

## **An optimality index of the single currency: internal asymmetries within the Eurozone since 1999 \***

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### Abstract

It is always difficult to assess the optimality of a common currency in a multiple state economies. The traditional Optimal Currency Union literature offers the rationale for the adoption of a single currency but it does not provide specific indicators or values to assess how near a single currency may be to optimality. In our paper we calculate and propose an overall index of the macroeconomic integration in a currency area, as well as several sub-indices. We have calculated such metrics for the Eurozone and we have observed that internal asymmetries (1) grew from the very launch of the euro in 1999, (2) they have worsened in the crisis years, particularly as regards competitiveness across Member States and (3) asymmetries have diminished from 2014 to 2017 but remained stagnated since then and thus very far from the pre-crisis levels. Finally, we have calculated the same metrics for the US and compare then with those of the Eurozone. As shown in the paper, macroeconomic asymmetries within the US did exacerbate in the 2008-09 crisis years but have returned to pre-crisis levels since ... .

**Keywords:** Currency optimality index, Eurozone internal asymmetries, economic integration

**JEL codes:** F15, F45, C82.

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## **1. Introduction: an index of internal asymmetries**

Since the outbreak of the Global Financial Crisis and the subsequent Eurozone crisis, the euro Member States (MSs) have taken the steps towards deepening their economic integration and strengthening supervision and surveillance procedures. As observed in the years running up to the 2017-08 crisis, trade and fiscal imbalances had accumulated all across the Eurozone for a long time, thus making it more and more difficult for a single monetary policy to fit all. In addition, once the decision was taken not to let any MS abandon or leave the Eurozone (in contrast with seceding from the EU), it became clear that the fiscal and economic performance of each MS in a crisis would create spill-over effects all across the Eurozone. In an effort to impose common standards, the euro MSs have agreed on more stringent fiscal rules (the so-called 'Fiscal compact') and on new macroeconomic criteria (the Macroeconomic Imbalance Procedure, MIP, or so-called 'Six Pack') to avoid the recurrence of asymmetries in the area. With the aim of integrating the economies of the MSs, they have chosen more centralised procedures and rules further constraining the ability of MSs to run their own macroeconomic and fiscal policies.

The EU Commission publishes an annual report on the euro to assess economic integration in the Eurozone mainly by using the convergence criteria stated in the Maastricht Treaty. In addition, a number of studies have tried to gauge the degree of economic convergence within the Eurozone. In a recent empirical study, Campos, Fidrmuc and Korhonen (2017) found that the business cycle became more homogeneous across the EU economies, and even more so in the Eurozone. In this vein, Glick (2017) shows a significant increase in intra-European trade after the introduction of the single currency. Also, the new Macroeconomic Imbalance Procedure adopted in 2011 extends the number of indicators used by the Commission to assess the performance of MSs economies and now includes, among others, current account balances, unit labour costs, real exchange rates, and financial indicators, such as private sector debt and house prices. In line with the MIP approach, we have included in our research a wide variety of macroeconomic indicators to assess the performance of the Eurozone MSs since 1999; and crucially we have added monetary growth in our calculations<sup>1</sup>. In our view the lacking in a monetary indicators in the Commission's assessment exercise results in an incomplete reflection on the conditions needed for optimality in a monetary zone.

Here we calculate an overall index to assess the level of economic integration in the Eurozone since the introduction of the euro in 1999, as well as partial indices referring to four separate chapters: fiscal performance, cycle synchronicity, competitiveness, and monetary dispersion. With these indices we will be able to measure the internal asymmetries within the Eurozone, and which partial developments have most contributed to them; and thus possibly offering insights towards the introduction of reforms in the respective areas. Another contribution of this paper is to compare the performance of the Eurozone with the more consolidated and, in principle, more symmetrical US dollar zone. To do so, we have used the same methodology to calculate the index of internal asymmetries within the US economy.

The remainder of the paper is structured as follows: section 2 explains how our indices are elaborated, section 3 shows the results of the indices as applied to the Eurozone. Section 4 applies the same indices of dispersion to compare the performance of the Eurozone with the US dollar monetary area. And Section 5 summarises and draws conclusions on policy issues regarding Eurozone performance.

## **2. The calculation of the indices: the indicators used**

We have assessed the performance of the euro on the basis of the volatility or dispersion of the MSs under the four chapters or sub-indices, namely: (1) the business cycle, (2) public finance, (3) competitiveness and (4) monetary. As for the business cycle we have included the dispersion of the annual real growth of GDP and the unemployment rate. As for public finances, we use the ratio of the public debt and of the deficit on the GDP. Regarding competitiveness, we use inflation (as calculated by the Harmonised Index of Consumer Prices), Unit Labour Costs and real exchange rates. We add a monetary sub-index, with the rate of growth of broad money (M3) per nation, and the ratio of credit to the private sector and the current account balance on the GDP. <sup>2</sup> The measure of dispersion used in our paper is the standard deviation of the above indicators per year. Since the composition of the Eurozone has changed from the eleven founders in 1999 (Austria, Belgium, Finland, France, Germany, Italy, Ireland, Luxemburg, The Netherlands, Portugal and Spain) plus Greece in 2001, to nineteen today (with Slovenia (2007), Cyprus and Malta (both in 2008), Slovakia (2009), Estonia (2011), Latvia (2014) and Lithuania (2015)), we present the overall index in two forms: first, for the twelve throughout the period; and second, for the seven more gradually added after 2007. This allows one to discount the effect of the increased members on the general dispersion index.

With the business cycle sub-index we want to point out that one should expect the introduction of the single currency to foster intra-Eurozone trade and economic links across Member States, making business cycles more homogeneous (or synchronic<sup>3</sup>). Consequently we should expect a reduction in the dispersion in the rates of growth of the GDP and the rates of unemployment across MSs. This is a key feature for the proper running of the single monetary policy by the European Central Bank (ECB), as a large cycle divergence within the Eurozone would make virtually unfeasible to design an optimal monetary policy to fit all. But the convergence has not in fact increased as expected (see section 3 below).

Convergence in public finances across MSs has always been at the core of the efforts of the euro architects since its very design and inception. As evidenced in the Eurozone crisis, large fiscal imbalances in individual MSs may end up precipitating a crisis in the whole area, and thus also affecting the credit risk and borrowing costs of both errant and well-behaved MSs. This means that fiscal consolidation, and thus convergence towards fiscal sustainability, should be achieved in the 'good years' in order not to suffer a dire fiscal situation in 'bad times'. However, the pre-crisis deficit

and debt to GDP ratios were not low enough to contain the escalation of fiscal imbalances during the crisis time (see Blanchard et al, 2013). So as to in future achieve a lower public debt to GDP ratios during the expansionary phase of the cycle, the EU MSs in 2012 approved the "Treaty on Stability, Coordination and Governance in the Economic and Monetary Union", which introduced tougher fiscal criteria: a maximum 0.5 to 1% fiscal deficit ratio to GDP and a country-based calendar and criteria for the reduction in the public debt ratio to GDP. If these new regulations prove to be effective, we would expect a lower dispersion in public finance performance after 2013, and thus an improvement in our public finance dispersion sub-index.

Competitiveness across MSs is an essential dimension of the sustainability of the Eurozone. Once monetary sovereignty has been delegated to a supranational authority, MSs can only resort to adjustments in costs and prices in order to re-gain competitiveness (the so-called, 'internal devaluation'). For this to happen labour, goods, and service markets must be flexible. In the absence of such flexibility and in the event of a crisis, markets will be forced to clear by quantity and not by price, that is to say, will do so through a deeper recession and more unemployment than otherwise would be the case. This lack of flexibility would be reflected in excessively high real exchange rates: when the nominal exchange rate is fixed, the only way to depreciate the real exchange rate is by reducing internal costs. This is why one of our sub-indices compares the real exchange rate of the different MSs: a failure to carry out an internal devaluation will make the country uncompetitive, increase its foreign deficit, and reduce the national supply of euros.<sup>4</sup>

Another sub-index included in this study is the rate of growth of broad Money Supply in the different MSs. In our view, monetary dispersion across the Eurozone did not receive enough attention in the years up to the 2007-08 crisis.<sup>5</sup> As a matter of fact, overall money growth in the Eurozone as well as differences in money growth across MSs expanded significantly from 2004 to 2007 (see Castañeda and Congdon 2017 for further details). This is relevant for assessing how feasible a single monetary policy by the ECB is. We use two indicators to measure this monetary dispersion. One is dispersion of the balance sheets of their respective banking sectors: for this we look at the asset side (credit to the private sector) and the liability side (M3 growth). The second is the dispersion of the current account balance of the different MSs: if a current account is in continuous deficit, the MS will require an inflow of capital from the rest of the world to sustain it.

### **Target 2 balances**

This latter (monetary) information is especially relevant to some countries in the Eurozone. Before 2008, countries such Greece, Spain, and Portugal were able to accumulate negative foreign (im)balances amounting to more than 10% of their respective GDPs without suffering a run on their currencies or the refusal of their foreign suppliers to continue financing them. But why would current account imbalances be a concern at all, provided that the MS with a current account deficit is able to attract foreign capital to pay for it? For a country running its own currency the market will set the limit to the size of the economy's current account deficit. The

difference is that, under the current euro, these MSs could finance their negative balances continuously and without limit at the ECB through the TARGET2 system.

The Target 2 pan-European payment system makes it easy (and free) for deficit countries to access credit from Eurozone surplus countries, provided that they can present adequate collateral (i.e. mainly, sovereign debt of each Eurozone MS). Unlike in the equivalent US payments system (the 'Fed wire'), MSs' Target 2 balances are not regularly settled (see Westermann, 2018), nor is interest charged to debtors. This makes it easier for a current account deficit economy to accumulate a debit position overtime, with potentially destabilising effects for the euro as a whole when crises come. This is why we have added Target 2 balances to the calculation of the monetary sub-index as an additional indicator along monetary growth, credit to the private sector and current account imbalances.

However, we need to be aware of correlations among the indicators included in our monetary sub-index for the proper interpretation of the empirical results. In particular, the effects of the QE programme(s)<sup>6</sup> of the ECB on the indicators included in our indices, specifically on broad monetary growth (M3) and on Target 2 balances have been sizeable: (a) QE has been effective in stabilising the rate of growth of broad money in the Eurozone (see IIMR, 2018) and in diminishing disparities in the rate of growth of money within MSs, which should have the expected effect of an improvement in our monetary dispersion sub-index. (b) Regarding the effects of QE on Target 2 balances, the implementation of the ECB's Asset Purchases Programme (APP) since 2015 has resulted in an escalation in Target 2 imbalances which, when included in the monetary sub-index, would show a significant deterioration in the Eurozone integration. As detailed in Cecchetti and Schoenholtz (2018), this is because of the way these APP are done; with the seller bank typically based in a creditor or core Eurozone MS, which increases the creditor position of the core central banks at the ECB. This poses caution in the interpretation of the Target 2 balances, particularly since 2015; true, they do reflect imbalances in the financial position of each MS in the Eurozone, but the continuous increase in the central banks' balances since 2015 does not necessarily reflect a deepening of financial fragmentation within the Eurozone, but the necessary outcome of the ECB's APP. This caveat will be taken into account in the interpretation of the results in the section below.

### **The calculation of the overall index and the sub-indices**

In order to avoid distortions in the calculation of the indices when using indicators measured in different units, we have used their standard deviation to measure dispersion. We have collected the information since the inception of the euro in 1999 and adopted it as the base year in our calculations<sup>7</sup> (1999 = 100). Both the sub-indices and the overall index have been calculated as the (un-weighted) average of the standard deviation of each component of the index as detailed in the table below.<sup>8</sup> Finally, we must note that the composition of the Eurozone has changed with the addition of seven new economies since 2007. This may well affect the results of our measures of economic integration in the whole area. Therefore, to assess the level

of integration of the original MSs for both the whole Eurozone (Euro-19) and the original Euro-12.

**Table 1: Indicators and indices used for the Eurozone**

	Sub-indices				Overall index
	Business Cycle	Public Finance	Competitiveness	Monetary Dispersion	
<b>Indicators used</b>	Real GDP growth,  Unemployment rate	Deficit (%GDP),  Debt (%GDP)	Annual inflation rate (HICP),  Unit Labour Costs  Real Exchange Rate(a)	Contribution to the Eurozone annual M3 growth by the Member State  Credit to the Private Sector (% GDP)  Current Account balance of each Member State with the rest of the world (b)  Target 2 balances	Arithmetic average of all the indicators

Notes (a): We calculate the real exchange rate as follows: the nominal exchange rate between the euro in one Member State versus the others, times the difference of the price index in a Member State over the price index in the Eurozone. (b) These balances do not include intra-Eurozone operations.

### 3. Eurozone-19 dispersion indices: interpretation of the results

#### Business cycle sub-index

The cycle has become more similar across Eurozone MSs since 1999. Before the crisis years, the index reflects a trend of improvement (fall) in the dispersion of the cycle across MSs, with a peak 48% fall in dispersion in 2006 (See Figure 1 below). This very much confirms the expected effects coming from the introduction of the new (single) currency, as the economies of the Eurozone became indeed more integrated in terms of real output growth and the rate of unemployment. During the crisis years (first the Global financial Crisis, 2008-09, and then the Eurozone crisis, 2010 - 2013), the index shows a deterioration in cycle integration, as the crises particularly affected the peripheral Eurozone MSs' economies as compared to the Eurozone 'core' MSs. From 2007 the index shows a continuous increase in business cycle dispersion across MSs until 2011, when the maximum level of dispersion stabilises around 145 (indeed nearly a threefold deterioration in the index in only five years). But since 2011 the index shows an improvement in business cycle dispersion, with a positive trend and even lower than pre-crisis levels.

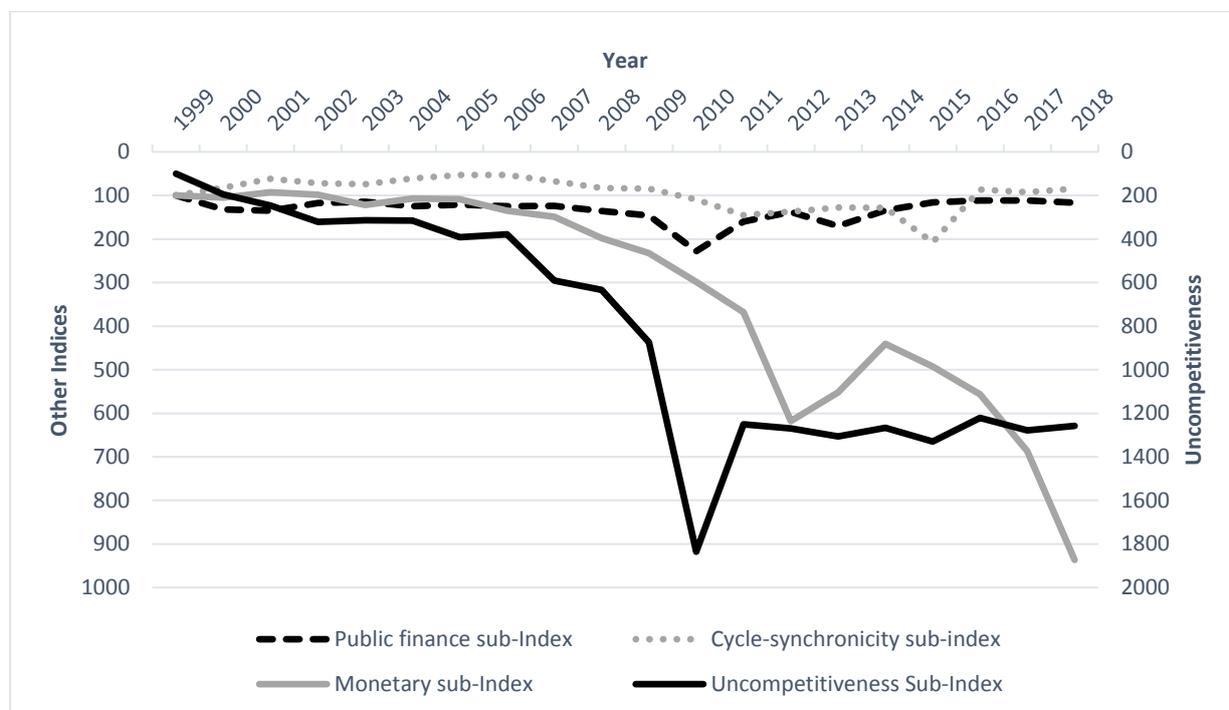
## Public finance sub-index

The fiscal criteria established in the Treaty of Maastricht (and the original Stability and Growth Pact) aimed at achieving fiscal sustainability across Member States; however, as measured in our index, this did not happen since the inception of the euro. In fact, fiscal dispersion increased by 23% during the expansionary phase of the cycle (1999 – 2007), which put the Eurozone in a very fragile position in the event of a crisis occurred. The Eurozone crisis exacerbated the weaknesses in the architecture of the euro, particularly touching the rules supposed to keep fiscal balances and debt in check, and the public finance index reached an all-time high in 2010 (228); this means that dispersion in this chapter had more than doubled since the introduction of the euro. In 2010, Eurozone MSs approved new fiscal measures to cut on deficits and debt (see section 1 above) that have resulted in more fiscal discipline and convergence in the last seven years, with a gradual reduction in fiscal dispersion since 2011, even lower than in the pre-crisis years (the index fell to 116 in 2017).

We will now summarise the trends observed in the other two sub-indices, which indeed posed new risks and concerns on the performance of the euro.

**Figure 1: Partial Indices - Eurozone 19 (1999 = 100)**

(Competitiveness index, right-hand scale; all the others on the left-hand scale)

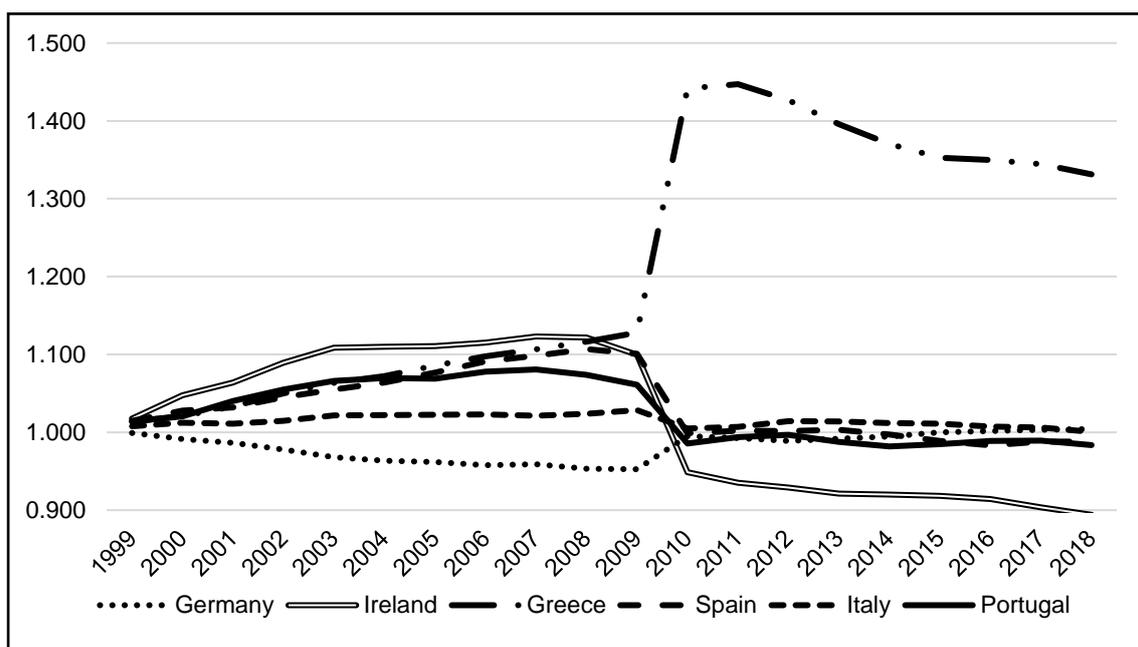


Note that the greater the value of the indices, the greater dispersion,

## Competitiveness sub-index

This is one of the areas in which dispersion has not been addressed effectively since the introduction of the euro. In fact, since the very first year of the adoption of the euro as the single currency, dispersion in competitiveness across Member States very much increased, and even more than trebled in the years running up to the Global Financial Crisis (with a 377 value of the index in 2006). This is mainly explained by the disparities observed in the real exchange rate across MSs. Again, the crisis years triggered even greater dispersion in labour costs and inflation rates across Member States, which ended up in further accumulation of dispersion in this area, with all time record high in 2010 (1,835). It is worth noting that dispersion has diminished since then, which seems to point at the effectiveness of the internal devaluation policies adopted by the MSs in crisis (see Figure 2 below with real exchange rates), and the renewed efforts of the EU Commission to improve macroeconomic surveillance in the EU (such as the approval of the MIP discussed above). However this more favourable trend has stopped since 2016 with the stagnation of competitiveness asymmetries across MSs.

**Figure 2: Real exchange rates, 1999 – 2017 (1999 = 100)**



Note: Calculated as the nominal exchange rate between the euro in one Member State versus the others (effectively,  $1 \times (\text{price index in a Member State} / \text{price index in the Eurozone})$ ).

## Monetary sub-index

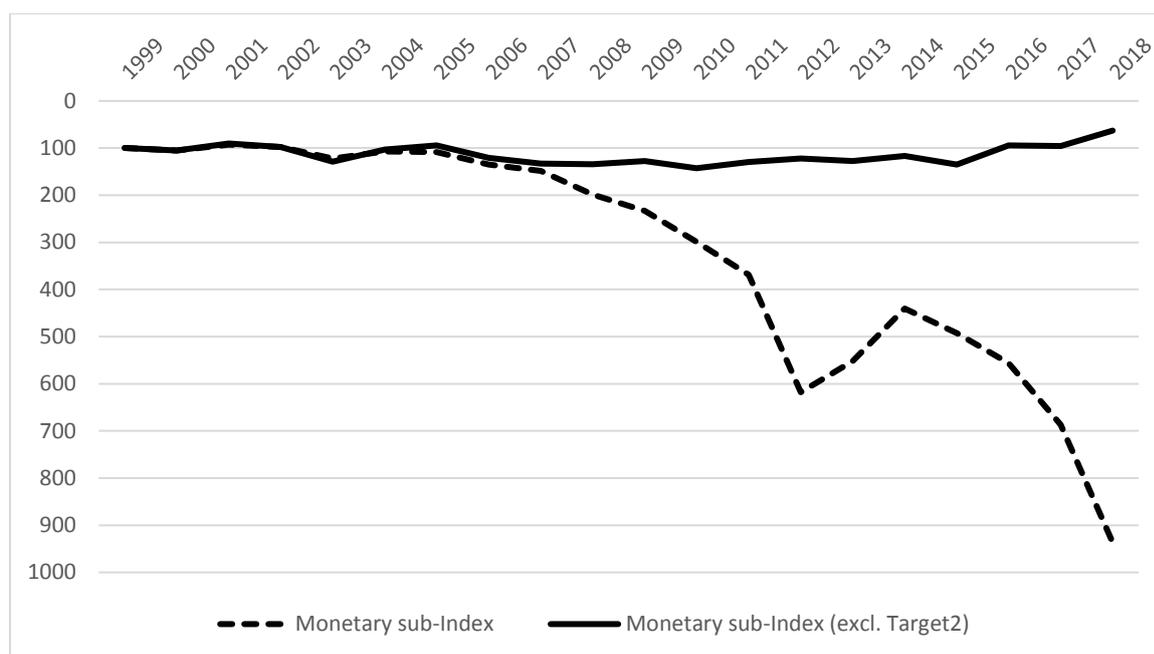
As discussed in section 2 we will be offering the results of this index with and without Target 2 balances.

In the first years after the introduction of the euro, monetary dispersion was very much in check. It was only from 2004 to the outbreak of the crisis when monetary

dispersions started to accumulate in the Eurozone. This is clearly shown in the monetary sub-index results, with an accumulated 33% higher dispersion in this chapter from 2004 to 2007 (See Figure 3 below). Indeed it was in the years running up to the crisis when disparities in our set of monetary indicators increased. The ECB had abandoned its initial monetary strategy, by which predominant weight was given to the rate of growth of money in the Eurozone when making policy decisions, and a 'reference value' for annual M3 announced. This in our view helps to understand why the ECB did not pay enough attention to the excess in monetary growth in the Eurozone as a whole as well as to disparities in monetary growth across MSs for the design of monetary policy from 2004 to 2007. With the outbreak of the crisis in 2007-08 (and credit) tensions manifested themselves. The sub-index reflects the increase in dispersion across MSs. It reached a record high in 2010 (142). Since then, monetary dispersion has stabilised and even fallen below pre-crisis levels (to 62 in 2018). The fall in dispersion in recent years may well reflect the success of the implementation of the European QE programmes in 2010 and the APP since 2015. As announced by the ECB, APP did cut down the sum of asset purchases from €80 billions (April 2016 to March 2017) to €60 billions (April to December 2017) (to be gradually reduced until termination in December 2018) <sup>9</sup>.

When Target 2 balances are included in the monetary index of dispersion, asymmetries worsened significantly: the index values are very much similar to those without Target 2 balances up to 2007 (See Figure 3 below). In a single year, 2008, the index showed an increase in dispersion of more than 100% variation, which accentuated even further from 2010 to 2012 with the outbreak of the Eurozone crisis. This reflects a redirection of funds from the banking systems of the peripheral MSs to those at the core of the Eurozone (see Cecchetti and Schoenholtz, 2018), which started to reverse towards less dispersion values once the crisis mitigated in 2013 and 2014. However, as explained in section 2, the implementation of a new QE programme since March 2015 meant again an increase in the debtor position of the peripheral MSs central banks at the ECB, and thus a significant worsening in the Target 2 balances asymmetries.

**Figure 3: Monetary Sub-Index (1999 = 100)**



Note that the higher the value of the indices, the greater the dispersion.

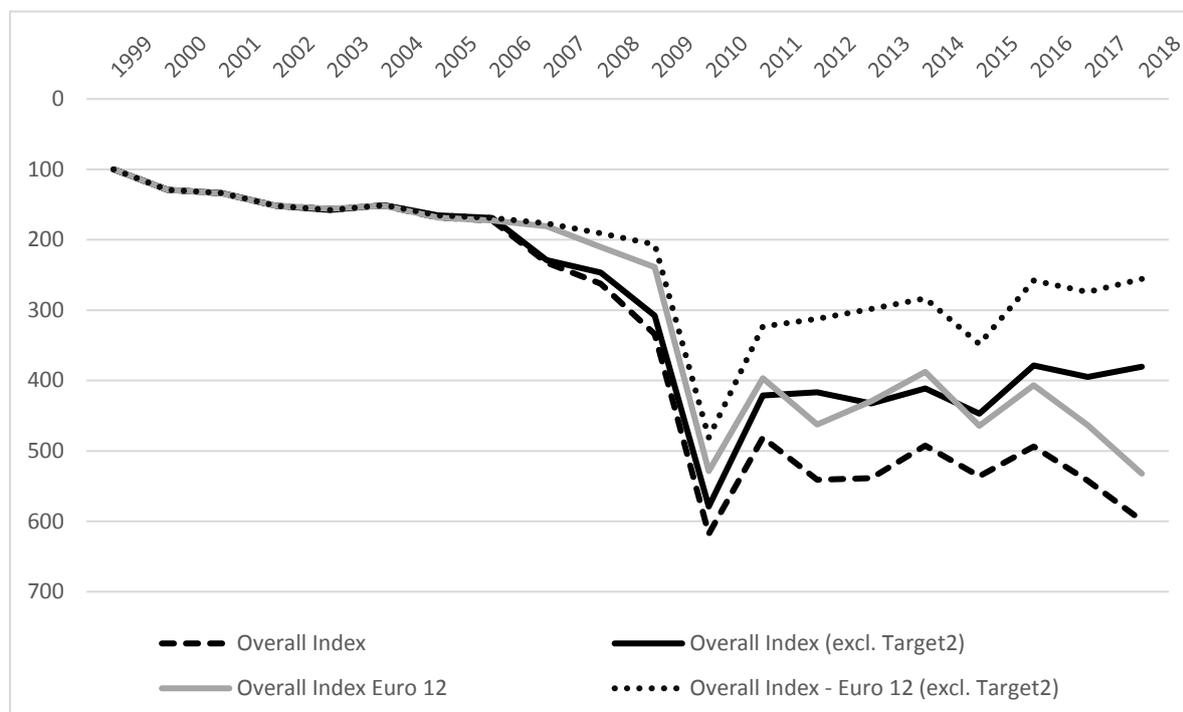
### **Overall index of dispersion: the performance of the Euro, 1999 - 2017**

When all the indicators are considered in the calculation of the overall index of dispersion in the Eurozone, a common pattern is shown in all the scenarios considered in our research: either with or without Target 2 balances included or if just when applies to the Euro 12 or the Euro 19, the Eurozone shows an increase in internal asymmetries since the very inception of the euro in 1999, and thus well before the outbreak of the crisis. As detailed in the paragraphs above, the accumulation of dispersion as regards competitiveness and public finance, as well as in the monetary index after 2004, explain this negative trend in the performance of the euro until 2007 (with a 72% increase in overall asymmetries). Even more, as shown in Castañeda and Schwartz (2017), we should not take the dispersion values calculated for 1999 as the desirable or optimum values for the running of the Eurozone; in fact, we would expect for the introduction of the new currency to foster integration and reduce the levels of asymmetries already in place at the time of the introduction of the euro, something that has clearly not happened. The crisis years meant a deterioration in the levels of internal asymmetries within the Eurozone as measured in our indices, a trend that has started to reverse since 2010, showing a very slow path towards pre-crisis levels of integration.

As shown in the figure below (see Figure 4), the Euro-12 have performed better than the enlarged Euro-19 area; the addition of new Member States since 2007 has not meant an increase in the dispersion of the business cycle, public finances or monetary indicators but has in competitiveness. In 2009, with the addition of four new Member States in only two years, dispersion in this chapter in the Euro-19 area nearly doubled that of the original Euro-12 area.

**Figure 4: Overall index of dispersion, Euro-12 and Euro-19 (1999 = 100)**

Note that the higher the value of the index, the greater the dispersion.



#### 4. Indices of dispersion for the US dollar monetary area

We have applied the same indices and rationale and method to the US, so that we can offer a comparable picture of the level of internal asymmetries in the US dollar monetary area as in the Eurozone - also with 1999 as the base year. We have considered in our analysis the 50 (mainland) States plus Washington DC. However there are relevant institutional differences with the Eurozone that affect the calculation of the indices for the US (and indeed their interpretation). Though the dollar has been the single currency in the US for more than a century neither the regional Reserve Banks nor the US Federal Reserve, established in 1913, publish monetary growth data per state or Federal Reserve Bank region. The same applies to the availability of trade current account data, which only refer to the whole US economies versus the rest of the world. Even more, there is not a comparable Consumer Price Index calculated at the state level. To overcome these gaps, rather than the contribution of each State to the overall rate of growth of money, we have used the ratio of bank deposits held by households as a proxy (using the Federal Deposit Insurance Corporation database as a source). Regarding inflation, we have resorted to the Consumer Price Index (CPI) per region calculated by the Bureau of Labour Statistics<sup>10</sup>. As for state current account balances, we have included the trade balance per State (goods only) as a proxy in the calculation of the indices<sup>11</sup>.

**Table 2: Indicators and indices used for the US dollar**

	Sub-indices				Overall index
	Business Cycle	Public Finance	Competitiveness	Monetary Dispersion	
<b>Indicators used</b>	Real GDP annual growth,  Unemployment rate	Deficit (%GDP),  Debt (%GDP)	Consumer Price Index (CPI),  Labour Costs,  Real Exchange Rate	Deposits by households,  Trade balance  Credit to the Private Sector: - Loans and leases - Real Estate Loans (both % GDP)	Arithmetic average of all the indicators (calculated with and without monetary dispersion)

Sources: Bureau of Economic Analysis (Real GDP), Bureau of Labor Statistics (Unemployment rate), US Census Bureau (States deficit, % State Nominal GDP and States imports and exports), USgovernmentspending.com (Total Debt per State, % State Nominal GDP), Bureau of Labor Statistics (for CPI and Labor Cost) and Federal Deposit Insurance Corporation (for Deposits, Leases and Loans, and Real Estate Loans).

## Results for the US

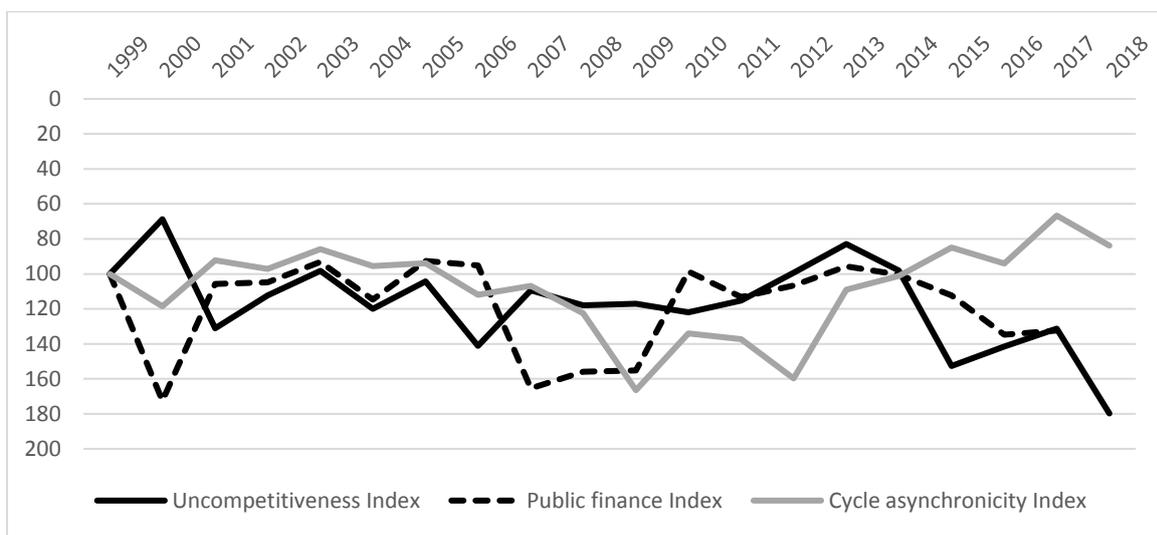
As shown in the chart below (see Figure 5a), the stability in the indices of dispersion for both the business cycle and public finances in the US is remarkable. True, dispersion in the business cycle increased approximately 50% in the crisis years (2008 – 2012), but reversed quite quickly to even lower than pre-crisis values and has stayed there ever since. In fact, in 2018 the business cycle dispersion is 17% lower than in 1999. Regarding public finances dispersion across States, the trend is quite stable since 2010. However, the competitiveness dispersion index did deteriorate in the years running up to the crisis, approximately 40% from 1999 to 2006. During the crisis years dispersion in competitiveness was reduced until 2013 which saw the start of a new trend towards greater asymmetry in this chapter.

The situation looks more worrying as regards the dispersion in monetary indicators (see Figure 5b), especially in the years running up to the Global Financial Crisis: as happened in the Eurozone, monetary dispersion spiked in 2004 and 2006. Since 2006, monetary dispersion has diminished and reached even lower than pre-crisis levels. The US Fed had abandoned the publication of its M3 monetary aggregate in 2005<sup>12</sup>, which may well be interpreted as a sign of the diminishing role played by this aggregate in monetary policy decisions. Monetary dispersion displays quite a volatile

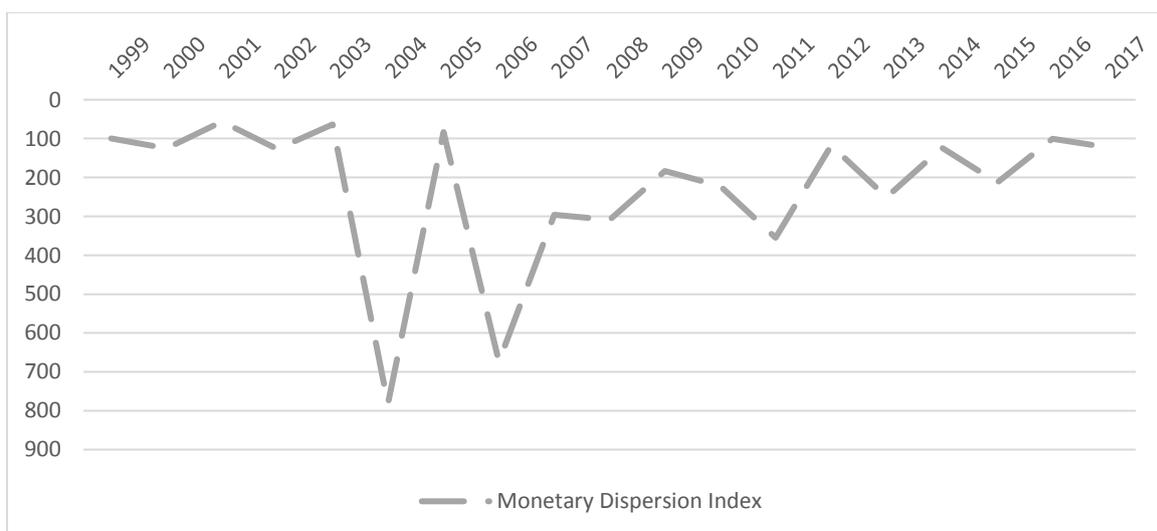
behaviour and the data needs to be interpreted with caution. Although we would prefer to use official money growth data at the state level, as they are not published we use as a proxy bank deposits by households. However relevant it may be, monetary dispersion is less worrying in an economy with a more integrated capital and banking markets across the whole country as the USA. This is in sharp contrast with the Eurozone, where this level of integration of capital markets has not been reached. This is why we will assess the overall index of dispersion in the USA dollar area with and without these monetary indicators.

**Figure 5: US dollar zone dispersion indices: 1999 – 2017**

**a. Cycle synchronicity, public finance and monetary dispersion indices**



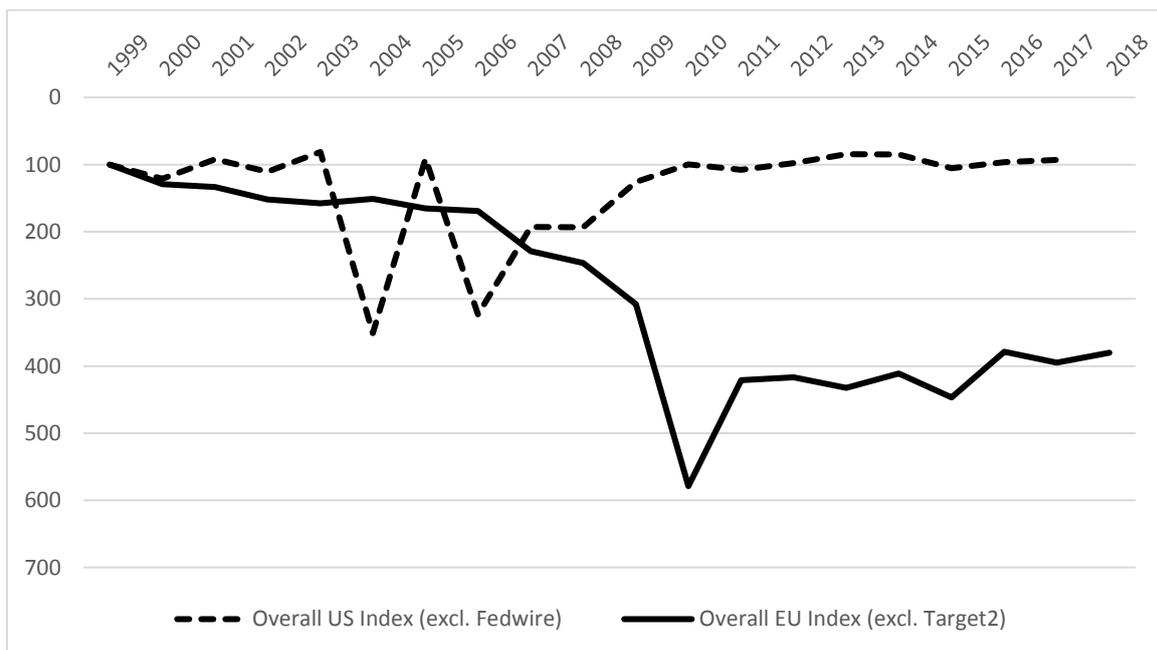
**b. Monetary dispersion index**



Note: the greater the value of the indices the greater dispersion.

Overall, the US dollar zone index of dispersion shows a better performance than that of the Eurozone (see Figure 6). The critical difference lies in the years of the crisis: from 2007 to 2010, asymmetries in the Eurozone became much deeper than in the US, whereas asymmetries diminished in the USA to even lower than the pre-crisis levels. In both economies asymmetries seem to have stagnated since 2011, however the size of asymmetries is four times greater in the Eurozone as compared to the USA. As observed in both indices, there is not a clear trend in recent years towards more integration in any of the two economies. The overall size of macroeconomic dispersion is much lower and the response of the economy to the crisis seems to be much more timely and flexible in the USA: on the one hand, effective constitutional fiscal rules at the state level have prevented deficits from accumulating to unsustainable levels in the USA; and on the other hand, factor mobility across states and more flexible goods, service and labour markets have helped to allocate resources across states more efficiently in the event of a crisis, resulting in less business cycle dispersion. Finally, a sizeable USA federal budget<sup>13</sup> provides with both discretionary policies as well as automatic fiscal stabilisers that contribute to alleviate income and spending asymmetries across states.

**Figure 6: US dollar and Eurozone-19 dispersion indices: 1999 – 2017**



Note: We adopt for both economies 1999 as the base year so we can compare their performance since then, therefore focusing on changes in asymmetry; this does not mean that the level of asymmetries in both areas in 1999 was the same. In both cases we have displayed the overall index of dispersion without including the Fedwire and Target2 balances for the USA and the Eurozone economies, respectively.

## 5. Summary and policy conclusions

The euro was launched in 1999 with the expectation that the single currency would lead to a greater macroeconomic integration in the Eurozone. The general consensus at the time was that, even though not an optimal currency area, the euro would help to mitigate macroeconomic asymmetries among Member States. The several indices used to measure the performance of the euro show the following trends: (1) With the exception of business cycle synchronicity, asymmetries worsened in all the other areas (fiscal and monetary and, above all, competitiveness). This appears well before the start of the Global Financial Crisis. (2) The policies and new regulations adopted both by Member States and the Eurozone as a whole in the aftermath of the Global financial Crisis and the Eurozone crisis seem to have helped to contain and even mitigate macroeconomic asymmetries: we can see that both monetary (excluding Target2 balances) and public finance dispersion have decreased and reached lower than pre-crisis levels in recent years; in addition, cycle synchronicity has improved further and it is now better than in 1999. (3) It is differences in competitiveness what still remains quite high and stagnant since 2011. This seems to indicate that more emphasis should be put in better functioning of good and services, as well labour markets in the Eurozone.

It is important though to assess the indices and calculations presented above within the proper historical context and institutional limitations of the Eurozone. The USA dollar monetary area is generally used as a benchmark to compare the performance of the euro. As detailed in Rogoff (2003), it took nearly a century for the dollar zone to approach optimality. Further research is needed on the influence of institutional and political factors such as the greater labour mobility<sup>14</sup> and the large federal fiscal transfers to the states. In any case, the indices calculated for the Eurozone and the US dollar area are informative of the different level of integration currently existing in the world's two major monetary areas, as well as of the greater flexibility in the US economy to absorb a major shock such as the recent 2008-2009 crisis with a single monetary policy.

## Annex

Table A1: Indices of dispersion in the Eurozone (1999 – 2018)

	<b>Un-Competitiveness</b>	<b>Public Finance</b>	<b>Cycle-synchronicity</b>	<b>Monetary Dispersion</b>	<b>Overall Index</b>	<b>Overall Index excl. Target2</b>
1999	100	100	100	100	100	100
2000	195.8975182	132.148725	82.42442871	105.1978349	128.917127	128.917127
2001	247.155577	134.737435	61.87197285	92.6390759	134.101015	133.487605
2002	320.7601545	117.356212	71.62341966	97.98294517	151.930683	151.924021
2003	313.2503567	114.219086	74.00145737	122.0515071	155.880602	157.507878
2004	315.077162	124.744464	61.00155791	107.1744461	151.999408	150.953508
2005	392.0080132	121.373361	52.9896617	108.469311	168.710087	165.229761
2006	377.7173986	124.391681	52.99834919	134.761915	172.467336	168.977749
2007	590.6850307	123.763369	67.61694916	148.6608021	232.681538	228.780374
2008	633.4039061	135.889725	82.93662025	198.3212392	262.637873	246.598067
2009	873.1535005	146.070671	84.6732642	232.7962653	334.173425	307.923988
2010	1835.483855	228.063942	109.4785829	298.5282634	617.888661	578.939645
2011	1250.929585	159.814148	145.0281594	368.3146697	481.021641	421.313264
2012	1270.313929	137.800796	137.3516758	617.9987886	540.86297	416.880864
2013	1305.702833	170.489163	127.2932816	551.8842913	538.842392	432.721129
2014	1266.114497	134.230903	128.7009837	440.6570918	492.425869	411.3616
2015	1328.962386	115.72414	207.5941996	492.2509298	536.132914	446.847346
2016	1221.67176	111.616143	86.40437611	556.2460989	493.984594	378.484289
2017	1279.100384	111.537906	92.20988824	686.6604169	542.377149	394.679647
2018	1257.946912	116.49071	84.43223092	936.5218747	598.847932	380.447954

Table A2: Indices of dispersion in the USA dollar (1999 – 2018)

	Un-competitiveness	Public Finance	Cycle Synchronicity	Monetary Dispersion	Overall index of dispersion	Overall index of dispersion excl. Fedwire
1999	100	100	100	100	100	100
2000	68.72145357	172.5045319	118.5449763	124.6689568	121.1099796	121.209377
2001	131.062294	105.6428952	92.19767899	56.29727008	96.30003456	91.88952255
2002	112.3016251	104.8131778	97.13719174	126.6437293	110.223931	110.7158176
2003	98.20449755	93.16654572	85.78818094	63.65756325	85.20419687	81.17648909
2004	119.9218465	114.7350232	95.59923329	782.1822867	278.1095974	351.074609
2005	104.2635308	92.58435188	93.93857048	83.50438705	93.57271004	91.31562758
2006	141.2206864	95.18333356	111.8870354	673.4821919	255.4433118	323.1198878
2007	109.3093027	165.4230703	106.8454041	295.4794039	169.2642952	192.6577941
2008	117.9890496	155.940029	122.5974525	308.7755084	176.3255099	193.2726798
2009	117.1343486	155.1375085	166.4843114	183.6892057	155.6113435	125.7042346
2010	121.9248031	98.52521283	134.0480108	221.6930896	144.0477791	99.87157804
2011	115.2121659	113.1235222	137.3816909	355.2688107	180.2465474	107.8722489
2012	99.34694596	106.6990074	159.7599272	117.8084751	120.9035889	97.88172048
2013	82.99297486	95.75111965	108.9774208	250.4388179	134.5400833	84.67017436
2014	97.99907232	100.3820503	101.0945967	123.4268019	105.7256303	84.83421127
2015	152.6485422	112.3313531	84.99274112	212.9298554	140.725623	105.2953035
2016	141.5594823	134.7501448	94.08433242	100.3348736	117.6822083	96.51918684
2017	131.3355267	132.3108608	66.65955441	122.3362157	113.1605394	92.78501136
2018	179.7896625	N.A	83.9025214	N.A	N.A	N.A

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## Notes

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<sup>1</sup> A preliminary index has been attempted in Castañeda and Schwartz (2017).

<sup>2</sup> We have used Eurostat data for chapters 1, 2 and 3. Regarding 4, we have used the national central banks' datasets for the national contribution to M3 growth, the World Bank's for credit to the private sector and the IMF's for the current account balances.

<sup>3</sup> By synchronic we mean that Member States share both the timing of the cycle as well as the size or amplitude of their expansionary and contractionary phases along the cycle.

<sup>4</sup> This is something particularly relevant for the Eurozone and at the core of the sound running of a common currency area. This is because, as explained by R. Mundell in his 1961's seminal article, labour mobility across Member States (see XXXX) does not seem to mitigate the concentration of abnormally high unemployment rates enough in the economies in crisis. In this regard, the calculation and monitoring of the real exchange rate will be key to understanding the accumulation of imbalances across Member States as well as the effectiveness of the measures adopted by Member States and the Eurozone as a whole to tackle the recent crisis.

<sup>5</sup> The ECB had suspended the publication of the 'reference value' for the rate of growth on M3 in the Eurozone in 2003.

<sup>6</sup> Since March 2015 the ECB has re-launched and merged its Quantitative Easing (QE) policies under the new Asset Purchase Programme (APP), which has consisted on the pre-set amount of purchases of private securities as well as sovereign debt of the Member States. This has alleviated borrowing costs on the most debtor economies in the Eurozone and thus has helped finance their overspending by the private and the public sectors. The size of Target 2 balances is very much under discussion and indeed a matter of concern in the Eurozone.

<sup>7</sup> With the exception of those indicators with no information available in 1999, such M3 growth (2000 = 100) and credit to the private sector and Target 2 balances (both, 2001 = 100).

<sup>8</sup> As imperfect as an un-weighted average may be, we do not have the criteria to assign a different weight to each indicator reflecting their (distinctive and asymmetric) impact on the general index of economic integration calculated in our research. This is not unusual in the calculation of economic indices such as the Index of Economic Freedom by the Heritage Foundation. Of course, different weightings might be suggested or recommended in future, depending on the importance given to each of the indicators included in our calculations.

<sup>9</sup> With this we suggest that, if credit to the economy does not lead to more positive rates of growth, overall monetary growth in the Eurozone and also differences across Member States may again deteriorate further.

<sup>10</sup> There are the States included in the four (Census) regions: Northeast Region (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York and Pennsylvania), South Region (Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma and Texas), Midwest Region (Illinois, Indiana, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota and South Dakota) and West Region (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, Alaska, California, Hawaii, Oregon and Washington).

<sup>11</sup> As per the calculation of the real exchange rate per State we have used the same formula as in the Eurozone: the nominal exchange rate between the dollar in one State versus the others (1) times the price index in a State over the price index in the US. The sources of the US data are specified on Table 2 in the text.

<sup>12</sup> As stated in the US Fed press release, November 10<sup>th</sup> 2005: '*M3 does not appear to convey any additional information about economic activity that is not already embodied in M2 and has not played a role in the monetary policy process for many years. Consequently, the Board judged that the costs of collecting the underlying data and publishing M3 outweigh the benefits*'.

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<sup>13</sup> The USA Federal budget amounts to around 20% of the USA GDP (approximately 50% of total government spending comes from the federal budget, see Bordo et al. 2013), as compared to the Eurozone total budget of virtually 1% of the EU GDP.

<sup>14</sup> Even though increasing in the last years and thus making the gap smaller, labour mobility in the EU is still lower than in the USA: according to the 2016 European Commission report on labour mobility in the EU, 1,78% of the total population changed their country of residence to work abroad; whereas in the USA, following Census data for 2016, 2.26% moved to a different state searching for a job.