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* Views expressed are those of the authors and do not necessarily reflect official positions of De Nederlandsche Bank.

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How competitiveness shocks affect macroeconomic performance across euro area countries*

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Abstract

This paper considers the short-term effects of competitiveness shocks on macroeconomic performance in the euro area. Vector autoregressive models are estimated on quarterly data from 1995 to 2013 for individual countries and the whole euro area. The results show that competitiveness shocks help to explain subsequent GDP developments in most countries but have little explanatory power for the current account balance and domestic credit. These results apply for all of the competitiveness measures considered, but a non-traditional competitiveness measure accounting for quality differences fares better in some cases. The effects of the competitiveness measures vary substantially across the countries in the euro area, which likely reflects their different economic structures and institutions. This heterogeneity suggests that policy measures seeking to improve competitiveness may have very different effects on economic performance and financial stability in different countries.

Keywords: Competitiveness, macroeconomic variables, transmission, euro area.
JEL classifications: E32, E61, F32.

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"Current account imbalances could be justified for any country, including those participating in a monetary union, and they do not necessarily reflect a loss of competitiveness. But increasingly, larger current account deficits have resulted from significant losses of national competitiveness, signalling domestic macroeconomic imbalances and deeper structural problems. These losses of competitiveness limit the country's growth potential and hinder its participation in the global trade integration" – Mario Draghi (13 March 2012)

1. Introduction

A key policy prescription following the global financial crisis and the European sovereign debt crisis has been to improve price or cost competitiveness, especially in Southern European countries. Improving competitiveness is seen as a way to strengthen macroeconomic performance, reduce the risk of financial instability and stop imbalances accumulating within the monetary union (Sinn, 2011; Draghi, 2012). Since 2011 the European Union has implemented a number of policy initiatives seeking to monitor and improve competitiveness. These measures include the Euro Plus Pact, the Six Pack and the accompanying Macroeconomic Imbalance Procedure.

Given the policy focus placed on improving competitiveness in the European Union and in individual EU countries, it is clearly of importance to assess how far policies targeting competitiveness affect macroeconomic performance over different time horizons. A large number of studies analyse the effect of competitiveness on variables such as export or import volumes, but surprisingly only a few papers consider the effect of competitiveness on the current account, GDP and domestic credit, variables which are of immediate policy interest and which appear in different forms in the list of variables in the Scoreboard of the Macroeconomic Imbalance Procedure. Moreover, disproportionate movements in the current account balance and domestic credit are often seen as important indicators of vulnerability to financial instability or financial crises (Bussiere and Fratzscher, 2006; Claessens *et al.*, 2010).

This paper contributes to the literature by empirically assessing the short-term effects of changes in competitiveness on broader macroeconomic performance in terms of GDP, credit growth and the current account balance. Although trends in competitiveness may affect

macroeconomic performance in the longer term, it is important to understand the shorter-term effects in order to assess the costs of the transition path. The shorter-term effects are the most immediate and noticeable effects of changes in competitiveness and so they may be important for the economic and political acceptability of policies that seek to improve competitiveness. The empirical analysis distinguishes itself from most earlier studies by using quarterly data and estimating VAR models not only for a panel of euro area countries but also for individual countries. This approach makes it possible to determine the importance of heterogeneities within the euro area. Moreover, the paper quantifies competitiveness using a number of different variables to measure it, including a non-traditional one developed within the Competitiveness Research Network of the European Central Bank.

The small number of studies looking at the importance of measures of price or wage competitiveness on macroeconomic performance find contradictory results. Some studies find that current account imbalances in the peripheral euro area countries can largely be attributed to unit labour costs (cf. Belke and Dreger (2013), Hancké (2013) and Zemanek *et al.* (2009)), and so they advise that these countries should take measures to improve their competitiveness by lowering unit labour costs. On the other side are Diaz Sanchez and Varoudakis (2013), who conclude that competitiveness is rather unimportant for the current account balance. This is supported by Holinski et al. (2012), Tressel and Wang (2014) and Wyplosz (2013), who emphasise the importance of the domestic business cycle for external balances. Comunale and Hessel (2014) find relatively weak effects from price competitiveness to imports and exports and the current account balance. Finally, Gabrisch and Staehr (2015) show that changes in the current account balance help explain the development of the competitiveness measures while there is no discernible effect in the other direction.

Virtually all the studies seeking to ascertain the importance of changes in competitiveness for broader macroeconomic developments use panel data, essentially assuming the same effects are to be found across the countries in the panel. A notable exception is Podstawski (2014), who estimates time-varying VAR models for selected European countries and identifies shocks using long-run and sign restrictions. It is found that shocks to domestic demand, monetary policy and price competitiveness are important for developments in the current account balance. Dieppe et al. (2012) report the results of simulation studies using different types of country-specific econometric models. The effect of changes in price and wage cost competitiveness is found to differ markedly across various countries. Non-price

competitiveness may also play a role, but the simulation results again differ substantially across countries. [1]

It may be surprising that cross-country homogeneity is assumed given the very different macroeconomic developments across EU countries both before and after the outbreak of the global financial crisis (Deroos et al., 2008). It is also surprising in light of the discussion on the challenges to the European common currency area stemming from symmetric shocks in economies with different economic structures (De Grauwe, 2014, chs. 1-2). At a more general level it is clear that the effects of macroeconomic shocks will depend on the structural and institutional characteristics of the country affected by the shock (Hoeller et al., 2004; Torój, 2009).[2] Among the many likely candidates for such heterogeneity are the size of the economy, its openness to trade and capital flows, price elasticities in foreign trade, labour market institutions, industry structure, the role of government, and the formation of expectations. The upshot is that the macroeconomic developments following a competitiveness shock may vary markedly from country to country depending on the characteristics of the countries being considered.

Our results show that shocks to competitiveness help explain subsequent GDP developments in most countries in the short term. In general, a loss of competitiveness lowers GDP growth several quarters after the initial shock, but this result is not robust in all cases. Furthermore, competitiveness measures have little explanatory power on the short-term dynamics of the current account balance and domestic credit growth. If anything, the results provide suggestive evidence that competitiveness losses result in lower credit growth. However, many impulse response functions are not significantly different from zero. So, caution is necessary when interpreting the results.

A key message from the results is that the transmission mechanism for shocks is different in different countries. The consequence of different transmission mechanisms is that results cannot as a rule be generalised to all countries in the euro area because there appears to be

[1] Benkovskis et al. (2015) seek to explain the developments in the export market shares of 25 EU countries using a large set of variables signifying both price and non-price competitiveness. The results obtained using Bayesian Model Averaging are rather different for panels of Western European and Eastern European countries.
[2] An often cited example is the development in unemployment in the USA and Europe after both regions were hit by the oil price shocks of the 1970s. The oil price shocks were followed by persistently higher unemployment in Europe, while the rise in unemployment was temporary in the USA. The likely reason for this heterogeneity is that the two regions had different institutions and structures (Blanchard and Wolfers, 2000).

substantial variation across countries, whichever competitiveness variable is considered. Specifically it is countries in the core and in the periphery that do not respond homogenously to competitiveness shocks. Therefore, policies aiming to improve competitiveness may have very different effects on short-term macroeconomic performance in different countries in the euro area, suggesting that country-specific policy measures are needed for economic and financial stability to be attained.

The rest of the paper is organised as follows: Section 2 describes the data used, the transformations needed for their use in VAR models and the estimation procedure of the VAR models. Section 3 discusses the results of the VAR models using impulse responses and variance decompositions. Section 4 summarises the results and discusses policy conclusions.

2. Data and empirical methodology

2.1 Variable selection and hypotheses

Before we can investigate the effect of competitiveness on macroeconomic performance we need to define how to measure competitiveness and macroeconomic outcomes. There is no single widely agreed variable that captures competitiveness, so we choose to analyse the macroeconomic outcomes using four different competitiveness variables: 1) the real effective exchange rate using unit labour costs as the deflator, 2) the real effective exchange rate using the consumer price index (CPI) as the deflator, 3) nominal unit labour costs, and 4) a quality adjusted export price. These four indicators measure different aspects of a country's competitiveness. Note that the quality adjusted export price and both real effective exchange rate variables are unit free variables and are usually indexed at 100 for a base year. Unit labour costs are a nominal variable (euros per unit of real GDP) and therefore are not unit free.

The most widely used competitiveness indicators from this set of variables are perhaps the real effective exchange rates using the consumer price index and an index of unit labour costs as the deflator, both of which feature prominently on the EU Commission's Macroeconomic Imbalances Procedure Scoreboard. The first variable measures the price of a country's consumption goods relative to prices of consumption goods in the country's trading partners

using a unit free measure. The CPI may not be the best price index to use for measuring competitiveness because the CPI measures the price of a country's consumption basket and not the price of its production. In an alternative real effective exchange rate measure, a country's unit labour costs are used as the price deflator rather than the CPI. The idea of using unit labour costs as deflator follows from unit labour costs being arguably more closely related to production costs and hence to international competitiveness than the CPI is.

The unit labour costs indicator measures the nominal labour costs per unit of real GDP. A large increase in unit labour costs is associated with increasing production costs and consequently a loss of competitiveness. However, this indicator is not above criticism either (see e.g. Filipe and Kumar, 2014). Unit labour costs cannot be directly compared across countries, because the composition of a unit of real GDP in one country is not necessarily the same as the composition of one in another country. The quality of the goods produced by one country may also be different from those produced by another country. Furthermore, unit labour costs only take account of cost developments in the domestic economy but not of those in other countries.

The final indicator of competitiveness is the non-price or quality adjusted export price index developed by Benkovskis and Wörz (forthcoming). The quality adjustment reflects that a country with high export prices is not necessarily uncompetitive, since goods are heterogeneous and the country may produce goods that are in high demand for their high quality for example. Benkovskis and Wörz (forthcoming) construct the quality adjusted export price index by aggregating highly detailed data on relative prices and market shares for more than 5,000 products, and they effectively attribute changes in market shares that are unexplained by relative prices to quality changes and other non-price features that affect the demand for the exported products. It must be emphasised that the quality adjustment does not necessarily relate to any physical features of the export products but captures changes in demand that cannot be attributed to price changes.

The three key macroeconomic variables are GDP growth, domestic credit growth and the current account balance. These variables are chosen because of their policy relevance; GDP growth is of immediate importance for economic welfare, while the dynamics of domestic credit and the current account balance are often seen as important indicators or proxies of financial vulnerability (Obstfeld, 2012; Jordá et al. 2013; Taylor, 2013). The variables also

overlap relatively closely with those used in the panel VAR models in Diaz Sanchez and Varoudakis (2013).

2.2 Properties of the data

The data for all the variables are from the OECD except the data on the quality adjusted export price, which are from the ECB CompNet database (Karadeloglou et al., 2015). We restrict our country sample to the original 11 euro area countries, i.e. Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.[3] We use a common sample for the data which runs from 1995:Q1 until 2013:Q4. Even though data for most variables are available from before 1995, we use 1995 as the starting year to avoid including the ERM crisis in the sample. In 1995-1998, before the national exchange rates were irrevocably fixed to the euro on 1 January 1999, exchange rates among the euro area members were very stable. The quality adjusted export price is only available from 1999 and only at an annual frequency, so to use this variable at the quarterly frequency we interpolate the quality adjusted export price using a quadratic trend to obtain a variable that runs from 1999:Q1-2013:Q4 for all the countries in the sample. We follow the literature on VAR models in an international context by choosing to interpolate the annual data to a quarterly frequency, cf. Pesaran et al. (2004), Dees et al. (2007) and Eickmeier and Ng (2015).[4] Interpolation with a quadratic trend results in a smoother series than interpolation with a linear trend does.

The sample variables are generally non-stationary or borderline stationary (unit root tests are available upon request), so we implement several data transformations to obtain a set of variables that are stationary. We measure the current account in per cent of GDP. Credit to the private sector is deflated with the consumer price index, and finally GDP is measured in real terms. We remove the trend from each variable and retain the cyclical component. There are several ways of removing the trend component from variables, and here we choose the relatively straightforward method of an HP-filter with a lambda parameter of 1600, which is

[3] Unfortunately there are not enough data available for Greece to be included in the country sample.
[4] See Foroni and Marcellino (2013) for an overview of alternative econometric methods for handling mixed frequency series.

standard for quarterly data.[5] Thereafter, any remaining seasonal pattern is removed using the Census X12 method assuming an additive seasonal pattern.

The transformation described above simplifies the interpretation of the variables. For example, the transformed output variable GDP_GAP can be interpreted as an output gap and the transformed credit variable CR_GAP is a type of credit gap. Similarly, the transformed current account CA_GAP is a current account gap, which is the deviation from the trend development of the current account. The competitiveness measures are also deviations from trends. The names we use for the competitiveness variables, all of which are interpreted as the cyclical component of the variable, are REER_ULC for the real effective exchange rate using unit labour costs as deflator, REER_CPI for the real effective exchange rate using the consumer price index as deflator, ULC for nominal unit labour costs, and PX_QUAL for the quality adjusted export price.

Table 1 provides descriptive statistics for the transformed variables. The mean of all the variables is virtually zero, because the variables are detrended. All variables exhibit some excess kurtosis, while the skewness is quite close to zero for most of them.

[Table 1 about here]

Table 2 shows the correlation between the variables. The correlation coefficient is 0.86 between REER_CPI and REER_ULC and 0.54 between REER_ULC and ULC, but otherwise the correlations are not larger than 0.5. All the competitiveness variables are negatively correlated with GDP, which suggests that an increase in one of those variables is associated with a lower GDP relative to trend. However, the patterns of correlations between competitiveness and the current account are less clear cut and the correlations are generally low. Finally, the competitiveness variables are generally negatively correlated with the credit variable.

[Table 2 about here]

[5] The results remain largely unchanged if larger deviations from the trend are allowed, e.g. with a lambda parameter of 10,000.

2.3 VAR estimation procedure

In a VAR model all variables are considered as endogenous, which allows all variables to affect each other with one or more lags. We include one of the competitiveness variables together with the current account gap, the output gap and the credit gap, and for the competitiveness variable we use REER_CPI, REER_ULC, ULC or PX_QUAL. This means that we estimate four different VAR models, each containing four endogenous variables, with only a single competitiveness variable included in each. We choose to include only one competitiveness variable in each model because the competitiveness variables are generally strongly correlated, likely because of the same underlying factors. This also keeps the VAR models relatively small in size, which is important given the number of observations.

Each VAR model is estimated using two lags of all variables. In general, the BIC suggests one lag, while the AIC indicates four or more but the Hannan-Quinn test generally points to a number below four. Given our relatively small number of observations we opt for a lag length of two as most of the tests indicate that this number of lags adequately removes serial correlation. It also avoids over-specifying the model by reducing the degrees of freedom of the relatively small number of observations for which the VAR models need to be estimated.

The VAR models only contain domestic variables and do not explicitly account for spillovers between the different euro area countries. In principle a GVAR framework would be suitable for modelling international spillovers, but there are several complications in using this framework. First, existing studies using GVARs do not model the transmission of competitiveness shocks explicitly because of endogeneity concerns (Dees et al., 2007; Holinski and Vermeulen, 2012). One important assumption is that foreign shocks need to be weakly exogenous, and this requirement is likely to be violated when a trading partner's real effective exchange rates are included to explain a country's real effective exchange rates. This is also problematic for other variables such as GDP, particularly for larger EMU countries. The assumption for example that French GDP growth is (weakly) exogenously affected by German GDP is quite questionable. Second, in a GVAR framework the researcher has to decide on a weighting matrix to weight other countries' economic variables, such as GDP or private credit. Countries are often weighted by their trade intensity, which may be a good choice for real variables but may not be appropriate for credit shocks. Finally, we follow the variable selection in recent studies considering the effects of competitiveness on

macroeconomic performance (Belke and Dreger, 2013; Diaz Sanchez and Varoudakis, 2013). This ensures a parsimonious specification at the country level.

As an alternative to estimating VAR models, which need stationary time series, it may be possible to estimate a VECM on non-stationary time series by assuming one or more cointegrated vectors. We do not pursuit this alternative for several reasons. First, the literature does not allow us to identify clear long term equilibrium relationships between the variables being analysed. Second, some variables such as the current account variable are difficult to reconcile theoretically with non-stationarity in long samples. Third, when testing for cointegration using tests like the trace test does not clearly indicate that there is a long term cointegrating relationship in most cases. Arguably, the long-run effects may be better analysed using dynamic general equilibrium models that facilitate the modelling of structural changes in the economy. Finally, in this study we are mainly interested in the short and medium-run effects of shocks to competitiveness variables.

3. VAR results

This section discusses the macroeconomic effects of shocks in each of the four competitiveness variables using the results of the estimated VAR models. Four VAR models are estimated for the panel of euro area countries and four for each of the 11 individual countries, making 48 models in total. The results are presented through impulse responses and variance decompositions. To structure the discussion we consider the importance of competitiveness for each of the macroeconomic outcome variables in separate subsections.

The impulse response functions are produced for a positive shock of one standard deviation to the competitiveness variable. In all cases an increase in the competitiveness variable signifies worsening or deteriorating competitiveness. The results will be presented using Generalised Impulse Response Variables (GIRFs), cf. Pesaran and Shin (1998). An advantage of using GIRFs is that these impulses are invariant to the ordering of the variables. Robustness analyses have shown that qualitatively similar results are obtained if Cholesky ordering is used irrespective of the ordering of the variables (not presented).

The variance decompositions are produced using a Cholesky ordering with first the competitiveness variable (REER_ULC, REER_CPI, ULC or PX_QUAL), then CR_GAP, then GDP_GAP, and finally CA_GAP. The ordering is of little importance for the results of the variance decompositions; the results presented do not change markedly if other orderings are used. All computations are conducted in EViews 8.

3.1 Competitiveness and the current account balance

Figure 1 shows the response of the current account balance to a one standard deviation increase in each of the four competitiveness measures for the panel and for the 11 euro area countries individually. To improve readability, the scales are allowed to vary across the plots for the panel and the individual countries, and the confidence bands are omitted. Appendix A.1 shows the exact numbers of each impulse response function and highlights in bold when an impulse is statistically significant at the 5 percent level.

[Figure 1 about here]

One striking observation from the impulse responses in Figure 1 is the heterogeneity across the countries in the sample. The current account often declines or "worsens" initially in response to deteriorating competitiveness, but the picture is far from uniform over time or across the 11 countries. The immediate response for Austria is a decline in the current account balance but the effect subsides after 4-8 quarters. The response for Italy is positive initially and only turns negative after 2-6 quarters. The extreme responses of the current account balance in the first 2-3 quarters make Luxembourg a special case, perhaps because the financial sector plays a unique role in the economy of that country.

The results for some countries differ substantially across the four competitiveness measures considered. This is the case for Portugal and Spain, where there are large differences in the responses across all four of the competitiveness variables. For other countries, such as Italy and the Netherlands, the differences are smaller and the responses generally have the same sign.

The heterogeneous and often weak response of the current account to competitiveness shocks across the countries and across the competitiveness measures may appear surprising at first. The results are, however, basically in line with the finding in other studies that measures of competitiveness have little explanatory power for the current account balance (Diaz Sanchez and Varoudakis, 2013; Comunale and Hessel, 2014, Gabrisch and Staehr, 2015). Studies of export and import performance similarly find that competitiveness measures have little effect in the short run and that the effects vary substantially across different countries (Boyd et al., 2001; Christodoulopoulou and Tkačevs, forthcoming). The results also line up with research on the *j*-curve, which typically finds mixed responses for the trade balance or current account balance when the real exchange rate changes; see the literature overview in Bahmani-Oskooee and Ratha (2004).

It is noticeable that the literature has not found any particular "patterns" or arrangements that explain why the effects of changes in competitiveness vary so much across countries (Christodoulopoulou and Tkačevs, forthcoming). This also applies in our case; countries with many economic and institutional similarities often exhibit quite different results. Italy and Spain may be quite similar in some respects, leading other studies to pool the countries in the same panel, the responses of their current account balances to competitiveness shocks show different patterns.

The relatively modest explanatory power of the different competitiveness variables is confirmed when the results of variance decompositions for the current account balance are considered. Table 3 shows the percentage share of the total explained variation accounted for by each of the four competitiveness variables four quarters and 12 quarters ahead.

[Table 3 about here]

The competitiveness variables typically account for less than 10 per cent of the explained variation in the current account balance, and this applies both for a time horizon of one year and for one of three years. It is notable, however, that in some cases, including Austria, Belgium, France, Ireland and Portugal, the quality adjusted export price, PX_QUAL, explains a larger share of the variation in the current account balance than the other competitiveness variables do; this may in part result from the way in which the index is constructed.

As a robustness test we also estimated the VAR models using only pre-crisis data up to 2007:Q4, because the crisis may have affected the coefficients in the VAR models. The results remain remarkably stable, with most impulse response functions showing the same sign. There are some differences in terms of significance, but the main findings remain intact. Because of space constraints we do not report these results, but a full set of tables is available from the authors upon request.

3.2 Competitiveness and GDP

Figure 2 shows the responses of GDP to a generalised shock in the four competitiveness variables. Although there is also substantial heterogeneity across the 11 sample countries in this case, the most common pattern is one of GDP declining after a worsening of competitiveness, up to two years after which, the effect typically dies out. Table A.2. in the Appendix shows that most impulse responses are significant for the first few quarters. This pattern is most uniform across the four competitiveness variables for France, while the responses across the competitiveness variables vary for Germany, Ireland, Luxembourg and Spain. The overall picture is nevertheless that an adverse competitiveness shock is typically followed by a downturn lasting one to two years. Moreover, the response is typically substantial in economic terms for the countries with a negative response of GDP to a worsening of competitiveness. In many cases a one standard deviation increase in the competitiveness variable is followed by a fall in GDP relative to trend by 0.2-0.4 percentage point in the first two years after the shock occurs.

[Figure 2 about here]

Even though the results point in the direction of worsening competitiveness leading to lower GDP relative to trend for most countries, we must be careful in drawing policy conclusions since we do not identify the source of the economic shock that worsens competitiveness. The results do provide important information even so, in the sense that a worsening in the competitiveness variables may be a useful signal to policymakers about a future decline in GDP relative to trend. However, the policy action required will depend very much on the underlying causes of the deterioration in competitiveness. It may matter, for example, whether

the increase in REER_ULC is caused by rising domestic labour costs, falling foreign labour costs, an appreciating nominal exchange rate, or a combination of these factors.

[Table 4 about here]

The results of the variance decompositions shown in Table 4 suggest that the competitiveness variables have some, or even substantial, explanatory power in at least half of the euro area countries. The variance decompositions also reveal that the share of variation explained differs substantially across the 11 sample countries and in some cases also across the four competitiveness measures. Spain stands out as a country where a very large part of explained variation is accounted for by the competitiveness measures, but it is notable that Spain at the same time is one of the countries for which the impulse responses vary a lot between the four competitiveness measures.

3.3 Competitiveness and domestic credit

The final macroeconomic variable to be considered is credit relative to trend, a variable of particular interest for financial stability. Competitiveness may affect credit volumes indirectly through changes in other variables such as the current account or GDP but it may also affect credit directly through changes in factors such as expectations and balance sheet compositions.

Figure 3 shows the impulse responses for the credit variable and this is arguably the variable for which the results vary the most across different countries and across different competitiveness measures. For some countries, including Ireland, Portugal and Spain, the responses are generally positive in the first two to three years after the shock. For other countries, including Finland, France, Germany and Luxembourg, the responses are generally negative during the same time interval. The countries in the group with positive responses are predominantly in the euro area periphery, which reflects how deteriorating competitiveness and growing credit have generally gone hand-in-hand in these countries. The countries in the group with negative responses are all in the core of the euro area, which for extended periods of time have seen improvements in competitiveness even while there has been substantial credit growth. The heterogeneity across the sample countries is also reflected in the

numerically very small impulse responses for the panel. This is confirmed by most impulse responses not being statistically significant, as shown in Appendix A.3.

[Figure 3 about here]

The variance decomposition in Table 5 confirms that competitiveness variables are not very important in explaining credit developments. Competitiveness explains more than 10 per cent of the variation in credit growth for the Netherlands, Portugal and Spain, but for the other countries and the panel, the explained variation is in general less than 10 per cent.

[Table 5 about here]

4. Final comments

This paper shows how shocks in competitiveness affect the current account balance, GDP and domestic credit. The analyses are based both on individual country VAR models and on a panel comprising all 11 euro area countries using quarterly data from 1995 to 2013. The models include the three macroeconomic variables and one of four different competitiveness measures, i.e. the real effective exchange rate computed using unit labour costs as deflator, the real effective exchange rate based on consumer price deflators, nominal unit labour costs, and a quality adjusted export price. The importance of each competitiveness variable is assessed using impulse responses and variance decompositions.

The results suggest that deteriorating competitiveness is followed by a decline in GDP relative to trend in most of the 11 euro area countries. The declines are typically significant in both economic and statistical terms and last one to two years. The relationship is less clear for credit growth and current account balances. A shock in competitiveness is followed by a deterioration of the current account balance in some cases but the effect is generally weak and has varying lags. It appears that a competitiveness shock helps explain developments in domestic credit in only a few cases.

An important finding is that effects of competitiveness on the macroeconomic variables considered differ substantially across the 11 euro area countries, in both qualitative and

quantitative terms. In many cases the use of a different competitiveness variable shows different effects. The cross country heterogeneity suggests that the use of panel estimations may be unwarranted. It is imprudent to assume that the experiences of one euro area country would also apply to other countries. Detailed country-specific analyses are needed for the effect of competitiveness on macroeconomic performance to be assessed.

The results in this paper suggest that competitiveness may be of importance for GDP growth in the short term, while the importance for variables related to financial stability is uncertain and varies substantially across countries. The modest explanatory power of different competitiveness variables is, however, a result which is broadly in line with the findings from the annual panel data analysis in Diaz Sanchez and Varoudakis (2013), the simulations in Dieppe et al. (2012) and the complex VAR models in Podstawski (2014). The heterogeneity across different countries in the euro area is also in line with the findings of the latter two studies.

The analyses in this paper do not allow us to ascertain why the effects of shocks in competitiveness differ so much across the euro area countries. Economic theory posits that different economic structures, institutions, expectation formation and policymaking may lead to different shock transmission mechanisms and it may be speculated that such structural differences could be behind the heterogeneous effects. Industry and export structures differ substantially across the euro area countries and changes in competitiveness may therefore affect net exports and the rest of the economy differently.[6] Other forms of heterogeneity may stem from different policies and policy reactions across the euro area countries. In addition, countries may react differently to foreign shocks. Finally, different expectations due to country-specific features may also influence the macroeconomic effects of competitiveness shocks.

The results in this paper are important for surveillance and policymaking. Changes in competitiveness in a country may bear witness to future developments in GDP but generally carry very little reliable information on short-term developments in variables of importance for financial stability. The implications for the design of policies seeking to attain economic

[6] Berthou et al. (2015) find that the export price elasticities differ markedly across firms with low and high productivity and the distribution of productivity across firms in different countries may thus affect how changes in competitiveness affect external balances and other macroeconomic variables.

and financial stability may be that a narrow focus on improved competitiveness may not be sufficient for these objectives to be reached in the short term.

Given the policy importance placed on competitiveness in the European Union after the outbreak of the global financial crisis and the ensuing economic and financial problems in the region, we believe that it is important to continue the line of research in this paper and analyse the broader macroeconomic effects of changes in competitiveness as well as the underlying factors behind the heterogeneous effects found in this paper. Future research can take several directions. One option would be to define larger VAR models with many variables including consumption, investment and government spending, which would provide a fuller picture of the linkages within the economies. Detailed and country-specific modelling taking structural differences between countries into account may similarly provide new insights. Finally, and arguably most pertinently, econometric models allowing for spillovers between different countries could provide a fuller picture of the effects of competitiveness on macroeconomic performance. Indeed, the study of competitiveness and its macroeconomic effects in the euro area countries is an area of great policy importance where many questions are waiting to be explored.

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Tables

Table 1: Descriptive statistics

	Mean	Std. Dev.	Minimum	Maximum	Skewness	Kurtosis	Obs.
CA_GAP	0.01	0.01	-8.56	6.88	1.69	-0.30	7.26
GDP_GAP	0.01	-0.11	-5.68	6.69	1.58	0.36	4.96
CR_GAP	-0.17	-0.33	-10.27	13.85	3.05	0.45	5.19
REER_CPI	0.02	-0.06	-13.92	6.72	2.21	-0.33	4.86
REER_ULC	0.00	-0.06	-15.10	9.76	2.75	-0.17	4.63
ULC	-0.01	-0.08	-5.83	10.20	1.56	0.60	7.25
PX_QUAL	0.00	-0.23	-10.47	10.58	2.93	0.34	4.65

Note: All variables in the table represent the seasonally corrected cyclical component of the original variables.

Table 2: Correlation coefficients

	CA_GAP	GDP_GAP	CR_GAP	REER_CPI	REER_ULC	ULC	PX_QUAL
CA_GAP	1						
GDP_GAP	-0.05	1					
CR_GAP	-0.21	0.23	1				
REER_CPI	0.04	-0.28	-0.27	1			
REER_ULC	-0.08	-0.41	-0.16	0.86	1		
ULC	-0.18	-0.52	0.13	0.26	0.54	1	
PX_QUAL	0.06	-0.18	-0.09	0.30	0.28	0.01	1

Note: All variables in the table represent the seasonally corrected cyclical component of the original variables.

Table 3: Variance decompositions for the current account balance, per cent

	REER_ULC		REER_CPI		ULC		PX_QUAL	
	4^{th} qtr.	12^{th} qtr.	4^{th} qtr.	12^{th} qtr.	4^{th} qtr.	12^{th} qtr.	4^{th} qtr.	12^{th} qtr.
Panel	0.9	1.1	0.4	0.7	1.8	1.9	0.1	0.3
Austria	6.5	7.2	2.4	3.4	3.9	4.1	13.1	14.5
Belgium	2.0	2.1	1.1	1.4	10.8	13.1	21.9	24.5
Finland	3.3	4.6	2.4	4.2	2.5	3.0	2.8	2.8
France	0.4	2.0	0.9	3.4	3.4	7.4	14.3	15.2
Germany	0.3	1.0	3.4	4.2	9.4	9.5	2.2	2.6
Ireland	0.5	1.3	0.6	1.9	2.6	3.7	13.3	16.3
Italy	2.3	7.6	1.6	5.9	4.0	3.7	7.7	7.9
Luxembourg	4.1	4.2	13.0	13.2	1.3	1.9	6.7	7.7
Netherlands	6.6	5.5	1.3	1.5	5.0	18.6	3.4	2.8
Portugal	4.6	9.8	2.1	2.3	1.4	2.4	13.2	26.7
Spain	14.0	16.1	4.5	6.8	3.5	10.6	0.5	0.9

Note: The table shows the percentage of total explained variation explained by the four different competitiveness variables at the 4^{th} quarter and the 12^{th} quarter.

Table 4: Variance decompositions for GDP, per cent

	REER_ULC		REER_CPI		ULC		PX_QUAL	
	4th qtr.	12th qtr.	4th qtr.	12th qtr.	4th qtr.	12th qtr.	4th qtr.	12th qtr.
Panel	3.8	3.8	3.3	3.3	4.4	4.4	5.2	5.2
Austria	3.1	3.1	3.5	3.5	6.4	6.1	8.6	8.6
Belgium	22.8	22.7	23.7	23.7	14.9	14.9	22.7	22.5
Finland	5.5	5.5	5.6	5.6	3.4	3.4	9.0	9.0
France	13.3	13.1	11.6	11.5	13.5	13.6	8.6	8.7
Germany	13.6	13.4	11.6	11.5	2.8	2.8	19.5	19.5
Ireland	22.8	22.3	18.5	18.4	21.8	21.7	19.1	18.8
Italy	7.4	7.3	7.5	7.4	8.2	7.7	6.2	6.2
Luxembourg	2.1	2.1	4.9	4.9	3.0	2.9	4.2	4.1
Netherlands	18.0	17.8	17.6	17.4	13.6	14.3	16.1	16.1
Portugal	9.6	9.6	5.9	6.0	13.7	13.8	21.4	21.4
Spain	40.1	40.3	45.8	46.0	24.6	24.7	64.2	64.3

Note: The table shows the percentage of total explained variation explained by the four different competitiveness variables at the 4th quarter and the 12th quarter.

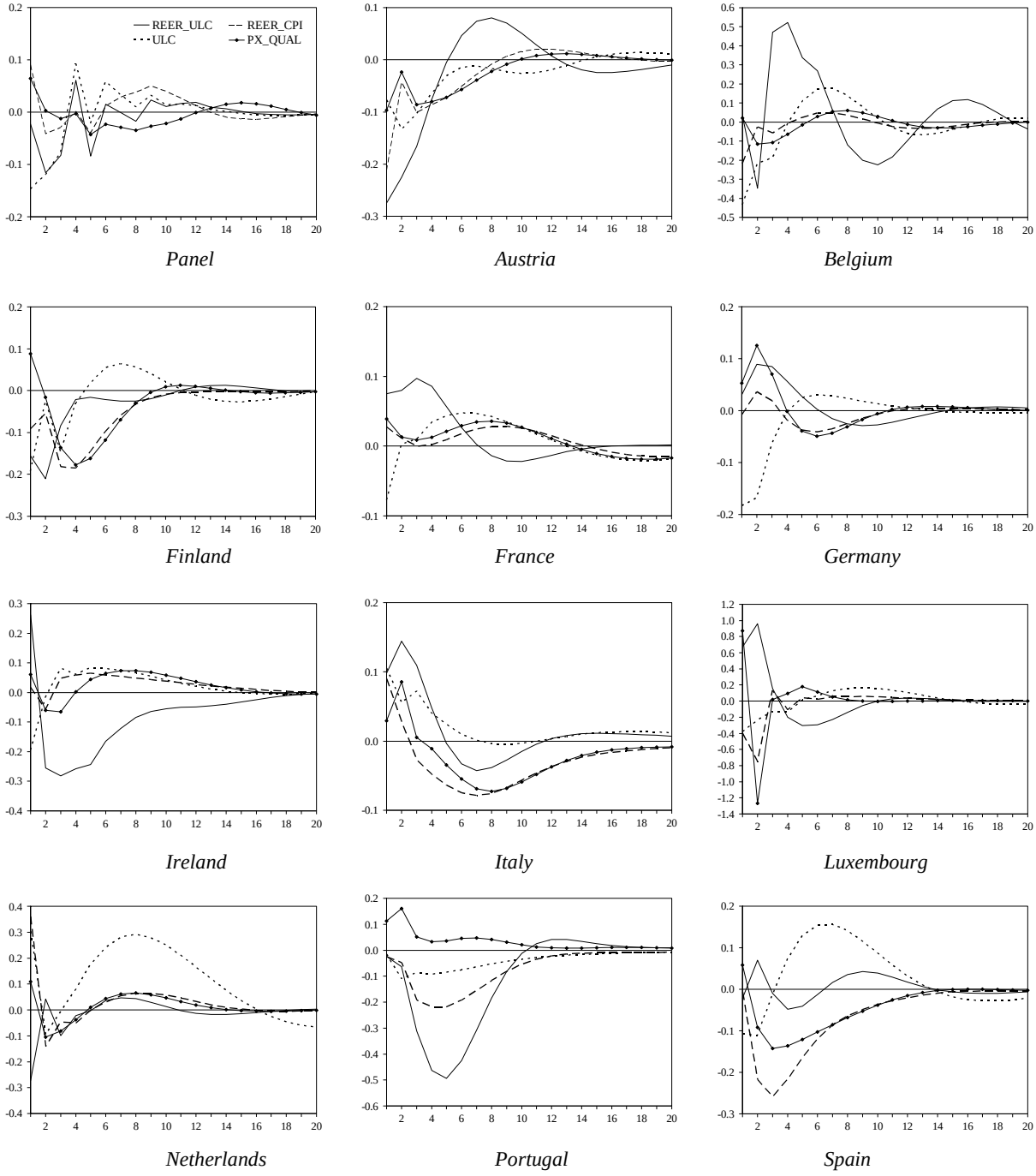
Table 5: Variance decompositions for credit, per cent

	REER_ULC		REER_CPI		ULC		PX_QUAL	
	4th qtr.	12th qtr.	4th qtr.	12th qtr.	4th qtr.	12th qtr.	4th qtr.	12th qtr.
Panel	3.0	4.5	3.3	4.6	2.7	3.7	4.1	5.1
Austria	0.9	2.4	0.5	1.3	0.4	0.7	2.8	3.2
Belgium	2.4	2.2	2.7	2.7	2.9	2.7	5.1	4.2
Finland	0.7	1.6	0.6	1.7	2.6	4.4	5.7	6.8
France	1.2	1.6	1.0	1.4	0.7	1.5	1.4	1.8
Germany	2.9	2.7	2.7	2.5	2.7	2.6	1.3	1.4
Ireland	4.7	6.3	7.3	9.9	6.6	9.5	6.3	7.4
Italy	2.1	3.8	2.0	3.7	1.6	3.5	3.1	7.0
Luxembourg	8.6	8.8	6.4	6.5	7.9	7.9	11.3	11.5
Netherlands	4.3	14.5	4.9	14.6	5.8	14.0	4.7	15.8
Portugal	13.4	17.2	12.5	15.3	11.2	14.2	10.2	10.1
Spain	14.5	17.9	17.6	22.0	21.5	32.1	10.2	13.7

Note: The table shows the percentage of total explained variation explained by the four different competitiveness variables at the 4th quarter and the 12th quarter.

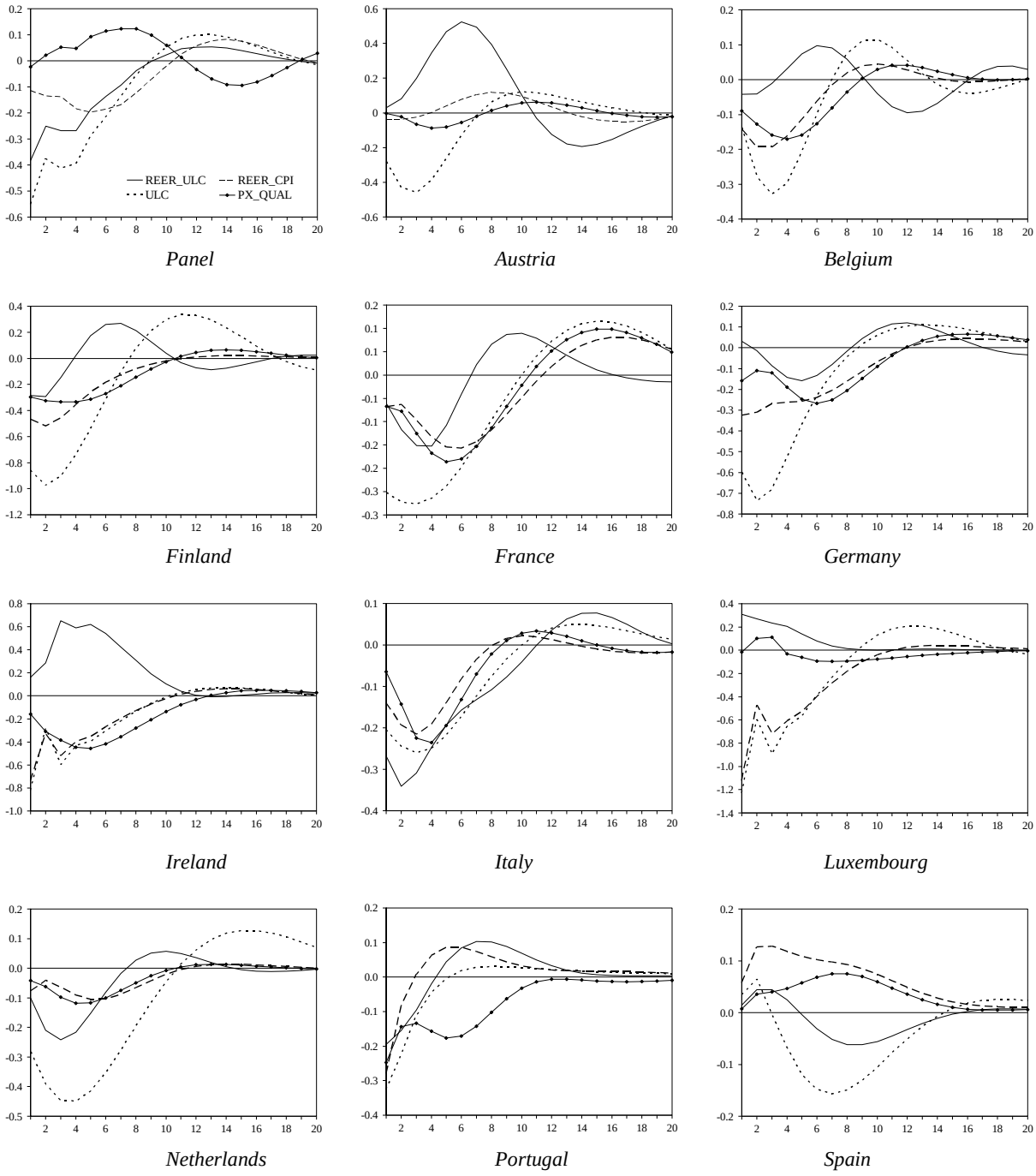
Figures

Figure 1: Response of current account balance to a generalised competitiveness shock



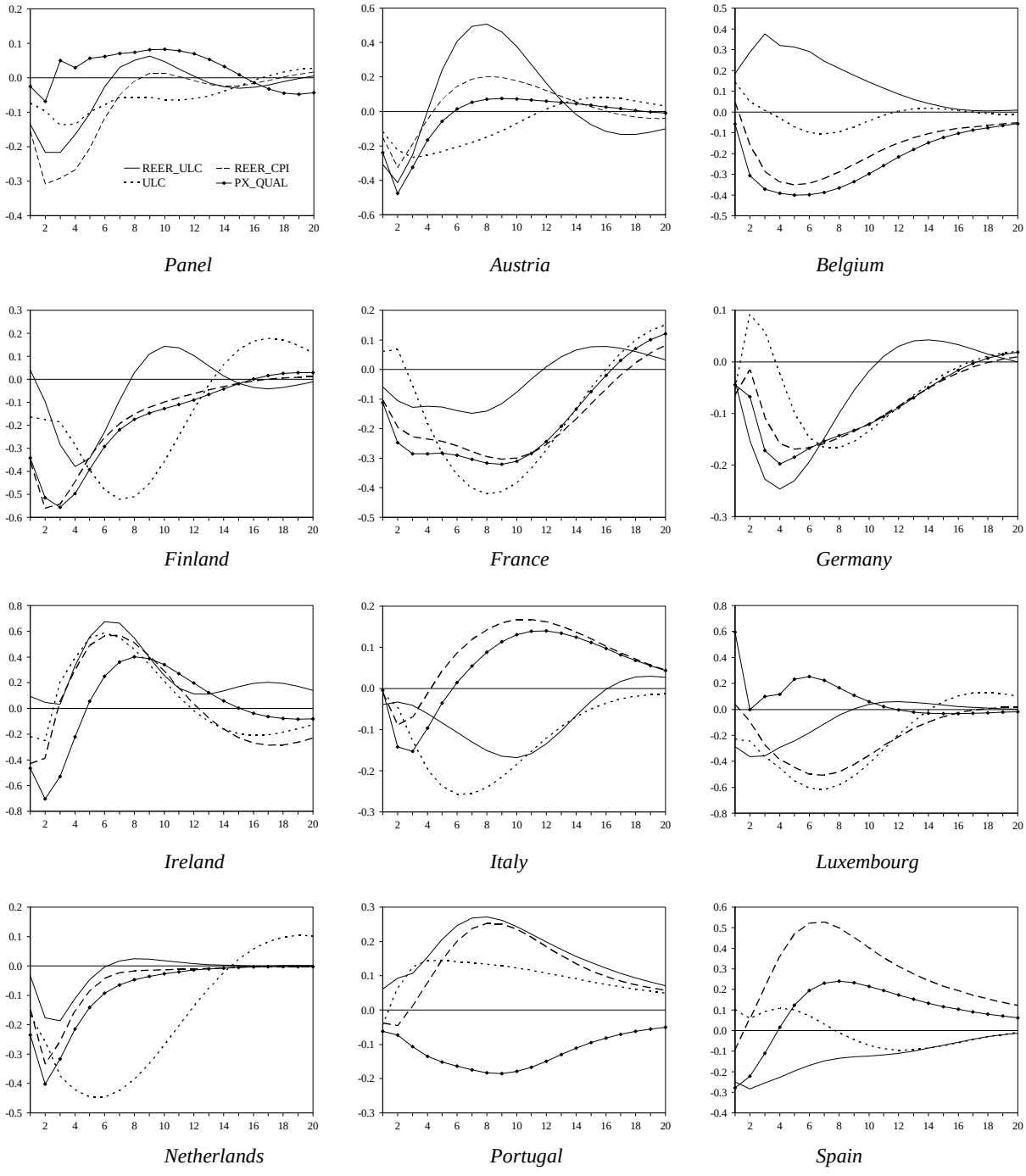
Note: A generalised shock of one standard deviation in the competitiveness variable.

Figure 2: Response of the output gap to a generalised competitiveness shock



Note: A generalised shock of one standard deviation in the competitiveness variable.

Figure 3: Response of credit to a generalised competitiveness shock



Note: A generalised shock of one standard deviation in the competitiveness variable.

Appendices

Appendix A.1: Response of the current account balance to a one-standard deviation impulse to the competitiveness variables

	Panel	Panel	Panel	Panel	AUT	AUT	AUT	AUT	BEL	BEL	BEL	BEL	FIN	FIN	FIN	FIN	FRA	FRA	FRA	FRA	DEU	DEU	DEU	DEU
Period	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL
1	-0.02	0.09	**-0.15**	0.06	**-0.21**	-0.10	-0.08	**-0.27**	-0.22	0.02	**-0.43**	0.03	-0.09	0.09	-0.19	-0.16	0.03	0.04	-0.08	0.07	-0.01	0.05	**-0.18**	0.03
2	**-0.12**	-0.04	**-0.12**	0.00	-0.04	-0.02	-0.13	-0.23	-0.03	-0.12	-0.22	-0.35	-0.05	-0.02	-0.03	-0.21	0.01	0.01	0.00	0.08	0.04	0.13	-0.17	0.09
3	-0.08	-0.03	-0.08	-0.01	-0.10	-0.09	-0.10	-0.17	-0.06	-0.11	-0.19	**0.47**	-0.18	-0.14	-0.15	-0.08	0.00	0.01	0.01	**0.10**	0.02	0.07	-0.06	0.08
4	0.06	0.00	0.09	0.00	-0.09	-0.08	-0.06	-0.08	-0.01	-0.06	-0.01	**0.52**	-0.18	-0.18	-0.03	-0.02	0.00	0.01	0.03	0.09	-0.02	0.00	0.00	0.06
5	**-0.08**	-0.04	-0.02	-0.04	-0.07	-0.07	-0.03	0.00	0.02	-0.01	0.11	**0.34**	-0.14	-0.16	0.02	-0.02	0.01	0.02	0.04	0.06	-0.04	-0.04	0.02	0.03
6	0.01	0.01	0.06	-0.02	-0.05	-0.06	-0.01	0.05	0.05	0.03	0.17	0.27	-0.10	-0.12	0.05	-0.02	0.02	0.03	0.05	0.03	-0.04	-0.05	0.03	0.00
7	0.00	0.03	0.03	-0.03	-0.03	-0.04	-0.01	0.07	0.05	0.05	**0.18**	0.06	-0.06	-0.07	0.06	-0.03	0.02	0.03	0.05	0.00	-0.04	-0.04	0.03	-0.01
8	-0.02	0.04	0.01	-0.03	-0.01	-0.02	-0.02	0.08	0.04	0.06	0.14	-0.12	-0.03	-0.03	0.06	-0.03	0.03	0.04	0.04	-0.01	-0.03	-0.03	0.02	-0.03
9	0.02	0.05	0.03	-0.03	0.01	-0.01	-0.02	0.07	0.01	0.05	0.08	-0.20	-0.02	0.00	0.04	-0.02	0.03	0.03	0.03	-0.02	-0.02	-0.02	0.02	-0.03
10	0.01	0.04	0.01	-0.02	0.02	0.00	-0.03	0.05	-0.01	0.03	0.02	-0.22	-0.01	0.01	0.02	-0.01	0.03	0.03	0.03	-0.02	-0.01	-0.01	0.01	-0.03
11	0.02	0.03	0.02	-0.01	0.02	0.01	-0.02	0.03	-0.02	0.01	-0.03	-0.18	-0.01	0.01	0.00	0.00	0.02	0.02	0.02	-0.02	0.00	0.00	0.01	-0.02
12	0.02	0.01	0.01	0.00	0.02	0.01	-0.02	0.01	-0.03	-0.01	-0.06	-0.10	0.00	0.01	-0.01	0.01	0.01	0.01	0.01	-0.01	0.00	0.01	0.00	-0.02
13	0.01	0.00	0.00	0.01	0.02	0.01	-0.01	-0.01	-0.03	-0.03	-0.07	-0.01	0.00	0.01	-0.02	0.01	0.01	0.00	0.00	-0.01	0.00	0.01	0.00	-0.01
14	0.01	-0.01	0.00	0.02	0.01	0.01	0.00	-0.02	-0.03	-0.03	-0.06	0.07	0.00	0.00	-0.03	0.01	0.00	0.00	-0.01	0.00	0.00	0.01	0.00	0.00
15	0.00	-0.01	0.00	0.02	0.01	0.01	0.01	-0.02	-0.02	-0.03	-0.04	0.11	0.00	0.00	-0.03	0.01	0.00	-0.01	-0.01	0.00	0.00	0.01	0.00	0.00
16	0.00	-0.01	-0.01	0.02	0.00	0.01	0.01	-0.02	-0.01	-0.02	-0.02	0.12	0.00	-0.01	-0.02	0.01	-0.01	-0.01	-0.02	0.00	0.00	0.01	0.00	0.01
17	0.00	-0.01	-0.01	0.01	0.00	0.00	0.01	-0.02	-0.01	-0.02	0.00	0.09	0.00	-0.01	-0.02	0.00	-0.01	-0.02	-0.02	0.00	0.00	0.00	0.00	0.01
18	-0.01	-0.01	-0.01	0.01	0.00	0.00	0.01	-0.02	0.00	-0.01	0.02	0.05	0.00	-0.01	-0.02	0.00	-0.01	-0.02	-0.02	0.00	0.00	0.00	0.00	0.01
19	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.01	-0.01	0.00	0.00	0.02	0.00	0.00	0.00	-0.01	0.00	-0.02	-0.02	-0.02	0.00	0.00	0.00	0.00	0.01
20	0.00	0.00	0.00	-0.01	0.00	0.00	0.01	-0.01	0.00	0.00	0.02	-0.04	0.00	0.00	0.00	0.00	-0.01	-0.02	-0.02	0.00	0.00	0.00	0.00	0.01

Note: **Bold numbers** indicate statistical significance at the 5% level

	IRL	IRL	IRL	IRL	ITA	ITA	ITA	ITA	LUX	LUX	LUX	LUX	NLD	NLD	NLD	NLD	PRT	PRT	PRT	PRT	ESP	ESP	ESP	ESP
period	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL
1	0.02	0.06	-0.20	0.26	0.09	0.03	0.11	0.10	-0.40	**0.87**	-0.38	0.67	**0.36**	0.11	**0.30**	-0.27	-0.02	0.11	-0.01	-0.02	-0.01	0.06	-0.11	-0.02
2	-0.06	-0.06	-0.02	-0.26	0.03	0.09	0.06	0.14	-0.76	**-1.27**	-0.23	0.96	-0.14	-0.10	-0.09	0.04	-0.05	0.16	-0.11	-0.06	**-0.22**	-0.09	-0.11	0.07
3	0.05	-0.07	0.08	-0.28	-0.03	0.01	0.07	0.11	0.13	0.02	-0.13	0.16	-0.05	-0.08	-0.01	-0.10	-0.19	0.05	-0.09	-0.31	**-0.26**	-0.14	-0.01	-0.01
4	0.06	0.00	0.06	-0.26	-0.05	-0.01	0.04	0.05	-0.11	0.10	-0.14	-0.20	-0.05	-0.04	0.08	-0.02	-0.22	0.03	-0.09	**-0.46**	**-0.22**	-0.14	0.07	-0.05
5	0.06	0.04	0.08	-0.24	-0.06	-0.03	0.02	0.00	0.04	0.18	0.01	-0.30	0.00	0.01	0.18	0.00	-0.22	0.04	-0.09	**-0.49**	-0.16	-0.12	0.13	-0.04
6	0.06	0.06	0.08	-0.16	-0.07	-0.05	0.01	-0.03	0.02	0.11	0.06	-0.29	0.03	0.04	**0.24**	0.04	-0.19	0.05	-0.08	-0.42	-0.12	-0.10	0.15	-0.01
7	0.05	0.07	0.07	-0.12	-0.08	-0.07	0.00	-0.04	0.05	0.05	0.13	-0.23	0.05	0.06	**0.28**	0.05	-0.16	0.05	-0.06	-0.31	-0.09	-0.09	0.16	0.02
8	0.05	0.07	0.07	-0.08	-0.08	-0.07	0.00	-0.04	0.05	0.01	0.15	-0.14	0.06	0.06	**0.29**	0.04	-0.12	0.04	-0.05	-0.18	-0.06	-0.07	0.14	0.04
9	0.04	0.07	0.05	-0.06	-0.07	-0.07	-0.01	-0.03	0.06	0.00	0.16	-0.06	0.06	0.06	**0.28**	0.03	-0.08	0.03	-0.04	-0.08	-0.05	-0.05	0.12	0.04
10	0.04	0.06	0.04	-0.05	-0.06	-0.06	0.00	-0.02	0.05	0.00	0.15	0.00	0.06	0.05	**0.25**	0.01	-0.05	0.02	-0.04	-0.01	-0.04	-0.04	0.09	0.04
11	0.03	0.05	0.03	-0.05	-0.05	-0.05	0.00	0.00	0.04	0.00	0.13	0.03	0.04	0.03	**0.21**	0.00	-0.04	0.01	-0.03	0.03	-0.03	-0.03	0.06	0.03
12	0.03	0.04	0.02	-0.05	-0.04	-0.04	0.00	0.00	0.04	0.00	0.10	0.04	0.03	0.02	0.17	-0.01	-0.02	0.01	-0.02	0.04	-0.02	-0.02	0.03	0.02
13	0.02	0.03	0.01	-0.04	-0.03	-0.03	0.01	0.01	0.03	0.00	0.07	0.03	0.02	0.01	0.12	-0.02	-0.02	0.01	-0.02	0.04	-0.01	-0.01	0.01	0.01
14	0.02	0.02	0.00	-0.04	-0.02	-0.02	0.01	0.01	0.02	0.00	0.04	0.02	0.01	0.00	0.08	-0.02	-0.01	0.01	-0.02	0.03	-0.01	0.00	-0.01	0.00
15	0.01	0.01	0.00	-0.03	-0.02	-0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.04	-0.01	-0.01	0.01	-0.01	0.03	-0.01	0.00	-0.02	-0.01
16	0.01	0.00	0.00	-0.02	-0.02	-0.01	0.01	0.01	0.01	0.00	-0.01	0.00	0.00	-0.01	0.00	-0.01	-0.01	0.01	-0.01	0.02	-0.01	0.00	-0.03	-0.01
17	0.01	0.00	-0.01	-0.02	-0.01	-0.01	0.01	0.01	0.00	0.00	-0.03	0.00	0.00	-0.01	-0.03	-0.01	-0.01	0.01	-0.01	0.01	0.00	0.00	-0.03	-0.01
18	0.00	0.00	-0.01	-0.01	-0.01	-0.01	0.01	0.01	0.00	0.00	-0.04	-0.01	-0.01	0.00	-0.05	0.00	-0.01	0.01	-0.01	0.01	0.00	0.00	-0.03	-0.01
19	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	0.01	0.01	0.00	0.00	-0.04	-0.01	-0.01	0.00	-0.06	0.00	-0.01	0.01	-0.01	0.01	0.00	0.00	-0.03	-0.01
20	0.00	-0.01	0.00	0.00	-0.01	-0.01	0.01	0.01	0.00	0.00	-0.04	0.00	0.00	0.00	-0.07	0.00	-0.01	0.01	-0.01	0.01	-0.01	0.00	-0.02	-0.01

Note: **Bold numbers** indicate statistical significance at the 5% level

Appendix A.2: Response of GDP to a one-standard deviation impulse to the competitiveness variables

	Panel	Panel	Panel	Panel	AUT	AUT	AUT	AUT	BEL	BEL	BEL	BEL	FIN	FIN	FIN	FIN	FRA	FRA	FRA	FRA	DEU	DEU	DEU	DEU
Period	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL
1	**-0.38**	**-0.11**	**-0.55**	-0.02	-0.03	0.00	**-0.28**	0.03	**-0.14**	**-0.09**	**-0.14**	-0.04	**-0.47**	**-0.30**	**-0.86**	**-0.29**	-0.07	-0.07	**-0.25**	-0.06	**-0.33**	**-0.16**	**-0.60**	0.03
2	**-0.25**	**-0.13**	**-0.38**	0.02	-0.04	-0.02	**-0.43**	0.08	**-0.19**	-0.13	**-0.28**	-0.04	**-0.52**	-0.32	**-0.97**	-0.29	-0.06	-0.08	**-0.27**	-0.12	**-0.31**	-0.11	**-0.74**	-0.01
3	**-0.27**	**-0.14**	**-0.41**	0.05	-0.02	-0.07	**-0.46**	0.20	-0.19	-0.16	**-0.33**	-0.01	**-0.46**	-0.33	**-0.90**	-0.15	-0.10	-0.13	**-0.28**	-0.15	-0.27	-0.12	**-0.68**	-0.09
4	**-0.27**	**-0.18**	**-0.40**	0.05	0.00	-0.09	**-0.39**	**0.35**	-0.16	-0.17	**-0.30**	0.03	-0.35	-0.33	**-0.74**	0.02	-0.13	**-0.17**	**-0.26**	-0.15	-0.26	-0.19	**-0.53**	-0.14
5	**-0.19**	**-0.20**	**-0.29**	0.09	0.04	-0.08	**-0.26**	**0.47**	-0.11	-0.16	**-0.21**	0.07	-0.26	-0.31	**-0.54**	0.17	-0.15	**-0.19**	**-0.24**	-0.11	-0.26	-0.25	**-0.37**	-0.16
6	**-0.14**	**-0.19**	**-0.21**	0.11	0.08	-0.05	-0.13	**0.52**	-0.06	-0.13	-0.10	0.10	-0.18	-0.27	-0.32	0.26	-0.16	-0.18	**-0.20**	-0.04	-0.24	-0.27	-0.23	-0.13
7	-0.09	**-0.17**	**-0.13**	0.12	0.11	-0.02	-0.02	**0.49**	-0.01	-0.08	0.00	0.09	-0.13	-0.21	-0.10	0.27	-0.14	-0.15	**-0.15**	0.02	-0.21	-0.25	-0.12	-0.08
8	-0.04	**-0.12**	-0.05	**0.12**	0.12	0.01	0.06	**0.39**	0.02	-0.04	0.07	0.06	-0.08	-0.15	0.08	0.21	-0.12	-0.11	-0.10	0.07	-0.16	-0.21	-0.04	-0.02
9	0.00	-0.07	0.01	0.10	0.11	0.04	0.11	0.25	0.04	0.00	0.11	0.01	-0.05	-0.08	0.21	0.13	-0.08	-0.07	-0.05	0.09	-0.11	-0.15	0.02	0.05
10	0.02	-0.02	0.05	0.06	0.09	0.06	0.12	0.10	0.04	0.03	0.11	-0.04	-0.02	-0.03	0.30	0.04	-0.05	-0.02	0.00	0.09	-0.07	-0.09	0.06	0.09
11	0.05	0.03	**0.09**	0.01	0.07	0.06	0.12	-0.03	0.04	0.04	0.09	-0.08	0.00	0.02	0.33	-0.03	-0.01	0.02	0.04	0.08	-0.03	-0.04	0.09	0.12
12	0.05	0.06	**0.10**	-0.03	0.03	0.06	0.10	-0.13	0.03	0.04	0.06	-0.10	0.01	0.05	0.33	-0.07	0.02	0.05	0.07	0.06	0.00	0.00	0.10	0.12
13	**0.05**	**0.08**	**0.10**	-0.07	0.00	0.04	0.08	-0.18	0.01	0.03	0.02	-0.09	0.02	0.06	0.29	-0.09	0.04	0.08	0.10	0.04	0.02	0.04	0.11	0.11
14	0.05	**0.08**	**0.09**	-0.09	-0.02	0.03	0.06	-0.19	0.00	0.02	-0.01	-0.07	0.02	0.06	0.23	-0.08	0.06	0.09	0.11	0.03	0.03	0.05	0.11	0.08
15	0.04	**0.08**	**0.07**	-0.09	-0.04	0.01	0.04	-0.18	0.00	0.01	-0.03	-0.04	0.02	0.06	0.17	-0.05	0.08	0.10	0.11	0.01	0.04	0.06	0.10	0.06
16	0.03	**0.06**	**0.05**	-0.08	-0.05	0.00	0.03	-0.15	-0.01	0.01	-0.04	0.00	0.02	0.05	0.09	-0.03	0.08	0.10	0.11	0.00	0.04	0.07	0.09	0.03
17	0.02	0.04	0.03	-0.06	-0.05	-0.01	0.01	-0.11	-0.01	0.00	-0.04	0.02	0.01	0.04	0.03	0.00	0.08	0.09	0.10	-0.01	0.04	0.06	0.07	0.00
18	0.01	0.02	0.01	-0.03	-0.05	-0.02	0.00	-0.08	0.00	0.00	-0.03	0.04	0.01	0.03	-0.03	0.01	0.08	0.08	0.09	-0.01	0.04	0.06	0.06	-0.02
19	0.00	0.01	0.00	0.01	-0.04	-0.02	-0.01	-0.04	0.00	0.00	-0.01	0.04	0.01	0.01	-0.07	0.02	0.07	0.07	0.07	-0.01	0.03	0.05	0.04	-0.03
20	-0.01	-0.01	-0.02	0.03	-0.02	-0.02	-0.02	-0.02	0.00	0.00	0.00	0.03	0.00	0.00	-0.09	0.02	0.05	0.05	0.05	-0.02	0.03	0.04	0.03	-0.03

Note: **Bold numbers** indicate statistical significance at the 5% level

country	IRL	IRL	IRL	IRL	ITA	ITA	ITA	ITA	LUX	LUX	LUX	LUX	NLD	NLD	NLD	NLD	PRT	PRT	PRT	PRT	ESP	ESP	ESP	ESP
period	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL
1	**-0.74**	-0.16	**-0.82**	0.16	**-0.14**	-0.06	**-0.20**	**-0.27**	**-1.12**	-0.02	**-1.23**	0.31	-0.08	-0.04	**-0.28**	-0.10	**-0.28**	**-0.25**	**-0.33**	**-0.19**	0.06	0.01	0.03	0.01
2	-0.33	-0.31	-0.28	0.29	-0.19	-0.14	**-0.24**	**-0.34**	**-0.47**	0.10	**-0.59**	0.27	-0.04	-0.06	**-0.39**	**-0.21**	-0.08	-0.14	**-0.23**	-0.15	**0.13**	0.04	0.06	0.04
3	**-0.52**	-0.39	**-0.60**	**0.65**	-0.22	-0.22	**-0.26**	-0.31	**-0.72**	0.11	**-0.89**	0.23	-0.06	-0.10	**-0.45**	-0.24	0.01	-0.13	-0.11	-0.10	0.13	0.04	0.00	0.04
4	**-0.40**	**-0.45**	**-0.43**	0.59	-0.19	-0.24	**-0.25**	-0.25	**-0.61**	-0.03	**-0.66**	0.21	-0.09	-0.12	**-0.45**	-0.22	0.06	-0.16	-0.04	-0.02	0.12	0.05	-0.07	0.02
5	-0.36	**-0.46**	-0.39	0.62	-0.14	-0.19	-0.22	-0.19	**-0.53**	-0.06	**-0.57**	0.14	-0.11	-0.12	**-0.41**	-0.15	0.09	-0.18	0.00	0.04	0.11	0.06	-0.12	0.00
6	-0.27	-0.42	-0.30	0.54	-0.08	-0.13	-0.17	-0.16	-0.40	-0.09	**-0.39**	0.08	-0.10	-0.10	**-0.35**	-0.08	0.09	-0.17	0.02	0.08	0.10	0.07	-0.15	-0.03
7	-0.20	-0.35	-0.22	0.42	-0.03	-0.07	-0.12	-0.13	-0.28	-0.10	-0.23	0.04	-0.09	-0.08	**-0.28**	-0.02	0.07	-0.14	0.03	0.10	0.10	0.07	-0.16	-0.05
8	-0.13	-0.28	-0.14	0.31	0.00	-0.02	-0.08	-0.11	-0.18	-0.09	-0.08	0.01	-0.07	-0.05	-0.20	0.03	0.06	-0.10	0.03	0.10	0.09	0.08	-0.15	-0.06
9	-0.07	-0.21	-0.07	0.19	0.02	0.01	-0.03	-0.08	-0.10	-0.09	0.04	0.00	-0.04	-0.03	-0.12	0.05	0.04	-0.06	0.03	0.09	0.08	0.07	-0.13	-0.06
10	-0.02	-0.14	-0.01	0.10	0.02	0.03	0.00	-0.04	-0.04	-0.08	0.13	0.00	-0.02	-0.01	-0.05	0.06	0.03	-0.03	0.03	0.07	0.07	0.06	-0.11	-0.06
11	0.01	-0.08	0.03	0.04	0.02	0.03	0.02	0.00	0.00	-0.07	0.18	0.00	-0.01	0.00	0.01	0.05	0.02	-0.01	0.02	0.05	0.06	0.05	-0.08	-0.05
12	0.04	-0.03	0.05	0.00	0.01	0.03	0.04	0.04	0.02	-0.06	0.21	0.01	0.01	0.01	0.06	0.04	0.02	-0.01	0.02	0.03	0.05	0.04	-0.05	-0.03
13	0.05	0.01	0.07	-0.01	0.00	0.02	0.05	0.06	0.04	-0.04	0.21	0.01	0.01	0.01	0.10	0.02	0.02	-0.01	0.02	0.02	0.04	0.02	-0.03	-0.02
14	0.06	0.03	0.07	-0.01	0.00	0.01	0.05	0.08	0.04	-0.04	0.18	0.01	0.01	0.01	0.12	0.01	0.02	-0.01	0.02	0.01	0.03	0.02	-0.01	-0.01
15	0.06	0.04	0.07	0.00	-0.01	0.00	0.05	0.08	0.04	-0.03	0.15	0.01	0.01	0.01	0.13	0.00	0.02	-0.01	0.01	0.01	0.02	0.01	0.01	0.00
16	0.05	0.05	0.06	0.02	-0.02	-0.01	0.04	0.07	0.03	-0.02	0.10	0.01	0.01	0.01	0.13	-0.01	0.02	-0.01	0.01	0.00	0.02	0.01	0.02	0.00
17	0.04	0.05	0.04	0.02	-0.02	-0.01	0.03	0.05	0.03	-0.01	0.06	0.00	0.01	0.00	0.12	-0.01	0.02	-0.01	0.01	0.00	0.01	0.01	0.02	0.01
18	0.03	0.04	0.03	0.03	-0.02	-0.02	0.03	0.03	0.02	-0.01	0.02	0.00	0.01	0.00	0.11	-0.01	0.01	-0.01	0.01	0.00	0.01	0.00	0.03	0.01
19	0.02	0.04	0.02	0.03	-0.02	-0.02	0.02	0.01	0.02	-0.01	-0.01	0.00	0.00	0.00	0.09	-0.01	0.01	-0.01	0.01	0.00	0.01	0.01	0.03	0.01
20	0.01	0.03	0.00	0.02	-0.02	-0.02	0.01	0.00	0.01	0.00	-0.04	0.00	0.00	0.00	0.07	0.00	0.01	-0.01	0.01	0.00	0.01	0.01	0.02	0.01

Note: **Bold numbers** indicate statistical significance at the 5% level

Appendix A.3: Response of credit to a one-standard deviation impulse to the competitiveness variables

	Panel	Panel	Panel	Panel	AUT	AUT	AUT	AUT	BEL	BEL	BEL	BEL	FIN	FIN	FIN	FIN	FRA	FRA	FRA	FRA	DEU	DEU	DEU	DEU
Period	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL
1	**-0.13**	**-0.15**	-0.07	-0.02	-0.15	**-0.24**	-0.12	**-0.31**	0.04	-0.06	0.14	0.18	**-0.36**	**-0.34**	-0.16	0.04	-0.10	-0.11	0.06	-0.06	-0.06	-0.04	-0.05	-0.04
2	**-0.22**	**-0.31**	-0.10	-0.07	**-0.33**	**-0.48**	-0.23	**-0.41**	-0.16	**-0.31**	0.05	0.29	**-0.56**	**-0.51**	-0.18	-0.10	**-0.20**	**-0.25**	0.07	-0.11	-0.02	-0.07	0.09	-0.15
3	**-0.22**	**-0.29**	-0.14	0.05	-0.19	**-0.32**	-0.27	-0.25	-0.29	**-0.37**	0.01	0.37	**-0.54**	**-0.56**	-0.19	-0.28	**-0.23**	**-0.29**	-0.06	-0.13	-0.11	-0.17	0.06	**-0.23**
4	-0.16	**-0.27**	-0.13	0.03	-0.05	-0.17	-0.26	0.00	-0.34	**-0.39**	-0.03	0.32	-0.45	-0.50	-0.29	-0.38	-0.24	**-0.28**	-0.18	-0.12	-0.16	**-0.20**	-0.02	-0.25
5	-0.10	**-0.20**	-0.10	0.06	0.07	-0.06	-0.23	0.24	-0.35	**-0.40**	-0.07	0.31	-0.34	-0.39	-0.39	-0.34	-0.24	-0.28	**-0.28**	-0.13	-0.17	-0.18	-0.10	-0.23
6	-0.02	-0.12	-0.08	0.06	0.14	0.01	-0.21	0.41	-0.34	-0.40	-0.10	0.29	-0.25	-0.29	-0.48	-0.23	-0.26	-0.29	**-0.36**	-0.14	-0.17	-0.17	-0.15	-0.19
7	0.03	-0.05	-0.06	0.07	0.19	0.05	-0.18	**0.49**	-0.32	-0.39	-0.11	0.24	-0.19	-0.22	**-0.52**	-0.09	-0.28	-0.30	**-0.40**	-0.15	-0.16	-0.15	-0.17	-0.15
8	0.05	-0.01	-0.06	0.07	0.20	0.07	-0.15	**0.51**	-0.29	-0.37	-0.10	0.21	-0.15	-0.17	**-0.51**	0.03	-0.30	-0.32	**-0.42**	-0.14	-0.15	-0.14	-0.17	-0.10
9	0.06	0.01	-0.06	0.08	0.20	0.07	-0.11	0.46	-0.25	-0.34	-0.07	0.18	-0.12	-0.15	-0.45	0.11	-0.30	-0.32	**-0.41**	-0.12	-0.14	-0.13	-0.15	-0.05
10	0.05	0.01	-0.06	0.08	0.18	0.07	-0.07	0.38	-0.22	-0.30	-0.04	0.14	-0.10	-0.13	-0.36	0.14	-0.30	-0.31	**-0.38**	-0.08	-0.12	-0.12	-0.13	-0.02
11	0.03	0.00	-0.07	0.08	0.15	0.07	-0.03	0.27	-0.18	-0.26	-0.02	0.11	-0.08	-0.11	-0.25	0.14	-0.28	-0.28	**-0.33**	-0.03	-0.10	-0.11	-0.11	0.01
12	0.00	-0.01	-0.06	0.07	0.12	0.06	0.01	0.16	-0.15	-0.22	0.00	0.09	-0.06	-0.09	-0.13	0.10	-0.25	-0.24	-0.27	0.01	-0.09	-0.09	-0.09	0.03
13	-0.02	-0.02	-0.05	0.05	0.09	0.05	0.04	0.06	-0.13	-0.18	0.01	0.06	-0.05	-0.07	-0.02	0.06	-0.21	-0.19	-0.20	0.04	-0.07	-0.07	-0.06	0.04
14	-0.03	-0.02	-0.04	0.03	0.06	0.04	0.07	-0.02	-0.11	-0.15	0.02	0.04	-0.03	-0.04	0.06	0.01	-0.17	-0.13	-0.13	0.07	-0.05	-0.05	-0.04	0.04
15	-0.03	-0.02	-0.02	0.01	0.03	0.04	0.08	-0.08	-0.09	-0.12	0.01	0.02	-0.02	-0.02	0.13	-0.02	-0.12	-0.08	-0.06	0.08	-0.04	-0.03	-0.03	0.04
16	-0.03	-0.02	-0.01	-0.01	0.00	0.03	0.08	-0.12	-0.08	-0.10	0.01	0.01	-0.01	0.00	0.16	-0.04	-0.07	-0.02	0.00	0.08	-0.02	-0.02	-0.01	0.03
17	-0.02	-0.01	0.01	-0.03	-0.02	0.02	0.07	-0.13	-0.07	-0.09	0.00	0.01	0.00	0.02	0.18	-0.04	-0.02	0.03	0.06	0.07	-0.01	0.00	0.00	0.02
18	-0.01	0.00	0.02	-0.04	-0.03	0.01	0.06	-0.13	-0.07	-0.08	-0.01	0.00	0.00	0.03	0.17	-0.04	0.02	0.07	0.10	0.06	0.00	0.01	0.01	0.02
19	0.00	0.01	0.02	-0.05	-0.04	0.00	0.05	-0.12	-0.06	-0.07	-0.01	0.01	0.01	0.03	0.15	-0.02	0.06	0.10	0.13	0.05	0.00	0.01	0.02	0.01
20	0.01	0.02	0.03	-0.04	-0.04	-0.01	0.03	-0.10	-0.05	-0.06	-0.01	0.01	0.01	0.03	0.11	-0.01	0.08	0.12	0.15	0.03	0.01	0.02	0.02	0.00

Note: **Bold numbers** indicate statistical significance at the 5% level

	IRL	IRL	IRL	IRL	ITA	ITA	ITA	ITA	LUX	LUX	LUX	LUX	NLD	NLD	NLD	NLD	PRT	PRT	PRT	PRT	ESP	ESP	ESP	ESP
Period	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL	REER_ULC	REER_CPI	ULC	PX_QUAL
1	-0.43	**-0.46**	-0.22	0.09	-0.01	0.00	-0.01	-0.04	0.04	0.60	-0.23	-0.29	-0.15	**-0.24**	-0.17	-0.03	-0.04	-0.06	-0.04	0.06	-0.10	**-0.28**	0.10	**-0.25**
2	-0.39	**-0.70**	-0.25	0.05	-0.09	-0.14	-0.05	-0.03	-0.09	0.00	-0.25	-0.37	**-0.33**	**-0.40**	-0.26	-0.18	-0.05	-0.07	0.06	0.09	0.06	-0.22	0.06	-0.28
3	0.05	-0.53	0.20	0.03	-0.07	-0.15	-0.13	-0.04	-0.27	0.10	-0.37	-0.36	-0.26	-0.32	**-0.37**	-0.19	0.01	-0.11	0.12	0.11	0.21	-0.11	0.09	-0.25
4	0.30	-0.22	0.39	0.33	-0.01	-0.10	-0.20	-0.06	-0.39	0.12	-0.45	-0.29	-0.15	-0.22	**-0.42**	-0.11	0.08	-0.13	0.14	0.15	0.36	0.02	0.11	-0.23
5	0.49	0.06	0.55	0.55	0.04	-0.04	-0.24	-0.08	-0.45	0.23	-0.55	-0.24	-0.08	-0.14	**-0.45**	-0.05	0.15	-0.15	0.14	0.21	0.47	0.12	0.10	-0.20
6	0.56	0.25	0.58	0.67	0.09	0.01	-0.26	-0.11	-0.50	0.25	-0.61	-0.18	-0.04	-0.09	**-0.45**	0.00	0.20	-0.16	0.14	0.25	0.52	0.19	0.07	-0.17
7	0.57	0.36	0.55	0.66	0.12	0.05	-0.26	-0.13	-0.51	0.22	-0.62	-0.11	-0.02	-0.06	**-0.43**	0.02	0.24	-0.17	0.14	0.27	0.53	0.23	0.03	-0.15
8	0.51	0.40	0.46	0.55	0.14	0.09	-0.24	-0.15	-0.48	0.17	-0.59	-0.05	-0.02	-0.05	**-0.39**	0.02	0.25	-0.18	0.13	0.27	0.50	0.24	-0.01	-0.13
9	0.41	0.39	0.34	0.40	0.16	0.11	-0.22	-0.16	-0.43	0.11	-0.51	0.01	-0.02	-0.03	-0.33	0.02	0.25	-0.19	0.13	0.26	0.45	0.23	-0.05	-0.13
10	0.29	0.34	0.21	0.26	0.17	0.13	-0.18	-0.17	-0.36	0.06	-0.42	0.04	-0.01	-0.03	-0.27	0.02	0.24	-0.18	0.12	0.24	0.40	0.22	-0.07	-0.12
11	0.16	0.27	0.09	0.16	0.17	0.14	-0.15	-0.16	-0.28	0.02	-0.31	0.06	-0.01	-0.02	-0.20	0.01	0.21	-0.17	0.12	0.22	0.35	0.19	-0.09	-0.12
12	0.04	0.20	-0.02	0.11	0.16	0.14	-0.12	-0.13	-0.21	-0.01	-0.20	0.06	-0.01	-0.01	-0.14	0.01	0.18	-0.15	0.11	0.20	0.31	0.17	-0.10	-0.11
13	-0.07	0.12	-0.10	0.11	0.15	0.13	-0.09	-0.10	-0.15	-0.02	-0.09	0.05	-0.01	-0.01	-0.08	0.00	0.16	-0.13	0.10	0.18	0.27	0.15	-0.09	-0.10
14	-0.16	0.06	-0.16	0.14	0.14	0.12	-0.07	-0.07	-0.10	-0.03	-0.01	0.04	-0.01	-0.01	-0.02	0.00	0.13	-0.11	0.09	0.16	0.24	0.13	-0.09	-0.09
15	-0.23	0.00	-0.20	0.17	0.12	0.11	-0.05	-0.03	-0.06	-0.03	0.06	0.03	-0.01	0.00	0.02	0.00	0.11	-0.10	0.08	0.14	0.22	0.12	-0.07	-0.07
16	-0.27	-0.04	-0.21	0.20	0.10	0.10	-0.04	0.00	-0.03	-0.03	0.10	0.02	0.00	0.00	0.06	0.00	0.10	-0.08	0.07	0.12	0.19	0.10	-0.06	-0.06
17	-0.29	-0.06	-0.21	0.20	0.09	0.08	-0.03	0.02	-0.01	-0.03	0.12	0.01	0.00	0.00	0.08	0.00	0.08	-0.07	0.07	0.11	0.17	0.09	-0.05	-0.04
18	-0.28	-0.08	-0.19	0.20	0.07	0.07	-0.02	0.03	0.00	-0.03	0.13	0.01	0.00	0.00	0.10	0.00	0.07	-0.06	0.06	0.09	0.15	0.08	-0.03	-0.03
19	-0.26	-0.08	-0.16	0.17	0.06	0.06	-0.02	0.03	0.01	-0.02	0.12	0.00	0.00	0.00	0.10	0.00	0.06	-0.06	0.05	0.08	0.14	0.07	-0.02	-0.02
20	-0.23	-0.08	-0.13	0.14	0.04	0.04	-0.01	0.03	0.02	-0.02	0.10	0.00	0.00	0.00	0.10	0.00	0.06	-0.05	0.05	0.07	0.12	0.06	-0.01	-0.01

Note: **Bold numbers** indicate statistical significance at the 5% level

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