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Financial imbalances and household welfare: empirical evidence from the EU

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FINANCIAL IMBALANCES AND HOUSEHOLD WELFARE

EMPIRICAL EVIDENCE FROM THE EU

Livio Stracca

In 2013 all ECB publications feature a motif taken from the €5 banknote.

NOTE: This Working Paper should not be reported as representing the views of the European Central Bank (ECB). The views expressed are those of the authors and do not necessarily reflect those of the ECB.

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Abstract

This paper uses Eurobarometer survey data from 26 EU countries to evaluate whether the general public cares about financial stability and imbalances over and above their effects on key macroeconomic variables such as unemployment and inflation. I confirm previous results in the literature that life satisfaction - a widely used measure of household welfare - negatively depends on the unemployment rate. In addition to previous results in the literature, I establish a strong empirical link between life satisfaction and consumer confidence as measured by the European Commission consumer survey. The main result of the paper is that life satisfaction generally does not systematically depend on a number of measures of financial imbalance based on credit and asset prices once the other macroeconomic controls are included.

Keywords: Eurobarometer, life satisfaction, consumer confidence, financial stability, central bank.

JEL: E6.

Non-technical summary

This paper uses Eurobarometer survey data from 26 EU countries to evaluate whether the general public cares about financial stability and imbalances over and above their effects on key macroeconomic variables such as unemployment and inflation. The measure of household welfare used in this paper is life satisfaction as measured in the European Commission's Eurobarometer survey.

I confirm previous results in the literature that life satisfaction negatively depends on the unemployment rate and, in some specifications, on real GDP growth. In addition to previous results in the literature, I establish a strong empirical link between life satisfaction and consumer confidence as measured by the European Commission consumer survey, in particular the components of the consumer confidence indicator that are related to respondents' expectations about the own situation.

I then turn to include financial imbalance variables in the regression, mainly based on statistical indicators of "gap" obtained by de-trending asset price and credit data. While this type of measure still represents the state of the art in the literature, it is likely that better and more theory-based measures will be identified in future research, and this limitation has to be kept in mind when interpreting the results of this paper.

The main result of the paper is that life satisfaction generally does not systematically depend on a number of measures of financial imbalance based on credit and asset prices once the other macroeconomic controls, notably consumer confidence, are included. Indeed, most of the indicators that we consider are statistically insignificant. While the real house price gap is significant with a negative sign, its effect is not very robust and appears to have changed sign over time. Moreover, we find some evidence that the absolute level of the share price gap matters negatively for life satisfaction, suggesting that what matters for citizens is to avoid booms and busts independent of their direction.

Overall, this study suggests that financial imbalances mainly matter for households through their effect on real economy variables such as the unemployment rate and real GDP growth, and do not have a large independent influence. From a policy-making perspective, this finding certainly does not diminish the importance of limiting financial imbalances and maintaining financial stability, as these steps are instrumental in maintaining overall macroeconomic stability.

1 Introduction

In the wake of the global financial crisis many jurisdictions are equipping themselves with authorities explicitly in charge of protecting financial stability at the systemic level, and central banks are typically heavily involved in the setting of macro-prudential policies. According to many observers, financial stability should become a key objective for central banks alongside price stability. Central bank mandates are ultimately based on the support by citizens, as it should be in every democracy. The attribution of a macro-prudential function to central banks should ideally be based on the public's preference for financial stability, independent of, and in addition to, the important role that financial stability plays to preserve price stability and sustainable economic growth.

Does the general public care about financial imbalances? Is there a trade-off between price and financial stability if the objectives of policy are to maximise household welfare? One way to address this question is to trust the working of the political system. If elected and accountable representatives of the people choose that financial stability should be an explicit and independent objective of economic policy (and possibly of central banks), then the decision should have a high degree of democratic legitimacy and ultimately reflect citizens' preferences. The alternative, as suggested by Di Tella and MacCulloch (2007), is to use quantitative measures of citizens' welfare and investigate the link between those and the objectives of economic policy, in order to understand their true desirability. This is the route also taken in this paper.

There is already a substantial literature based on quantitative measures of subjective well being such as life satisfaction and happiness (see, among others, Clark et al. 2008; Di Tella and MacCulloch 2006; Kahneman and Krueger 2006). Whether quantitative measures of subjective well being truly measure utility is certainly an open question, especially given that utility itself is a more complex concept than most economists normally care to recognise (Kahneman and Krueger 2006). It is therefore not at all un-controversial that life satisfaction (or any other measure of subjective well being) is the best target for economic policy (Di Tella and MacCulloch 2007). Moreover, life satisfaction is not the same as happiness, though it is correlated with it; it measures mainly a cognitive evaluation of distance from aspirations (Bruni and Porta 2007). As in Di Tella et al. (2003), in this paper I focus on life satisfaction as a measure of subjective well being mainly owing to the longer data availability in the European Commission's Eurobarometer survey. In addition, life satisfaction like other measures of subjective well-being correlates with other objective measures of well-being (such as health) and is a legitimate way at least to *start* investigating the question of the impact of economic policies on people's welfare. In addition, a policy which makes citizens unhappy and unsatisfied with life will not only probably be sub-optimal, but also ultimately lead to the removal of the policy-maker responsible for it, at least if the policy maker is under the direct control of the public (which may be

less the case for central bankers in the short term, of course).[1] Finally, note that the empirical model being estimated contains country fixed effects, which implies that average differences across EU countries (e.g., due to different interpretations of the Eurobarometer questions across cultures) ought to be controlled for. Nonetheless, it should be noted that the results in this paper do depend on the particular choice of the subjective well-being measure, i.e. life satisfaction, and may not necessarily extend to other, equally plausible measures.

In this paper, I use data on life satisfaction from the European Commission's Eurobarometer survey as in Di Tella et al. (2003). Unlike Di Tella et al., in this paper I am interested in investigating the effect of financial stability on the population as a whole and do not aim to understand the role of personal characteristics such as demographics. I therefore use *country-level* data from 1973 to 2011 in 26 EU countries (all EU countries excluding Malta) where the left-hand side variable is essentially the share of the respondents who are satisfied with their life. From the standpoint of a policy maker, maximising the number of people who are satisfied with their life is a legitimate objective which may also contribute, at least for policy makers who are subject to the political cycle, to being re-elected and remaining in power. The EU is a very interesting source of data for financial stability as experiences have been very heterogeneous in different countries. House prices, for example, have experienced booms and busts in countries such as Ireland or Spain but have remained almost unchanged in others, such as Germany and Austria. This wide array of experience should give us some idea of whether financial imbalances affect citizens' welfare as measured by reported life satisfaction. Clearly, using country-level data also has significant downsides because it does not allow to study heterogeneity and the role of personal characteristics. For example, being a homeowner or not might matter quite a lot in influencing the effect of changes in house prices on household welfare, though it should be noted that information on home ownership is not contained in the Eurobarometer survey. Extending the empirical work of this paper to individual-level data could therefore be a useful avenue of future research.[2]

From a conceptual point of view, the analysis of the impact of financial stability on household welfare is more complex than the analysis of the effect of inflation and unemployment on the same variable. First, there is a measurement problem. While we know how to measure price stability and output growth stability, financial stability and imbalances still remain largely qualitative concepts. Moreover, the channels through which financial stability may affect citizens' welfare are potentially complex and indeed at least four transmission channels may be envisaged. First, financial

[1] An interesting extension of this work would be to evaluate whether measures of life satisfaction have an impact on citizens' voting behaviour and whether the reaction of life satisfaction to certain economic policies correlates with the probability of the government being re-elected.

[2] Also note that with country-level data it is not possible to evaluate the impact of the macroeconomy on the own vs the general situation as done in Di Tella et al. (2003). However, this distinction is not important in their calculation of the trade-off index between inflation and unemployment.

stability affects output and price stability, and this may in turn influence people's happiness directly (say, some citizens lose their job, empirically a big drag on life satisfaction) or indirectly (a worse macroeconomic environment raises fear). Second, life satisfaction may be correlated with "animal spirits", i.e. trends in optimism and pessimism about the future (see in particular Barsky and Sims 2012), and optimism may in turn affect asset prices, credit and financial stability. This raises a chicken-and-egg problem since the direction of causality is not clear in this nexus (more satisfied people are more optimistic, but more optimism also leads to higher life satisfaction). Third, let us assume that financial imbalances can be characterised by a distortion in the inter-temporal price of assets and of credit (say, too cheap or too expensive compared with the fundamentals). This may have a direct impact on the utility of individuals since, for example, house prices may be too high or credit conditions too tight exactly when, say, young people need to buy a new property and take on a mortgage. Excessively high house prices therefore have very different implications for current homeowners, prospective homeowners and renters. Since these distortions have largely a distributional effect (some people benefit, other people lose out) it will be important, from a general point of view, to understand their net effect on the population as a whole. Finally, financial instability and imbalances may result in the disruption of the provision of financial services that is an essential utility in a modern economy and which may therefore affect welfare. In this paper, we build possible measures of financial imbalances based on estimated measures of boom and bust in asset prices and mortgage credit as well as measures capturing the health of the banking sector and the presence or not of a banking crisis. An important problem associated to many of these measures is that it is not clear whether, say, a positive imbalance is a good or a bad in the same way as it is possible to state for variables such as the unemployment rate and inflation.

One novel element of this paper is the use of consumer confidence data drawn from the European Commission's consumer survey in the context of the analysis of life satisfaction trends. To the author's knowledge, there is no evidence so far in the literature on the link between life satisfaction or happiness and confidence. We find that life satisfaction and confidence are very strongly correlated, which is interesting and reassuring for the quality of both indicators, which come from separate surveys. Moreover, I find that life satisfaction is more correlated with those components of the consumer confidence survey which have to do with respondents' own situation and prospect, and less so (but still positively and significantly) with variables related to consumers' views on the overall economic situation. Given that some of the questions in the consumers survey are directly aimed at measuring expectations about the future, I use these variables in order to try and rule out an association between life satisfaction and financial imbalances which is actually driven by a third factor (optimism).

This paper is also related to the literature on the welfare costs of macroeconomic fluctuations (Lucas 2003) but this literature is generally focused on the standard

macroeconomic variables such as inflation and unemployment. Chauvin et al. (2011) estimate the welfare cost of asset bubbles (an inter-temporal price distortion) and find that the order of magnitude crucially depends on the degree of heterogeneity in agents' exposure to the assets. If the heterogeneity is sufficiently high, asset price bubbles have a first-order effect (defined as the quantity of permanent consumption that a social planner would forego to eliminate bubbles) on household welfare. The analysis by Chauvin et al. is based on a calibration, while in this paper the question is addressed using real data on citizens' life satisfaction and empirical measures of asset price misalignment.

Before looking at the effects of financial imbalance measures, I try to replicate the results in Di Tella et al. (2003) on country-level data and for a different (and significantly longer) sample period. As in Di Tella et al., we find the unemployment rate and real GDP growth to matter (respectively with a negative and a positive sign) for life satisfaction in EU countries. At the same time, we find the inflation rate to be insignificant, but show that this is explained by the post-1999 observations, when inflation has been low and stable in most EU countries. We also establish a close relation between life satisfaction and consumer confidence, in particular the sub-components of the consumer confidence indicator that are related to the respondents' own situation and expectations, such as the willingness to undertake major purchases in the following 12 months.

A key finding of this paper is that there is little evidence that financial imbalances matter directly for life satisfaction in EU countries once we control for the unemployment rate and for consumer confidence (which takes away the effect of real GDP growth). Indeed, most of the financial imbalance indicators that we consider are statistically insignificant. As an exception, the real house price gap is found significant with a negative sign, but its effect is not very robust and appears to have changed sign over time.

In addition, I find some evidence that the *absolute* level of the share price gap matters negatively for life satisfaction. This would suggest that what matters for citizens is to avoid booms and busts independent of their direction. Also this result, however, should not be over-emphasised. First, it holds for the most recent period only, and second, it is puzzling that the same result is not found for other variables, notably the real house price gap in absolute terms, which should arguably matter more than the share price for households. All in all, the main conclusion of this study is that financial imbalances mainly matter for households through their effect on (or being real-time indicator of) real economy variables such as the unemployment rate and real GDP growth (or consumer confidence), and do not appear to have a large and consistent own influence on household welfare.

The paper is organised as follows. Section 2 describes the data in some detail. Section 3 presents the empirical model and Section 4 the results. Section 5 concludes.

2 Data

This paper is based on quarterly data for 26 EU countries (all EU countries except Malta) spanning from 1973 to 2011. Data for the new EU Member States are only available as from the year in which they joined the EU. In the following, I describe the data sub-divided by category. *Table 1* reports a description of all variables used and the sources.

(Table 1 here)

Life Satisfaction. The Eurobarometer survey is conducted typically at biannual frequency by the European Commission since 1973. The standard surveys are normally carried out each autumn and spring and cover about 27,000 respondents; note that the survey is not a panel, i.e. respondents change in every survey. Although the questions have changed over the years, there is a set of common questions for which long time series are available. Among these is a question about life satisfaction. This is based on answers to the question *"All things considered, how satisfied would you say you are with your life these days?"* with the possible answers being *"Very"*, *"Fairly"*, *"Not really"*, *"Not at all"*. The chosen measure of life satisfaction in a given country is the share of answers being either *"Very"* or *"Fairly"*.[3] Note that time t refers to the quarter in which the fieldwork takes place (e.g., if the fieldwork is in May then t is Q2). In order to allow for some delay in the processing of information by survey participants, the determinants of life satisfaction are typically dated $t-1$.

Consumer confidence. We also consider measures taken from the consumer survey as part of the European Commission Business and Consumer Surveys. The monthly consumer survey covers about 40,000 consumers in the EU and is carried out at national level by partner institutes such as ministries, statistical offices, central banks, research institutes, business associations or private companies. Answers obtained from the surveys are aggregated in the form of "balances". Balances are constructed as the difference between the percentages of respondents giving positive and negative replies (European Commission 2007).[4] In this paper I aggregate the original monthly data at a quarterly frequency using the average of the monthly observations. Apart from the overall consumer confidence indicator (*Confidence*), I also consider the question on the financial situation of the own household in the next 12 months (*Financial situation*), the opinion on the general economic situation in the past and next 12 months (*General economic situation*), the unemployment expectations, a question whether the respondent plans to make major purchases in the next

[3] Note that this is different from Di Tella et al. (2003), who use an ordered probit model on individual data. Using the share of respondents appears to be a logical choice when using country-level data.

[4] The consumer confidence indicator is the arithmetic average of the balances (in percentage points) of the answers to the questions on the financial situation of households, the general economic situation, unemployment expectations (with inverted sign) and savings, all over the next 12 months. Balances are seasonally adjusted. See European Commission (2007).

12 months (*Purchases*)[5] and finally a question on the savings intentions in the next 12 months (*Savings*).

Macroeconomic data. Quarterly data for the unemployment rate, annual CPI inflation and annual real GDP growth in EU countries are also included. Data are drawn from the OECD Economic Outlook database and from the IMF International Financial Statistics.

Financial imbalance measures. The financial imbalance measures used in this paper aim to capture the boom and bust cycles in asset prices and credit which have been emphasised in the recent literature on financial stability from a macro perspective (e.g. Drehmann et al. 2011; Fornari and Stracca 2012). For the 26 EU countries, I collect data for the real share price index, the real share price of the financial sector, and the real house price.[6] Turning to credit, I use ECB data on the loans to households for house purchase, which are of high quality and may be more relevant for households than loans to non-financial firms. Unfortunately, these high quality data are available for euro area countries only, which reduces the sample size significantly. I consider not only real credit, but also annual credit growth (see Schularick and Taylor 2011) and the ratio between real loans and real GDP (Drehmann et al. 2011).

There is still no consensus on the best way to measure financial imbalances and instability, as opposed to monetary stability for which the inflation rate is considered to be the appropriate summary statistic as well as an adequate target for monetary policy to aim at. In this paper, therefore, I have to rely on measures that, while reasonable and intuitive, are not necessarily backed by a fully fledged and consistent theoretical framework. In particular, the baseline measures of financial imbalance are based on "gaps" derived from real asset price and credit data obtained by taking a deviation of the log level from a moving average of 12 quarters. As shown in *Figure 1*, this is akin to removing a slow-moving linear trend from the data. For illustration purposes, the figure reports the gap measure computed on data for real loans for house purchase in Ireland, the dotted black line obtained by removing using a recursively computed linear trend, the solid blue line obtained by removing a 12-quarter moving average, and the purple dashed line being the annual growth rate. The three measures are highly correlated and show a boom-bust cycle peaking around 2006, which accords well with the conventional view about the bust of the Irish credit bubble, although only the latter two measures show signs of a turnaround in 2012. *Figure 2* reports the same calculation for the real house price.

In the empirical analysis, I therefore use "gaps" in the real log share price, the real log share price of the financial sector, the real log house price, and log real loans for house purchase (with and without removing log real GDP). In order to cross

[5] There are also questions about the intention of buying a car or a real estate propery at a quarterly frequency in the same survey, but these are not used in this paper.

[6] Data are deflated using the CPI. Note that for house prices there are several data limitations and data have to be interpolated from a lower frequency in some countries.

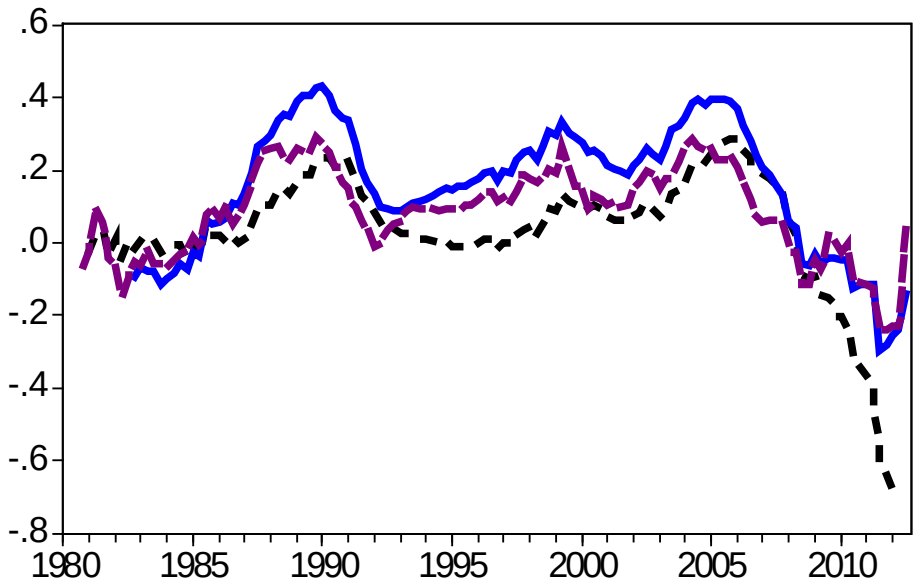

Figure 1: Financial imbalance measures for real mortgage loans in Ireland: based on removing a recursive linear trend (dotted black line), a 12-quarter moving average (solid blue line) and the annual growth rate (purple dashed line).

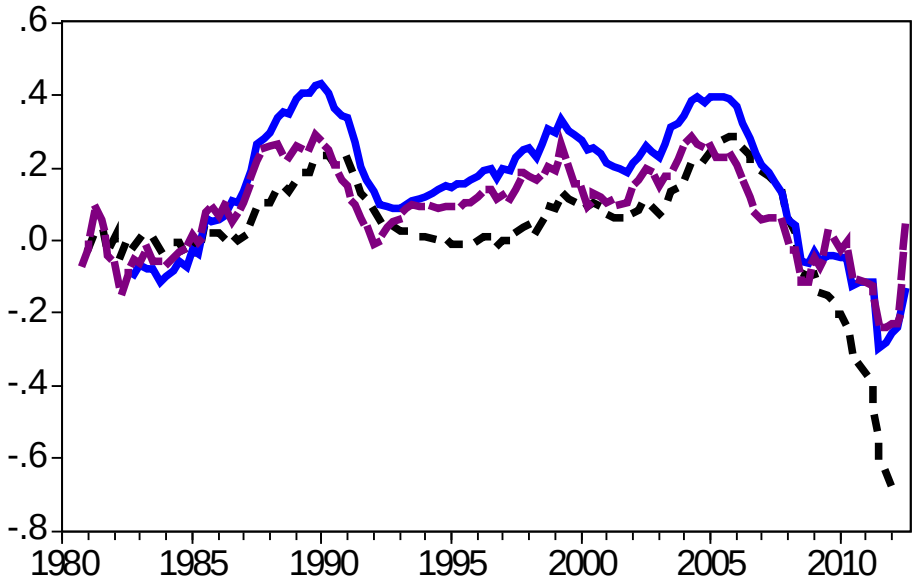

Figure 2: Financial imbalance measures for the real house price in Ireland: based on removing a recursive linear trend (dotted black line), a 12-quarter moving average (solid blue line) and the annual growth rate (purple dashed line).

check results, I also consider the annual growth rates in these variables as alternative measures of financial imbalance. Moreover, I also consider a measure of "excess" stock returns in the financial sector (relative to the stock market as a whole) as a possible measure of financial imbalance, since this indicator has often been positively correlated to boom-bust cycles (e.g., financial excess stock returns were positive in the run up to the global financial crisis, and negative during the crisis itself) and may be a measure of the state of "health" of the financial sector. Finally, I also consider the banking crisis dummy of Laeven and Valencia (2010), which I interpolate to a quarterly frequency (all quarters of a crisis year are considered to be crisis quarters); this last measure can be considered as a more direct indicator of a situation of financial instability. Additional details on the calculation of the financial imbalance measures are provided in Table 1.

Preliminary analysis. *Table 2* reports the summary statistics for all variables used in the paper, and *Table 3* correlations between some of them. As can be seen in Table 3 (upper panel), life satisfaction is negatively correlated with unemployment and inflation, while the correlation with real GDP growth and with the growth rate of real compensation per employee is statistically insignificant. Interestingly, the correlation with consumer confidence is very high, at 0.64, and statistically significant. Consumer confidence is also quite strongly correlated with all the considered macroeconomic variables, with the expected sign.

Coming to the measures of financial stability and imbalance (bottom panel of Table 3), we find that all the "gap" measures are statistically significantly and negatively correlated with the banking crisis dummy of Laeven and Valencia (2010). The asset price and credit gap measures are also strongly positively correlated among themselves. Interestingly, the excess return on stocks in the financial sector is positively correlated with the mortgage loan gap measures, although the correlation is not large in absolute terms.

(Tables 2-3 here)

3 Empirical model

The empirical model is similar to Di Tella et al. (2003) but, as noted, is based on country-level data. The baseline estimated model is

$$Lifesatis'_{it} = \kappa_i + \lambda_t + \alpha Unemp_{i,t-1} + \beta \Delta y_{i,t-1} + \gamma Inflation_{i,t-1} + \eta FIN_{i,t-1} + v_{it} \quad (1)$$

where $Lifesatis'$ is a logistic transformation of the baseline life satisfaction measure (see below), $Unemp$ is the unemployment rate, Δy is the annual growth rate of real GDP, $Inflation$ is annual CPI inflation, κ_i are country fixed effects, λ_t are time dummies, FIN is a vector of variables including financial imbalance indicators, and v is the error term. The main parameters of interest in the analysis are in the vector

η. In another version of the model, I also include the consumer confidence data and, in one of the estimated variants, use instrumental variables in order to rule out the possibility of reverse causality. Note that the right-hand side variables are lagged one quarter, not least in order to mitigate concerns of reverse causality (e.g., more satisfied or happier citizens spend more and stimulate economic growth). In the robustness analysis I also consider right-hand side variables dated t.

Note that the presence of country fixed effects and time dummies in the model suggests an interpretation of the estimates as a treatment model. In other words, we are comparing the behaviour of life satisfaction in each country against both the own average (country fixed effect) and trends prevailing in all other countries (time fixed effect), in a 'diff in diff' approach.

The left-hand side variable is bound between 0 and 1; I therefore apply a logistic transformation to life satisfaction,

$$Lifesatis'_{it} = \log(\frac{Lifesatis_{it}}{1 - Lifesatis_{it}}) \tag{2}$$

where as mentioned $Lifesatis_{it}$ is the share of respondents reporting to be very or fairly satisfied in the Eurobarometer survey. The baseline model is estimated using panel OLS with robust standard errors, on quarterly data from 1973 to 2012.

4 Results

I present the results in three separate steps. First, I try to replicate the results of Di Tella et al. (2003), essentially imposing $\eta = 0$ in equation (1). Second, I evaluate whether the consumer confidence data bring any additional insight in the analysis of life satisfaction data. The final step, and the core of the analysis in this paper, is whether life satisfaction is affected by the financial imbalance indicators.

4.1 Replicating the Di Tella et al. (2003) results

Table 4 reports the baseline results for the model where $\eta = 0$. In spite of the very different sample period, the results broadly confirm those of Di Tella et al. (2003) with the exception of inflation, which is statistically insignificant (more on this later in the robustness analysis). Adding the annual growth rate of real compensation per employee not only makes real GDP growth insignificant but the variable is insignificant itself. Considering t or $t-1$ regressors does not make much difference for the results, see column (2) of Table 4.

(Table 4 here)

4.2 Adding confidence indicators

In *Table 5* we add consumer confidence indicators. Generally speaking, as already seen in Table 3, there is a strong association between life satisfaction and consumer confidence. In addition, including the latter variable makes real GDP growth insignificant. In order to understand whether this is primarily due to consumer confidence being a better measure of the business cycle than real GDP growth, in column (2) of the table I run an instrumental variables regression where I instrument consumer confidence at time $t-1$ with real GDP growth in the previous quarter ($t-2$). I find that, in this case, the coefficient for consumer confidence is statistically insignificant, suggesting that consumer confidence enters in the equation for life satisfaction for reasons that go beyond its being a measure of the business cycle. We can conjecture, for example, that consumer confidence is a good measure of the degree of optimism by economic agents in economic matters, be it at the personal or at the general level. In order to further investigate this proposition, in columns (3) and (4) I separately include sub-components of the consumer confidence index; in column (3) measures which pertain to the personal level (*Financial situation*, *Purchases* and *Savings*) and in column (4) at the general level (*General economic situation* in the next and last year, unemployment expectations). I find that forward-looking variables such as Purchases and expectations on the general economic situation next year are statistically significant; when putting both together, only *Purchases* remains statistically significant (see column (5)). This may be an indication that, indeed, the statistical significance of consumer confidence for life satisfaction is related to its being a measure of economic optimism or pessimism for the future, a variable which is not adequately measured by real GDP growth in quarter $t-1$.

(Table 5 here)

4.3 Do financial imbalances matter?

In *Table 6* we move closer to the main object of investigation of this paper by including the measures of asset price and credit gaps described in Section 2. Because we want to understand the role that these gaps play on their own right, on top of the effect that they might have due to their being a proxy for the degree of optimism on economic matters, we also include consumer confidence and *Purchases* in the regression.

A main finding is that most of the financial imbalance indicators are statistically insignificant, with the only exception being the real house price gap, which is statistically significant and with a negative sign. This would indicate that an excessively high level of the real house price has more negative than positive repercussions for life satisfaction in a country as a whole, although it will clearly have different effects on the welfare of homeowners, renters and would-be homeowners (note however that this result is not very robust, as we will see shortly). In all these regressions the unemployment rate and consumer confidence remain statistically significant.

(Table 6 here)

In *Table 6a*, we replace with asset price and credit gaps with annual growth rates of the same variables (in real terms or, in the case of mortgage credit, as a share of real GDP). All these measures are statistically insignificant, including the growth rate of house prices.

(Table 6a here)

As mentioned earlier, asset price and credit gaps may have no impact on household welfare in a given country as a whole because higher or lower values benefit different categories, so that the effect cancels out in the aggregate. It could still be the case, however, that large deviations *in any direction* (i.e. positive or negative) are detrimental to life satisfaction if the effect is asymmetric or because deviations in absolute terms are symptomatic of mis-pricing and boom-bust behaviour and economic uncertainty. We address this question in *Table 7*, where we consider the gap measures in absolute terms. I find (columns (2) and (3)) that the real stock price gap in absolute term has a statistically significant negative impact on life satisfaction, even after controlling for consumer confidence. When putting the absolute gap in total and financial stock prices together, only the former remains statistically significant (the two measures are obviously very positively correlated). This result might indicate that asset price variability and uncertainty – or "extreme" values for stock prices specifically – have a negative impact on household welfare.

(Table 7 here)

4.4 Robustness

In *Table 8* we present some robustness analysis. Column (1) reports the "best" equation based on the analysis of the previous tables. In short, life satisfaction depends negatively on the unemployment rate, positively on consumer confidence and *Purchases*, and negatively on the house price gap and on the absolute value of the stock price gap. In column (2), we remove the consumer confidence variables and include real GDP growth; the real house price gap becomes insignificant, but the absolute stock price gap remains significant. In columns (3)-(4) we split the sample period into 1999-2012 (column (3)) and 1973-1998 (column (4)) for the specification including consumer confidence; in columns (5)-(6), we do the same for the specification excluding consumer confidence. I find consistent evidence that the real house price gap switches sign between the two periods; it becomes negative in the latter part of the sample (1999-2012) but is actually positive in the former part of the sample. The absolute value of the stock price gap also appears to matter more in the latter part of the sample (it is statistically insignificant in the 1973-1998 sample when including consumer confidence). It is plausible that structural changes in the financial

system and in the degree of financial development between the two sub-samples are at the root of this different, although this is a question which will need to be properly addressed by future research. Finally, we also find that inflation matters in the 1973-1998 period, but not thereafter (see column (6)). This result is hardly surprising given that inflation has generally been low and stable in EU countries after 1999, and does not necessarily imply that life satisfaction of EU citizens would not be impaired should inflation go up to higher levels again.

(Table 8 here)

In *Table 8a* I present results using consumer confidence as the left-hand side variable. While there is no research, at least to the author's knowledge, on whether consumer confidence is a possible indicator *of* life satisfaction, rather than a measure of a host of factors that may *contribute* to it, it is possible that both consumer confidence and life satisfaction are noisy indicators of the same underlying concept of household well-being. Results reported in Table 8a suggest that the financial imbalance measures that appear to matter for life satisfaction are insignificant for consumer confidence. I find that real GDP is positive and strongly significant, while the unemployment rate is negative but not always significant. Different from the results on life satisfaction, I find inflation to matter (with a negative coefficient) in the most recent sub-sample (1999-2012), but is insignificant in the previous one (1973-1998).

(Table 8a here)

5 Conclusions

In this paper we have analysed the empirical link between a measure of citizens' household welfare (life satisfaction) from the EU Eurobarometer survey and various measures of financial imbalances. The motivation underpinning this paper is based on the consideration that an explicit and democratically legitimate macro-prudential mandate for economic policy-makers (be it the central bank or another authority) must ultimately hinge on whether financial imbalances have a welfare cost, independently or indirectly through their potentially destabilising impact on the macroeconomy. Our baseline measures of financial imbalances are based on statistical indicators of "gap" obtained by de-trending asset price and credit data. While this type of measure still represents the state of the art in the literature, it is likely that better and more theory-based measures will be identified in future research. This limitation has to be kept in mind when interpreting the results of this paper.

A key finding of this paper is that there is little evidence that financial imbalances matter directly for life satisfaction in EU countries. Most of the indicators that we consider are statistically insignificant. While the real house price gap is significant

with a negative sign, its effect is not very robust and appears to have changed sign over time. Moreover, we find some evidence that the absolute level of the share price gap matters negatively for life satisfaction, suggesting that what matters for citizens is to avoid booms and busts independent of their direction. Even so, it is puzzling that the same result is not found for other variables, such as the real house price gap in absolute terms, which should matter more than the share price for households (as is well known, housing is more widely spread than equity as a component of household wealth). Overall, this study suggests that financial imbalances mainly matter for households through their effect on real economy variables such as the unemployment rate and real GDP growth, and do not have a large independent influence. From a policy-making perspective, this finding certainly does not diminish the importance of limiting financial imbalances and maintaining financial stability, as these steps are instrumental in maintaining overall macroeconomic stability.

One important limitation of this study is the use of non-panel observations. In future research, it would be useful to re-visit the same question on databases that have longitudinal observations, such as the German Socio-Economic Panel. While this would certainly limit the number of countries available (and hence the variation in the financial imbalances), it would also allow to control for individual fixed effects and for individual characteristics and analyse the persistence of the effects over time. Another promising direction of research is to investigate the potential of consumer confidence data as direct measures of life satisfaction and well-being, as hinted by the strong correlation between consumer confidence and life satisfaction shown in this paper.

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TABLE 1. Description of the variables

	Source	*Notes*
Life satisfaction data	Eurobarometer survey	Based on the question *"All things considered, how "All things considered, how satisfied would you say you are with your life these days?"*. The measure of life satisfaction used in the empirical analysis is the share of respondents answering either *"Very"* or *"Fairly"*.
Consumer confidence data	European Commission Business and Consumer Surveys	We consider overall consumer confidence, as well as answers to the question on the financial situation of the own household in the next 12 months (Financial situation), the opinion on the general economic situation in the past and next 12 months (General economic situation), the unemployment expectations, a question whether the respondent plans to make major purchases in the next 12 months (Purchases), and a question on the savings intentions in the next 12 months (Savings).
Macroeconomic data	Annual real GDP growth, annual CPI inflation, unemployment rate: OECD Main Economic Indicators and IMF International Financial Statistics Growth in real compensation per employee: Eurostat (for nominal compensation per employee) and OECD (for the CPI from which the real values are computed)	
Financial imbalance measures	Stock price data (financial sector and total market): Datastream House price and mortgage loan data (for euro area countries only): ECB Banking crisis dummy: From Laeven and Valencia (2010) – transformed into quarterly observations	The house price, stock price, financial stock price and mortgage loan gaps are computed by (i) taking the variables in log and in real value (using the CPI as deflator) and (ii) removing a 12-quarter moving average. The annual growth rates of the same variables are computed on the real values. The excess stock returns for the financial sector are computed as the difference

	between the annual return for financial stocks minus the annual return for the whole stock market.
	For mortgage loans as share of GDP, in step (i) above we also subtract the log of real GDP. From then on we compute annual growth rates and the gap measure as described above.

Note: Data are quarterly from 1970:1 to 2012:4.

TABLE 2. Summary statistics

	Obs.	*Mean*	*St. dev.*	*Min*	*Max*
Life satisfaction	985	0.79	0.14	0.25	0.98
Unemployment rate	3079	7.51	3.94	0.68	25.59
Inflation	3258	0.06	0.06	-0.06	0.45
Real GDP growth	2962	0.03	0.04	-0.55	0.15
Consumer confidence	2135	-13.66	16.96	-83.8	30.2
Financial situation	2108	11.37	13.5	-24.2	49.7
Purchases	2137	-17.96	14.96	-82	31.6
Savings	2135	-12.71	32.7	-87	58.4
General economic situation next	2174	-11.54	16.4	-88.7	30.8
General economic situation last year	2174	-24.97	24.58	-98.6	42.5
Unemployment expectations next year	2169	25.07	22.01	-33	92.7
Growth in real compensation per employee	1650	0.01	0.04	-0.25	0.26
Banking crisis dummy	4472	0.07	0.26	0	1
House price gap	2007	0.04	0.14	-0.7	0.77
Stock price gap	2372	0.05	0.33	-1.43	1.21
Financial stock price gap	2051	0.02	0.42	-2.77	1.82
Mortgage loan gap	1440	0.12	0.12	-0.35	0.73
Mortgage loan gap (share of GDP)	1268	0.09	0.1	-0.33	0.64
House price annual growth	2199	0.03	0.13	-0.66	1.3
Stock price annual growth	2580	0.02	0.32	-1.6	2.45
Financial stock price annual growth	2211	0	0.38	-2.68	1.78
Mortgage loan annual growth	1536	0.08	0.09	-0.5	0.7
Mortgage loan annual growth (share of GDP)	1364	0.05	0.08	-0.58	0.64
Excess stock annual return, financial sector	2165	-0.02	0.33	-2.06	1.83

See Table 1 for a description of the variables.

TABLE 3. Correlations table

	(1)		(2)		(3)		(4)		(5)		(6)
(1) Life satisfaction	1.00										
(2) Unemployment rate	-0.24	*	1.00								
(3) Inflation	-0.25	*	-0.07	*	1.00						
(4) Real GDP growth	0.02		-0.04	*	0.05	*	1.00				
(5) Growth in real compensation per employee	-0.05		-0.11	*	0.04		0.49	*	1.00		
(6) Consumer confidence	0.64	*	-0.29	*	-0.32	*	0.34	*	0.17	*	1.00

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
(1) Bank crisis dummy	1.00												
(2) House price gap	-0.16	*	1.00										
(3) Stock price gap	-0.19	*	0.44	*	1.00								
(4) Fin. Stock price gap	-0.30	*	0.38	*	0.71	*	1.00						
(5) Mortgage loan gap	-0.25	*	0.47	*	0.25	*	0.41	*	1.00				
(6) Mortgage loan gap (share of GDP)	-0.20	*	0.31	*	0.08	*	0.27	*	0.95	*	1.00		
(7) Excess stock returns fin. Sector	-0.12	*	-0.02		-0.25	*	0.37	*	0.16	*	0.19	*	1.00

Note: An asterisk indicates statistical significance at the 10% confidence level at least.

TABLE 4. Baseline results

Dependent variable: Life satisfaction (logit transformation)

	(1)	(2)	(3)
Unemployment rate, t-1	-0.040***		-0.043**
	(0.012)		(0.016)
Real GDP growth, t-1	1.524**		0.963
	(0.592)		(0.746)
Inflation, t-1	0.197		-0.197
	(1.456)		(1.633)
Unemployment rate		-0.044***	
		(0.011)	
Real GDP growth		1.128**	
		(0.528)	
Inflation		-0.027	
		(1.604)	
Growth in real compensation per employee, t-1			-0.045
			(0.638)
Observations	856	859	566
Number of countries	26	26	25
R2 Within	0.412	0.418	0.341

Note: Robust standard errors in parentheses; */**/*** denotes significance at the 10/5/1% level. All equations include country fixed effects and time dummies. The regressions are based on quarterly data from 1973 to 2012.

TABLE 5. Adding confidence indicators

Dependent variable: Life satisfaction (logit transformation)

	(1)	(2) IV estimation	(3)	(4)	(5)
Unemployment rate, t-1	-0.035**	-0.053***	-0.019	-0.042***	-0.026**
	(0.013)	(0.010)	(0.014)	(0.015)	(0.013)
Real GDP growth, t-1	-0.390	4.816**	0.179	0.003	-0.906
	(0.857)	(2.397)	(0.669)	(0.794)	(0.846)
Financial situation, t-1			0.002		
			(0.004)		
Purchases, t-1			0.011***		0.009***
			(0.002)		(0.002)
Savings, t-1			0.006*		
			(0.003)		
Consumer confidence, t-1	0.012***	-0.015			0.009**
	(0.003)	(0.012)			(0.003)
General economic situation next year, t-1				0.006**	
				(0.003)	
General economic situation last year, t-1				0.000	
				(0.001)	
Unemployment expectations next year, t-1				-0.000	
				(0.002)	
Observations	717	717	717	718	717
R-squared	0.458	0.158	0.491	0.443	0.487
Number of countries	26	26	26	26	26
Kleibergen-Paap test for underidentification (P value)	.	0.0029	.	.	.

See notes to Table 4. In the Instrumental Variables (IV) estimation in column (2), the instrument is annual real GDP growth in t-2.

TABLE 6. Adding asset price and credit "gaps"

Dependent variable: Life satisfaction (logit transformation)

	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment rate, t-1	-0.026**	-0.038**	-0.024*	-0.038**	-0.041*	-0.046*
	(0.012)	(0.016)	(0.012)	(0.017)	(0.019)	(0.021)
Consumer confidence, t-1	0.008***	0.010***	0.007***	0.008***	0.012***	0.013***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
Purchases, t-1	0.008***	0.007***	0.008***	0.008***	0.009***	0.007**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Banking crisis dummy	-0.026					
	(0.099)					
House price gap, t-1		-0.495**				
		(0.197)				
Stock price gap, t-1			-0.095			
			(0.092)			
Financial stock price gap, t-1				0.051		
				(0.060)		
Mortgage loan gap, t-1					0.030	
					(0.242)	
Mortgage loan gap (share of GDP), t-1						-0.008
						(0.272)
Observations	724	627	696	601	429	415
Number of countries	26	24	26	20	12	12
R2 Within	0.485	0.499	0.475	0.511	0.553	0.557

Note: See notes to Table 4.

TABLE 6a. Adding asset price and credit annual growth rates

Dependent variable: Life satisfaction (logit transformation)

	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment rate, t-1	-0.025*	-0.026*	-0.038**	-0.042*	-0.042*	-0.037**
	(0.014)	(0.013)	(0.016)	(0.019)	(0.020)	(0.016)
Consumer confidence, t-1	0.009***	0.007***	0.009***	0.012***	0.012***	0.009***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
Purchases, t-1	0.007***	0.008***	0.008***	0.009***	0.008***	0.009***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
House price annual growth, t-1	-0.187					
	(0.146)					
Stock price annual return, t-1		-0.035				
		(0.071)				
Financial stock price annual return, t-1			0.076			
			(0.051)			
Mortgage loan annual growth, t-1				-0.032		
				(0.294)		
Mortgage loan (share of GDP) annual growth, t-1					-0.029	
					(0.307)	
Excess stock annual return, financial sector, t-1						0.083
						(0.067)
Observations	660	705	610	429	422	606
Number of countries	24	26	20	12	12	20
R2 Within	0.490	0.473	0.524	0.553	0.552	0.515

Note: See notes to Table 4.

TABLE 7. Adding asset price and credit "gaps" in absolute value

Dependent variable: Life satisfaction (logit transformation)

	(1)	(2)	(3)	(4)	(5)
Unemployment rate, t-1	-0.029*	-0.024*	-0.035**	-0.037*	-0.040*
	(0.015)	(0.012)	(0.017)	(0.018)	(0.019)
Consumer confidence, t-1	0.009***	0.007***	0.008***	0.011***	0.012***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
Purchases, t-1	0.005**	0.007***	0.008***	0.009***	0.008**
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
House price gap in absolute value, t-1	-0.044				
	(0.110)				
Stock price gap in absolute value, t-1		-0.199**			
		(0.073)			
Financial stock price gap in absolute value, t-1			-0.152*		
			(0.078)		
Mortgage loan gap, t-1				0.392	
				(0.275)	
Mortgage loan gap (share of GDP) in absolute value, t-1					0.498
					(0.334)
Observations	627	696	601	429	415
Number of countries	24	26	20	12	12
R2 Within	0.476	0.481	0.517	0.559	0.564

Note: See notes to Table 4.

TABLE 8. Robustness

Dependent variable: Life satisfaction (logit transformation)

	(1)	(2)	(3) 1999-2012	(4) 1973-1998	(5) 1999-2012	(6) 1973-1998
Unemployment rate, t-1	-0.035**	-0.040**	-0.042**	-0.004	-0.055***	-0.025
	(0.016)	(0.017)	(0.020)	(0.016)	(0.018)	(0.018)
Real GDP growth, t-1		1.855**			1.586*	2.286**
		(0.683)			(0.791)	(0.859)
House price gap, t-1	-0.444**	-0.218	-0.566**	0.309**	-0.474*	0.677***
	(0.181)	(0.214)	(0.204)	(0.126)	(0.240)	(0.135)
Stock price gap in absolute value, t-1	-0.242**	-0.282**	-0.307***	-0.015	-0.361***	-0.182*
	(0.087)	(0.116)	(0.101)	(0.084)	(0.120)	(0.099)
Consumer confidence, t-1	0.010***		0.009***	0.009**		
	(0.003)		(0.003)	(0.003)		
Purchases, t-1	0.005**		0.004	0.010		
	(0.002)		(0.002)	(0.006)		
Inflation, t-1			0.223	0.239	-0.651	-7.204***
			(1.446)	(1.440)	(1.286)	(1.880)
Observations	621	676	432	189	436	240
Number of countries	24	24	24	13	24	14
R2 Within	0.502	0.441	0.417	0.642	0.362	0.613

Note: See notes to Table 4.

TABLE 8a. Robustness

Dependent variable: Consumer confidence

	(1) Full sample 1973-2012	(2) 1999-2012	(3) 1973-1998
Unemployment rate, t-1	-0.328	-0.818*	0.224
	(0.319)	(0.411)	(0.614)
Real GDP growth, t-1	169.291***	137.885***	213.867***
	(27.554)	(29.203)	(26.490)
House price gap, t-1	2.843	3.865	12.608
	(4.826)	(5.012)	(9.610)
Stock price gap in absolute value, t-1	2.283	-0.972	8.879*
	(3.080)	(2.954)	(4.124)
Inflation, t-1		-93.279***	-65.351
		(29.107)	(90.434)
Observations	1,515	1,051	464
Number of countries	24	24	13
R2 Within	0.633	0.672	0.669

Note: See notes to Table 4.