



The development of two EMU member countries Germany and Ireland

What are the similarities and differences between both states' positive development

Yichen Sun

Shenzhen College of International Education, Shenzhen, Guangdong, 518017, China

*Corresponding author. Email: khykc1072162@mail.wcccd.edu

Abstract. After the European Monetary Union (EMU) was established, every member state participating in the union was influenced positively or negatively including two founding members Ireland and Germany. Among all the members, Ireland and Germany both experienced an upward development but their reasons of development and primary situation are not very different. By analyzing and comparing different sectors including culture, economy and agriculture of these two countries, it came to the result that Ireland's rapid growth was more related to joining the EMU, and it has undergone successful economic and cultural transformation. However, Germany also developed throughout the centuries but not only depending on the EMU, especially from the economic aspect. Although they both can be considered as a winner according to the flourish development, the economic tendency, cultural shifts and industrial developments are not identical at all. From these two case studies it can be extended to the fact that the establishment of the EMU impacted countries differently. It can be both based on its economic and political decisions before joining the EMU and their later performances as well.

Keywords: European Monetary Union, European integration, Germany, Ireland, Development, Comparison.

1 Introduction

The EMU was formed in 1990 and the most vital period of it was the implementation of Euro from 1999 to 2002. Generally, the establishment of the EMU was truly a platform for many member states to take advantage from and to prosper their countries' economy. For instance, most of the European Union (EU) members, especially the senior members are considered as the winner from the EMU. In fact, those member states grew rapidly after participated in this organization from economic, agricultural, cultural and/or political aspect [1].

However, a strong argument turned out to be that not all developed EMU members relied on the aids and construction of the EMU. Since the member states are still individual countries and the considerable transformation, what they witnessed was the change of Euro currency and the formation of the Eurozone, the political decisions, policies and many other factors that are not closely connected to the EMU also decided the growth tendency of one country. Accordingly, what elements really determine the different growths of countries and to what extent they were benefited from the EMU?

This question can be answered by analyzing and comparing two EMU member countries, Ireland and Germany, whose growth is both positive after joining the EMU but developed in different ways. In this case, history of the EMU, especially the timings for these two member states, quantitative statistics on the economic growth and evidence for the cultural transformations can all support the statement that the growth disparities between well-developed EMU members can be analyzed according to their long-term performances and historical events. Replying to the question of to what extent they were benefited from the EMU, the result tends to be that one country shows a dramatic development after the participation of EMU and another did not really rely on being as one of the members. The study introduce the history of the EMU, economic development of Germany and Ireland, including each of their economic growth models and scales, and the cultural backgrounds of both countries, but most importantly, any shifts they experienced after the establishment of EMU.

2 History of the EMU

Nearly ten years after the Treaty of Rome, European Economic Community Member States started to lessen their connections to the US dollar and seek stronger protection against global economic instability. This is when European monetary union started. This process, in which numerous parties were involved (Member States, European institutions), evolved from weaker forms, like the "Snake in the Tunnel" mechanism, to Monetary Union and a unified currency with a crucial function and significance on the global stage [2].

At the meeting in The Hague in 1969, the heads of state or government defined a new goal of European integration: economic and monetary union (EMU). The ultimate objectives were to fully liberalize capital flows, fully convert the currencies of Member States, and permanently set exchange rates. However, The Bretton Woods system's disintegration and the US government's decision to let the dollar float in 1971 caused a wave of foreign exchange instability that seriously called into question the parities between the European currencies. The EMU project was abruptly stopped. The formation of the European Monetary System (EMS), which is based on the idea of fixed but flexible exchange rates, was a continuation of efforts to create a zone of monetary stability at the Brussels Summit in 1978 [3]. Except for the UK (during the time it was still a member of the EU), all Member States' currencies took part in the exchange rate system. It became increasingly obvious after the Single Market Program was adopted in 1985 that the internal market's potential could not be fully realized as long as relatively

high transaction costs associated with currency conversion and the uncertainties associated with exchange rate fluctuations, no matter how small, persisted [3,4].

A committee to explore EMU was established by the Hanover European Council in 1988, with Jacques Delors serving as its chairman. It emphasized the need for stronger economic policy coordination, the implementation of fiscal regulations that set deficit ceilings in national budgets, and the construction of a stand-alone organization that would be in charge of the Union's monetary policy: the European Central Bank (ECB). The Delors study served as the foundation for the Madrid European Council's 1989 decision to begin the first phase of EMU, which would see the complete liberalization of capital movements by 1 July 1990. A summit of governments was summoned by the Strasbourg European Council in December 1989 to determine what Treaty revisions were required to realize EMU. The work of this intergovernmental conference resulted in the Treaty on European Union, which was formally ratified on November 1, 1993, after being officially endorsed by the Heads of State or Government at the Maastricht European Council in December 1991 [4].

According to the Treaty, the policies and movements of the EMU should be implemented in three stages. Stage 1 started from 1 July 1990 to 31 December 1993, the EMU was establishing the free movement of capital between Member States. Stage 2 started from 1 January 1994 to 31 December 1998, the main action was the convergence of economic strategies among members and more coordination between national central banks of members. The creation of the European Monetary Institute (EMI), which was entrusted with enhancing collaboration between the national central banks and with carrying out the required preparations for the adoption of the single currency, institutionalized the coordination of monetary policy. During this phase, the national central banks were to become independent [2, 4]. Stage 3 started on 1 January 1999, this was the beginning of a single monetary policy under the supervision of the Euro system and the eventual adoption of euro bills and coins by all members of the euro region. A high degree of lasting convergence judged against a number of criteria outlined by the Treaties was required in order to advance to the third stage. Any Member State that violated the budgetary regulations would be subject to sanctions. The Euro system, which consists of the six members of the ECB's Executive Board and the governors of the national central banks of the euro area, was given responsibility for the monetary policy for the euro region [3].

3 Benefits of the EMU Membership

Economically, the EMU will provide price stability. The Maastricht Treaty establishes price stability as the principal goal of the single monetary policy, which must be stated openly in the statutes of member national central banks. To meet this obligation of the Treaty, the European System of Central Banks (ESCB) will have complete autonomy in choosing the appropriate level of interest rates. Furthermore, the elimination of the risk of significant real exchange rate fluctuations is another significant advantage of EMU. These could undermine free trade and lead to protectionism in addition to slowing economic progress and causing an inefficient use of resources. Given the degree of

economic interdependence, such fluctuations are particularly damaging in Europe; it has been demonstrated that abrupt strong declines in currencies like the lira and sterling some time ago instantly resulted in - rather isolated - calls for protection and compensation [1]. If these pressures are not restrained, the Single Market's survival and all the advantages it offers consumers and producers may be in jeopardy. Additionally, those expenses act as an additional layer of protection for national producers. A single currency will increase price transparency and direct comparability throughout the European Union, which should boost competition and, in turn, efficiency, as well as advance the Single Market's development [1, 5].

Culturally, some member states experienced cultural transformations due to the fact that their participation of EMU provided an opportunity to become more independent and they are more integrated under the European context. Meanwhile, this is also impacted by the economic growth of states and the unified Euro currency [6].

Yet, it is important to acknowledge that not all member states benefited from the EMU, and in fact they developed their own agriculture, economy, industry and other section by their inner promotion and trades with non-EMU countries. In this case Germany as an example.

4 Germany and Ireland Before European Integration

The situation of Germany and Ireland before the establishment of EMU was different to a large extent.

After the Second World War, years of conflict, price controls, shortages, and the loss of leading scientists and patents to the US had a devastating effect on the German economy. However, by 1950, the economy had undergone an economic change known as the *Wirtschaftswunder*, or "economic miracle," as a result of investment, economic development, and other factors [7]. 1950 saw the start of the West German upswing, which was absolutely remarkable. Industrial production increased by 25.0% in 1950 and by 18.1% in 1951. Despite sporadic slowdowns, growth remained strong for the majority of the 1950s. By 1960, industrial production in Germany had increased to a level that was 2.5 times higher than it had been in 1950 and much above any level attained by the Nazis during the 1930s. Over the same ten years, GDP increased by two thirds. Between 1950 and 1960, the number of people in employment increased from 13.8 million to 19.8 million, and the unemployment rate decreased from 10.3% to 1.2% [8].

In the case of Ireland, it was not as positive as Germany. Ireland's economy, which was dominated by agriculture and animal husbandry before to joining the European Community, trailed behind the average level of European countries in terms of economic and social development. Ireland maintained a very conservative strategic orientation up until the late 1950s and early 1960s, when the nation made the decision to "transition from protectionist to outward orientation" in response to payment problems, economic decline, and emigration issues [9]. Meanwhile, Ireland's goal was to transform its domestic economy into one that was export-oriented while also luring foreign investment. Ireland did apply to join the European Community in 1961, but the country

didn't formally join until 1973, during which time it underwent a number of political, economic, and psychological reforms to get ready for the impending modernization. In fact, the economy underwent a significant structural transformation. Agriculture, forestry, and fishing together made up over 37% of all jobs in 1960. This dropped to 14% by 1987, suggesting a sharp increase in production [10].

Accordingly, although the development tendency of two countries are all motive after joined the EMU, their economic situation before EMU establishment are totally opposite and different to a large extent. Meanwhile, the way they developed are also different at any time.

5 Economic Development of Germany and Ireland

After the European integration and establishment of the EMU, both Germany and Ireland had experienced upward growth. However, when comparing in which ways these countries grew, it can be clearly seen that Ireland was truly benefited from the same currency policy and the aids from the EMU (see figure 1).

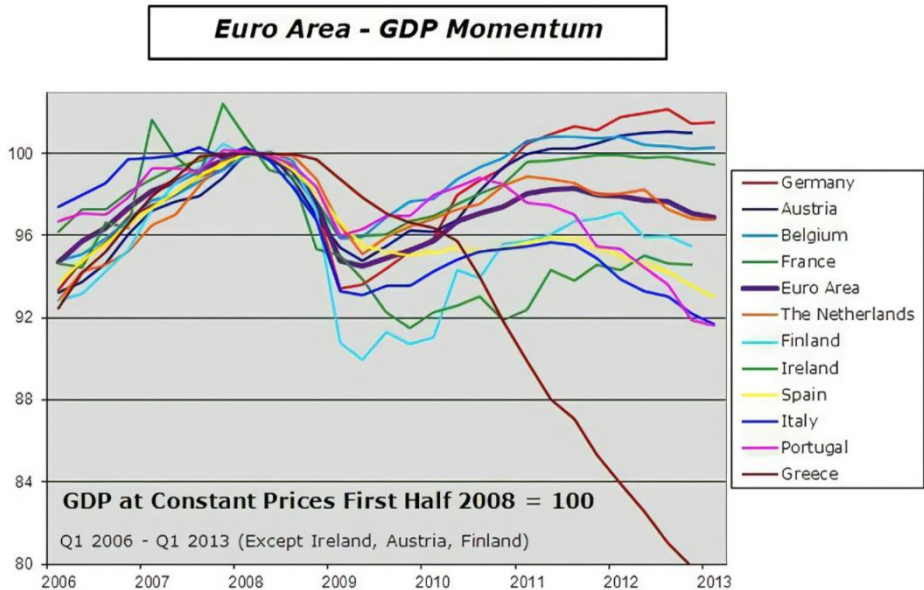


Fig. 1. Index of real GDP per capita from 1995 to 2004. Retrieved from Datastream, Natixis AM.

First of all, the economic model of two countries is different to a large extent. Ireland has a mixed economy. According to the constitution, the state should support private initiative in business and industry, but it is also allowed to provide basic services and support development projects in the lack of private initiative. As a result, state-sponsored ("semistate") organizations run the nation's peat industry, certain television and radio stations, rail and road transportation, power generation and distribution, and some

radio and television stations. The industries of air travel and health insurance are both dominated by state-owned enterprises. Many of these businesses were urged to privatize in order to increase their competitiveness by the 1990s creation of a single European market [10]. Ireland's high-tech industry, which benefited from a very low corporate tax rate of 12.5%, helped the country experience economic development in the 1990s and lower unemployment to previously unheard-of levels. The economic boom that followed, during which the nation's growth was more than twice as high as that of the majority of other EU nations, led to the designation of the nation as the "Celtic Tiger" [11]."

The economy of Germany is a highly developed social market economy, which is also an export-led economy. Countries applying this kind of growth model increase their domestic productivity by aiming the foreign market, and Germany is one of these prosperous Western European countries [12]. Germany supports increased economic and political union in Europe. Agreements among European Union (EU) countries and EU single market regulations are progressively influencing its commercial strategies. However, compare to the benefits Ireland got from the EMU, German economic development was more about its internal sectors, mainly businesses, and what it gained from the EMU was only the same currency policy which helps with the external trades.

By separating the sections that boosted post war societies, the advantages Germany received from the EU or EMM can be clearly labeled. Firstly, the benefits of EMU for Germany are worth to note down. Export-oriented industries dominate the German economy (see figure 2).

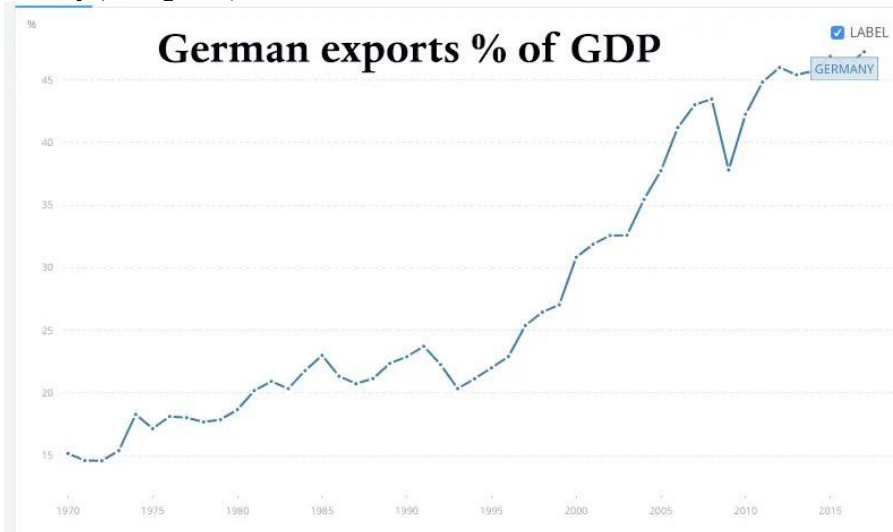


Fig. 2. German export growth from 1970-2017. Retrieved from World Bank 2017.

It has benefited from free trade and the European Union's involvement in lowering trade barriers. The importance of trade has increased recently. Germany's exports of goods and services made up 47% of its GDP in 2011, according to the World Bank. Germany has specialized in sophisticated and high-value manufacturing exports, which

has allowed it to maintain a competitive edge against Asian manufacturing nations with cheaper labor costs. Other than that, in comparison to economies in the southern Eurozone, the German economy has seen a relative gain in competitiveness since the introduction of the Euro in 2000. Meanwhile, Germany's labor expenses have increased more slowly than elsewhere, but there hasn't been a rise in the value of the German mark like there was before the Euro. The current account surplus reflects this competitive advantage (arguably this surplus creates problems for rest of Eurozone) [6].

However, for the rest of the vital developments, German inner decisions took an important place. For instance, West Germany began receiving funding from the Marshall Plan in 1948. Up to October 1954, this amounted to \$2 billion; while this represented only 5% of the German economy (econ lib), it was nonetheless significant from an economic and psychological standpoint. Allied forces stationed in West Germany also made significant financial contributions to the German economy. Furthermore, according to Posen, "Coming to this assessment requires an examination of three sets of implications for EMU." The first is whether modifications to monetary regimes result in modifications to actual economic structures, such as the depth of financial markets or the institutions governing the labor market. The overall idea is that there is sufficient evidence that economic structures are actually rather resistant to change, thus those who expected a rise in competitiveness brought on by the euro will likely be dissatisfied [6]. The second concern is whether there are significant enough economic differences across EU members, or at least those within the eurozone, to necessitate risky monetary policy accommodations. The lesson to be learned from this situation is that regional disparities rarely affect monetary policy decisions, and the underlying asymmetries are in any case overblown, so those who are against the euro have little to worry about [6,13]. The third concern is whether the European Central Bank will act differently from the Bundesbank in a way that permits or even encourages increases in inflation. I am very confident that these worries are unfounded in this regard for a variety of reasons. In the end, the same factors that made the currency reform of 1948 successful—underlying stability and backing from civil society for sensible economic policies—also explain why EMU is irrelevant for the German economy. Because of this, the only threat to the EMU is if the European Central Bank neglects its obligation and self-interest to establish political legitimacy for its operations. Thus, he claims that the EMU is 'irrelevant' for the German economic growth [6].

Starting from Ireland joined the EMU, it grew dramatically from the point that they became more independent in economy and by the help of European central bank, it received effective aids during economic corruptions (see figure 3).

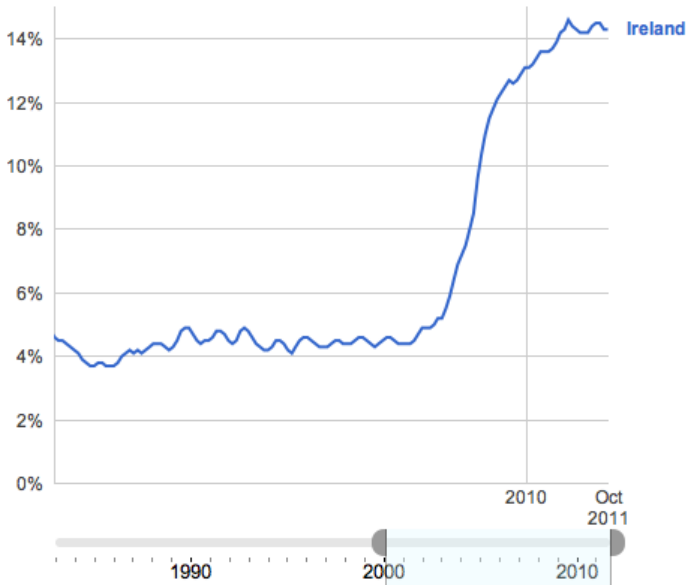


Fig. 3. Irish economic growth on a time scale. Retrieved from nejtillmu.com.

Until 1979, when the country became a member of the European Monetary System, the Irish pound (or punt) was pegged to the British pound sterling [14]. Currently, the nation's official currency is the euro, the single currency of the EU. The country's monetary authority was founded in 1942 and is known as the Central Bank of Ireland. Its duties include granting licenses to, regulating, and supervising the nation's financial institutions, as well as managing the Irish Stock Exchange. The bank does not conduct business with the general public, but through the "advice" it provides to the clearing (or, to use the Irish phrase, the affiliated) banks, it has a considerable impact on the level of bank credit [14]. One of the oldest stock exchanges in the world, the Irish Stock Exchange is situated in the heart of Dublin and has been open since 1793. Economic turmoil was brought on by the collapse of the Irish economy in late 2008. At first, the government thought that by promising to guarantee all bank deposits, failing banks would draw investment. As a result of the government's commitment, the Irish people are now responsible for losses that are out of this world for such a tiny nation. Through November 2010, Ireland tried to control its situation, but in the end, it agreed to a bailout of more than \$100 billion from the EU, the IMF, and nations offering bilateral aid. The EU and IMF imposed very strict conditions on the bailout [15].

Therefore, comparing the economic growth of Ireland and Germany, it can be concluded that both countries were developing positively but most of the Ireland's development was due to the European integration, Central bank and the same currency. However, for Germany, the country as an individual state boosted the national economy. According to figure 4 and 5, these two line graphs illustrate and compare the economic growth of two countries before and after joining the EMU (1999). It can be seen that

Germany was actually increasing steadily with a higher starting economy rather than the dramatic rise of Ireland after participated the EMU (see figure 4&5).

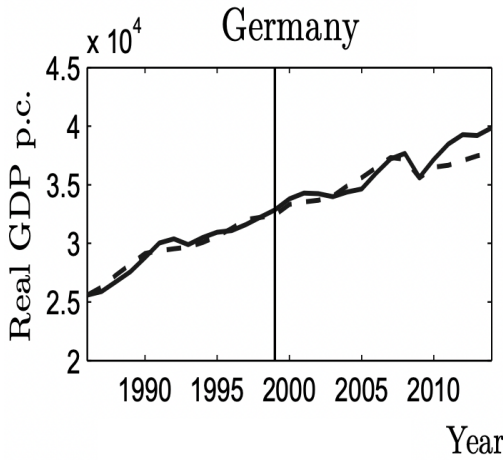


Fig. 4. Real GDP per capita of Germany before and after the formation of EMU (1999). Retrieved from Center for Economic Research.

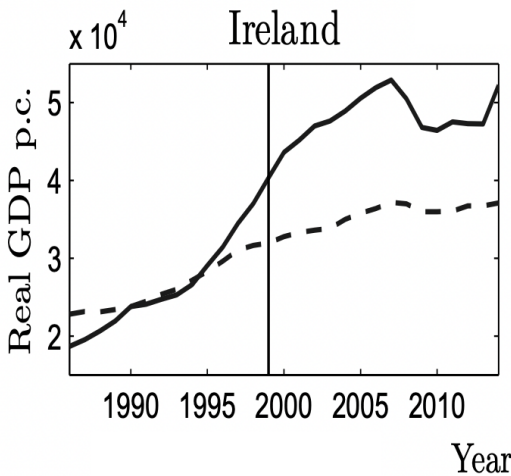


Fig. 5. Real GDP per capita of Germany before and after the formation of EMU (1999). Retrieved from Center for Economic Research.

6 Cultural, Social, Agricultural Transformation of Germany and Ireland

From the cultural, social and agricultural aspects, Germany and Ireland also witnessed some shifts or transformations, and in this case, Ireland was still the country that

changed remarkably. In these three sections, agriculture is intertwined with the country's economy, with no doubt, German agriculture continues to develop until the current period. West Germany produced around four-fifths of its food needs at the time of reunification, and increasing productivity and price guarantees led to enormous surpluses (especially of butter, meat, wheat, and wine). At the start of the twenty-first century, Germany produced more key agricultural products than was needed domestically (such as grains, sugar, oils, milk, and meat), which led to both exports and ongoing surpluses [8]. In the case of Ireland, European integration has helped it to end the economic dependence on the UK, and it successfully created a new economic form through industrial change and commercial diversification. Ireland's economic structure has changed from that of a traditional agricultural and livestock-raising nation to that of an industrialized nation with comparative advantages in the high-tech and finance sectors. The proportion of Irish exports to the UK decreased from 55% in 1973 to 18% in 2004 [16].

From the perspective of social and cultural transformation. For Germany, German reunification happened in the 1990s is actually connected with the formation of EMU. However, in this case it is not really about how the EMU affected the German reunification, but how German reunification accelerated the process of EMU formation. German compensation for reunification did not come from monetary union alone; rather, it came from West Germany's already burgeoning economic might in the 1980s [8]. Reunification sped up the process by prioritizing building institutions over preserving stability first and by prioritizing the EMU over a political union. Having said that, EMU was established on a fundamental consensus over (German) principles of "stability politics," which helped to shape the Maastricht compromise: the consensus on an independent Central Bank with price stability as its main goal, and finally the 1997 Euro Stability Pact, which aimed to maintain the necessity of budgetary restraint for all EMU members [17]. Meanwhile, according to evidences, Germany didn't experience any cultural or social transformation because of the EMU after it was formed.

For Ireland, one of its most vital social transformation — independence from the UK is having a triangular relationship with the EU, EMU, especially the European communities (EC). Along with the United Kingdom and Denmark, Ireland joined the EC — as they were referred to at the time — in 1973. That membership was in many respects characterized by the bilateral ties between the British and Irish. The majority of the Irish political and economic establishment saw participation alongside the United Kingdom as practically axiomatic because Ireland was, in all actuality, an underdeveloped appendage of the British economy. The Common Agricultural Policy, the direct transfers resulting from cohesion, regional, and structural funding, as well as the chance to promote Ireland as a successful location for Foreign Direct Investment (FDI) with access to the entire European market, were among the opportunities provided by membership that Irish policymakers, however, fully embraced. The range of advantages that FDI brings to the Irish economy must be recognized. FDI still serves as a direct and indirect engine for economic expansion and employment creation. Meanwhile, Ireland continues to be a powerhouse, luring more investment per resident than the majority of other wealthy nations. Ireland surpassed nations including Germany, Spain, and the Netherlands to be placed 10th internationally in 2013 in terms of FDI project inflows

(see figure 6). The 3,300 foreign-owned firms¹¹ based in Ireland employ about a quarter of a million people directly. Agency-supported¹² foreign-owned companies: directly employed 172,326 and another estimated 124,000 indirectly in 2013; contributed 72% of total corporation tax revenues; spent €13.2 billion on materials and services sourced in Ireland (2012); and invested just under €1.4 billion in R&D (2012). A little over €1.4 billion was invested in R&D in 2012, which is equivalent to over 70% of all business investments [17].

Figure 5. FDI inflows: top 20 host economies, 2013
(Billions of US dollars)

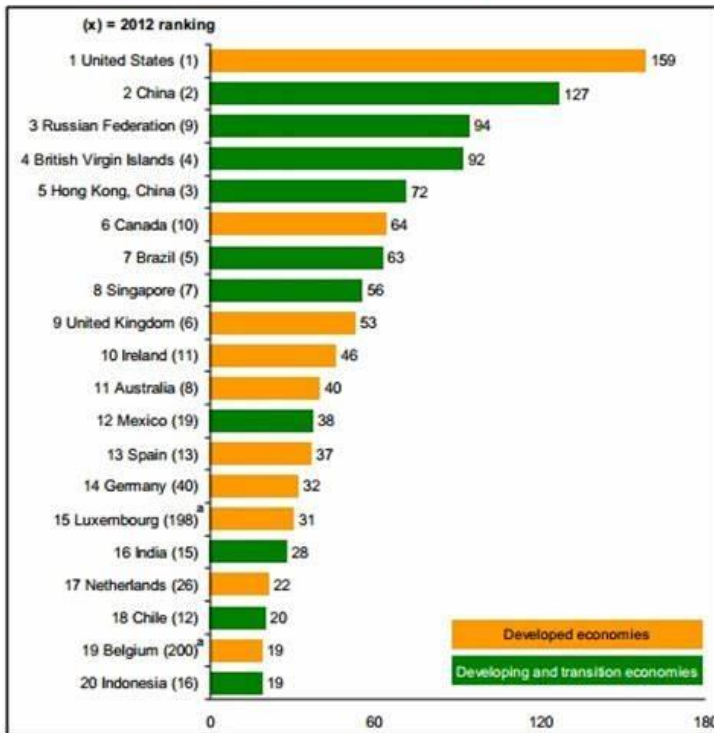


Fig. 6. FDI Inflows: top 20 host economies, 2013 (Billions of US dollars). Retrieved from UNCTAD.

Instead, Irish policymakers also took a rhetorical stance that put them near to the center of the European Union, which had the added benefit of establishing an Irish counterpoint to Britain's persistent European discontents [18,19].

Compare and contrast the agricultural, cultural and social relations between Ireland, Germany and the EMU, these two countries showed an obvious disparity in culture and social performance but somehow similar in the influence of the EMU on industrial growth. For Germany, it didn't experience any cultural or social transformations (positive impacts) but German reunification had an impact on the formation of European

Monetary Union. While for Ireland, the EC helped it to get rid of the of the over-dependence on the UK due to the fact that before joining the EC, Ireland was imprinted by British colonialism and had a fairly authoritarian regime. Furthermore, from the industrial aspect, since it counts as a sector of economy, the benefits of the EMU are similar to the 'Economic development of Germany and Ireland'.

7 Conclusion

Based on the origin and development of the EMU, this paper focuses on the economic, cultural, social and agricultural changes and growths of two EMU patriarchal member states Germany and Ireland. Meanwhile, among the comparisons between two countries, the benefits they gained from the EMU and European integration are the main objects. According to the factual information and the statistics, it can be concluded that from the economic aspect, both countries were benefited from the Euro currency since it makes them easier to trade, especially to export the goods to other EMU member countries. However, it is worth to note that Ireland's economy was lower than most of the member states before 2000s, but from point 1995, its GDP per capita was dramatically increasing and even became the top economy. Irrespective of before and after the Emu establishment, it received necessary aids during economic crisis as well, but for German it didn't have much fluctuations but a steady growth after the EMU establishment. From the cultural, social and agricultural aspects, the European integration and EC helped Ireland to successfully achieve independence from the UK, which made them to have a more liberal trades and economic performances. For Germany, it is the opposite, its social transformation happened before the EMU establishment and even boosted the European integration. The establishment of European integration and EMU did not have a great impact on the development of Germany, but it was of great help to Ireland. Therefore, even if the overall development trend of the two countries is upward, separate sectors and the way of development of each is very different.

References

1. Gyork Emilia. "Economic Costs and Benefits of EMU Membership from the Perspective of a Non-member." *Open Econ Rev* 28, 2017, 893–921.
2. Delivorias Angelos. "A history of European monetary integration". European Parliament, 2015, 1-8.
3. European Central Bank. "Economic and Monetary Union." European Central Bank, European Central Bank, 10 July 2020, <https://www.ecb.europa.eu/ecb/history/emu/html/index.en.html>. Accessed 29 Jun, 2022.
4. Cordes Karen. "European Monetary Union: History and Institutions" IMF Website, 2005, 1-6.
5. Benjamin Conrad. "The European Monetary Union - Benefits and Potential Risks." *GRIN*, GRIN.cn, 13 May 2000, www.grin.com/document/95394. Accessed 18 July, 2022.
6. Pettinger, Tejvan. "The Strength of the German Economy Post-War." *Economics Help*, 6 Dec.

7. Preda Daniela. "The History of the European Monetary Union Comparing Strategies amidst Prospects for Integration and National Resistance" P.I.E. Peter Lang, 2013, 9-89.
8. "Germany - Agricultural Sector." *International Trade Administration | Trade.gov*, International Trade Administration, 16 Nov. 2021, <https://www.trade.gov/country-commercial-guides/germany-agricultural-sector>. Accessed 30 Jun, 2022.
9. "Ireland and Emu." *The Irish Times*, The Irish Times, 4 Oct. 2006, <https://www.irishtimes.com/opinion/ireland-and-emu-1.92417>. Accessed 2 July, 2022.
10. O'Donnell Rory. "IRELAND" S ECONOMIC TRANSFORMATION Industrial Policy, European Integration and Social Partnership." CERN Virtual Library, 1998, 8-23.
11. McAleese Dermot. "THE CELTIC TIGER: ORIGINS AND PROSPECTS". *OPTIONS POLITIQUES*, 2000, 46-50. Ng, Nicole. "CEP Study: Germany Gains Most from Euro Introduction: DW: 25.02.2019." *DW.COM*, Deutsche Welle, 25 Feb. 2019, <https://www.dw.com/en/cep-study-germany-gains-most-from-euro-introduction/a-47675856>. Accessed 30 Jun, 2022.
12. Dauderstädt Michael. "Germany's Economy Domestic Laggard and Export Miracle". *ECONOMY OF TOMORROW*, 2012, 2-13.
13. Verstegen, Loes; van Groezen, Bas; Meijdam, Lex. "Benefits of EMU Participation." Center, Center for Economic Research, 2017, 3-27.
14. Kelly John. *The Irish Pound: From Origins to EMU*. Quarterly Bulletin Spring 2003, centralbank.ie.
15. John Fitz Gerald, David Duffy, Diarmaid Smyth. *Managing an Economy Under EMU: The Case of Ireland*. ESRI Working paper No. 127.
16. Lane, P. R. (2009). *European Monetary Union and Macroeconomic Stabilization Policies in Ireland*. Report Prepared for National Economic and Social Council.
17. Bruton Richard. "Policy Statement on Foreign Direct Investment in Ireland." *Department of Jobs*, July. 2014, 1-24.
18. Posen, Adam. "Why Emu Is Irrelevant for the German Economy." *PIIE*, PIIE, 6 Sept. 2018, <https://www.piie.com/publications/working-papers/why-emu-irrelevant-german-economy>. Accessed 30 Jun, 2022.
19. Pettinger, Tejvan. "The Strength of the German Economy Post-War." *Economics Help*, 6 Dec. 2018, www.economicshelp.org/blog/143663/economics/the-strength-of-the-german-economy-post-war/. Accessed 15 July, 2022.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

