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Capital flows and labour-market distortions

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Capital flows and labour-market distortions

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Abstract

In this paper we explore employment data for several countries that were severely affected by the recent financial crisis. We compare pattern in the employment data of several capital inflow countries with German employment numbers. These countries all experienced capital inflows in the years before 2008 crisis but differ in their currency arrangements. We find that the market distortions were significant in all countries that experienced capital inflow. In comparison, sectoral reallocation during this period in Germany, the main capital outflow country, was small.

1. Introduction

Mainstream economics has taught policy makers to think of the economy as producing only one type of output. Policy makers, journalists and economic commentators often discuss such measures as economic growth, productivity, employment and wages without considering the changing structure of the economy. A recession, brought about by a fall in demand, will then be seen to reduce income, consumption and investment while increasing unemployment. Popular remedies take the familiar form of expansionary fiscal and monetary policy. In this tradition, the policy responses to the global financial crisis of the past five years have consisted of expansionary policies without much attention being paid to sectoral imbalances. But, to quote Amar Bhidé, "counting on monetary policy to secure full employment is like attempting vascular surgery with a dull ax," since diversity and dynamism are vital features of our economy.[1]

But what if there were more than one sector in the economy? The roots of the current financial crisis can be traced to capital flows. A capital inflow into an open economy by raising the real exchange rate and generating credit in the banking system could make some sectors, such as construction and retail; expand while others, such as manufacturing, contract. The reversal of capital flows, bringing about a real exchange rate depreciation and reduced credit creation, would then make the expanding sectors unprofitable. The effect of expansionary monetary or fiscal policy might be limited in this case. An expansionary policy might, to take an example, slow down the necessary labour adjustment. Instead, time may be needed following a crisis for the allocation of labour across sectors to reach equilibrium again, equilibrium being defined by the absence of unsustainable capital inflows or outflows.

The crisis has been particularly acute in countries that had capital inflows before its onset in 2008. As it turns out, the cessation of the capital flows caused a financial crisis in the countries with the highest current account deficits in 2007. These were Latvia (current account deficit of 22.3% of GDP in 2007), Iceland (20.2%), Estonia (17.7%), Lithuania (14.6%), Greece (14.3%), Spain (10.1%) and Portugal (9.5%). In addition countries with large financial sectors such as Ireland (deficit of 5.3%), the U.K. (2.7%) and the U.S. (5.3%) suffered a near meltdown of their financial sectors and a recession caused by the contraction of the financial sectors and, in the case of Ireland and the U.S.,

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[1] Amar Bhidé, "Wanted: A Boring Leader for the Fed," New York Times, 20 August 2013.

the bursting of a housing bubble. Ireland also experienced significant capital inflows.

We will analyse employment data from some of the worst affected countries; Iceland, Ireland and Spain, the three small Baltic economies of Estonia, Latvia and Lithuania and Greece, to show that the boom that preceded the bust affected the allocation of labour across industries and pay particular attention to Iceland, Ireland and Spain. We will then compare the employment patterns found in these countries to those of Germany, which had a capital outflow. We ask how distorted were the real economies of these worst affected countries before the onset of the financial crisis? And, which were more distorted, the Eurozone economies or the floating exchange rate economy of Iceland?

2. Literature

Although sectoral imbalances do not feature prominently in modern macroeconomics, this was not always so. Economists of an earlier generation such as Wassily Leontief (1941), Ragnar Nurske (1934) and Emil Lederer (1931), often associated with the so called Kiel School of Economics, based their work on an old tradition in European economics of using models with many sectors, a tradition that goes back at least to Tugan-Baranovsky and Alfred Spiethoff. Hayek (1931) used the two sector framework but differs from the others in emphasizing monetary shocks sparking a debate about the relative importance of monetary and productivity shocks. In the Hayekian model, an increase in credit increases the size of the capital producing sector relative to the consumer goods sector and a recession follows when the credit generation comes to an end causing unemployment in the capital goods sector. The Kiel School economists, in contrast, showed how technological progress in one sector drew labour from other sectors while a technology slowdown could cause increased unemployment in the slowing sectors. In Schumpeter (1942) the activities of entrepreneurs explain both long run growth as well as the business cycle.

Later economists derived formal two-sector growth models, such as Uzawa (1961) and Foley and Sidrauski (1971), in which one sector produces a consumption good and is capital intensive while the other produces a capital good in a labour intensive manner. This framework has also been applied to labour markets. Kanaginis and Phelps (1994) study fiscal policy in a two sector model. They show how increased public debt contracts employment by driving up the real rate of interest making the labour intensive capital sector contract. Moreover, changes in government purchases have an effect which

depends on whether they fall on the capital goods sector or the consumer goods sector.[2] In an earlier paper, Harris and Todaro (1970) showed how unemployment can arise when workers migrate from a contracting rural sector to an expanding urban sector. In equilibrium the expected urban wage equals the rural wage – the higher the urban wage the higher is the unemployment rate and the lower is the probability of getting an urban job.

Phelps (1994) presents a model of the natural rate of unemployment in a two sector model where one sector produces a labour-intensive capital good while the other produces a capital-intensive consumer good. An increase in the relative prices of the capital goods sector raises the demand prices of labour and lowers the natural rate of unemployment when real wage rigidity is captured by an upward-sloping wage curve in the employment-real wage plane. This framework can be applied to study the labour market effects of financial crises, as in Zoega (2010). The expansion of credit precedes a financial crisis generating rising asset prices and optimism about future profitability. During this period firms invest in physical capital. Following the financial crisis the cost of capital goes up and its availability falls and the labour demand curve shifts back toward its original position as the capital-goods sector contracts. Real wages fall and unemployment rises.

There have been other applications of two sector models to financial crises. Jonung, Söderstöm and Stymne (1996) describe the role of balance sheet adjustments in reducing investment. They also describe the structural distortions in the pre-crash economy where sectors that rely on low real interest rates and high real exchange rate expand at the expense of other sectors. These are mainly the construction sector, the retail sector and the financial sector which expand at the expense of the manufacturing sector. When real interest rates rise and the real exchange rate falls these sectors must contract and unemployment is generated while workers are gradually absorbed by the now expanding manufacturing sector.

Financial crises are often preceded by large current account imbalances. Blanchard (2007) describes the impact of current account imbalances on the real economy.[3] In

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[2] Higher government purchases of the consumer good raise employment while raising the real interest rate and lowering the real wage with a positive impact on labour supply. In contrast, higher purchases of the capital good reduce the real interest rate and raise the real wage and employment with a positive impact on both labour demand and supply.
[3] See also Lane (2010) and Giavazzi and Spaventa (2011).

particular, large imbalances cause significant inter-sectoral shifts in economic activity. Large current account deficits expand the nontraded sector at the expense of the tradables sector and the return to current account surpluses causes a rebalancing consisting of a contraction of the nontraded sector and an expansion of the tradable sector. Krugman (1987) and Summers (1988) argue that a deficit may have long term effects if there is greater productivity growth due to learning by doing in the tradables sector. In contrast, persistent current account surpluses coincide with the growth of the tradables sector and falling surpluses require the contraction of this sector.

Lane and Pels (2011) explain the pattern of recent current account imbalances for a sample of 30 European countries. They find that lower income countries tend to run deficits in accordance with the convergence prediction of neoclassical growth models; see also Blanchard and Giavazzi (2002). In addition, higher deficits go together with high growth projections. The convergence result stems from the inclusion of Euro zone countries since it cannot be found in the data when these countries are excluded – capital flowing from low income China to high income United States, to take just one important example. Finally, the relationship between growth forecasts and the current account balance became stronger between 2002 and 2007, mainly through greater volumes of construction investment in the more optimistic countries. However, these capital flows caused house price bubbles – instead of raising productivity in the tradables sector – and reduced competitiveness in the receiving countries; see also Chen (2011).

3. Macroeconomic developments

The global financial crisis that started in 2008 was preceded by very large current account imbalances. Table 1 lists the surplus and deficit countries at the height of the boom in 2007 before the near collapse of the international banking system. China, Germany and Japan were the biggest net savers – had the biggest current account surpluses – all supplied in excess of 200 billion dollars in 2007. China comes on top with 371 billion, then Germany with 263 billion and Japan with 210 billion dollars. A distant fourth is Saudi Arabia with 93 billion dollars. The United States is the biggest deficit country with a deficit of 727 billion dollars. The U.S. alone spends approximately the surplus savings of China, Japan, Saudi Arabia and Norway while in Europe Spain, the U.K. and Greece manage to spend the surplus savings of Germany.

Table 1. Current account surplus/deficit in 2007 (Millions of US dollars)

Millions of US dollars				Per cent of GDP			
Surplus countries		**Deficit countries**		**Surplus countries**		**Deficit countries**	
China	371,833	United States	-726,571	Saudi Arabia	24.3	Latvia	-22.3
Germany	263,056	Spain	-144,657	Norway	15.6	Iceland	-20.2
Japan	210,490	U.K.	-74,729	China	11.0	Estonia	-17.7
Saudi Arabia	93,390	Australia	-58,032	Luxembourg	10.0	Lithuania	-14.6
Russia	77,012	Italy	-51,574	Switzerland	9.5	Greece	-14.3
Netherlands	67,462	Greece	-44,587	Netherlands	8.7	Spain	-10.1
Norway	60,459	Turkey	-37,697	Sweden	8.6	Portugal	-9.5
Switzerland	40,566	France	-26,620	Germany	7.9	New Zealand	-7.8
Sweden	39,130	Portugal	-21,179	Russia	5.9	South Africa	-7.3
Canada	29,936	South Africa	-20,572	Japan	4.8	Australia	-7.1
Austria	13,189	Poland	-20,253	Chile	4.4	Hungary	-6.8
Indonesia	10,493	Ireland	-13,850	Finland	4.3	Turkey	-5.8
Finland	10,481	India	-11,284	Austria	3.6	Ireland	-5.3
Belgium	9,512	New Zealand	-10,542	Argentina	2.8	United States	-5.3
Argentina	7,384	Hungary	-9,375	Indonesia	2.4	Slovak R.	-4.9
Chile	7,189	Mexico	-8,335	Canada	2.1	Poland	-4.8
Korea, Rep.	5,876	Latvia	-6,425	Belgium	2.1	Czech R.	-3.3
Luxembourg	4,988	Czech R.	-5,754	Denmark	1.5	U. K.	-2.7
Denmark	4,769	Lithuania	-5,692	Korea, Rep.	0.6	Italy	-2.4
Brazil	1,551	Slovak R.	-4,103	Brazil	0.1	France	-1.0
		Iceland	-4,096			India	-1.0
		Estonia	-3,805			Mexico	-0.8

Source: World Bank.

In Europe we also have the Netherlands as a big saver (67 billion dollars), Norway and Sweden (60 and 39 billion dollars respectively); while some other countries have smaller surpluses. The big spender in Europe is Spain (144 billion deficit), which uses up more than half the German surplus, then there is the U.K. with a deficit of 74 billion dollars, Italy with 51 billion, Greece with 44.5 billion and France with 26.5 billion.

The deficits of the three Baltic states – Estonia, Latvia and Lithuania – together come out at around 16 billion dollars and Iceland plays its part by spending 4 billion dollars in excess of its income. The European Union has a balance vis-à-vis the rest of the world.

Relative to GDP, the ranking of the countries is much different. Saudi-Arabia now becomes the biggest saver, followed by Norway, China and Luxembourg while Latvia, Iceland, Estonia, Lithuania, Greece, Spain and Portugal are the biggest dissavers. The construction boom in Ireland was also fuelled by capital inflows. The net foreign liabilities of the Irish banks grew from 10% of GDP to 60% of GDP between 2003 and 2006.[4] The Irish construction boom, however, was not confined to Ireland since the capital outflows reduced the current account deficit to 5.3% in 2007.

The capital inflow into the Baltic countries, Spain, Greece, Portugal, Iceland and Ireland created a domestic credit expansion[5] and a boom that preceded the bust. The real exchange rate appreciated between 2003 and 2007 while the current account went into deficit. Table 2 shows the development of key macroeconomic variables in the period 2000-2007, 2008-2009 and 2010-2012 for three of the capital inflow countries; Iceland, Ireland and Spain and the most important capital outflow country which is Germany. All inflow countries share the pattern of very high investment, rising asset price, low inflation and high growth during the expansionary period with very large current account deficits in Iceland and Spain. The annual rate of credit expansion in Iceland between 2003 and 2007 was 37.8%; it was 21.1% in Ireland and 18.3% in Spain. The average rate of change of (nominal) house prices during the same period was 15.4% in Iceland, 10.7% in Ireland and 14.4% in Spain. Stock prices rose at a rapid rate but less than house prices with one exception, the stock market boom in Iceland was much stronger than the house price boom with stock prices rising at an annual rate of 40.4%.

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[4] See Lane (2011b).
[5] Lane and McQuade (2012) showed a strong correlation between capital inflows and domestic credit growth during the pre-crisis period.

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Table 2. Macroeconomic developments

	Iceland			Ireland			Spain			Germany		
	03-07	08-09	10-12	03-07	08-09	10-12	03-07	08-09	10-12	03-07	08-09	10-12
Real GDP growth	5.6	-2.7	0.1	4.9	-4.3	0.4	3.5	-1.4	-0.4	1.7	-2.0	2.6
Nominal GDP growth	10.0	7.2	4.5	7.7	-7.5	0.4	7.6	-0.2	0.1	2.6	-1.1	3.7
CPI growth (inflation)	4.2	12.4	4.9	3.4	-0.2	1.1	3.1	1.9	2.5	1.6	1.5	1.7
Private consumption growth	7.0	-11.4	1.8	5.4	-2.8	-0.4	3.7	-2.2	-0.8	0.4	0.5	1.1
Export growth	6.1	7.0	2.8	5.2	-2.5	4.4	4.8	-5.5	7.3	8.4	-5.0	8.5
Stock market growth (%)	40.4	-68.3	12.0	14.0	-44.2	5.8	18.1	-20.0	-9.1	13.0	-22.6	8.7
Credit expansion (%)	37.8	-16.8	-3.6	21.1	-1.5	-2.7	18.3	7.5	-1.0	-0.2	2.2	1.1
House price growth (index)*	15.4	-1.7	2.8	10.7	-15.0	-2.7	14.4	-6.1	-7.3	-0.5	0.6	4.5
Fixed investment growth	17.3	-35.9	3.1	7.7	-18.3	-10.8	5.9	-11.4	-6.9	2.5	-5.2	3.2
Fixed investment/GDP (%)	27.0	19.1	13.7	25.3	19.0	11.2	29.2	26.1	20.8	17.8	17.9	17.7
Unemployment (%)	2.8	5.1	6.9	4.5	9.2	14.4	9.7	14.7	22.3	10.1	7.7	6.2
Current account/GDP	-14.0	-18.2	-6.5	-2.6	-4.0	2.2	-7.0	-7.2	-3.1	5.0	6.1	6.5
Household gross saving/disposable income (%)**	5.5	16.2	6.3	8.3	12.4	11.6	10.9	15.8	12.4	16.3	17.2	16.8
Public saving/GDP (%)	2.8	-11.7	-6.4	1.3	-10.6	-17.0	1.0	-7.9	-9.9	-2.6	-1.6	-1.6
Real exchange rate app. (%)	5.9	-28.5	4.8	5.2	0.2	-6.6	3.1	0.7	-5.4	-1.3	1.4	-2.8

Sources: Macrobond, Statistics Iceland

*Germany: Urban Residential Property Price Index; Iceland: Whole Country; Ireland: Second Hand Houses; Spain: Tinsa, Housing Price Index

**The data for Iceland is not fully comparable

The real economy was affected in all the countries. Investment grew annually at 17.3% in Iceland 7.7% in Ireland and 5.9% in Spain. Consumption grew at 7% in Iceland, 5.4% in Ireland and 3.7% in Spain. Iceland had annual growth of real output of 5.6%, followed by Ireland at 4.9% and Spain at 3.5%. Inflation remained low in all three countries; unemployment was low by the standards of each country; and the public sector accumulated surpluses.

The reversal of capital flows that occurred in 2008 made asset prices fall. The record fall in stock prices occurred in Iceland (68.3%). House prices fell by 1.7% in Iceland[6] in nominal terms and by 14.1% in real terms. In Ireland,[7] house prices fell by 15% per year and by more than 6% in Spain.[8] Growth became negative in all the countries, the most severe contractions taking place in Ireland. The slump was caused by the collapse of investment. Private debt accumulation was replaced by public sector deficits, which exceeded 10% of GDP in Iceland and Ireland. Private saving increased in all three countries, Iceland's ratio to GDP jumping from 5.5% to 16.2% due to the effect of the large depreciation of the krona on the price of imports.

A significant part of the capital flows emanated from Germany where one can see a very different pattern in the data. The real exchange rate depreciated, the current account surplus was 5% of GDP, real house prices fell, investment grew at only 2.5% per year; consumption grew at 0.4% and GDP at 1.7%. Exports grew robustly at 8.4% per year and household savings at 16.3% of GDP exceeded those of Icelandic households (5.5%), Irish households (8.3%) and Spanish households (10.9%). The reversal of capital flows made the real exchange rate appreciate. Exports fell and real GDP fell. While stock prices fell, house prices in fact grew and the share of investment of GDP did not fall. Looking at the numbers for 2010-2012 we find signs of a recovery in Iceland and Ireland while Spain's problems deepen.

Figure 1 shows the savings and investment for Iceland, Ireland and Spain over the period 1990-2007. Note that the years 2005-2007 form distinct outliers, showing high investment not matched by similarly high rates of saving.

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[6] See Aliber (2010), Benediktsdottir et al. (2010), Gylfason et al. (2019) and Buiter and Sibert (2010) on the crisis in Iceland.

[7] See Lane (2011) on the Irish crisis and Lane (2012) and Mody and Sandry (2012) on the European sovereign debt crisis. Lane (2006) describes the increased economic integration within the eurozone and the dangers of a financial crisis in any one member country endangering the project.

[8] See Suarez (2010) on the Spanish crisis.

Figure 1. Gross domestic saving and investment (% of GDP)

Iceland
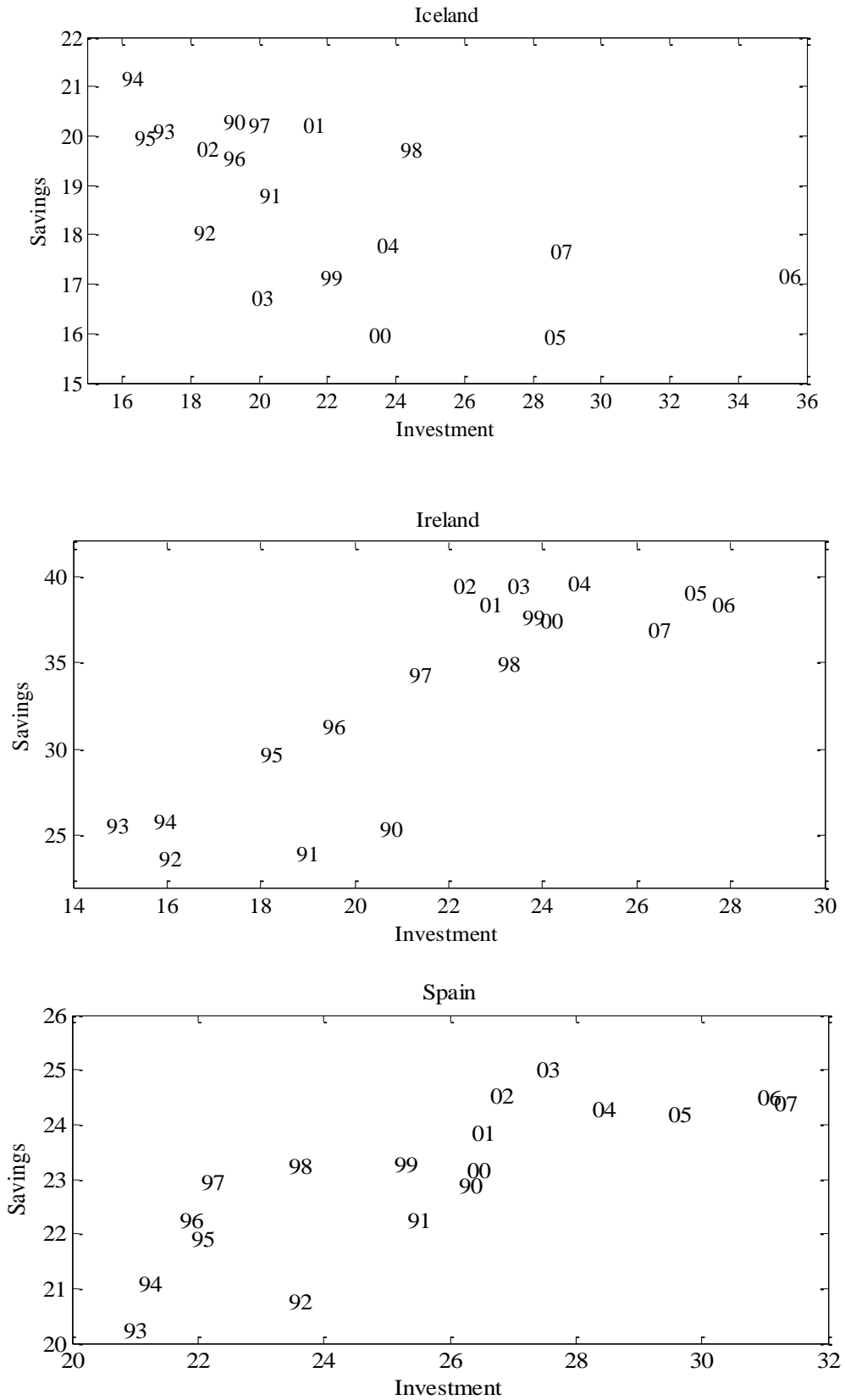
Ireland

Spain

Source: World Bank.

For Spain these years are unmatched in the period 1990-2004 with investment close to 34% of GDP and saving between 24% and 25% of GDP. Ireland appears to differ from our reference group in that saving exceeds investment for the whole period but this is due to GDP far exceeding GNP. Ireland did have a current account deficit for most of this period and experienced an investment boom in 2005-2007.

Investment boomed in Iceland, Ireland and Spain. However, the behaviour of saving differed between the countries. In Iceland public savings increased while private savings fell significantly, the latter making domestic savings fall. In Ireland private savings fell also, but much less than in Iceland. In Spain falling private savings were offset by public surpluses leaving domestic savings unaffected. See table below.

Table 3. Private and public saving and investment (% of GDP)

	2000	2001	2002	2003	2004	2005	2006	2007
Iceland								
Domestic saving	16.0	20.2	19.8	16.7	17.8	15.9	17.2	17.7
Public saving	2.7	-0.1	-1.2	-2.1	0.8	4.8	6.0	4.8
Private saving	13.2	20.3	21.0	18.8	17.0	11.1	11.2	12.9
Investment	23.2	21.3	18.2	19.8	23.4	28.3	35.2	28.5
Ireland								
Domestic saving	37.5	38.3	39.4	39.5	39.6	39.1	38.4	36.9
Public saving	4.9	1.5	0.0	0.1	1.3	1.5	2.8	0.4
Private saving	32.6	36.9	39.5	39.4	38.4	37.6	35.6	36.5
Investment	23.9	22.7	22.1	23.2	24.5	27.0	27.6	26.3
Spain								
Domestic saving	23.1	23.8	24.5	25.0	24.3	24.2	24.5	24.4
Public saving	-0.5	0.2	0.3	0.7	-0.3	1.3	2.0	2.4
Private saving	23.6	23.7	24.2	24.3	24.6	22.9	22.5	21.9
Investment	26.3	26.4	26.6	27.4	28.3	29.5	30.9	31.2

Source: World Bank.

4.   Real economy distortions

We are interested in studying the effect of the capital flows on the sectoral allocation of labour in the three countries – Iceland, Ireland and Spain – and in Germany, the

comparison country[9] We use data on the share of employment belonging to each sector i of the economy in the three countries, n_{it} for years $t = 1, 2, T, i = 1, 2, .. N$ and stack the observations in one $T \times N$ matrix U. Assume that u_{it} has a factor structure

$$u_{it} = \lambda_i f_t + e_{it},$$

and standardise the data and calculate the underlying global factors as the principal components (PCs) of the correlation matrices of U.[10] These are the orthogonal linear combinations of the data that explain the maximum variance of the data. If the idiosyncratic errors, e_{it} above are I(0) the PC estimators for f_t are consistently estimated (large N) independently of whether all the factors are I(0) or whether some or all of the factors are I(1) (see Bai and Ng (2004)). We will assume that the errors are I(0) and that the long-memory in sectoral employment comes from persistent national factors.

The labour market developments in Iceland, Ireland and Spain will be described in the following section. The results for the three Baltic economies and Greece were qualitatively similar and are shown in the appendix and briefly discussed below.

4.1 Iceland

Iceland has the distinction of being the country that had floating exchange rates, experiencing a sudden stop that made its currency collapse. Also, being outside the Euro zone its banking system did not have access to liquidity and collapsed in the first week of October 2008. As such it provides a natural comparison to the Euro zone countries.

Table 4 shows the principal components of the employment matrix U for Iceland from 2000-2012 while Table A1 in the appendix has the eigenvectors for the five three PCs.[11] The first three PCs explain 74% of the variance of the matrix.

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[9] We relegate our results for the Baltic economies and Greece to an appendix.

[10] For forecasting, it may be more useful to estimate dynamic factors that take the principal components of the spectral density matrix. However, static factors are commonly used in the FAVAR literature. Stock and Watson (2005) discuss the relation between dynamic and static factor analysis.

[11] We take data on the Icelandic labour market from Statistics Iceland. In 2008 Statistics Iceland changed its classification from NACE rev.1 system to the NACE rev.2 system followed by example of Eurostat. There exists a slight difference between the systems. We got data on NACE rev.1 from 2000 to 2008 and NACE rev.2 from 2008 to 2012. By subtracting the difference of NACE rev.2 and NACE rev.1 in year 2008 from NACE rev.2 we got a series from 2000 to 2012 we could work with.

Table 4. Eigenvalues for Iceland

PC	Eigenvalues	Proportion	Cumulative eigenvalues	Cumulative proportion
1	6.36	0.42	6.36	0.42
2	3.36	0.22	9.72	0.65
3	1.45	0.10	11.17	0.74
4	1.29	0.09	12.46	0.83
5	1.04	0.07	13.50	0.90

The first PC explains 42% of the variation in the matrix and has a negative value for fishing, retail and repairs, manufacturing and agriculture. Real estate (services) has a positive weight as do financial services, insurance, health and social services, hotels and restaurants and public services. The PC trends upwards over this period and reflects the movement of labour away from fishing, industry and agriculture, as well as retail, to services.

The second principal component explains 22% of the variation and captures the effect of massive public investment projects in energy intensive industries undertaken during this period. In particular, employment in construction and utilities has a large negative weight while employment in real estate, fishing, hotels and restaurants and other services has a large positive weight.

The third principal component explains 10% of the variation and appears to capture the effect of the capital inflow. It assigns a negative weight to construction, finance and retail as well as transport and other services and a large positive weight to fishing, health and social services, utilities and education. Figure 2 shows this PC and employment in retail, transport and finance (correlation being 0.80) and also imports of investment goods (correlation equal to 0.75) in Figure 3.[12,13]

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[12] The index is derived by subtracting the mean of the series and dividing by a number to best fit the third PC.

[13] Furthermore, adding investment as a ratio to GDP and the index for investment goods imports to the matrix U makes these variables have a positive weight in the eigenvector for the second and third PC alongside construction, retail and finance.

Figure 2. Iceland: The third PC and employment in retail, transport and finance.
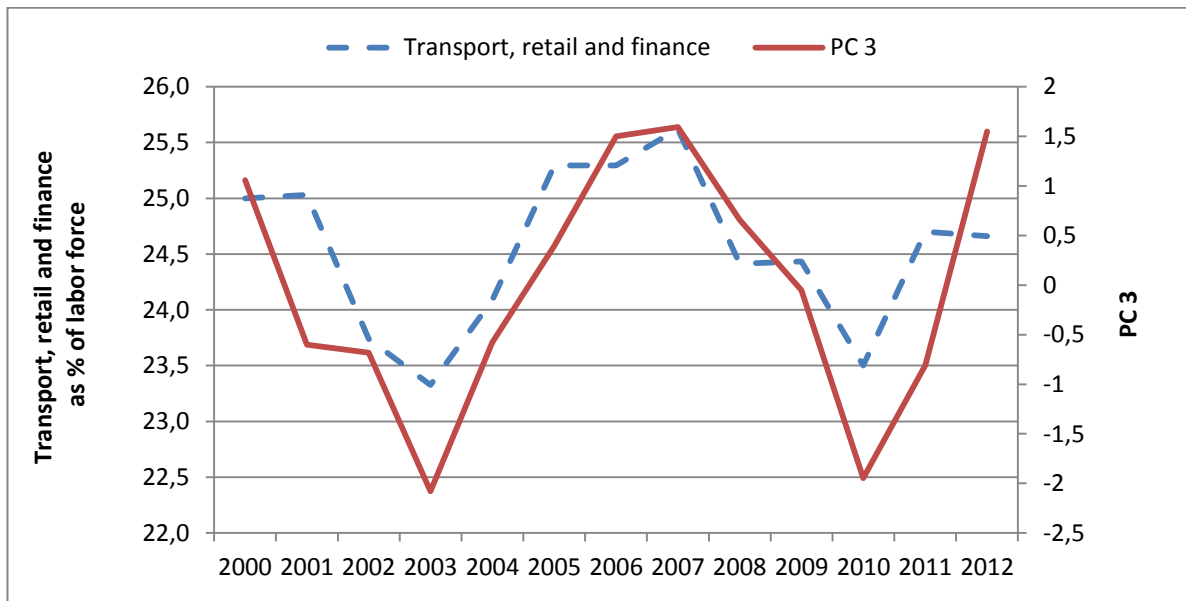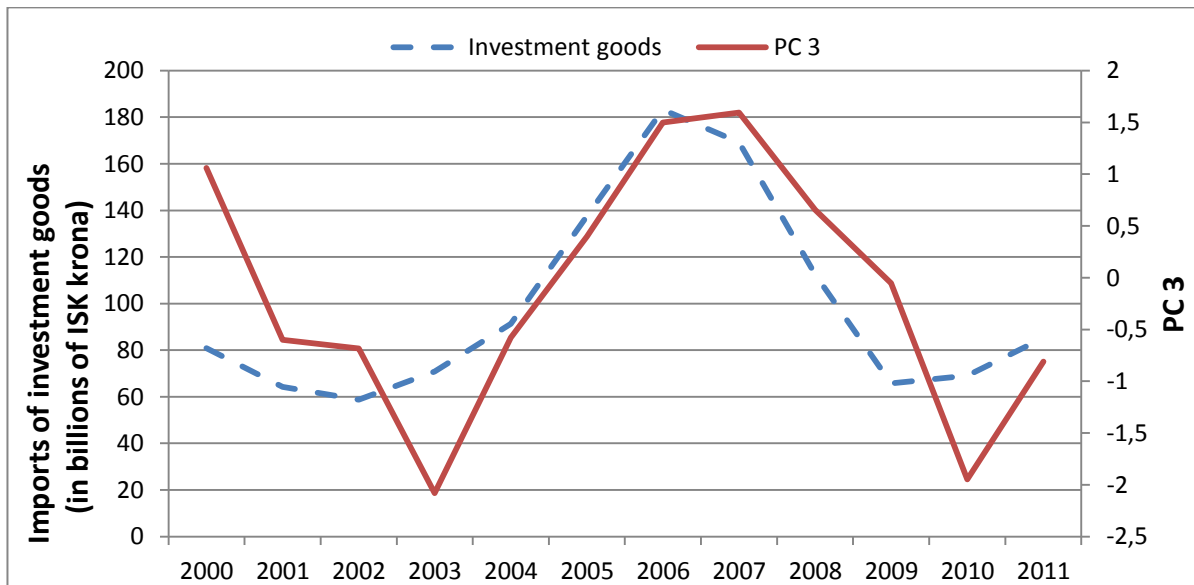

Figure 3. Iceland: The third PC and imports of investment goods.

The fourth principal component has a large positive weight attached to public services and education (also public) and manufacturing and a negative weight for most other sectors. The fifth principal component gives a large weight to transport, reflecting the growth in airlines and shipping.

4.2 Ireland

Ireland shares with Iceland having had a growing and oversized financial sector as well as a construction boom. The main difference lies in Ireland being a part of the Euro zone with the ECB providing sufficient liquidity to save its banking system in 2008. Also, real exchange rate fluctuations were smaller than in Iceland.

Turning to labour market development, the first PC explains 54% of the variation in the employment matrix while the second PC explains 17% of the variation in the matrix.[14] The eigenvectors in Table A2 show that for the first PC agriculture, construction, fisheries and manufacturing have a negative weight while the service sectors have a positive weight. This factor, as was the case in Iceland, captures the movement of workers to the service sectors. The second PC has a large and negative weight for construction and mining and a positive weight for agriculture, fisheries, utilities and transport.

Table 5. Eigenvalues for Ireland

PC	Eigenvalues	Proportion	Cumulative eigenvalues	Cumulative proportion
1	9.73	0.54	9.73	0.54
2	2.98	0.17	12.71	0.71
3	1.52	0.08	14.23	0.79
4	1.13	0.06	15.36	0.85
5	0.84	0.05	16.20	0.90

The second PC in Ireland captures the movement of workers into construction before 2008. Figure 4 has the PC against the share of employment in construction and mining (correlation between the two series is 0.62) and Figure 5 has the second PC and the ratio of investment to GDP (correlation is 0.58).

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[14] The sectoral allocation of workers in Ireland is based on an older classification system than that used in Spain.

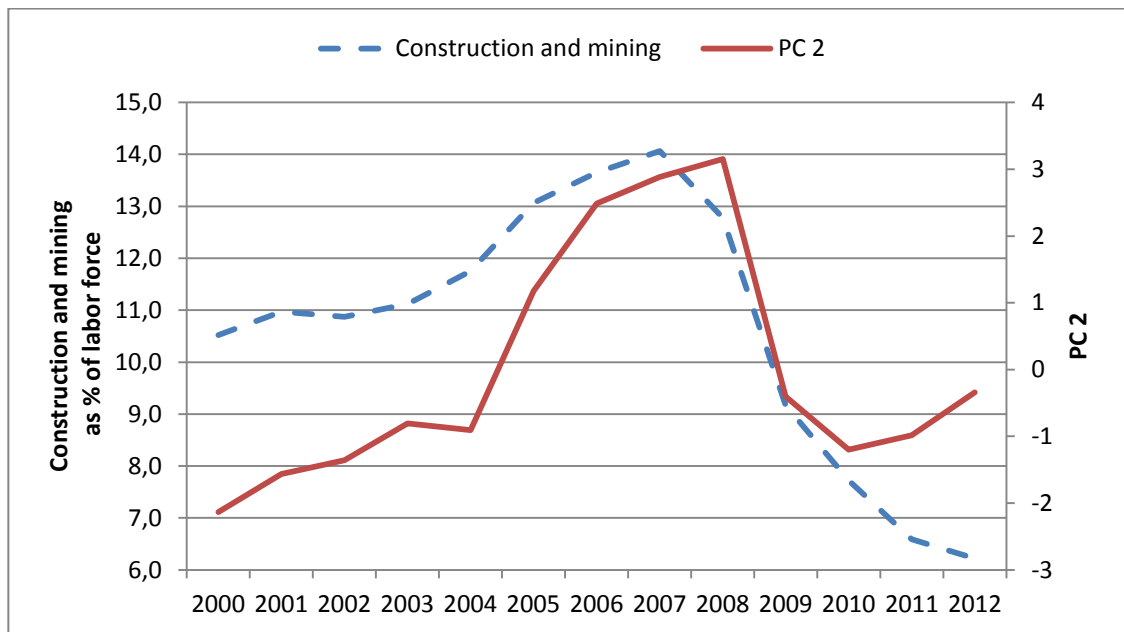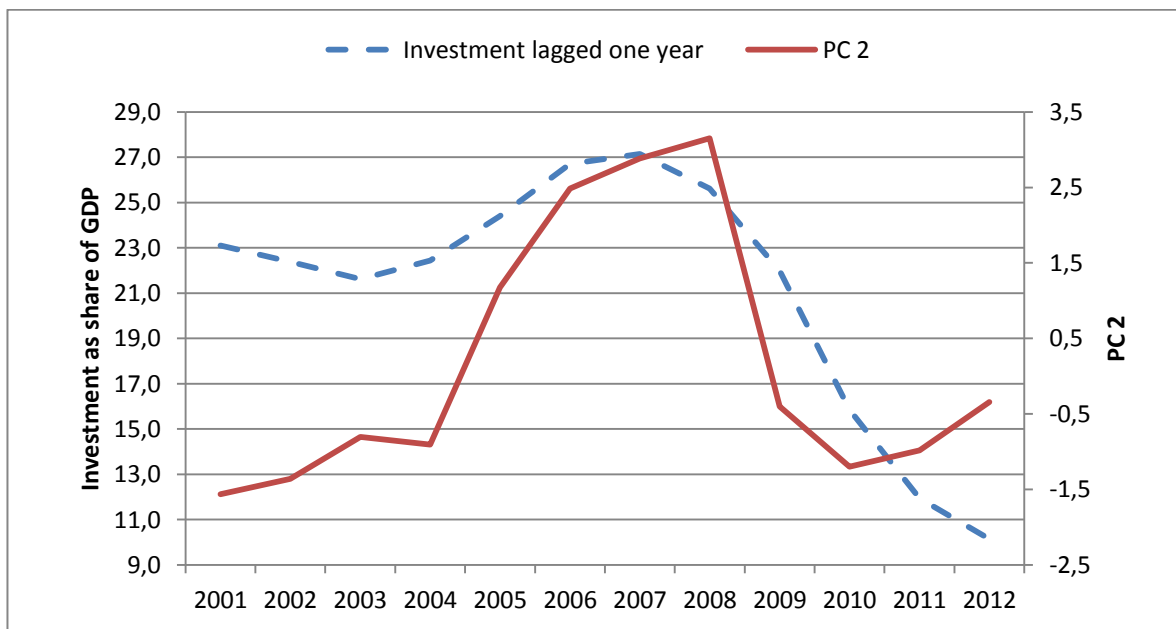**Figure 4.** Ireland: The second PC and the share of construction and mining in total
employment

Figure 5. Ireland: The second PC and the share of investment of GDP in Ireland with
one year time lag on investment.

4.3 Spain

Spain also experienced a massive construction boom before the crisis started. As in Ireland, membership of the Euro zone prevented its banking system from collapsing.

The Spanish labour market was characterised by the movement of workers from agriculture and manufacturing to the service sector and construction over the period 2000-2008. Construction peaked at 13.5% of total employment in 2007 before falling to 9% in 2010.[15] The first two PCs explain 82% of the variation in the employment matrix, see Table 6. The first PC explains 67% and the second 16%.

Table 6. Eigenvalues for Spain

PC	Eigenvalue	Proportion	Cumulative eigenvalues	Cumulative proportion
1	13.97	0.67	13.97	0.67
2	3.33	0.16	17.29	0.82
3	1.31	0.06	18.61	0.89
4	1.12	0.05	19.73	0.94
5	0.53	0.03	20.26	0.96

The eigenvectors are shown in Table A3 in the appendix. The first PC gives the service industries a positive weight and manufacturing, agriculture, construction and mining a negative weight. Thus 67% of the variation of the employment matrix is explained by a PC that captures the movement of workers from manufacturing to services. The correlation between the first PC and the share of employment in the service industries is 0.99.

The second PC assigns a very large negative weight to construction and real estate while wholesale and retail, utilities and agriculture and transport have a positive weight. The second PC explains 16% of the variation in the employment matrix. Figure 6 shows the second PC plotted against the share of employment in construction and mining (correlation equal to 0.64) and Figure 7 shows the second PC and the share of investment in GDP (correlation equal to 0.74).

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[15] The Spanish data are taken from the OECD using the classification system ISIC rev.4.

Figure 6. The second PC and the share of construction and real estate in total employment in Spain
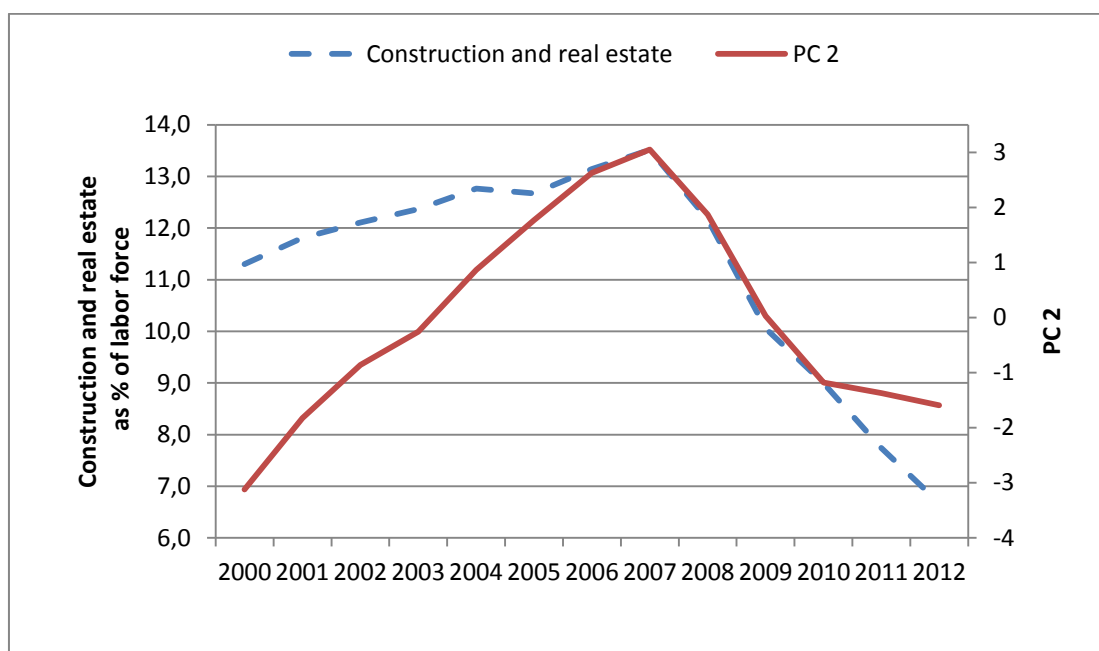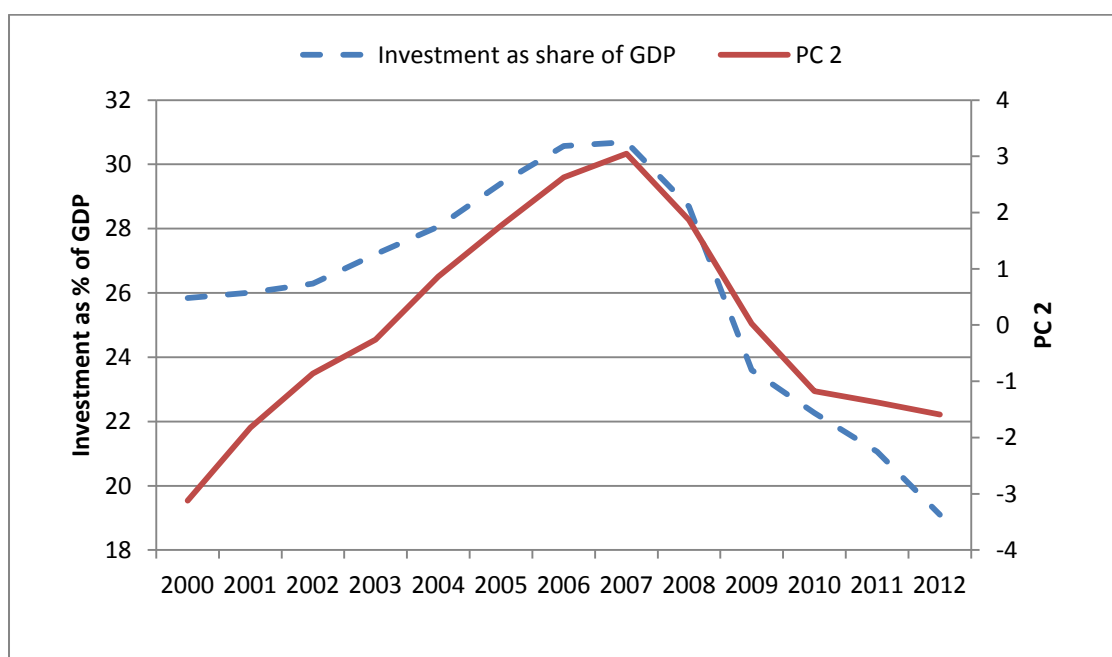

Figure 7. Spain: The second PC and the share of investment in GDP in Spain

4.4 The Baltic economies and Greece

In Estonia, Latvia and Lithuania there was an investment boom with the public sectors in balance and steady or moderately increasing private saving. As with the other countries,

the saving-investment configuration for these countries between 2005 and 2007 form distinct outliers, showing high investment not matched by similarly high rates of saving.[16] House prices increased in all countries, propelled by the expansion of credit. The average rate of change of house prices was 24.9% in Estonia and 16.7% in Lithuania.[17] All three countries experienced annual growth of GDP in excess of 6% between 2003 and 2007. The reversal that occurred in 2008 made growth negative in all the countries, the contraction of GDP being more severe than in other inflow economies. Stock prices fell as did house prices.

Results for Estonia, Latvia and Lithuania are shown in an appendix, the eigenvectors in Tables A5, A6 and A7 and the eigenvalues in Table A9. The first PC captures the movement of labour to the service industries while the second one captures a construction boom, the latter explain 19% of the employment variation in Estonia and Lithuania and 20% in Latvia.

Results for Greece are shown in Tables A8 and A9. The main difference is that the construction boom captured by the second PC explains slightly less or 16% while the eigenvector for the first PC puts a much greater weight on public employment than in the other six capital inflow economies. The first PC thus explains movements of labour from manufacturing and agriculture to services as well as to the public sector.

Figures showing the second PC for all four countries as well as employment in construction and investment as a share of GDP are shown in Figures A1-A8 in the appendix.

4.5 Germany

In comparison, we now take a look at employment in the largest capital outflow country, which is Germany. The movement of labour between sectors was much more limited in Germany than in the capital inflow countries discussed above. The first PC explains a higher fraction of the employment variation and captures the movement of workers away from construction, finance and the public sector to manufacturing, health care, education and other services. See Table A4 in appendix.

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[16] The observations in 2005-2008 for the Baltic economies match those from the early 1990s when these countries emerged from the collapsed communist bloc.
[17] Source: Bank of Estonia and Bank of Lithuania

Table 11. Eigenvalues for Germany

PC	Eigenvalues	Proportion	Cumulative eigenvalues	Cumulative proportion
1	12.22	0.76	12.22	0.76
2	1.69	0.11	13.91	0.87
3	1.01	0.06	14.92	0.93
4	0.62	0.04	15.54	0.97
5	0.16	0.01	15.70	0.98

The strength of manufacturing and the falling share the construction sector reflect the effect of the low real exchange rate.

5. Distortions compared

Figure 8 plots the three PCs together that describe the effect of the capital inflow in Iceland, Ireland and Spain. Note that the magnitude of fluctuations of the PC in Iceland is smaller than in the other countries. This suggests that the effect of the capital inflow was greater in Spain and Ireland than in Iceland. Also, the PC for Iceland explains a lower fraction of the variance in the data than the second PCs for Ireland and Spain.

Figure 8. Effect of capital inflow in Iceland, Spain and Ireland
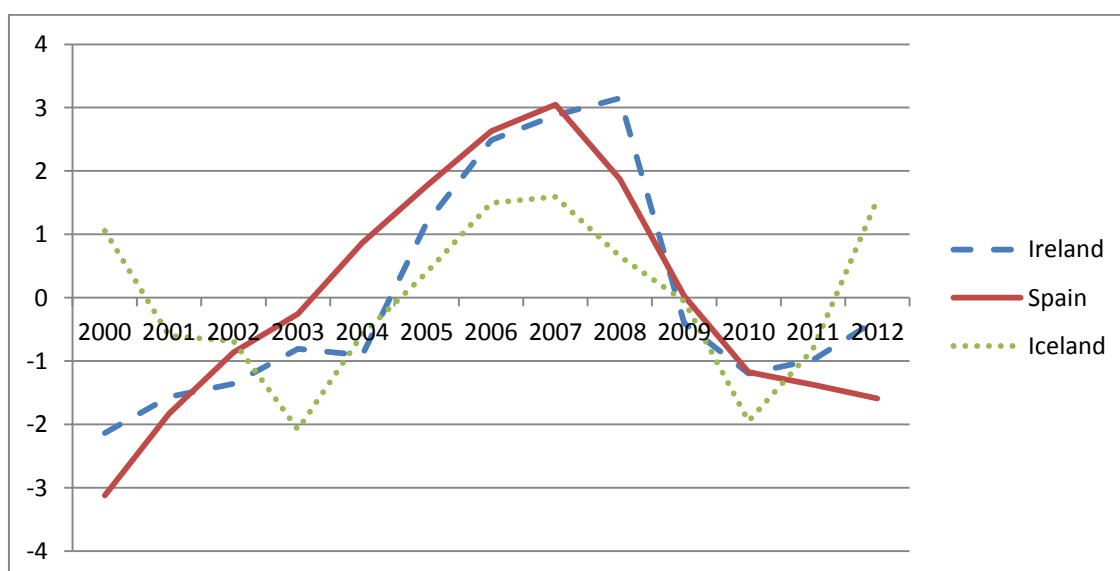
6. Conclusions

For Iceland, Ireland and Spain, as well as for the Baltic countries and Greece, we have found that one principal component in each county appears to capture the effect of the capital inflow on the pattern of employment. In Iceland it is the third PC, which explains 10% of the variation in the employment matrix. In Spain it is the second PC, which explains 16% of the variation and in Ireland it is also the second PC, which explains 17% of the variation.

The capital inflow coincided with an expansion of the share of the construction sector of employment in all countries, and the share of retail and finance in Iceland and real estate in Spain. Comparing the experience of a floating exchange rate country to the two eurozone countries one can conclude that the floating-rate country experienced greater financial market turbulence, as manifested by the collapse of Iceland's banking system in October 2008 and the collapse of its currency, while the two eurozone countries experienced greater real economy distortions. In contrast, changes in the allocation of labour across sectors in Germany, which had a capital outflow, were limited. The construction sector's share of employment fell and the manufacturing sector maintained its share better than in Iceland, Ireland and Spain.

We conclude that capital inflows have distortionary effect on the real economy that takes time to unwind. Thinking of the economy as producing one type of output while making policy decision may lead to errors. The main policy implication has to do with the conduct of monetary and fiscal policy. Monetary authorities should focus on banking supervision, the creation of leverage throughout the economy and attempt to temper capital flows since the direct use of monetary policies may have limited effectiveness following the reversal of the capital flows and the creation of debt. The use of fiscal policy has to be targeted at the slumping sectors. But this may also run into problems. Following a construction boom the construction sector slumps because too many houses have been built. For the government to respond by borrowing money to build more houses may reduce the pain of the slump but will not change the fact that the construction will not be revived until more houses are again needed.

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Table A1. Eigenvectors for Iceland

Industry	PC1	PC2	PC3	PC4	PC5
Construction	-0.02	**-0.49**	**-0.30**	-0.12	0.03
Real estate and other Services	**0.34**	0.19	0.09	-0.19	-0.05
Fishing	**-0.30**	**0.27**	**0.29**	-0.05	0.02
Fish processing	**-0.36**	0.11	**0.23**	0.14	0.07
Finance and insurance	**0.31**	-0.03	-0.16	**-0.35**	0.19
Health and social security	**0.33**	0.08	0.33	-0.07	**-0.24**
Retail and repairs	**-0.26**	-0.05	**-0.42**	**-0.32**	0.09
Hotels and restaurants	0.19	**0.43**	0.11	-0.12	0.12
Manufacturing	**-0.32**	0.06	0.04	**0.33**	-0.07
Agriculture	**-0.37**	0.02	-0.02	-0.10	-0.03
Public services	**0.23**	-0.19	0.15	**0.55**	0.08
Transport	0.08	0.18	**-0.33**	0.13	**-0.78**
Utilities	-0.04	**-0.38**	**0.41**	**-0.30**	-0.06
Education	0.19	**-0.33**	0.27	**0.34**	0.14
Other services	0.11	0.35	**-0.27**	0.18	**0.49**

Table A2. Eigenvectors for Ireland

Industry	PC1	PC2	PC3	PC4	PC5
Agriculture	**-0.28**	**0.23**	0.05	-0.16	-0.09
Fisheries	-0.18	**0.35**	0.03	-0.09	**0.51**
Construction	**-0.24**	**-0.36**	-0.08	0.15	-0.08
Mining, oil and gas	-0.13	**-0.44**	0.04	0.05	**0.32**
Utilities	0.07	**0.34**	0.16	**0.50**	**-0.47**
Manufacturing	**-0.28**	**0.27**	0.03	-0.15	-0.10
Education	**0.32**	0.02	0.05	0.00	0.09
Finance and insurance	**0.29**	0.03	-0.06	**0.25**	-0.02
Wholesale and retail	**0.24**	0.06	0.17	-0.10	0.08
Hotels and restaurants	0.13	0.17	**0.58**	0.17	0.18
Health care	**0.32**	-0.04	-0.02	0.00	0.06
Real estate	**0.30**	-0.04	0.05	**-0.21**	0.13
Transport	0.10	**0.45**	-0.17	**-0.23**	0.07
Public service	**0.27**	0.01	-0.08	**0.35**	-0.15
International organisations	**0.27**	0.01	0.07	**-0.34**	0.09
Home service	0.00	**-0.23**	**0.68**	-0.19	-0.16
Other services	**0.28**	-0.09	**-0.29**	0.05	0.03
Unclassified	**-0.21**	0.09	0.10	**0.44**	**0.50**

Table A3. Eigenvectors for Spain

	PC1	PC2	PC3	PC4	PC5
Agriculture and fisheries	**-0.22**	**0.29**	0.19	-0.04	-0.08
Construction	**-0.21**	**-0.33**	-0.04	0.05	0.02
Mining, oil and gas	**-0.26**	0.10	0.14	0.03	0.04
Water supplies, sewage and garbage collection	**0.22**	-0.03	**0.25**	**-0.24**	**-0.31**
Utilities	0.17	**0.34**	**0.29**	0.19	0.00
Manufacturing	**-0.26**	0.09	0.12	0.00	-0.11
Arts and culture	**0.24**	0.19	-0.12	-0.17	**0.21**
Education	**0.24**	0.18	0.08	-0.19	0.11
Finance and insurance	0.06	**0.22**	-0.08	**0.80**	0.18
Wholesale and retail	0.14	**0.40**	-0.13	0.15	**-0.44**
Hotels and restaurants	**0.26**	-0.06	-0.09	0.06	0.08
Health care	**0.26**	0.09	-0.05	-0.08	0.08
Real estate	**0.21**	**-0.30**	0.02	0.15	-0.12
Transport	-0.11	**0.41**	**-0.26**	**-0.33**	**-0.20**
Travel office, job centres	**0.26**	-0.08	-0.10	-0.03	0.04
Information and telecommunications	**0.24**	-0.04	0.15	0.09	-0.19
Science, technology	**0.26**	-0.10	-0.15	0.10	0.00
International organisations	0.10	-0.01	**0.77**	-0.02	**0.33**
Home service	**0.23**	**-0.25**	-0.07	0.03	**0.31**
Other services	**0.24**	-0.02	0.07	-0.05	**-0.48**
Public service	**0.24**	**0.21**	-0.08	0.10	**0.25**

Table A4. Eigenvectors for Germany

Industry	PC1	PC2	PC3	PC4	PC5
Construction	**0.24**	-0.17	**-0.42**	**0.24**	**-0.31**
Real estate and other Services	**-0.28**	0.05	-0.02	0.04	0.15
Finance and insurance	**0.27**	-0.05	0.07	**-0.36**	**0.42**
Health and social security	**-0.28**	0.00	0.00	**-0.23**	0.10
Retail and repairs	**-0.23**	**0.37**	0.14	-0.03	**0.26**
Hotels and restaurants	**-0.28**	0.09	0.02	0.19	-0.02
Manufacturing	**-0.33**	-0.15	0.02	0.03	-0.16
Agriculture	**0.28**	0.00	-0.06	0.12	0.00
Public services	**0.28**	-0.03	-0.01	**-0.20**	0.19
Transport	0.03	**-0.59**	**0.47**	**0.50**	**0.21**
Utilities	**-0.26**	0.00	**-0.35**	-0.06	-0.18
Education	**-0.28**	0.00	0.19	-0.12	0.15
Home service	**-0.26**	**0.48**	0.15	**0.32**	-0.13
International organisation	0.16	**0.48**	**-0.23**	**0.54**	**0.38**
Other services	**0.23**	**0.40**	**0.58**	-0.05	**-0.48**

Table A5. Eigenvectors for Estonia

	PC1	PC2	PC3	PC4	PC5
Agriculture and fisheries	**-0.36**	0.04	0.02	0.08	0.18
Construction	**0.29**	**-0.33**	-0.03	-0.07	**-0.24**
Mining, oil and gas	-0.16	0.10	-0.19	**0.27**	-0.06
Water supplies, sewage and garbage collection	**-0.25**	-0.03	-0.19	-0.08	**-0.24**
Utilities	-0.14	**0.34**	**-0.49**	-0.01	**0.41**
Manufacturing	**-0.34**	0.09	-0.18	-0.01	**-0.27**
Arts and culture	-0.14	0.19	0.18	**-0.48**	**0.38**
Education	0.15	0.18	**0.38**	-0.04	-0.01
Finance and insurance	**0.28**	**0.22**	0.14	0.28	0.00
Wholesale and retail	-0.06	**0.40**	**0.39**	**0.40**	0.01
Hotels and restaurants	0.16	-0.06	-0.07	0.06	**0.34**
Health care	0.07	0.09	-0.04	0.28	0.02
Real estate	**-0.25**	**-0.30**	**0.34**	0.06	0.13
Transport	**-0.26**	**0.41**	**0.20**	0.01	**0.43**
Travel office, job centres	**0.28**	-0.08	0.14	-0.19	0.11
Information and telecommunications	**0.23**	-0.04	-0.17	0.01	0.03
Science, technology	**0.30**	-0.10	-0.15	0.14	**0.25**
Other services	**0.20**	-0.02	-0.11	**-0.20**	-0.05
Public service	0.13	**0.21**	**-0.24**	0.09	**0.29**

Table A6. Eigenvectors for Latvia

Industry	PC1	PC2	PC3	PC4	PC5
Construction	0.11	**-0.56**	0.06	**0.26**	-0.03
Real estate and other Services	**0.36**	**0.21**	-0.03	-0.04	**0.24**
Finance and insurance	**0.36**	-0.01	-0.01	0.19	**-0.48**
Health and social security	-0.11	**0.46**	0.15	**0.41**	**0.42**
Retail and repairs	**0.29**	**-0.25**	-0.07	**-0.34**	**0.52**
Hotels and restaurants	**0.30**	0.12	-0.10	**0.41**	**-0.25**
Manufacturing	**-0.35**	0.04	-0.17	**-0.26**	**-0.30**
Agriculture	**-0.38**	0.08	-0.02	-0.04	-0.19
Public services	-0.07	**-0.30**	**-0.61**	0.18	0.13
Transport	**0.25**	-0.09	**0.55**	0.01	-0.12
Utilities	**-0.34**	0.05	0.09	**0.42**	0.18
Education	0.18	**0.46**	-0.16	**-0.36**	-0.09
Other services	**-0.25**	**-0.20**	**0.47**	**-0.20**	0.03

Table A7. Eigenvectors Lithuania

Industry	PC1	PC2	PC3	PC4	PC5
Construction	0.09	**-0.56**	-0.19	-0.18	**0.41**
Real estate and other Services	**0.35**	0.09	0.03	-0.03	-0.11
Finance and insurance	**0.33**	0.01	**-0.28**	-0.19	-0.04
Health and social security	**0.32**	**0.24**	**0.64**	**-0.57**	**0.24**
Retail and repairs	-0.12	-0.08	-0.02	**-0.21**	0.14
Hotels and restaurants	**0.32**	0.01	**0.30**	0.14	**0.31**
Manufacturing	**-0.33**	**-0.22**	-0.05	0.19	**0.23**
Agriculture	**- 0.35**	0.07	0.09	0.08	**-0.36**
Public services	**0.24**	**0.35**	-0.10	-0.15	-0.08
Transport	**0.31**	0.18	-0.19	0.14	0.02
Utilities	**-0.27**	**0.26**	**-0.24**	0.01	**0.61**
Education	-0.07	**0.58**	**-0.25**	0.17	**0.24**
Other services	**0.23**	-0.02	**0.44**	**0.65**	0.17

Table A8. Eigenvectors for Greece

Industry	PC1	PC2	PC3	PC4	PC5
Construction	-0.17	**-0.47**	0.17	0.34	0.06
Real estate and other services	**0.33**	-0.01	-0.01	0.05	0.10
Finance and insurance	0.18	**0.52**	0.02	0.15	0.11
Health and social security	**0.33**	0.12	0.07	-0.04	**0.21**
Retail and repairs	**0.35**	-0.08	-0.07	-0.13	0.14
Hotels and restaurants	**0.32**	0.11	**-0.48**	**-0.29**	0.01
Manufacturing	**-0.34**	-0.11	0.05	0.05	0.03
Agriculture	**-0.26**	**0.30**	**-0.23**	**-0.24**	**-0.22**
Public services	**0.32**	0.01	0.17	0.15	0.16
Transport	-0.14	**0.31**	**0.57**	-0.12	**-0.26**
Utilities	-0.05	**0.23**	**-0.31**	**0.76**	0.00
Education	**0.31**	0.03	**0.27**	0.17	-0.01
Other services	0.19	**-0.39**	**-0.31**	0.02	**-0.37**
Home service	**0.27**	**-0.24**	**0.23**	-0.16	-0.08
Mining, Oil and Gas	**-0.25**	-0.07	-0.05	-0.16	

Table A9. Eigenvalues

Estonia

PC	Eigenvalues	Proportion	Cumulative eigenvalues	Cumulative proportion
1	6.87	0.36	6.87	0.36
2	3.53	0.19	10.41	0.55
3	2.28	0.12	12.69	0.67
4	2.05	0.11	14.73	0.78
5	1.33	0.07	16.06	0.85

Latvia

PC	Eigenvalues	Proportion	Cumulative eigenvalues	Cumulative proportion
1	6.27	0.48	6.27	0.48
2	2.58	0.20	8.84	0.68
3	1.52	0.12	10.37	0.80
4	1.06	0.08	11.43	0.88
5	0.54	0.04	11.97	0.92

Lithuania

PC	Eigenvalues	Proportion	Cumulative eigenvalues	Cumulative proportion
1	7.54	0.58	7.54	0.58
2	2.42	0.19	9.96	0.77
3	1.18	0.09	11.14	0.86
4	0.69	0.05	11.83	0.91
5	0.49	0.04	12.32	0.95

Greece

PC	Eigenvalues	Proportion	Cumulative eigenvalues	Cumulative proportion
1	8.38	0.56	8.38	0.56
2	2.43	0.16	10.81	0.72
3	1.57	0.10	12.38	0.83
4	1.16	0.08	13.54	0.90
5	0.63	0.04	14.17	0.94

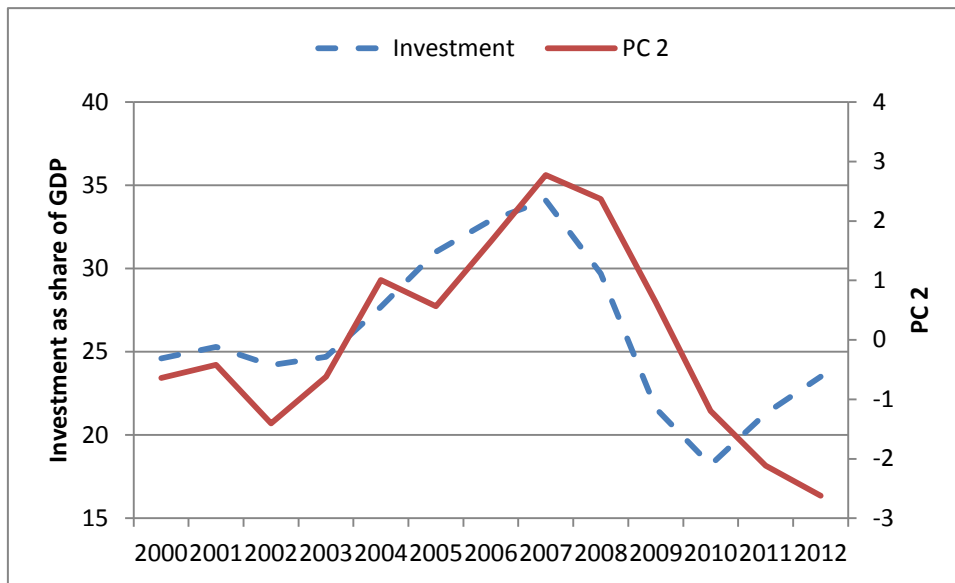**Figure A1.** Estonia: The second PC and the share of investment in GDP in Estonia
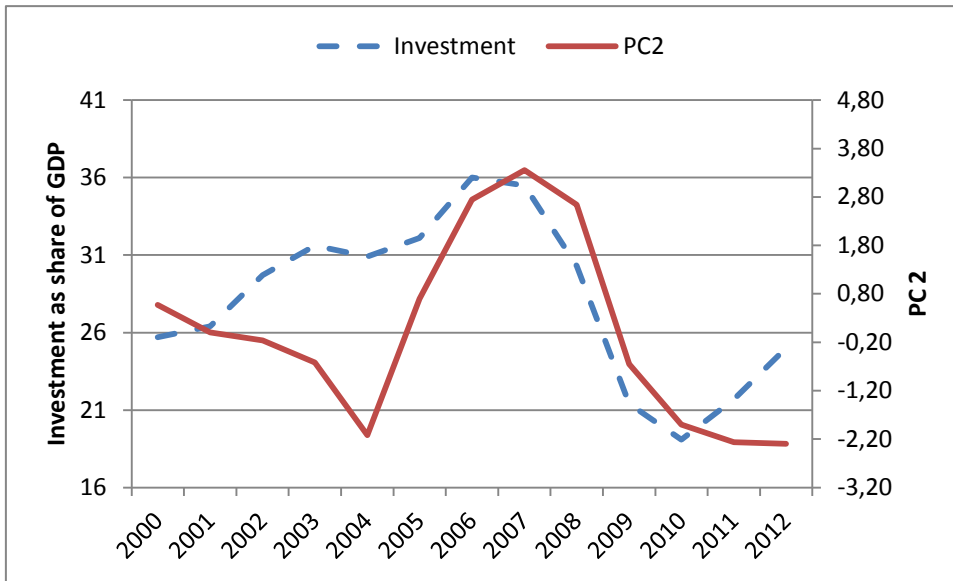
Correlation is 70% between second PC and share of investment

Figure A2. Estonia: The second PC and Accommodation, Construction, Arts and
Recreation as share of employment in Estonia
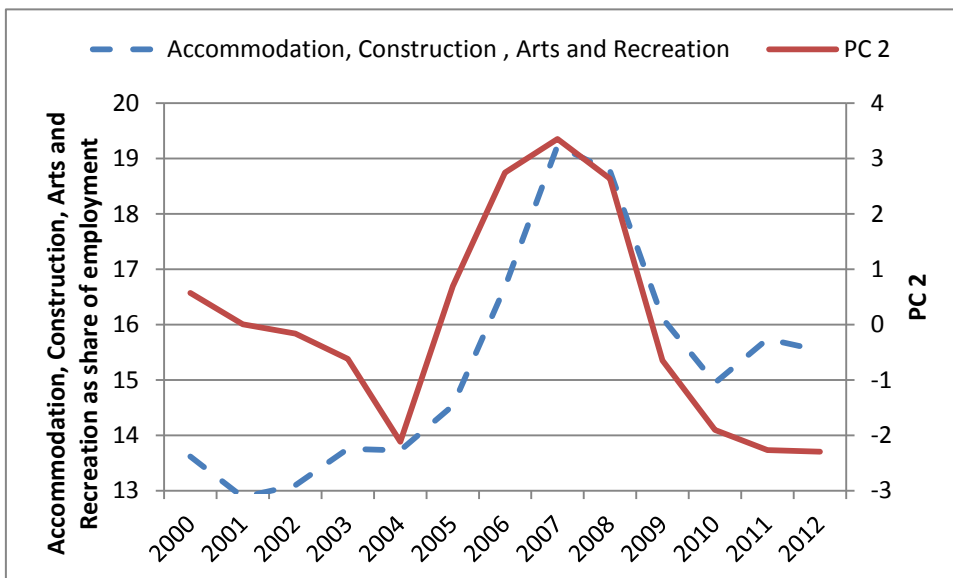
Correlation is 59% between the two series.

Figure A3. Latvia: The second PC and the share of investment in GDP in Estonia
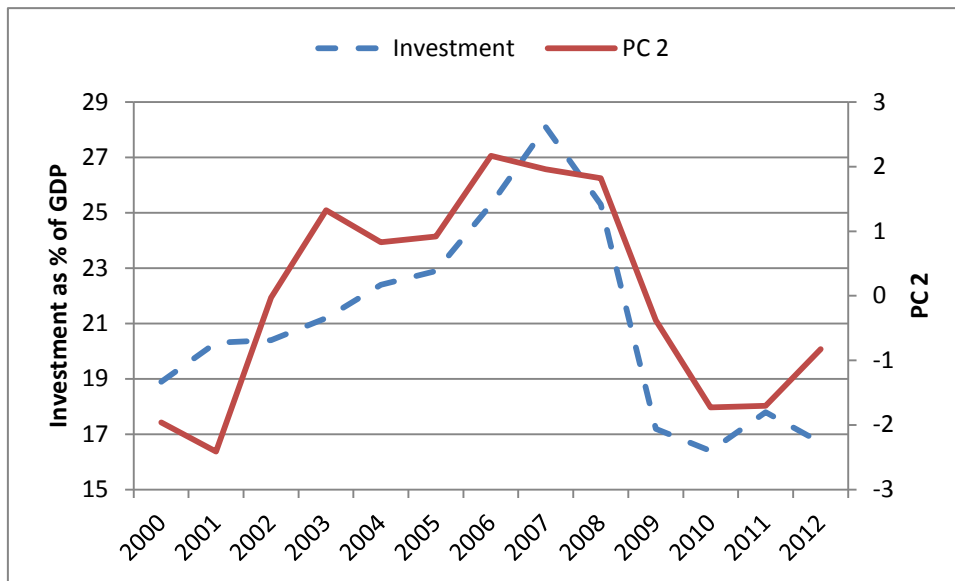

Correlation between the two series is 79%.

Figure A4. Latvia: The second PC and Construction, Public service and retail trade as share of employment in Latvia

Correlation between the two series is 88%

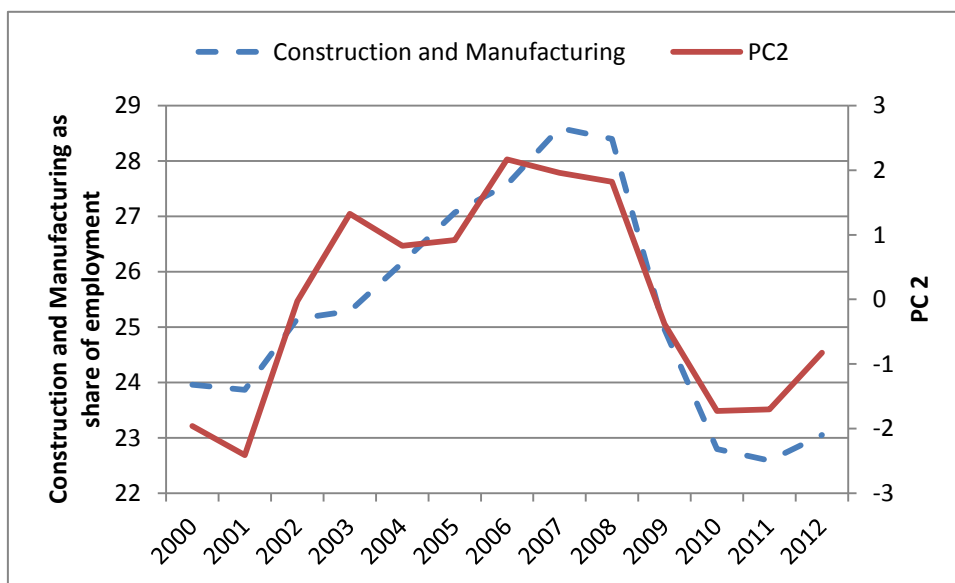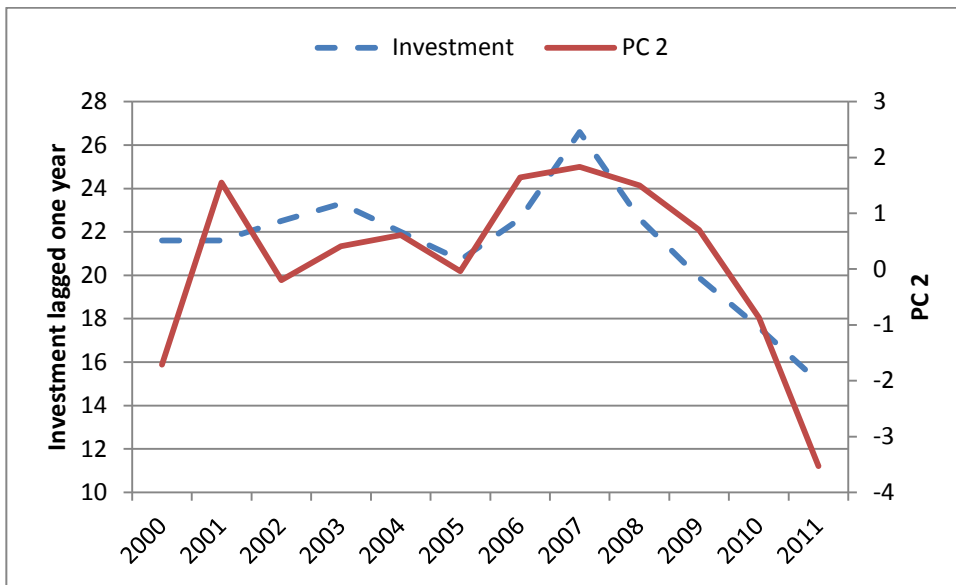**Figure A5.** Lithuania: The second PC and the share of investment in GDP in Lithuania

Figure A6. Lithuania: The second PC and Construction and Manufacturing as share of employment in Lithuania
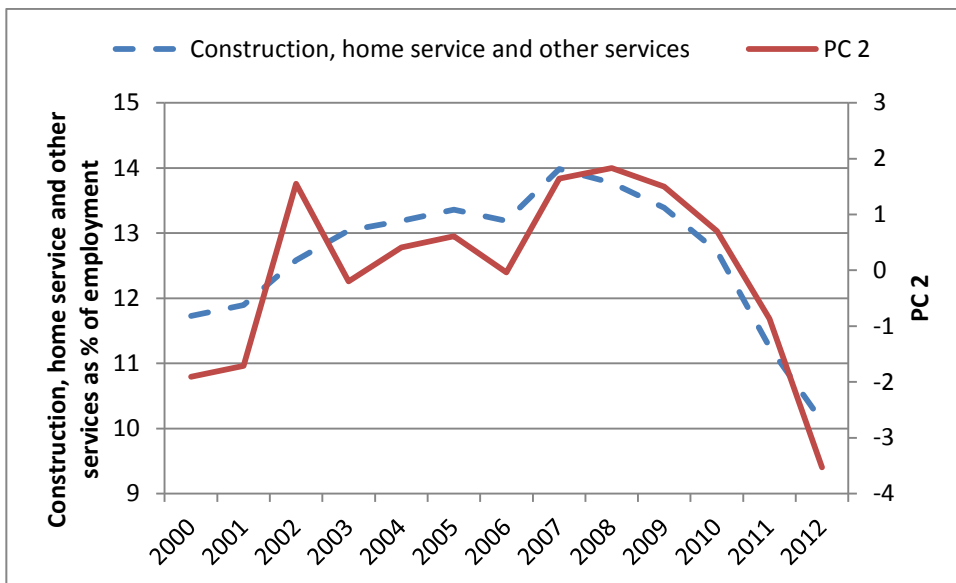

Correlation between the two series is 90%.

Figure A7. Greece: The second PC and the share of investment in GDP lagged one year in Greece.

Correlation between the two series is 77%

Figure A8. Greece: The second PC and Construction, Home service and other services as share of employment in Greece

Correlation between the two series is 89%