The Euro at 20:
Successes, Problems, Progress and Threats

Karl Whelan[1]

University College Dublin

Paper for Presentation at the 16th EUROFRAME Conference at ESRI, Dublin

June 2019

Abstract: The euro has had a difficult second decade but the project has still had some important successes. The common currency is popular among the euro area's citizens, intra-European exchange rate instability has been removed and the ECB has successfully achieved its primary goal of price stability. The single currency's popularity has made the euro more resilient than many sceptics thought possible twenty years ago. A number of improvements to the architecture of EMU have been implemented in the past decade but serious tensions remain, relating to fiscal capacity, sovereign default and financial stability. To keep the euro together, Europe's politicians need to make the euro area less crisis-prone and to make it easier for member states to recover from the inevitable cyclical downturns that will happen in the future. The past few years have seen many proposals put forward for future improvements to the economic policy structure underlying the euro. Keeping the euro together may depend on Europe's politicians agreeing to implement them.

[1] karl.whelan@ucd.ie

1. Introduction

In November 2008, the ECB hosted a conference on the "The Euro at Ten" that, even as the global financial crisis was underway, focused mainly on self-congratulation among the ECB officials and eminent European economists about how successful the euro had been.[2] The celebrations to commemorate the Euro's 20th birthday appear thus far to be somewhat more restrained, reflecting a tough second decade for the common currency. This past ten years have exposed many of the structural weaknesses that critics of the euro prior to Economic and Monetary Union (EMU) had suggested would affect the single currency area as well as some a number of other important weaknesses that were largely overlooked prior to the introduction of the euro.

This paper reflects on the first twenty years of the euro project and considers its future. The paper first discusses the successes associated with the euro project. Despite the difficulties of the past decade, these successes are considerable. The ECB has successfully achieved its primary goal of price stability and the common currency has facilitated a series of improvements such as savings on exchanging currencies and the elimination of intra-euro exchange rate fluctuations, a more efficient payments systems and greater integration of euro area financial markets. Most importantly, the common currency is popular among the euro area's citizens.

Despite these successes, the euro remains a work in progress and is still likely to face existential threats in the future. The rest of the paper focuses on the economic problems that have affected the euro area, on progress made (and not made) since the euro crisis of 2010-12 and finally considers the resilience of the euro project and the future challenges it is likely to face.

[2] See ECB (2009).

2. Successes

The legal and organisational infrastructure underlying the European Central Bank stems from the Maastricht Treaty which was signed in February 1992. Its signing followed a long period in which many EU member states were unhappy with monetary policy outcomes, with inflation being higher than desired in many countries and exchange rate stability proving elusive under the European Monetary System (EMS) which aimed to keep currencies within pre-specified bands.

One can point to two areas of the academic macroeconomics literature that inspired the perceived need for a common monetary policy and the subsequent design of the Eurosystem. The first was the literature on exchange rate crises. The second was the literature on credibility and time-consistency.

The period after the introduction of the EMS in 1979 ran parallel with the economics profession developing sophisticated models of how current account imbalances could lead to exchange rate crises with key contributions including Krugman (1979), Flood and Garber (1984) and Obstfeld (1986). Fiscal and monetary policies that produced current account deficits would lead to the erosion of official foreign currency reserves. Eventually, investors would anticipate a state running out of foreign exchange and thus being unable to defend its fixed exchange rate. This would lead to a self-fulfilling run in which investors would sell the currency and force a devaluation. The history of the EMS, which was subject to regular crises and realignments, fitted well with the predictions of these models.

In fact, the signing of the Treaty was immediately followed by the most disruptive of all the crises to hit the EMS. With tensions driven by macroeconomic events in Germany that followed unification, the UK exited from the EMS's Exchange Rate Mechanism in September 1992 after a speculative attack, which reportedly made over one billion dollars for George Soros. The subsequent months saw most other EMS members also devalue against the Deutsche Mark and a significant widening of the bands within which the currencies of the continuing members could fluctuate.

Viewed from today's perspective, the EMS crisis of 1992-1993 could be viewed as a sign that large asymmetric shocks were always likely to prevent EMU from being a successful project. However, for many European leaders and academics, the events of this period strengthened the arguments for monetary union. The years prior to this crisis had seen a significant easing of restrictions on capital movements as well as financial deregulation. The large capital flows associated with sterling crisis of 1992 convinced many that the self-fulfilling speculative crises outlined in the academic models were going to be ever more virulent and make a system of quasi-fixed exchange rates impossible to operate.

Once Europe's politicians decided to adopt a common currency, the design of the European Central Bank also reflected the academic thinking of the 1980s and 1990s, in particular the literature on inflation expectations and time consistency. The disappointing macroeconomic performance of many countries during the 1970s, which often featured the "stagflation" combination of high unemployment and high inflation, led to an increased emphasis on the need for central banks to focus on managing the public's expectations about policy and on the advantages gained from central banks committing to a low-inflation policy and being given independence from political control. The advantages of committing to a policy of low inflation, rather than continuously setting policy in a discretionary manner, can be found in many famous papers from the era prior to the signing of the Maastricht Treaty, such as Kydland and Prescott (1977) and Barro and Gordon (1983). By the 1990s, these ideas were having a dramatic effect on monetary policy institutions around the world as that decade saw a number of central banks adopt explicit inflation targeting regimes and others, such as the Bank of England, be given far greater independence from political control.

The ECB's mandate reflects the thinking of this time. The ECB is a highly independent central bank with various restrictions in place that prevent politicians from influencing the monetary policy decisions of its Governing Council. The ECB also has one primary goal which is the maintenance of price stability. All other economic goals are only to be pursued provided the primary goal of price stability is not endangered.

A common monetary policy implemented by a highly credible central bank was an attractive proposition for many European countries that had previously had poor inflation records. The design of the EMS reflected the desire of these countries to "shadow" the Deutsche mark and "import" the monetary policy and inflation performance generated by Germany's Bundesbank. But this structure was often unstable and, importantly, it did not allow countries outside Germany to have a say in setting policy interest rates.

Given its mandate (and how it interprets that mandate) the European Central Bank has been a successful organisation. Its management of the euro area economy has produced a period of subdued inflation, with the average inflation rate (as measured by the HICP) since January 2000 being 1.75 percent, which comes in close to the ECB's own definition of price stability as "close to but below two percent". This success was by no means pre-ordained. Despite its Bundesbank-like legal structures, some would have feared that an ECB Governing Council comprised of representatives from several countries, many of which had records of high inflation, would struggle to match the Bundesbank's inflation record. In fact, the ECB has improved upon it.

Figure 1: Euro Area Consumer Price Inflation

One can quibble a little with this success. For example, the ECB has been lucky to have operated during a period where various global trends have contributed to a low inflation environment across the world. One could also point out that in recent years, inflation in the euro area has tended to fall short of the ECB's own definition of price stability: Average HICP inflation since January 2010 has been only 1.35 percent. But the fact remains that the ECB has delivered a high degree of price stability for millions of Europeans, many of whom were previously used to substantially higher average inflation rates.

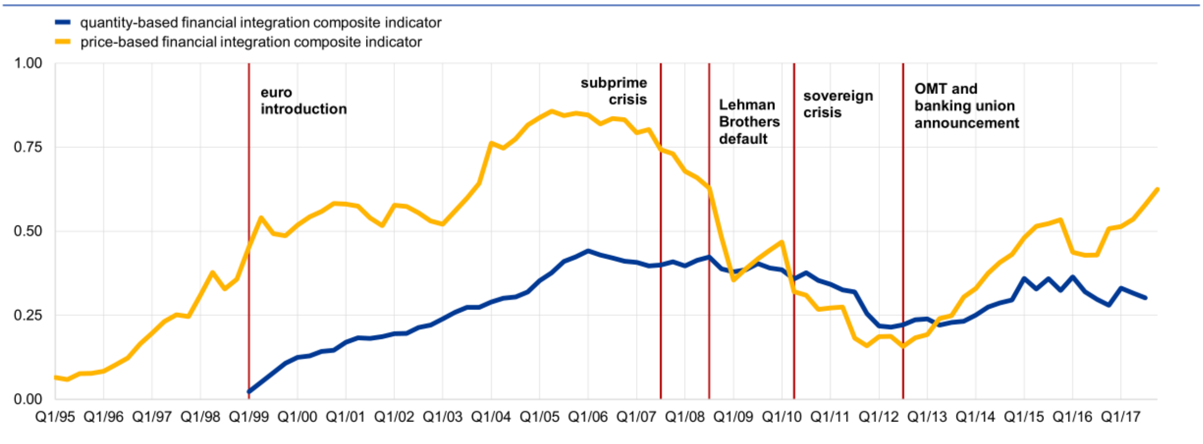
The ECB has also generally performed well in the communication of its policies to financial markets and the wider public. Governing Council press conferences have generally been handled well, particularly under the leadership of President Mario Draghi. Communications in various forms, including speeches of executive board members and other publications are generally of a high quality, backed by a large highly-qualified staff of professional economists.

In addition to the benefits of low inflation, the existence of the common currency has removed exchange rate fluctuations between euro area member states as a factor that firms and consumers in the euro area have had to deal with. The changeover to euro area notes and coins in 2002 went smoothly and the common currency has saved consumers from not having to exchange their local currencies when travelling abroad or buying goods from other European countries. That said, it appears that pre-EMU arguments that the euro would provide a significant boost to intra-European trade have not been confirmed.[3]

In the area of financial markets and banking, the single currency has facilitated efficiencies in payments systems, most notably via the real time settlement of large transactions via the TARGET system operated by the Eurosystem. The common currency also played a role in forging increased financial integration during the early years of the euro but these patterns were reversed during the financial crisis and subsequent euro crisis. Figure 2 shows two measures of financial integration published by the ECB. The yellow line is a price-based indicator based on differences across countries in pricing in money markets, bond markets, equity markets and the banking sector while the blue line is a quantity-based indicator based on the extent of cross-border holdings of bank loans, bonds and equity by banks and investment funds.

At first, monetary union effectively removed the perceived devaluation risk for investors in countries such as Germany when making investments in euro area countries that had previously been known for devaluing their currencies in the EMS era. This had a significant effect on cross-border capital flows as investors became more willing to purchase financial assets in "peripheral" euro area countries and banks became more interested in opening branches in other euro area member states. This was reflected in significant increases in the ECB's measures of financial integration. From 2008 onwards, increased concerns about default risk in peripheral economies and, subsequently, concerns that these countries might exit the euro and re-issue their own weaker currency, led to a reversal of this pattern of financial integration. As the euro crisis has eased in recent years, financial integration has increased again but still remains short of the levels that prevailed just prior to the global financial crisis.

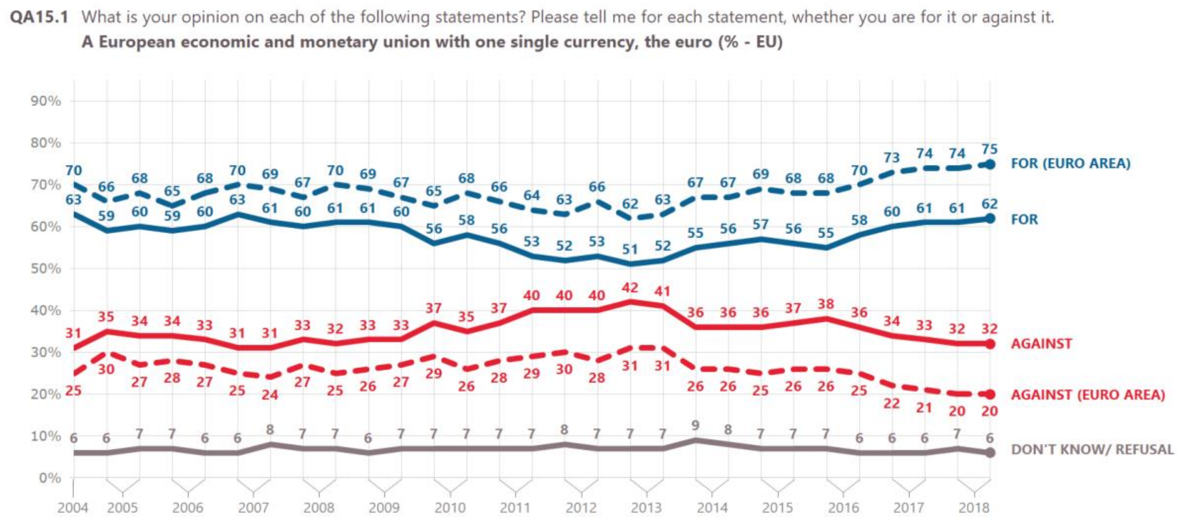
Figure 2: ECB Measures of Financial Integration



[3] See Glick and Rose (2016)

Finally, and perhaps most importantly, the best indicator of the euro's success is that the common currency is popular with the euro area's citizens. The most recent Eurobarometer survey, from November 2019, shows that 75 percent of euro area citizens are in favour of "*a European economic and monetary union with one single currency, the euro*" – an all-time high for this measure.[4] This means the euro is more popular than any government in Europe. Even acknowledging the problems of the past decade, I suspect the founders of EMU would be very happy to see the common currency being held in such high regard by the public after twenty years.

Figure 3: Public Support for European Economic and Monetary Union



Source: European Commission Standard Eurobarometer Survey, Autumn 2018

[4] The survey results are available at http://ec.europa.eu/COMMFrontOffice/publicopinion/index.cfm

3. Problems

Despite the successes just noted, the second decade of the euro has illustrated a number of serious difficulties with running a common monetary and exchange rate policy across a wide range of countries. Some of these difficulties were widely anticipated by pre-1999 critics of EMU, others were not.

3.1. Fiscal Policy and Slow Macroeconomic Adjustment

Perhaps the most predictable failure of the euro has related to the use of fiscal policy.

As documented by Jonung and Drea (2010), during the 1990s. the debate about EMU tended to divide between European economists who, by and large, viewed the EMU project positively and U.S. economists, many of whom were sceptical. American sceptics of the euro established a strong case that the new currency union did not satisfy the criteria for being an optimum currency area. Critics such as Feldstein (1992) pointed out that the euro area would not have a substantial federal budget to allow centralised transfers and taxes to ease the burden of asymmetric shocks. Others, such as Christopher Sims (1999) worried about the "precarious fiscal foundations of EMU" with concerns that excessive debts accumulated by member states could endanger price stability.

In relation to the latter point, the "founding fathers" of EMU were also concerned about the influence of fiscal debt on the euro. The Maastricht treaty contained a number of articles that were aimed at minimising the impact on price stability of fiscal problems. An article known as the "no bailout" clause was widely described as preventing countries from assisting other member states with sovereign debt problems and the ECB was prevented from engaging in "monetary financing" via direct purchases of sovereign bonds. As it turns out, the no bailout clause didn't prevent bailouts and the monetary financing clause did not prevent the ECB from purchasing sovereign bonds, so these articles were of questionable effectiveness.

That said, the main instrument through which the euro's founders believed they would control fiscal debt was the Stability and Growth Pact (SGP). Unfortunately, the early years of the common currency showed the pact was unlikely to be successful. In 2003, the Commission assessed both Germany and France to be in violation of the SGP and recommended to the Economic and Financial Affairs Council (ECOFIN) that prescriptive steps be required for these countries under the excessive deficit procedure. The politicians on the ECOFIN committee declined to follow the Commission's recommendations. With the euro area's leading economies unwilling to comply with the terms of the SGP, the pact was violated almost as often as honoured by euro area member states in the following years.

The fiscal rules have been revised in recent years but the increased complexity brought by these revisions has not obviously done much to improve their effectiveness and the rules are probably not held in much higher esteem today by economists or politicians than they were in 2002, when the then European Commission President, Romano Prodi, labelled the rules "stupid" and "rigid".

Even if the SGP had worked successfully during its first decade to contain deficits and produce lower debt-GDP ratios on the eve of the global financial crisis, it is unlikely that rules of this sort would have countered the basic problem that euro area countries lack the macroeconomic adjustment tools to respond adequately to large negative shocks that have particularly acute effects on their country.

It may have been hoped that countries in EMU would manage their national budgets carefully during expansions so they would have sufficient “fiscal space” to counter-cyclical fiscal policy to make up for the absence of a national interest rate instrument or an adjustable exchange rate. In practice, even countries that entered the global financial crisis with apparently strong public finances, such as Ireland and Spain, where unable to use active fiscal policy to counteract the large country-specific shocks. In fact, in these economies as well as Greece, Portugal and others, fiscal policy has effectively been pro-cyclical throughout the past decade. With fiscal multipliers in most of the euro area’s smaller countries being small, even if some of these states had been able to run independent expansionary fiscal policies during the crises, they would perhaps have less effect than a co-ordinated euro-area-wide fiscal expansion that could boost demand across the whole area.

With only the ECB’s monetary policy to provide stimulus and no independent exchange rate, the adjustments of many euro area economies to the large shocks of 2008-2010 have been extremely slow when compared with the recoveries from crises seen in other countries that can use all available macroeconomic policy tools, including a national monetary policy and an exchange rate than can be devalued.

One way to examine the slow path of adjustment is to look at current account balances. The global recession and change in financial market conditions in 2008 left public and private sectors in peripheral euro area countries in precarious positions, requiring improvements in both public and private sector balances. Traditionally, public sector balance can be achieved via fiscal adjustment but private sector balances can be improved via devaluation of the exchange rate. For example, in the East Asian crises of the late 1990s, current account balances swung rapidly from deficit to surplus, accompanied by large devaluations. In contrast, as Figure 4 shows, the gradual return of current accounts to balance in Greece, Italy, Spain and Portugal took about a decade, with the domestic economy being squeezed by fiscal austerity and pressure on domestic costs throughout this period.

The slow pace of adjustment from the crisis – and the huge long-term human costs associated with this adjustment – can also be illustrated by examining the unemployment rates in euro area countries affected by debt crises. It has taken a decade for the unemployment rates in Portugal and Ireland to return to close to their pre-crisis levels of unemployment. Unemployment in Spain and Greece still remains well above the levels seen prior to 2008.

This pattern of slow adjustment to large shocks reflects the absence of an independent exchange rate, which would almost certainly have been devalued during a major crisis if these countries were outside the euro. However, it also reflects the fact that the ECB continued to provide funding to banks in these countries when private investors were withdrawing funds. In the absence of the ECB’s full allotment policy on credit provision, these countries would likely have experienced shorter but sharper crisis in response to the "sudden stop" in capital flows. This would have meant a faster decline in current account deficits and steeper initial rises in unemployment but also would likely have meant a quicker recovery.

One can debate which of these options works better but it is questionable whether the countries that suffered most from the euro crisis are prepared to suffer another "lost decade" should another large recession occur in the next few years.

Figure 4: Current Account Deficits as a Share of GDP in Selected Euro Area Countries

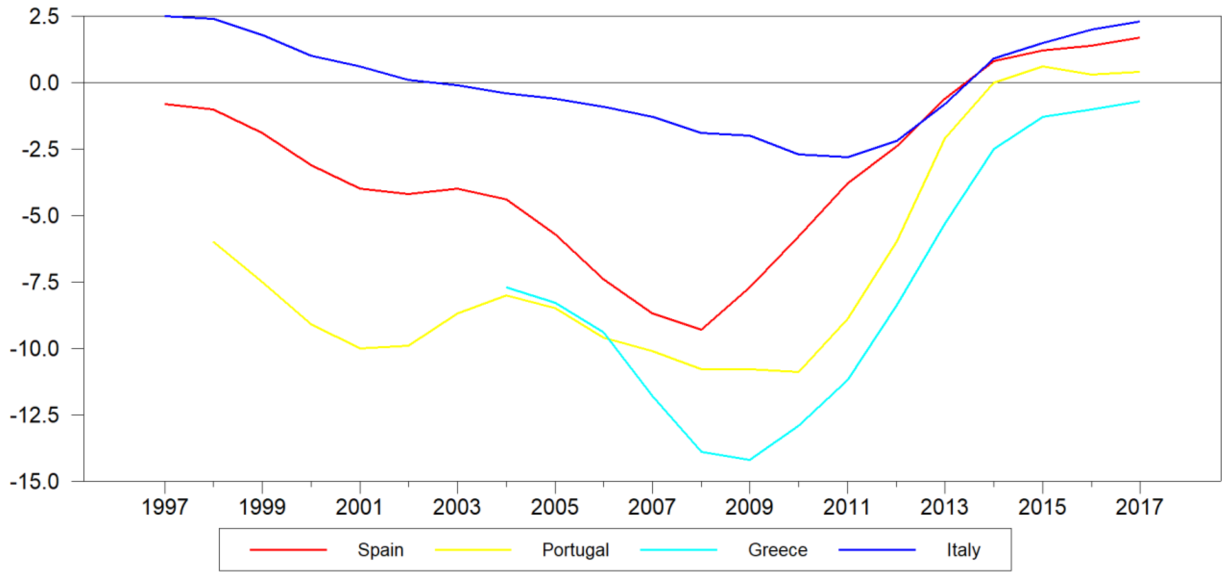
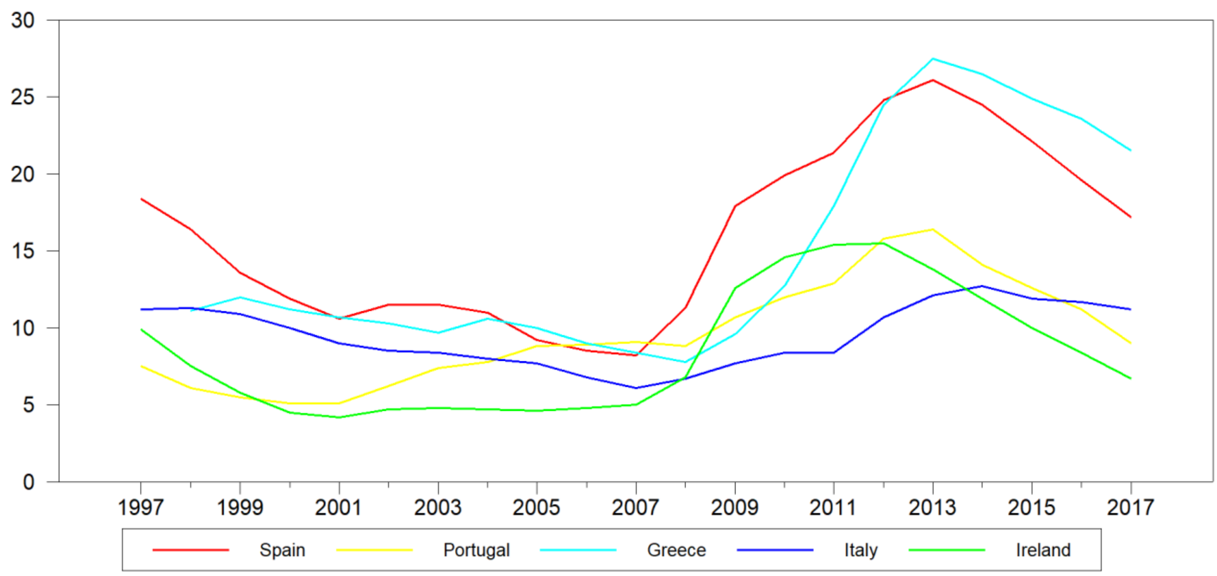


Figure 5: Unemployment Rates in Selected Euro Area Countries



3.2. Sovereign Default

It took about a decade for sovereign default within the euro to become an important topic but it probably should have been a central part of the policy discussions from the start. Indeed, in many ways, the story of the boom and subsequent crisis of the euro area centres around a widespread misunderstanding about the possibilities for sovereign default within the euro and the gradual dawning of the true reality.

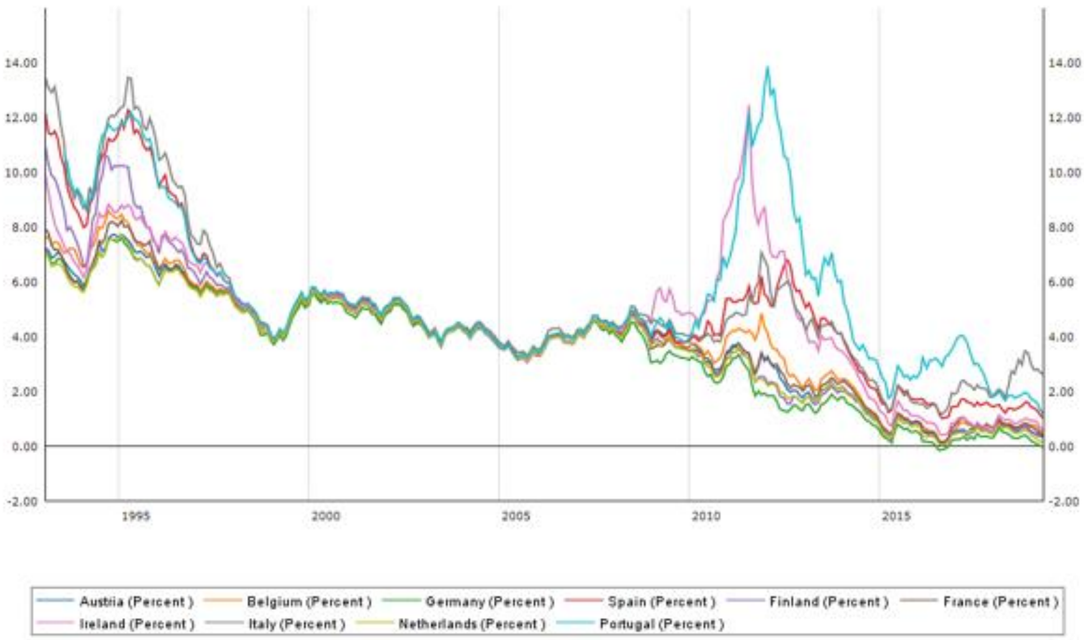
As Reinhart and Rogoff (2009) demonstrated, sovereign debt sustainability problems are as old as sovereign debt itself and they have tended to be solved via some combination of high inflation, financial repression and default. With the price stability mandate of the ECB and the EU's requirements for free movement of capital making the first two difficult to achieve, it could have been argued that it was always likely that a euro area member state that got into severe fiscal trouble would have to default. Indeed, as reviewed in Whelan (2013), you can find predictions from a number of eminent economists during the 1990s that sovereign default was going to be a likely feature of the euro area given the absence of alternative tools for resolving debt unsustainability.

Despite these predictions, and despite the failure of the SGP to enforce the strict fiscal discipline that had been envisaged, governments and markets still saw very little risk of a sovereign default inside the euro area during the early years of EMU. Financial markets had not seen a sovereign debt default in Europe in the post-war period but were well attuned to the risks associated with regular currency devaluations. As the prospect of devaluations receded in the run-up to the introduction of the euro and then (apparently) disappeared altogether in 1999, yields on sovereign debt across all member states—which had previously differed substantially—converged within a narrow band and remained this way until 2009. Figure 6 shows the long-term sovereign bond rates of a selected group of euro area member states. Despite substantial variations across euro area member states in their underlying fiscal positions, financial markets barely priced default risk into sovereign debt yields.

By 2010, however, it became apparent that Greece and other countries in the euro had substantial public debt problems that could require debt restructuring or could even result in these countries leaving the euro. This resulted in the re-emergence of substantial differences in sovereign yields across euro area member states. Concerns about potential sovereign default were confirmed as having reasonable foundations it was agreed in 2011 that Greece would restructure its debt in 2012. While sovereign yields have converged again following the easing of the euro crisis and the return of economic expansion, they are no longer fully aligned and financial markets are now extremely sensitive in their pricing of risk related to potential default or to prospects of countries exiting the euro e.g. Figure 6 illustrates the notable uptick in Italian sovereign bond yields after the election of the current government.

The confusion related to sovereign default was not simply a “bad luck” story for EU policy makers or the ECB. Both the ECB and European government economic officials should have been clearer in communicating the possibility of default for countries that had taken on too much public debt and should have done more preparatory work in anticipation of these problems showing up during a recession. Instead, the EU did nothing to discourage financial markets from pricing all euro area sovereign debt the same and when the Greek crisis began, most leading European politicians denied reality.

Figure 6: Yields on Long-Term Government Bonds for Selected European Counties



Typical among the initial reaction of senior European politicians to the Greek crisis was the comment of Joaquin Almunia, the European Commissioner for Economic and Financial Affairs, in early 2010, "*No, Greece will not default. Please. In the euro area, the default does not exist*.[5] As documented in Whelan (2013), this kind of denial was widespread among euro area leaders at this time and fuelled an inadequate policy approach to the Greek situation.

The ECB also performed poorly in relation to questions surrounding sovereign default. From the beginning of the Greek crisis, the ECB played a crucial rule in presenting a Greek default as a potential disaster for the euro area and delaying the decision to allow such a default. Members of the Executive Board, such as Lorenzo Bini Smaghi regularly gave speeches depicting a potential Greek default as something that would provoke "*an economic meltdown*".[6] For example, Bini Smaghi (2011) argued that a default should be avoided because it would "*punish patient investors*" who believed in the adjustment program could restore sustainability, that a default would discourage investors from providing money to any euro-area member state and that

"the payment of debts should be enforced, through sanctions if need be"

[5] See https://www.telegraph.co.uk/finance/financialcrisis/7104762/Joaquin-Almunia-we-dont-need-a-Greek-bail-out-because-the-country-wont-default.html

[6] http://www.businessinsider.com/smaghi-greek-debt-restructuring-2011-5

ECB officials regularly threatened to cut off credit to the Greek banking system if a default was implemented and this hard line was maintained right up to the decision to restructure Greece's debts, with ECB President Jean-Claude Trichet still insisting on July 11, 2011[7]

"no credit event, no selective default, no default. That is the message of the Governing Council."

In the event, the Greek restructuring took place without any major euro-wide financial stability effects and it is now widely accepted that sovereign default is something that can occur within the euro area without triggering a widespread crisis or the need for the defaulting country to exit the euro.

3.3. Financial Stability Problems

Another area that received little attention prior to the introduction of the euro was the idea that financial instability – and in particular banking sector instability – would become a major concern for the ECB and euro area leaders. As with investment in sovereign debt, the perception that devaluation risk had been eliminated meant that private borrowing rates in euro area member states generally tracked sovereign yields after the introduction of the new currency leading to a substantial harmonisation of private borrowing rates across the area.

Much of the focus in the pre-EMU discussion centred on whether the euro area was an "optimum currency area" with critics pointing to the widely different economic structures across the area is implying there would be important "asymmetric shocks" i.e. shocks that affecting some areas more than other. EMU optimists argued that the currency union would increase trade links between member states and that countries with close trade links tended to have more correlated business cycles.[8] It is ironic, then, that this near-harmonisation of private borrowing rates proved to be a far greater asymmetric shock than had been envisaged in this debate. Interest rates in Germany and other "core" euro members remained at pre-EMU levels but private borrowing rates for firms and households in many other euro area states declined dramatically and this had a big impact on these countries.

The elimination of devaluation risk also greatly encouraged intra-EMU financial flows. With borrowing costs well down and many willing providers of this cheap credit, it is perhaps unsurprising that private debt levels in the euro area's "peripheral" member states soared. With hindsight, it is easy to see that these increases in private debt represented an important risk factor for the sovereign debt of these countries. For example, while Spain and Ireland had low and declining public debt ratios during the pre-crisis years, the explosion in private debt fuelled housing bubbles that masked underlying problems with public finances in these countries.

The global recession provoked by the financial crisis hit Europe's economy hard and led to a substantial worsening of budgetary positions. In addition, the crisis brought a worldwide re-evaluation of risk and of banking models based on high leverage and risky investments. Creditors

[7] http://www.ecb.int/press/pressconf/2011/html/is110707.en.html

[8] See, for example, Frankel and Rose (1997).

that had been happy to lend to banks in Europe's periphery became less enthusiastic about continuing to lend into economies with high debt levels and deep recessions. Increased debt levels for households and businesses that had seemed sustainable when the economy was expanding now looked less so, triggering concerns about solvency problems for banks due to non-performing loans.

These banking problems in the euro area's peripheral members made an already sharp global recession even more severe in these countries. Europe's politicians came to understand the "doom loop" between sovereigns and banks: Decisions to provide support for banks placed additional pressure on state finances and concerns about potential sovereign defaults affected perceptions about the risks to solvency of private banks. With external funding fleeing and banks struggling to meet regulatory capital ratio requirements, banks in peripheral economies cut back sharply and suddenly on lending, thus making recessions deeper. The increased perception of sovereign and banking risk played an important role in tipping the euro are back into a slump during 2012 at a time when the rest of world was enjoying a solid recovery.

While the banking sector had played little role in pre-EMU discussions, it turned out that euro area countries were particularly vulnerable to systemic banking pressures. The free movement of capital within the EU meant that investors and depositors could pull their money without cost from struggling banks. Deposit insurance funding also operates on a national level, so the perception that a state might not have the funds to deal with defaulting banks could further trigger withdrawals. This interaction between concerns about bank- and state-level solvency was perhaps seen most intensely in Ireland in 2010 when the state's attempt to bail out its banking sector lead to concerns that the sovereign would end up defaulting. Similar concerns, however, have affected other countries, including Cyprus and Greece, at various times in the past decade. Other problems related to the banking sector including a lack of harmonisation in rules concerning how to wind up banks and the complexities of coping with failing cross-border banking entities.

The ECB played a central role in dealing with the euro area's banking crisis, with mixed results. The Eurosystem's move to full allotment in its regular monetary policy operations prevented a full-scale liquidity crisis across the euro area's banking system and, as noted above, prevented some countries from experiencing the massive dislocation usually associated with financial "sudden stops".

Less positive were the ECB's dealings with various banks that developed severe solvency problems. As I have written about on several occasions (Whelan, 2014b, 2015, 2016), the ECB's policies in relation to collateral policies for refinancing operations and, in particular, Emergency Liquidity Assistance (ELA) to banks are not fit for purpose. There were a number of examples of lending to severely insolvent banks, a lack of clarity surrounding the terms under which the Eurosystem caps or withdraws ELA and a series of decisions where the granting or curbing of ELA appeared to be directly related to political developments in various countries. I will not repeat these examples here but will note merely that the uncertainty surrounding the ECB's performance of its role as lender of last resort to the banking system has tended to worsen banking crises and that the politicisation of this role has damaged the reputation of the ECB as an institution.

3.4 Economic Performance

At the time of the launch of the euro, there was optimism in some parts that the efficiencies associated with EMU would provide a boost to economic growth. Reductions in trading frictions were seen as a way to boost intra-European trade and efficiency and the euro area's poorer members could benefit from the external investments that would be facilitated by greater financial integration. While the euro may have contributed to some efficiency gains, it seems to have done little to facilitate intra-euro-area trade (see Glick and Rose, 2016) and the process of greater financial integration has thus far proved to be a destabilising factor for the euro area rather than a force for sustainable growth.

The overall growth performance of the euro area has been disappointing. From 1999 to 2017, the average annual growth rate for the area was 1.37 percent per year. This is down from 2.17 percent per year for the same group of countries over the previous decade.[9]

It is possible to attribute some of the blame for this comparatively poor performance to the ECB. While the ECB has contributed to macroeconomic stability by maintaining stable inflation, it is fair to say that it was too slow to react to the consistent economic weakness in the euro area from 2008 onwards: It was too slow to cut policy rates to zero and too slow to introduce non-standard measures such as asset purchase programmes.[10] This slowness to react has likely meant lower economic growth in recent years than would have been possible otherwise.

That said, the principal sources of slow growth in the euro area relate to slow growth in supply capacity, most notably the declining work-age population and the weak levels of growth in total factor productivity. The ECB is not responsible for these developments and there is little it can do about them, though I would like to see the ECB being as vocal about the desirability of increasing immigration to boost the euro area workforce as it is about the potential growth-enhancing benefits of structural reforms.

[9] These calculations were based on the dataset for the ECB's Area Wide Model. See https://eabcn.org/page/area-wide-model

[10] See Whelan (2014a) for a summary of these arguments from a few years ago.

4. Progress Made (and Not Made)

The past decade has presented many challenges for the ECB and for the governments of euro area member states. Faced with these challenges, there has been a series of changes to the architecture of EMU. In Section 4.1, I will briefly discuss a number of areas where significant progress has been made. In total, it represents a significant amount of institutional change over a relatively short amount of time and challenges the conventional wisdom that the EU is unable to come up with agreements to implement important changes. That said, there are many areas where progress has not been made and this means that some of the problems that have affected the euro area over the past decade are likely to reappear in the future. These are discussed in Section 4.2.

4.1. Progress Made

I will briefly discuss the progress made in the last decade towards a more effective economic and monetary union under four headings (i) Monetary policy (ii) Macroeconomic and financial monitoring (iii) Crisis management and sovereign default (iv) Banking

1. Monetary Policy

While I have criticised the ECB for being slower than it should have been over the past decade to respond to macroeconomic weakness, by now, the ECB has in fact gone further than any other major international central bank in designing new and innovative monetary policy tools. In addition to the kind of asset purchase programmes operated by the Fed and Bank of England, the ECB is also operating a negative deposit rate on reserves. This rate, combined with the large increase in the stock of bank reserves due to the Eurosystem's asset purchase, has likely had a strong impact in bringing down bond yields in the euro area in recent years.[11]

The ECB has also radically changed its refinancing operations, moving them towards full allotment instead of rationing off fixed amounts of liquidity, providing credit to banks over longer time horizons via the Long-Term Refinancing Operations (LTRO) and using them to encourage lending into the real economy via the so-called Targeted Long-Term Refinancing Operations (TLTRO).

The ECB has also developed a new tool, which has not yet been used. Developed in 2012 following Mario Draghi's "whatever it takes" comment about defending the euro, the announcement of the Outright Monetary Transactions (OMT) instrument had a substantial effect in curbing negative sentiment about peripheral sovereign bond yields at the peak of the euro crisis in 2012. However, the OMT instrument has never been deployed and there remain many questions about how it would work in practice.

Given how low policy rates are at present and the likelihood of another recession in the coming years, it is likely that the ECB will need to use all of its newly-developed tools (and perhaps some

[11] For evidence on how individual euro area banks are adjusting their balance sheets in the presence of negative rates and large increases in reserves, see Ryan and Whelan (2019).

new ones) to fight any future severe recession but with these tools in place, it is possible the policy response to the next crisis will be quicker.

2. Macroeconomic and Financial Monitoring

The monitoring of macroeconomic policy by the European Commission that took place prior to the global financial crisis was narrowly focused on budget deficits and debt sustainability. It failed to sport the build-up of important imbalances and threats to the financial system. With the introduction of the Macroeconomic Imbalance Procedure (MIP), the ongoing monitoring process looks at wider range of indicators, including current account deficits, house prices and credit growth. While by no means perfect, this kind of process may help to curb some of the excessive imbalances that had built up across member states during the euro's first decade. More generally, there is a wider acknowledgment among national and European authorities of the dangers posed by financial instability and the need for better financial regulation and supervision.

3. Crisis Management and Sovereign Default

One problem that emerged quickly during the early days of the euro crisis was that the IMF was ill-prepared for the scale of financial commitments required to run a large and long financial adjustment programme for a euro area countries that are facing severe macroeconomic adjustment problems. The setting up of the European Stabilisation Mechanism (ESM) has rectified this absence and the ESM now has experience dealing with financial adjustment programmes and their associated conditionality in Ireland, Greece and Portugal. The next crisis should see less time wasted on which institutions need to arrange financial assistance and how these programmes should operate.

4. Banking Supervision and Resolution

As outlined above, banking sector problems played a major role throughout the crisis years of 2008-2012 and the legacy of non-performing loans continues to hang over the banking sectors of a number of euro area member states. A number of significant institutional reforms have taken place in this area over the past decade.

The ECB has been appointed the single supervisor for the euro area's banking system. This has helped improve transparency, as previously the euro area had different national regimes for strictness in supervision, accounting standards and protocols for valuing and dealing with non-performing loans. The application of a common high standard in each of these areas will hopefully play some role in minimising the future build-up of serious banking problems. The Bank Recovery and Resolution directive has provided European authorities with a series of important tools to intervene to restore banks to health where necessary, to minimise threats to financial stability and to apply resolution tools where a bank is failing. These tools should help to minimise the cost to taxpayers of dealing with future banking failures.

4.2. Progress Not Made

Despite the substantial progress on building new economic institutions for the euro area, there are a number of areas where no progress (or insufficient progress) has been made. The absence of progress in these areas is likely to see the euro area continue to come under serious pressure during the next economic downturn. Here, I will focus on (i) Fiscal rules (ii) Joint fiscal capacity (iii) Sovereign debt restructuring (iv) Banking: Sovereign bonds and deposit insurance (v) The lender of last resort.

1. Fiscal Rules

The "fiscal compact" revised the original SGP fiscal rules but not in a way that has made them more effective. The rules remain focused on arbitrary limits such as the 3 percent deficit. The introduction of a "cyclically adjusted" budget deficit to the rules has done little to help because the European Commission's methodology for estimating potential output itself induces pro-cyclicality by revising down potential during recessions and revising it up during expansions. A replacement of these rules by simpler rules that facilitate more counter-cyclical fiscal policy while maintaining a focus on longer-term reductions in debt-GDP levels would be welcome.

2. Joint Fiscal Capacity

The lack of national fiscal capacity could be offset by introducing some level of joint fiscal policy across the euro area. There have been lots of ideas for how such a scheme could work. One approach is to increase the scale of jointly-funded public infrastructure projects with expenditure adjusted across the business cycle and across countries, with additional spending to provide cyclical boosts to economies in recession. There have also been various proposals for either a formal euro-wide unemployment insurance scheme or a more informal system of transfer payments related to fluctuations in unemployment levels.

The general principle of the desirability of a greater level of euro area fiscal capacity has featured in many different high-level political documents over the past decade, including, for example, the "four presidents" report of 2012.[12] More recently, the French and German governments have developed a limited joint proposal that would see an increase eurozone budget that could play some role in stabilising national economies.[13] This proposal, however, was rejected at the December 2018 Eurogroup meeting.

The comments of the Dutch finance minister about this proposal give a good flavour of why we are unlikely to see any progress on this issue this side of another crisis: The Financial Times reported Wopke Hoekstra as saying "*The need for such a budget is less than convincing. It is unclear how this will help, and why this would be in the interest of Dutch citizens. If this is not in the interest of the*

[12] See https://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/134069.pdf

[13] See https://www.consilium.europa.eu/media/37011/proposal-on-the-architecture-of-a-eurozone-budget.pdf

Netherlands or the Dutch taxpayer, then we are out".[14] Until the government of each euro area state sees that their citizens have a national interest in a more stable euro area, then we are unlikely to make progress in this area.

In the absence of progress on joint fiscal capacity, there is merit in having more discussion about the appropriateness of the fiscal stance of the euro area as a whole. There were a number of years during the euro crisis where the combined fiscal stance of the euro area was far too negative. While there was nothing that countries undergoing debt crises could do about this, a co-ordinated effort to have other nations adopt a more counter-cyclical fiscal policy would have helped. The new European Fiscal Board has been set up recently by the European Commission to provide some of the analytic work to underpin discussions around the overall euro area fiscal stance. Time will tell whether this body's work does anything to improve macroeconomic co-ordination across member states.

3. Sovereign Debt Restructuring

The Greek debt restructuring was an important milestone because it showed that sovereign debt could be restructured in the euro area without creating a broader financial crisis. However, as documented by Zettlemeyer, Trebesch and Gulati (2013), the Greek restructuring was very generous to "holdout" investors and may have set a bad precedent for getting investors to agree to restructuring even in the presence of collective action clauses (CACs).

The December 2018 Eurogroup meeting signalled the intention to introduce "single limb" CACs into all new euro area sovereign bonds by 2022, meaning all such bonds could be restructured together with an agreement of a qualified majority of investors across all bonds. This will eventually make it harder for individual investors to take large positions in individual bond issues and then block their restructuring. That said, it will be a long time before a large fraction of euro area debt carries these single limb clauses, so this will not help much with any restructuring required over the next five years.

Another issue is the danger that the ESM funds are used to "throw good money after bad" by lending to a member state to allow it to pay off private creditors and then later seek debt restructuring from ESM, as occurred with Greece. An important aspect of the ESM, however, is that the possibility of sovereign debt restructuring is acknowledged. The treaty underlying the ESM states

> *In accordance with IMF practice, in exceptional cases an adequate and proportionate form of private sector involvement shall be considered in cases where stability support is provided accompanied by conditionality in the form of a macro-economic adjustment programme.*

In this sense, the need for sovereign restructuring in some circumstances is now part of official euro area policy.

Ideally, however, the ESM would have the legal power to restructure private debt, via maturity extensions, as a potential condition of providing a financial support package. The December

[14] See https://www.ft.com/content/5ac73768-ebe5-11e8-8180-9cf212677a57

Eurogroup statement contained the following "*if requested by the Member State, the ESM may facilitate the dialogue between its Members and private investors. This involvement would take place on a voluntary, informal, non-binding, temporary, and confidential basis*." While the reassuring words are clearly intended to sooth investors in, for example, Italian government bonds, this may signal a move towards a more formal approach to restructuring debt once ESM gets involved.

4. Banking: Sovereign Bonds and Deposit Insurance

Two of the key aspects of the "doom loop" between sovereigns and banks remain unresolved. One is the treatment of sovereign bonds by bank regulators. European banks are not required to have a diversified portfolio of sovereign bonds and these bonds continue to have a zero risk weight. This means we continue to have banks that are encouraged by regulators and by their own governments to keep a large fraction of assets in the form of bonds issued by their national governments. Changes to these regulations may increase the cost of sovereign debt issuance for some euro area members but these costs are currently very low so now would be a good time to make these sensible changes.

The other unresolved aspect is the absence of any common deposit insurance scheme. Without such a scheme, depositors will link the safety of their bank deposits with the fiscal strength of their national government. This means that some depositors will respond to a national fiscal crisis by transferring their deposits to another country, potentially triggering a liquidity crisis for the banking sector to accompany the fiscal crisis. With all of the euro area's banks under the shared supervision of the ECB and following capital adequacy rules set by the EU, there is a strong argument that a common deposit insurance scheme would be an important stabilising factor. However, such a scheme is unlikely to be in place prior to the next recession or crisis to affect the euro area.

5. The Lender of Last Resort

I have noted above that the ECB's procedures for acting as a lender of last resort have been problematic. In particular, its guidelines for providing ELA to banks are ad hoc and rely on a complex set of arrangements in which ELA is granted by the national country central banks but ELA programmes then need to be continually renewed by the ECB Governing Council. Given the importance of a well-functioning lender of last resort function, I recommend that the ECB adopt a new policy structure in this area. The distinction between centralised refinancing operations and ELA provided by national country central banks should be eliminated and the ECB should formulate official guidelines for lending to banks undergoing crisis.[15]

Importantly, these guidelines should indicate that the ECB will provide emergency loans to banks that it assesses as solvent. This latter point is important because, in 2017, the Spanish bank, Banco Popular was deemed "likely to fail" and put through resolution because it was undergoing a bank run and the ECB did not approve providing it with liquidity. The ECB stated "*The reasons that triggered that decision were related to the liquidity problems. There was a bank run. It was not a*

[15] For more discussion of this issue, see Whelan (2014b).

matter of assessing the developments of solvency as such, but the liquidity issue."[16] Subsequent events have shown that Banco Popular may well have been insolvent but language suggesting that the ECB does not consider solvency when deciding whether to provide funding is dangerous. Closing solvent banks that are under severe liquidity pressure during a systemic bank run would not be a feasible policy. Before the next crisis hits, the ECB should clarify and streamline its procedures in this area.

[16] See https://www.reuters.com/article/us-ecb-banks-spain/ecbs-constancio-says-bank-run-triggered-banco-popular-rescue-idUSKBN18Z1UK

5. Resilience and Threats

So what is the future of the euro? Despite all of the negative events of the past decade, the euro has remained intact as a common currency area. In Section 5.1, I discuss the reasons for this resilience. Section 5.2, on the other hand, discusses some scenarios in which the euro area could break up.

5.1. Resilience

The most important factor keeping the euro together is its popularity with citizens. Remarkably, given the multiple crises of the last decade, support for the euro among people living in the single currency area has grown steadily in recent years and, as noted above, now stands at 75 percent.

This shows that the euro project has been far more resilient than many people thought it could be. Indeed, the common currency has survived many events that pre-EMU commentators would have thought likely to trigger the exit of one or more countries: Decade-long economic slumps in some member states, EU-IMF financial conditionality programmes, the imposition of capital controls in Greece and Cyprus and the loss of depositor funds in Cypriot banks. In each of these cases, an exit from the euro would have been an alternative option and the fact that governments chose to accept these difficult events is a sign of the importance placed on maintaining euro membership.

The popularity of the euro amongst the public plays an important role in restricting political movements to take countries out of the euro. To give two examples, support for the euro stands at 67 percent in Greece and 63 percent in Italy. This level of support means that even political parties in these focused on nationalist rhetoric have tended to back off from proposing an exit from the euro since it is not seen as a “winning” message.

One can point to two sets of factors underlying public support for euro membership. There are positive factors relating to the successes associated with the euro and there are negative factors related to the fear of what would happen to a country that left the euro.

The positive factors are the ECB’s ability to deliver a positive long-term inflation performance and the convenience savings to consumers and firms from not having to pay currency exchange costs when buying from many other European countries. In relation to the inflation performance, many citizens will doubt the ability of the politicians in their own country to design central bank institutions that would maintain the low inflation rates achieved in the euro area.

The negative, fear-related, factors are perhaps more important. Beyond the question of the long-run economic performance of a country that leaves the euro, the process of leaving is likely to trigger a major short-term crisis. It will be hard for any country to leave without a democratic process in which there is a referendum or vote in parliament authorising this decision. With such votes taking time to set up, there would be a period of enormous capital outflows as investors anticipate their investments possibly being redenominated into a new currency that would trade at a lower value than the euro. This would likely result in the imposition of capital controls until the decision to leave had been executed.

A new currency would then end up, whether pegged to the euro or floated, trading at a substantial discount to the euro. This large devaluation would probably lead to a surge in inflation which could end up being countered by tight monetary policy by the national central bank which could then put the departing economy into recession.

Once a country has left, there would be substantial legal problems centring around contracts with payment amounts denominated in euros. The government of the departing country could pass laws declaring all domestic contracts that previously mentioned euros should now be interpreted as meaning the new currency but this would be challenged in international courts. Disruptive legal disputes would likely rumble on for years after a euro exit causing persistent damage to the economy. The departing country's status within the EU could also come into question.

Many of these negative factors are independent of the question of whether joining the euro was a good idea or not in the first place. Rather, they reflect an asymmetry that could be dubbed the "Hotel California" factor: Even if it wasn't a good idea to join, leaving may now still be a very bad idea.

5.2. Threats

Despite the high levels of popularity of the euro amongst citizens and the substantial problems that an exit from the euro would cause any country, it would be dangerous to assume that the worst has passed and there will be no further existential threats.

One reason is that it is hard to extrapolate to the future based on what has happened over the past decade. For example, just because a country's citizens accepted a multi-year slump once without seeking to leave the euro doesn't not mean the euro will continue to be popular if a second long slump were to occur. This is particularly likely to be the case in countries where the next recession sees the restrictions of euro membership leading to further imposition of pro-cyclical austerity.

The past may not also be a good guide when looking at how countries react to specific events. For example, not all countries may react to the possibility of sovereign default in the same way as Greece, particularly countries were there are large domestic holdings of sovereign debt. A number of countries so far have coped with externally-imposed financial adjustment programmes in return for official support but others may be less comfortable in the future.

As of now, the ECB's OMT programme is widely viewed as a way to prevent a crisis in the euro area but nobody really knows how an Italian programme of OMT purchases, combined with a formal ESM adjustment programme, would work at a political level. Similarly, citizens in other countries may decide that leaving the euro is preferable to the capital controls that were accepted in Greece and Cyprus or the haircuts that were imposed on depositors in Cypriot banks. The rise in support for populist\nationalistic parties in many countries in Europe make it difficult to be sure that, in the future, these kinds of events will not trigger campaigns to exit the euro.

More generally, it is not enough to assume that the economic arguments against leaving the euro that have just been detailed are sufficient to prevent political movements that lead to euro exit.

There are lessons for the rest of Europe from the Brexit process. In many ways, the economic benefits from euro membership are smaller than the benefits of being a member of the EU: Hence, some countries that are EU members have chosen not to be members of the single currency. In the case of the UK, there were no reputable economic arguments for leaving the EU and plenty of expert analysis indicating the large losses that would occur under various leave scenarios. All of these were dismissed by populists who relied on catchphrases about “talking about control” and dismissed all counter-arguments as part of a “Project Fear” conspiracy being promoted by various unseen elites.

Despite the obvious short-term and long-term potential economic downsides of leaving the euro, talking points about “taking back control of our money and our budgets” may at some point become very effective in the hands of nationalist parties who will have learned from Brexiteers how to dismiss counter-arguments as elitist fear-mongering. While we can rely on opinion polls as a reliable indicator of opinion at a point in time, the Brexit process shows that opinions of large parts of the electorate on economic issues can become radicalised in a relatively short time in the right conditions.

For example, recent polls show surprisingly high levels of support in the UK for an extremely hard Brexit to enable the UK to pursue new free trade deals with non-EU countries. There was little evidence of support for this idea prior to the Brexit referendum and there is no economic basis for this as a good proposal but, in a short space of time, this idea went from being the opinion of a few think-tank radicals to official UK government policy. One could make similar arguments for UK policy on migration, where the concerns of a minority of the electorate ending up leading to a radical change, with negative economic effects, becoming official government policy.

Once one country has left the euro, it would likely become difficult to prevent speculation that other countries could follow. As such, it is not impossible that the exit of a single country, in particular a larger euro area member state, could trigger a process in which the whole of the euro area ends up breaking apart.

6. Conclusions

Economic and monetary union has brought some important gains for European citizens and the euro is popular with the public. The euro project has proven to be robust to events such as a sovereign default, the imposition of capital controls, haircuts for depositors and a slump that has taken a decade to recover from. This might lead people to conclude that the worst has passed and the euro is now bound to succeed. I think this would be overly optimistic.

History never stops. Nothing lasts forever. Officially, the euro may be "fixed and immutable" but the years of hearing European finance ministers talk about how Greece may have to leave the euro has shown that this was not necessarily the case.

To keep the euro together, Europe's politicians need to make the euro area less crisis-prone and to make it easier for member states to recover from the inevitable cyclical downturns that will happen in the future. Despite their reputation for being slow to agree on institutional changes, Europe's leaders have actually implemented an impressive amount of positive institutional changes to the euro area's economic and financial architecture, in a way that involves more sharing of sovereignty than many would previously have thought possible. But that has still left a number of key weaknesses in the areas of fiscal capacity and financial stability.

Having observed the range of problems that affected the euro area during its crisis period, the economics profession has provided many plans for wide-ranging institutional improvements for the euro area, most notably the Franco-German plan authored by fourteen eminent economists (Benassy-Quere et al, 2018) which focuses on many of the issues discussed here in Section 4.2 as well as a few others. It is up to Europe's politicians, in all of its branches – Council, Commission, Parliament – to consider these suggestions and turn many of them into concrete actions in the coming decade. Only by continuing to work on its weaknesses can policy makers reduce the chances of a large-scale future existential crisis for the economic and monetary union.

REFERENCES

- Barro, Robert J. and David B. Gordon (1983). "A Positive Theory of Monetary Policy in a Natural Rate Model", *Journal of Political Economy*, Vol. 91, pages 589-610
- Benassy-Quere, Agnes et al (2018). Reconciling Risk Sharing with Market Discipline: A Constructive Approach to Euro Area Reform, CEPR Policy Insight. Available at https://cepr.org/sites/default/files/policy_insights/PolicyInsight91.pdf
- European Central Bank (2009). *The Euro at 10: Lessons and Challenges.* Available at https://www.ecb.europa.eu/pub/pdf/other/euroattenen2009en.pdf?6ca2c8ad670dc32eecd6ba34120c80b5
- European Central Bank (2018). Financial Integration in Europe. Available at https://www.ecb.europa.eu/pub/pdf/fie/ecb.financialintegrationineurope201805.en.pdf
- Feldstein, Martin (1992). "Europe's Monetary Union: The Case Against EMU", *The Economist*, June 13.
- Flood, Robert P. and Peter M. Garber (1984). "Collapsing Exchange-Rate Regimes: Some Linear Examples", *Journal of International Economics*, Vol.17, pages 1-13.
- Frankel, Jeffrey A. and Andrew Rose (1997), "Is EMU More Justifiable Ex Post Than Ex Ante?", *European Economic Review*, vol. 41, pages 753-760.
- Glick, Reuvan and Andrew K. Rose (2016). "Currency Unions and Trade: A Post-EMU Reassessment", *European Economic Review,* Volume 87, issue C, pages 78-91.
- Lars Jonung and Eoin Drea (2010). "It Can't Happen, It's a Bad Idea, It Won't Last: U.S. Economists on the EMU and the Euro, 1989-2002", *Econ Journal Watch*, Volume 7, pages 4-52.
- Krugman, Paul (1979). "A Model of Balance-of-Payments Crises", *Journal of Money, Credit and Banking*, Vol.11, No.3, pages 311-325.
- Kydland, Finn and Edward Prescott (1977). "Rules Rather Than Discretion: The Inconsistency of Optimal Plans", *Journal of Political Economy*, 1977, Volume 85, pages 473-91
- Obstfeld, Maurice (1986). "Rational and Self-Fulfilling Balance-of-Payments Crises", *American Economic Review*, Vol.76, No.1, pages 72-81.
- Reinhart, Carmen and Kenneth Rogoff (2009). *This Time is Different*, Princeton University Press, Princeton.
- Ryan, Ellen and Karl Whelan (2019). Quantitative Easing and the Hot Potato Effect, Evidence from Euro Area Banks, Central Bank of Ireland working paper. Available at https://www.centralbank.ie/docs/default-source/publications/research-technical-papers/01rt19-quantitative-easing-and-the-hot-potato-effect-evidence-from-euro-area-banks-(ryan-and-whelan).pdf
- Sims, Christopher (1999). "The Precarious Fiscal Foundations of EMU", *De Economist*, Volume 147(4), pages 415-436.

- Whelan, Karl (2013). "Sovereign Default and the Euro", *Oxford Review of Economic Policy*, Volume 29, pages 478-501.
- Whelan, Karl (2014a). The ECB and Non-Standard Policies: Too Little Too Late?, briefing paper for European Parliament Committee on Economic and Monetary Affairs, available at http://www.europarl.europa.eu/cmsdata/106502/Compilation_518.781_FINAL.pdf
- Whelan, Karl (2014b). The ECB's Collateral Policy and Its Future as Lender of Last Resort, briefing paper for European Parliament Committee on Economic and Monetary Affairs, available at http://www.europarl.europa.eu/cmsdata/106744/COMPILATION_587.299%20-%20Online.pdf
- Whelan, Karl (2015). The ECB and Financial Assistance Programmes: Has ECB Acted Beyond its Mandate?, briefing paper for European Parliament Committee on Economic and Monetary Affairs, available at http://www.europarl.europa.eu/cmsdata/105467/IPOL_IDA(2015)569963_EN.pdf
- Whelan, Karl (2016). "Banking Union and the ECB as Lender of Last Resort" *in Filling the Gaps in Governance: The Case of Europe* edited by Franklin Allen, Elena Carletti, Joanna Gray and Mitu Gulati, Robert Schuman Centre for Advanced Studies, EUI Florence
- Whelan, Karl (2018). Monetary Policy in an Era of Low Average Growth Rates, briefing paper for European Parliament Committee on Economic and Monetary Affairs, available at http://www.europarl.europa.eu/cmsdata/157018/Whelan%20final%20publication.pdf
- Zettelmeyer, Jeromin, Christoph Trebesch and Mitu Gulati (2013). "The Greek Debt Exchange: An Autopsy", *Economic Policy*, pages 513-563.