Price competitiveness in individual euro area countries: developments, drivers and the influence of labour market reforms

Price competitiveness in the euro area countries has changed significantly since the introduction of the euro. In general, competitiveness vis-à-vis a broad group of countries has improved on balance over the past decade. This is mainly due to the nominal effective depreciation of the euro. However, within the monetary union itself, exchange rate movements are inconsequential. Over the past ten years, Greece, Ireland and Spain, in particular, have gained in price competitiveness due to relatively low inflation. By contrast, Germany's price competitiveness compared with its trading partners in the common currency area slipped slightly in this period.

If relative price levels in individual euro area countries are analysed on the basis of absolute purchasing power parity theory, then, after a longer period of convergence, the differences between them became much more pronounced again starting in 2011. However, the price level typically also depends on the prosperity of the economy observed – as measured, for instance, by productivity level. Thus, if – in order to account for potential Balassa-Samuelson effects – the relative productivity levels of the individual countries are additionally taken into consideration, the dispersion of price competitiveness has barely moved. Price level developments in some countries appear to have contributed to reducing imbalanced competitive positions. This is especially true of Greece, where pressure to adjust the price level and implement structural reforms was high in this period due to the profound economic crisis.

This article contains a cross-country empirical analysis examining the extent to which reform measures have an actual impact on price competitiveness. Use is made, above all, of an employment protection indicator to model labour market reforms. The results suggest that relaxing employment protection legislation promotes competitiveness.

Development of price competitiveness in individual euro area countries

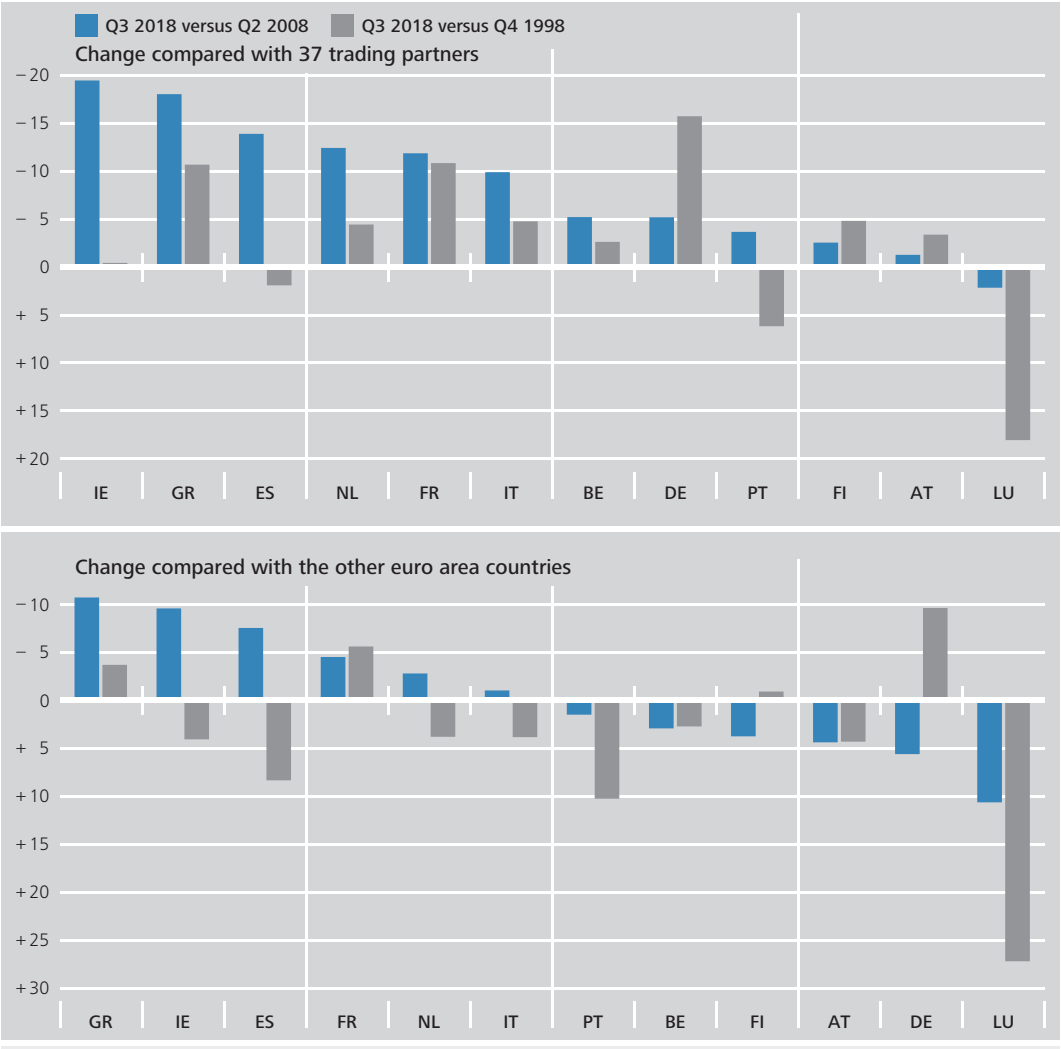
Euro depreciation from 2010 to 2015 propped up euro area price competitiveness

Since the outbreak of the global financial and economic crisis, the euro has depreciated against a number of currencies in several bursts, the most pronounced being in the period from 2010 to 2015. Despite its recovery in mid-2015, at the end of 2018 the euro was around 12% weaker in effective terms compared with the currencies of 19 major trading partners than the average of the second quarter of 2008. This is an appropriate point at which to make comparisons as it was then that the real estate crisis in the United States grew into a global financial crisis (hereinafter referred to as "the start of the crisis"). The euro's depreciation had a considerable impact on the price competitiveness of euro area suppliers. Real effective exchange rates, which take into account not only weighted nominal exchange rate movements vis-à-vis the currencies of major trading partners but also the relevant inflation rates, are often used as an indicator of price competitiveness.[1] As measured by the real effective euro exchange rate based on deflators

1 The indicators of price competitiveness referred to in this article are described in the box on pp. 33 ff.

Change in price competitiveness*

%[1]



Source: ECB. * Harmonised indicator of price competitiveness based on deflators of GDP. **1** Inverted scale: a negative value denotes an increase in price competitiveness.

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Real effective exchange rates, price competitiveness indicators and concepts for their assessment

The nominal effective exchange rate ($NEER$) is a trade-weighted average of a given currency's bilateral nominal exchange rates,

$$NEER_{t,i} = \prod_{j=1}^{N} (S_{t,j,i})^{w_{ij}},$$

where $S_{t,j,i}$ denotes the bilateral nominal exchange rate of the currency in country i against the currency in partner country j at time t and w_{ij} represents the trade weight of country j for country i. An increase in S is usually defined as a nominal appreciation of the domestic currency or the base country's currency. If, for example, the euro area is considered base country i, an increase in the euro's nominal effective exchange rate ($NEER_{t,euro}$) denotes nominal effective euro appreciation, i.e. nominal appreciation of the euro on a trade-weighted average.

Adjusting the calculation by the ratio of the domestic price level to the foreign price level (shown here as $P_{t,i}$ and $P_{t,j}$) yields the real effective exchange rate ($REER$):

$$REER_t = \prod_{j=1}^{N} (P_{t,i} S_{t,j,i} / P_{t,j})^{w_{ij}}.$$

While the nominal effective exchange rate is the exchange rate of the domestic currency vis-à-vis a trade-weighted average of foreign currencies, the real effective exchange rate represents the value of a fixed basket of goods in the domestic country relative to its average value abroad.

The real effective exchange rate is often used as an indicator of price competitiveness. Real appreciation, i.e. an increase in the $REER$, occurs in two instances: when the domestic currency appreciates against trading partners' currencies in nominal terms or when domestic price levels rise at a faster rate or fall at a slower rate than the average of trading partners' price levels. In both cases, the relative price of the basket of goods at home and abroad becomes more expensive. This means that the price competitiveness of domestic providers deteriorates when real appreciation occurs. The real exchange rates of individual euro area countries calculated by the European Central Bank and the Bundesbank following a common methodology are known as harmonised competitiveness indicators (HCIs).[1]

Applying this methodology, alternative real exchange rates can be calculated for a given base country – these differ primarily in terms of which and how many trading partners are taken into account in the calculation (N) and which deflator or price level is included (P_i and P_j).[2] First, this article makes reference to the nominal and real effective exchange rates of the euro against the currencies of 19 trading partners.[3] Here, the real effective exchange rate of the euro uses GDP deflators for P_i and P_j. These deflators were selected because analytical results suggest that real exports

1 See M. Schmitz, M. De Clercq, M. Fidora, B. Lauro and C. Pinheiro (2012), Revisiting the effective exchange rates of the euro, ECB Occasional Paper No 134. In particular, the methodology for calculating the trade weights w_{ij} is also explained here. The aforementioned methodology is used by the ECB and the Bundesbank to calculate not only the HCIs but also the effective exchange rates of the euro.
2 Price levels are often measured by means of indices. Unit labour cost indices may be used instead of price indices to calculate real effective exchange rates. For the sake of simplicity, these are also referred to as indicators of price competitiveness.
3 These effective exchange rates are also presented in Table XII. 12. of the Statistical Section of this Monthly Report, which also provides information on the composition of the group of countries.

of goods and services can be explained relatively reliably using indicators of price competitiveness based on broadly defined aggregates.[4]

Moving from the real effective exchange rate of the euro, which, by necessity, covers trading partners outside the euro area only, to an indicator of the price competitiveness for an individual euro area country, it is necessary to take account of trading partners within the euro area as well. For example, the indicator of price competitiveness vis-à-vis 37 trading partners covers the above-mentioned 19 trading partners outside the euro area and all 18 trading partners within it.

In some cases, it makes sense for euro area countries to consider an indicator of price competitiveness that is not influenced by nominal exchange rates. The indicator of price competitiveness calculated solely vis-à-vis the other 18 trading partners in the euro area bears this hallmark. Since, by definition, all euro area countries use the euro as their currency, the nominal exchange rate (for the period since euro adoption) can be expressed in the aforementioned equations as $S_{t,j,i} = 1$. Changes in the indicator are then determined exclusively by inflation rate differentials.

Econometric analyses tend to benefit from large sample sizes. If opting for a panel of price competitiveness indicators, these can be obtained by means of sets of indicators going far back into the past or by taking into account sets of indicators for a large number of countries. In the first case, this article uses indicators of price competitiveness for individual euro area countries vis-à-vis 19 industrial countries. The trading partners here are the 11 founding countries of the euro area, Greece and eight other traditional industrial countries (Canada, Denmark, Japan, Norway, Sweden, Switzerland, the United Kingdom and the United States).[5] These indicators are available for all of the countries specified on the basis of several broad deflator concepts, e.g. GDP deflators, deflators of total sales and unit labour costs in the total economy. There are particularly long time series available, stretching back to 1972, if using deflators of total sales. However, these are normally only used to analyse price competitiveness for the period from 1975 onwards due to the turbulence caused by the shift from the Bretton Woods system of fixed exchange rates to floating exchange rates.

Indicators of price competitiveness vis-à-vis 56 trading partners are available for all 19 euro area countries as well as for 38 other countries, but only on the basis of consumer price indices.[6] Given the broad coverage of trading partners, these indicators have the advantage of being particularly representative in this respect. However, the heterogeneity of the countries means that, when looking at price increases in developing countries and emerging market economies, it is not possible to clearly distinguish between catch-up processes and declining competitiveness.

Lastly, this article also makes mention of real effective exchange rates where the ratio $P_{t,i}/P_{t,j}$ is captured by relative price

4 See Deutsche Bundesbank, The impact of alternative indicators of price competitiveness on real exports of goods and services, Monthly Report, January 2016, pp. 13-29.
5 Unlike the aforementioned series, these series do not constitute harmonised competitiveness indicators, which are only available for shorter periods.
6 A list of the 38 countries mentioned can also be found in Table XII. 12. of the Statistical Section of this Monthly Report in the context of the effective exchange rates of the euro presented in the "EER-38" column. See also Schmitz et al. (2012), op. cit.

levels rather than price indices.[7] In a monetary union where nominal exchange rates play no role, it is therefore possible to speak of effective relative price levels for corresponding effective real exchange rates. Contrary to indicators based on price indices, these allow assertions to be made about the effective relative price level at a given point in time without the need for a reference period.

In order to assess whether the value of the price competitiveness indicator at a given point in time is favourable or rather unfavourable, this indicator value must be compared with an economically justified benchmark. To this end, three simple approaches are commonly used.[8] Relative purchasing power parity theory implies that the benchmark should be a long-term average for the indicator series over time. If the current real value of the currency is higher than the long-term average, this can be interpreted as unfavourable price competitiveness on the part of the country or currency area in question. This approach is particularly well suited for indicators of price competitiveness that are calculated using price or cost indices and cover countries at a similar level of development.

By contrast, the other two approaches cannot be applied to such index-based real effective exchange rates; instead, they require indicators to be calculated by means of relative price levels. Due to their superior comparability across different countries, however, these approaches are more suited to examining corresponding measures of dispersion. In the case of absolute purchasing power parity theory, the benchmark corresponds to a situation in which the price of a given basket of goods – calculated in a single currency – is the same at home and on a trade-weighted average of trading partners. While deviations from such a benchmark allow conclusions to be drawn about price level comparisons, they are, at best, suited as an approach to assessing price competitiveness over the very long term.

A more targeted measure of price competitiveness adjusts relative price levels beforehand for the relative productivity levels of the countries under review. This is achieved, for example, by regressing relative price levels on relative productivity levels, the estimated residuals of which are used in the equation for the real effective exchange rate.[9] If such a relative price level adjusted for relative productivity corresponds to the weighted average of a country's trading partners, this yields the benchmark in accordance with the productivity approach. In the present article, this measure is taken as the basis for calculating the dispersion of price competitiveness in the euro area.

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7 Apart from nominal exchange rates, relative price level calculations employ what are known as purchasing power parities, which are published, inter alia, by the World Bank (see the World Development Indicators database) and are ultimately based on data from the International Comparison Program.

8 See Deutsche Bundesbank, Macroeconomic approaches to assessing price competitiveness, Monthly Report, October 2013, pp. 31-45, or Deutsche Bundesbank, Purchasing power parity theory as a concept for evaluating price competitiveness, Monthly Report, June 2004, pp. 29-42.

9 See also, particularly with respect to the issue of how to deal with possible fixed effects in a corresponding panel estimate: C. Fischer and O. Hossfeld (2014), A consistent set of multilateral productivity approach-based indicators of price competitiveness – Results for Pacific Rim economies, Journal of International Money and Finance, Vol. 49, pp. 152-169.

of GDP against the currencies of 19 trading partners, price competitiveness in the euro area improved by 17½% between the second quarter of 2008 and the end of 2018.

Development of price competitiveness since Q2 2008 in Germany, …

When looking at the competitive positions of individual euro area countries, it is essential to consider the relative price movements within the monetary union, too. Indicators of competitiveness vis-à-vis 37 trading partners, for instance, include 19 partner countries outside the euro area and all trading partners within it.[2] As measured by the harmonised competitiveness indicator based on deflators of GDP, Germany's price competitiveness has improved by 5% on balance since the start of the crisis.[3] The nominal depreciation of the euro outlined above played a major part in this development. By contrast, within the euro area, individual countries' price competitiveness hinges solely on their relative price and cost developments; euro exchange rate movements have no direct impact. For instance, in the same period and compared with its euro area trading partners – rather than the broader group of countries – Germany's price competitiveness deteriorated by 5½%.

… in the other founding members of the monetary union and in Greece

If the analysis is extended to include other euro area countries, it is not just Germany, but also Luxembourg, Austria, Finland and Belgium, for instance, that have suffered a loss in price competitiveness since the second quarter of 2008 in comparison with the other countries belonging to the common currency area.[4] At the other end of the spectrum are, first and foremost, Greece, Ireland, Spain, France and the Netherlands, where price competitiveness within the euro area has improved since the outbreak of the global financial and economic crisis thanks to lower rates of inflation. Using the indicators vis-à-vis 37 euro area and non-euro area trading partners, all founding members of the monetary union – with the exception of Luxembourg – plus Greece have gained in price competitiveness since the start of the crisis due to the nominal effective depreciation of the euro outlined above. However, the gains for the latter five countries cited were particularly pronounced, reaching double digits; the results ranged between 19½% in Ireland and 12% in France.

Dispersion of price competitiveness in the euro area

Benchmark necessary for an assessment

Rates of change in the indicators of price competitiveness show, based on certain assumptions, whether a country has become more or less competitive over the period of observation. However, they do not provide any indication of how the competitive position is to be evaluated independent of changes over time. Price competitiveness can only be assessed in relation to a benchmark that is derived on the basis of economic considerations.[5] Without such a benchmark, it is impossible to assess whether shifts in price competitiveness show convergence or divergence. If a benchmark is constant, convergence may be brought about by member states of a monetary union aligning their prices and wages. One of the aims behind setting up the euro area was the hope that using a common currency would promote price level convergence.[6] By contrast, if the benchmark varies over time, it is possible that sustained changes in the indicator value represent an equilibrium process.

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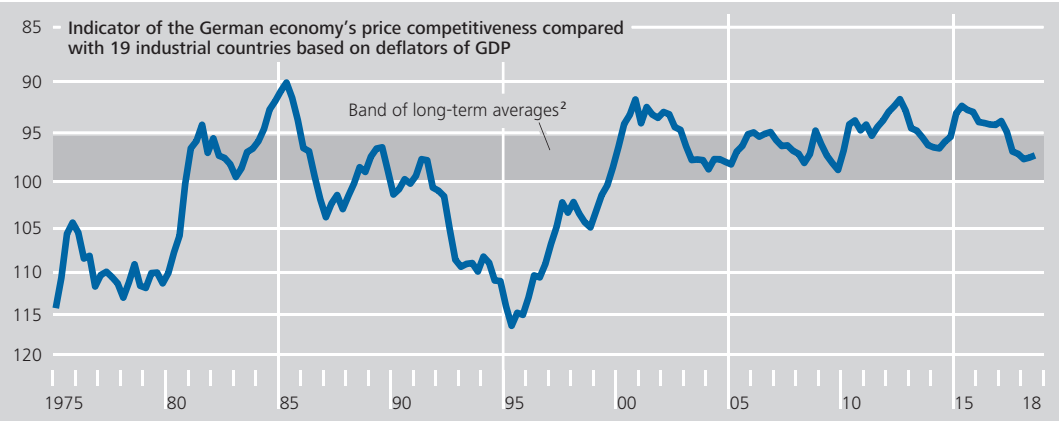
2 See Table XII.12. in the Statistical Section of this Monthly Report, which provides information about the composition of the group of countries.
3 Harmonised competitiveness indicators based on deflators of GDP are available up to the third quarter of 2018. The percentage changes cited here are therefore based on the period from the second quarter of 2008 to the third quarter of 2018. For information on harmonised competitiveness indicators, see ECB, The introduction of harmonised competitiveness indicators for euro area countries, Monthly Bulletin, February 2007, pp. 53-55.
4 The analysis here and in the remainder of the article focuses on the founding members of the monetary union and Greece.
5 For further information, see Deutsche Bundesbank, Macroeconomic approaches to assessing price competitiveness, Monthly Report, October 2013, pp. 31-45.
6 See, for example, European Commission (1990), One market, one money: an evaluation of the potential benefits and costs of forming an economic and monetary union, European Economy, Vol. 44, p. 19, or ECB, Price level convergence and competition in the euro area, Monthly Bulletin, August 2002, pp. 39-49.

German economy's price competitiveness

Average since 1975 = 100, log scale[1]



1 Inverted scale: a rise in the curve (fall in values) denotes an increase in competitiveness. **2** Comprises the averages that were derived successively across all periods starting with the period from Q1 1975 to Q3 2018 up to the period from Q1 2003 to Q3 2018.

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Relative purchasing power parity implies stationary competitiveness indicators

One possible benchmark for indicators of price competitiveness that are based on price or cost indices is their long-term average. Such a benchmark can be derived from relative purchasing power parity theory. According to this theory, inflation differentials between two currency areas are offset by opposing movements of the bilateral nominal exchange rate, ensuring that purchasing power parity at home and abroad remains constant over the long term. Within a monetary union, for instance, relative purchasing power parity theory implies that inflation differentials do not cause permanent shifts in price levels across member states but rather that these are reduced over time. Under these circumstances, the indicator of price competitiveness has to – technically speaking – be stationary as a time series to enable its expected value and thus the benchmark derived using relative purchasing power parity theory to be modelled over the long-term average.

Germany's price competitiveness compared to the long-term average …

Harmonised competitiveness indicators based on deflators of GDP are available for euro area countries as of the first quarter of 1995. As measured by its long-term average, which has been calculated over the period since this date, Germany's current level of price competitiveness vis-à-vis 37 trading partners may be seen as favourable. However, such an assessment may depend, inter alia, on the group of trading partners and the period used to derive the average. For the German economy, values for the indicators of price competitiveness have been recorded since the early 1970s – but solely vis-à-vis 19 industrial countries, not the 37 trading partners.[7] This smaller group of countries comprises 11 euro area trading partners plus Canada, Denmark, Japan, Norway, Sweden, Switzerland, the United Kingdom and the United States. As measured by the indicator of price competitiveness based on deflators of GDP vis-à-vis these 19 industrial countries, Germany's price competitiveness compared to the long-term average since 1975 currently tends to be classed as neutral. The difference here is mainly down to the smaller group of trading partners.

… and the period used to derive the average

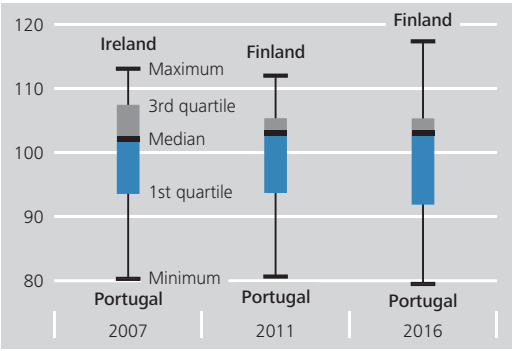
To determine the impact of the period used to derive the average on estimated competitiveness, the current indicator value is compared with an average calculated using a reference period that is shortened successively.[8] It tran-

… may depend on both the group of trading partners …

7 This group of Germany's 19 trading partners here, which comprises both euro area and non-euro area countries, is not to be confused with the euro area's group of 19 trading partners mentioned at the start of the article which, by definition, are all non-euro area countries. See the box on pp. 33 ff.

8 See Deutsche Bundesbank, Purchasing power parity theory as a concept for evaluating price competitiveness, Monthly Report, June 2004, pp. 29-42, in which a similar calculation was made and the maximum difference was much lower than here.

Dispersion of the effective relative price levels in the euro area*



* An effective relative price level of 100 implies that the price level in the country observed equals the weighted average of the price levels in the other 11 euro area countries included in the analysis.

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spires that the long-term average for 1975 onwards yields a particularly favourable assessment of Germany's current competitiveness on account of the price and exchange rate pattern in the second half of the 1970s being unfavourable for Germany. If the values from the 1970s, and later also those from the 1990s, are no longer included in the reference period used for deriving the average as it is shortened, the average calculated shifts by a maximum of 5%; as a result, the German economy's current price competitiveness using an average over a shorter period could be up to 5 percentage points more unfavourable than in the former case. However, due to the fact that the deviation from the benchmark is still low, its position would still be considered neutral.[9]

Price competitiveness in other euro area countries based on long-term averages

Of the other states that have been part of the monetary union since at least 2001, the indicator vis-à-vis 37 trading partners based on deflators of GDP shows a competitive position that has been more favourable than the average since 1995 for Greece, France and the Netherlands, in particular. The assessment is somewhat less favourable if price competitiveness is compared with the smaller group of countries comprising the 18 other euro area countries. However, it should also be noted here that the assessment may change if a different reference period is used to calculate the average.

Absolute purchasing power parity implies price level convergence

Whereas relative purchasing power parity theory in a currency union is based on inflation rates converging, the mechanism of goods arbitrage when applying absolute purchasing power parity theory ensures that the price levels of trading partners expressed in a common currency converge. This concept involves the weighted average of the trading partner's price levels converted to the domestic currency being used as a benchmark for the domestic price level. The indicators of price competitiveness employed thus far – calculated using price or cost indices – cannot be used to ascertain any information about relative price levels. The aggregate relative price level of a country compared with the weighted average of the price levels of its trading partners – i.e. the effective relative price level – can be calculated from purchasing power parities such as those provided by Eurostat. These purchasing power parities state the local currency price of a given basket of goods in the country observed relative to a base region.

Dispersion of price levels in the monetary union up again as of 2011

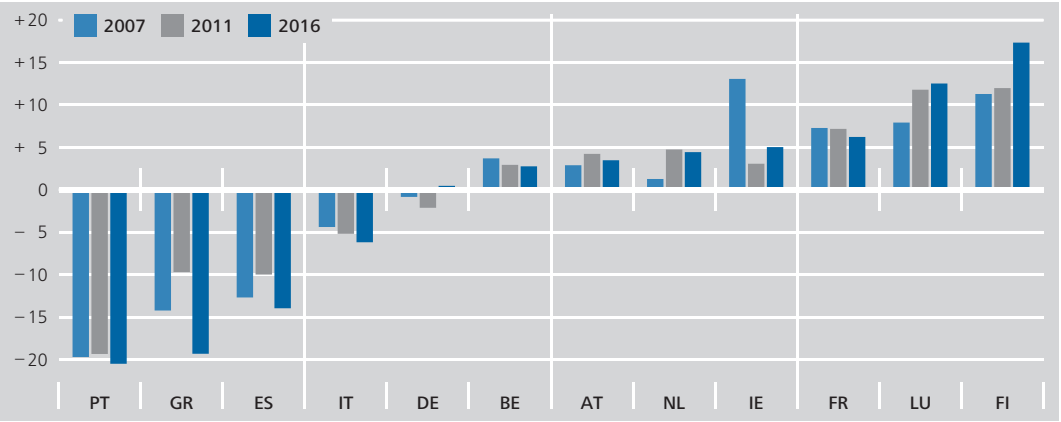
To determine whether the competitive positions in the euro area as measured by absolute purchasing power parity theory have converged over time, the coefficient of variation of the effective relative price levels across all countries can be used as a measure for the dispersion of these levels at a given point in time.[10] For the sake of simplicity, this measure is hereinafter referred to as "price level dispersion". A decline in this measure of dispersion implies that the effective relative price levels within the euro area are converging. It had already been

9 As purchasing power parity theory is a long-term concept, the period of observation should not be too short. All averages used therefore span at least the last 15 years. To estimate the price competitiveness of the German economy, the Bundesbank usually uses a somewhat broader indicator based on deflators of total sales rather than on deflators of GDP. Using this indicator, too, the finding that the German economy's competitive position is currently more or less neutral is confirmed. This continues to hold true when the period for ascertaining the average for this indicator is successively shortened from the relatively long period from 1975 onwards to a period of up to 15 years.

10 The coefficient of variation of the effective relative price levels is calculated as a standard deviation of the effective relative price levels in the 12 euro area countries included in the analysis from their mean.

Deviations from the absolute purchasing power parity theory*

%



* Percentage deviation of the price level in the country observed from the weighted average of the price levels in the other 11 euro area countries included in the analysis. A positive deviation denotes an above-average price level.

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shown in the March 2009 Monthly Report that, with regard to price level dispersion across the common currency area, considerable progress towards convergence had been made up to that point, especially at the start of the 1990s.[11] After the euro area was established, the trend towards price level convergence continued, initially even surviving beyond the outbreak of the financial crisis. However, in comparison with developments in the ten years prior to the start of monetary union, convergence was rather weak.[12] When the sovereign debt crisis in the euro area peaked at the turn of 2010-11, the convergence process underwent a turnaround. From 2011 to 2014, price level dispersion widened notably across the euro area countries included in the analysis, and since then has stayed put at an elevated level.

Development in individual countries up to the turnaround in 2011 …

In 2007, the price levels in some countries – despite the progress previously made towards convergence – were still way off the weighted average of the country's 11 euro area trading partners. For instance, in 2007, the price levels in Ireland and Finland were well above and the price levels in Portugal, Greece and Spain well below this benchmark; in some cases, the percentage deviation even reached double digits and ranged from -20% in Portugal to +13% in Ireland. Dispersion appears to have been particularly wide within the group of countries with comparatively low effective relative price levels. After the US real estate crisis grew into a global financial and economic crisis over the course of 2008, the effective relative price level in countries with low prices (Portugal, Greece and Spain) initially began to rise again up to 2011, whereas the comparatively high level of prices in Ireland – a country that was hit by the crisis early on – fell in relative terms. Overall, the price levels in these countries continued adjusting to those of their euro area trading partners; the process of price level convergence pressed ahead. By contrast, the price level in Finland, which was already comparatively high, went up even further vis-à-vis these trading partners. This was due to the fact that the aggregate wage level in Finland and, with it, unit labour costs continued to rise until 2013.[13]

… and thereafter

The process of price level convergence ended in 2011 when adjustment pressure in the real economy intensified in countries that were par-

11 See Deutsche Bundesbank, Price convergence in the euro area, Monthly Report, March 2009, pp. 33-47. The analysis conducted at that time covered developments up to 2007.

12 A temporary rise in dispersion between 1992 and 1995 is due to the EMS crisis and the crisis-related exchange rate adjustments between EMS country currencies.

13 See European Commission (2015), Macroeconomic Imbalances Country Report – Finland 2015, European Commission Occasional Paper, No 225, p. 3.

ticularly hard hit by the European sovereign debt crisis. In the wake of the crisis-related adjustments, the effective relative price level in Greece, Portugal and Spain fell. This meant that the price levels in the southern European periphery countries, which were already relatively low, became even further removed from those of their European trading partners. This was especially true of Greece, where the economic crisis deepened during this time, putting greater pressure on its price level. By contrast, in Ireland, the relative price level rose again somewhat. These developments, too, contributed to a rise in price level dispersion starting in 2011.

Alternative approach to measuring price competitiveness includes relative productivity growth

The aggregate purchasing power parities underlying the calculation of effective relative price levels also include the prices of non-tradable goods which, as a rule, do not face international competition. An alternative approach to measuring price competitiveness takes into account the fact that price adjustments in the non-tradable sector can cause the benchmark to shift. According to the Balassa-Samuelson model, productivity growth in the tradable sector can lead to wage rises in both this sector and the non-tradable sector.[14] While this pushes up prices in the non-tradable sector, thereby increasing headline inflation, and causes the currency to appreciate in real terms, it does not have an impact on price competitiveness. When determining the benchmark by applying such a productivity approach, then, the greater the equilibrium, relative price level in a country, which implies a neutral competitive position, compared to its trading partners, the higher the productivity level in this country compared to its trading partners.[15,16] That is why very productive economies usually have a relatively high price level without this necessarily implying low competitiveness.

Productivity approach takes into account Balassa-Samuelson effects

The productivity approach takes into account potential Balassa-Samuelson effects by regressing effective relative price levels on relative productivity levels in a panel regression and uniting the residuals to form an indicator of price competitiveness adjusted for relative productivity developments. In order to evaluate whether the competitive positions of the euro area countries included in the analysis have drifted apart in the past few years based on this approach, too, the determined competitive positions can also be used here to derive the coefficient of variation at a given point in time. If this measure of dispersion were to fall over time, this development would be interpreted as a convergence of price competitiveness in the euro area, in line with the considerations outlined above.

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14 For a detailed description and derivation of the Balassa-Samuelson effect, see Deutsche Bundesbank, Fundamental determinants of real exchange rate movements in the central and east European accession countries, Monthly Report, October 2002, pp. 47-59. See also B. Balassa (1964), The purchasing-power parity doctrine: a reappraisal, Journal of Political Economy, Vol. 72, pp. 584-596; and P.A. Samuelson (1964), Theoretical notes on trade problems, Review of Economics and Statistics, Vol. 46, pp. 145-154.

15 For technical details on productivity approach calculations, see C. Fischer and O. Hossfeld (2014), A consistent set of multilateral productivity approach-based indicators of price competitiveness – Results for Pacific Rim economies, Journal of International Money and Finance, Vol. 49, pp. 152-169. The time series on productivity provided by the Conference Board are published as "Labor productivity per hour worked in 2017 US$ (converted to 2016 price level with updated 2011 PPPs)".

16 In the model framework established by Balassa (1964), op. cit., and Samuelson (1964), op. cit., the fact that changes in the real exchange rate stemming from variations in productivity are not accompanied by a shift in price competitiveness is partly to do with the comparatively static nature of the model. As these variations in productivity do shift the equilibrium real exchange rate in the model, price competitiveness in the new equilibrium is the same as in the old one. However, the domestic wage level increases on the way towards the new equilibrium. A rise in productivity thus means a welfare gain. In a dynamic approach (which is not modelled), it could be said that productivity growth temporarily raises price competitiveness for as long as it takes for wage growth to "consume" competition growth. In principle, the impact of variations in labour market regulation on price competitiveness could be interpreted in a similar way; deregulation would then only improve price competitiveness temporarily. However, this depends on the specific design of the model. A further aspect concerns the role that non-tradable goods, which are often actually services, play in price competitiveness. As they are not tradable, they do not face international competition, which means that changes in prices of non-tradable goods do not affect price competitiveness. However, if – in a departure from the assumptions in the model – non-tradable goods (such as state services in the form of available infrastructure, for instance) are included as input factors in the production of tradable goods, it can be assumed that changes in prices of non-tradable goods would affect price competitiveness. The present analysis therefore also demonstrates that the interpretation of shifts in the real exchange rate, too, is determined by the – often simplified – assumptions in the theoretical models.

Dispersion of price competitiveness is lower than dispersion of effective relative price levels when productivity approach is used

The dispersion of competitive positions in the euro area calculated this way is lower than that of the effective relative price levels described above. This is due to the fact that Greece, Portugal and Spain have low effective relative price levels coupled with comparatively low productivity levels, which fundamentally justifies their low price levels. For this reason, their competitive positions deviate from the euro area average to a substantially smaller degree when the productivity approach is used than when absolute purchasing power parity theory is applied. It is a similar situation for Luxembourg, where productivity levels are relatively high, justifying a comparatively high price level.

Development of price competitiveness dispersion since 2007

In spite of what was already a rather low dispersion of competitive positions in the euro area back in 2007 calculated using the productivity approach, there was evidence of a further slight convergence here until 2010. The dispersion of these competitive positions has since increased, as has that of effective relative price levels, on balance, but only to a comparatively modest extent.[17]

Contributions made by Greece and Spain up to 2011 …

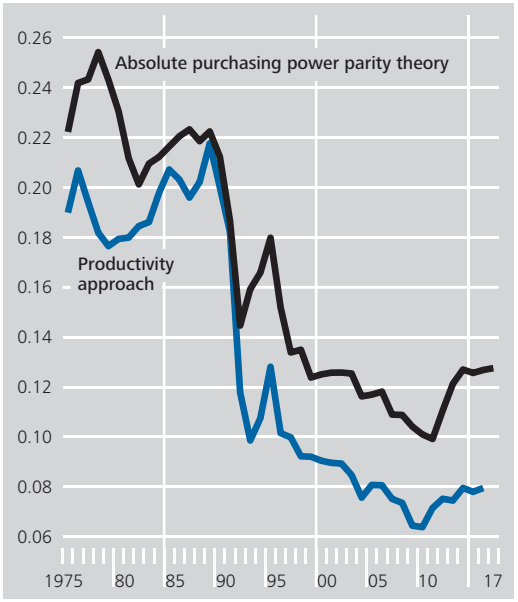
Applying the productivity approach, Greece's and Spain's competitive positions were neutral in 2007. Up to 2011, the relative price level in Greece rose disproportionately to productivity growth, leading to a deterioration in the country's price competitiveness. Taken in isolation, this would have resulted in a broader dispersion of competitiveness. In contrast to the Greek situation, price competitiveness in Spain, for example, changed relatively little prior to 2011. The slight rise in the relative price level here was evidently largely consistent with the development of the relative productivity level.

… and thereafter

The fall in relative prices in the wake of the sovereign debt crisis in Greece contributed significantly to the improvement in the Greek economy's unfavourable competitive position. Due to the fact that this caused Greece's competitive position to move closer to the average of the country's euro area trading partners once more, this development was again at odds with the trend of generally increasing dispersion in the euro area. The situation in Spain, by contrast, was in keeping with the slight divergence in competitiveness. The country's competitive position has improved since 2011; in

Dispersion of competitiveness in 12 euro area countries*

Coefficient of variation, annual data



* Measured by the coefficient of variation, which is calculated as a standard deviation of the respective measure of competitiveness from the mean. The standard deviation and the mean are derived at a given point in time from the competitiveness of the countries Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.

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17 This result is in line with the findings of a recently published study which uses a slightly different calculation method, but identifies a very similar pattern of price level dispersion within the euro area over time. See M. Hoeberichts and A. Stokman (2018), Why price-level dispersion went up in Europe after the financial crisis, The World Economy, Vol. 41, pp. 913-925. The study additionally examines possible determining factors behind the increasing dispersion of price levels since 2011 that it also identified. Evidently, a cointegration relationship exists between price level and income level dispersion in the euro area. This finding indicates that the increasing dispersion of euro area income levels has been one major cause of the rise in price level dispersion in the current decade. Hoeberichts and Stokman (2018), op. cit., see income level dispersion as a proxy variable for the costs of non-tradable intermediate goods. This explanation is ultimately very similar to the productivity approach referred to in this article. As the rise in price level dispersion has, since 2011, been only very weakly reflected in increased dispersion in a measure of competitiveness that adjusts relative price levels for the impact of relative productivity levels, it can be stated on the strength of these results that productivity and income levels go some way towards explaining the increasing price level dispersion.

Competitive positions within the euro area according to the productivity approach*

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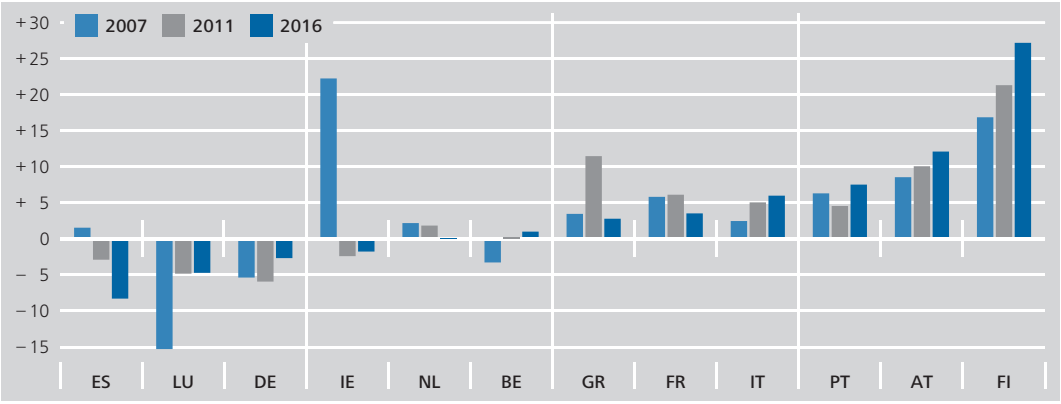

* Percentage deviation of a given country's price competitiveness from the equilibrium value, which is estimated relative to the other 18 euro area counties using the productivity approach. A positive value represents a real overvaluation and thus an unfavourable competitive position.

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2016, it was no longer classed as neutral, but rather as favourable.

Competitive disadvantage reduced in Ireland, …

Judged by the productivity approach, Ireland and Finland were in unfavourable competitive positions in 2007. Ireland, which was hit by the financial crisis at an early stage, saw substantial improvement in its price competitiveness up to 2011, contributing to the identified convergence of competitive positions in the euro area. Competitive gains in the Irish economy were largely attributable to an exceptionally strong productivity surge. Ireland's productivity per hour worked, for instance, which was used to determine competitiveness, rose by over 20% between 2007 and 2011. This is by far the highest figure recorded across the advanced economies of Europe and North America during this period, and stems partly from the decline in hours worked at that time. However, the transfer of patents from multinational companies to Irish branches also contributes greatly to the high level of Irish GDP growth recorded in the national accounts, generally speaking. Here, value added from licences, which in some cases is likely to have been generated primarily in third countries, is classed as part of Irish GDP. The productivity gains and increased competitiveness of the Irish economy are thus probably overstated.[18]

… but further increased in Finland

The competitive position of the Finnish economy, already deemed unfavourable in 2007 according to the productivity approach, has – based on these calculations – since deteriorated further vis-à-vis that of the other euro area countries included in the analysis. This is linked not only to Finland's increasing relative price level, but also to the decline in its relative productivity following a drop in output in the electrical engineering industry and decreased output in the paper and wood-processing industries.[19] These factors have resulted in an increasing dispersion of competitive positions within the euro area.

18 For information on how the activities of multinational enterprise groups affected Irish GDP and the (presumably) associated distortion of derived indicators, see Deutsche Bundesbank, Activities of multinational enterprise groups and national economic statistics, Monthly Report, October 2018, pp. 65-78.

19 In the Finnish economy, labour productivity per hour has been stagnant since 2007, whilst it has increased in other euro area countries. Finland's relative productivity is therefore declining. For information on the causes of productivity developments in Finland, see European Commission (2015), op. cit., p. 17.

The impact of labour market reforms on price competitiveness

Productivity gains through labour market reforms

Structural reforms are measures that target the supply side of a country's economy and improve the institutional and regulatory frameworks for the macroeconomic production process. By making labour markets more flexible, simplifying the tax system or cutting red tape, for example, such measures aim, inter alia, to create a more favourable business environment and increase aggregate productivity. It is striking that, to a partial extent, price competitiveness has improved particularly dramatically in recent years in those euro area countries which were under high adjustment pressure and, in some cases, have implemented quite extensive reforms in the labour and product markets. The degree of influence that labour market reforms exert on competitiveness may depend on whether conditions have improved in the tradable or non-tradable sector.[20]

Models indicate that labour market reforms could improve price competitiveness; …

In the theoretical literature, one subject that is modelled is the direct effect of labour market deregulation on price competitiveness, taking into account the fact that efficiency gains in job mediation reduce hiring costs and could result in a decline in active job-seeking.[21] A labour-intensive non-tradable sector could benefit to a comparatively large degree from these cost savings. This would tend to reduce the prices of non-tradable goods and thus lead to real depreciation.[22]

Something else that can be modelled is labour market reforms, which may increase aggregate productivity and thus influence the real exchange rate. This is the case, for example, when the allocation of factors is improved by increasing the flexibility of the labour market. Using a theoretical model, Du and Liu (2015) deduce that productivity in the non-tradable sector may increase under such circumstances.[23] In line with the Balassa-Samuelson model, this reduces the relative price of non-tradable goods. This movement represents real depreciation; the indicator of price competitiveness signals an improvement.

… this relationship is studied

The postulated positive impact of labour market reforms on the indicator of price competitiveness was subjected to empirical review using a panel of countries (see pp. 45 ff.) The analysis relies on the OECD's indicator of employment protection for regular employment as a reform variable.[24,25] This variable is composed of eight differently weighted components which can be divided into three categories: procedural aspects; notice periods and severance payments; and dismissal-related regulations. The period under review is limited to the years 1985 to 2013, as these are the most recent employment protection indicator data available. For reasons of data availability, the panel comprises, in addition to Germany, the 19 other previously mentioned industrial nations in the narrower group of countries.[26] Competition indicators based on the deflators of total sales or aggregate unit labour costs are entered into the regression as endogenous

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20 This is the case when labour market reforms have an impact on productivity initially and thus indirectly affect the real exchange rate, for instance, because, according to the Balassa-Samuelson model, while productivity gains in the tradable sector lead to real appreciation, productivity gains in the non-tradable sector result in real depreciation.
21 See H. Gartner and S. Klinger (2010), Verbesserte Institutionen für den Arbeitsmarkt in der Wirtschaftskrise, Wirtschaftsdienst, Vol. 11, pp. 728-732.
22 Y. Sheng and X. Xu (2011), Real exchange rate, productivity and labor market frictions, Journal of International Money and Finance, Vol. 30, pp. 587-603, use an extended Balassa-Samuelson model to analyse the influence of efficiency gains in job mediation on the real exchange rate. At a given level of sectoral factor productivity, real depreciation, and thus an improvement in price competitiveness, occurs in the model if labour market efficiency rises in the non-tradable sector.
23 See Q. Du and Q. Liu (2015), Labor market flexibility and the real exchange rate, Economics Letters, Vol. 136, pp. 13-18.
24 The OECD provides three versions of employment protection indicators for regular employment which differ in terms of breadth of content. For reasons of data availability, the relatively narrow EPRC_V1 indicator was used in the present empirical study.
25 Employment protection for regular employment has been singled out as just one aspect of labour market regulation. Other labour market reforms, e.g. measures to liberalise temporary employment or subcontracting, can of course influence price competitiveness as well. However, this is not examined in this study.
26 Values of the EPRC_V1 indicator have been available for this group of countries since 1985.

variables. In addition to the employment protection indicator, a proxy variable for aggregate productivity and, as appropriate, further control variables are entered as exogenous variables.

Evolution of the OECD indicator of employment protection for regular employment in euro area countries

The OECD indicator of employment protection for regular employment used in the study shows the following developments in the euro area countries analysed.[27] Whereas in the 1990s employment protection regulations were reinforced in Germany (1994), thus, based on the estimation results, putting downward pressure on the German economy's price competitiveness, Finland (1990), France (1987) and Spain (1995) implemented measures to relax such regulations. Ireland joined the path of reform in 2005. Following the outbreak of the global financial and economic crisis and the ensuing sovereign debt crisis, reform pressure increased and employment protection was relaxed in a number of particularly hard-hit countries. For example, Portugal (2010, 2012 and 2013), Greece (2011 and 2013) and Spain (2011 and 2013) implemented what were, in some cases, relatively comprehensive reforms in the context of the rescue programmes. In Italy, employment protection was only reformed to a comparatively minor extent in 2013. While certain amendments were made to employment protection legislation in France in 2009,[28] no action was taken in Germany and Finland. In Ireland, employment protection measures were even ramped up in 2012. Measured against the OECD's reform indicator, several other euro area countries have thus – in relative terms – taken steps towards liberalisation compared with Finland, France, Germany, Ireland and Italy in recent years.

Relaxing employment protection legislation improves price competitiveness, according to estimation results

The empirical analysis suggests that price competitiveness can be improved by relaxing the rules on employment protection to a greater extent than those of partner countries. The wage-based indicator displays a greater degree of elasticity than the price-based indicator. This is certainly plausible, as the indicator based on aggregate unit labour costs is directly linked to labour market policy measures and exhibits relatively high volatility. The outbreak of the global financial crisis itself also appears to have exerted a not insignificant influence on the strength of this relationship. The significance of the estimated parameters thus increases considerably when the crisis and post-crisis period since 2008 is differentiated from the pre-crisis period in the form of a dummy variable. The estimation results suggest that measures to deregulate the labour market during times of crisis, when adjustment pressure is particularly high, have a stronger impact on wages and prices and consequently price competitiveness than is usually the case. The estimated effect of labour market regulation on price competitiveness both before and after the crisis is greater in economic terms when a relative productivity variable is also factored into the analysis.

Productivity gains through relaxing employment protection

However, theoretical reasoning suggests that not only could labour market regulation have a direct impact on price competitiveness, it could also have an indirect effect by influencing productivity levels.[29] The analysis does indeed indicate that, for the period since the start of the crisis, relaxing employment protection regulations increases aggregate productivity. As, according to the estimates, an increase in productivity raises the indicator of price competi-

27 As mentioned above, the OECD indicator only examines certain aspects of employment protection for regular employment. Reforms in other areas of labour market regulation are not taken into account in the following overview, even if they have in some cases been profound – like the German labour market reforms since 2002, for instance.
28 After 2015, France implemented further such reforms.
29 One direct effect of a variation in labour market regulation at a given level of productivity, as has been estimated so far, is produced in the model of Sheng and Xu (2011), op. cit., by altering the efficiency of job mediation. However, amending labour market regulations can also first have an impact on labour productivity and thus indirectly affect price competitiveness, as modelled by Du and Liu (2015), op. cit. In both cases, the direction of the effect on price competitiveness is greatly dependent on which sector is most affected by such amendments.

Estimates of the impact of labour market regulation on price competitiveness

Various theoretical approaches postulate that structural features of the labour market have an impact on an economy's price competitiveness. We refer, in particular, to the contributions of De Gregorio et al. (1994), Sheng and Xu (2011), Du and Liu (2015), and Berka and Steenkamp (2018).[1] Each of the aforementioned approaches refer to the modelling concept proposed by Balassa (1964) and Samuelson (1964), according to which the real exchange rate is determined purely on the supply side by total factor productivity in the tradable and non-tradable sectors;[2] however, they modify or expand the model in a way that allows structural features of the labour market to make an additional explanatory contribution. In order to verify this empirically, the following econometric model was estimated as part of a panel regression:

$$q_{it} = \alpha_i + \beta_1 \cdot X_{it} + \beta_2 \cdot r_{it} + \varepsilon_{it},$$

where the variable q_{it} stands for the logged indicator of the price competitiveness of country i at point in time t, α_i represents a country-specific constant, r_{it} generally denotes an indicator of relative labour market regulation, X_{it} is a vector of additional explanatory variables which should at least contain the logged relative aggregate production level, and ε_{it} is an independent and identically distributed random variable. The indicator of price competitiveness is defined as the real exchange rate, which is calculated in this estimate against a group of 19 key trading partners.[3] Together with the base country, this group of advanced economies also forms the sample of 20 countries included in the panel. Similarly to the real exchange rate, the variables assumed as exogenous are considered for a given country relative to the trade-weighted average of the corresponding variables of the same 19 trading partners.

An OECD indicator that models the degree of employment protection is used as the

1 See J. De Gregorio, A. Giovannini and T. H. Krueger (1994), The behavior of nontradable goods prices in Europe: evidence and interpretation, Review of International Economics 2, pp. 284-305; Y. Sheng and X. Xu (2011), Real exchange rate, productivity and labor market frictions, Journal of International Money and Finance 30, pp. 587-603; Q. Du and Q. Liu (2015), Labor market flexibility and the real exchange rate, Economics Letters 136, pp. 13-18; M. Berka and D. Steenkamp (2018), Deviations in real exchange rate levels in the OECD countries and their structural determinants, CEPII Working Paper No 2018-16.

2 See B. Balassa (1964), The purchasing-power parity doctrine: a reappraisal, Journal of Political Economy 72, pp. 584-596; and P. A. Samuelson (1964), Theoretical notes on trade problems, Review of Economics and Statistics 46, pp. 145-154. An aggregate increase in total factor productivity, whereby the total factor productivities of the tradable and non-tradable sectors rise in proportion with each other, results in a real appreciation – as in the classic case of a productivity gain in the tradable sector only – if the tradable sector is capital-intensive compared with the non-tradable sector. See, for example, C. Fischer and O. Hossfeld (2014), A consistent set of multilateral productivity approach-based indicators of price competitiveness – Results for Pacific Rim economies, Journal of International Money and Finance 49, pp. 152-169. Against this backdrop, empirical studies often use aggregate measures of productivity to simplify matters.

3 The countries included are Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States.

Fixed effects estimates of the impact of employment protection legislation on price competitiveness°

Item	Specification (1)	(2)	(3)
	Endogenous variable: indicator of price competitiveness based on deflators of total sales		
GDP per capita			0.18**
D*GDP per capita			0.01***
EPI	0.10	0.12	0.19***
D*EPI		0.08***	0.09***
N	557	557	557
R^2(overall)	0.04	0.05	0.07
	Endogenous variable: indicator of price competitiveness based on unit labour costs in the total economy		
GDP per capita			0.27
D*GDP per capita			0.02***
EPI	0.32**	0.37**	0.50***
D*EPI		0.11***	0.12***
N	367	367	367
R^2(overall)	0.04	0.05	0.06

° Estimation period for the indicator based on total sales deflators 1985-2013, for regressions with the indicator based on unit labour costs 1995-2013. All variables logged and calculated as a weighted average against 19 advanced economies; GDP per capita = relative gross domestic product per capita, index; EPI = relative employment protection indicator which models relative labour market regulation r in the estimate equation; D = dummy variable to separate the pre and post-crisis periods with 1 from 2008 and 0 prior to that year; N = number of observations in the (unbalanced) panel; R^2(overall) = squared correlation coefficient between the endogenous variable and its estimate (disregarding fixed effects). **/*** denote significance at the 5%/1% level according to the estimator robust to autocorrelation, heteroskedasticity and cross-correlation used by J. C. Driscoll and A. C. Kraay (1998), Consistent covariance matrix estimation with spatially dependent panel data, Review of Economics and Statistics 80, pp. 549-560.

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variable for labour market regulation.[4, 5] The OECD's indicator is composed of eight differently weighted components that contain information on employment protection legislation for regular employment. The scale of the employment protection indicator ranges from 0 (lax regulation) to 6 (strict regulation). An increase in the relative employment protection indicator calculated on this basis signals that employment protection in the country concerned is regulated more strictly than before relative to the weighted average of the trading partners.

The above table shows the results of a fixed effects panel estimation based on annual data. Two variables are used as the indicator of price competitiveness: first, a real exchange rate based on the deflator of total sales (upper half of the table), and second, one based on unit labour costs in the total economy (lower half of the table). In the former case, the observation period runs from 1985 to 2013, and in the latter from 1995 to 2013.[6] A regression which includes only employment protection as the explanatory variable (see specification (1)) produces a positive coefficient. This is significant where price competitiveness is based on unit labour costs in the total economy, but not significant where an indicator based on deflators of total sales is used. The esti-

4 The OECD's indicator of the degree of employment protection has already been used in a number of comparable studies. In A. Bénassy-Quéré and D. Coulibaly (2014), The impact of market regulations on intra-European real exchange rates, Review of World Economics 150, pp. 529-556, the authors build on the model employed by De Gregorio et al. (1994), op. cit., to estimate the impact of the OECD indicator on the real exchange rate for a panel of 12 European countries and find that stricter employment protection results in a significantly less favourable level of competitiveness. However, Berka and Steenkamp (2018), op. cit., are unable to confirm this result in a slightly different specification for 17 OECD countries. Finally, in M. Groneck and C. Kaufmann (2017), Determinants of relative sectoral prices: the role of demographic change, Oxford Bulletin of Economics and Statistics 79, pp. 319-347, the authors include an interaction term between the employment protection indicator and a demographic variable and, in a panel of 15 OECD countries, they find that the stricter the labour market regulation, the more the relative price of non-tradable goods is driven up by an ageing population (i.e. price competitiveness declines). Unlike the analysis presented here, Bénassy-Quéré and Coulibaly (2014), op. cit., as well as Berka and Steenkamp (2018), op. cit., both use bilateral rather than multilateral variables and data that do not extend beyond the onset of the global financial crisis.

5 Employment protection for regular employment has been singled out as just one aspect of labour market regulation. Other labour market reforms, e.g. measures to liberalise temporary employment or subcontracting, can of course influence price competitiveness as well. However, this is not examined in this study.

6 The employment protection indicator is available for 19 of the 20 countries in the panel for the period from 1985 to 2013. The corresponding time series for Luxembourg only begins in 2008. The OECD currently does not provide employment protection indicators for the years after 2013. Indicators of competitiveness based on unit labour costs are available only from 1995 onwards.

mated positive coefficient implies that stricter employment protection legislation results in real appreciation, thus reducing price competitiveness. This is consistent with the above-mentioned theoretical models.[7]

It is conceivable that measures to (de)regulate the labour market have a stronger than usual impact on prices in crisis periods, when adjustment pressure is relatively high.[8] For this reason, specification (2) is augmented with an interaction term between the employment protection indicator and a dummy variable that takes the value of 1 from 2008 onwards and 0 prior to that.[9] It actually transpires that – independent of the competitiveness indicator – the impact of the chosen labour market regulation measure on price competitiveness is significantly greater after 2008 than before.

If specification (3) is expanded in line with the theoretical concept to include a relative productivity variable (simply measured here as an index of relative real gross domestic product (GDP) per capita),[10] the estimated impact of employment protection legislation on price competitiveness is even larger in economic terms both before and after the crisis. All employment protection-related coefficients are now statistically significant. For the indicator based on unit labour costs, elasticity is markedly higher than on the basis of total sales deflators (0.5 compared with 0.2 before the crisis, and 0.6 compared with 0.3 after 2008). This is quite plausible, first because indicators based on unit labour costs should have a direct link to labour market policy measures, and second because they are inherently more volatile than those based on total sales deflators. Consistent with the indications of the Balassa-Samuelson model, the productivity variable is significantly positive,[11] i.e. an aggregate increase in productivity results in a real appreciation; in the context of the model, however, this should not be interpreted as a loss of competitiveness as it only reflects price pressures in the non-tradable sector.[12]

It can also be posited that labour market regulation in the countries analysed affects their price competitiveness not only directly but also indirectly via productivity. The model employed by Du and Liu, for example, also indicates that this is the case.[13] To gain an impression of whether such a transmission mechanism actually exists, the impact of employment protection on the productivity variable is estimated in the same panel as before. This reveals that the coefficient in question was not statistically significant before the crisis began, but has been significantly negative since then. According to the estimate, then, the higher the level of relative labour market regulation, the lower the productivity level measured by relative GDP per capita. Thus, the above-described positive primary effect on

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7 However, several models stipulate that the adjustment of employment protection legislation relates to the non-tradable sector.
8 In R. Anderton, B. Di Lupidio and J. Piqueras (2018), Labour and product market regulation, worker flows and output responsiveness, in K. Masuch, R. Anderton, R. Setzer and N. Benalal (eds.), Structural policies in the euro area, ECB Occasional Paper 210, pp. 95-98, the authors in fact identify different labour market responses depending on whether a pre-crisis period up to 2007 or the crisis and post-crisis period from 2008 is considered.
9 If the equation to be estimated with the interaction term is expanded to additionally include the specified dummy as a single variable, the coefficients of the employment protection indicator remain statistically significant. They are each somewhat larger, however.
10 The specification thus follows Bénassy-Quéré and Coulibaly (2014), op. cit., and Du and Liu (2015), op. cit.
11 See, for example, Fischer and Hossfeld (2014), op. cit.
12 Further econometric specifications were estimated to verify the robustness of the results. For example, the group of explanatory variables was expanded to include a relative unemployment rate as a cyclical variable. However, this has only a minimal effect on the coefficients of the employment protection indicator.
13 See Du and Liu (2015), op. cit.

Fixed effects estimate of the impact of the volume of regulation[o]

Item	Value
GDP per capita	0.33***
Regulation	– 0.11**
N	660
R^2(overall)	0.10

o Estimation period 2006-17. All variables logged and calculated as a weighted average against 56 advanced economies; endogenous variable: indicator of price competitiveness based on consumer price indices; GDP per capita = relative gross domestic product per capita, index; Regulation = effective measure of relative volume of regulation derived from nine sub-indicators of the "Ease of doing business" indicator; N = number of observations in the (balanced) panel; R^2(overall) = squared correlation coefficient between the endogenous variable and its estimate (disregarding fixed effects). **/*** denote significance at the 5%/1% level according to the estimator robust to autocorrelation, heteroskedasticity and cross-correlation used by Driscoll and Kraay, 1998, op. cit.

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the indicator of price competitiveness would be counteracted by a secondary effect via productivity, but only to a negligibly small fraction. Based on specification (3) in the table on p. 46, the primary effect of a variation in the employment protection variable on price competitiveness is between 25 and 36 times as great as the countervailing secondary effect via productivity.

Finally, there is the question of whether the result of a competitiveness-boosting impact of deregulating employment protection for regular employment can be generalised to a broader concept for structural reforms.[14] To do so, a time series of the volume of regulation compiled from sub-categories of the World Bank's "Ease of doing business" indicator is used as the explanatory variable. These sub-categories include regulation of cross-border trade or tax payments, for instance.[15] The regulatory indicator thus calculated is only available for a relatively short period (2006 to 2017) but for a large number of countries. Therefore, the estimation generally uses variables relative to a broad country group of 56 trading partners. Indicators of price competitiveness compared with 56 trading partners are only calculated on the basis of consumer price indices, implying that they be used as endogenous variables.[16]

A fixed effects panel estimation again based on annual data, which contains relative GDP per capita as an additional explanatory variable, produces a significantly negative impact of regulation on price competitiveness (see the adjacent table). Because – unlike the employment protection indicator in the above model – the indicator is normalised such that an increase signifies a decreasing volume of regulation, this implies that the latter is associated with rising price competitiveness. Here, too, there is again a significant countervailing secondary effect on price competitiveness through the impact of the volume of regulation via productivity. In this case, this is by no means negligible, also in terms of dimension. Generally speaking, the results for the impact of

14 Studies related to this question can also be found in the literature. Bénassy-Quéré and Coulibaly (2014), op. cit., for example, also find that in the pre-crisis period deregulation of the product market has a positive impact on the price competitiveness of 12 EU countries. In M. Fidora, C. Giordano and M. Schmitz (2017), Real exchange rate misalignments in the euro area, ECB Working Paper No 2108, the authors also find for a broad panel of 57 countries that an improvement in the quality of regulation accelerates the adjustment to an equilibrium level of price competitiveness.

15 The "Ease of doing business" indicator itself has numerous methodological structural breaks and its quality is therefore low for an analysis that considers the time dimension. The time series used in this study, however, makes use of nine sub-categories that have only a few methodological structural breaks over the observation period. The categories are: enforcing contracts, getting credit, dealing with construction permits, resolving insolvency, paying taxes, protecting minority investors, registering property, starting a business, and trading across borders.

16 See Deutsche Bundesbank, Recalculated weights for indicators of the German economy's price competitiveness, Monthly Report, August 2017, pp. 41-43. The article also lists which 57 countries are included in the broad group. With the exception of Algeria and Venezuela, for which there is no complete dataset, these are also the countries whose data are included in the panel.

regulation extending beyond the labour market on price competitiveness do not seem especially robust. For example, there is no coherent picture when the impact of the nine sub-indicators is gauged by studying them separately rather than as an aggregate.[17] The estimation results presented in the latter part of this box, in particular, must therefore be interpreted with caution.

17 In a panel that considers all sub-indicators individually, some have a significantly positive coefficient, others have a significantly negative coefficient, and others still have an insignificant coefficient, without this being justifiable at first glance.

tiveness,[30] liberalisation of the labour market yields a negative secondary effect;[31] its economic significance is, however, very minimal.

Ease of doing business indicator represents broader concept of structural reforms

In addition to employment protection for regular employment, however, other reforms that improve local conditions are also likely to influence aggregate productivity and price competitiveness – presumably positively. The World Bank's ease of doing business indicator, which is calculated on the basis of ten sub-indicators, provides a measure of the level of business regulation in a given country.[32] These sub-categories are available for quite varied time periods. In addition, the calculation method for the ease of doing business indicator has been adapted on several occasions over time by widening the indicator set and the group of countries analysed. In order to ensure more reliable comparisons over time, a new aggregate regulatory indicator was calculated using nine of the ten sub-categories.[33]

Findings regarding influence of labour market reforms cannot simply be applied to broader structural reform concepts

The impact of the aggregate regulatory indicator or sub-indicators on the price competitiveness indicator was determined by means of a panel estimation using a broad panel of 55 countries for the years 2006 to 2017. This influence proves to be significant in the baseline specification – when the volume of regulation is reduced as measured by the aggregate indicator, price competitiveness improves. Here,

30 On the face of it, this result may not appear to tally with the model of Du and Liu (2015), op. cit., in which the productivity gains generated by labour market flexibility reduce the indicator. However, the differences between the model and the estimate can be explained by the fact that the model assumes productivity growth in the non-tradable sector only, whereas empirically, aggregate productivity is observed across all sectors, and by the fact that productivity gains in the tradable sector can be expected to have an adverse effect on the real exchange rate.

31 As employment protection regulations are only one of many factors influencing aggregate productivity, the productivity variable must nevertheless be included in the analysis.

32 Although the World Bank's ease of doing business index includes information on labour market regulation, it is not part of the overall index.

33 For information on the sub-categories studied here, see p. 48.

too, a surge in productivity triggered by liberalisation subsequently weakens the primary effect, according to the estimates. However, these results do not appear to be very robust. For example, there is no coherent picture when the sub-indicators are used in the regression rather than the aggregate indicator. This may be linked to the fact that a general reduction in the volume of regulation can, unlike a relaxation of employment protection regulations, influence productivity in the tradable sector more strongly under certain circumstances.

Conclusion

In summary, it can be maintained that, over the past few years, competitive positions in the euro area have shifted in favour of those euro area countries which were relatively hard hit by the global financial and economic crisis and the subsequent sovereign debt crisis, and which have undertaken labour market reforms. Although the dispersion of the effective relative price levels in the euro area has increased, the competitive positions of the observed euro area countries are, on average, still quite closely spaced when factoring in productivity developments.

An empirical study indicates that price competitiveness can be improved by relaxing employment protection regulations for regular employment. The estimation results suggest that such measures aiming to deregulate the labour market during times of crisis, when adjustment pressure is particularly high, have a stronger impact on relative price levels and consequently price competitiveness than is usually the case. Of course, this should not be the only yardstick by which labour market policy measures in general and employment protection regulations in particular are evaluated. It must also be borne in mind that although liberalisation gains may be high, this level of gains cannot be sustained in the long term. However, where there is scope for deregulation, its implementation can have a positive impact on price competitiveness, as these findings show.