and sample period considered. First, we re-estimated Table 3, without Argentina[16], who presented extreme levels of real interest rates and unionization, as reported in Fig 3 and Fig4g. Second, we re-estimate Table 3 excluding 2020-2021, to avoid the potential

[16] We also check if our results were robust to dropping one country at a time with no impact on our main findings about hysteresis.

effect that Covid years might have on our results. However, results are broadly in line with those reported in Table 3, and the hysteresis hypothesis continues to be supported, see Table A4 and A5 in appendix[17]. Thus, results from Table 3 seem robust to different definitions of LMI institutions, as well as, to changes in the geographical and time span of the analysis.

5.4 Instrumental variables analysis

The analysis presented above assumes that causality runs from real interest rates to unemployment, however, there is a reasonable argument that CB policy can also respond to labour market developments, i.e. potentially creating reverse causality or endogeneity problems. To evaluate this possibility, we instrumentalise ri using its own lags, which might still influence future labour market developments, but are independent from them. Table 5 reports our estimates using three instruments for real interest rates, $rifit1_{i,t}$ that uses one lag of $ri_{i,t}$, next $rifit2_{i,t}$ that considers two lags, and $rifit3_{i,t}$, which uses three lags.

Table 5. β_r estimates using instrumental variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	D.ur Pooled $ben1$	D.ur Pooled $tw1$	D.ur Pooled $tud1$	D.ur Pooled mw	D.ur PMG $ben1$	D.ur PMG $tw1$	D.ur PMG $tud1$	D.ur PMG mw
$rifit1$	0.967**		1.586	1.008	0.869*		5.610**	-8.740**
$rifit2$	1.963*	-0.356	4.980**	0.439	1.878	1.130	-13.71**	36.21**
$rifit3$	0.515**	0.329	0.873*		0.474**	0.309	-4.802**	

* $p < 0.10$, ** $p < 0.05$

Note: In all regressions, lag order for $\Delta ri_{i,t-j}$ is $j = 0$. Regressions including $tud1$, $j = 1$ for $\Delta z_{i,t-j}$, zero otherwise. The term $\Delta u_{i,t-j}$ only appears in regressions including mw with $j = 1$.
All regressions include cross-sectional averages of unemployment, $\sum_{l=0}^{pT} \delta'_{i,l}\underline{x}_{t-l}$, in eq(1) with $l = 0$ to account for cross-sectional dependence, as earlier estimates without this term did not pass the CD-test. t_{CD} is statistic for Pesaran (2006)'s Cross-sectionality dependence (CD) Test and χ^2_{SC} the statistic for Woolridge's (2002) serial correlation test for Panel data.

Results using our instrumental variables are broadly in line with those from Table 3, except for $tw1$, confirming that our results capture the impact of real interest rates on unemployment and not the opposite. Real interest rates continue to significantly increase the unemployment equilibrium in regressions including $ben1$, see col (1) and (5). Controlling for $tud1$ in columns (3) and (7), there is some ambiguity in PMG regressions, col (7), but on the overall, estimates for our measures of real interest rates continue to be positive and significant. When we consider $tw1$, however, real interest becomes insignificant in all regressions in col (2) and (6), indicating that we cannot rule out reverse causality in regressions including $tw1$ reported above. Results for ri controlling for mw are ambiguous but on the overall suggest positive but not significant impact of

[17] Estimates for ri continue to be significant and positive in regressions including ben1 and tud1, as in Table 3, only in the regression with tw1 it becomes insignificant, see Table A5.

real interest rates as in Table 3. Thus, all-in-all, our results seem to be free of endogeneity problems.

6. Conclusion

The aim of this paper was to investigate the existence of hysteresis in LATAM economies for which evidence is yet very limited. For this purpose we have built a panel of ten countries, vis-à-vis, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru and Uruguay, for the period between 2010 and 2022. We test the hysteresis hypothesis using a panel ARDL approach controlling for different LMIs, which previous literature suggest can affect unemployment equilibrium in the region, namely, benefits, labour taxation, union power and minim wages.

Two key findings outstand from our analysis. First, Central Bank policy, through interest rates have a significant positive impact on the unemployment equilibrium as suggested by the Hysteresis hypothesis. Our estimates suggest that a 1% increase in real interest rates increases unemployment equilibrium somewhere between 0.40 and 0.79 percentage points. Our second key finding is that LMIs have little influence over the unemployment equilibrium, except for union density, which is the only LMI that enters the unemployment equilibrium with a positive and significant coefficient in line with LNJ model. Our estimations appear to be robust to a battery of checks, including IV analysis. Our findings extend the incipient literature on hysteresis in LATAM, by providing the first formal test of the relationship between interest rates and unemployment equilibrium.

In terms of policy, our findings question the consensus among LATAM Central Banks and international institutions, that monetary policy can be used to manage inflation and exchange rates at no cost for the real equilibria of the economy, i.e. unemployment equilibrium. It is well-beyond the scope of this paper to discuss the optimal design of monetary policy in developing economies, but our results call for an acknowledge by Central Banks of the existence of hysteresis effects, as well as, for a re-consideration of the costs of reducing inflation or managing exchange rates. These costs ought to be taken into account, particularly, in the current context of raising global inflation pressures due to the US-Iran war.

Furthermore, our results question the renewed interest in labour market structural reforms in the region, as according to our estimates, benefits, taxation and the minimum wage do not affect unemployment equilibrium. Our findings suggest that only unions have a long-term impact on unemployment, although its influence is more modest than that of monetary policy. Thus, our findings suggest that contrary to conventional thought, policy makers aiming at reducing unemployment equilibrium do have a choice between looser monetary policy or structural reforms.

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Appendix
Figures

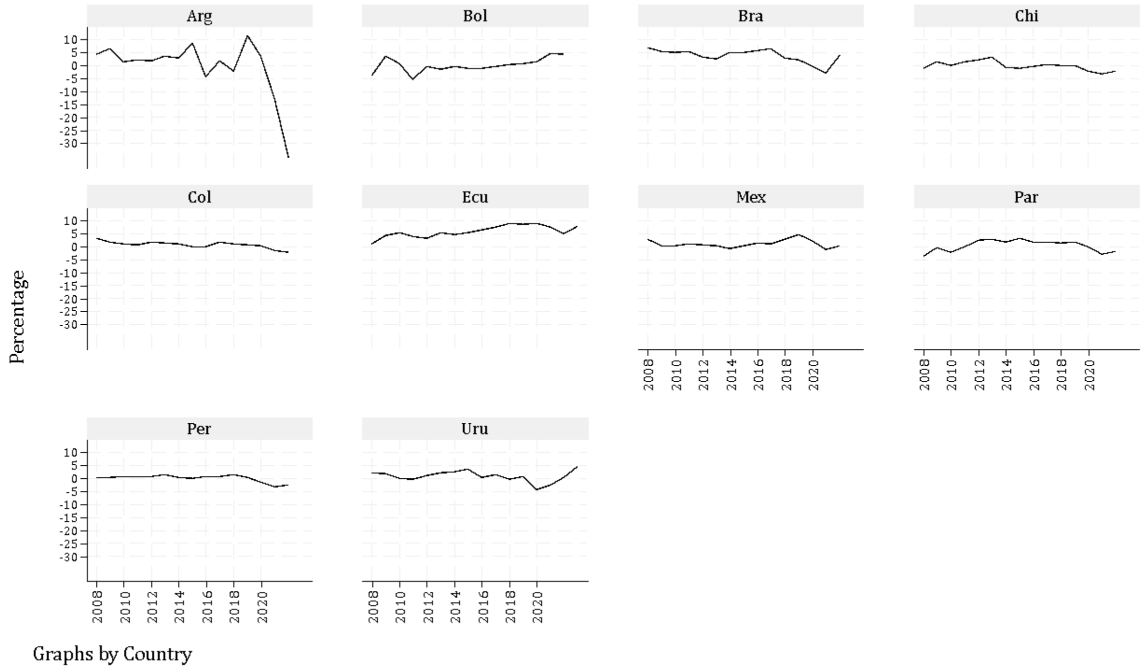

Fig A1. Real interest rates by country

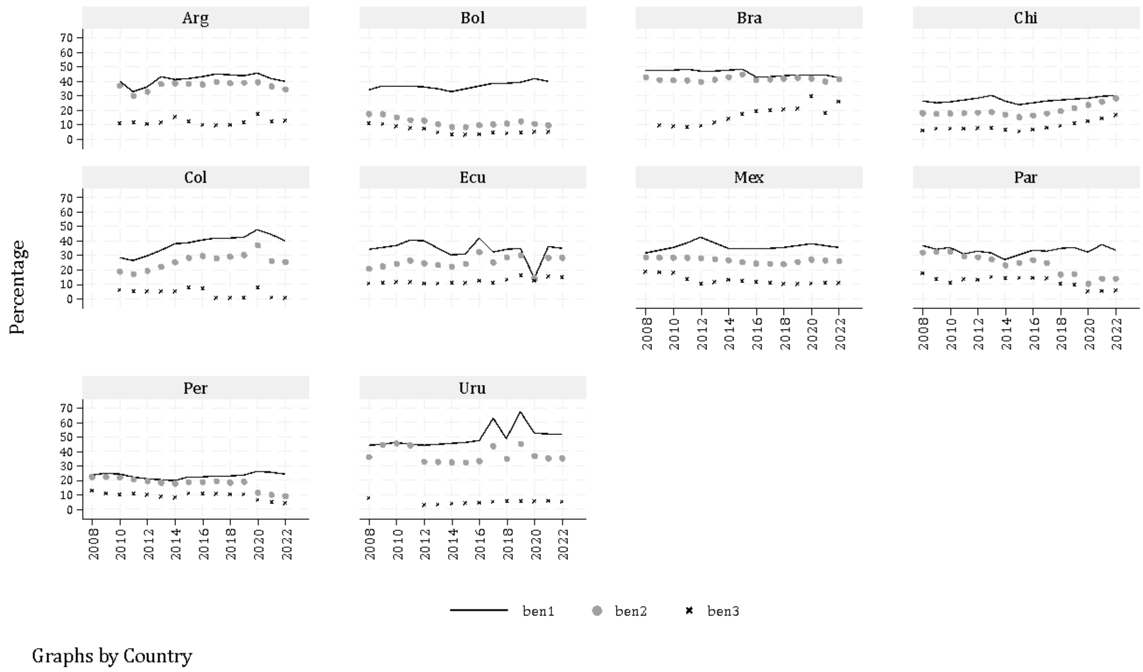

Fig A2. Benefits ($\boldsymbol{ben1}$, $\boldsymbol{ben2}$, $\boldsymbol{ben3}$) by country

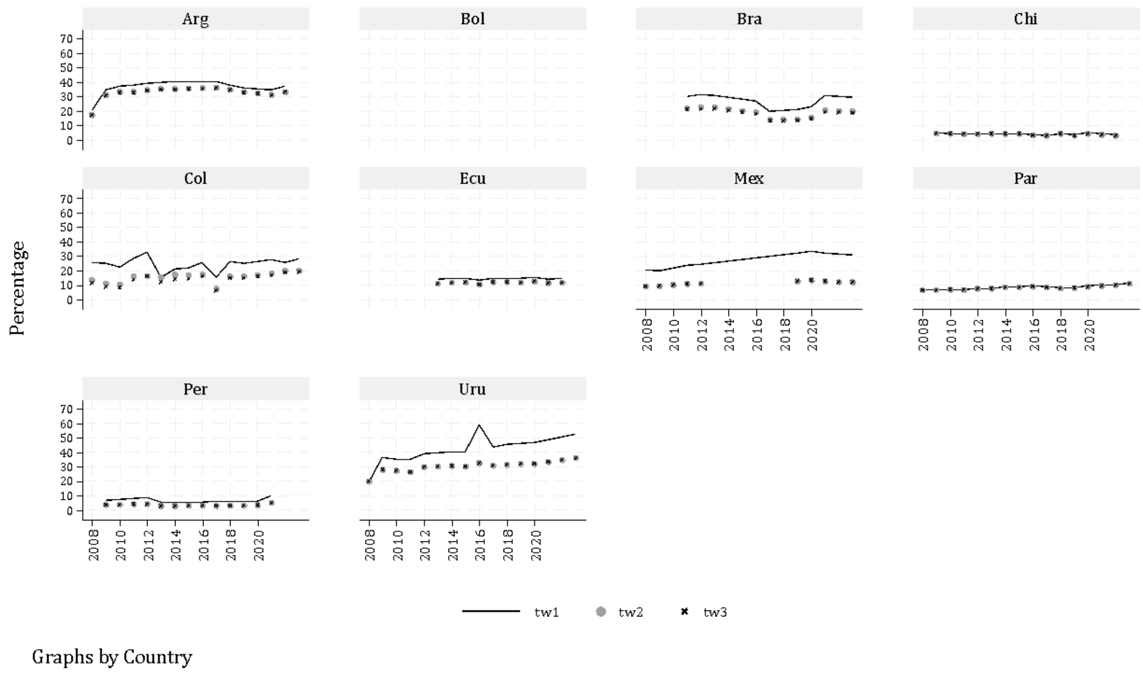

Fig A3. Labour taxation ($tw1$, $tw2$, $tw3$) by country

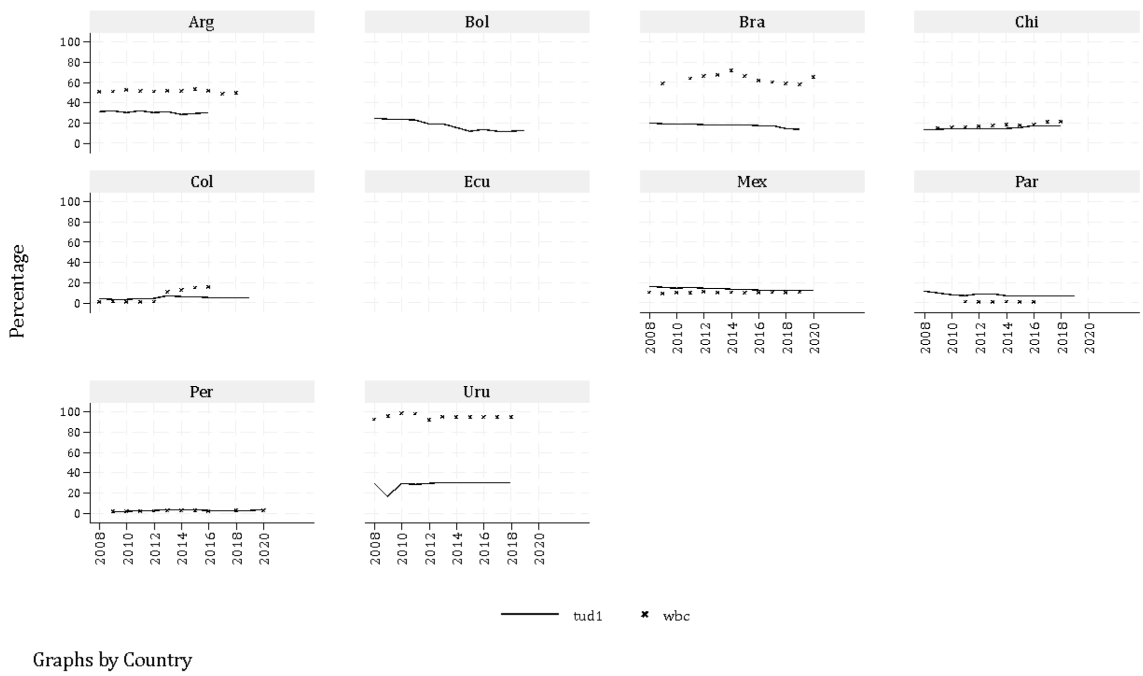

Fig A4. Trade union density and Wage Bargaining coverage by country

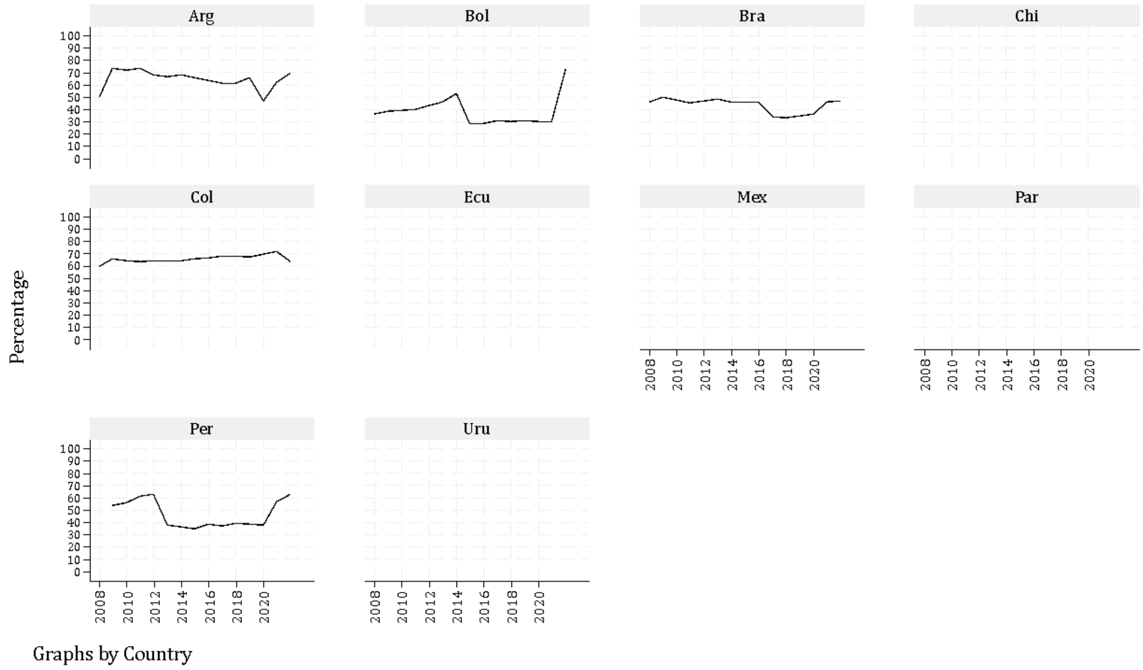

Fig A5. Minimum wage by country

Tables

Table A1. Data definitions and sources

Variable	Description	Source
$ur_{i,t}$	Unemployment Rate, calculated as Ratio of Total unemployment (thousands)/ Labour force size (thousand)*100	Authors calculations using† [1]/[1]
$ri_{i,t}$	Real Interest Rate, calculated as difference between the Central Bank nominal interest rate and difference of log for CPI	Authors calculations using* [2],[2]
$ben1_{i,t}$	Benefits replacement rate, uses World Bank measure of "Adequacy of social insurance programs". Calculated as total transfer amount received by participants in social insurance, social security and health insurance over total income of beneficiary households.	[4] † link
$ben2_{i,t}$	Benefits replacement rate, uses World Bank measure of "Adequacy of social protection & labour programs". Calculated as total transfer amount received by participants in social insurance, social safety net, and unemployment benefits and active labour market programs over total income of beneficiary households.	[4] † link
$ben3_{i,t}$	Benefits replacement rate, uses World Bank measure of "Adequacy of social safety net". Calculated as total transfer amount received by participants in last resort programs, non-contributory social pensions over total income of beneficiary households.	[4] † link
$tw1$	Ratio of Government Revenue from taxes on income paid by individuals, payroll taxes and social contributions over the wage bill *100. Individual Income Taxes includes income, profits and capital gains Wage bill=average wage*employment	Authors calculations using† [2]/[3][1]
$tw2$	Ratio of Government revenue from Payroll and workforce taxes over the wage bill *100	Authors calculations using † [2]/[3][1]
$tw3$	Ratio of Government revenue from Social security contributions over the average wage*100.	Authors calculations using † [2]/[3][1]
$tud1_{i,t}$	Trade Union Density. Percentage of employed workers that belong to a union.	[1]†
$mw_{i,t}$	Minimum Wage rate, calculated as ratio of Monthly Statutory Minimum wage in units of local currency/Monthly Average wage in units of local currency.	Authors calculations using [3]/[3].

Source: [1] ILOStat LFS, [2] IMF IFS, [3] ILOStat, [4] World Bank WDI.
Note: * Argentina's CPI was downloaded from its Central Bank. Uruguay interest rates uses the IMF's interbank rate. † Missing values in the following series were interpolated assuming constant annual growth in the following variables: Unemployment, $\boldsymbol{ur}$, in Colombia. $\boldsymbol{ben}$ series for Bolivia, Brazil, Chile, Colombia, Ecuador and Mexico. $\boldsymbol{tw}$ series for Argentina, Peru, Uruguay and Colombia. $\boldsymbol{tud1}$ for Argentina, Peru and Uruguay.

Table A2. Descriptive stats

Whole panel

	count	mean	sd	min	max
ur	236	7.11	3.53	2.02	20.5
ri	211	2.00	6.74	-35.8	73.0
ben1	153	36.4	8.61	14.2	67.3
ben2	153	26.9	10.0	8.41	46.7
ben3	146	9.84	4.89	0.57	29.6
tud1	152	16.4	9.65	1.93	43.8
wbc	81	34.2	33.6	0.70	98.5
mw	105	49.8	15.3	17.8	77.2
tw1	145	20.8	13.7	3.13	58.9
tw2	145	15.7	10.6	2.86	36.4
tw3	145	15.1	10.3	2.86	36.1

Country c_id= 1""

	count	mean	sd	min	max
ur	24	10.00	3.62	6.14	19.6
ri	20	-0.74	9.92	-35.8	11.5
ben1	14	41.3	3.56	32.5	45.8
ben2	14	37.2	2.99	29.9	40.9
ben3	14	11.9	2.19	9.36	17.3
tud1	17	34.2	5.05	27.7	43.8
wbc	11	51.0	1.27	48.4	52.9
mw	19	63.6	8.87	46.5	77.2
tw1	19	33.4	8.15	16.4	40.4
tw2	19	29.4	8.18	12.8	36.4
tw3	19	29.0	8.18	12.5	36.0

Country c_id= 2""

	count	mean	sd	min	max
ur	23	4.00	1.39	2.02	7.90
ri	20	0.41	2.79	-5.39	5.55
ben1	16	36.5	2.42	32.8	41.7
ben2	16	13.8	5.91	8.41	27.6
ben3	16	6.06	2.57	3.06	10.9
tud1	20	20.4	5.67	11.3	26.1
wbc	0	.	.	.	.
mw	24	36.4	10.5	17.8	72.9
tw1	0	.	.	.	.
tw2	0	.	.	.	.
tw3	0	.	.	.	.

Country c_id= 3""

	count	mean	sd	min	max
ur	20	9.89	2.00	6.75	13.7
ri	22	5.91	3.99	-3.07	12.5
ben1	17	45.8	2.05	42.6	48.4
ben2	17	42.0	1.88	39.5	46.7
ben3	14	16.6	6.69	8.30	29.6
tud1	20	18.2	1.80	13.0	20.1
wbc	11	63.3	4.38	57.7	71.7
mw	24	39.6	9.94	18.2	50.0
tw1	13	27.1	4.32	20.0	31.1
tw2	13	19.1	3.32	14.1	22.8
tw3	13	18.1	3.15	13.4	21.6

Country c_id= 4""

	count	mean	sd	min	max
ur	24	8.58	1.58	6.07	11.3
ri	22	0.21	1.53	-3.14	3.13
ben1	17	27.1	1.85	23.4	30.4
ben2	17	19.5	3.46	15.3	28.3
ben3	17	8.36	3.37	4.40	16.8
tud1	19	13.4	2.19	10.9	17.4
wbc	10	17.5	2.05	14.8	21
mw	0	.	.	.	.
tw1	20	4.13	0.49	3.13	5.13
tw2	20	4.04	0.50	3.13	4.68
tw3	20	4.04	0.50	3.13	4.68

Country c_id= 5""

	count	mean	sd	min	max
ur	24	11.5	2.81	8.57	20.5
ri	22	0.98	1.37	-2.15	3.43
ben1	13	37.8	6.54	26.2	47.5
ben2	13	25.9	5.49	16.9	36.9
ben3	13	4.01	2.91	0.57	7.75
tud1	12	4.65	0.97	3.38	6.52
wbc	9	6.41	6.68	0.70	15.7
mw	24	64.2	6.06	46.1	71.9
tw1	17	23.6	5.86	8.40	32.5
tw2	17	15.3	3.72	7.59	20.2
tw3	17	13.6	3.80	6.34	19.2

Country c_id= 6""

	count	mean	sd	min	max
ur	25	4.11	0.78	3.08	6.13
ri	16	5.81	2.22	1.07	8.91
ben1	15	34.0	6.42	14.2	41.8
ben2	15	25.0	4.39	14.0	32.3
ben3	15	12.2	1.85	10.4	15.9
tud1	0	.	.	.	.
wbc	0	.	.	.	.
mw	0	.	.	.	.
tw1	10	14.5	0.58	13.3	15.2
tw2	10	11.8	0.57	10.7	12.7
tw3	10	11.8	0.60	10.5	12.7

Country c_id= 7""

	count	mean	sd	min	max
ur	24	3.90	0.84	2.63	5.36
ri	22	1.79	1.79	-1.10	5.29
ben1	15	36.1	2.58	31.5	42.4
ben2	15	26.6	1.63	24.0	28.6
ben3	15	12.7	3.03	10.1	18.5
tud1	21	14.8	1.86	12	17.2
wbc	12	10.0	0.42	9.20	11
mw	0	.	.	.	.
tw1	10	27.0	5.51	20.1	33.7
tw2	10	11.4	1.45	9.27	13.4
tw3	10	11.4	1.45	9.27	13.4

Country c_id= 8""

	count	mean	sd	min	max
ur	24	5.84	1.31	4.09	9.39

ri	22	1.59	4.59	-3.81	15.6
ben1	16	33.3	2.63	27.2	37.1
ben2	16	24.4	7.75	10.5	35.7
ben3	15	11.7	3.82	5.21	17.5
tud1	20	8.94	1.90	6.40	11.3
wbc	6	0.72	0.041	0.70	0.80
mw	0	.	.	.	.
tw1	19	8.10	1.64	5.43	11.6
tw2	19	7.96	1.52	5.43	11.2
tw3	19	7.96	1.52	5.43	11.2

Country c_id= 9""

	count	mean	sd	min	max
ur	24	4.16	0.87	3.21	7.18
ri	22	0.67	1.73	-3.41	4.65
ben1	15	22.9	1.77	19.9	25.9
ben2	15	17.9	4.27	8.97	22.5
ben3	15	9.26	2.41	4.19	12.8
tud1	12	2.61	0.52	1.93	3.21
wbc	10	2.25	0.31	1.80	2.60
mw	14	46.7	11.4	34.9	63.1
tw1	13	6.71	1.35	5.49	9.97
tw2	13	3.59	0.67	2.86	5.17
tw3	13	3.59	0.67	2.86	5.17

Country c_id= 10""

	count	mean	sd	min	max
ur	24	9.67	3.13	6.31	16.7
ri	23	3.91	15.8	-5.19	73.0
ben1	15	49.4	7.04	44.2	67.3
ben2	15	37.7	5.28	32.3	45.5
ben3	12	4.91	1.35	2.74	7.77
tud1	11	28.4	3.95	16.6	30.1
wbc	12	94.5	2.55	89	98.5
mw	0	.	.	.	.
tw1	24	37.2	10.4	19.9	58.9
tw2	24	29.1	4.08	19.9	36.1
tw3	24	27.6	5.22	18.6	36.1

Arg=1,Bol=2,Bra=3,Chi=4,Col=5,Ecu=6,Mex=7,Par=8,Per=9,Uru=10

Table A3 Kao and Pedroni Cointegration test, p-values

Kao approach

	(1) ur ri	(2) ur ben1 ri	(3) ur ben2 ri	(4) ur ben3 ri	(5) ur tw1 ri	(6) ur tw2 ri	(7) ur tw3 ri	(8) ur tud1 ri	(9) ur mw ri
	p-values	*p-values*	*p-values*	*p-values*	*p-values*	*p-values*	*p-values*	*p-values*	*p-values*
DF rho*	.004	.316	.245	.468	.416	.44	.485	.222	.026
DF t*	.003	.231	.227	.334	.271	.304	.36	.045	.026
ADF	.000	.312	.158	.189	.06	.037	.1	.167	.031
DF rho	.002	.018	.062	.08	.179	.274	.239	.14	.005
DF t	.003	.047	.107	.10	.144	.209	.208	.031	.015
Obs	189	130	130	122	114	114	114	124	85
Countries	10	10	10	10	9	9	9	9	5
Periods	19	13	13	12	13	13	13	14	17
Lags	1	1	1	1	1	1	1	1	1

Pedroni approach

	p-values	*p-values*	*p-values*	*p-values*	*p-values*	*p-values*	*p-values*	*p-values*	*p-values*
Group rho	.001	.483	.182	.276	.193	.357	.3	.106	.44
Group t PP	.023	.005	.243	.015	.049	.176	.134	.000	.257
Group t ADF	.016	.000	.237	.07	.029	.165	.112	.378	.433
Obs	199	140	140	132	125	125	125	133	90
Countries	10	10	10	10	9	9	9	9	5
Periods	20	14	14	13	14	14	14	15	18
Lags	1	1	1	1	1	1	1	1	1

Table A4. Westerlund Cointegration test by pairs of LMIs, *p*-values

a) ben and tw combinations

	(1) ur ben1 tw1 ri	(2) ur ben1 tw2 ri	(3) ur ben1 tw3 ri	(4) ur ben2 tw1 ri	(5) ur ben2 tw2 ri	(6) ur ben2 tw3 ri	(7) ur ben3 tw1 ri	(8) ur ben3 tw2 ri	(9) ur ben3 tw3 ri
Variance ratio (whole panel)	.203	.229	.23	.263	.273	.275	.153	.147	.13
Variance ratio (some panels)	.256	.311	.326	.463	.436	.451	.464	.457	.458
Obs	114	114	114	114	114	114	110	110	110
Countries	9	9	9	9	9	9	9	9	9
Periods	13	13	13	13	13	13	12	12	12

b) ben, tud1 and mw combinations

	(1) ur ben1 tud1 ri	(2) ur ben1 mw ri	(3) ur ben2 tud1 ri	(4) ur ben2 mw ri	(5) ur ben3 tud1 ri	(6) ur ben3 mw ri
Variance ratio (whole panel)	.249	.273	.214	.255	.133	.148
Variance ratio (some panels)	.194	.351	.111	.375	.484	.406
Obs	108	72	108	72	101	69
Countries	9	5	9	5	9	5
Periods	12	14	12	14	11	14

c) tw tud1 and mw combinations

	(1) ur tud1 tw1 ri	(2) ur tud1 tw2 ri	(3) ur tud1 tw3 ri	(4) ur mw tw1 ri	(5) ur mw tw2 ri	(6) ur mw tw3 ri
Variance ratio (whole panel)	.268	.285	.366	.166	.163	.168
Variance ratio (some panels)	.264	.315	.315	.274	.271	.288
Obs	94	94	94	58	58	58
Countries	8	8	8	4	4	4
Periods	12	12	12	15	15	15

Table A5 Baseline without Argentina

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	D.ur	D.ur	D.ur	D.ur	D.ur	D.ur	D.ur	D.ur
	Pooled	Pooled	Pooled	Pooled	PMG	PMG	PMG	PMG
Short-run								
ec	-0.153**	-0.092	-0.246**	-0.080	-0.128**	-0.044	-0.186**	-0.048
D.ri	-0.097*	-0.023	-0.034	-0.122	-0.070**	-0.030	-0.052	-0.073
Long-run								
ben1	0.046				0.064			
ri	0.390*	0.708**	0.449*	2.070**	0.530*	1.404**	0.519**	3.312**
tw1		-0.015				0.032		
tud1			0.023				0.045	
mw				0.035				0.038
Obs	127	105	123	69	127	105	123	69
Countries	9	8	8	4	9	8	8	4
Years	14	13	15	17	14	13	15	17
AdjR2	0.76	0.68	0.74	0.71	0.67	0.60	0.58	0.64
t_{CD}	-1.651	-1.630	-0.298	0.551	-1.754	-1.304	-0.508	1.572
	(0.099)	(0.103)	(0.766)	(0.582)	(0.079)	(0.192)	(0.611)	(0.116)
$\chi^2_{SC}(1)$	0.032	0.732	0.833	9.014	0.009	13.568	0.008	52.097
	(0.858)	(0.392)	(0.361)	(0.003)	(0.924)	(0.000)	(0.930)	(0.000)

* $p < 0.10$, ** $p < 0.05$, p −values for diagnostic tests in round brackets.

Note: In all regressions, lag order for $\Delta ri_{i,t-j}$ is $j = 0$. Regressions including $tud1$, $j = 1$ for $\Delta z_{i,t-j}$, zero otherwise. The term $\Delta u_{i,t-j}$ only appears in regressions including mw with $j = 1$.

All regressions include cross-sectional averages of unemployment, $\sum_{l=0}^{pT} \delta'_{i,l}\underline{x}_{t-l}$, in eq(1), with $l = 0$ to account for cross-sectional dependence, as earlier estimates without this term did not pass the CD-test. t_{CD} is statistic for Pesaran (2006)'s (2006) Cross-sectionality dependence (CD) Test and χ^2_{SC} the statistic for Woolridge's (2002) serial correlation test for Panel data.

Table A6 PRE-COVID

	(1) D.ur Pooled	(2) D.ur Pooled	(3) D.ur Pooled	(4) D.ur Pooled	(5) D.ur PMG	(6) D.ur PMG	(7) D.ur PMG	(8) D.ur PMG
Short-run								
ec	-0.195**	-0.154*	-0.230**	-0.071**	-0.234**	-0.209**	-0.164**	-0.116**
D.ri	-0.058	-0.026	-0.028	-0.069	-0.045	0.007	0.009	-0.024
D.tud1			0.042				0.006	
L.dur				0.048				-0.017
Long-run								
ben1	0.109**				0.116**			
ri	0.348	0.313	0.406	1.777	0.253*	0.111	0.635**	0.973
tw1		0.083				0.068		
tud1			0.003				0.040	
mw				0.029				0.037
Obs	112	88	131	73	112	88	131	73
Countries	10	7	9	5	10	7	9	5
Years	11	13	15	15	11	13	15	15
AdjR2	0.69	0.41	0.74	0.57	0.51	0.31	0.49	0.28
t_{CD}	-1.888	-1.320	-1.281	-1.344	-1.645	-1.551	-1.018	-1.251
	(0.059)	(0.187)	(0.200)	(0.179)	(0.100)	(0.121)	(0.309)	(0.211)
$\chi^2_{SC}(1)$	0.000	0.943	0.038	0.896	0.157	0.871	0.131	0.462
	(0.998)	(0.332)	(0.846)	(0.344)	(0.691)	(0.351)	(0.718)	(0.496)

* $p < 0.10$, ** $p < 0.05$, p −values for diagnostic tests in round brackets.

Note: In all regressions, lag order for $\Delta ri_{i,t-j}$ is $j = 0$. Regressions including $tud1$, $j = 1$ for $\Delta z_{i,t-j}$, zero otherwise. The term $\Delta u_{i,t-j}$ only appears in regressions including mw with $j = 1$.

All regressions include cross-sectional averages of unemployment, $\sum_{l=0}^{pT} \delta'_{i,l}\underline{x}_{t-l}$, in eq(1), with $l = 0$ to account for cross-sectional dependence, as earlier estimates without this term did not pass the CD-test. t_{CD} is statistic for Pesaran (2006)'s (2006) Cross-sectionality dependence (CD) Test and χ^2_{SC} the statistic for Woolridge's (2002) serial correlation test for Panel data.