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The Effect of Household Debt on Aggregate Demand – The Case of Spain

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The Effect of Household Debt on Aggregate Demand – The Case of Spain

Abstract

Households in some European countries increased their indebtedness massively over the past 20 years. Besides household debt, also government debt and corporate debt are in some countries at levels not seen before. While there is a common agreement that these high debt levels are not sustainable there is fewer consensus about the effect of changes in debt and especially debt levels on aggregate demand. Based on a cross country study of 18 European countries we show that there is a strong link between household sector debt and aggregate demand. We strengthen these results by an analysis for Spanish provinces. The level of household debt in the Spanish provinces is highly significant for changes in aggregate demand that translated into increasing unemployment in these regions during the recession following the financial crisis of 2007/08.

JEL-Code: E210, J200, O520.

Keywords: debt, leverage, balance sheet recession, household sector, aggregate demand, unemployment.

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1 Introduction

The world is now in its sixth crisis year. It all began in the United States with the Subprime Crisis. Among other reasons, low interest rates and rising house prices together with an unregulated subprime mortgage market triggered more and more Americans to fulfill a lifelong dream and buy their own apartment or house or a larger and fancier place. In 2006/2007 the housing bubble burst, first home owners, then banks and finally real sector companies came under distress, leading to the global financial crisis in 2007/2008 which was followed in most advanced economies by a deep recession in 2008/2009. This recession was accompanied by increasing unemployment rates and debt financed government programs to support the economy. Today, in 2012, many economies around the world continue to suffer from high unemployment rates and debt levels that exceed pre-crisis levels.

All episodes of this long lasting crisis period are closely linked to debt. In the beginning, households realized their overindebtedness after the burst of the real estate bubble. Then it was financial sector debt and leverage, leading to the systemic financial crisis. Since 2010 it is government debt that worries rating agencies, investors who bought government bonds and the public, who ultimately guarantees public debt via the tax basis. For non-economists it seems obvious why the huge debt loads are a source of worry. A larger nominal amount of debt leads to higher debt service burdens. The more a household, bank, corporation or state has to pay for interest, the less is available for consumption and investment given a fixed income. Once the debt service becomes too high, there is bankruptcy.

Some economists look at this differently. Overall, debt of one person, corporation or state is wealth of another person, corporation or state. If John Doe has to serve a debt of 10,000 Dollar and pays interest of 10%, he lacks 1,000 Dollar he could otherwise spend. But Jane Doe lent 10,000 Dollar to John and she has an additional 1,000 Dollar to spend. The same is true for a government. When the government reduces its spending because of high debt services, there is a counterpart who receives the interest payment and spends it. Following this line of argument, do we really need to care about debt levels and is the public debate about too much government debt falling for a zero sum game, instrumented by political parties? Conservative parties push austerity plans to restructure public finances according to their ideals. Left wing parties call for growth programs, aiming to give advantages to their clientele.

This paper does not aim to argue in favor of austerity or growth. It contributes to the academic and public debate regarding the relationship of debt and aggregate demand. Theory might give reasons for believing that debt levels itself need not be a source of concern, though even the theoretical evidence is far from conclusive. The amount of empirical work on this relationship is increasing and controversial. Two recent and very influential analyses that will be discussed in more detail later are by Mian and Sufi (2012) and Dynan (2012), but both papers focus on the United States.

This paper instead investigates how the level of household debt and changes in household debt in Europe are linked to aggregate demand. The focus on the household sector rests upon the importance of household consumption expenditure for aggregate demand and the fact that household debt increased rapidly prior to the crisis, while public finances were in a rather good shape in many countries. Furthermore there is a high variation in the development of household debt among and within European countries. The comparison of 18 European countries shows that there is a high and significant correlation between debt build up prior to 2007 and changes in employment from 2008 to 2010. The economic performance suffers from a stop of debt-fueled growth. Thus there is a link of changes in debt and aggregate demand. A more granular analysis based on regional data for Spain backs the result that high household debt levels hold back consumption and aggregate demand. Importantly we also find strong evidence of a role for aggregate demand on the rising unemployment rates in Spain.

The remainder of the paper is structured as follows. Section 2 gives a brief descriptive overview of the development of debt levels in Europe for the different institutional sectors and highlights problems these sectors face. Section 3 provides an overview of related literature. Section 4 entails the empirical analysis. The first empirical part in this section is a cross country study for 18 European countries. The second empirical part then contains the within country study of Spain. Section 5 finally concludes.

2 The European Debt Dilemma

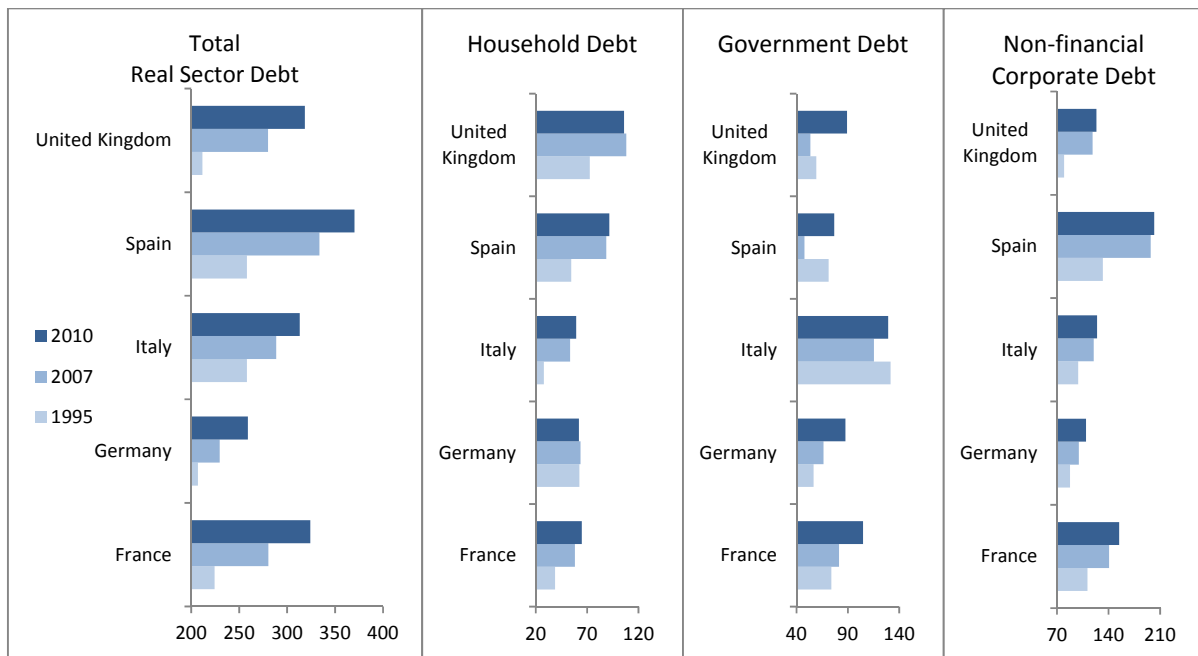
Prior to analyzing the link of debt and aggregate demand this section establishes some stylised facts about the development and magnitude of debt of the different institutional sectors in Europe.

The data is based on Eurostat’s National Sector Accounts. Figure 1 illustrates how the debt to GDP ratio evolved in the five largest Western European countries and how this was split according to the different sectors of the economy.

Figure 1

Gross debt to GDP ratios of the institutional sectors in Europe

Total real sector debt is the sum of household, government, and non-financial corporate debt. All debt figures represent total financial liabilities as provided by Eurostat, except non-financial corporate debt where we subtracted shares and other equity. The years for comparison are 1995, 2007 and 2010 with the exception of Spain, where we use data from 2000 as the first data point as previous years are not available from Eurostat.



Source: Eurostat System of National Accounts, Financial Accounts, Closing Financial Balance Sheets (annual)

It can be easily seen that debt ratios in all countries increased until 2007 and only the British and the German household sectors started to deleverage since the outbreak of the crisis.

Household debt: The development of household debt is quite diverse within Europe. The German household sector debt ratio is relatively low and decreased by 2 percentage points from 2007 until 2010. Contrary, households in all other major economies have debt loads that are well above the average of the last 16 years. British households started to decrease their debt level compared to

2007 while the Mediterranean countries continued to increase their debt. Italian household debt increased by 113% since 1995 but it is still the lowest among the large European economies.

Government debt: Debt levels of the government sector further increased since 2010 and are throughout European countries at historic peaks. Italy, Spain, and the United Kingdom had an interim decrease of debt levels but with exemption of Italy, all countries are well above their 1995 levels.

Non-financial corporate debt: The non-financial corporate sector is responsible for the largest share of debt of all sectors (excluding the financial sector) and the percentage changes within the countries are more homogenous than in the other sectors. The corporations in Germany, Italy and the United Kingdom have similar levels of debt. Likewise to the household sector, Spain has again one of the highest levels of debt. This also makes the case of Spain especially interesting to our analysis in section four.

The overview of the largest economies and their real sector debt shows the challenges Europe faces, if one claims that today's debt levels are not sustainable. The individual borrower, be it a household, corporation or government, may ask herself how to manage to reduce its debt level. This paper does not look at the micro level and individual debt reduction efforts but at the effect of what this debt burden means for the whole economy.

3 Overview of related literature

The effect of household debt on the economy has been repeatedly examined in combination with recessions. Fisher (1933) postulated the debt deflation theory of great depressions. Mishkin (1978) looked empirically at the great depression and how household balance sheets served as transmission mechanism for changes in aggregate demand. The American recession of 1973-75 is empirically investigated by Mishkin, Gordon, and Hymans (1977) who focus on the role of household debt and stockmarket developments. All papers find an important negative effect of debt on economic activity. While Fisher regards the effect on asset prices, Mishkin and Mishkin et al. focus on consumption and aggregate demand. Palley (1994) builds a model on the effects of household debt on aggregate demand based on different propensities to consume of creditor and debtor households and applies the model to the recession of the early nineties. Palley concludes

that increases in household debt fuel aggregate demand but the service of this debt subsequently lowers aggregate demand. The financial crisis and economic downturn of 2007-09 again draw attention to the role of household sector debt. Keen (2009) emphasizes the role of debt for aggregate demand. Changes in the volume of debt as percentage of GDP explain how much aggregate demand is debt-financed. Keen backs the household debt-aggregate demand-link for Australia by showing how increasing debt and declining unemployment and decreasing debt and rising unemployment move together. The link of household debt and aggregate demand in the recent recession is shown for the United States by Mian and Sufi (2012) and Dynan (2012). Dynan uses the PSID to examine the effect of household debt on consumption. She estimates the effect of leverage as well as debt service burdens on changes in consumption from 2007 to 2009 and confirms the significant negative impact even after controlling for income and wealth effects.

Overall, our paper is most closely linked to Mian and Sufi (2012). Mian and Sufi investigate the link between household sector debt levels and aggregate demand with a regional analysis. They use county level data of the United States and estimate how household debt levels, measured as debt over income, influence consumption which fuels aggregate demand. The size of the debt level is interpreted as magnitude of a household balance sheet shock and the adjustment need of household finances. Mian, Rao and Sufi (2011) showed that household debt levels affect consumption by using local retail sales data. Having shown the link of household debt to consumption, Mian and Sufi use the elasticity of employment to aggregate demand to measure the transmission of household debt via consumption and aggregate demand on employment and thus the severity of the crisis in the United States. Important to the analysis is the differentiation between employment in tradable and non-tradable sectors. Demand for tradable goods is determined on a national level so that shocks to the household balance sheet in one county can be neglected. Demand for non-tradable goods in contrast is only dependent on local consumption. It follows that employment in tradable industries is independent from local debt levels and employment in non-tradable industries should be highly dependent on local debt levels. They confirm their model by regressing changes in total employment, tradable employment and non-tradable employment from 2007 to 2009 on the debt to income ratio 2006. Controlling for structural shocks by including the shares of the construction, tradable and non-tradable industries does not change the outcome.

Papers that cover more than one country are the IMF (2012) and the McKinsey Global Institute (2010, 2012). The IMF finds that larger increases in household debt lead to more severe recessions and looks in country case studies on how to address large household debts and house price decreases. The McKinsey Global Institute gives a perspective on deleveraging across all economic sectors and describes how historic deleveraging processes took place (2010) and where the major economies stand today (2012). Provided case studies suggest that on the way of economy wide deleveraging a country best starts deleveraging in the private sector while the public sector compensates for the loss in aggregate demand and begins deleveraging once economic growth regains momentum.

The contribution of this paper to the literature is in applying existing approaches to investigate household debt and aggregate demand to Europe and especially Spain with its provinces. This research can thus confirm that previous results for the United States and Australia are also valid for a legally and culturally quite different region. Furthermore it crucially contributes to the discussion on how to deal with the economic slump in Spain.

4 The Link of Household Sector Debt and Aggregate Demand

4.1 Empirical approach – A European Perspective

To investigate whether there is a link between household debt and aggregate demand in Europe, debt data of European countries are compared with two types of indicators for aggregate demand. One measure for the effects of debt on aggregate demand is the contribution of household consumption expenditure to GDP growth. The other measure for aggregate demand is employment which is suited due to the high elasticity of employment to aggregate demand, albeit with some time delay only. The hypotheses we test are:

Regions with (1) a larger increase in debt and (2) higher debt levels prior to an economic downturn experience a lower growth of aggregate demand during an economic downturn than regions with (1) smaller increases in debt or (2) lower debt levels, which is due to household balance sheet restructuring.

Lower growth of aggregate demand means thereby that it can also turn negative. The transmission mechanism of household debt to aggregate demand is as described by Keen (2009), Mian and Sufi (2012) or Dynan (2012). Using the permanent income hypothesis as starting point, households that expect higher future income adopt their consumption behavior and consume more. If the expectation about future income is high enough it is rational to take on debt today to smooth consumption. When a negative exogenous shock lowers the expectations of households, they need to change their consumption and investment behavior accordingly. Households that increased their debt more than others or that hold higher levels of debt have to reduce their debt by a larger amount. This restructuring of the household balance sheet is done by a reduction of consumer spending. Still, it is not obvious that aggregate demand is affected by households that restructure their balance sheet. Households that acted as lenders in the first place have the option to consume more when the debt is repayed. So in aggregate there should not be an effect on aggregate demand if the propensity to consume out of income is the same across households. This might however be different with aggregate demand indeed being reduced if the debt overhang is sufficiently large and the economy is stuck at the zero lower bound (see Eggertsson and Krugman (2010)).

To test our hypothesis, we compare changes in household debt as well as levels of household debt with our two measures for aggregate demand. If there was no effect on spending, the contribution of household consumption expenditure to GDP growth should be independent of debt. If debt had no influence on aggregate demand, neither changes in household debt nor the level of household debt were linked to changes in employment which follows aggregate demand. Both hypothesis are tested by using aggregated country level data.

Description of data

The cross country study builds on 18 European countries regarding the measure of employment and 9 euro area countries regarding measure of household consumption expenditure's contribution to GDP growth. All debt data are sourced from Eurostat's annual sector accounts and amended by data from national statistical agencies and central banks when Eurostat data coverage is not sufficient. Household debt is used as provided by Eurostat (total financial liabilities of the household sector including non-profit institutions serving households). GDP and

disposable income data is also based on Eurostat's annual sector accounts. To establish the link from household sector consumption expenditure and its contribution to GDP growth data from the European Central Bank are used. These data are on a quarterly basis but not provided all euro area countries, which limits the number of observations to 9 countries. The second test of the hypotheses uses employment data, which is based on the EU's Labor Force Survey and sourced from Eurostat.

Empirical analysis

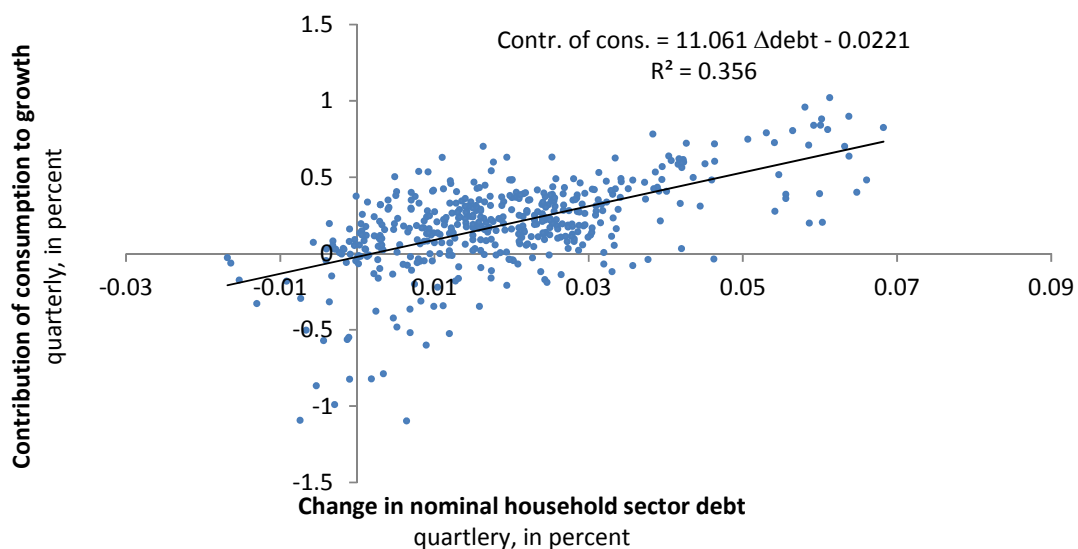
The American subprime crisis of the year 2007 spread to the European real economy in 2008 only. 2007 showed a peak in debt issuance and 2008 a peak in employment. Thus 2007 serves as starting point for the analysis of the effects of household debt on aggregate demand. We argue that debt levels and changes in debt have an effect on consumption and consequently on aggregate demand. The transmission channel is the necessary restructuring of the household balance sheet. In a boom period, a household takes on debt in aspiration of increases in future income and asset prices. The household spends this debt on the purchase of assets, foremost housing, and for consumption expenditure. When the boom period ends, asset prices stagnate or shrink, and future income streams become more uncertain. Households consequently restructure their balance sheet in accordance with their updated expectations. The restructuring of balance sheets comes along with increasing saving and decreasing consumption expenditure. The higher the debt level of the household sector is, the larger is the amount of debt, the sector has to repay and the larger is the reduction in consumption and thus aggregate demand. The same holds for changes in debt. The higher the increase in debt prior to the shock, the larger is the need to pay back debt and save following the peak of a boom. Both measures, changes in debt and the level of debt, are important. The level of debt is a good indicator, as there is a natural limit to household debt in terms of debt service. The more debt a household sector holds, the larger is the debt service burden which cannot exceed disposable income if one rules out Ponzi games. The increase of debt serves as a good indicator, as it shows how far households deviated from their used level of debt. If interest rates did not change, an increase in the debt to income ratio would alter the debt service burden proportionally. If the aggregated household sector long-term consumption behavior did not change accordingly, there needs to be a short-term drop in

consumption in order to soften the adjustment process to previous debt-to-income ratios. This drop in consumption dampens aggregate demand and consequently employment. For an effect on aggregate demand it is even not necessary to have a nominal decrease in debt volume. A reduction of the debt growth rate is sufficient to reduce aggregate demand compared to previous periods when income levels do not change, as the total amount available for consumption is reduced. The first way to prove this line of argumentation I to show the high correlation of changes in debt and the contribution of household consumption expenditure to GDP growth, as shown in figure 2.

Figure 2

Changes in household sector debt and contribution of consumption expenditure to GDP growth

Household sector debt is measured in euro. Changes in debt and the contribution of household consumption expenditure to GDP growth are quarterly data, measured as moving average over four quarters. Countries included (time span covered) are Austria (2003-2011), Belgium (1997-2011), France (1996-2011), Germany (1992-2011), Ireland (2002-2011), Italy (1998-2011), Netherlands (2000-2011), Portugal (1998-2011), and Spain (2001-2011).



Source: National Central Banks, European Central Bank

Figure 2 has two implications. First, mortgages, which represent the largest fraction of household sector debt, are not only linked to the housing market. Second, an increase in household debt comes along with an increasing positive impact of household consumption expenditure on GDP growth. One would expect that changes in European household debt are not closely linked to

consumption as most debt is used for the purchase of housing assets. The positive correlation of increases in household debt and contribution of consumption to GDP growth means that even so mortgage equity withdrawals are of minor importance in Europe, a higher volume of real estate mortgages is associated with a higher contribution of consumption to GDP growth. This relation does not only hold on a pooled euro area level. A closer look at the single countries of the currency union confirms the results (cf. table A1).

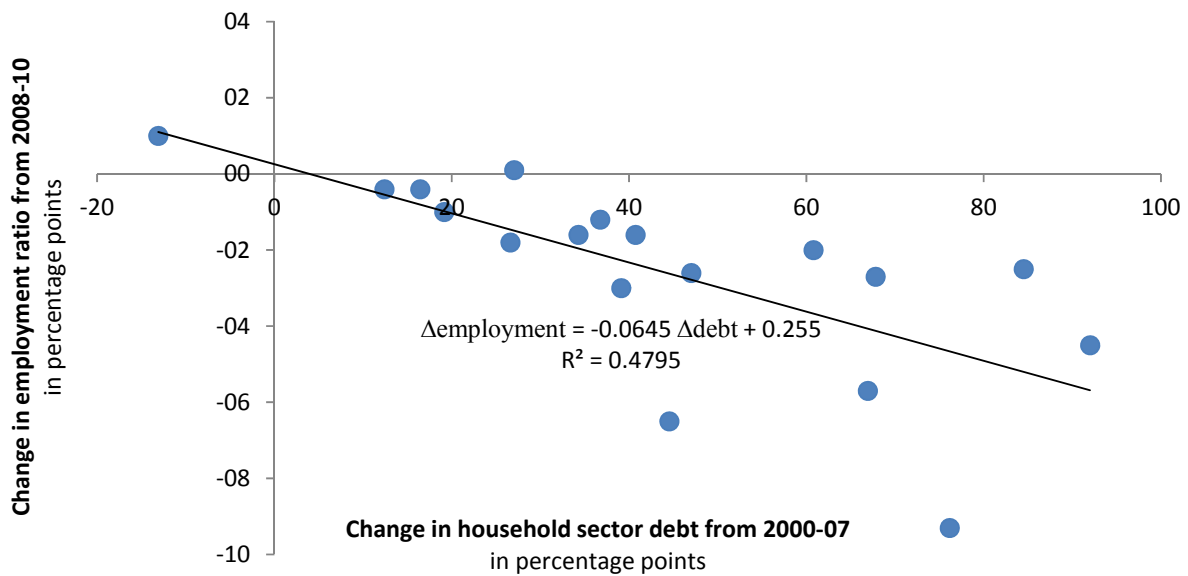
Eight out of the nine euro area countries under consideration show a high correlation of changes in household sector debt and contribution of household consumption expenditure to GDP growth with Belgium being the only country without any link. Furthermore, countries with longer time periods show that the correlation is especially apparent in the last decade – the years preceding the crisis and the crisis itself. The next interesting result is that countries that face the most severe problems in the euro crisis are those with the highest correlation of growth in debt and consumption expenditure. Ireland, Portugal, and Spain have correlation coefficients of about 80%, Italy's coefficient for the period from 2000 until 2011 is at 65.6%. Not taking the smoothing moving average data but instead quarterly data also yield high coefficients. The conclusion thereof is that debt financed consumption driven GDP-growth is highly vulnerable to shocks.

Turning to the second and more indirect measure of aggregate demand, figure 3 illustrates the high correlation of changes in debt prior to the crisis and the following magnitude of changes in employment.

Figure 3

Changes in debt and employment

Household sector debt is measured as ratio of financial liabilities over disposable income. Employment is measured as ratio of the employed population aged 15 to 64 to the total population aged 15 to 64. The number of European countries included is 18.



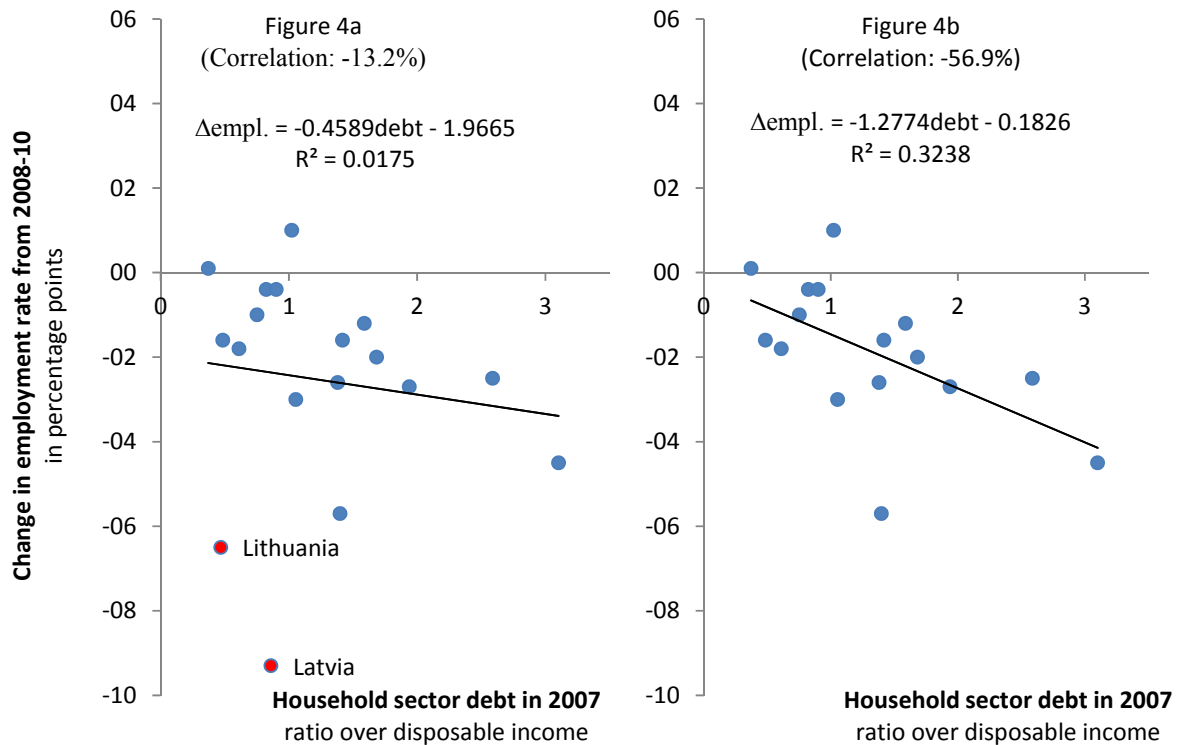
Source: Eurostat

The hypothesis that a larger increase in debt ratios leads to a subsequent stronger decline in employment is confirmed for the 18 European countries where debt as well as employment data are available for the relevant time span. The correlation coefficient of -69.2% demonstrates the high and negative relation of household debt increases and following adjustments in aggregate demand. A regression without further control variables indicates that for every increase in debt of 10 percentage points from 2000 to 2007 the employment ratio decreased by 0.6 percentage points from 2008 to 2010. The level of household sector debt is an alternative measure to the increase in household sector debt. The relation of the level of household sector debt relative to disposable income prior to the crisis is shown in figure 4.

Figure 4

Levels of household debt and changes in employment

Figure 4a comprises the same 18 countries as figure 3. Figure 4b shows a country sample that is reduced by the outliers Lithuania and Latvia



Source: Eurostat

Using the same country sample to test this paper's underlying hypothesis does not give support to the hypothesis and it seems as if the level of household sector debt is not relevant. However there are two outliers in the country sample, Latvia and Lithuania. Both countries started with very low levels of household debt and experienced a very large increase in household debt prior to the crisis. Correcting the analysis for these outliers backs the hypothesis (cf. figure 4b). Increases as well as levels of debt during a boom are good indicators for the magnitude of changes in aggregate demand in the downturn. Current Eurostat data do not yet include the years 2011 and 2012 which would allow an exact measuring of the degree of adjustment in household sector debt, whether it is a reduced debt growth, no debt growth at all or a nominal reduction in the debt-to-income ratio. The conclusion of the data presented in this section is nevertheless clear.

Household sector debt has fueled economic growth in the upswing but during a time of debt moderation, when debt growth decelerates or turns negative, the impact on aggregate demand is severe.

The results of analyses for American household sector debt deleveraging by Mian and Sufi (2012) and Dynan (2012), and the work by Keen (2009) for Australian household sector debt and aggregate demand can be confirmed for European household sectors.

4.2 Empirical approach – The Case of Spain

The cross country study gives very good results for our hypotheses. But the 18 European economies are a lot more diverse in comparison to Australia and the United States so that the results are more vulnerable to unobserved country characteristics. The low number of observations does furthermore hamper the use of econometric regressions. To address both issues, this section focuses on one single country. Criticism against results from aggregation on a national level and comparison of European countries is certainly less problematic for a comparison of more granular regional data. The case of Spain is also used in order to address one of the countries that is most heavily hit by the euro crisis, that experienced especially high increases in debt and high levels of debt, and that currently suffers from exceptionally high unemployment rates. By focusing on Spanish provinces the number of observations is increased to 50³ which is more suitable for econometric regressions. In addition, shocks that apply to all Spanish provinces are more homogenous than shocks that apply to 18 European countries. Therefore this section focuses on the regional analyses Spain. We follow the same procedure as in section 4.1. The regional level of the analyses is NUTS-3,⁴ i.e. the 52 Spanish Provincias.

Description of Data

Spanish regional data are sourced from the Instituto Nacional de Estadística (INE), the Spanish Ministry of Employment and Social Security (Ministerio de Empleo y Seguridad Social), the Spanish Ministry of Public Works and Transport (Ministerio de Fomento) and Eurostat.

³ Spain has 52 provinces but the relevant data are only available for 50 provinces.

⁴ NUTS-levels (fr. *Nomenclature des unités territoriales statistiques*) are used for regional statistics in Europe. Especially NUTS-3 is used for the distribution of regional funds of the European Union.

The INE provides mortgage on the regional level of the Spanish provinces. All mortgage data are monthly data starting in January 2003 and lasting until April 2011. There is no aggregated volume of mortgages but the monthly information relate to the number and amount of newly issued mortgages. The volume of mortgages is a good alternative to total household debt as mortgages account for 84% of total household debt, almost independent of the income percentiles.⁵ The mortgage data are used in the analyses in two different ways. First, instead of using the growth in total mortgage volume we use the growth rate of newly issued mortgages. This enables us to investigate the effects of an increase in mortgage issuance on subsequent changes in aggregate demand. We thus compare the average monthly amount of mortgages issued in 2007 with the average monthly amount of mortgages issued in 2003. Second, the volume of mortgages at a certain point in time is replaced by the aggregated volume of newly issued mortgages in the five years preceding the crisis, i.e. January 2003 until December 2007. The unweighted mean household sector debt to GDP ratio across all provinces was 63% with a standard deviation of 27%. Provincial GDP data to calculate the debt-to-GDP ratios is based on Eurostat figures. The average GDP per province in 2007 was 20.2 billion EUR. Excluding the two most important provinces (Barcelona and Madrid) leads to an average GDP of 14.2 billion EUR.

Real estate prices are included in the analysis to compare how the effects of household debt differ by provinces with and without booms in the real estate sector. If the increase in debt was associated with a parallel increase in real estate prices, following adjustments in aggregate demand might result from real estate price developments and not from debt levels. The data is provided by the Spanish Ministry of Public Works and Transport. All prices are mean prices of residential real estate transactions by province and quarter from 2004 to 2012. The average Spanish residential real estate price in the first quarter 2004 was 124 thousand EUR. It increased to 190 thousand EUR in the fourth quarter of 2007 (+ 53%) and was at 148 thousand EUR in the first quarter of 2012 (-22% vs. peak, +19% vs. Q1 2004). The unweighted mean increase of the prices across all provinces from the first quarter of 2004 to the maximum was 89% with a standard deviation of 44%.

⁵ The share of mortgage debt in total debt in 2008 ranges from 85.3% for the top income percentile to 82.3% for the second highest income percentile. The overall average is 84% (cf. 17, main tables of the Survey of household finances (EFF) 2008)

Aggregate demand is measured via the employment and unemployment channel. Provincial employment rates⁶ and total nominal employment figures are sourced from the INE. The Spanish employment rate was 51.1% in the first quarter of 2005. It increased to 54.4% in the third quarter of 2007 and decreased to 45.3% in the first quarter of 2012. The employment and unemployment rates already show a high and significant correlation to the provincial household debt figures. In order to untangle the effect of debt on aggregate demand, it is necessary to identify the part of unemployment that results from provincial consumption. To identify this effect, unemployment data by occupation and by economic activity on a provincial level is sourced from the Spanish Ministry of Employment and Social Security. Economic activities are split into 22 different groups. These groups are then clustered by the type of employment to the tradable sector, non-tradable sector, construction, and other sectors. Due to a change in the classification of economic activities in 2009, we needed to match the classification prior to 2009 with those after the recoding (cf. table A4). Consequently not all groups were matched exactly, but tradable and non-tradable sectors can be identified. Demand for tradable economic activities is not bound to the place of production but to the whole economy. The tradable sector thus faces a similar shock across all provinces. Economic activities classified as tradable are extracting industries, manufacturing industries, and agriculture and fishing. The retail sector and non-qualified service sector count as non-tradable industries. Retail activities like grocery stores or clothing and shoe stores, crucially depend on local consumption. The same holds for non-qualified services that are mainly found in household services. It need not be that non-tradable sectors have a higher increase in unemployment than tradable sectors, as the employment elasticities with regards to consumption can be different. But it is important to note that the non-tradable sector depends on aggregate demand on a provincial level and the hypothesis to be tested builds on this link of debt and aggregate demand.

Empirical analysis

To compare Spanish provinces with an average population of less than one million gives a granular view that is suited to disentangle the effect of household debt on aggregate demand. Models mentioned in section 3 look at the effect of deleveraging on consumption. The Spanish

⁶ We use the term unemployment for simplicity throughout this section but the data sourced from the Ministry of Employment and Social Security also include job seekers that are employed part time and look for a full time job, seasonal workers or people that did not have a job prior to looking for a job.

household sector as whole did barely start to reduce its debt outstanding as ratio over GDP. However, to investigate the deleveraging effect, households need not necessarily reduce their debt outstanding. It is sufficient to reduce the growth of liabilities in order to consume less than in previous periods. A simple example illustrates this: If the household sector used to take on debt of 10% of disposable income a year it can reduce consumption by 5% of disposable income and still take on debt of 5% of disposable income. An increase in debt outstanding can thus still mean a reduction in consumption expenditure so that an analysis of the debt-consumption link should not only take a look at nominal deleveraging.

Taking the data to the hypothesis, we first look at the correlation of increases in the provision of debt from 2003 to 2007 and the level of debt in 2007 and changes in unemployment in the different economic sectors from 2007 until 2010. The starting point of the employment figures is November 2007 and the end point is November 2010. We use the November figures as real estate prices peaked in the fourth of quarter of 2007 and the employment rate was at a high in third quarter of 2007 which still includes tourism, i.e. tradable sector, effects and we do not want to include December-year-end effects in employment or unemployment. We limit the analysis to November 2010 in order to capture first round effects of reduction in consumption. The decline in employment lost momentum in the second half of 2010 but the recession proliferated again towards the end of 2011 and in 2012 with capital flights taking place at the same time. Using year over year changes November 2010 is consequently the end to the analysis in this paper.

The correlation of household debt and employment on a provincial level is shown in table 1. The results for the total unemployment rate are similar to the results for employment on a European country level. The level of debt is highly and significantly positively correlated with the total unemployment rate. These results do not hold for increases in debt. Spanish households reduce their consumption more based on their total debt level and the resulting debt service and to a lower extent to changes in their debt prior to the crisis. Distinguishing between economic activities, there is the link that larger increases in debt lead to subsequent higher rates of unemployment in sectors that depend on local consumption, but the relationship is much stronger for debt levels. Unemployment in economic activities that are classified as non-tradable is closer tied to household debt than unemployment in the construction sector. Unemployment in the tradable sector has no significant correlation with the level of debt. These correlation results

support the hypothesis that household debt restrains consumption as employment linked to local spending is tied to household debt whilst employment linked to nationwide spending is not.

Table 1

Correlation of household sector debt and unemployment

Increase in debt is measured as the increase of mortgage provisions from 2004 to 2007 in percent. The level of debt is measured as cumulative mortgage provision from 2004 to 2007 over 2007 GDP. Tradable unemployment includes the economic activities agriculture and fishing, extractable industries and manufacturing industries. Non-tradable unemployment includes retail and household service activities.

| | Increase in Debt | Level of Debt |
|--------------|-------------------------|----------------------|
| Total | 0.2248 | 0.5212*** |
| Tradable | 0.1846 | 0.2143 |
| Non-Tradable | 0.3000** | 0.6490*** |
| Construction | 0.0074 | 0.3889*** |

*, **, *** denote the significance level at 10%, 5% and 1%

Source: INE, Ministerio de Empleo y Seguridad Social, Eurostat

A regression of unemployment on household sector debt confirms these results (cf. table 2). The level of household sector debt prior to the crisis has a significant positive effect on total, non-tradable and construction unemployment and does not affect tradable sector unemployment. The effect of debt is about 10% stronger for the construction sector than for the non-tradable sector. Besides the very high significance of household, the explanatory power of this household balance sheet shock is also quite high with an R^2 of 42% for the non-tradable sector.

Table 2

OLS regression of unemployment on household sector debt

The regressions are estimated with ordinary least squares and heteroskedasticity robust standard errors are used where necessary.

| <i>OLS estimation</i> | Change in unemployment from 2007 to 2010 | | | | | | | |
|-------------------------|--|-------------|-----------------|-------------|---------------------|-------------|--------------|-------------|
| | Total | | Tradable sector | | Non-tradable sector | | construction | |
| | (a) | (b) | (a) | (b) | (a) | (b) | (a) | (b) |
| Level of household debt | 0.70 | 0.71 | 0.41 | 0.42 | 0.78 | 0.77 | 0.86 | 0.82 |
| (p-value) | (0.00) | (0.00) | (0.14) | (0.15) | (0.00) | (0.00) | (0.01) | (0.01) |
| Real Estate Boom Dummy | | 0.02 | | 0.02 | | -0.04 | | -0.13 |
| (p-value) | | (0.83) | | (0.88) | | (0.55) | | (0.41) |
| Constant | 0.40 | 0.38 | 0.58 | 0.56 | 0.27 | 0.30 | 1.05 | 1.14 |
| (p-value) | (0.00) | (0.00) | (0.00) | (0.00) | (0.01) | (0.00) | (0.00) | (0.00) |
| N | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| R ² | 27.2% | 27.2% | 4.6% | 4.6% | 42.1% | 42.5% | 15.1% | 16.4% |

Source: INE, Ministerio de Empleo y Seguridad Social, Eurostat

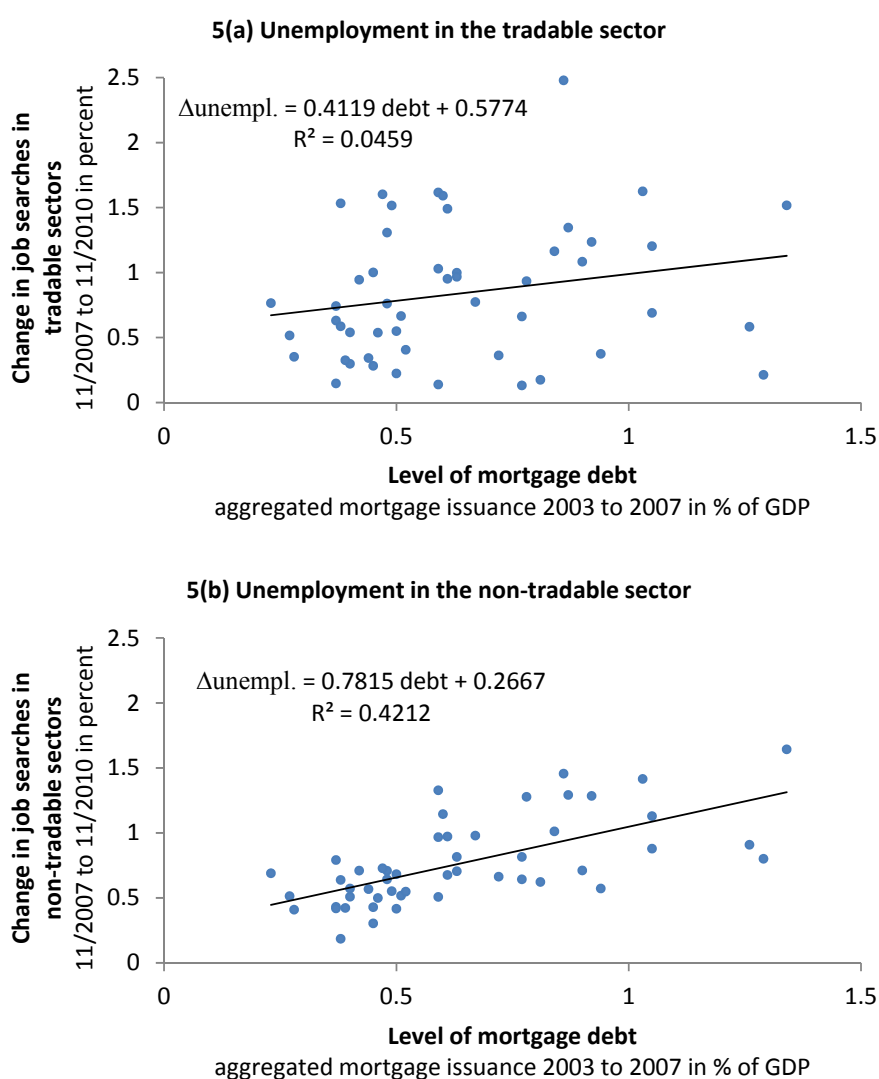
Model (a) uses the level of household debt as only explanatory variable. In model (b) we amend the estimation for a dummy variable that takes the value one if the respective province is among the 50% of provinces with the highest increase in real estate prices in the years preceding the crisis and zero otherwise. Including an indicator for provinces with booms in house prices reflects the idea that households may have over borrowed in order to finance a house and are especially vulnerable to house price decreases during the recession. Model (b) has marginally higher explanatory power and slightly changed coefficients for the level of household debt compared to model (a), but the real estate dummy is not significant at all.

Plotting the 50 provinces in diagrams for tradable and non-tradable sectors further illustrates these relationships (cf. figure 5). The vertical axes of figures 5(a) and 5(b) both have the same scale. This highlights the larger variation in the tradable sector that does not exhibit a relation to household balance sheet shocks compared to the non-tradable sector where the observations are within a narrower band.

Figure 5

Household sector debt and changes in tradable and non-tradable unemployment

The level of mortgage debt is calculated as the sum of all mortgages provided from 2003 to 2007 divided by GDP in 2007. Job searches in tradable and non-tradable industries include unemployed persons that are looking for a job as well as non-unemployed persons looking for a job (e.g. part-time workers or seasonal workers). The scatter plots for the underlying economic activities are in figure A1 and A2 in the Appendix.



Source: INE, Ministerio de Empleo y Seguridad Social, Eurostat

We further distinguish between provinces that show a high correlation of changes in real estate prices and employment and those with a low correlation. If both categories of provinces had similar levels of debt, there might be an omitted variable that is driving the relation of changes in debt and aggregate demand. Table A2 in the appendix provides the changes in real estate prices, employment and debt during boom and bust periods. On average, all provinces experienced about the same increase in real estate prices prior to the crisis (~73%) but provinces that had a higher drop in real estate prices and employment during the crisis had an increase of mortgage provisioning of almost 150% while the other provinces had an increase of less than 100%. Furthermore provinces with a steeper decline had a debt level in 2007 that was 130% percent higher. This further backs our hypothesis of the effect of household debt on aggregate demand.

5. Conclusion

The results of this analysis are unambiguous. Increasing unemployment in Europe is an explicit consequence of a lack of consumer demand compared to the pre-crisis period. A combination of private sector balance sheet restructuring with a parallel program in government austerity is currently amplifying the effects of shrinking consumption on aggregate demand and employment. Apart from giving an empirical overview and explanation of the European debt problem, we investigated in greater detail the situation of Spanish provinces. We found strong positive effects of pre-crisis mortgage debt levels on changes in regional unemployment rates during the crisis. This is in line with the results of Mian and Sufi (2012) and highlights the importance of household indebtedness for unemployment. However, whilst we have statistically identified a positive relation between debt and unemployment, we cannot at this stage of the analysis tell what fraction of the increase in unemployment is due to the aggregate demand effects. This remains for future work.

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Appendix

Table A1

Household debt and the contribution of household consumption expenditure to GDP growth

Correlation coefficients and R² based on quarterly data of the contribution of household consumption expenditure on GDP growth and growth household sector debt. Moving average data are calculated as four quarter moving averages. Two results are shown for countries with data prior to 2000 (starting year until 2011 and 2000 until 2011).

| Country | Period | Moving Average | | | Quarterly Data | | |
|-------------|-----------|-------------------------|------------------------|--|-------------------------|------------------------|--|
| | | Correlation Coefficient | Trend - R ² | Trend - Coefficient for change in debt | Correlation Coefficient | Trend - R ² | Trend - Coefficient for change in debt |
| Austria | 2003-2011 | 64.4 | 41.4 | 9.4 | 33.3 | 11.1 | 4.9 |
| Belgium | 1996-2011 | 0.6 | 0 | 0.08 | 8.7 | 0.8 | 1 |
| France | 1996-2011 | 16.6 | 2.8 | 4.6 | 23.3 | 5.4 | 8.6 |
| France | 2000-2011 | 31.6 | 10 | 8.3 | 25.5 | 6.5 | 9.1 |
| Germany | 1993-2011 | 48.9 | 23.9 | 8.5 | 20.1 | 4 | 9.6 |
| Germany | 2000-2011 | 48.5 | 23.5 | 18.7 | 16.5 | 2.7 | 14.1 |
| Ireland | 2002-2011 | 80.7 | 65.1 | 16.1 | 61 | 37.2 | 15.2 |
| Italy | 1997-2011 | 35.7 | 12.8 | 8.7 | 25.4 | 6.3 | 6.1 |
| Italy | 2000-2011 | 65.6 | 43 | 12.9 | 42.9 | 18.4 | 10.1 |
| Netherlands | 2000-2011 | 42 | 17.7 | 5.7 | 24.8 | 6.2 | 5.6 |
| Portugal | 1998-2011 | 79.1 | 62.6 | 18.6 | 53.8 | 28.9 | 18 |
| Spain | 2000-2011 | 81.4 | 66.2 | 18.2 | 64.6 | 41.7 | 16 |

Source: Eurostat, European Central Bank

Table A2

Development of real estate prices, employment, and debt in provinces with high and with low correlations of employment and real estate prices

Correlation coefficients for employment and real estate prices differ across provinces. The first cluster of provinces consists of 5 provinces with correlation coefficients of 80% or more. The second cluster of provinces consists of provinces with correlation coefficients below 30% or even negative. Correlations are calculated with lagged employment rates. Developments in real estate prices and employment are measured from the start of the time series until the national peak of real estate prices and from that point in time until the latest available data. Debt is provided in levels and changes from 2003 to 2007.

| | | | Correlation of Employment and Real Estate Prices | |
|--------------------|---------------|----------------------|--|----------------------------------|
| Period | | | High ($\geq 80\%$), 5 provinces | Low ($\leq 30\%$), 7 provinces |
| Real Estate Prices | Increase | (2004/Q1 to 2007/Q4) | 73.8% | 73.1% |
| | Decrease | (2007/Q4 to 2012/Q1) | 31.7% | 6.6% |
| Employment | Increase | (2005 to 2007/Q4) | 8.4% | 0.6% |
| | Decrease | (2007Q4 to 2012/Q1) | 19.9% | 12.8% |
| Debt | Increase | (2003 to 2007) | 149.2% | 96.6% |
| | Level in 2007 | | 96.6% | 41.7% |

Table A3

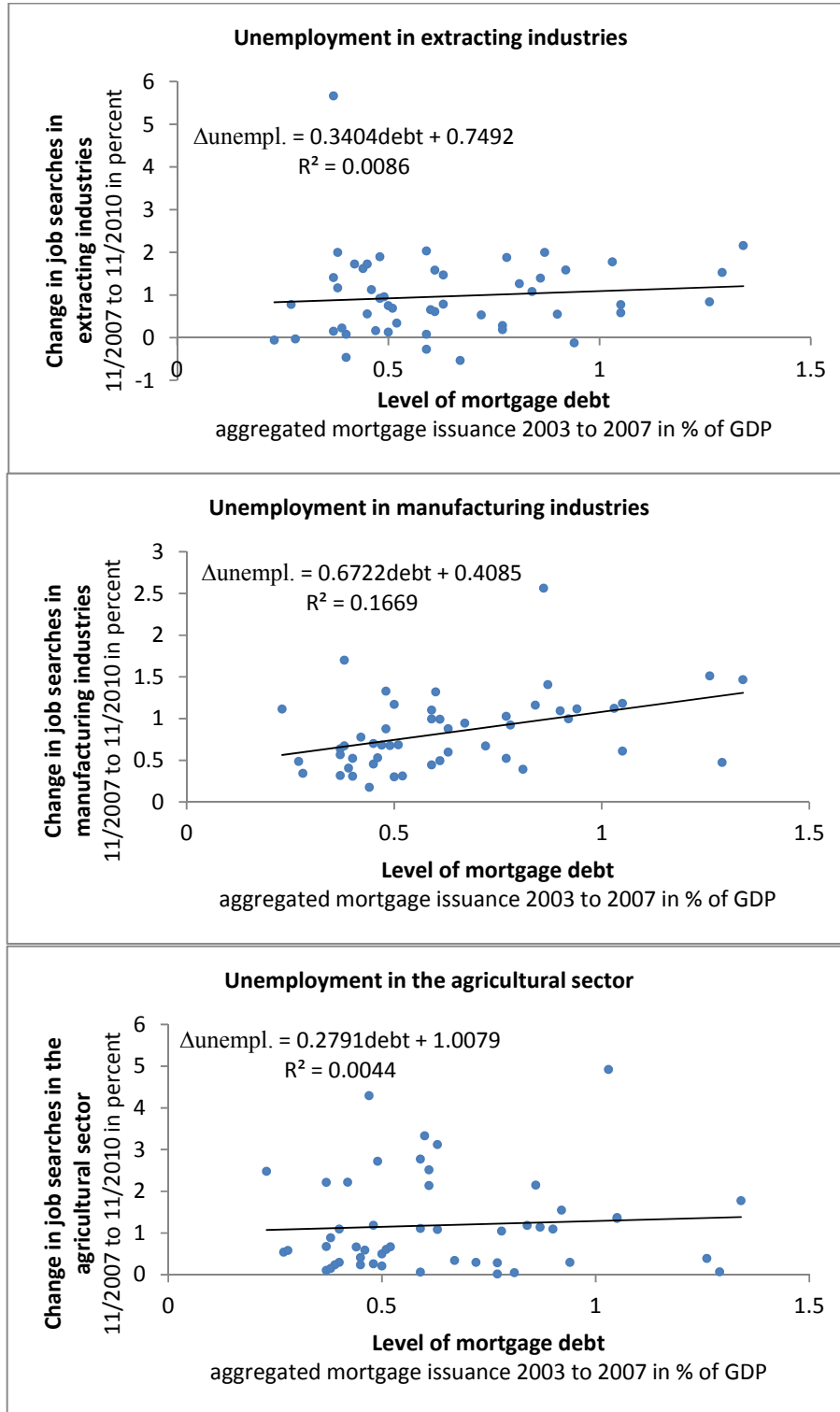
Economic activities with old and new classification

Economic activities are matched along their old and new description. The share of subcodes indicates how many of all subcodes could be matched one to one.

| Category | Economic Activity (CNAE 1993) | Economic Activity (CNAE 2009) | Share of subcodes that are matched |
|--------------|--|--|--|
| Tradable | A - Agriculture, livestock farming, hunting and forestry B - Fishing | A - Agriculture, livestock farming, forestry and fishing | 90% |
| Tradable | C - Extracting industries | B - Extracting industries | 87% |
| Tradable | D - Manufacturing industries | C - Manufacturing industries | 94% |
| Non-Tradable | G - Trade, repair of motor vehicles, motorcycles, household goods and personal items | G - Wholesale and retail trade, repair of motor vehicles, motorcycles | 93% |
| Non-Tradable | P - Private households with employed persons | T - Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use | 100% |
| Construction | F - Construction | F - Construction | 98% of old "F" is matched to new "F", but contributes to 81% of new "F" only |

Figure A1

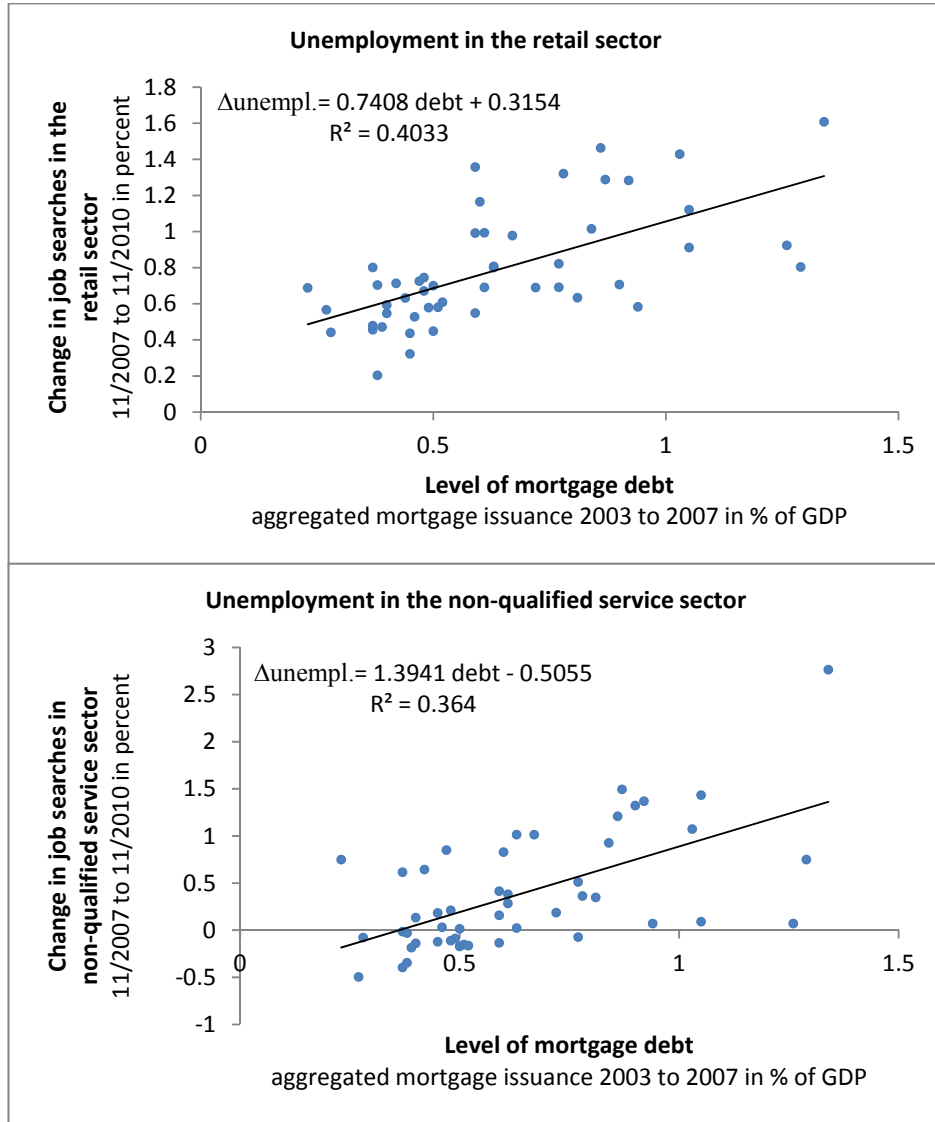
Household sector debt and tradable employment sectors



Source: INE, Ministerio de Empleo y Seguridad Social

Figure A2

Household sector debt and non-tradable employment sectors



Source: INE, Ministerio de Empleo y Seguridad Social