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Building a financial conditions index for the euro area and selected euro area countries: What does it tell us about the crisis?

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ABSTRACT

In this paper we construct financial conditions indices (FCIs) for the euro area, for the period 2003 to 2011, using a wide range of prices, quantities, spreads and survey data, grounded in the theoretical literature. One FCI includes monetary policy variables, whilst two versions without monetary policy are also constructed, enabling us to study the impact of monetary policy on financial conditions. The FCIs constructed fit in well with a narrative of financial conditions since the creation of the monetary union. FCIs for individual euro area countries are also provided, with a view to comparing financial conditions in core and periphery countries. There is evidence of significant divergence both before and during the crisis, which becomes less pronounced when monetary policy variables are included in the FCI. However, the impact of monetary policy on financial conditions appears not to be entirely symmetric across the euro area.

1. Introduction

Mapping linkages between the financial system and the real economy has taken on a new significance and urgency following the systemic financial crisis which was triggered by high default rates among subprime mortgage loans. Following the failure of Lehman Brothers in the Autumn of 2008, the disruption of financial linkages and the appearance of dysfunctional financial markets – both the interbank and debt securities markets – generated widespread concern about the impact on the real economy.

The majority of econometric models, used either for forecasting or simulating the impact of shocks, have very little financial wiring. At best, they include interest rates. At a time of dysfunctional markets, changes in interest rates alone may not capture all the interactions between the financial system and the real economy. Additionally, credit aggregates, survey data reflecting the supply of loans and their terms and conditions, volatility and spreads can all convey additional information on financial conditions and, in turn, influence growth via their effects on consumption, savings, investment and, ultimately, real economic activity.

For this reason, a number of authors have suggested the need to construct an index which reflects financial conditions. A financial conditions index (FCI) can be considered a natural extension of the monetary conditions index (MCI; see, for example, Dudley and Hatzius, 2000; Eika et al., 1996; Ericsson et al., 1997; Federal Reserve Bank of New Zealand, 1996; Gerlach and Smets, 2000). It can be used for policy purposes to compare financial conditions across two periods or as an input to a forecasting model where interest rates alone seem insufficient. As a natural extension of the MCI literature, the FCI literature focuses on a much broader range of variables and not simply the interest rate and exchange rate commonly found in MCIs used in central banks. Such breadth has the advantage that it summarises a whole set of information describing conditions in the financial system in one series.

FCIs are also related to Financial Stress Indicators (FSIs). In theory, an FSI suggests periods of fragility in financial markets and can be useful in facilitating early recognition of stress; an FCI is more useful in exploring macro-financial linkages (Carlson et al., 2012). In practice, however, the two are often closely related, using similar variables as inputs. Indeed, Brave and Butters (2012) show that FCIs can predict stress. Moreover, since financial conditions are clearly affected during periods of financial stress, it is important to capture stress in any FCI.

The purpose of this paper is to construct an FCI for the euro area over the period 2003 to 2011. This permits us to undertake an exercise in mapping the narrative of financial conditions in the pre- and post-

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0264-9993/

crisis periods. The impact of events, such as the failure of major financial institutions, can be identified. This is possible, because, unlike other papers where the index produced can prove difficult to interpret, one of the contributions of this paper is to produce an index which can then be used, as a first step, to describe the evolution of financial conditions over time. This is achieved by incorporating a wide range of data in a manner which would be predicted by economic theory. Whilst the resulting index cannot be used as an absolute measure of financial conditions, it does serve as a relative measure, tracking periods when conditions are looser and those when conditions are tighter. Moreover, it can be used for a range of purposes stretching from forecasting economic activity to investigating the effect of a tightening in financial conditions on investment, consumption etc. In this sense, it is comparable to recent indices constructed for the US and the euro area by Matheson (2011), and for the US by Hatzius et al. (2010) and Swiston (2008).

A second contribution of this paper is the study of the effects of monetary policy (both standard, i.e. interest rates, and non-standard, i.e. quantitative easing) on the evolution of the index. In most of the literature on FCIs, monetary policy has been accounted for through the inclusion of short-term interest rates. However, such an approach is clearly flawed in periods of financial stress and dysfunctional money markets and does not allow for a qualitative assessment of the effects of monetary policy on financial conditions. In this paper, three monetary policy variables are included in one of the indices constructed. The resulting index is then compared to an index where these monetary policy variables are excluded and against an index in which the weights on the monetary policy variables have been set to zero. In both cases, evidence of monetary policy 'leaning against the wind' emerges from the comparison. This evidence is corroborated by a principal components analysis of the three policy variables.

A third contribution is to construct individual FCIs for selected euro area countries. This allows us to investigate the hypothesis that financial conditions across the euro area diverged markedly both pre- and post-crisis. This assumption figures in a number of accounts of the development of the euro area crisis, and, particularly, those that emphasise the build-up of unsustainable imbalances as a consequence of looser monetary conditions in the periphery and tighter conditions at the centre. In the period following the crisis, liquidity pressures on banks have been particularly strong in peripheral countries, resulting in financial conditions being markedly tighter than those in the centre.

Our results suggest that our index does indeed provide a better picture of financial conditions than that provided by looking at, say, just interest rates. Financial conditions in the euro area as a whole became progressively looser from mid-2003 up until the beginning of 2007; thereafter they tightened sharply. Aggressive monetary policy loosening by the ECB and, indeed, a number of central banks around the world turned the situation around resulting in loosening financial conditions, at least up until mid-2011. Thereafter the euro area sovereign debt crisis takes its toll, causing financial conditions to tighten again. Interestingly, our results also point to strong differences across countries, with the countries of the European south experiencing a stronger deterioration in conditions in the second half of 2011, something which is not evident in Germany where conditions continue to improve.

The paper is organized as follows. In Section 2, we provide an overview of the literature on financial conditions indices. We also describe the data series that we have chosen to use and clarify how each series is incorporated into the index based on the direction of its effect on financial conditions. In Section 3, we discuss the methodology used to combine the data into an index of financial conditions. We have chosen to use principal components analysis because it does not involve estimation – it is derived from a linear transformation of the data series – and hence does not impose any structure. This contrasts with a large strand of the literature which estimates the weights to be applied to each series using structural models linking the financial sector to the real economy. In Section 4, we present the indices and discuss the results. Finally, Section 5 offers some conclusions.

2. Literature review

2.1. Brief history of FCIs

The literature on financial conditions indices dates back to the early 2000s and was motivated, first, by evidence building up since the late 1980s on the importance of financial variables in monetary policy transmission, and, second, by the boom–bust cycle in stock markets in the period 1995–2000 (commonly known as the dot.com bubble), which gave rise to heated policy debates as to whether central banks should take into account financial asset prices when deciding their policy stance.

More specifically, the credit channel literature (e.g. Bernanke and Gertler, 1995) highlights the role of financial market imperfections in propagating the effects of monetary policy on the economy, by leading to excessive responses of liquidity-constrained banks and firms. These are caused by the fact that restrictive monetary policy limits the lending resources available to banks (bank lending channel)[2] and, at the same time, raises the cost of external financing for firms with low net worth (balance sheet channel or financial accelerator).[3] The reduction in credit supply at a time when firms need it most will lead to a propagation of the initial shock. Similar evidence can be found in the consumption literature. Zeldes (1989) shows that liquidity constraints may cause large fluctuations in consumption that are inconsistent with the permanent income hypothesis.

Related to the second motivating factor mentioned above, i.e. the relevance of financial asset prices for monetary policy, as Montagnoli and Napolitano (2004) report, three different strands of literature argue that: i) financial asset prices should be used exclusively to improve on central banks' forecasts of inflation (Bernanke and Gertler, 1999, 2001); ii) they should form part of a broader price index targeted by central banks (Goodhart and Hofmann, 2000, 2001, 2003); or iii) that monetary policy should actively pursue a stabilization of asset prices around their fundamentals, just as it does with inflation (Cecchetti et al., 2000).

Building on the MCIs used during the 1990s to assess the monetary policy stance, the first attempts to construct FCIs include asset prices (predominantly stock and housing prices) and money market rates and spreads, capturing the position and shape of the yield curve. Recent work on FCIs for the US features the inclusion of credit terms and conditions (Hatzius et al., 2010; Swiston, 2008).

In most of the initial work, the various components of the FCI are weighted, with weights derived either from structural models (Dudley and Hatzius, 2000; Goodhart and Hofmann, 2002) or reduced-form models (Gauthier et al., 2004; Mayes and Viren, 2001). Principal components analysis is also commonly used (English et al., 2005; Forss Sandahl et al., 2011) and has the advantage that it does not suffer from many of the criticisms of the more structural literature.[4] Most recent work involves techniques which allow the weights on different components of the FCI to fluctuate over time, such as dynamic factor analysis and weights derived from impulse responses or Kalman filters (Montagnoli and Napolitano, 2004; Swiston, 2008).

FCIs have been constructed for a number of countries (US, Canada, Finland, Sweden, Germany, UK, euro area etc.) and used for several purposes, e.g. to assess their relevance for monetary policy in the context of augmented Taylor rules (Goodhart and Hofmann, 2002; Montagnoli and Napolitano, 2004) or to forecast economic activity, inflation, investment or financial stress (Brave and Butters, 2012; Diron et al., 2005; English et al., 2005; Hatzius et al., 2010; Swiston, 2008).

[2] Bernanke and Blinder (1988, 1992), Oliner and Rudebusch (1995).
[3] Bernanke and Gertler (1995), Kiyotaki and Moore (1997), Bernanke et al. (1996, 1999).
[4] Eika et al. (1996), Ericsson et al. (1997), and Gauthier et al. (2004) are all critical of the dependence of MCIs on the dynamic structure of the models, the stationary properties of the data, endogeneity, parameter consistency and omitted variable bias.

Most of the FCIs constructed in the literature appear to have good leading indicator properties, in the sense that they improve the forecasting performance of simple VAR models of economic activity – and its components, e.g. investment – (this result is common across most of the literature reviewed), whilst they also appear to forecast turning points (e.g. Gauthier et al., 2004). The indices do a better job in forecasting economic activity than any of their individual components. By contrast, the evidence on the forecasting content of FCIs for inflation appears to be mixed (see Goodhart and Hofmann (2002) for positive evidence and English et al. (2005) for negative evidence). FCIs also improve the performance of Taylor-rules (Goodhart and Hofmann, 2002; Montagnoli and Napolitano, 2004). Finally, they can help predict financial stress, at least up to horizons of one year ahead (Brave and Butters, 2012).

One of the less prominent but important findings of the literature on FCIs is the asymmetry apparent between their peaks and troughs (Hansen, 2006). Periods of heightened financial stress are more pronounced than periods of loose financial conditions. This finding is consistent with the empirical evidence from the financial accelerator literature, according to which financial market imperfections matter most in periods of negative shocks to economic activity. Another, possibly related, finding is that the forecasting performance of FCIs changes across different sample periods. It seems to be more pronounced throughout the 2000s than in the preceding period (see e.g. Dudley and Hatzius, 2000; Hatzius et al., 2010).

Although the forecasting properties of FCIs across time have been studied, such work has not yet been undertaken across countries/regions. The euro area, in particular during the financial market crisis of 2007–2009 and the subsequent debt crisis of 2009–2012, provides a natural experiment of the asymmetric effects of financial conditions, especially because in the euro area the money market is integrated and monetary policy is common. The comparison of FCIs in individual euro area countries with the composite euro area FCI is one of the novelties presented in this paper.

2.2. Data selection[5]: the economic underpinnings of the FCI

Drawing on the extensive literature on FCIs, we choose to include a variety of indicators of financial conditions in our index which have been shown in the literature to have some explanatory value. We group the variables into various categories.

First, we focus on prices. If markets were perfect and cleared continuously, then prices would suffice to describe financial conditions completely (Swiston, 2008). In general rising prices, whether of goods or assets, would be expected to indicate looser financial conditions. Rising goods prices are associated with falling real interest rates. Rising stock price or residential property prices are associated with an increase in the value of assets that can be used as collateral, making it easier for companies or households to borrow.

When market imperfections exist, prices in and of themselves are insufficient to describe financial conditions and quantities provide additional information. In a world better described as non neoclassical, a world with uncertainty and asymmetric information, quantities would have their role to play (Hatzius et al., 2010; Stiglitz and Weiss, 1981). Matheson (2011) also argues that quantities play an important role in periods of either extremely easy financial conditions or of extremely tight financial conditions. This seems relevant to the period under consideration here. In the euro area, credit volumes are considered important since banks have traditionally played a stronger role than markets in providing finance to the real economy (Dudley and Hatzius, 2000). To this end, we include in our FCI, the flow of loans to both nonfinancial corporations and households. In the light of the increasing importance of financial markets, as opposed to institutions, in financing firms in the euro area since the formation of the single currency, we also include debt securities issues of non-financial and financial corporations. Higher rates of growth of credit provision or securities issues are assumed to signal looser financial conditions.

Periods of easy finance and tight finance are often accompanied by strong movements in risk premia as manifest in various interest rate spreads. Our period is no exception. We include a variety of spreads in the FCI. Higher loan-to-deposit spreads (for both nonfinancial corporations and households — both mortgages and consumer loans) indicate tighter conditions in the provision of credit to the private sector. Spreads in the interbank market can also be indicative of funding stress for financial institutions — indeed, one characteristic of the present crisis has been the drying up of the interbank market at various times and to various degrees. This is usually manifested in a rise in spreads between overnight borrowing and longer-term borrowing. Thus we include the spread between the 3-month Euribor rate and EONIA. Finally, sovereign spreads over the perceived safe haven of German government bonds indicate increasing stress in bond market segments. In general, higher spreads are indicative of tighter financial conditions.

A common sign of heightened tension in financial markets is given by measures of the volatility of prices in those markets. Higher volatility is associated with tighter financial conditions. We include volatility measures capturing the volatility of euro area stock prices (the volatility of the STOXX index) along with a measure of implied volatility in bond markets.

We also exploit the information contained in survey data. The bank lending survey in euro area countries is undertaken quarterly, under the coordination of the ECB. It encompasses factors such as the access of banks to market funding, banks' liquidity positions and the prospects for housing markets, along with consumer and firm creditworthiness. Swiston (2008) has shown that the data from bank surveys can be extremely useful in providing a picture of credit availability in the US. These measures allow us to capture supply of credit effects in contrast to quantities of credit granted which could also reflect demand conditions. Hence we include these measures in our index.

Finally, monetary policy variables are included in one version of the FCI constructed for the euro area. An increase in net liquidity provided by the Eurosystem or its growth rate is interpreted as contributing to a loosening of financial conditions (and vice versa). Similarly, a cut in the policy rate represents a loosening of financial conditions.

3. Methodology

Our empirical approach consists of extracting principal components from a large dataset of the above-mentioned financial and credit series covering all aspects of financial conditions. These are subsequently studied individually and then combined into what we define as a financial conditions index, with a view to interpreting their intertemporal evolution against the backdrop of the financial crisis timeline.

Principal components analysis models the variance structure of a set of observed variables, using linear combinations of the variables themselves. It is a way of identifying patterns in the data, of expressing the data in such a way as to highlight their similarities and differences. Once these patterns (or components) have been identified, the data can be compressed without much loss of information. In other words this is essentially a variable reduction process and, as such, it is appropriate when one has a large set of data and needs to condense it into a smaller number of artificial variables that will account for most of the variance in the dataset. Such a need may arise from the belief that there is some redundancy in the data, in the sense that a number of the variables may be thought to primarily reflect the same underlying fundamentals. Seen another way, one may be interested in studying only the primary drivers of a dataset, which are likely to be both more manageable and more easily interpretable, and may thus wish to abstract from the remaining noise without however employing a

[5] See Appendix A for more details on the specific variables used and their sources.

Table 1
Loadings and weighted loadings on each variable. (NB the results of the principal components analysis including all variables).

	PC1	PC2	PC3	Weighted loadings
	(1)	(2)	(3)	(4)
1. Loans to non-financial corporations (NFCs, flows)	0.157	0.319	0.069	0.144
2. Loans to households (HHs, flows)	0.315	0.029	0.116	0.120
3. Spread between interest rates on other loans and deposits to NFCs	0.231	0.280	0.056	0.155
4. Spread between interest rates on overdrafts etc. and deposits to NFCs	−0.021	0.286	0.351	0.116
5. Spread between interest rates on consumptions loans and deposits to HHs	−0.127	0.300	0.270	0.077
6. Spread between interest rates on mortgage loans and deposits to HHs	−0.159	0.266	.0304	0.062
7. Net liquidity provision by Eurosystem	−0.276	−0.088	0.301	−0.071
8. Growth net liquidity provision by Eurosystem	−0.055	−0.006	−0.151	−0.038
9. Debt securities issued by NFCs	−0.110	−0.148	−0.170	−0.096
10. Debt securities issued by monetary financial institutions	0.165	0.243	−0.137	0.100
11. Rate of change of residential property prices	0.290	−0.005	0.084	0.099
12. Rate of change of Harmonised Index of Consumer Prices	0.035	0.010	0.106	0.027
13. 3-month − overnight spread	0.282	−0.173	−0.023	0.037
14. 2-year − 3-month spread	0.147	0.160	−0.330	0.047
15. 10-year − 3-month spread	0.101	0.361	−0.085	0.118
16. Average spreads on long-term government debt relative to Germany	0.292	0.093	−0.288	0.079
17. Rate of change of stock prices	0.141	−0.132	0.029	0.011
18. Volatility of stock prices	0.033	−0.094	−0.028	−0.019
19. Volatility of bond prices	0.333	0.014	0.055	0.114
20. Survey question on banks' access to market financing	0.273	−0.207	0.143	0.047
21. Survey question on banks' liquidity position	0.256	−0.234	0.036	0.020
22. Survey question on housing market prospects	0.216	−0.185	0.353	0.062
23. Survey question on consumer creditworthiness	0.231	−0.071	0.390	0.102
24. ECB refinancing rate	−0.093	−0.359	0.090	−0.115
Share of total variance explained	31.0%	27.2%	12.9%	71.0%

structural framework which would a priori impose a set of beliefs on the resulting series.

The principal components of a set of variables are obtained by computing the eigenvalue decomposition of the observed variance matrix. Each principal component is an optimal linear combination of the observed variables. The first principal component is the unit-length linear combination of the original variables with maximum variance, i.e. it accounts for a maximal amount of total variance in the observed variables. Subsequent principal components maximize variance among unit-length linear combinations that are orthogonal to the previous components, i.e. each accounts for a maximal amount of the dataset's remaining variance (that which has not already been accounted for by the preceding components) and is uncorrelated with all of the preceding components. Thus, they account for a progressively smaller share of the original dataset's variance, the bulk of the information having been summarised in the first few components, i.e. in the *principal* ones.

The loadings of each variable in the linear combinations may be used to provide an interpretation for the principal components, whilst the principal components themselves, in which the bulk of the dataset's information has been distilled, may be used in subsequent analysis as summary variables.

In order to ensure that the extracted principal components are not unduly influenced by the measurement units and relative magnitude of individual series, all of the variables have been normalised, i.e. they have been demeaned and divided by their standard deviations. As the empirical framework employed involves no estimation and thus no error term, consisting essentially of a transformation of the data matrix, we do not difference the data to ensure stationarity.[6] This is convenient because, not only is the idea that economically meaningful variables may have unit roots counterintuitive but also because our main concern in this exercise is the interpretability of the extracted components, which would have been severely hindered by differencing the data, as noted by English et al. (2005).

Moreover, wherever needed, the data have been transformed to take into account the way in which each series associates with financial conditions. For example, spreads and volatilities have been included with the opposite sign. Thus, in the final dataset, an increase in any series reflects an easing of credit conditions. This is crucial to constructing an FCI which may enhance our understanding of how financial conditions have evolved over the period of study, as movements in the index will also be interpretable in the same way.

In deciding which components to use in the construction of the financial conditions index, the threshold for the share of total variance explained was set at 70%. By this measure, the first 3 principal components suffice to summarise the euro area dataset. For the country indices, the same threshold criterion leads to retaining the first four principal components. The financial conditions indices are then constructed, in each case, by summing the selected principal components weighted by the share of total variability explained by them. The resulting indices are then further divided by the exact share of total variance cumulatively explained in each case, to ensure comparability between them.

4. Results

4.1. Euro area principal components

Table 1 describes the exact contribution of each series to the first 3 principal components in our dataset (i.e. the loadings), along with the share of total variance explained by each component and, thus, the share of overall variance explained by the resulting index. The components are ordered conventionally in descending order of the share of overall variance explained. Fig. 1 graphs the first three principal components.

First, we examine the loading weights presented in Table 1 for the first 3 principal components. It is customary when looking at the loading weights to look for patterns which suggest that different principal components reflect different influences (see columns 1–3). Thus the first principal component includes a variety of the variables, those derived from bank lending survey data playing a particularly important role, along with residential property prices and spreads in the interbank market (3-month compared to the overnight), sovereign spreads and

[6] All series have been tested and indeed, in many cases, the null hypothesis of a unit root cannot be rejected (results are available upon request). This is not surprising, as we are considering a period with clear structural breaks and extreme events. It should however also be noted that all of our data series are flow variables (i.e. they are growth rates, flows etc.) and as such they are essentially in first differences already.

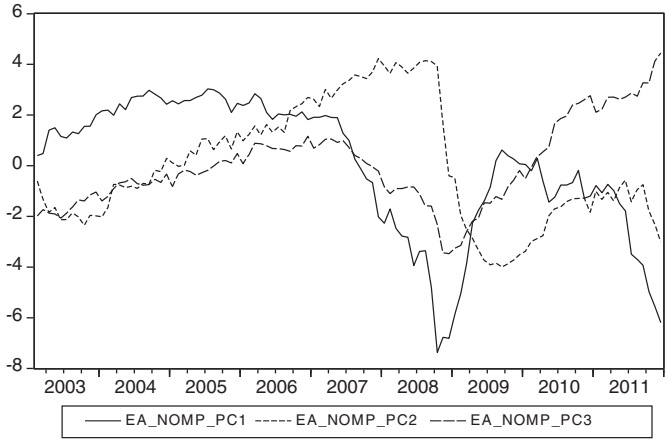

Fig. 1. Euro area — the first three principal components (PC1–PC3) for FCI.1.

the volatility in the bond market. Bank credit variables (both spreads and quantities) along with security issuance by monetary financial institutions are present in the second principal component. The third component primarily represents the influence of loan-to-deposit spreads and some of the survey questions.

Second, the actual importance of each variable in the financial conditions index is equal to the weighted sum of the loadings on each variable across the 3 principal components. This is presented in column 4 of Table 1. By and large the signs in this column are as we would have expected. Thus the non-monetary policy variables have a positive loading — when credit increases or spreads decline or bank lending conditions improve, financial conditions become looser.[7] By contrast, the variables representing monetary policy (the refinancing rate, net liquidity provision by the Eurosystem and its rate of change) have negative loadings. This may, at first glance, appear perplexing. However it should be borne in mind that, by construction, principal components analysis accounts for 100% of the variance in the dataset (in contrast to a regression where there is an unexplained residual) and does so essentially by identifying the main patterns in the data. The main pattern reflected in our findings is that when the financial variables (i.e. financial conditions) move in one direction, monetary policy tends to move in the opposite direction. This indicates that, intuitively, over the sample period, monetary policy has been 'leaning against the wind'.

In order to further investigate the impact of monetary policy on financial conditions, we produce three indices. First, we construct a financial conditions index which includes all variables except those that explicitly represent monetary policy (FCI.1). Second, we construct a financial conditions index using the results from a principal components analysis which includes all variables (FCI.2 a). Finally, using these latter results, we set the loadings on the monetary policy variables to zero, and construct a third index (FCI.2 b). We then compare the indices in order to glean information about the role that monetary policy has played over the period.

It should be noted from the outset that neither the comparison between FCI.1 and FCI.2 a nor that between FCI.2 a and FCI.2 b is entirely satisfactory. Comparing the indices resulting from the two separate principal components analyses (i.e. FCI.1 and FCI.2 a) is conceptually as close as we can get, within this framework, to comparing financial conditions with and without monetary policy effects, as FCI.1 minimises as far as possible the inclusion of monetary policy effects. However, it is important to note that it is not possible to purge any index totally of monetary policy effects, since some of the impact of monetary policy will be felt through its indirect effect on the other (nonmonetary policy) variables included in the principal components analysis (e.g. the spreads). Moreover, this is a non-nested comparison, thus not an exact one.

Comparing the results of the principal components analysis which includes all the variables and where monetary policy is either retained or removed by setting the loadings on the monetary policy variables to zero (i.e. comparing FCI.2 a and FCI.2 b) has the advantage that the with–without comparisons are nested in the same principal component results. Comparison of the indices is therefore easier, the difference being the exact contribution of the monetary policy variables to FCI2a. However, in such a comparison, the loadings on the nonmonetary policy variables are still calculated having included the monetary policy variables in the analysis.

By exploring both approaches we fully exploit the information content of our analysis and can use one comparison to corroborate the conclusions drawn from the other. Thus, in each graph that follows, we present two financial conditions indices (FCI.1 and FCI.2 a), along with the difference between FCI.2 a (all variables) and FCI.2 b (loadings on monetary policy variables set to zero) in order to facilitate a discussion of the impact of monetary policy.

Finally, the fact that the monetary policy variables are only 3 out of 24 (in the euro area dataset) implies that, by construction, they have a smaller weight than the non-monetary policy variables. In short, the effect of monetary policy, as captured by either comparison, is not expected to be great in terms of magnitude. In order to somehow account for that, we undertake a third investigation of our dataset. This involves performing principal components analysis on the three monetary policy variables and examining the evolution of the resulting first principal component against the FCI.1, in an effort to yet again confirm our main conclusions in a framework which affords monetary policy more weight.

4.2. A euro area FCI

Fig. 2 graphs the financial conditions index without monetary policy (FCI.1) along with the economic sentiment indicator for the euro area. The two track each other quite well. Fig. 3 graphs two of the financial conditions indices (FCI.1 and FCI.2 a) along with the difference between FCI.2 a and FCI.2 b in the top panel; in the bottom panel, we have plotted the ECB refinancing rate (the main policy rate in the euro area). The graph also contains information which covers "exogenous" financial events (e.g. the collapse of Lehman Brothers, the recourse of Greece, Ireland and Portugal to adjustment programmes with the EC-IMF-ECB) along with non-standard monetary policy measures undertaken by the ECB (including the covered bond purchase programme, the securities market programme, the fixed rate — full allotment tenders, etc.). Two financial conditions indices are included — one which excludes

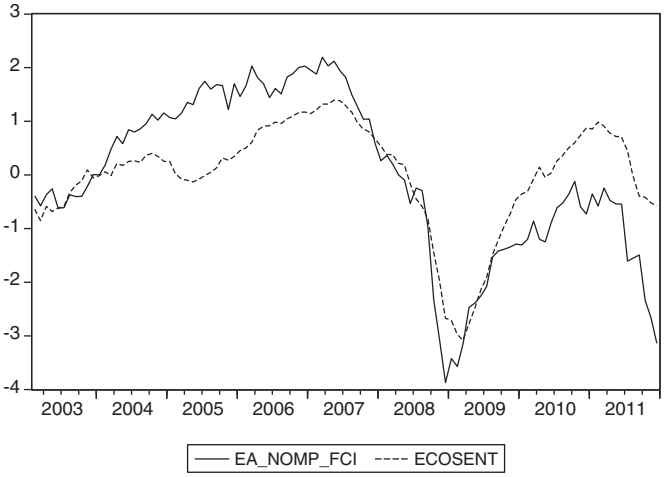

Fig. 2. Financial conditions index (FCI.1) and economic sentiment in the euro area.

[7] Recall that the variables are included in the analysis so that an increase in the variable signals a loosening of financial conditions.

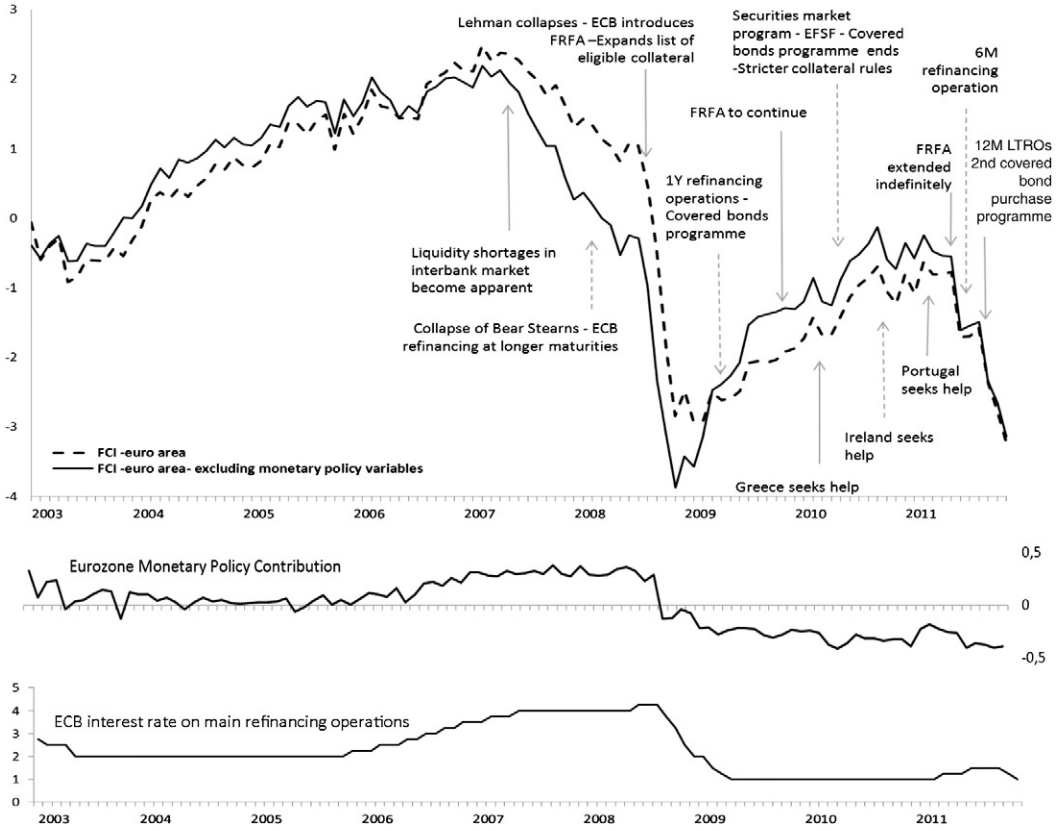

Fig. 3. Euro area — financial conditions indices (FCI.1, continuous line and FCI.2 a, dashed line) along with the difference between FCI.2 a and FCI.2 b (middle panel) and the ECB refinancing rate (lower panel).

the instruments of monetary policy and one which includes them (that is, we include both the refinancing rate and the net liquidity provision by the ECB and NCBs, as well as the growth rate of the latter[8]).

Before going into the differences between the two lines in the top half of Fig. 3, we can note simply the general movement of both series. In around mid-2003, financial conditions which had been tightening begin to loosen (the FCI turns upwards). Loosening increases until a peak at the beginning of 2007 when a cycle of tightening financial conditions begins. It is interesting that in June 2007 and again in August, there are increasing signs of liquidity shortages. Tightening conditions are intensified by the failure of Bear Stearns in March 2008, at which point a situation of albeit fairly rapid tightening becomes a rapid plunge. If we compare our results with those of Hatzius et al. (2010), where an FCI is calculated from 1970 onwards for the US, we observe a period of virtually unprecedented tightening. In the euro area, the tightening appears even sharper and, of course, is compounded by the failure of Lehman Brothers in September 2008. Conditions bottom out at the end of 2009 and a recovery in financial conditions occurs until mid-2011. Of course during this time there are setbacks, first when Greece asks for official finance in April 2010 and then Ireland at the end of November 2010. From April 2011 onwards, when Portugal seeks EC-IMF finance, conditions deteriorate again and, especially, after the announcement of Private Sector Involvement in Greek debt relief in July of 2011.

The two FCIs in the top half of Fig. 3 (FCI.1 and FCI.2 a), whilst generally moving together, provide a potentially interesting insight into the effect of monetary policy on financial conditions. The red line represents financial conditions without including the main instruments of monetary policy — the refinancing rate, which is shown in the bottom half of the figure, and the level and growth rate of our measure of net liquidity provision by the ECB to financial markets (this encompasses all non-standard measures). In the early period, financial conditions ignoring monetary policy are loosening at a faster rate than financial conditions including monetary policy. This might be interpreted as monetary policy succeeding to reign in the tendency for financial conditions to loosen — a 'leaning against the wind' policy. Indeed, from the beginning of 2006, the ECB raises the refinancing rate systematically every two months or so up until June 2007. Financial conditions begin to tighten, although monetary policy helps to prevent them worsening up until around mid-2008. Although the ECB raises interest rates in July 2008, it also begins to offer refinancing at longer maturities. However, financial conditions continue to deteriorate and the ECB (along with other central banks around the world) embarks on a rapid cutting of interest rates in an attempt to stem the tightening of financial conditions. Whilst these interest rate cuts prevent the index with monetary policy from falling to the levels seen in the case of the FCI without monetary policy measures, the tightening is still unprecedented.

The situation tends to stabilize at the end of 2008 and into 2009. In December 2009, the ECB announces that it will continue to refinance at a fixed rate with full allotment. At this point, the interest rate tool has reached what might arguably be its lower limit. This perhaps explains the fact that from early 2009 onwards, financial conditions excluding monetary policy measures appear to loosen faster than those with monetary policy. There is some indication that monetary policy is acting as a brake on improving market conditions. Of course, this could just be leaning against the wind; what is puzzling though is that the leaning against the wind was occurring at a time of unprecedentedly tight monetary conditions. Alternatively, this could be a manifestation of the fact that the key instrument of monetary policy (the main

[8] Net liquidity provision by the ECB and NCBs covers: gross liquidity provision via monetary operations, the covered bond purchase programme, the securities market programme and other forms of liquidity provided by NCBs net of deposits held in Eurosystem central banks by commercial banks.

Table 2
Weighted loadings for individual countries.

	Germany	Greece	Ireland	Portugal	Spain
	(1)	(2)	(3)	(4)	(5)
1. Loans to non-financial corporations (NFCs, flows)	0.114	0.071	0.117	0.124	0.163
2. Loans to households (HHs, flows)	−0.014	0.105	0.135	0.104	0.154
3. Spread between interest rates on other loans and deposits to NFCs	0.148	0.050	−0.060	0.124	0.055
4. Spread between interest rates on overdrafts etc. and deposits to NFCs	0.179	0.013	−0.012	0.135	
5. Spread between interest rates on consumptions loans and deposits to HHs	0.159	0.041	−0.014	0.084	0.083
6. Spread between interest rates on mortgage loans and deposits to HHs	0.173	−0.033	−0.061	−0.092	−0.080
7. Net liquidity provision by Eurosystem	0.060	−0.146	−0.100[a]	−0.101	−0.146
8. Growth net liquidity provision by Eurosystem	0.003	0.019	−0.049	0.017	−0.056
9. Debt securities issued by NFCs	–	–	–	–	–
10. Debt securities issued by monetary financial institutions	–	–	–	–	–
11. Rate of change of residential property prices	0.009	0.093	0.145	0.097	0.119
12. Rate of change of Harmonised Index of Consumer Prices	0.071	0.005	0.058	0.069	0.029
13. 3-month − overnight spread	−0.064	0.028	0.132	0.049	0.090
14. 2-year − 3-month spread	0.079	0.152	0.054	0.099	0.067
15. 10-year − 3-month spread	0.165	0.163	0.086	0.134	0.127
16. Average spreads on long-term government debt relative to Germany		0.155	0.093	0.111	0.139
17. Rate of change of stock prices	−0.034	0.049	0.059	−0.002	0.047
18. Volatility of stock prices	–	–	–	–	–
19. Volatility of bond prices	–	–	–	–	–
20. Survey question on banks' access to market financing	−0.016	0.088	0.146	0.084	0.039
21. Survey question on banks' liquidity position	−0.047	0.099	0.144	0.082	−0.022
22. Survey question on housing market prospects	0.016	0.033	0.118	0.111	−0.002
23. Survey question on consumer creditworthiness	0.073	0.095	0.125	0.126	0.051
24. ECB refinancing rate	−0.160	−0.115	−0.054	−0.137	−0.107
Share of total variance explained	73.7%	70.5%	77.5%	72.7%	72.2%

[a] Simple average of weighted loadings on standard and nonstandard Eurosystem refinancing (both are negative).

refinancing rate) had reached an 'implicit' lower limit. This interpretation is supported by the fact that, at the same time (in fact during the whole period from the collapse of Lehman Brothers), nonstandard measures are being employed (the details are given in Fig. 3, top half).[9]

Financial conditions continue to improve throughout 2010, in spite of the emerging sovereign debt crisis in Europe. The ECB even moves to increase interest rates in April 2011 and July 2011, whilst keeping nonstandard measures in place. However, then, following the announcement that the private sector would participate in a Greek government debt restructuring, the sovereign debt crisis intensifies; it is arguably at this point that it becomes systemic — spreads in Spain, Italy and other non-core countries rise. Financial conditions tighten quickly and the ECB moves to loosen policy through its nonstandard measures.[10]

Table 3
Correlations between FCIs (with and without monetary policy) across countries.

	Euro area	Greece	Ireland	Portugal	Spain	Germany
Without monetary policy						
Euro area	1					
Greece	0.691	1				
Ireland	0.780	0.759	1			
Portugal	0.802	0.893	0.778	1		
Spain	0.790	0.807	0.816	0.929	1	
Germany	0.124	−0.067	−0.173	0.207	0.278	1
With monetary policy						
Euro area	1					
Greece	0.747	1				
Ireland	0.664	0.615	1			
Portugal	0.847	0.945	0.645	1		
Spain	0.880	0.877	0.787	0.931	1	
Germany	0.620	0.366	−0.011	0.506	0.457	1

4.3. Individual country FCIs: the core versus the periphery

Tables 2 and 3 along with Figs. 4–8 provide the results for the FCIs for individual euro area countries. In Table 2, we present the weighted loadings for each variable by country. Once again there is evidence that monetary policy 'leans against the wind', although, not surprisingly, given that monetary policy is set with the whole euro area in mind, the results are slightly weaker. Hence, the interest rate policy appears with the correct negative sign[11] and so does net liquidity provision by the Eurosystem in all periphery countries. However, the *growth* of net liquidity appears with the wrong sign (e.g. it acts to reinforce financial conditions) in Greece and in Spain. Moreover, in the case of Germany, the nonstandard monetary policy measures appear with a 'wrong' positive sign, reflecting the fact that this is the only country in our dataset for which net liquidity from the Eurosystem has declined over the sample period.

[9] In interpreting this finding, one may draw parallels to the literature on the zero lower bound of nominal interest rates. Therein it is argued that, once in a "liquidity trap", the monetary policy authorities have no other policy option, in the face of deflation and recession, than to resort to unconventional measures such as quantitative easing, but it is also acknowledged that in practice these may prove to have a very limited effect on inflation and output. Similarly, one may conjecture that these same non-standard measures may also be relatively ineffective in maintaining stable and smooth financial conditions. Furthermore, Bernanke et al. (2004) find evidence that the importance of central bank communication may be elevated when the policy rate is constrained by the zero lower bound. For example, they argue that the central bank may be able to impart additional stimulus to the economy by persuading the public that the policy rate will remain low for a longer period than was previously expected. Additionally, they suggest that quantitative easing may also work through a signalling channel, if its implementation is such that it conveys the message the central bank will not quickly reverse large amounts of quantitative easing or signals a general willingness to break from the cautious and conventional policies of the past. By analogy, to the extent that maintaining smooth credit conditions is an implicit target of the central bank during a crisis, communicating a strong commitment to the achievement of this target may be critical, especially at the zero lower bound. In this context, some analysts have argued that the ECB's handling of the sovereign debt crisis was less effective in conveying the message of a whole-hearted and unwavering commitment to maintaining stable and smooth financial conditions, than that of e.g. the FED.

[10] We should note that our data extends to end-2011. Whilst, therefore, it includes the 12-month long-term refinancing operation conducted in October 2011 and the 3-year LTRO announced in October 2011 for end-December 2012, it does not include the impact of the December LTRO on other variables since the LTRO took place at the end of the month; the LTRO which took place at end-February 2012 is, of course, entirely absent.

[11] It should be noted that, in the case of Ireland, we include 4 monetary policy variables since we split liquidity provision into standard liquidity provision and nonstandard. This split generates a more sensible loading weight on the policy rate which is otherwise positive. Overall this slightly different approach generates more easily interpretable results as we discuss below.

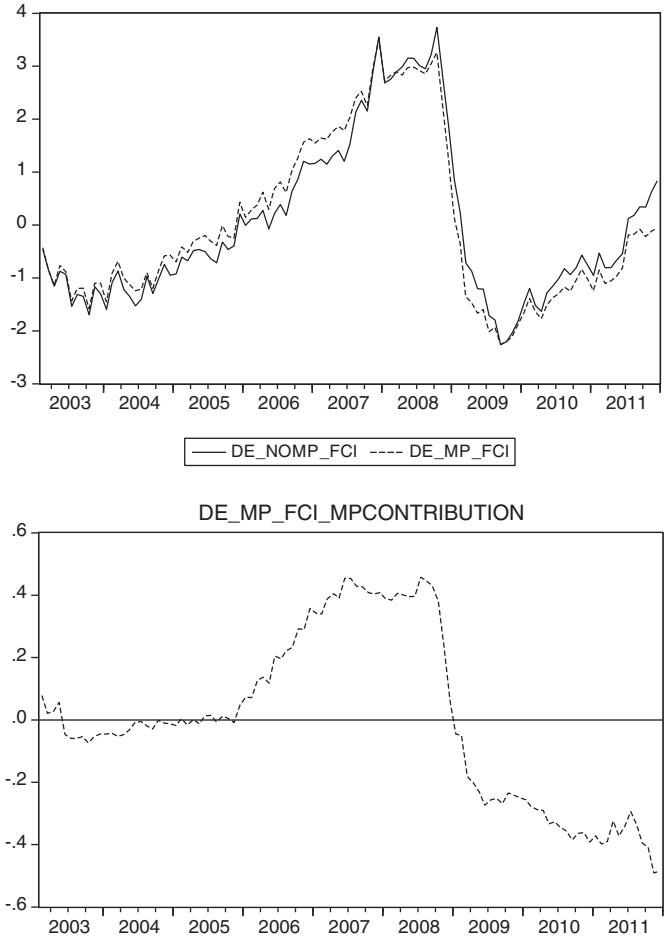

Fig. 4. Germany — financial conditions indices (FCI.1 (DE_NOMP_FCI) and FCI.2 a (DE_MP_FCI)) along with the difference between FCI.2 a and FCI.2 b (lower panel).

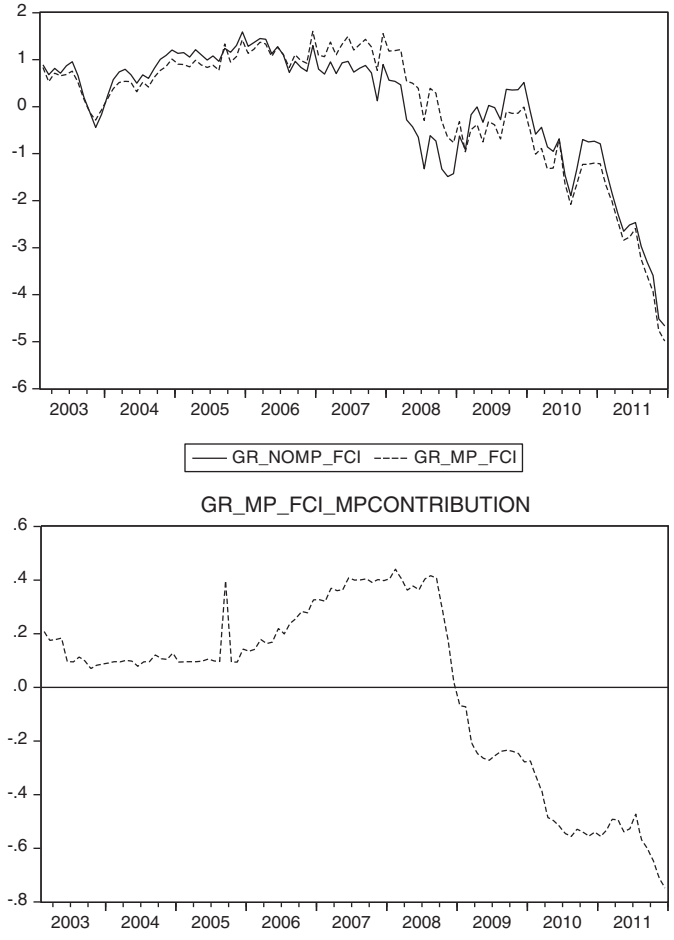

Fig. 5. Greece — financial conditions indices (FCI.1 (GR_NOMP_FCI) and FCI.2 a (GR_MP_FCI)) along with the difference between FCI.2 a and FCI.2 b (lower panel).

Additionally, only very few other variables (such as one of the spreads between loan and deposit rates and, in the case of Germany, two survey questions) also enter with the wrong sign in the sense that something that should reflect a tightening of financial conditions appears to loosen them.[12]

Turning now to the figures and the actual indices, they provide some interesting results about possible asymmetric behaviour of financial conditions both before the financial crisis of 2008 and thereafter. Fig. 4 maps out financial conditions in Germany. Taking the euro area as our benchmark, it appears that financial conditions in Germany before the Lehman Brothers collapse were loosening quite quickly. The trend pre-Lehman is considerably steeper than that of the euro area as a whole. Moreover, monetary policy, if anything, is contributing to a slightly steeper loosening. The impact of Lehman Brothers' failure is stark and it would appear that an even speedier rate cut may have been appropriate for Germany. Thereafter, financial conditions have slowly improved. There is no evidence of the deterioration seen in conditions in the euro area in the last 6 months of 2011. On the contrary, in terms of levels, Germany seems to have recovered to its pre-crisis financial conditions. With this in mind, from the perspective of Germany, the "leaning-against-the-wind" effect of monetary policy may have been called for.

This outcome contrasts with the situation in Spain, Greece, Ireland and Portugal (see Figs. 5–8). In their cases financial conditions do not appear to have loosened much in the pre-crisis period.[13] However, they begin to tighten earlier than in Germany — in early 2008 and before the collapse of Lehman Brothers. We should recall that liquidity shortages were evident as early as the summer of 2007 and from that point onwards, financial conditions start to tighten in the euro area as a whole (Fig. 3). This appears not to have affected Germany. The impact of Lehman Brothers was much milder in Greece, Portugal and Spain (at least in Greece this perhaps reflects the fact that Greek banks had no exposure to sub-prime mortgage-related assets). Ireland, not surprisingly experiences a strong tightening after Lehman Brothers, similar to that of Germany. Monetary policy in the periphery in the aftermath of Lehman Brothers appears to have 'leant against the wind'. Financial conditions including monetary policy appear to have fallen by less than financial conditions without monetary policy.

The period following the Lehman crisis is again marked by interesting divergences in country experience. Ireland experiences some improvement in conditions and avoids the sharp deterioration seen in other countries in 2011; in Spain conditions initially flatten out at a low level after the global crisis and then continue their downward trend. Conditions sharply tighten, however, from mid-2010 in Greece and from the beginning of 2011 in Portugal. This is a reflection of the impact of the sovereign debt crisis that followed in the wake of the more

[12] The 'wrong' sign on the spreads between loan and deposit rates in countries like Greece may reflect the relatively sharp increase in deposit rates that took place in an attempt to stem ongoing deposit flight.

[13] This result may be counterintuitive since credit was rising at rapid rates in peripheral countries in the pre-crisis period. However, recall that the FCI can only map relative moves in financial conditions. The results tell us that financial conditions did not get relatively looser between 2003 and 2007; whether they were loose or tight is not discernible from the FCI unless the starting year chosen represents neutral financial conditions.

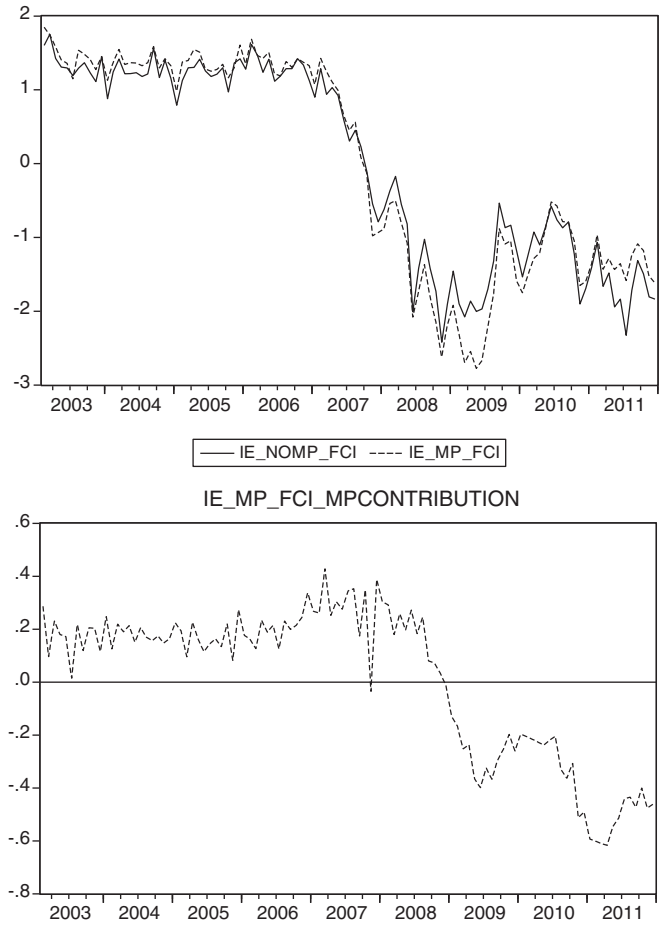

Fig. 6. Ireland — financial conditions indices (FCI.1 (IE_NOMP_FCI) and FCI.2 a (IE_MP_FCI)) along with the difference between FCI.2 a and FCI.2 b (lower panel).

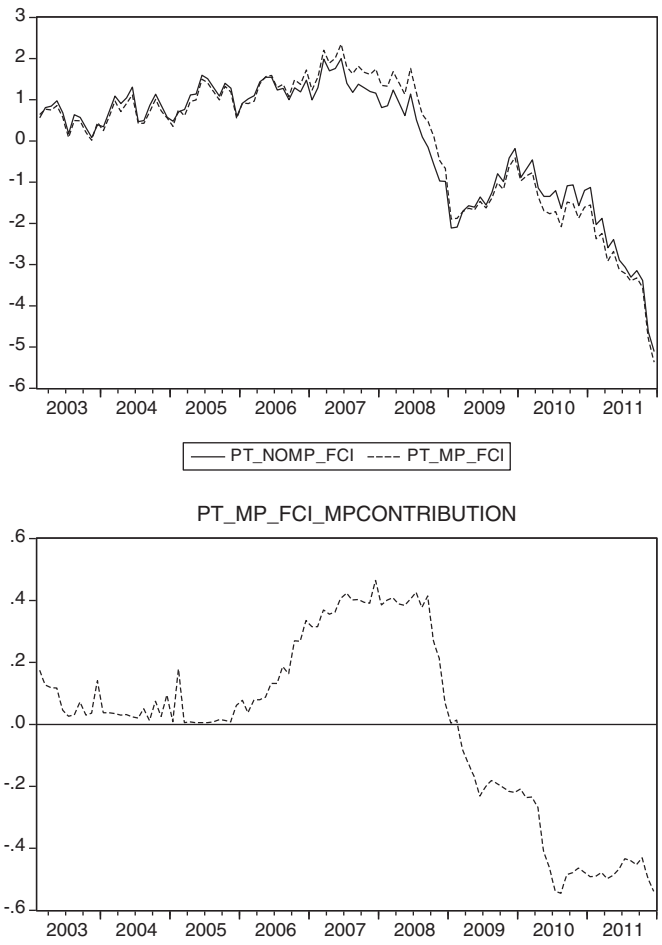

Fig. 7. Portugal — financial conditions indices (FCI.1 (PT_NOMP_FCI) and FCI.2 a (PT_MP_FCI)) along with the difference between FCI.2 a and FCI.2 b (lower panel).

generalized global financial crisis. Banks in Greece and Portugal, and to a lesser extent in Spain (at least up until end-2011), have been under considerable pressure — cut off from international money markets and experiencing a slow, but steady, deposit leak. Banks have also faced pressure to reign in loan-to-deposit ratios which have been rising as deposits fall faster than loans. With monetary policy operations in the euro area being conducted under fixed-rate full allotment, it might be expected that liquidity conditions in the periphery would have recovered — banks could simply replace lost sources of funds, whether the international markets or depositors, with central bank refinancing. However, this does not seem to have occurred. This result might reflect the growing shortage of collateral experienced by some banks, as rising sovereign spreads increased the haircuts on eligible assets and downgrades of the sovereign led to banks and then instruments being downgraded as well or even rendered ineligible. Irish banks, of course, faced similar problems. However, deleveraging in their case was more easily achieved through the sale of foreign assets. In this way financial conditions in Ireland were less affected, allowing, perhaps, for the slight recovery seen in Fig. 6 in 2009–2010 and the relatively smaller deterioration in 2011; it can also be pointed out that financial conditions in Ireland were arguably more strongly affected by the global financial crisis than were conditions in Greece and Portugal — part of the recovery reflects a rebound from their very low level in the wake of the US subprime crisis.

The impact of euro area monetary policy on the periphery in this period is also interesting. In contrast to the positive role played by monetary policy during the global financial crisis (preventing financial conditions from falling by as much as they might have), since the outbreak of the sovereign debt crisis in mid-2010, monetary policy seems to be operating in a pro-cyclical manner in the periphery. Financial conditions without monetary policy variables appear less tight than those with monetary policy variables.[14]

The case of Ireland deserves more consideration (Fig. 6). The two methods of extracting the impact of monetary policy generate somewhat different results (compare the top and bottom halves of Fig. 6). In particular, the extraction of the monetary policy effect by comparing FCI.1 (the FCI without monetary policy variables) and FCI.2 a (the FCI with monetary policy variables) suggests that monetary policy has been leaning against the wind from 2010 onwards. By contrast, comparing FCI.2 a with FCI.2 b (where the impact of monetary policy variables in FCI.2 a are set to zero) suggests that monetary policy was not leaning against the wind throughout the period after the Lehman Brothers collapse in line with evidence from the rest of the periphery.[15] This ambiguity could be related to the fact that Irish banks were far less tied to the real economy of Ireland than banks in Greece, Portugal or Spain. It is thus more difficult to extract an indicator of financial conditions in Ireland since much of the information such as credit growth, credit conditions and central bank financing relate not only to the provision of finance to the Irish economy but

[14] This could be due to the fact that the ECB has interpreted what was happening in peripheral countries as an asymmetric negative productivity shock. In the wake of such a shock it would be wrong to respond by loosening monetary policy further, as opposed to a situation in which the same conditions were due to a negative demand shock.

[15] This result is even stronger if we do not split central bank liquidity provision into standard and non-standard provision and is another reason why we chose to split liquidity provision in the case of Ireland.

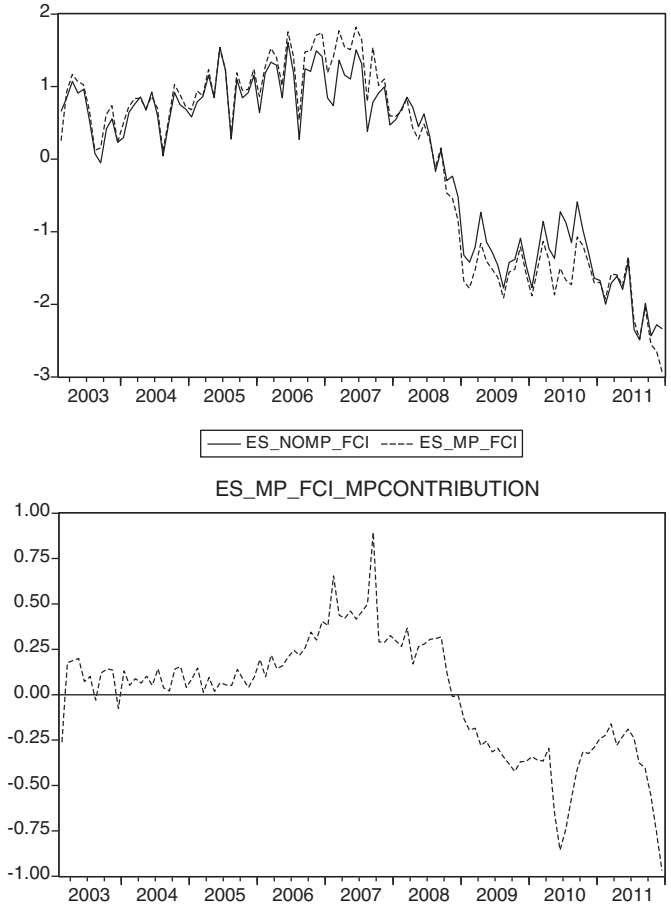

Fig. 8. Spain — financial conditions indices (FCI.1 (ES_NOMP_FCI) and FCI.2 a (ES_MP_FCI)) along with the difference between FCI.2 a and FCI.2 b (lower panel).

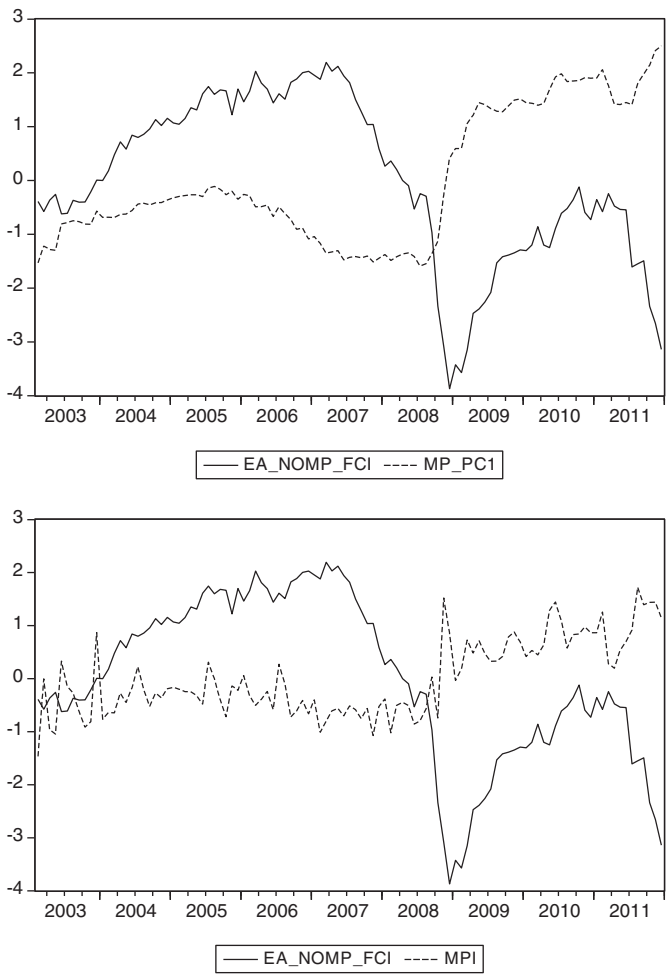

Fig. 9. Euro area — financial conditions index (FCI.1) against the first principal component of the monetary policy variables and against an index of all monetary policy variables (lower panel).

also to the provision of finance to other economies where Irish banks were operating.

Taken together Figs. 4–8 provide strong evidence of heterogeneous financial conditions both before and after the global financial crisis. This is the case in spite of the fact that these countries are subject to a single monetary policy. Of course, after the global financial crisis, monetary policy has become increasingly less homogeneous across the euro area — net liquidity provision through Eurosystem refinancing has diverged; the covered bond purchase programme and the Securities Market Programme have had different impacts across the countries of the monetary union; even policy rates have begun to diverge with the growth in importance of Emergency Lending Assistance (ELA), which comes at a penalty rate, in some countries.

Heterogeneity is confirmed by looking at simple pairwise correlations between the individual countries' FCIs and at the ones with the euro area FCI. The results of such an exercise are shown in Table 3. If we ignore monetary policy (FCI.1), financial conditions across the periphery appear to be strongly positively correlated with each other and with the euro area; Germany, by contrast, is weakly and often even negatively correlated with the periphery. Its correlation with the euro area FCI is positive but strikingly low, possibly reflecting the disproportionate impact of the adverse financial conditions prevailing in peripheral countries on conditions in the euro area.[16] When we include monetary policy (FCI.2 a), the correlation coefficients generally rise and, interestingly, the financial conditions in Germany are now positively correlated with those of the periphery and much more strongly correlated with financial conditions across the euro area (Ireland being once again the only outlier). This result suggests, as one would expect, that the single monetary policy does help convergence in conditions across the euro area.

4.4. The euro area FCI against monetary policy variables

Thus far, the analysis has been based on the effect of including three monetary policy variables within a fairly large dataset of financial and credit variables. However, within such a framework, monetary policy has a small overall weight by construction. In order to account for this issue, we undertake one final investigation of our euro area dataset which affords monetary policy more weight. Principal components analysis has been performed on the three monetary policy variables and the resulting first principal component has been plotted against the euro area financial conditions index without monetary policy variables (FCI1) in Fig. 9. Monetary policy appears to roughly mirror the FCI from mid-2005 to the end of 2008, i.e. it appears to be "leaning against the wind" both during the pre-crisis credit easing and during the Lehman Brothers plunge. The same appears to have been the case recently, in the second half of 2011. However, during the unfolding of the sovereign debt crisis,

[16] Moreover, it should be noted that principal components analysis by construction explains variability in the data. To the extent that developments in the periphery contributed more to the overall volatility of euro area data than those in the core of the euro area (i.e. more than their GDP-derived weights would imply), the principal components obtained from the euro area dataset will be geared more towards explaining developments in the periphery.

Table 4
Correlations between the euro area MPI, its underlying principal components and the euro area FCI without monetary policy.

	EA_NOMP_FCI	MP_PC1	MP_PC2	MP_PC3	MPI
EA_NOMP_FCI	1				
MP_PC1	−0.590	1			
MP_PC2	−0.162	0	1		
MP_PC3	−0.125	0	0	1	
MPI	−0.608	0.868	0.470	0.162	1

monetary policy appears to provide only limited easing of financial conditions. Analogous conclusions are drawn from an examination of the lower panel of Fig. 9, where an index constructed from all three monetary policy principal components has been plotted. Table 4 presents the corresponding correlation analysis, which provides further confirmation of the overall "leaning against the wind" effect of monetary policy. Thus, this final exploration of the data corroborates our earlier analysis.

5. Conclusions

This paper has sought to construct indices of financial conditions for the euro area and for individual countries within the monetary union. The indices are constructed using a wide variety of data, including monetary policy variables (both interest rates and quantities), interest rate spreads, credit quantities, the volume of activity in debt securities markets, market volatility and bank survey data describing terms and conditions on bank loans. The rationale for the inclusion of such a broad range of indicators of financial conditions is grounded in the theoretical literature and it is premised in the concept that market imperfections imply a need to look beyond simply prices (interest rates) as measures of financial market conditions. The resulting indices have an intuitive appeal, fitting in well with a narrative of financial conditions since the early years of the monetary union. Moreover, the indices appear, unsurprisingly in an era characterized by the dominance of non-standard monetary policy, to provide a better picture of financial conditions than would an examination of the policy rate, or interest rates more broadly.

Further investigation of financial conditions at the individual country level also provides interesting results. Whilst care needs to be taken in comparing the levels of the FCIs across countries, it is hard to escape the conclusion that financial conditions differed across the countries of the euro area both before and after the global financial crisis. In particular, in the aftermath of the crisis, conditions in countries such as Greece and Portugal have deteriorated considerably, whilst those in Germany have continued to improve. This result poses an important challenge for the exercise of monetary policy across the monetary union. It also points to a considerable tightening of financial conditions in Greece and Portugal and, to a lesser extent, Spain at a time of parallel fiscal tightening in these countries.

Appendix A. Detailed description of variables

A.1. The euro area dataset

Variable	Description
1. Loans to non-financial corporations (NFC, flows)	Flow of loans to non-financial corporations (ECB, SDW, BSI.M.U2.Y.U.A20.A.4.U2.2240.Z01.E)
2. Loans to households (HH, flows)	Flow of loans to Households and non-profit institutions serving households (ECB, SDW, BSI.M.U2.Y.U.A20.A.4.U2.2250.Z01.E)
3. Spread between interest rates on other loans and deposits to non-financial corporations	Interest rate on loans other than revolving loans and overdrafts, convenience and extended credit card debt to non-financial corporations minus interest rate on deposits of non-financial corporations with agreed maturity up to 1 year (MIR.M.U2.B.A2A.A.R.A.2240. EUR.N − MIR.M.U2.B.L22.F.R.A.2240. EUR.N
4. Spread between interest rates on overdrafts etc. and deposits to non-financial corporations	Interest rate on revolving loans and overdrafts, convenience and extended credit card debt, Total, Non-Financial corporations minus interest rate on deposits of non-financial corporations with agreed maturity up to 1 year (MIR.M.U2.B.A2Z.A.R.A.2240. EUR.N − MIR.M.U2.B.L22.F.R.A.2240. EUR.N)
5. Spread between interest rates on consumptions loans and deposits to households	Interest rate on loans for consumption excluding revolving loans and overdrafts, convenience and extended credit card debt to households and non-profit institutions serving households minus interest rate on deposits of households with agreed maturity up to 1 year (MIR.M.U2.B.A2B.A.R.A.2250. EUR.N − MIR.M.U2.B.L22.F.R.A.2250. EUR.N)
6. Spread between interest rates on mortgage loans and deposits to households	Interest rate on lending for house purchase excluding revolving loans and overdrafts, convenience and extended credit card debt to households and non-profit institutions serving households minus interest rate on deposits to households with agreed maturity up to 1 year (MIR.M.U2.B.A2C.A.R.A.2250. EUR.N − MIR.M.U2.B.L22.F.R.A.2250. EUR.N)
7. Net liquidity provision by Eurosystem (8. = the growth rate of 7)	Refinancing operations, liquidity provided by Covered Bond Purchase Programme, liquidity provided by Securities Markets Programme, marginal lending facility and ELA net of current accounts of commercial banks held with Eurosystem and the deposit facilities
9. Debt securities issued by non-financial corporations	Euro area (changing composition), Index of Notional Stocks, Securities other than shares, excluding financial derivatives, Nominal value, Non-financial corporations issuing sector, Euro, denominated in Annual growth rate (Sec. M.U2.1100.F33000.N.I. EUR.A.Z)
10. Debt securities issued by monetary financial institutions	Euro area (changing composition), Index of Notional Stocks, Securities other than shares, excluding financial derivatives, Nominal value, MFIs issuing sector, Euro, denominated in Annual growth rate (Sec. M.U2.12A0.F33000.N.I. EUR.A.Z)
11. Rate of change of residential property prices	Euro area 17 (fixed composition); Residential property prices, New and existing dwellings; Residential property in good & poor condition; Whole country; Neither seasonally nor working day adjusted; ECB (RPP.Q.I6.N.TD.00.3.00)
12. Rate of change of Harmonised Index of Consumer Prices	ECB, SDW, annualized month-on-month rate of change
13. 3-month − overnight spread	3-month Euribor minus EONIA
14. 2-year − 3-month spread	Interest rate on 2-year euro area benchmark bond minus 3-month Euribor
15. 10-year − 3-month spread	Interest rate on 10-year euro area benchmark bond minus 3-month Euribor
16. Average spreads on long-term government debt relative to Germany	ECB, SDW, harmonised long-term interest rates for convergence assessment purposes
17. Rate of change of stock prices	Datastream, Euro share price index, annualized month-on-month rate of change
18. Volatility of stock prices	ECB, SDW, VSTOXX Index — annualized month-on-month rate of change

Appendix A (*continued*)

Variable	Description
19. Volatility of bond prices	ECB, SDW (FM.M.U2. EUR.BL.VL.RX1. IVAE), Bloomberg, Volatility, Eurex Generic 1st 'RX' Future, Implied bond volatility, end of period
20. Survey question on banks' access to market financing	Euro area (changing composition) — All banks — Question on Impact of ability to access market financing — contract counterpart Enterprise — Backward looking three months — domain of Credit standards — Loan supply — Diffusion index (ECB, SDW, BLS.Q.U2. ALL.MF.E.Z.B3.ST.S. DINX)
21. Survey question on banks' liquidity position	Euro area (changing composition) — All banks — Question on Impact of liquidity position — contract counterpart Enterprise — Backward looking three months — domain of Credit standards — Loan supply — Diffusion index (ECB, SDW, BLS.Q.U2. ALL.LP.E.Z.B3.ST.S. DINX)
22. Survey question on housing market prospects	Euro area (changing composition) — All banks — Question on Impact of housing market prospects — contract counterpart Household, motivation Loans for house purchase — Backward looking three months — domain of Credit standards — Loan supply — Diffusion index (ECB, SDW, BLS.Q.U2. ALL. HMP.H.H.B3.ST.S. DINX)
23. Survey question on consumer creditworthiness	Euro area (changing composition) — All banks — Question on Impact of creditworthiness of consumers — contract counterpart Household, motivation Consumer credit — Backward looking three months — domain of Credit standards — Loan supply — Diffusion index (ECB, SDW, BLS.Q.U2. ALL. CWC.H.C.B3.ST.S. DINX)
24. ECB refinancing rate	ECB, SDW, minimum bid rate on variable rate tenders; fixed rate on fixed rate tenders

Items 3–6 and 13–16 (i.e. spreads), 18 and 19 (volatilities) and 20–23 (bank lending survey responses) have been included with the opposite sign, so that an increase in any series reflects an easing of credit conditions.

A.2. The individual country datasets

The corresponding country-specific series have been used for the calculation of the individual country indices. Items 10, 11, 18 and 19 are available only for the euro area, not for individual countries. Item 4 has not been included for Spain, because the interest rate on overdrafts exhibits a structural break (a very rapid plunge, possibly reflecting some institutional change) which would have affected our results. For both Ireland and Greece the yield on 3-year bonds has been used in item 14. The Bank of Greece's series on "Bank interest rates on new euro-denominated deposits and loans vis-à-vis euro area residents – from domestic credit institutions – to non-financial corporations" and "Bank interest rates on new euro-denominated deposits and loans vis-à-vis euro area residents – from domestic credit institutions – all housing loans" have been used in items 3 and 6 respectively. Finally, for all countries, the series closest to a whole-country retail property price index has been used. All series are monthly, with the exception of items 11 and 20–23 which have been interpolated from quarterly data.

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