Common and Idiosyncratic Factors of Real Interest Rates in Emerging Economies

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Abstract

In this paper, we attempt to model real interest rates in advanced and emerging economies. We rely on an open economy general equilibrium model (Clarida, 2017) to derive a cointegrating structure in interest rates for advanced and emerging economies. In this model, interest rates in an emerging economy would be the sum of a unit root process related to a global factor, another unit root process related to idiosyncratic factors and a stationary component. We account for these properties to estimate a global factor for emerging economies using the PANIC (2004) approach. The results show that a common factor is present in emerging economies, and it is very similar to the cointegrating factor in advanced economies, while the residuals in emerging economies are still unit root, thus validating the theory.

Keywords: Interest rates, common factors, emerging economies, natural rate of interest

JEL-Classification: G15, G12, E43

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1.INTRODUCTION

The weak economic recovery that followed the global financial crisis and the slow rise in inflation has led some scholars to postulate that advanced economies are in a position of secular stagnation. In this situation, the equilibrium real interest rate would be so negative that conventional monetary policy, restricted by the effective lower limit of nominal interest rates (slightly below zero), would not be able to reach that real interest rate, thus implying that aggregate demand (and, therefore, employment) would be very persistently below potential output, and no pressures on inflation (Summers, 2016).

As any other price, the equilibrium real interest rate is determined in a market; in this case, in the market of loanable and borrowable funds. If this price has diminished is because the fund demand curve (investment) has been displaced to the left or the fund supply curve has been displaced to the right, or both. From a theoretical perspective, there exist very good reasons to think that this has been the case. For example, ageing population, lower productivity growth, higher demand of safe assets or less long-term events such as the deleveraging process or the uncertainty would explain that behavior. From an empirical perspective, the difficulty lies in that this equilibrium price is non-observable, so it has to be estimated. This is what Holston *et al.* (2017) did recently for various advanced economies, finding that there was a generalized decline in the equilibrium interest rate, reaching negative values by the end of the sample. The problem with these estimates is that they are estimated very imprecisely, although Fiorentini *et al.* (2018) show that precision increases substantially if the interest rate gap is considered stationary, without altering the downward trend in the equilibrium real interest rate in the final part of the sample.

The emerging economies have been absent from this debate. On the one hand, growth after the global financial crisis has been relatively high and there was no deflationary risk; on the other, nominal interest rates have been well above the effective lower limit. Besides, looking at the determinants of desired saving and investment, emerging economies have younger population, considerable margin to increase productivity (convergence process) and relative reduced indebtedness, among others. Nonetheless, proper measurement of the equilibrium interest rate is also very important in emerging economies, as it is crucial to determine the tone of monetary policy. However, it is well known, that, to some extent, the equilibrium interest rate in emerging economies depends on the evolution of foreign interest rates.

In this paper we try to estimate the equilibrium real interest rates of a selected sample of emerging economies. But, instead of applying the Holston *et al.* (2017) procedure (or variants of it), we exploit the theoretical time-series and transversal properties that ex ante real interest of these countries must fulfil. Since, in the last few decades, most of emerging economies have opened their capital accounts to the international capital flows but they are not able to produce a safe asset, we assume that its equilibrium real interest rate is going to be determined as a spread over a common global equilibrium real interest rate of the advanced economies, that according to the empirical evidence cited before should be a non-stationary variable. In the theoretical literature, there are several arguments to postulate that the spread could also be disaggregated in a non-stationary country specific component that would capture, among others, the difference in potential growth between advanced countries and each emerging economy[1], and a stationary country specific factor that would capture the remaining elements that determine the risk profile of a country, in particular, the different cyclical positions. Precisely this kind of disaggregation is what the panel analysis of non-stationarity in idiosyncratic and common components (PANIC) approach (Bai and Ng, 2004) allows to do for a multi-country panel of time series.

The results show that i) the behavior of the global common factor obtained for the ex ante real interest rates of emerging economies is very similar to the long run trend of interest rates in advanced economies; and ii) there is a country specific non-stationary component in the remaining part of interest rates. The influence of the global factor can be sizable in several emerging economies.

The paper is structured as follows. In the next section we motivate and specify the empirical approach we have adopted. In the Section 3 we present the empirical approach. The Section 4 presents the database and the estimates of the equilibrium real interest rates of emerging market economies. Finally, in Section 5 we extract some conclusions.

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[1] Although, convergence would imply a stationary component, the memory should be very long, provided the usual estimates on speed convergence.

2. THE THEORETICAL MODEL AND THE EMPIRICAL COUNTERPART

In order to motivate the empirical approach that we develop below, our departure point is the determination of the equilibrium real interest rate in a global context as it was specified in Clarida (2017). This author uses a variant of the two country DSGE model by Clarida *et al.* (2002) in which nominal rigidities and cost push shocks can make the production to be below the flexible price output $\left(\overline{y}\right)$. It is assumed that households in both countries extract utility from the consumption of domestic and foreign produced goods and have the same elasticity of intertemporal substitution (1/σ). Production requires the labor supplied by households and exogenous productivity is also subjected to shocks. Besides, as firms operate under monopolistic competition, they set prices as a mark-up over marginal costs *a la* Calvo.

In these circumstances, the home real equilibrium interest rate (r*), defined as the real interest rate that makes zero the home output gap (x) will be the following (see expression [9] in Clarida, 2017):

$$r_t^* = r_t^{F*} + E_t\left(\Delta\overline{y}_t - \Delta\overline{y}_t^F\right) + \frac{\sigma - 1}{2}\left(\Delta\chi_t^F - \Delta\chi_t\right) \quad (1)$$

That is, the equilibrium real interest rate of the home country will be obtained as a spread over that of the foreign country (the superscript F refers to the foreign country variables). And that spread will depend on the differential of potential growth and on the different cyclical position of both economies. Notice that this last term could be positive, negative or even disappear depending on the elasticity of intertemporal substitution.

However, from the point of view of an advanced economy, if the emerging economies are sufficiently small, the model collapses to its closed economy counterpart and the foreign part of equation 1 will have a negligible effect. In this case, the equilibrium interest rate will only be related to domestic factors. As a result, it can be characterized as a unit root, reflecting expectations of future potential output growth and domestic cyclical positions, as it is usually assumed in the literature.

Alternatively, if we assume that the home country is an emerging economy and F the advanced countries, the time series properties of its real equilibrium interest rate would be the following. The first term would correspond to the equilibrium real interest rate of the advanced economies, which will be a unit root. The third term would reflect the difference in cyclical positions: as the output gaps are by definition stationary variables, this term would also be a stationary variable.

The second term merits more attention. It captures the potential growth differential between the two areas. If we assume a Cobb-Douglas production function with constant returns to scale, potential growth in each area will be the sum of population growth (Δn) and total factor productivity growth (Δtfp). Population growth is, in general, a slow-moving variable. Moreover, there exist very good reasons to think that productivity growth in advanced and emerging market economies are linked through processes of international diffusion of knowledge, in line with the proposal of Jones (2002). If that is the case, the growth of total factor productivity growth in emerging markets will be explained by that of the advanced economies (the countries that determine the technological frontier) plus a fraction of the distance to that frontier:

2 $$\Delta\overline{tfp}_t = \Delta\overline{tfp}_t^F - \lambda\left(\overline{tfp}_{t-1} - \overline{tfp}_{t-1}^F\right)$$

Therefore, the differential potential growth will be:

3 $$\Delta\overline{y}_t = \Delta\overline{y}_t^F - \lambda\left(\overline{tfp}_{t-1} - \overline{tfp}_{t-1}^F\right)$$

Since the level of total factor productivity in emerging market economies is approximately 50% of that of US according to Penn World Tables vs 9,[2] and the estimates of the convergence parameter λ oscillate between 0.03 y 0.06 (see Rodrik, 2011), it will take more than 100 years to converge. Thus, if advanced economies TFP is an integrated order 1 time series, that of emerging economies should be order 2 or at least an order 1 with a very long memory, and the

[2] See: Groningen Growth and Development Centre | University of Groningen

differential with respect to advanced economies should be an integrated order 1 variable.

The implication for the equilibrium real interest rate of emerging economies is immediate: it should behave as the sum of two integrated order 1 processes. The first unit root would correspond to a common global factor, probably governed by the decreasing trend of the equilibrium real interest rate in advanced economies. The second one would be related to the real convergence process of the emerging market economies to the advanced ones; of course, this second factor would be country-specific. Finally, there would be a third component, again country specific although stationary, as it is related to the differences in the cyclical position of each emerging economy with that of advanced ones.

3. EMPIRICAL APPROACH

The theoretical considerations explained in the previous section motivate our empirical approach to the estimate of the equilibrium real interest rates for emerging economies, which will consist on the following steps:

1) Check the time-series properties of the ex ante real interest rates of both developed and emerging economies, using standard ADF tests.

2) Apply the PANIC approach to the ex ante real interest rates of those emerging economies that are integrated of order 1 and obtain the global component and the two country-specific components.

3) Check the cointegration properties of the ex ante real interest rates in advanced economies.

4) Estimate the global component of advanced economies using the Gonzalo-Granger (1995) decomposition.

5) Compare both global factors and analyze the determinants of the country-specific components of emerging market economies.

In order to apply the PANIC methodology in step 2, we assume the following process for interest rates in emerging markets:

4 $$r_{i,t} = c_i + \lambda_i' F_t + e_{i,t}$$

Where $r_{i,t}$ is a real interest rate, F_t is a common factor, λ_i is a loading factor, c_i is a country-specific constant, and $e_{i,t}$ is a residual. In principle, the interest rate, the common factor and the error term can be I(1). In order to extract $\lambda_i' F_t$ in this model, we can not apply either cointegration techniques, as the $r_{i,t}$ are not cointegrated, or standard factor model tools.

In this case, Bai and Ng (2004) developed a methodology called PANIC that consists on applying principal component analysis (PCA) to the first difference of $r_{i,t}$ and then reconstruct the original factors as the cumulative sum of the factors obtained in the previous step.

5 $$\Delta r_{i,t} = \lambda_i' \Delta F_t + \Delta e_{i,t}$$

The factors F might not be unique. In the literature, the selection of the number of factors rely on using some information criteria, visual inspection and theoretical appeal. In our case, it will be of crucial importance to determine if there is a common factor in the interest rates of emerging markets related to the interest rate in advanced economies. This factor should be an I(1) process. Moreover, it would be also important to test whether the residuals are I(1) or I(0) after applying the PANIC approach. If the residuals are I(1), then a non-stationary idiosyncratic component is still present after accounting for the effect of foreign interest rates.

In step 4, we consider the common factor in advanced economies. Several papers, such as Holston *et al.* (2017) or Fiorentini *et al.* (2018), have found a common trend or cointegration in interest rates of advanced economies. Our objective is to obtain an estimation of this cointegrating factor using only interest rates of advanced economies and compare it with the common factor in advanced economies. In order to obtain the cointegrating factor of advanced economies, we apply the permanent-transitory decomposition introduced by Gonzalo and Granger (1995). They propose a factor extraction technique reliant on two assumptions. First, the common factor should be a linear combination of the variables $r_{i,t}$ Second, the transitory component should be an I(0) process. Both assumptions are consistent with the theoretical literature we have presented in section 2, but only for advanced economies.

4. THE COMMON GLOBAL FACTOR OF REAL INTEREST RATES

Our initial sample includes twenty-eight countries, six of them are classified as developed.[3] Data availability and representativeness determined this selection. In particular, we required monthly information from 2000 (to include the euro area as a whole) of a short-term nominal interest rate (quarterly average of the 3 months rate) and inflation. The ex ante real interest rate is defined as the nominal interest rate minus expected inflation three months ahead, both of them expressed in annual terms. Expected inflation are obtained from (automatically selected) ARIMA models, estimated with seven years rolling windows.[4]

In Table 1 we summarize the unit root tests of these series for all the countries considered. In order to put ourselves in the worst-case scenario, we run the tests considering for all the countries that, in levels, the deterministic components include a trend and a constant; this implies that in first differences the deterministic component will be a constant. Using the traditional Augmented Dickey-Fuller tests, it can be seen how, in almost all the cases, both for developed and emerging economies, the unit root test accepts the hypothesis that they are integrated of first order. The only exceptions are Colombia, Indonesia, Korea and Thailand, where real interest rates seem to be stationary with a confidence level of at least 5%.

Thus, the initial check of our proposition is supported by the data. The real ex ante interest rates of most economies behave as first order

3 The countries are: Brazil, Canada, Chile, China, Colombia, Czech Republic, Egypt, Euro Area, Honk Kong, Hungary, India, Indonesia, Japan, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Romania, Russia, South Africa, Switzerland, Taiwan, Thailand, Turkey, UK and USA. The data were extracted from Datastream.

4 The results are available upon request.

Table 1

UNIT ROOT TEST OF REAL EX ANTE INTEREST RATES

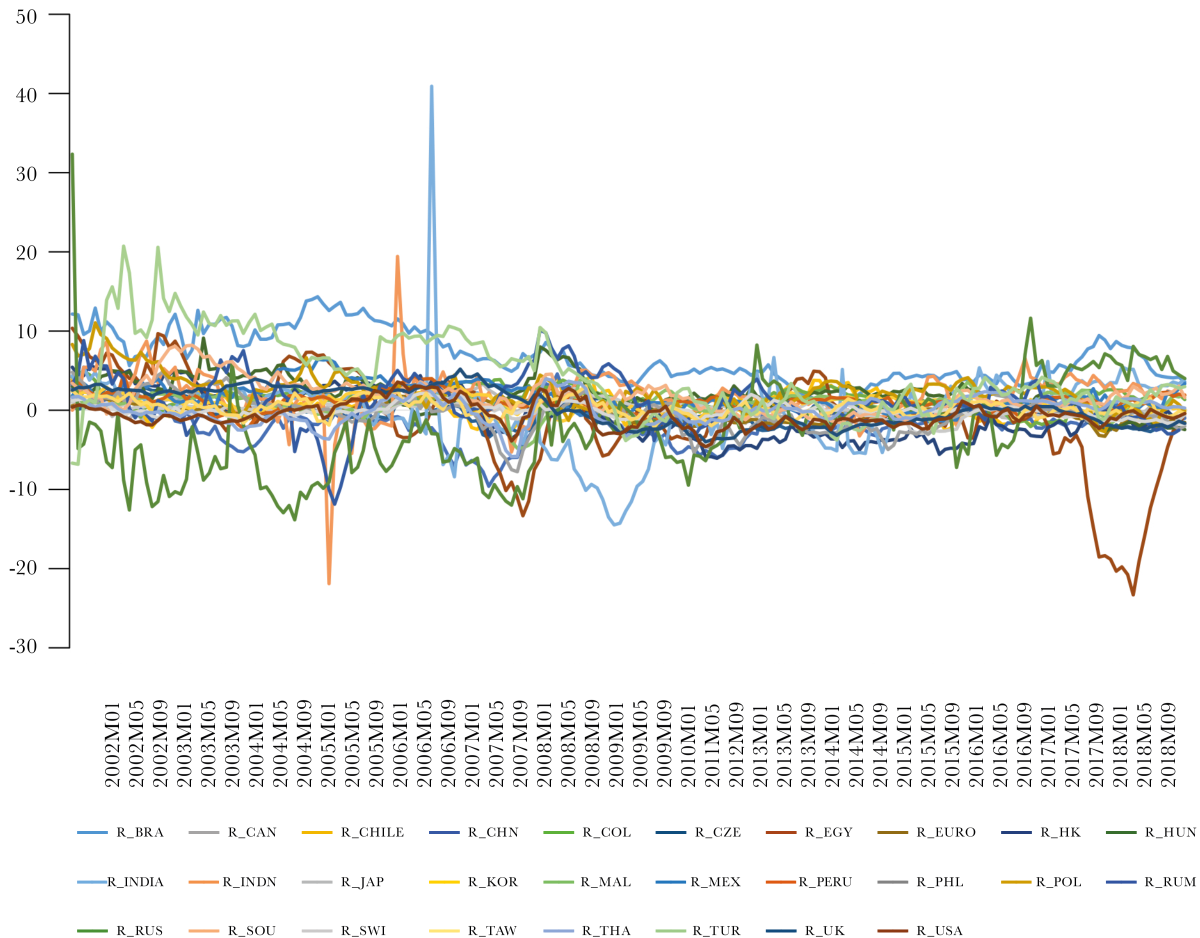
	Levels		*First Difference*	
Country	*Deterministic component*	*ADF*	*Deterministic component*	*ADF*
Brazil	C, T	-2.247	C	-7.037***
Chile	C, T	-2.588	C	-5.218***
China	C, T	-2.950	C	-4.814***
Colombia	C, T	-4.657***	C	-6.002***
Czech Rep.	C, T	-3.033	C	-4.497***
Egypt	C, T	-2.279	C	-7.481***
Honk Kong	C, T	-1.307	C	-7.618***
Hungary	C, T	-3.295*	C	-6.565***
India	C, T	-3.126	C	-11.498***
Indonesia	C, T	-3.584**	C	-4.590***
Korea	C, T	-3.480**	C	-4.033***
Malaysia	C, T	-2.987	C	-6.280***
Mexico	C, T	-2.249	C	-3.716***
Peru	C, T	-3.054	C	-4.067***
Philippines	C, T	-2.744	C	-6.326***
Poland	C, T	-1.827	C	-4.564***
Romania	C, T	-2.980	C	-4.047***
Russia	C, T	-3.367*	C	-6.480***
South Africa	C, T	-2.213	C	-6.619***
Taiwan	C, T	-2.034	C	-4.442***
Thailand	C, T	-3.625**	C	-5.890***
Turkey	C, T	-2.643	C	-6.980***
Canada	C, T	-2.046	C	-7.961***
Euro area	C, T	-2.724	C	-5.376***
Japan	C, T	-2.410	C	-5.509***
Switzerland	C, T	-2.439	C	-3.517***
UK	C, T	-2.397	C	-5.756***
USA	C, T	-2.010	C	-3.281**

Notes: C: constant, T: Trend; *, **, *** statistically significant at 10%, 5% and 1%, respectively.
Sources: Own calculations.

Figure 1

INTEREST RATES AND ADVANCED ECONOMIES

Real interest rates



integrated series. Now we can apply the PANIC approach to emerging markets variables in order to extract the common component that should be integrated of first order. However, due to the existence of some extreme values that affected significantly the identification of the global factor, we decided to drop some countries: Egypt, India, Indonesia, Romania, Russia and Turkey (see Figure 1). The inclusion of these countries resulted in a common factor that basically replicated the evolution of the outlier.

4.1 The global factor in emerging economies

The application of the PANIC approach to the real interest rates of the sixteen remaining emerging economies generates a non-conclusive number of common factors, according to the usual information criteria and the visual inspection. The Akaike information criterium finds a large amount of factors, while the visual analysis point to a number between 1 and 5. However, it is well known that the proposed statistics to select the number of common factors tends to overestimate them (Canner and Han, 2014).

Our approach relies on the economic meaning of the common factor. We are looking for a global factor in time series that might have several different common factors, for example, regional trends. In Table 2, we show the loadings of the autovector associated to the highest autovalue. It provides quite reasonable loadings (see Table 2), and therefore we use that as the global factor of real interest rates. Factors from 2 to 5 do not point to any common trend (see Table A.1 in the appendix). The highest weights correspond to Poland and Brazil, followed by a group of Chile, Thailand and Philippines. As can be seen, only Mexico enters with a negative (but very small) sign and all the emerging areas are represented. The three Latin American economies with the lowest loadings have underdeveloped domestic financial markets, which might be reflected on a lower pass-through of global interest rates. Perhaps, it could be expected a higher loading in the case of China given its economic relevance, but it should be remembered that its capital account is still quite closed.

As can be seen in Figure 1, that common factor shows a declining trend until the global financial crisis, when important fluctuations were recorded, and afterwards a certain stabilization. The unit root tests do not reject this variable to be a unit root with an ADF

Table 2

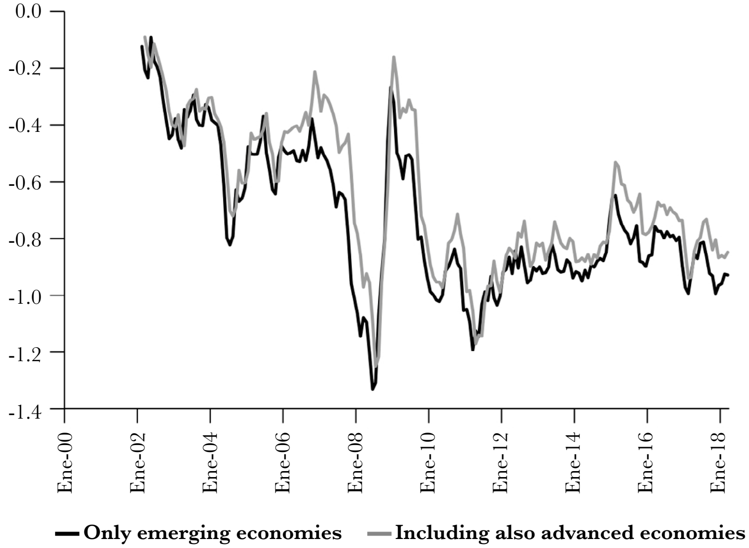
LOADINGS OF THE COMMON FACTOR FOR EMERGING COUNTRIES

Country	*Restricted sample*	*All the sample*
Brazil	5.995	0.619
Chile	5.035	2.978
China	3.779	1.954
Colombia	0.587	0.674
Czech Rep.	2.491	1.857
Honk Kong	1.582	0.464
Hungary	4.127	1.624
Korea	2.368	1.945
Malaysia	3.383	3.004
Mexico	-0.335	-0.177
Peru	0.730	0.723
Philippines	4.561	1.973
Poland	7.874	1.743
South Africa	3.996	1.662
Taiwan	2.973	5.256
Thailand	5.026	3.451
Canada	-	2.627
Euro area	-	2.089
Japan	-	1.660
Switzerland	-	2.627
UK	-	0.613
USA	-	4.294

Sources: Own calculations.

Figure 2

COMMON FACTOR OF EMERGING ECONOMIES AND ROBUSTNESS TEST



Source: Own Calculations

of -2.066 (p-val=0.259) on the levels, and rejects the unit root hypothesis in first differences with an ADF of -6.316 (p-val=0.000).

As a robustness test, we have re-estimated the global factor including also the six advanced economies we are considering. Again, using the PANIC approach various common factors are identified, but, as before, the loadings corresponding to the highest auto-value are the only ones that have economic rationality. All of them (apart from Mexico) are positive and the US seem to play a major role in its estimate. The other advanced economies also show a high loading, although not as high as some very open emerging economies such as Taiwan, Thailand, Malaysia or Chile. More importantly, a simple visual inspection of this global factor (confirmed by the formal statistical tests) shows that it is indistinguishable from the previous one (see Figure 2).

Other remarkable result of this decomposition is that when we remove the common factor from the ex ante real interest rates of the different emerging economies, the country specific residual can be

Table 3

UNIT ROOT TEST OF COUNTRY SPECIFIC REAL EX-ANTE INTEREST RATES OF EMERGING ECONOMIES

	ADF from PANIC (2004)
Brazil	-1.071
Chile	-1.677
China	-1.150
Colombia	-0.459
Czech Rep.	-1.688
Honk Kong	-0.349
Hungary	-1.210
Korea	-2.833***
Malaysia	-0.273
Mexico	-1.157
Peru	-1.410
Philippines	-0.608
Poland	-1.696
South Africa	-1.388
Taiwan	-2.159**
Thailand	0.418

Notes: C: constant, T: Trend; *, **, *** statistically significant at 10%, 5% and 1%, respectively.
Sources: Own calculations.

considered a first order integrated variable (see Table 3), which validates the theory presented in Section 2.

4.2 The global factor in advanced economies

As we stated before, contrary to emerging markets, the real interest rates of advanced economies should cointegrate, as long as real convergence has been achieved (or it is very close). But if that is the case, the estimation of the global common factor would be more robust if we exploit their cointegration properties using, for example, the Gonzalo-Granger (1995) methodology. Thus, the next step consists on checking the cointegration properties of the ex ante real interest rates of the advanced economies. We check that in two ways: first, considering all the different possible pairs that can be constructed; secondly, including all the countries at the same time. In the first case, the test used is that of Engle-Granger. In the second case, we use the trace statistic from the Johanssen approach.

As it can be seen in Table 4, the majority of the pairs cointegrate at 5% of statistical significance. The only exceptions (by a small margin) are USA/Japan, Euro-area/Japan, Euro-area/Canada and UK/Switzerland. As expected, all the estimated parameters are positive, but only in few cases are close to one (USA/Canada, Euro-area/Canada, Euro-area/Switzerland and Canada/Switzerland), showing that the fluctuations of the real interest rates vary from one country to another. The smallest coefficients are estimated for Japan, where the effective lower bound of the nominal interest rate was hit well before the other economies.

When checking the cointegration properties for all the countries at the same time, we find five cointegration relationships. Notice that the estimated coefficients are negative and significant with the exception of the one of Japan.

Assuming that the only I(1) component of interest rates in AEs is the global factor (consistent with Clarida, 2017), we can estimate this factor using the methodology of Gonzalo-Granger (1995) to obtain a common factor that is integrated of first order. This common trend should be our estimate of the equilibrium real interest rate. The results are presented graphically in Figure 3; they correspond to the following loadings: US: 0.43; euro area: 0.49; Japan: 0.08; UK: 1.29; Switzerland: 0.19 and Canada: 0.47. The highest loading corresponds to the UK, which is small with respect to the Euro Area

Table 4

COINTEGRATION RELATIONSHIPS AMONG ADVANCED COUNTRIES REAL EX ANTE INTEREST RATES

Countries	*Deterministic component*	*DOLS coefficient*	*ADF-residuals*
USA/Euro area	C	0.863 [0.000]	-4.757 [0.001]
USA/Japan	C	0.376 [0.147]	-3.067 [0.099]
USA/UK	C	0.452 [0.000]	-4.536 [0.001]
USA/Canada	C	1.033 [0.000]	-5.084 [0.000]
USA/ Switzerland	C	1.267 [0.000]	-3.952 [0.010]
Euro area/Japan	-	0.439 [0.034]	-2.067 [0.212]
Euro area/UK	-	0.394 [0.000]	-2.999 [0.029]
Euro area/ Canada	C	0.953 [0.000]	-3.209 [0.072]
Euro area/ Switzerland	-	0.992 [0.000]	-3.129 [0.020]
Japan/UK	-	0.097 [0.042]	-3.046 [0.025]

Countries	*Deterministic component*	*DOLS coefficient*	*ADF-residuals*
Japan-Canada	-	0.212 [0.021]	-3.016 [0.027]
Japan-Switzerland	-	0.395 [0.003]	-2.861 [0.041]
UK-Canada	-	1.778 [0.000]	-3.364 [0.010]
UK-Switzerland	-	1.471 [0.000]	-2.385 [0.118]
Canada-Switzerland	-	1.037 [0.000]	-4.191 [0.001]
	Deterministic component	Normalized cointegrating coefficients	Trace statistic
USA-euro area-Japan-UK-Canada-Switzerland	C	{1,0,0,0,0,-1.150} (0.127) {0,1,0,0,0,-1.189} (0.161) {0,0,1,0,0,-0.125} (0.126) {0,0,0,1,0,-0.444} (0.116) {0,0,0,0,1,-3.087} (0.447)	107.101 [0.007] 76.924 [0.012] 52.154 [0.019] 32.691 [0.023] 16.302 [0.038] 3.531 [0.060]

Notes: C: constant; between brackets p-values.
Sources: Own calculations.

Figure 3

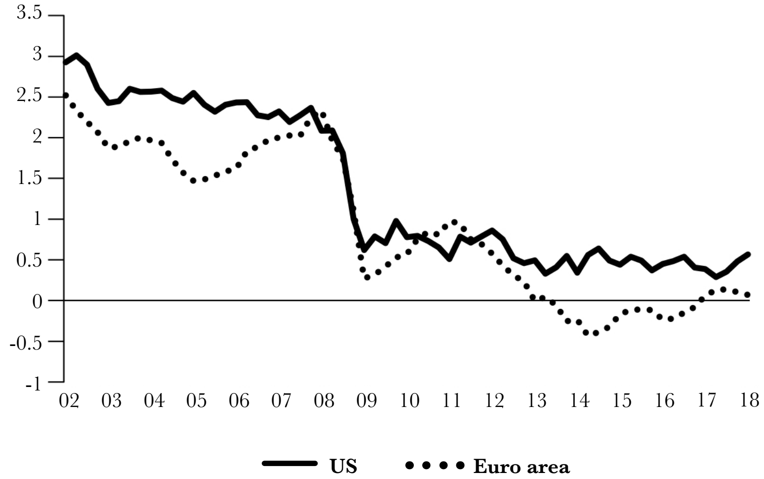
COMMON FACTOR OF ADVANCED ECONOMIES

Gonzalo-Granger common factor

Source: Own Calculations

Figure 4

NATURAL INTEREST RATE HOLSTON *ET AL.* (2017)



Source: Holston *et al.* (**2017**).

or the US in economic terms; however, it plays a very relevant role in the international financial system. The second surprising result is the high load assigned to Canada; probably, this is a consequence of the high economic and financial integration with the US. Therefore, it should be advisable to add the loadings of both countries when analyzing the relevance of the US. The two lowest loading corresponds to Japan. This analysis supports the findings in Fiorentini *et al.* (2018). They present an estimation of the natural interest rate based on structural factors and find a divergence of Japan with respect to other advanced economies as a consequence of the different demographic structure of Japan.

More interestingly, this factor seems similar to that estimated by Holston *et al.* (2017) (see Figure 3), Fiorentini *et al.* (2018), or Wynne and Zhang (2017). It is also similar to the calculations of the shadow interest rate in the US (Wu and Xia, 2016). We also find a somewhat stable interest rate around 2% before the crisis, followed by a quick drop in 2008-2009 and then some recovery, but at considerably lower rates.

4.3 Joint properties of global interest rates in emerging and advanced economies

We have calculated a global factor taking into account, sequentially, only emerging economies and only advanced economies. We now have to prove that both factors follow a common trend. Figure 5 plots both factors. The factor of advanced economies shows an evolution that is well in line with the common factor estimated for emerging economies. In fact, both common factors are cointegrated (see Table 5). Moreover, the cross-correlation, which is fairly high in the whole sample (0.56) is strikingly high after the financial crisis (reaching 0.70), a remarkable feature given that both factors are obtained from completely different samples and methodologies (see Figure 6).

Table 5

JOHANSEN TEST OF COINTEGRATION RELATIONSHIPS BETWEEN COMMON FACTORS

Number of cointegration equations between the common factors of advanced and emerging economies	*Critical Value*	*Prob.***
None *	15.49471	0.0426
At most 1	3.841466	0.1204

Note: Number of lags selected according to the AIC. Different lags and tests give similar results.

Figure 5

COMPARISON OF FACTORS IN DVANCED AND EMERGING ECONOMIES

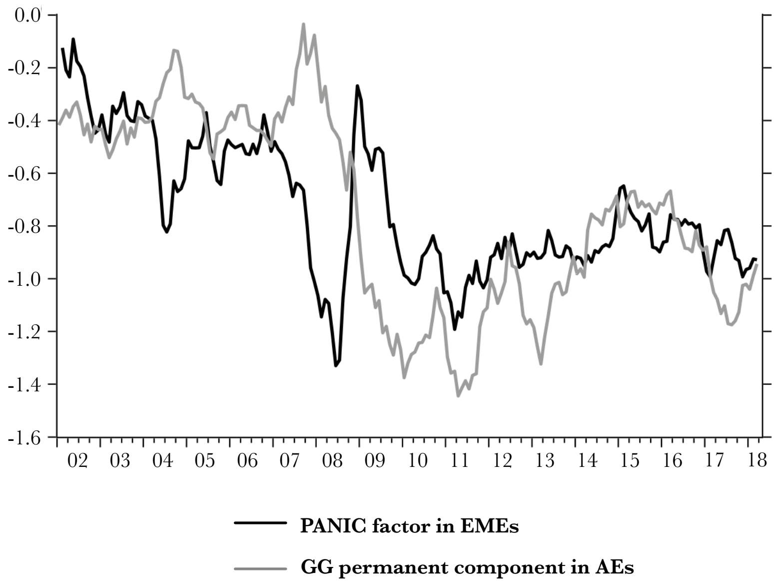
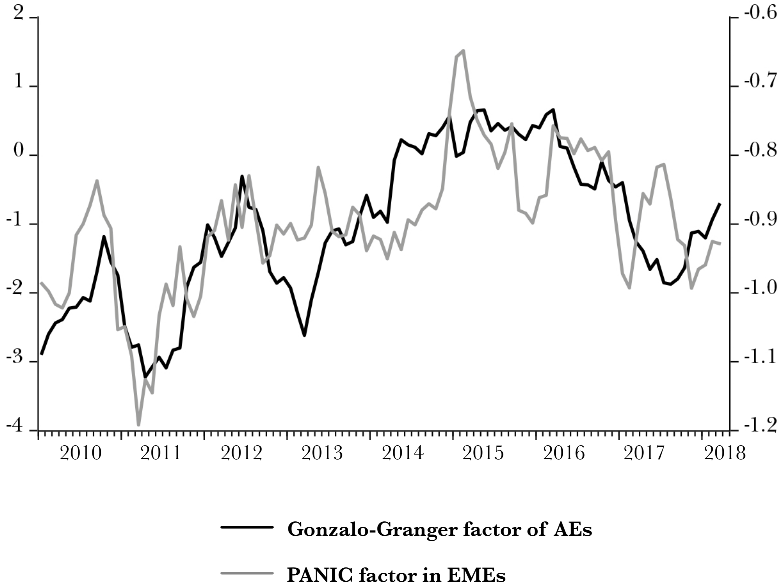


Figure 6

CORRELATION OF FACTORS AFTER THE FINANCIAL CRISIS



A final remark corresponds to the importance of the global factor to the interest rates in each one of the emerging economies. In Table 6, we present the results of the bivariate regression of the global factor on each of the emerging economies. We find that it is substantial, especially for some economies such as Hong Kong, Brazil, Czech Republic, Philippines, Poland, China or South Africa, although it is significant in all of the regressions.

Table 6

COEFFICIENTS AND R-SQUARED OF THE REGRESSION OF THE GLOBAL FACTOR ON THE INTEREST RATE OF THE EMERGING ECONOMIES

	Panic factor in emerging economies	
	Coefficient	*R2*
Brazil	8.8644***	0.4874
Chile	1.9178***	0.0895
China	5.5445***	0.3767
Colombia	0.7632**	0.0241
Czech Rep.	3.6353***	0.4951
Hong Kong	9.7538***	0.6529
Hungary	4.387***	0.2786
Korea	1.7257***	0.1796
Malaysia	1.4218***	0.0726
Mexico	2.7621***	0.166
Peru	1.8713***	0.1692
Philippines	6.5901***	0.5736
Poland	6.1373***	0.4936
South Africa	4.7712***	0.3534
Taiwan	2.5195***	0.3736
Thailand	2.2136***	0.1119

5. CONCLUSIONS

In this paper, we have presented evidence on the existence of a global factor in emerging economies. We consider a model of an open economy in which the equilibrium interest rate is a combination of two integrated processes. Taking this into account, we have used the PANIC approach to extract the global factor present in the interest rate of emerging economies. We have compared this factor to the cointegrating factor of advanced economies to prove that they share a common trend.

The paper sheds light on the formation of interest rates in emerging economies. First, they have to take into account the evolution of interest rates in advanced economies. As the advanced economies are subject to a long process of low interest rates, emerging economies will import this behavior to their domestic interest rates. Second, it is expected that, in more open emerging economies, the comovement with interest rates of advanced economies will be greater.

We have not analyzed the remaining part of interest rates in emerging economies after subtracting the influence of the global interest rate. In the theoretical literature, it depends on long and short run idiosyncratic trends. This discussion is left for future research.

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APPENDIX

Table A.1

LOADINGS OF THE FIRST 5 FACTORS

	Factor 1	*Factor 2*	*Factor 3*	*Factor 4*	*Factor 5*
R_TAW	2.973366	-3.22167	-0.7604	0.237735	-3.36305
R_SOU	3.996348	-1.46544	-1.91702	-1.71676	1.228335
R_POL	7.874226	4.445239	6.649019	5.826261	2.070601
R_HK	1.581859	-4.53144	-5.0824	8.211531	2.454224
R_HUN	4.11742	-3.14338	7.343935	-0.68472	-1.81389
R_BRA	5.995067	9.155254	-6.78537	0.384396	-2.88599
R_MEX	-0.33505	0.226703	0.562534	-1.22867	1.857517
R_MAL	3.382571	-0.44209	-1.1572	-2.01001	1.776246
R_PERU	0.729697	0.63976	-0.00295	-0.31586	-0.77631
R_PHL	4.561111	-3.17077	-2.59847	-4.15148	7.04734
R_CHILE	5.034508	0.049457	0.231206	-5.18457	-3.05165
R_CHN	3.778809	-7.33933	-2.35787	1.689361	-5.26571
R_CZE	2.491221	-1.06121	1.203086	-0.49229	-0.09455
R_THA	5.026442	-2.10912	-0.86732	-1.16351	1.250125
R_KOR	2.368347	0.84475	0.65669	0.014529	0.952191
R_COL	0.587238	-0.07965	-0.75538	0.193051	-0.5626