

## Successful collaboration between Eurozone countries: a case study of Germany and Greece

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### Abstract

This paper investigates productivity among countries using the Euro currency. It appears that there have been large differences between productivity in different countries, for more than ten years. However, analysis of data on wages and capital investment indicates a pattern that countries in richer Eurozone countries such as Germany tend to have relatively high wages, high investment, and high output; whereas poorer countries such as Greece generally have lower wages, less investment, and less output per employee. In addition, there is evidence that Greece has managed to excel in some specific products, and is exporting to Germany.

### Introduction

This paper investigates countries in the Eurozone, to investigate how far market forces have led to an efficient outcome. It may take some time for firms to adjust their output; so it seems unreliable to include countries such as Lithuania, which only began using the Euro in 2015. Hence, this paper is limited to countries which joined the Euro before 2007.

Evidence reported in this paper shows large differences between productivity, in different countries within the Eurozone; these differences seem to have persisted for more than ten years. This may appear inconsistent with economic analysis: we would expect market forces to drive out inefficient firms. Evidence reported in this paper suggests that much of the apparent difference in productivity (between countries) is due to lack of investment in peripheral Eurozone countries such as Greece.

A case study of exports from Greece to Germany is analysed; it indicates that for some (specialised) products, Greece has increased exports to Germany since 2010. This suggests it may be appropriate for EU institutions to support the Greek economy through the current crisis.

## Literature review

Economic problems are not new. The 1930s 'Great Depression' is seen by many economists as an important lesson: 'Those who cannot remember the past are condemned to repeat it' (Santayana, 1905). USA recovery in 1930s was assisted by the 'New Deal' associated with President Roosevelt; "the enemy was unemployment, and the weapon used to fight it was public works" (Smith, 2005: 8); the New Deal "sought to create long-term markets by building an infrastructure in underdeveloped regions" (Schwarz, cited in Smith, 2005: 15). Bernstein (1967: 264) wrote "the liberal reforms of the New Deal did not transform the American system; they conserved and protected American capitalism". Hanby (2004) claimed Roosevelt helped the world as a whole recover from depression in the 1930s.

When another global financial crisis occurred around 2008, President Obama implemented Keynesian policies (e.g. supporting the car industry): the USA federal government deficit was about 10% of GDP in 2009, 9% in 2010, and 9% in 2011 (Table 15.6 in Obama, 2012). This policy seems to have been successful: USA economic growth rates exceeded 2% in 2010 and 2011 (Table 10.1 in Obama, 2012), but "The euro area has not recovered from the crisis in the same way as the U.S." (Juncker et al., 2015: 7). Many EU countries show little recovery from the 2008 global financial crisis; "the current crisis in Europe is likely to be a protracted one, unless policymakers intervene" (Schmitt-Grohé & Uribe, 2013: 195). One possible solution for Greece and other troubled Eurozone countries is a Keynesian fiscal stimulus, i.e. more spending by EU organisations such as the European Parliament. For example, EU could spend more on education: "The basic strategy of expanding funding for individuals to attend a college or university and to get a degree, and funding the expansion of higher education institutions, has emerged internationally as a key component in national debates over the route to economic recovery" (Douglass, 2010: 3). However, despite European Commissioner's Marianne Thyssen's good intentions, "The Youth Guarantee is still very far from producing concrete effects" (Giuntella, 2015). Perhaps Europeans undervalue education – for example, "German universities have long suffered from declining funding on a per-student basis" (Douglass, 2010: 16).

Some observers compare the German Chancellor Merkel to President Roosevelt (Sopel, 2015). "The iconic national leader of the early 21st century is Chancellor Angela Merkel of Germany. She inspires no one. A physicist by training, she succeeds by rigorously examining the landscape of the possible and operating within it. Rather than seek to revolutionize her country or the world, she accepts what Germans call the *gegebenen Bedingungen* — the actual, given conditions. Realism is the key to her success. She is a master mechanic" (Kinzer, 2005). Drum (2014) is less positive about Chancellor Merkel: "Over the past five years, Germany has seemed almost spitefully hellbent on destroying the European economy simply because Germans disapprove of the spendthrift southerners responsible for the mess — all the time self-righteously refusing to admit that they themselves played a role that was every bit as lucrative and self-serving in the whole debacle [...] Does Merkel share this view of things? Or does she recognize what needs to be done but simply doesn't have either the will or the courage to challenge German public opinion?"

Perhaps Chancellor Merkel could arrange for Greece to have more time to restructure its debts. Christine Lagarde, head of the IMF, stated "We must all understand that this is a defining moment. It is not about saving any one country or region. It is about saving the world from a downward economic spiral" (IMF, 2012). European Commission President Jean-Claude Juncker stated "We don't have the right to deal with the Greek people as if they were the neglected part of Europe. The Greek people have great dignity. This is a great nation, although being from time to time a weak state, and we have to show solidarity with the Greeks" (Gotev, 2015).

Several economists blame ECB for some of the current problems in the Eurozone (Schmitt-Grohé & Uribe, 2013; Simister, 2015). "By January 2010 the need should have been clear. Rather than going into shock, leaders in Frankfurt and Brussels could have welcomed the Greek crisis as a useful opportunity to establish a precedent for the long-term life of the euro" (Frankel, 2011).

Many writers see commercial investment as the key to Europe's future. Could increased investment by successful firms lead to concentration of expertise in one location? Economists refer to this as 'external economies of scale' – for example, a successful film industry in Hollywood can spur local firms in related industries (such as lighting, editing, and costumes) to thrive. This seems straightforward in USA, but may lead to practical problems in Europe:

for example, if a UK firm wished to supply components to a French firm, any profit the UK firm expected could be destroyed by variations in the exchange-rate between the UK £ and the Euro. No single European country seems big enough to provide sufficient economies of scale (among domestic consumers) to bring down prices to a level able to compete with, for example, the Boeing Corporation in USA. Hence, we might expect any serious competition to USA's position as the world's leading economy would arise in a large country China or India ... unless the Euro could be maintained.

## **Data and methods**

This paper combines data from several sources, including factory output data from UNIDO (2015), and wage data from OECD (2015). Productivity is measured by 'value added': the value of a factory's output, subtracting the cost of raw materials bought by the factory – for example, a car factory might purchase car seats & car tyres, in order to assemble them into a finished car.

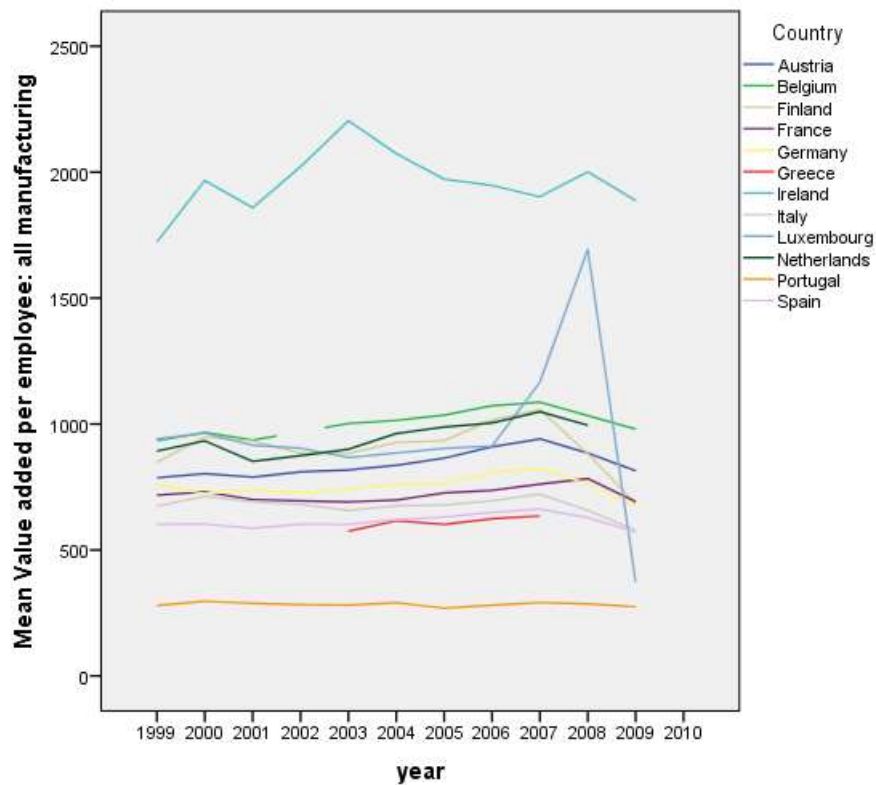
Data are calculated by the author as Euros per year per employee; data are converted by the author to constant 2005 prices, using World Bank (2013), except for UN (2015) data.

International trade data for Chart 6 are obtained from UN (2015), which "contains detailed merchandise trade data provided by countries (or areas) to the United Nations Statistics Division, Department of Economic and Social Affairs"; this reports monthly trade data, on specialised products. The trade data are reported in US\$, at current prices; it would be possible to convert their data to Euros, at constant prices – but UN (2015) only provide data from 2010, and because 1 Euro has remained approximately equal to US\$1 over this period, so it seems reasonable (for this paper) to approximate data in Chart 6 as Euros. Due to time constraints, only a very small fraction of this excellent data source has been investigated for this paper – more research is needed.

## **Results**

New empirical evidence in this paper begins by comparing productivity between different Eurozone countries. Which countries are most efficient at manufacturing? As explained in the introduction, this paper focuses on countries which have been in the Eurozone since before 2007.

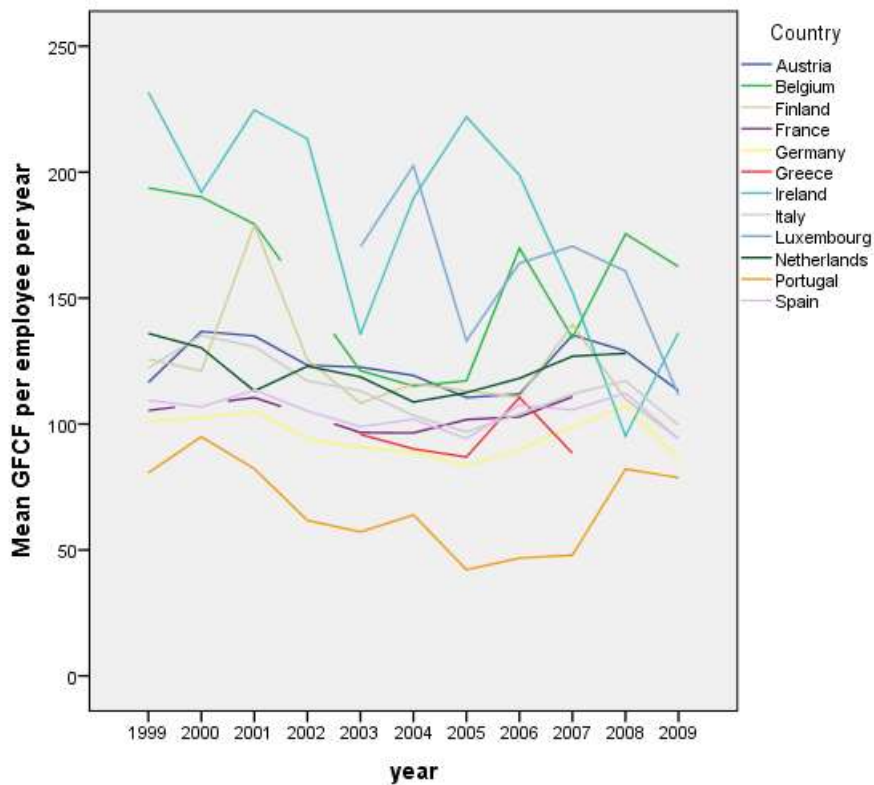
Chart 1: 'value added' per employee, by year and country (all manufacturing)



Source: see 'Data and methods' section.

Chart 1 indicates that factories in Portugal are (on average) far less productive than factories in Ireland. Greece has fairly low productivity; Germany is about average, among these 12 countries. A striking feature of Chart 1 is that the lines tend to be fairly close to horizontal lines (except for Luxembourg, which shows an increase in 2008: this is likely to be spurious, due to the relatively small size of Luxembourg). Does this mean Ireland will always be more productive than Portugal? There are various reasons to anticipate other Eurozone countries catching up with Ireland – some of these reasons are discussed below.

**Chart 2: Gross Fixed Capital Formation, by year and country (all manufacturing)**



*Source: see 'Data and methods' section.*

Chart 2 uses 'Gross Fixed Capital Formation' to measure investment; it shows a tendency for countries which had low productivity in Chart 1, such as Portugal, to have relatively low investment. This seems consistent with the idea that lack of investment (in Chart 2) may explain much of the apparent differences in productivity between countries (in Chart 1). However, the causality is not clear: for example, successful firms tend to have higher profits, which allows them to invest more by using some of their retained profits.

We can obtain a more complete picture of productivity in Europe by adding wage-rates to this analysis, as shown in Table 1; this table shows the larger Eurozone countries, and Greece. In all of these countries, 2009 is the latest available data.

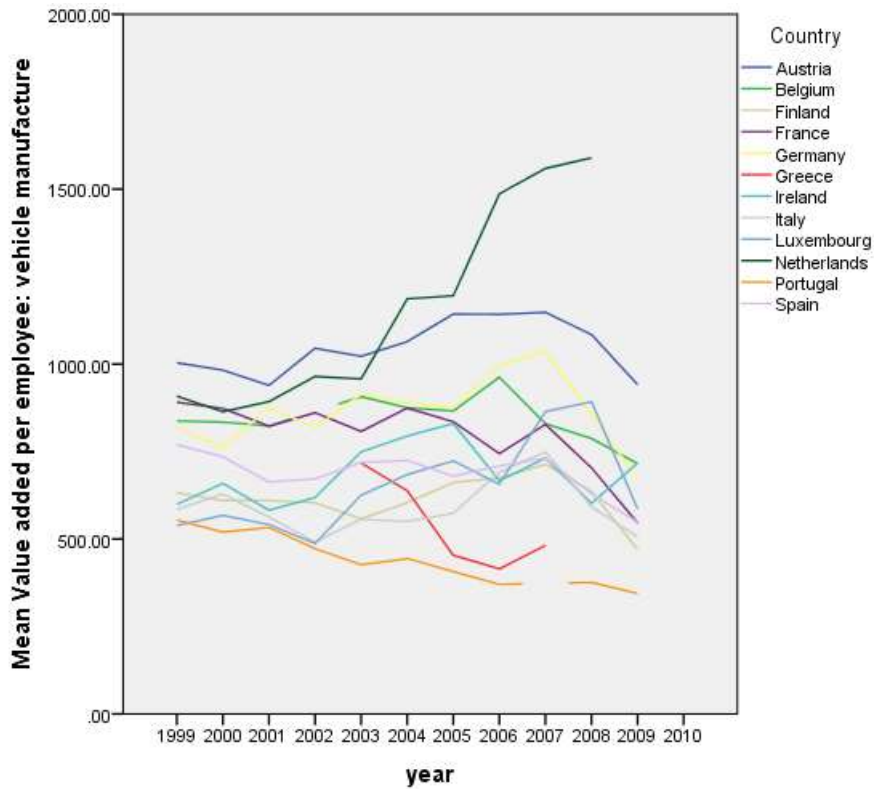
**Table 1: investment, wages, and output, by country and year**

Country	year	Gross Fixed Capital Formation	Average annual wage	Gross Fixed Capital Formation plus wage	'Value Added' by factories
France	2003	96.60	358.45	455.05	690.89
	2004	96.49	364.10	460.59	698.09
	2005	101.78	368.93	470.71	726.80
	2006	102.86	374.86	477.72	736.69
	2007	110.80	378.79	489.58	761.49
	2008		377.56		783.38
	2009		384.01		692.03
Germany	2003	90.58	385.22	475.80	742.35
	2004	88.87	382.61	471.48	762.46
	2005	83.62	381.98	465.60	762.55
	2006	89.79	380.61	470.40	811.14
	2007	99.03	377.57	476.60	820.93
	2008	107.20	376.16	483.36	763.19
	2009	85.96	375.04	461.00	676.23
Greece	2003	95.84	223.08	318.92	574.64
	2004	90.14	227.75	317.88	615.87
	2005	86.89	231.09	317.98	601.32
	2006	110.58	235.66	346.24	624.29
	2007	88.43	237.68	326.11	634.96
	2008		234.46		
	2009		245.06		
Ireland	2003	135.54	494.99	630.53	2204.19
	2004	189.66	509.32	698.97	2073.44
	2005	221.99	525.99	747.99	1972.06
	2006	198.75	525.86	724.61	1947.33
	2007	152.22	530.27	682.48	1902.40
	2008	95.32	538.43	633.75	2001.09
	2009	136.29	568.22	704.51	1887.77
Italy	2003	113.19	301.33	414.52	656.62
	2004	103.39	308.08	411.46	675.64
	2005	96.89	311.76	408.65	678.42
	2006	104.00	314.31	418.31	695.23
	2007	111.90	315.58	427.48	721.85
	2008	117.21	314.20	431.41	657.13
	2009	99.49	312.07	411.57	578.08

Sources: see 'Data and methods' section. All figures are Euros per employee, per year.

In Table 1, the second column from the right (GFCF plus wages) is calculated by the author as a crude proxy for firms' production costs; Table 1 indicates that 'value added' usually exceeds labour and capital costs, but other factors such as Value Added Tax (not examined in this paper) complicate this picture. Table 1 also confirms evidence in Chart 2, that at least some of Greece's low productivity in Chart 1 can be explained by low investment in Greece (compared to higher investment in Ireland, for example).

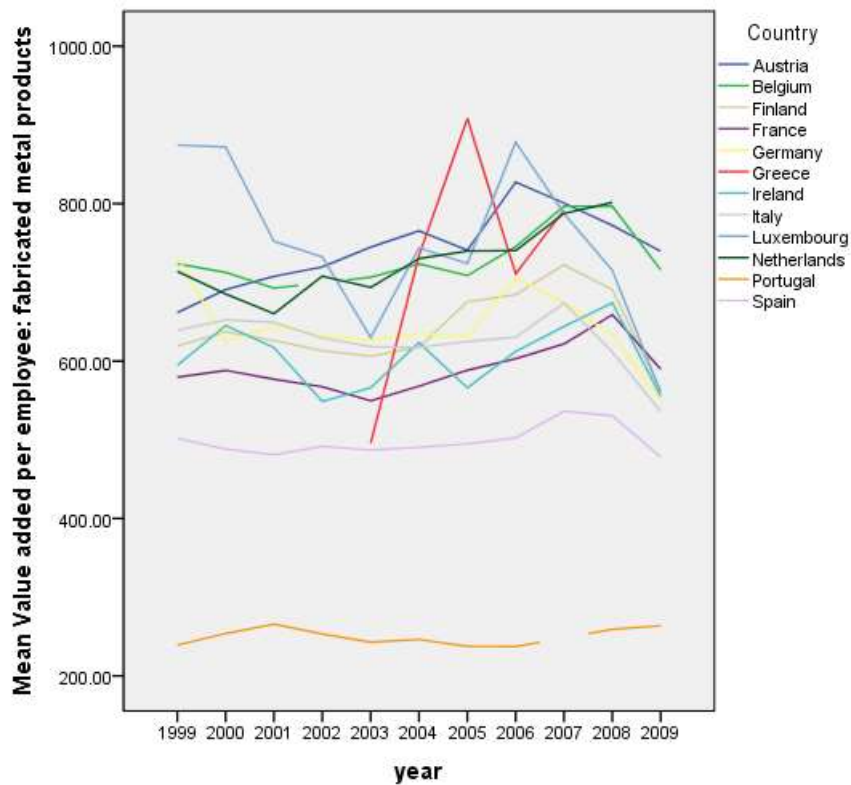
Chart 3: 'value added' per employee, by year and country: vehicles



Source: see 'Data and methods' section.

Chart 3 focuses on manufacture of vehicles: it shows that changes have been happening in Europe, regarding vehicle production. There has been increasing productivity of car production in, for example, Netherlands and Germany. This pattern is not shown for countries such as Greece or Portugal, which may cause concern for politicians seeking to help Europe develop; however, it can be argued that it would not be appropriate for every country to focus on vehicle manufacture; as explained below, Greek entrepreneurs and employees have other options.

Chart 4: 'value added' per employee, by year and country: fabricated metal products

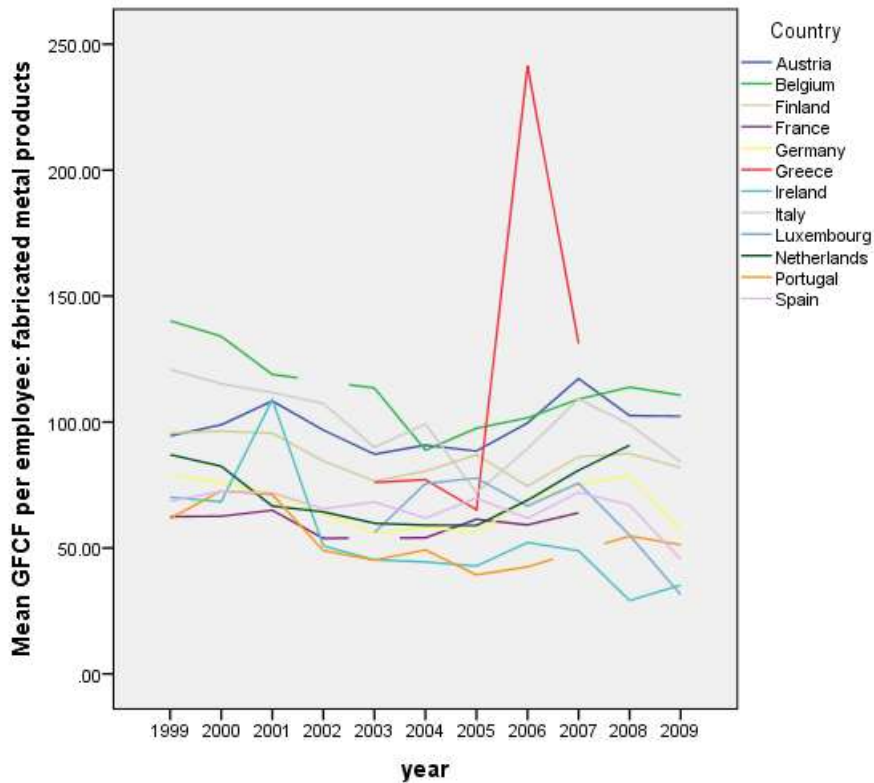


Source: see 'Data and methods' section.

Chart 4 indicates that employees in Greece obtained higher productivity in 'fabricated metal products' since 2003 (Greek data are missing for some years, in the UNIDO data source). This is an example of a specialised form of manufacturing: there are many other manufacturing divisions (not discussed in this paper) in which the Greek economy began to show productivity improvements in the last decade. Unfortunately, progress in Greece and other Eurozone countries was interrupted by the global banking crisis around 2008. The current situation in Europe seems to offer little encouragement for firms to invest; can Greece manufacturing recover?



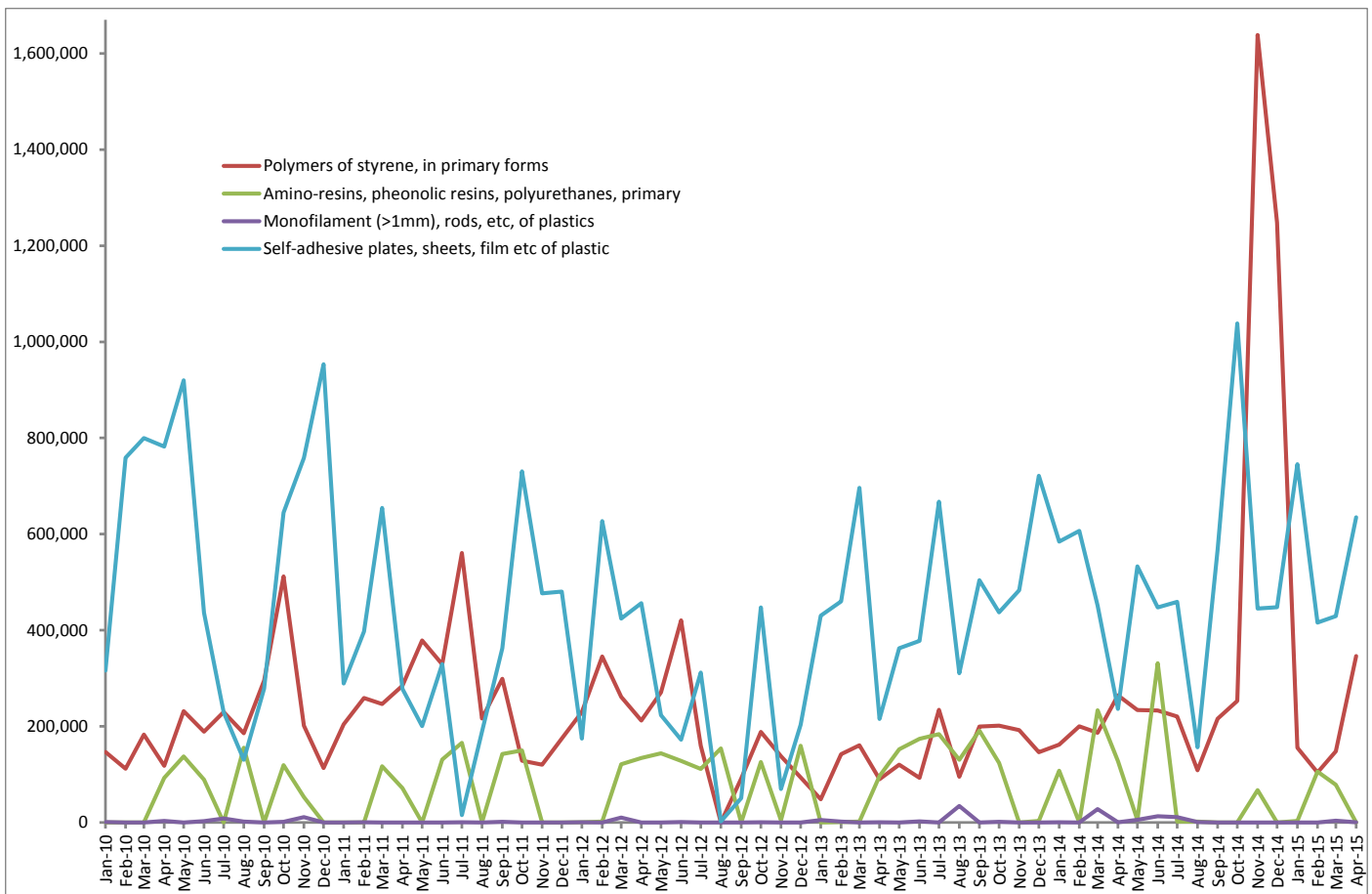
**Chart 5: Investment per employee, by year and country: fabricated metal products**



*Source: see 'Data and methods' section.*

Chart 5 shows an increased investment in Greece, in 2006, in factories producing 'fabricated metal products'. This may not be the clearest example (due to limited time for this paper: more research is needed). Chart 5 suggests firms in Greece (and other Eurozone countries) began to invest from 2005, i.e. a few years after the Euro began – until the global crisis (which began around 2008) disrupted progress. Charts 4 and 5 suggest a cause-and-effect sequence as follows: Greek factories became more efficient at producing fabricated metal products in 2005 (Chart 4); investment increased in these Greek factories in 2006 (Chart 5); but the global financial crisis starting around 2008 marked the end of progress by Greek entrepreneurs & employees. However, the following evidence suggests firms in Greece (and the Eurozone) were not defeated by the 2008 crisis; there has been increasing specialisation during Europe's recovery.

**Chart 6: Value of selected exports from Greece to Germany: US\$ per month**



Source: see 'Data and methods' section.

Chart 6 shows how Greek exports to Germany varied since 2010, for four selected products; 'Monofilament' exports from Greece to Germany seem small in Chart 6, but they were worth about \$35,000 in August 2013. There is a lot of random variation from month to month; but there seems to be a tendency for increases in these four products to increase, from 2010 to 2015.

We might think of economic development as "vertical integration": for example, a car factory could be expanded to allow the same factory to produce engines as well as assembling cars. But we see the opposite of vertical integration in Charts 1 to 6: there is increasing specialisation in the Eurozone. Economists associate such specialisation with the pin factory described by classical economist Adam Smith, and "the invisible hand" (sometimes interpreted as the invisible hand of God): factory workers are encouraged to improve products to please consumers, leading to a good outcome for society.

Recent research suggests altruism is a key aspect of Europe's progress. For example, describing a project between Germany and Greece, European Commission (2014) wrote "it took a certain amount of altruism to release work in progress to the consortium. Building up that trust among such a large consortium was a first". Similarly, "the world will also thank Germany for affordable solar power, not because the technology was invented there, but because its citizens will have paid for the critical cost-reduction phase by offering a large market [...] Germany's decade-long support of the rollout of solar photovoltaic (PV) technology has forced the technology down the cost curve at an accelerated rate. Before 2015, it will be fully commercial for sunny South Africa, Greece, or Mexico and soon, thereafter, for Germany itself. Without Germany's energy policy, this reduction in costs would have taken far longer to achieve" (Kupers, 2011).

## Conclusions

Within the Eurozone, there is a large difference between northern countries, and southern countries: in general, northern countries tend to produce more output per employee, and Chart 1 shows this difference continuing. This may surprise economists: how could low-productivity firms survive? According to evidence in this paper, this difference in productivity can be explained: countries in the south of the Eurozone tend to be poorer countries, in which wage-rates are generally low by European standards; and southern Eurozone countries tend to have less investment per employee. There tends to be more investment in richer countries such as Germany, than in poorer countries such as Greece – which is probably complicated by feedback effects: for example, in richer countries, it makes sense for employers to replace (relatively expensive) labour by machinery, which then increases productivity in those countries.

The Greek experience of low productivity in recent years seems especially surprising, given Greece's success in shipbuilding in previous decades (Nallu, 2014) – there is no reason to question the skills of Greek engineers and other employees; and Greece had one of the highest rates of economic growth in Europe, before the 2008 global financial crisis. Why did Greek industry choose to produce different products? No doubt Greek entrepreneurs have knowledge which economists don't – it seems unlikely that firms would make information public, if they found highly profitable new products to sell.

As the author of this paper, an economist who studied physics at university, I cannot explain why German firms choose to import products such as 'Monofilament (>1mm), rods, etc, of plastics' from Greece. German engineers & managers know what they are doing: Germany is the third-largest exporter in the world, after much bigger countries China and USA (World Bank, 2015). Perhaps German firms simply seek the cheapest components – but this seems unlikely, given the high-status and high-priced products such as BMW cars; it seems implausible that Europe can match the low prices feasible in countries such as China & India. Europe thrives in international cooperation within Europe, such as Airbus (one of the world's most successful aircraft producers, currently competing with Boeing in USA); if German engineers buy components made in Greece, it seems likely that Greek engineers have also developed world-class expertise in their own specialisms.

Simister (2015) argues that the European Central Bank (ECB) is partly to blame for Greece's current problems; and ECB could solve many of Greece's problems 'at the stroke of a pen', at almost no cost to European taxpayers. However, Simister argues, it would create moral hazard and other problems if Greece were the only recipient of ECB support; hence, it may be appropriate for Eurozone governments to ask ECB to be more active. If Greece leaves the Eurozone, or even the EU, Germany will survive; but German exports would be weaker without the expertise of Greek employees, even if no other countries follow Greece and leave the Eurozone.

Future historians will, no doubt, argue over why the Eurozone has been so successful. Perhaps they will see July 2015 as a turning-point (if Greece leaves the Euro, it seems probable that other countries will follow). They may suggest the 1929 Wall Street crash, resulting in the 1930s 'great depression', was echoed in the 2008 global financial crisis – which led to the end of the Eurozone experiment. Some of Europe's decision-makers may lack understanding of Keynesian economics (that governments should spend more in a recession) or of Monetarism (that the ECB should have maintained inflation at about 2% per year, by printing money). But historians should never forget that for a fleeting moment (from 1999 to 2015), the Eurozone showed that international cooperation showed that Europe's visionaries were correct: politicians, engineers, and other factory workers built a better world.

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