Coming together or drifting apart: The case for a European investment agenda

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Coming Together or Drifting Apart:
The Case for a European Investment Agenda.

Harald Benink, Sara Murawski and Mark Sanders

> *"But it would be much better to tackle the root cause of this growth divergence. These differences between North and South are not after all a God-given natural phenomenon."*
>
> *— Klaas Knot, 2020*

Introduction

In 1976, Lucas formulated his famous Critique that it is naïve to try to predict the effects of a change in economic policy entirely based on relationships observed in historical data. He basically argued that, as policies change, so will these relationships. In close analogy the Clemens' Critique can be stated as, it is naïve to assume your analysis will convince Clemens Kool on the first read. The inevitable "I am not convinced" is the phrase that implies you will need to do a better job of making your case. Therefore, in honor of Clemens Kool, we decided to take a report that was prepared by Sara and commented by Clemens, attempting to convince him of the arguments in a second try. We leave it to the reader (Clemens, first and foremost) to pass judgement on our success.

This chapter is about convergence in the European Union and more specifically the European Monetary Union (EMU), established with the Treaty of Maastricht. Convergence had a central role in the establishment of the EMU. The 1989 Delors-report argued that a monetary union requires a sufficient degree of convergence of economic performance and (hence) economic policies. It states that "[p]arallel advancement in economic and monetary integration would be indispensable in order to avoid imbalances which could cause economic strains and loss of political support

for developing the Community further into an economic and monetary union."[2] The Maastricht Treaty (1992) is even more explicit, arguing that "[t]he Community shall have as its task...a high degree of convergence of economic performance."[3] But what kind of convergence is meant? And which mechanisms in the design of the EMU were thought, hoped or believed to deliver such convergence?

Convergence

The convergence debate can be traced to the mainstream, neoclassical growth model. In this model, Solow (1956) assumed diminishing returns to capital, linear depreciation and a constant saving rate and showed that these ingredients would cause an economy to converge to a steady state level of capital and therefore income per capita. This convergence is conditional on parameters and exogenous variables such as population growth, saving rate, depreciation rate and productivity levels and growth. Provided these are comparable across economies, the model predicts they will end up in comparable steady state growth paths. The empirical performance of this model in global cross-sectional data is impressive (Mankiw, Romer and Weil, 1994) and convergence, especially among similar and integrated economies, is quite strong (e.g. Barro and Sala-I-Martin, 2004).

Opening the economies to trade and free flows of capital and labor, was therefore believed to speed up the convergence process by ensuring knowledge flows freely and the tide of productivity growth could lift all boats. Giving up national currencies to eliminate exchange rate fluctuations and uncertainty would facilitate trade and investment across EU borders and thereby push the poorer parts of the Union onto higher and steeper growth trajectories to rapidly catch up with the core. Transitional growth explains how Germany and Japan rapidly recovered from World War II and why countries like the Asian Tigers and Dragons rapidly converged to the

[2] https://ec.europa.eu/economy_finance/publications/pages/publication6161_en.pdf
[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A11992M%2FTXT

industrialized world after adopting the "right" institutions and integrating into the global (Western) economy.

The Solow model fails to explain two important facts. Why would some countries/economies converge to a slower growth than others and why would economies fail to converge to the global frontier? In the context of the European Union, why do some regions in Europe lag the levels and growth rates of GDP per capita in others, what causes some to suffer recession while others enjoy a boom and why are some affected more and others less by similar external shocks.

Before we turn to the empirical evidence and experiences in Europe over decades since he Maastricht Treaty, we briefly review a textbook endogenous growth model in the spirit of Romer (1990) with an extension due to Jones and Vollrath (2024). This helps us understand the mechanisms that may cause con- and divergence in the level and growth of GDP per capita in the European Union as well as the transmission of positive and negative shocks to (parts of) the Union.

A toy model of growth and convergence

If we assume a standard Cobb-Douglas production function:

$$Y_i = K_i^{\alpha}(A_i h_i L_i)^{1-\alpha} \quad (1)$$

Where Y, K, A, h and L represent output, capital, labor augmenting productivity, human capital and labor respectively, α is the output elasticity of capital between zero and one, i indexes the country and we suppress time subscripts (and assume human capital is constant). Solow (1956) added an exogenous constant population and productivity growth and the standard capital accumulation function:

$$A_i = A_{i0}e^{g_{Ai}t} \quad (2)$$

$$L_i = L_{i0}e^{g_{Li}t} \quad (3)$$

$$dK_i = s_i Y_i - \delta K_i \quad (4)$$

Where t is time and 0 indexes the exogenous starting values, s is the gross fixed capital formation rate and δ is the depreciation rate. We know (e.g. Jones and Vollrath (2024, ch. 2)) that the steady state growth in output per capita is given by:

$$g_{Y/L} = g_{Ai} \qquad (5)$$

And output per capita on the balanced growth path will converge to:

$$y_i^{BGP} = \left(\frac{s_i}{\delta + g_{Ai} + g_{Li}}\right)^{\frac{\alpha}{1-\alpha}} h_i A_{i0} e^{g_{Ai} t} \qquad (6)$$

From this simple model we can already see that convergence between two economies i and j in terms of growth rate and level of GDP per capita, will depend on the values of the parameters and exogenous variables in the model. But this model assumes closed economies, such that convergence in per capita GDP growth rates or levels would be a pure coincidence. All economies i, however, do converge to their own steady state and balanced growth path, such that if we assume gAi to be equal to or converge among these economies, we predict convergence in growth rates and by (6) convergence to a constant relative output per capita. Moreover, within the European Union, markets, notably goods, labor and capital markets, have all been integrated. To the extent that labor and capital are mobile between economies i and j, this would imply convergence in wages and cost of capital, such that, assuming competition in factor markets, also the marginal products of capital and labor would converge. Endogenizing gross fixed capital formation rates would then imply higher levels of investment in the capital poor economies, while labor mobility would imply that all economies effectively face the same overall growth rate in workforce (as people will move wherever their marginal productivity is highest).

Of course, labor is far from perfectly mobile across the Union and risk premia still distort capital markets. We can therefore derive more useful insights from the model in Jones and Vollrath (2024, ch. 5 and 7) that assumes labor and capital are immobile,

but knowledge accumulates endogenously (Romer, 1990) and knowledge spillovers exist between a frontier and a lagging economy.

The model above is first extended by replacing (2) by:

$$dA_i = \theta L_{Ri}^{\lambda} A_i^{\varphi} \qquad (7)$$

Where (7) describes the process of knowledge accumulation at the frontier country i as a function of the labor allocated to innovation, LRi, and the stock of knowledge accumulated in the past, Ai and θ, λ, φ are positive parameters and the last two are less than one. For the lagging economy j we assume:

$$dA_j = \psi h A_i^{\gamma} A_j^{1-\gamma} \qquad (8)$$

Where it should be noted that $A_j \leq A_i$ must hold and productivity in the lagging country benefits from innovations at the frontier, technology adoption in the past and the level of human capital, h in the labor force. Jones and Vollrath (2024) shows that on the balanced growth path we have:

$$g_A^{SS} = g_{Aj} = g_{Ai} = \frac{\lambda}{1-\varphi} g_{Li} \qquad (9)$$

Whereas the outputs per capita will converge to:

$$y_i^{BGP} = \left(\frac{s_i}{\delta + g_A^{SS} + g_{Li}}\right)^{\frac{\alpha}{1-\alpha}} (1 - s_R)\, h_i A_{i0} e^{g_A^{SS} t} \qquad (10)$$

$$y_j^{BGP} = \left(\frac{s_j}{\delta + g_A^{SS} + g_{Lj}}\right)^{\frac{\alpha}{1-\alpha}} h_j \left(\frac{\psi h_j}{g_A^{SS}}\right)^{\frac{1}{\gamma}} A_{i0} e^{g_A^{SS} t} \qquad (11)$$

Such that the model no longer predicts convergence in GDP per capita levels, even if all parameters and exogenous growth rates are the same or somehow would

converge to the same levels due to market integration. The model does predict convergence in growth rates and all else equal, poorer economies that start out further below their BGP will grow faster. But in this model, it is perfectly possible for economies to show no convergence in output per capita or even experience episodes of divergence following changes in the structural parameters that permanently shift and/or shock economies off their balanced growth paths. Since shocks and structural change have been a constant in the European Union since before the Treaty of Maastricht, convergence between parts of the Union should not be expected without deliberate policies to achieve it, even if full market integration is achieved.

For such policies, however, the Lucas (and Clemens?) Critique applies. In implementing European policies, the fundamental parameters and possibly relationships among the exogenous variables would change. Consequently, the behavior of the system we are trying to influence, will change as well. Policy makers should therefore not design and execute but should instead experiment and adapt. It certainly is not enough to force nominal variables (wages, prices, inflation, interest rates, debt and deficit ratios) to converge and/or remain converged to ensure real convergence. And even if real convergence is achieved in the long run, the European Union would still need powerful, automatic stabilizers and risk sharing mechanisms to ensure that shocks dissipate and business cycles remain converged across the Union.

In the below, we will first discuss three types of convergence: nominal, real and cyclical convergence.[4] Then we turn to some modest policy interventions that we believe will bring European economies closer together and empower Europe/the EU to address the urgent challenges the continent faces.

[4] Following IMF Working Paper (2018). Economic Convergence in the Euro Area: Coming Together or Drifting Apart?

Nominal, real and cyclical convergence

Nominal convergence refers to convergence in nominal variables. In case of the EMU, the most famous are the Maastricht convergence criteria, used to determine if a country is ready to introduce the euro. The Maastricht convergence criteria require four things: price stability, sound and sustainable public finances (consisting of both a deficit and debt criterion), exchange-rate stability and low and stable long-term interest rates.[5] The criteria were introduced in the run-up to the euro, to achieve price stability and enforce converging inflation across the EU.

Real convergence refers to the convergence of real variables, notably income levels between countries. Real convergence refers to the process where countries with low-income levels (measured by GDP per capita) "catch up" with countries with high income levels. Two types of income convergence can be distinguished: beta-convergence, which measures the degree to which countries with lower GDP per capita levels grow faster than countries with higher GDP per capita levels; and sigma-convergence, which is the decline in the dispersion of GDP per capita levels between countries over time.

Finally, we can distinguish cyclical convergence, measuring the correlation in real variables over the business cycle across European Member States to see if booms and busts are of similar size and timing across the Union.

The Maastricht Treaty

Convergence and prosperity were enshrined as the objectives of the EU in the Maastricht Treaty. Both are strongly related to real convergence (Creel, 2018). Significantly, however, real convergence targets were absent in the Maastricht treaty. Instead, real convergence was assumed to follow from nominal convergence, market discipline and further integration. Additionally, the nominal Maastricht convergence

[5] https://www.consilium.europa.eu/en/policies/joining-the-euro-area/convergence-criteria/

criteria were meant to reconcile the different fiscal policies across the EMU with a common monetary policy (IMF, 2018). Nominal convergence, however, does not automatically lead to real convergence.

On the contrary: a narrow focus on nominal convergence can hamper real convergence, for example if it leads to contractionary fiscal policy that negatively impacts the weaker economies. Paul de Grauwe argued in 1996 that complying to the Maastricht convergence criteria before entering the euro would maximize the costs of convergence and could actually lead to increasing inflation and higher deficits (de Grauwe, 1996).[6] In 1997, a group of 70 Dutch economists pointed out that the introduction of the euro forced countries to implement austerity policies with detrimental socio-economic effects.[7] In Italy, for example, fiscal consolidation in the 1990s and 2000s was much stronger than in other advanced economies (IMF, 2011) and this went hand in hand with a deteriorating standard of living in terms of GDP per capita since the 2000s (Beun, 2022). But because nominal convergence is easier to measure and observe, the Maastricht Treaty set nominal convergence criteria to determine who could join the euro in the first wave.

Nominal convergence in the euro zone

Before the introduction of the euro, inflation rates converged significantly between the twelve original euro members. The average inflation rate was 1.3% in 1998 compared to 3% in 1995 (IMF, 2018). Since then, the inflation convergence of the EU12 has stalled

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[6] The reasoning is as following, taking the example of Italy: Because of its reputation, Italy will find it hard to convince the market that it will bring its inflation down sufficiently in due time before entering the euro. While bringing down inflation, unemployment rises. Meanwhile, the lira experiences real appreciation because its exchange rate is pegged to the euro. This causes more scepsis regarding the markets' disinflationary expectations and speculation is set in motion. Italy is forced to devalue the lira as a result, implying diverging inflation. As a result, nominal interest rates will remain high, and the debt burden increases.

[7] "Het huidige beleid is echter gefixeerd op de uitgavenkant: terugdringing van de collectieve uitgaven. Dat brengt omvangrijke bezuinigingen met zich mee die veel sociale en economische schade veroorzaken. Niet in de laatste plaats omdat veel lidstaten al sinds 1982 in een web van bezuinigingen gevangen zitten […] De EMU-criteria en stabiliteitspactverordeningen werken de facto juist een Europees procyclisch beleid in de hand. Daardoor loopt met name de ontwikkeling van de werkgelegenheid in gevaar." https://www.volkskrant.nl/economie/met-deze-emu-kiest-europa-verkeerde-weg~bf1ca466/

(see Figures 1 and 2). The price levels of countries that joined the euro in 2007 or later (Eastern countries) converged only slightly.

Figure 1: Inflation Convergence (IMF 2018)

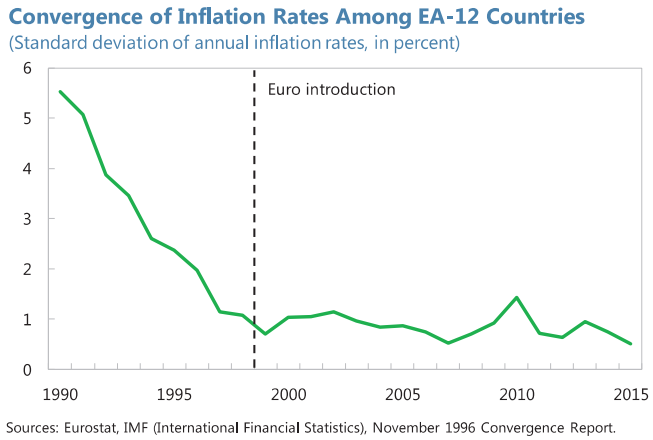
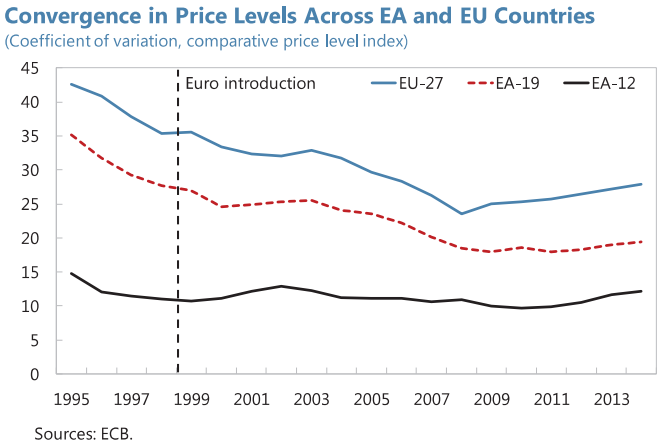


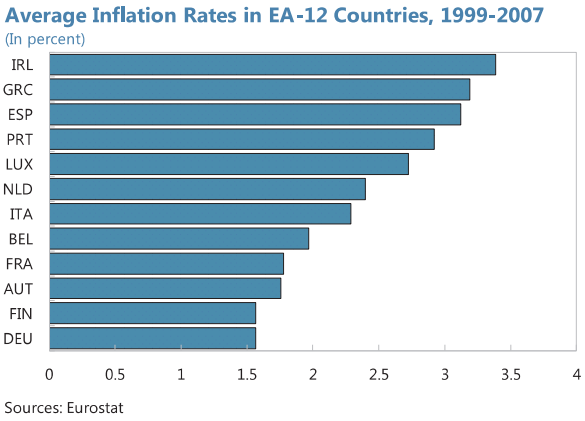
Figure 2: Price Convergence (IMF 2018)



The (small, but persistent) differences between the inflation rates of the EA 12 countries left their marks. The relatively high inflation rates of (mainly) Southern countries negatively impacted their competitiveness, as visible in the development of their real effective exchange rates (IMF, 2018, see Figures 3 and 4). This is an important fact when reflecting on the question to what extent nominal convergence

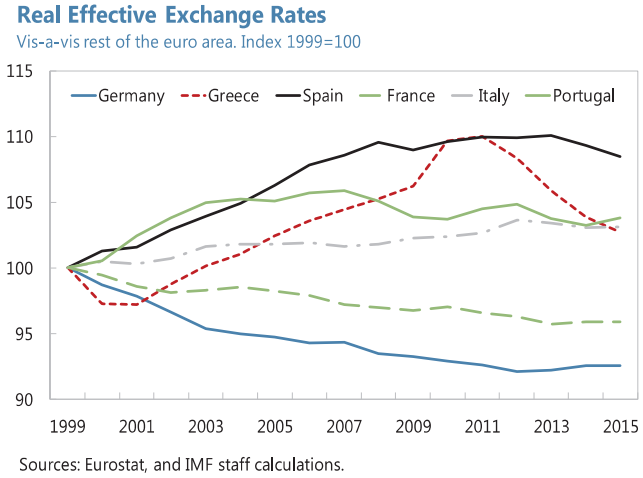
leads to real convergence. In this case, fulfilling the nominal convergence criteria for an important part did not prevent the real exchange rates to diverge.[8]

Figure 3: Inflation Rates (IMF 2018)



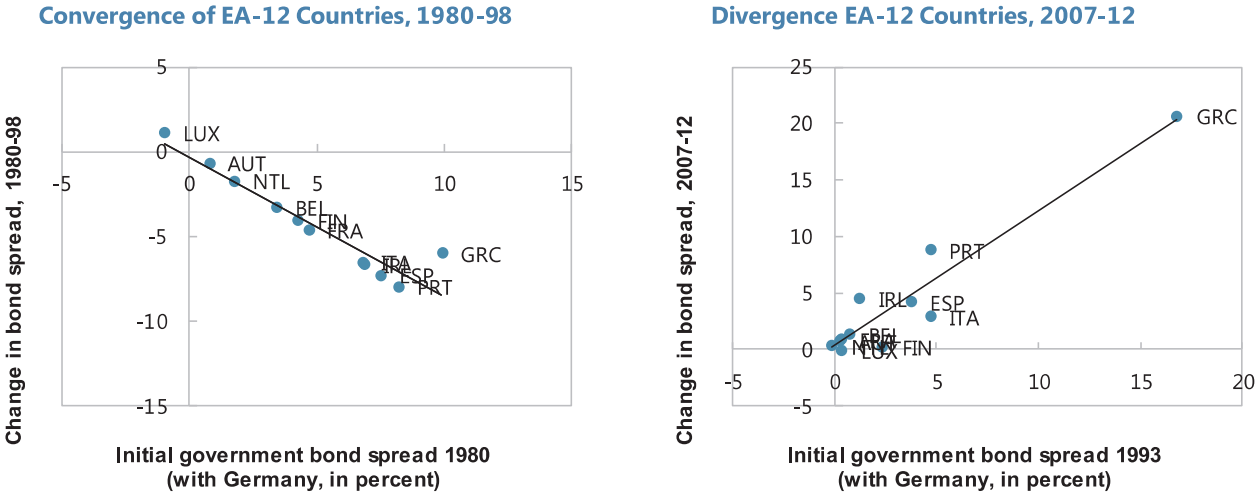
[8] The Clemens Critique: Het stuk over inflatieconvergentie is wel erg kort door de bocht. Vóór de start van de euro ging het erom om de transitie soepel te maken en alle NCBs te dwingen om een convergerend monetair beleid te voeren. Na de invoering speelt er iets heel anders en is (mijns inziens) de vraag in hoeveel jaren een land het inflatiecriterium niet haalt, niet relevant. Door het gezamenlijke monetaire beleid wordt de reële wisselkoers een belangrijk (het belangrijkste) instrument om evenwicht te realiseren bij asymmetrische schokken. Omdat de nominale wisselkoers is 1 is betekent dat dat je moet verwachten (en ook waarderen) dat er tijdelijke inflatieverschillen ontstaan die zorgen voor aanpassing. Voor landen met een gelijk ontwikkelingsniveau wil je wel dat over een langere tijd de gemiddelde inflatie ruwweg hetzelfde is. Tweede issue is dat verschillen in ontwikkeling (GDP per capita) leiden tot persistente inflatieverschillen. Landen die moeten inhalen (starten op een laag niveau) krijgen dan "automatisch" een hogere inflatie en reële appreciatie (in de literatuur bekend als het Balassa-Samuelson effect dat ontstaat omdat de prijs van niet verhandelbare goederen en diensten relatief stijgt als een land welvarender wordt). Ook dat kun je dus niet wegzetten als een (vermijdbaar) probleem. Tenslotte nog een punt over prijsniveaus: ook hier is de vraag over het gebrek aan volledige convergentie een issue is. Ook in Nederland (en andere landen), is het prijsniveau tussen regio's behoorlijk verschillend (denk met name aan onroerend goed, maar ook aan een "terrasje").
Our reply: Of course, we agree with Clemens that inflation convergence before and after the introduction of the euro is something different. Indeed, after the Euro, a sustained inflation differential implies a real exchange rate change that may indeed be necessary. The fact that these figures appear in Post-Euro Convergence reports by IMF and ECB suggest, however, that at least some had expected/hoped that the convergence in price levels and inflation would carry over beyond the introduction of the single currency such that the single currency would not create tensions. More importantly, it is important to note and show that it is the weaker countries in the Eurozone that experience an appreciation, increasing tensions and imbalances instead of adjusting to structural trends. If real exchange rate adjustments were needed to counterbalance persistent differences in GDP (growth), one would expect the faster growing and more advanced economies to appreciate. We have adjusted the text to prevent the reader from getting the impression that we consider this a preventable problem. We do believe, however, that the architects of the Eurozone did not anticipate the problem to take this form.

Figure 4: Real Effective Exchange Rates (IMF 2018)



Nominal interest rates converged before the crisis and remained so in the first ten years of the euro, but this trend was reversed in the euro crisis (IMF, 2018; see figures 5).

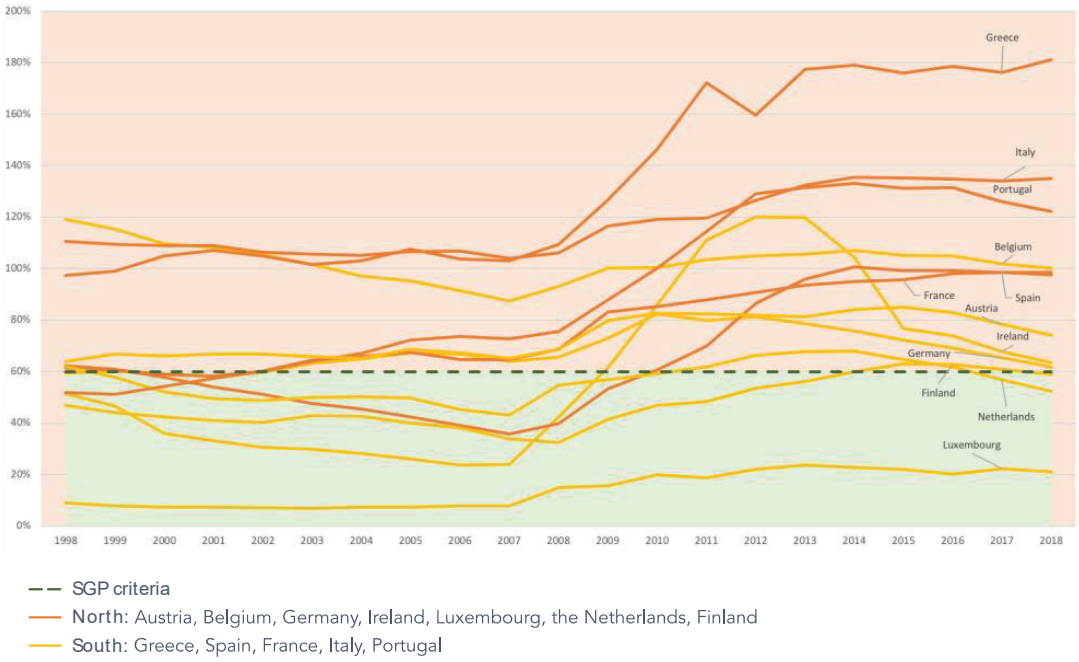
Figure 5: Con- and Diverging Interest Rates (IMF 2018)



As for debt sustainability, quite some countries approximately met the 60% debt threshold when the euro was introduced (see Figure 6). However, all debt levels rose

during the euro crisis, in most cases far beyond 60%, and divergence was and remains strong.[9]

Figure 6: Debt to GDP ratio (SFL 2020)



Debt continued to increase because the reference value of 3% of GDP for the deficit was breached 34 times between 1999 and 2007, including by France and Germany (Baldwin et al., 2015).[10]

[9] The Clemens Critique: Divergentie kan ontstaan door divergentie in (lange termijn verwachtingen van) inflatie en door divergentie in risicopremies. Mijn interpretatie van de literatuur is dat de divergentie in lange rentes voor het overgrote deel komt door risicopremies. Dat kun je niet oplossen met monetair beleid.
Our Reply: We agree with Clemens that this is the case. We made sure never to claim that this can be solved with monetary policy. Fact remains that in the Eurocrisis long term interest rates diverged. This is pretty much the only point we tried to make here.
[10] The Clemens Critique: Ook hier geldt of je dit moet zien als een probleem of als de normale werking van een aanpassingsmechanisme (of alternatief of dit een goed criterium is om nominale convergentie te meten).
Our Reply: We agree that in a currency union, the only adjustment mechanism for asymmetric shocks is the fiscal budget. Nevertheless, the SGP intended to impose discipline and force member states to converge, at least in the long run. The data here show that this is very doubtful as there is no reversion to the mean and debt ratios remain high and diverge.

From the above we conclude that the nominal convergence criteria that were set in the Maastricht Treaty, whether intentional or not, have not secured the same level of nominal convergence since the introduction of the Euro. Inflation differentials remained persistent and did not cause real appreciation in the countries that grew fast or were more advanced. Long term nominal interest rates remained converged up to the Great Financial Crisis and ensuing Eurocrisis, arguably because risk premia failed to price in the no bail-out clause before the crisis and overreacted in the Eurocrisis, whereas fiscal discipline and consolidation also failed to bring Eurocountries closer together. We now turn to the more important real convergence.

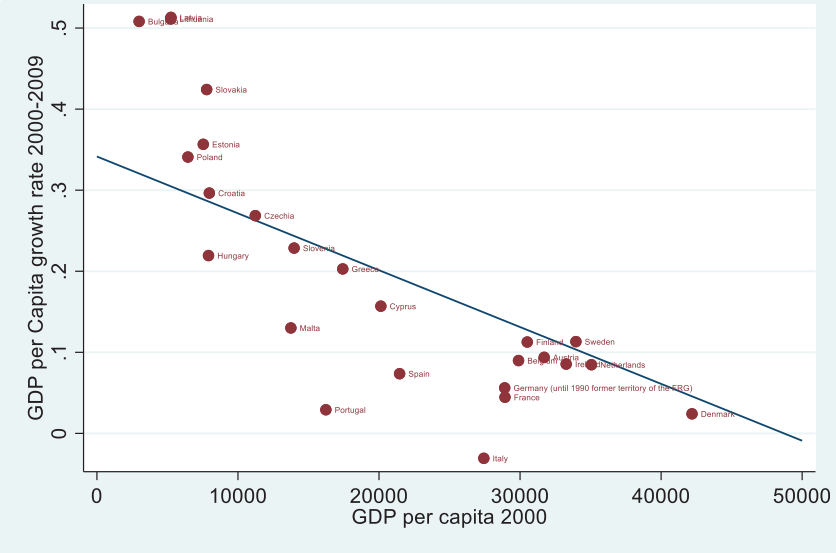
Real convergence in the euro zone[11]

Looking at real convergence, different patterns between the South and the East emerge. In terms of beta-convergence (countries with lower GDP per capita levels catching up with the higher-level countries), convergence before the Maastricht treaty among the original (twelve) euro countries (North and South) was strong (IMF, 2018). This trend slowed down between 1993 and 2015, while there was only little beta-convergence between North and South in the first decade of the Euro. The differences between countries are significant: while Greece experienced strong growth, Portugal and especially Italy lagged. Figures 7 and 8 below plot the average growth rate against the initial GDP per capita for Eurozone countries for the first and second decades after the introduction of the Euro. The plotted trendline represents the linear regression line when all countries are included. Both decades show overall evidence of beta-convergence among the euro countries. However, when we zoom in on the Southern Member states, the picture is much different. The trendline would still be somewhat

[11] The Clemens Critique: Ik vraag met af of je het stuk over nominale convergentie echt nodig hebt in je verhaal. Uiteindelijk ben je geïnteresseerd in real convergence. Een korte alinea waarin je stelt dat nominale convergentie om verschillende redenen niet perfect kan zijn in een monetaire unie (aanpassing, risicopremies) en dat nominale en reële convergentie niet 1-1 gekoppeld zijn, zou een goede en voldoende aanloop kunnen zijn.
Our Reply: We agree with Clemens that we could have skipped the data and elaborate discussion of why nominal convergence has failed to materialize, but we are not convinced this would be sufficient for the critical reader.

downward sloping in Figure 7 but now slopes up in Figure 8.[12] This clearly shows that especially the Southern Member states not only failed to converge but started to diverge in and after the euro crisis.

Figure 7: Beta-Convergence 2000-2009



[12] The Clemens Critique: Ik vind het lastig om de boodschappen uit de verschillende grafieken te halen. Ook de eenheid op de verticale as is wat onduidelijk. Deze grafiek suggereert sterk dat er geen lineair maar een kwadratisch verband was in deze periode, met redelijk gelijke groei in de oude lidstaten en hogere groei in de nieuwe (Oosten).
Our Reply: We agree with Clemens that it takes some effort to see the different stories for South and East Europe. We do not agree that the relationship is quadratic. If one considers the Eastern Member states, they are arguably on a steeper line then the south, as we argue in the text, reflecting stronger convergence in 2000-2009 and still some convergence in 2009-2019. Only looking at the Southern Member states, we see the trendline go from negative to positive. These scatterplots do not show a causal link. Beta-convergence refers to the beta coefficient of the regression of average growth on initial GDP per capita, so a quadratic specification makes little sense.

Figure 8: Beta-Convergence 2009-2019[13]

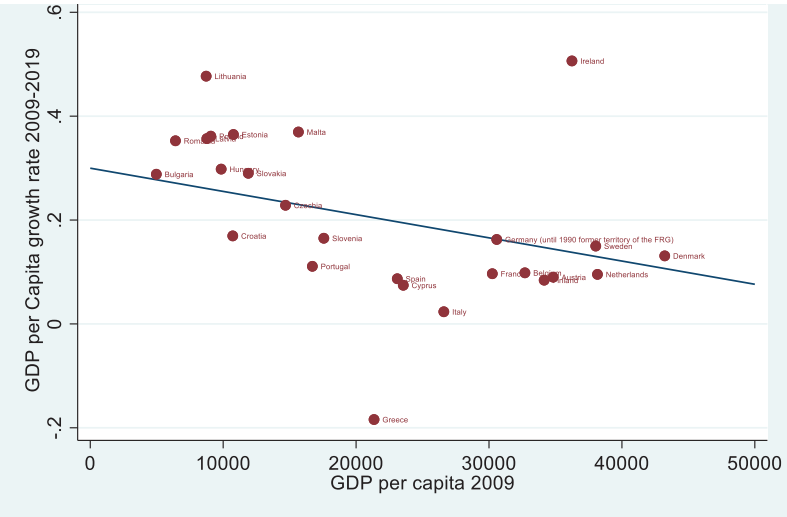
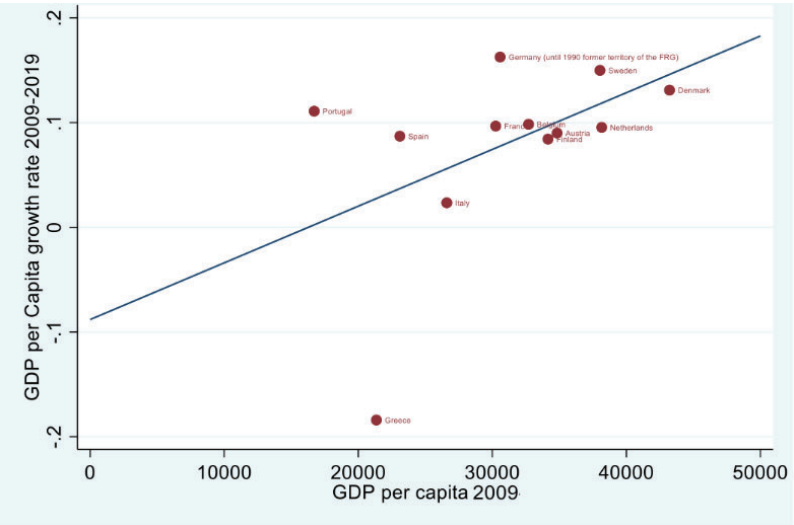


Figure 9: Beta-Convergence 2009-2019[14]

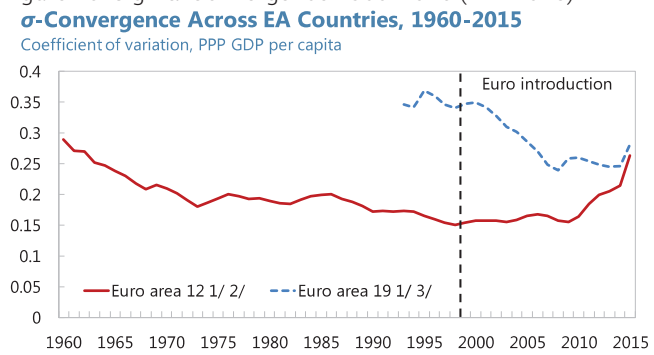


[13] The Clemens Critique: Ook hier kun je je afvragen of de lineaire lijn wel de goede boodschap geeft. Ierland en Griekenland zijn sowieso outliers.
Our Reply: Ireland and Greece are Eurozone countries. We do not think they are "outliers" because the measurements were incorrect. They are not typical countries, for sure, but you cannot drop observations because they do not fit a regression line. Taking them into account and estimating the sample average relationship between growth and initial level, we obtain the beta-coefficient. This is a linear line. The dots make it possible for the reader to critically assess our interpretation of the results, which are not much stronger than that the lines suggest a switch from con- to divergence in the South and continued but weaker convergence in the East. We believe that this conclusion survives eliminating Greece and Ireland.
[14] The Clemens Critique: Waarom hier 2008-19 ipv 2009-19 zoals in de vorige? Waar is Ierland nu? Als je Ierland en Griekenland eruit haalt, wordt de lijn denk ik vrijwel horizontaal.
Our reply: All figures are 2009-2019. We adjusted the text. Dropping Ireland and Greece would not make the line horizontal in Figure 8. Figure 9 gives the datapoints for only the Southern Member States and also without Greece the line would slope up.

However, compared to the rest of the EU, beta-convergence among the euro area members was significantly higher than between the EU countries in the period 1992 and 2015 (IMF, 2018).[15]

In the decades before the introduction of the euro, sigma-convergence (declining dispersion of GDP per capita levels) across the EU was visible, implying convergence of absolute income levels over time. For the original euro area countries, sigma-convergence after Maastricht slowed down and eventually stalled (IMF, 2018; see Figure 10).

Figure 10: Sigma-Convergence 1960-2015 (IMF 2018)



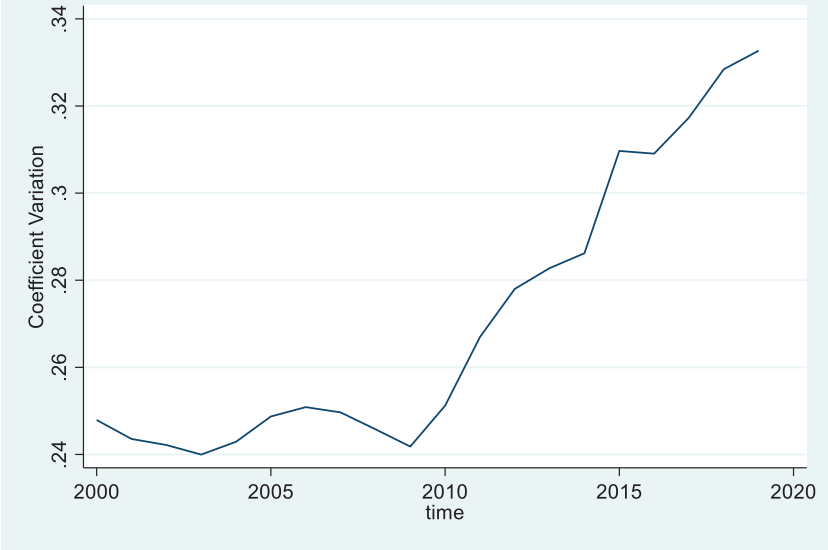
Sources: WEO database and IMF staff calculations.
1/ Excludes Luxembourg.
2/ Includes Ireland from 1970 and the Netherlands from 1980 onwards.
3/ Includes Lithuania from 1995 onwards.

The euro crisis reversed the convergence trend and caused diverging income levels among the Eurozone countries, notably between the North and the South. In Figure 11

[15] The Clemens Critique: Mijn take-away (uit jouw grafieken en andere literatuur) is dat de groei in de oude lidstaten nauwelijks samenhangt met initieel inkomensniveau (dus geen convergentie), en dat de groei in de nieuwe lidstaten hoger ligt (dus wel convergentie). Wat je hier niet ziet, is dat die hogere groeivoeten maar heel langzaam tot convergentie van inkomensniveaus leidt (hoge groei op laag inkomen loopt maar heel langzaam in op lage groei van hoog inkomen). Een tweede punt (ook voor de volgende sigma convergentie) is of je bij convergentie moet kijken naar GDP per capita of moet corrigeren voor verschillen in prijsniveaus (PPPadjusted GDP).
Our Reply: We agree that this should ideally be corrected for purchasing power parity but given what we know about prices (another reason to leave them in), we know that inflation differentials were small, persistent and positive, such that over time the purchasing power of the South would be eroded. In other words, the trends shown here are optimistic estimates of the real convergence. Clemens is of course correct that the core shows little convergence. As was shown in our toy-model, this is to be expected when countries are close to the steady state and shocks and productivity growth drive the dynamics between countries. We agree that the South and East converge, at least directly after introduction of the euro and the east continues to do so, while the South stops converging.

we show the trend in Sigma-convergence between North and South and for 2000-2019. The figure shows the clear upward trend in the coefficient of variation after 2009, when the euro crisis started to unfold.[16]

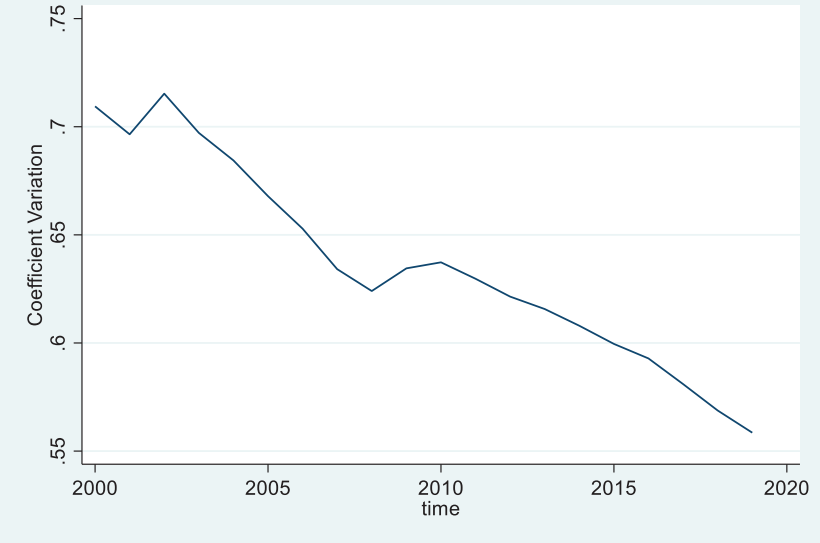
Figure 11: Sigma-Convergence North-South 2000-2019



In contracts, in Figure 12, we see the continued decline in the coefficient of variation between North and East, where the trend is consistently negative, with only a small blip when the euro crisis erupted.

[16] The Clemens Critique: Het zou wel nuttig zijn om een benchmark te hebben om het niveau te interpreteren. Is 0.25 hoog/laag ivm sigma convergentie binnen landen (VS, Duitsland, Spanje met een federale structuur)? In bovenstaande grafiek wordt weer weel PPP adj GDP gebruikt als ik het goed begrijp.
Our Reply: Indeed, we do not adjust for PPP and we focus in the figures on the trend, not the level, as it is hard to interpret what would be an appropriate benchmark for the Eurozone. Also, if we provided the levels for the USA, Germany or Spain, this would provide a very different benchmark. We therefore decided to focus on the trends only.

Figure 12: Sigma-Convergence North-East 2000-2019



Cyclical convergence in the euro zone

With respect to cyclical convergence, EMU countries have converged in the past two decades. While the business cycles of the future euro countries were already highly synchronized before the euro was introduced, this trend further increased after 1999 until the euro crisis (IMF, 2018, see Figure 13). During the euro crisis, the trend of cyclical convergence persisted.

Figure 13: Cyclical Convergence (IMF 2018)

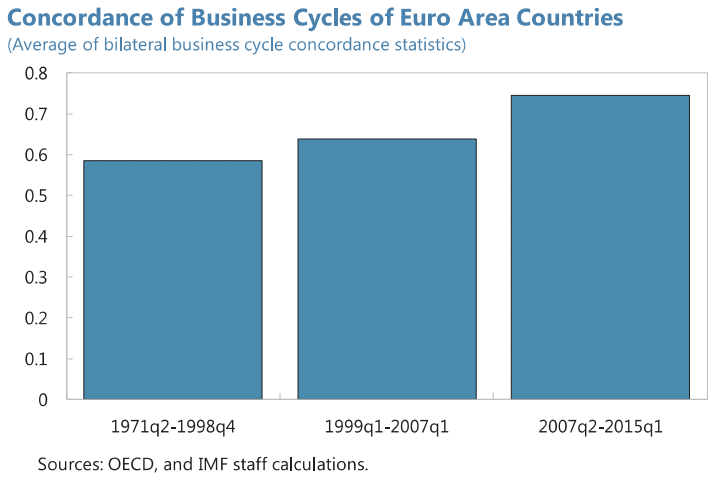
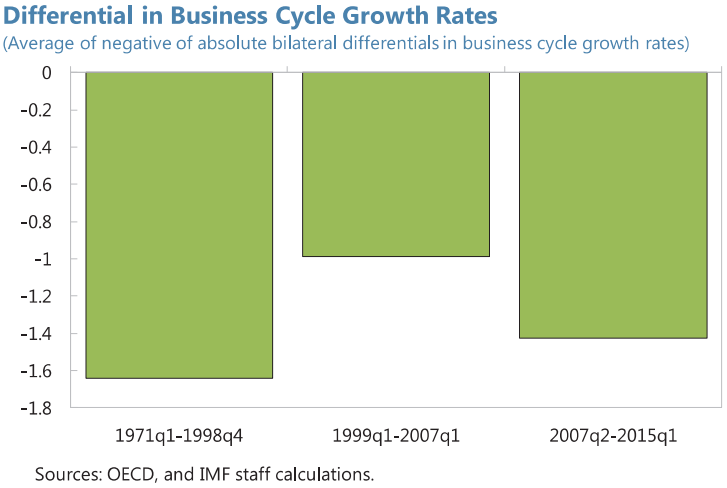
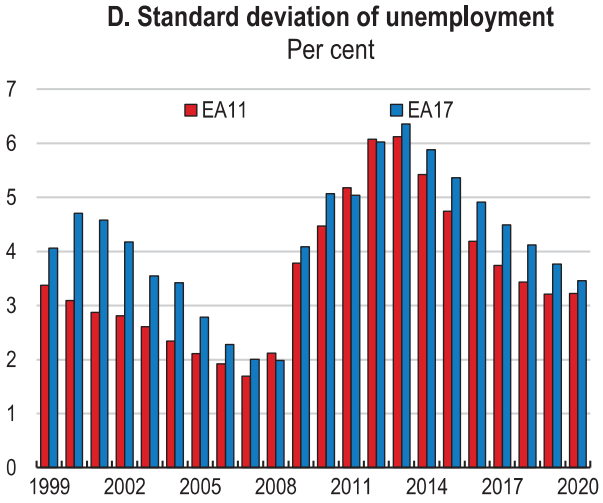


Figure 14: Cyclical Convergence (IMF 2018)



This is most likely because all euro members were hit by economic downturn and adopted a contractionary fiscal stance, deepening the recession. While business cycle convergence increased in the past three decades, the amplitudes of the business cycles in the euro countries show a different trend. Figure 14 displays that the reduction in differentials in business cycle growth rates of the first decade of the euro was reversed after the euro crisis hit.

Figure 15: Cyclical convergence (OECD 2021)



The consecutive business cycle convergence and divergence corresponds to unemployment patterns across the euro zone. Whilst unemployment levels converged in the first decade of the euro, they sharply diverged at the start of the euro crisis, impacting countries asymmetrically (Gori, 2021; see Figure 15). Since 2015, unemployment levels have started to converge again.[17]

Finally, financial cycle convergence shows a different pattern than business cycle convergence in the euro zone. The concordance of financial cycles decreased in the decade before the euro crisis. More precisely, Spain, Ireland, and Greece "experienced financial cycles of increasing duration and magnitude after euro introduction, in sharp contrast to core euro area countries, as cross-border bank flows from core country banks to the private (Spain, Ireland) and public (Greece) sectors boomed" (IMF, 2018). These differences in financial cycles (i.e., cheap credit flowing from the North to the South) was a major contributor to the euro crisis.[18] [19] We can conclude here that the euro has not hindered the cyclical convergence in the euro zone, but also has not prevented the backsliding that occurred when the euro was seriously tested. We conclude that the euro zone would benefit from cyclical convergence, as this reduces the need for adjustment and risk of asymmetric shocks. But to date, the EMU lacks the tools to ensure that gains in this respect are also robust.

What about productivity?

Productivity is an important driver of real convergence (ECB, 2017), and in fact, as we have seen in our toy model, the only driver that remains as countries approach their

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[17] The Clemens Critique: Er is behoorlijk wat extra literatuur over BC convergence/synchronization
Our Reply: Yes, we agree. But we believe this is sufficient for now. We are very open to your suggestions.
[18] The Clemens Critique: Wel erg kort door de bocht, Zeker een van de factoren.
Our Reply: We have adjusted the text to be less direct.
[19] This explanation of the euro crisis is broadly supported. See for example the "consensus narrative" https://voxeu.org/epubs/cepr-reports/rebooting-eurozone-step-1-agreeing-crisis-narrative and Stockhammer and Mohib Ali (2018), stating: "But since 1996 financial flows become more important as they were driven by property prices and stock prices. Overall, the picture that emerges is that real unit labour costs played a secondary role and the external imbalances in Eurozone arose as a consequence of strong domestic demand, spurred by credit boom in the South fuelled by the flow of private capital from the North and Anglo-Saxon countries."

steady state. In the past twenty years, productivity growth has been sluggish. Recently, productivity growth has been around 1% per year in the EU.[20]

Significantly, the introduction of the euro did not lead to a productivity catch-up; the Total Factor Productivity (TFP) growth of countries with low initial productivity levels was lower than that of countries starting with high initial productivity and also stalled more sharply since the euro crisis (IMF, 2018; see Figure 16).

Figure 16: Sluggish Productivity Growth (IMF 2018)

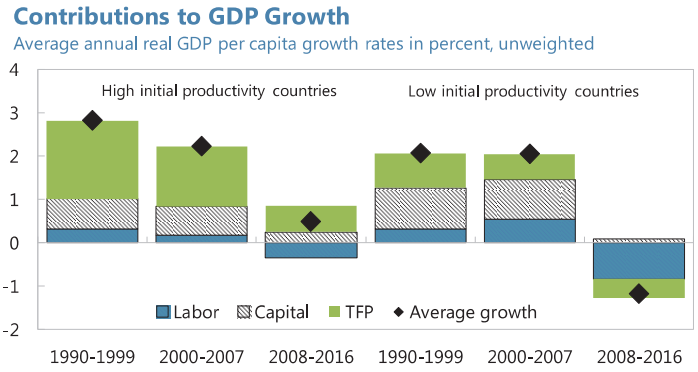
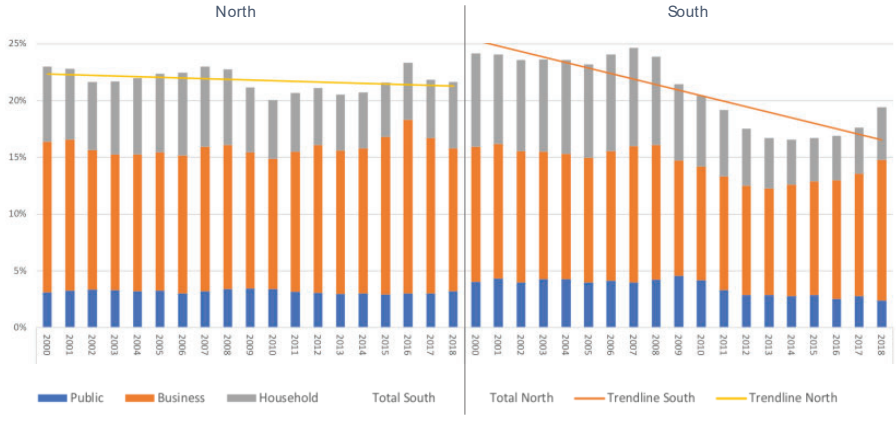


Figure 17: Investment in Europe (% of GDP, SFL 2020)



North: Austria, Belgium, Germany, Ireland, Luxembourg, the Netherlands, Finland
South: Greece, Spain, France, Italy, Portugal

[20] https://publications.jrc.ec.europa.eu/repository/handle/JRC119785

The fall of productivity during the euro crisis of the Southern countries corresponded to rising unemployment and a sharp decrease in investments, mainly on the public and household level as visible in Figure 17.

One way of explaining the stalled productivity growth in these countries is the so-called "non-convergence trap", which states that "if an economy does not progress from growth driven by accumulation of capital to growth led by innovation, then it stops converging towards the technology frontier" (ECB, 2017).

Understanding divergence in the EMU21

Real convergence as discussed in the above builds on our toy model that predicts that regional disparities tend to decline in a process of market-driven convergence to a common technological frontier. There is also a different perspective on convergence, which argues that regional differences are likely to increase as the euro zone integrates its markets. This is explained by a positive feedback loop between a region's growth and the competitiveness of its export sector. Alexiadis (2019) explains this process as: "The mechanism by which the circular process of cumulative causation operates is captured in the relation between employment and output growth, known as Verdoorn's Law (Verdoorn, 1949) […] Although workers move out of regions where employment opportunities are poor and move into regions where employment opportunities are good and wages are higher, there is now recognition that the consequences over the long-run are likely to be harmful to the origin regions. This is because migration tends to be age and skill selective with younger and more skilled or educated workers exhibiting greater mobility, thereby diminishing workforce quality in the origin region and making it less attractive to potential employers. Likewise, capital will flow into successful regions." Now that such arguments have also been raised to explain the rise of reactionary, populist right-wing politicians in

[21] The Clemens Critique: Volgens mij begint hier pas het punt dat je wil maken. Best wel heel laat in het paper en niet per se logisch vanuit de eerste 10 pagina's.
Our Reply: The paper is not making only one point. But we agree that here an important point follows from what went before.

especially the East, a European industrial policy, as proposed recently by Draghi, needs to carefully balance the need to boost productivity growth in Europe as a whole and ensure convergence among Europe's Member states to deliver on the promise of "Maastricht".

The fact that the decades following the introduction of a common currency did not bring real convergence across the Union, is, contrary to Northern preconceptions, not due to a lack of discipline or resolve in the Southern and Eastern Member States to abide by the rules or implement reforms. For example, Italy almost completely adopted the German labor market model in a series of reforms since the 1990s. Even more significant is the fact that Italy has displayed primary surpluses since 1992 with only two exceptions (2009 and 2010, at the start of the financial crisis; Beun, 2022). In a compelling article, Notermans and Piattoni (2021) contest the view that microeconomic reforms determine macroeconomic performance in a comparative study of Germany and Italy before and after euro implementation. They conclude that Italy suffered from a self-fulling prophecy dating back to their high debt legacy from the 1970s, which meant that a lack of trust of financial markets drove up interest rates and triggered the doom-loops that countries like Germany and the Netherlands could more easily avoid. At the same time, imbalances in the EMU, with productive Northern Member States achieving real depreciations with wage moderation and high domestic savings, hindered Italy to structurally strengthen its productivity and economy. The euro forced Italy to tackle current account imbalances with austerity and internal devaluations, depressing growth. Because of the practically unhindered export-oriented model of core countries such Germany and the Netherlands, Italy's productivity growth and thus real convergence remained vulnerable.

Fostering real convergence

As demonstrated in the above, the Maastricht promise of convergence has been only partially fulfilled. While the East experienced strong real convergence in the first decade of the euro, this trend slowed down in the second decade. Real convergence between North and South during the first ten years of the euro was weak, while there

was divergence after the euro crisis started. The euro did not foster or force a productivity growth catch-up, and the Southern countries experienced decreased investments in the second decade of the euro. Nominal convergence criteria did not bring about real convergence, and it has been argued that the stringent fiscal rules and targets during the euro crisis led to untimely fiscal contraction. What remains is the conclusion that the euro has survived and by now has forced also the frontier countries to stop and reconsider. Sharing a currency implies sharing more than bills and a central bank. Asymmetric shocks continue to have a destabilizing effect that can affect all, whereas symmetric shocks have shown that a coordinated policy response is stronger than a single monetary policy alone. And while the reformed economic governance framework contains small improvements, a narrow focus on debt sustainability remains, limiting the fiscal room that countries need to make the investments to fulfil the goals of the Green Deal and new EU objectives.

The way forward towards a European investment agenda

In July 2020 the European Council agreed on a pan-European Covid Recovery Fund ("Next Generation EU") of 650bn linked to economic reforms. Centre piece of this temporary recovery instrument is the Recovery and Resilience Facility (RRF). Through this Facility, the European Commission raises funds by borrowing on the capital markets (issuing bonds on behalf of the EU). These funds are then made available in grants (359bn) and loans (291bn) to the EU member states in order to implement ambitious reforms and investments that a) make their economies and societies more sustainable, resilient and prepared for the green and digital transitions, and b) address the challenges identified in country-specific recommendations under the European Semester framework of economic and social policy coordination.

The corona crisis (2020-2021) was followed by a new crisis caused by Russia's invasion of Ukraine in February 2022. EU sanctions against Russia drastically limited the imports of cheap gas from Russia, thereby damaging European competitiveness. And the competitiveness of Europe had already been under pressure because China and the US have been making substantially higher investments in new innovative

technologies during the past decade. Furthermore, after the inauguration of President Trump in January 2025 and his policy of imposing trade tariffs, European competitiveness received another blow, further underscoring the need for investments to foster the strategic autonomy of Europe.

In September 2024 the European Commission published the report "The Future of European Competitiveness". This report was prepared under the leadership of Mario Draghi, former President of the ECB. The report stipulates a need for a massive private and public investment, amounting to an additional 800bn *per year*, to enhance the competitiveness of the EU's economy. A substantial part of this amount should come from private investors, although some joint funding with the public sector of breakthrough innovation will be necessary.

Like the Covid Recovery Fund, it may be preferable to arrange the financing of investments in sustainable energy, digitalization and competitiveness, cross-border grids, and defense at the EU level. However, the Covid Recovery Fund implied financing at the EU level but investments made at the national level of EU member states. For several of the new challenges, this may also require careful consideration.

For strategic industries in Europe, the Draghi report advocates a coordinated EU strategy to bolster domestic production capacity and to protect key network structures. According to Draghi, there is a risk that a fragmented approach leads to weak coordination of priorities and demand requirements and lack of scale for domestic producers. To put this more bluntly, if we want to leverage the size of the EU domestic market and capitalize on economies of scale and scope, we must allow for agglomeration, clustering and, therefore, possibly divergence. A centralized EU budgetary allocation, provided it is well designed, could address these issues. In the case of pure public goods for the EU, such as a common defense and border security, a centralized allocation makes even more sense.

Such a centralized EU budgetary allocation would imply that not only the financing, but also the investment allocation decisions are taken at the EU level. An institution

such as the European Investment Bank (EIB), which has been active since 1977, could then play an important role in the implementation of the Draghi investment agenda for Europe.

The preceding would mean that the procedure underlying the Covid Recovery Fund, financing at the EU level but investments made at the national level, should not be repeated. In a rather critical report, published in May 2025, the European Court of Auditors highlighted significant problems in terms of performance, accountability and transparency of spending under the Covid Recovery Fund. But more importantly, such an allocation through national member state budgets inevitably creates political pressure to distribute the funds "fairly" across all member states. The challenges for 2025-2050, however, dictate that we optimize our capital allocation for the Union as a whole.

An important aspect of the Draghi investment agenda is strengthening the productivity growth in the EU, including in member states that are lagging, thereby fostering real convergence. Improving the quality of institutions and governance in countries can also help to make productivity growth sustainable. But that goal is not achieved by treating very different regions equally.

In terms of EU policy, a European industrial strategy focused on productivity growth enhancing investments largely implemented by the EIB, and reforms compatible with the Green Deal's goals in weaker regions could lead the way. The latter would help to reshore European value chains in a more balanced equitable way across the EU. Fiscal policy, both in terms of rules and coordination, can help to create the right circumstances for successful industrial and investment policies. It is time to accept that Europe faces more common than national challenges and should start to behave as one to address them.

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