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A 'New Modesty'? Level Shifts in Survey Data and the Decreasing Trend of 'Normal' Growth

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A ‘New Modesty’?

Level Shifts in Survey Data and the Decreasing Trend of ‘Normal’ Growth

Christian Gayer and Bertrand Marc

Abstract

While the current level of the Economic Sentiment Indicator, which is well above its long-term average, is compatible with expanding economic activity, it has been associated with lower growth rates than those implied in the pre-recession period. Departing from the idea that the relationship between qualitative survey (‘soft’) and quantitative (‘hard’) data might have changed during the Great Recession due to a ‘new modesty’ of survey respondents, this paper goes one step further and examines to what extent this link might be constantly moving over longer time periods. Using rolling regressions and time-varying parameter models for the euro area, the paper shows that the growth rates typically implied by given survey results did not only fall during the Great recession, but already decreased rather systematically for close to 20 years before the crisis, i.e. since around 1990. This is true for the overall economy (measured by GDP growth), but also industrial production, construction production, and households consumption. Country-specific results for the GDP of the four largest euro-area economies are also presented.

Furthermore, the paper suggests that business and consumer survey results can be used, beyond their usual short-term forecasting purposes, to gauge changes in long-term or potential growth. While the results should be interpreted as preliminary and experimental, they might be useful as a contribution to the assessment of post-crisis potential growth, not least since they are less subject to revisions than conventional methods based on production functions.

JEL Classification: C32, E32, O47, O52.

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1. INTRODUCTION

The experience of the double-dip recession in the euro area in 2008-09 and in 2011-13 and the ensuing slow recovery may arguably have led consumers and business managers to adjust their economic expectations to a more modest 'new normal'. Analytically, this would imply a pre-/post-crisis break in the link between qualitative survey ('soft') and quantitative ('hard') data, which has traditionally been regarded as remarkably stable. Using pre-crisis relationships between survey indicators and underlying real variables could then be misleading. This paper briefly reviews to what extent survey data for the euro area lends support to the hypothesis of a 'new modesty' (section 2). Using time-varying regressions as in European Commission (2011), it then adopts a longer-term perspective and finds evidence of a secular process of given survey levels being associated with lower growth rates, which started already long before the Great Recession (section 3). This analysis is carried out both at the aggregate euro area level as well as at the sectoral and country levels. Taking the long-term averages of economic confidence indicators as a neutral reference point, we then use our methodological set up to contribute to the discussion of developments in underlying (trend or potential) growth, as perceived by survey respondents (section 4). We investigate how the observed secular process may be connected with the decline in potential output growth as measured by a production function. It is shown that business and consumer survey results can be used, beyond their usual short-term forecasting purposes, to gauge changes in long-term or potential growth.

2. A PRE-/POST-CRISIS BREAK IN THE LINK BETWEEN SOFT AND HARD DATA?

2.1. THE 'NEW MODESTY' HYPOTHESIS

Two major arguments can be brought forward to explain the 'new modesty' hypothesis for survey data (see European Commission, 2016). The first one is a technical argument related to the sampling of the surveys: for business surveys it explains a positive bias in the results by the assumption that the businesses that survive the crises and keep answering the surveys are doing better than the others. Against this hypothesis, it can be argued that such a bias would equally apply to hard data, which are also based on sampling. Moreover, there is no empirical evidence to support the hypothesis that a selection effect occurred during the crisis period (see Bruno et al., 2016).

The second argument is of a psychological or cognitive nature: respondents' answers to survey questions are relative to a 'normal' benchmark, or 'sufficient' level of aspiration. Under the impression of the severe and tenacious recession period, economic agents may have adjusted, i.e. lowered, their underlying reference standard to a lower level of economic performance. For instance, the reference for businesses when assessing their situation is generally what they plan to produce. In this case, their views on a 'normal' situation are necessarily subject to change when production adapts to lower demand.

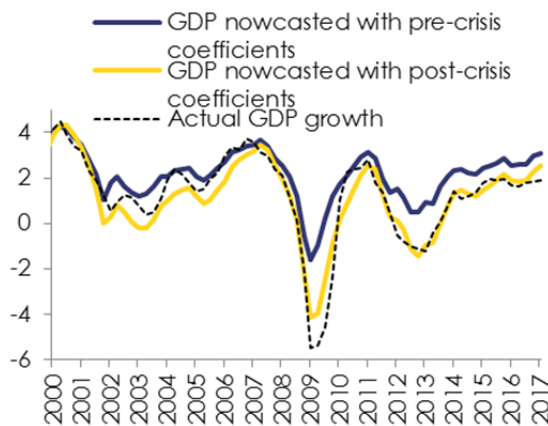
2.2. EMPIRICAL EVIDENCE OF A PRE-/POST-CRISIS BREAK

A straightforward way to check whether at the aggregate level the relationship between euro area soft and hard data has changed over time is to model year-on-year (yoy) GDP growth using the European Commission’s Economic Sentiment Indicator (ESI), which is calculated to track overall economic activity, as an explanatory variable.¹ The linear model chosen is simple and widely used: it includes the level of the survey and its first difference.²

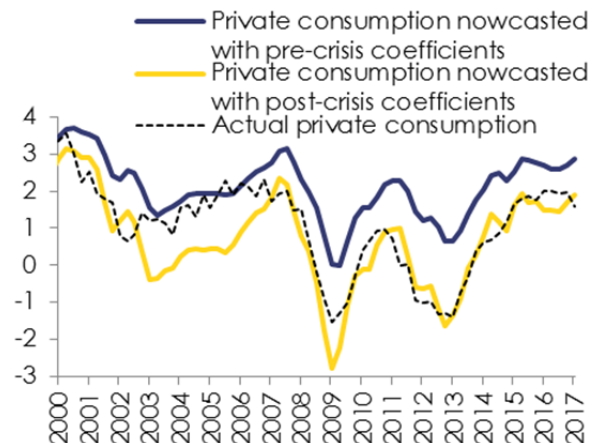
$$YoY(GDP)_t = b_0 + b_1 \cdot ESI_t + b_2 \cdot \Delta ESI_t + u_t$$

By estimating this model twice, once over a pre-crisis sample (from Q2-1985 to Q2-2007), and once over a post-crisis³ sample (from Q3-2009), it is possible to compute the GDP growth corresponding to a given level of the ESI in a pre-crisis versus a post-crisis world. Graph 2.1 illustrates that the relationship between GDP growth and the ESI has changed in the euro area around the 2008-2009 recession: GDP growth implied by pre-crisis coefficients is consistently higher than what is suggested by a post-crisis model. While the predictions based on the pre-crisis coefficients were very close to the actual GDP growth outcomes in the early part of the sample, the predictions are significantly overestimating actual growth after the crisis.

Graph 2.1. Euro area GDP growth (yoy % changes), nowcasted with the Economic sentiment indicator



Graph 2.2. Euro area private consumption (yoy % changes), nowcasted with the consumer confidence indicator



Beyond these aggregate results for the euro area, there is evidence of similar shifts for individual countries, sectors, and specific survey questions. In terms of sectors, results in European Commission

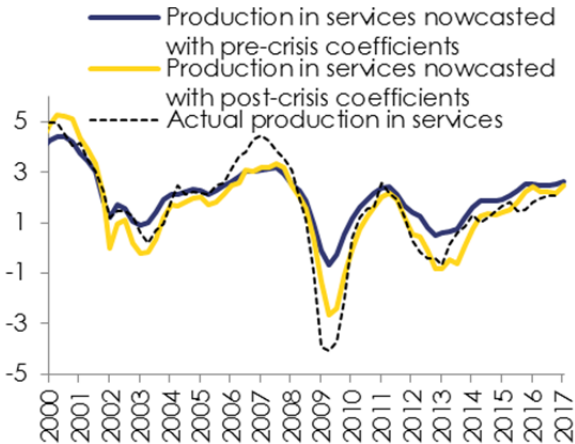
¹ The ESI summarises developments in five sectors (industry, services, retail trade, construction, and among consumers), see the BCS User Guide on https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/business-and-consumer-surveys_en for details. The ESI closely tracks euro area year-on-year GDP growth, with a correlation above 90%.

² This model has been used for instance in Rioust De Largentaye and Roucher (2015) or European Commission (2011). For a review of the use of bridge models, see Ferrara et al. (2010). While stability tests suggest that the Economic sentiment indicator has a constant mean, this is not the case for euro area GDP growth. This fact by itself supports the idea of a break in the relationship between soft and hard data. As a consequence, the chosen model can be considered to be misspecified. Because of its simplicity and wide use in forecasting, it is nonetheless used in this paper to illustrate a potential break. Moreover, under the assumption that GDP has a constant mean over each subsample, the model does not suffer from the previous critic.

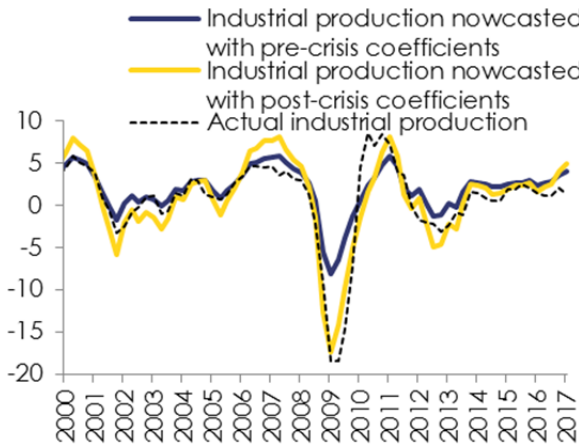
³ Only the first dip of the Great Recession is excluded for the pre/post-crisis analysis, mainly to avoid an undue effect on the length of the post-crisis sample. Moreover it is the steep 2008-2009 financial crisis that has arguably introduced non-linearities in the link between soft and hard data.

(2016) point to the strongest shift among consumers (Graph 2.2) and, to a lesser extent, among services managers (Graph 2.3).⁴

Graph 2.3. Euro area value added in services (yoy % changes), nowcasted with the services confidence indicator



Graph 2.4. Euro area industrial production (yoy % changes), nowcasted with the industry confidence indicator



On the other hand, a systematic level shift after the crisis is not apparent in the link between industrial production (IP) and the industry confidence indicator (Graph 2.4): the predictions based on the pre-crisis estimations are still close to the IP outcomes also after the crisis.

Yet, a level shift is not the only indicator of a change in the relationship between soft and hard data. Econometrical analysis shows that there was indeed a change in this relationship. Let us consider the following model:

$$YoY(IP)_t = b_0 + b_1 \cdot (INDU_t - \overline{INDU}) + b_2 \cdot \Delta INDU_t + u_t$$

With these notations, b_0 can be interpreted as the IP growth corresponding to the long-term average level in industrial confidence, b_1 as the acceleration of IP following a permanent increase of 1 in industrial confidence, and $b_1 + b_2$ as the acceleration of IP following a temporary increase of 1 in industrial confidence. Table 2.1 shows that there was a level shift in the growth corresponding to the average level of industry confidence (with b_0 decreasing from 1.8 to around 1), but it appears to have been offset by a higher sensitivity of industrial production to changes in the survey.

⁴ European Commission (2016) focused on possible effects in industry, services and among consumers; it thus excluded the retail trade and construction sectors.

Table 2.1. Estimated parameters depending on the estimation period

| | Growth with INDU=INDŪ (= b_0) | Acceleration from a permanent increase of 10 in INDU (= $10 \cdot b_1$) | Acceleration from a temporary increase of 10 in INDU (= $10 \cdot (b_1 + b_2)$) |
|--------------|----------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| until 2007Q2 | 1.8 | 3.0 | 3.9 |
| from 2009Q3 | 0.7 | 5.5 | 7.1 |
| from 2010Q1 | 1.0 | 3.5 | 7.2 |

There is some evidence of a pre-/post-crisis shift in the relation between soft and hard data also at the level of individual countries. Bruno et al. (2016), using Italian micro-data on capacity utilisation, provide evidence that the level of capacity utilisation that Italian managers consider as 'sufficient' has significantly declined after the crisis, pointing to a new, lower 'normal'.

For the United-Kingdom, Leach and Belegatis (2016) showed with the ITS Answering Practice Surveys conducted in 1998, 2008 and 2013 that during and after the crisis, firms have become more sensitive to changes in activity. The percentage of firms classifying movements of more than 2% as 'unchanged' (rather than 'risen') has decreased, while a higher percentage of firms consider that only smaller changes of up to 1 or 2% can be regarded as 'unchanged'.

3. LONG-TERM SHIFTS IN THE RELATIONSHIP BETWEEN HARD AND SURVEY DATA: HOW STRONG IS ECONOMIC GROWTH WHEN SURVEY INDICATORS ARE AT THEIR HISTORICAL AVERAGE?

The approach described above is 'discretionary' in the sense that it assumes a clear distinction between the pre- and post-crisis implications of a given level of survey results for economic growth. Curtin and Dechaux (2015) take a longer-term perspective and use the level of the business and consumer surveys as a gauge for secular developments in optimism/pessimism. According to the authors, the 'homeostasis' hypothesis (return to psychological equilibrium) implies that the long-term average of business and consumer confidence stays broadly constant over time, while measures of economic performance such as GDP growth are trending over longer time horizons. This supports the idea that the link between the surveys and GDP growth might be subject to constant change, not only around severe crisis times.

3.1. EURO AREA RESULTS FOR TOTAL ECONOMY

To widen the perspective and better understand how the link between the surveys and GDP growth may have changed over time, one may allow for a continuous adjustment over a large sample.⁵ To this end, two different econometric methods have been applied. The first one is based on the same linear model underlying the pre-/post-crisis method used in section 2.2, but instead of estimating it twice, it is estimated multiple times over rolling samples of 45 quarters.

The choice of a 45-quarter (i.e. 11-year) period ensures a sample long enough for stable ordinary least square (OLS) estimation of the coefficients. At the same time, the model results can be considered as a

⁵ Data for the euro area since 1995 were aggregated by Eurostat. GDP growth before 1995 is based on Fagan et al. (2001).

45-quarter (centered) moving average of the parameters. This means that any shift in the link between the ESI and the GDP growth will take 45 quarters to be completely taken into account by this model.⁶

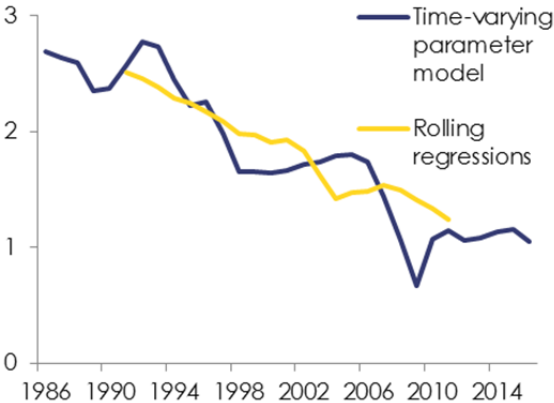
Alternatively, one can estimate a time-varying parameter model (TVP), as suggested in European Commission (2011). Thus, departing from the same structure as above, the coefficients are allowed to vary over time. The advantage of the TVP model compared to the rolling regression is that it does not depend on the choice of the length of the moving average. The coefficients are estimated using Kalman filtering and smoothing, in a classical state-space representation.⁷

When applied to the relationship between GDP growth and the ESI for the euro area, both approaches (i.e. rolling regression and TVP model) provide evidence that the estimated coefficients have changed significantly over the past decades. This implies that for a given level of the ESI, the projected, or corresponding, GDP growth did vary over time.

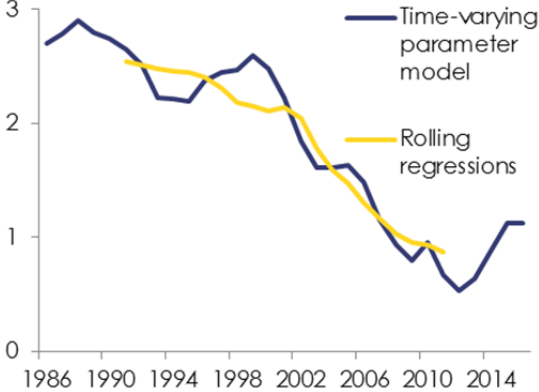
A straight-forward way to visualise the changing relationship between the ESI and GDP growth over time is to calculate the annual GDP growth corresponding to the long-term average of the ESI (of 100), which should reflect survey respondents' 'normal' assessment of a 'neutral' economic situation.

The TVP and the rolling regressions methods give similar results for 'normal' annual GDP growth for the euro area corresponding to an ESI level of 100 (Graph 3.1): such growth used to be above or close to 2% before 2007, before falling steeply between 2007 and 2009. After a mild rebound in 2010, 'normal' growth appears to have stabilised in the post-crisis period. Because the rolling regression method is closer to a centered moving average of the parameters corresponding to a period of 11 years, it shows a smoother decrease than the TVP method. However, estimates from both models confirm that the annual GDP growth corresponding to a level of 100 in ESI is currently just above 1%, as opposed to close to 2% 15 years ago.

Graph 3.1. Euro area GDP annual growth corresponding to the ESI's long-term average



Graph 3.2. Euro area GDP annual growth corresponding to the industry confidence indicator's long term average



⁶ The regression results are qualitatively insensitive to the chosen window length and mainly served to testify to the robustness of the TVP results.

⁷ For the state-space representation, see for instance Kim and Nelson (1989). The detailed setup is presented in Annex I.

The method can robustly be applied to other survey data. For instance, the Industry confidence indicator (INDU) differs from the ESI in that it is based only on the manufacturing sector.⁸ Being entirely based on managers' assessments and expectations concerning their production and business situation, INDU may arguably be more directly linked to concrete growth perspectives than the broader ESI, which also takes into account the consumer confidence. The projection of annual GDP growth corresponding to the long-term average of INDU (Graph 3.2) gives comparable results to those based on the ESI, although the peaks and troughs do not match exactly. In both cases, the estimated annual GDP growth is close to but below 3% around 1990, and follows a general decreasing trend up until the steeper fall during the Great Recession. Following the crisis period, there are clearer signs of a recovery in the INDU-based estimates. Nevertheless, as for the ESI-based estimates, the annual GDP growth corresponding to the long-term average estimated with the TVP model is just above 1% in 2016. The rolling regression method confirms the general trend.

The marked decrease around the crisis period of 2008-09 provides some justification for the discretionary 'pre-/post-crisis' view adopted in European Commission (2016); however, the graph shows that, in addition, there is also a more gradual underlying trend of given survey levels being associated with lower growth rates.

3.2. SECTORAL DRIVING FORCES (EURO AREA)

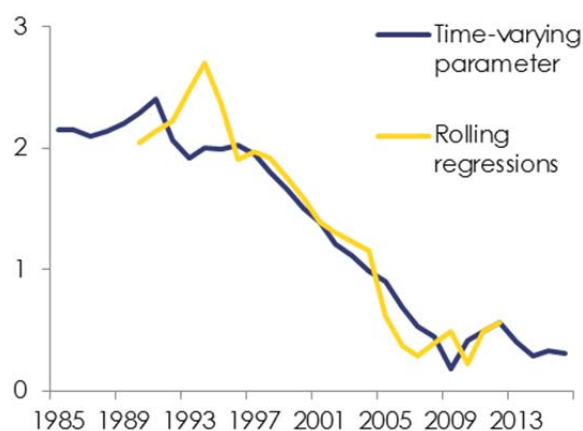
The same method can also be applied to other pairs of 'soft' and 'hard' data. In principle, this could be applied to any economic indicator that can be nowcasted with a survey. For instance, the above-mentioned industry confidence indicator is generally considered to be a particularly good indicator for industrial production growth. Graph 3.3 shows that with both the TVP and the rolling regressions⁹, the rate of annual IP growth corresponding to the long-term average of INDU shows a general decreasing trend between 1990 and 2009. The TVP method gives a very clear and smooth result: after several years above 2%, the IP growth prevailing at an average industry confidence followed a slowly decreasing trend from 1991 to 2009, before picking up slightly in 2010 and then stabilising around +0.4%. The rolling regressions are generally in line with the TVP model.

The results are similar for construction production growth, as projected by the Construction confidence indicator. The smooth TVP estimates clearly point to a general decreasing trend from 1990 to 2010 (from +7.3% to -4.2%), followed by a partial recovery after the Great Recession. The annual growth in construction production that is typically observed when construction confidence is at its average appears to be stabilising slightly above 0% since 2014. Again, the rolling regressions method gives a similar trend.

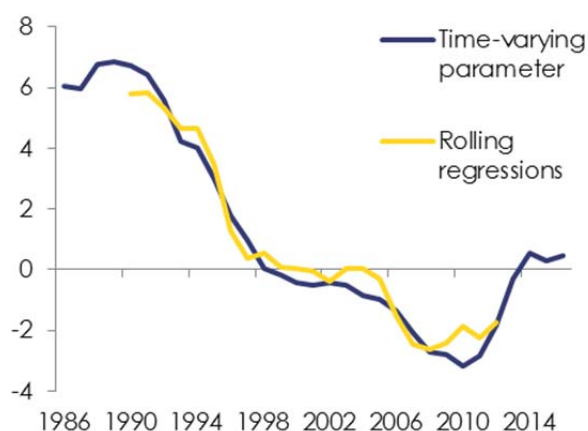
⁸ See the BCS User Guide cited above for details.

⁹ Due to the volatility of industrial production, construction production, and retail trade sales, the rolling regressions for these series were estimated on a sample window of 96 months (i.e. 8 years).

Graph 3.3. Euro area IP annual growth corresponding to the industry confidence indicator's long-term average



Graph 3.4. Euro area construction annual growth corresponding to the construction confidence indicator's long-term average



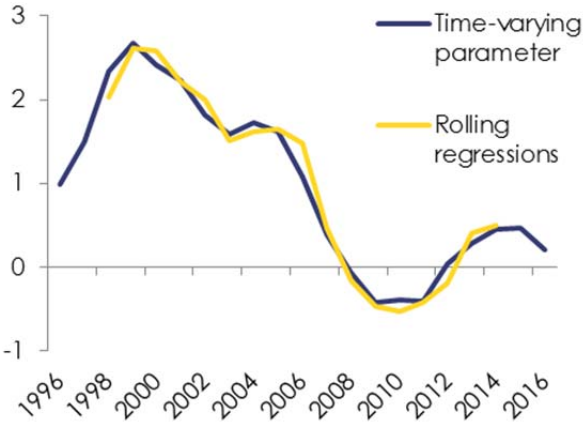
Concerning the annual growth in retail trade corresponding to the long-term average of retail trade confidence, both methods give very similar results, too. Overall, it seems that retail trade managers adapt their perception of the 'normal' growth faster than in other sectors. The growth rate prevailing when retailers' confidence is at its long-term average increased sharply from 1996 to 1999 (from +1% to almost 3%). It then decreased until 2009, slowly at first, and more sharply around the Great Recession, down to just below 0%. It picked up in 2012 and appears to remain at around +0.5% for now.

Concerning the annual growth of private consumption expenditures corresponding to the long-term average in the consumer confidence indicator, the TVP method indicates a general decreasing trend from 1987 to 2011, with periods of temporary stabilisation around 1996 and 2004. Since 2011, 'normal' growth in consumption first remained stable and then increased slightly in 2015-2016, to reach a rate just below 1%. As for the other sectors, the growth estimated with the rolling regressions method confirms the general trend estimated with the TVP.

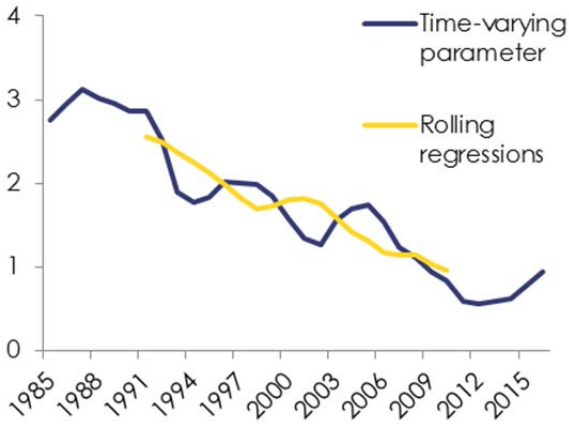
By contrast, in the services sector, the annual growth in value added corresponding to the long-term average of the services confidence indicator did not vary much over the last 20 years, remaining at around +2%. Picking up from just below 2% in the late 1990's, it reached a plateau level around +2.4% between 2000 and 2008. It then decreased slowly back to a rate just below +2% in 2015-2016. While the rolling regressions method indicates a similar rate of growth, the trend is not very clear, owing to data shortage.¹⁰

¹⁰ Data about the value-added in services are only available from Eurostat since 1995.

Graph 3.5. Euro area retail trade annual growth corresponding to the retail trade confidence indicator's long-term average

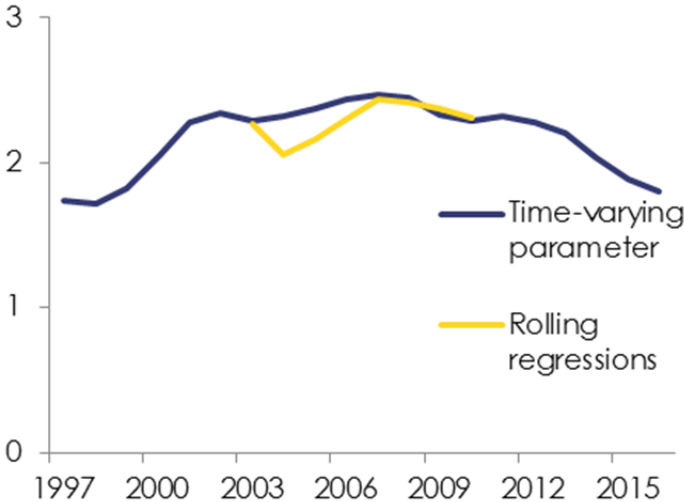


Graph 3.6. Euro area private consumption annual growth corresponding to the consumer confidence's long-term average



Altogether, the observation of a decline in the 'normal' rate of GDP growth since around 1990, accelerated by the Great Recession and then partly recovered and followed by a period of stabilisation is evidenced also at the sectoral level. With the exception of the services sector, the observed aggregate pattern is mirrored by developments in the manufacturing and construction sectors and in the consumption/retail trade sphere.¹¹ The signs of a recovery of 'normal' growth levels after the crisis appear strongest in the construction and retail trade sectors so far.

Graph 3.7. Euro area value added in services annual growth corresponding to the services confidence indicator's long-term average

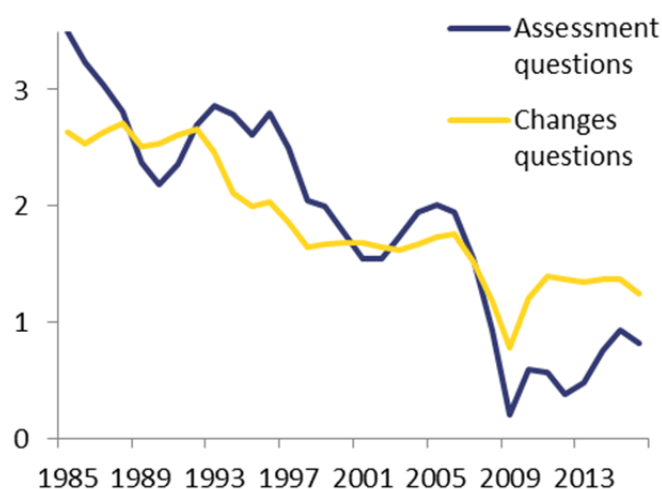


¹¹ The finding of corresponding sector-specific shifts underlines that the shift in the relationship between GDP and the ESI is not an artefact due to the use of fixed sectoral weights in the aggregation of the ESI, while the share of the sectors in the economy might have changed over time.

3.3. DECOMPOSITION INTO 'ASSESSMENT' AND 'CHANGE' QUESTIONS

The ESI and the sectoral confidence indicators are composed of two types of survey questions: those inquiring respondents' assessment of the economic concept at hand compared to a 'normal' reference situation [above normal, normal, below normal] and those asking for their judgement whether and in which direction the economic variable in question has changed (or will change) [increase, unchanged, decrease]. One may expect that the effect of a lower 'new normal' is more directly visible in responses to the first group of 'assessment' questions over time, tracing the very effect that a lower reference standard might have on respondents' comparably more generous answering behaviour. However, also for the 'change' questions, one can imagine that lower reference standards or expectations may lead respondents to consider as an 'increase' what was considered as an 'unchanged' situation before.

Graph 3.8. Euro area GDP annual growth corresponding to the ESI's long-term average



To look into this distinction, Graph 3.8 shows the results of time-varying parameter estimations between euro area GDP growth and a partial ESI based on (i) 'assessment' questions only and (ii) 'change' questions only. While the downward trend in the correspondence between hard and soft data appears somewhat more pronounced for the indicator based on the ESI's 'assessment' questions only, there is clear evidence of the same pattern also for the 'change' questions driving the ESI: a longer-term downwards trend, accelerated during the financial crisis, followed by a pick-up and stabilisation thereafter. Given that the theoretical reasoning for an adjustment of survey responses over time to a new normal is backed by empirical evidence for both types of questions entering the sentiment/confidence indicators, we will continue to look at the customary composite indicators in the following.

3.4. COUNTRY RESULTS FOR THE LARGEST ECONOMIES OF THE EURO AREA

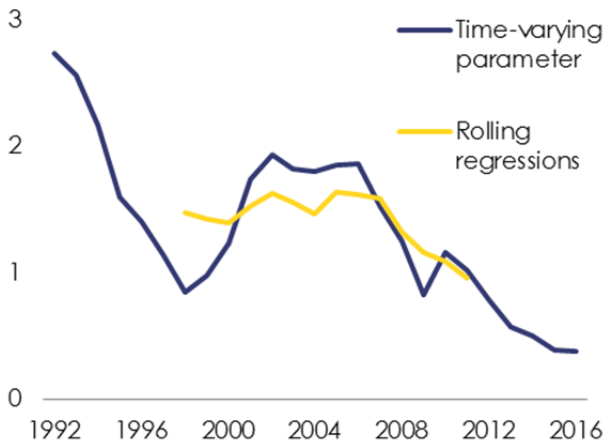
To test the robustness of the approach and findings, the methodology can also be applied to individual countries.¹² Graph 3.9 shows the results for Germany. The trend estimated by the TVP method shows some specific features compared to the euro area. After a sharp decrease from almost 3% in 1992, the growth corresponding to the ESI's long-term average decreased to slightly less than 1% in 1998. It then picked up to reach almost 2% in 2002, and remained at this level until 2007. With the Great Recession, 'normal' growth decreased sharply until 2009 and, interrupted by a short-lived recovery in 2010, kept

¹² For presentational reasons, the focus here is on estimating the annual GDP growth corresponding to the ESI's long-term average, but in principle the same could also be done for individual sectors, including linking the INDU confidence indicator instead of the ESI to overall GDP growth (see results in section 4).

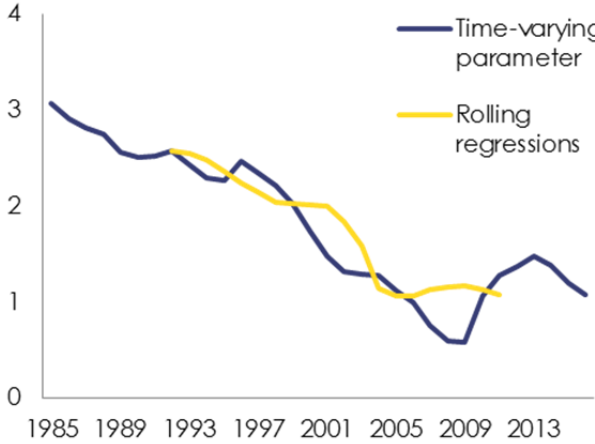
decreasing thereafter. In 2015-16 there are signs of stabilisation at just below +0.5%. Keeping in mind that the rolling regressions method represents a 45-quarters moving average of the parameters, the results are broadly in line for both methods.

The annual GDP growth corresponding to the ESI's long term average for France parallels that of the euro area. It decreased slowly from 3% in 1985 to 0.5% in 2009, and then picked up and remained above but close to 1%. Once again, the estimation using the rolling regressions is generally in line with that from the TVP method.

Graph 3.9. Germany GDP annual growth corresponding to the ESI's long-term average



Graph 3.10. France GDP annual growth corresponding to the ESI's long-term average

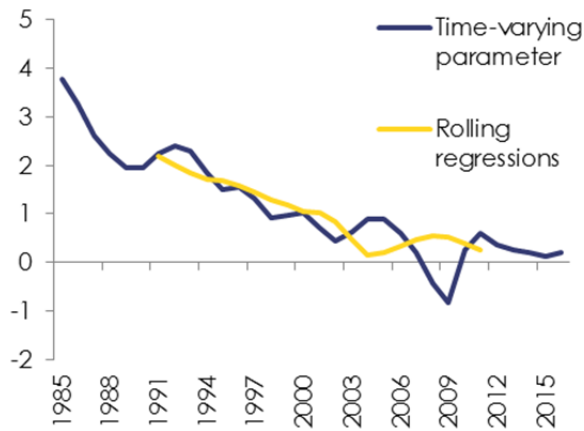


In Italy, the annual GDP growth corresponding to the ESI's long term average estimated with the TVP method shows a trend similar to that of France and the euro area. It decreased from almost 4% in 1985¹³ to around -0.8% in 2009 and then picked up in the aftermath of the Great Recession to 0.6% in 2011. However it fell back to around 0% in 2015 and 2016. The rolling regressions method indicates a rate of growth similar to that of the TVP method.

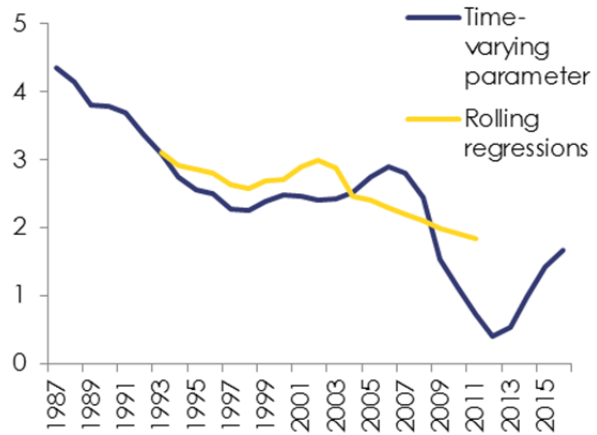
Concerning Spain, the annual GDP growth corresponding to the ESI's long term average estimated with the TVP method is quite smooth. It decreased from above 4% in 1987 to just above 2% in 1998, and then increased again to almost 3% in 2006. It then fell sharply in the crisis to around 0.5% in 2012. Since then, 'normal' growth according to the ESI has recovered to almost 2% in 2016. The rolling regressions method broadly confirms the general decreasing trend of 'normal' growth in Spain.

¹³ GDP growth in Italy and Spain before 1995 was downloaded from the OECD website.

Graph 3.11. Italy GDP annual growth corresponding to the ESI's long-term average



Graph 3.12. Spain GDP annual growth corresponding to the ESI's long-term average



All in all, the results presented in this section clearly indicate that the link between the surveys and GDP growth is subject to constant change, and not only around severe crisis times. Two methods were used in this section: firstly, the conceptually simple but robust rolling regressions method, and secondly, the technically more sophisticated TVP method. Since both methods give similar results, this suggests that also the TVP method can be considered robust. In addition, the TVP method has a clear advantage in terms of timeliness compared to the rolling regressions and will therefore be preferred in the following section.

4. AN ALTERNATIVE MEASURE OF POTENTIAL GDP GROWTH

We have argued that the long-term averages of economic confidence indicators describe a neutral or normal assessment of the economic situation by economic agents. Growth rates corresponding to this neutral reference point can arguably be interpreted as the ‘underlying’ trend, or potential, growth, as perceived by survey respondents. The results are consistent with the hypothesis that the level of economic activity which people consider as ‘normal’ changes over time: they adapt their views to the average growth experienced, or perceived, over the mid- to long-term. From a more technical point of view, these estimates can be interpreted as a measure of GDP growth adjusted for the cycle (i.e. potential growth), where the position in the cycle is determined on the basis of the widely used business and consumer survey results.

The most commonly used methodologies to estimate potential output and the deviations of measured output therefrom are based on production functions.¹⁴ These more sophisticated methodologies have the practical drawback that the results can be heavily revised, especially towards the end of the

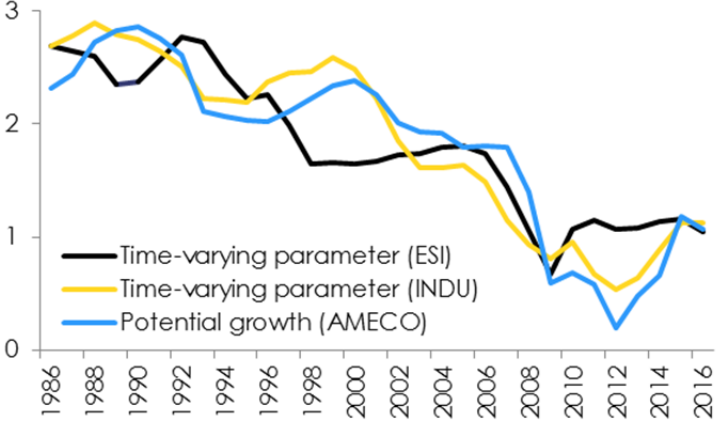
¹⁴ On the methodology for estimating potential growth in the European Commission, see Havik et al. (2014). While based on a much more sophisticated methodology distinguishing between supply and demand side effects, the estimation based on a production function also uses results from business surveys to characterise cyclical deviations and extract them from observed total factor productivity growth. Contrary to the methodology presented in this paper, the cycles in manufacturing industry are identified using a surveyed capacity utilisation indicator, which might be a more accurate measure than synthetic confidence indicators in conceptual terms.

sample.¹⁵ The idea to revert to qualitative BCS data to overcome this issue of strong revisions was already used in ECB (2015). Our approach, based on synthetic confidence indicators rather than survey information on 'factors limiting production', can be considered as an alternative.

Graph 4.1 shows the 'normal' euro area annual GDP growth estimated with the TVP model using the ESI and the industry confidence indicator (INDU), compared with the potential growth estimated by DG ECFIN using a production function. Despite the different underlying methodologies, the similarity between the curves is striking, especially for the INDU-based estimate. While showing some specific features especially in 1998-2002 and 2011-14, also the 'normal' growth estimated using the ESI shows a general trend similar to the two other series. This suggests that business and consumer survey results can be used, beyond their usual short-term forecasting purposes, to gauge changes in long-term or potential growth. As it is based on the perceived economic confidence or sentiment of managers and consumers, this survey-based measure could be called 'perceived potential growth'. The graphs in the annex show that potential growth estimates by other institutions (IMF, OECD) have been closer to our 'perceived' estimates in the aftermath of the crisis.

Graph A.6 in Annex III shows the revisions in the estimates of 'normal' growth according to a pseudo real time exercise between 2007Q1 and 2017 Q3. While the results are not immune against revisions of past GDP growth itself, the revisions towards the end of the sample due to the methodology of time-varying parameter estimation appear rather limited. In addition, Graphs A.7 and A.8 in Annex III compare the estimations derived from a Kalman filter to those from a Kalman smoother; as the former is not revised when subsequent observations become available, the strong similarity between the estimates underlines that the revisions due to the use of the proposed methodology are limited.

Graph 4.1. 'Normal' euro area GDP growth and potential growth



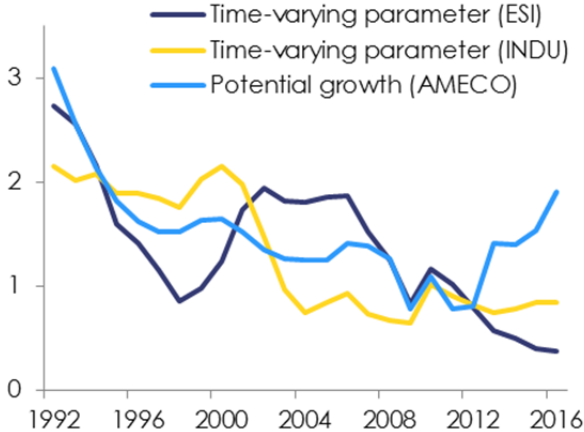
In Germany, although all estimations show a relatively similar decreasing trend from around 3% in 1992 to 1% in 2012, the year-on-year changes and even the rates of growth estimated seem to depend strongly on the methodology. Even using a similar methodology, estimations based on production functions (from DG ECFIN, IMF or OECD) can differ noticeably (see annex). The estimates show markedly different trends since 2013; while potential growth estimated by DG ECFIN's production function increased to reach almost 2% in 2016, the 'perceived' potential growth remained virtually unchanged around 1% (INDU) or decreased to below 0.5% (ESI). Estimations by the IMF and OECD (see annex) indicate a virtually unchanged potential growth since 2013, though at a higher level than our estimate using INDU.

There are two main explanations for this discrepancy. First, it is possible that potential growth perceived by German economic agents is indeed below the actual potential growth, possibly induced

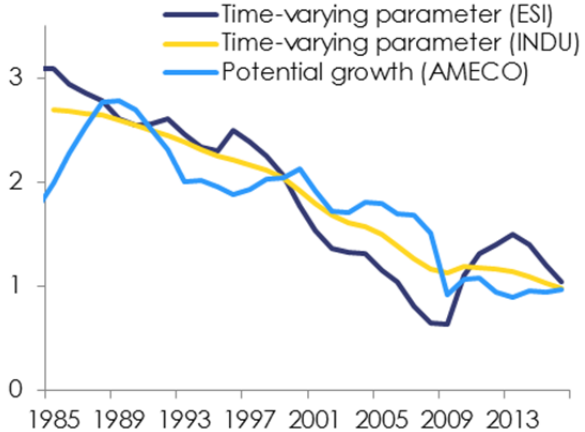
¹⁵ On the revisions and uncertainty of estimates of potential growth and the output gap, see for instance Anderton et al. (2014), ECB (2011) or Marcellino and Musso (2010).

by long-lasting legacy effects of the crisis weighing on expectations. Given that estimates for recent years are often subject to strong revisions, it is also possible that current potential growth could be somewhat overstated by the production function approaches.¹⁶

Graph 4.2. 'Normal' Germany GDP growth and potential growth



Graph 4.3. 'Normal' France GDP growth and potential growth

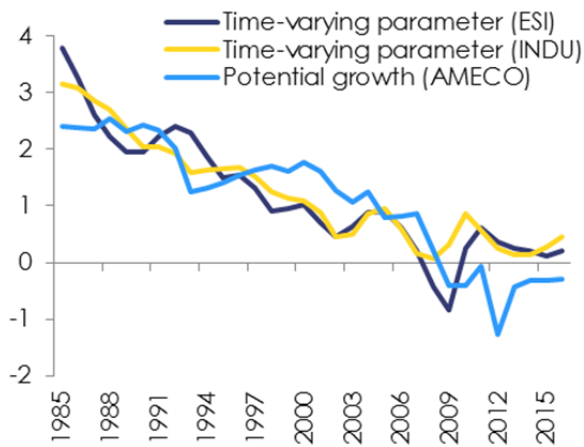


In France, the potential growth estimated using a production function shows a similar overall trend compared to the estimates of 'perceived' potential growth. All three decreased from almost 3% in 1989 to around 1% in 2009, and all estimates for 2016 are consistent at again around 1%. Nevertheless, there are some differences between the three estimations. First, the potential growth estimated with a production function was 2% in 1985, while the 'perceived' potential growth was closer to 3%. In addition, while the latter decreased rather steadily from 1996 to 2008 and remained unchanged in 2009, the former decreased only mildly and irregularly between 1993 and 2008, before falling sharply to a growth rate close to 1% in 2009. Furthermore, both ECFIN's potential growth estimate and the INDU-based perceived potential growth remained virtually unchanged since 2009, while the ESI-based potential growth picked up to 1.5% in 2013 and then decreased back to around 1% in 2015 and 2016. Overall, the INDU-based estimate for France appears smoother and closer to the production-function based estimates.

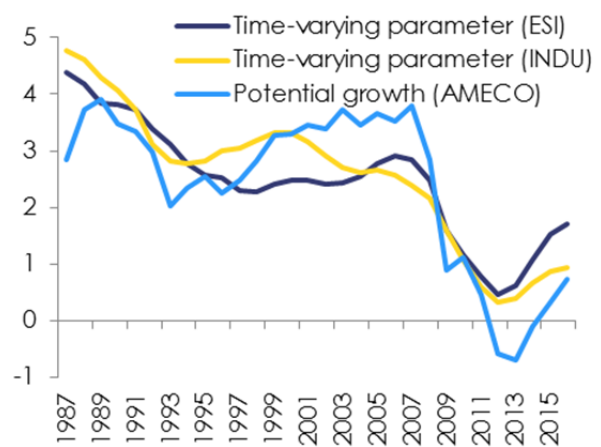
Also in Italy, overall trends are similar for the production-function based and time-varying parameter methods. According to the three estimates, potential growth decreased from around 2.5% in 1988 to between 0% and -0.5% in 2009, and is currently close to 0%. However, there are several differences between the estimates in particular in the aftermath of the Great Recession. On the one hand, the ESI-based perceived potential growth picked up in 2010 and 2011 to close to 1%, and then decreased to close to zero in 2015 and 2016; the INDU-based perceived potential growth shows a slight increase in 2016. By contrast, the potential growth estimated with a production function remained around -0.5%, apart from a kink in 2011-2012, and is still estimated at -0.3% in 2016. The estimates by the IMF and OECD are somewhat closer to the two 'perceived' potential growth estimates (see graph in Annex II).

¹⁶ If this were the case, GDP in Germany might already be close to or above potential output, consistent with the historically low rate of unemployment. While inflation clearly is still low in Germany, the link between the economic cycle and wages or core inflation (as postulated by the Phillips curve) has been found loosening in advanced economies in recent years, see e.g. Albuquerque and Baumann (2017) for a recent discussion.

Graph 4.4. 'Normal' Italy GDP growth and potential growth



Graph 4.5. 'Normal' Spain GDP growth and potential growth



Finally, for Spain the variation in the potential growth estimated by the production function approach is much larger than that in 'perceived' potential growth. From around 4% in 1989, the potential growth estimated by DG ECFIN's production function decreased to below 2½% in 1996 and then increased to close to 4% before the crisis hit. It then plunged to close to -1% in 2013 and picked up slowly to reach +0.5% in 2016. While the profile of the ESI-based perceived potential growth is quite similar, the estimated rates were significantly lower before the crisis and significantly higher since 2012. The INDU-based perceived potential growth shows a much smoother decline between 2000 and 2012, remaining in positive territory, and points to a modest rebound in potential growth since 2013. Since 1992 it closely parallels the potential growth estimates by the OECD and the IMF (see Annex II), including for the recent post-crisis period.

5. CONCLUSIONS

Overall, the presented results call for caution when mechanically mapping survey data levels into actual economic growth rates. While the current level of the ESI, which is well above its long-term average, is compatible with expanding economic activity, it also hints at lower growth rates than those implied in the pre-recession period. Using rolling regressions and time-varying parameters models, this paper shows that the growth rates implied by euro-area survey results did not only fall during the Great recession, but had decreased already since around 1990. This is true for the overall economy (measured by GDP growth), but also industrial production, construction production, retail trade and household consumption.

Furthermore, this paper suggests that business and consumer survey results can be used, beyond their usual short-term forecasting purposes, to gauge changes in long-term or potential growth. Despite the completely different underlying methodologies, the similarity between the results presented here, called 'perceived potential growth', and potential output growth estimates based on production functions is striking. The results of this alternative method are also presented for the four largest economies of the euro area, giving support to the hypothesis of a 'new modesty' connected with the decline in potential output growth observed in recent years.

The 'perceived' potential growth estimates presented in the paper might be useful in complementing the assessment of long-term growth prospects. The empirical applications show a high degree of

similarity with established potential growth estimates based on production functions, but also some differences. The latter concern in particular Germany, where the estimates derived from survey respondents' perceptions point to lower potential growth than indicated by production functions in recent years, and Spain, where, on the contrary, the time-varying regressions using survey data point to higher 'perceived' long-term growth than current potential growth estimates. While the estimates lack the foundation of the production-function based estimates in economic theory, they have a clear conceptual interpretation of GDP growth adjusted for the cycle (i.e. potential growth), where the position in the cycle is based on the widely used business and consumer survey results. Moreover, they have the advantage of being available in real time and do not depend on assumptions on the factors driving potential growth, which are often subject to later revisions. This being said, the results are not immune against revisions of past GDP growth itself.

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ANNEX I

Time-varying parameter models estimation

Departing from a base OLS model, where the growth is measured year-on-year to smoothen the results.

$$yoy(Y_t) = b_0 + b_1 \cdot (ESI_t - \overline{ESI_t}) + b_2 \cdot \Delta^4 ESI_t + u_t, u_t \sim N(0, \sigma_u^2)$$

The following model in a classical state space representation:

$$\begin{aligned} yoy(Y_t) &= b_{0,t} + b_{1,t} \cdot (ESI_t - \overline{ESI_t}) + b_{2,t} \cdot \Delta^4 ESI_t + v_t, v_t \sim N(0, \sigma_v^2) \\ b_{i,t+1} &= b_{i,t} + \varepsilon_{i,t}, \varepsilon_{i,t} \sim N(0, \sigma_i^2), i \in \{0,1,2\} \end{aligned}$$

Or in case b_2 is not significantly different from 0 in the OLS model:

$$\begin{aligned} yoy(Y_t) &= b_{0,t} + b_{1,t} \cdot (ESI_t - \overline{ESI_t}) + v_t, v_t \sim N(0, \sigma_v^2) \\ b_{i,t+1} &= b_{i,t} + \varepsilon_{i,t}, \varepsilon_{i,t} \sim N(0, \sigma_i^2), i \in \{0,1\} \end{aligned}$$

Here, $b_{0,t}$ is the annual growth corresponding to the ESI's long term average (100).

This time-varying parameter model is estimated with a Kalman filter and smoother, with the following initial conditions:

- variance of the observation noise $\sigma_v = 0.5 \sigma_u$
- diagonal elements of the variance matrix of the system noise
 - $\sigma_i = \alpha \sigma_i^{OLS}$, where α is a smoothness parameter to be determined later.
- the expected value of the pre-sample state vector
 - $m_0 = \begin{bmatrix} b_0 \\ b_1 \\ b_2 \end{bmatrix}$ or $m_0 = \begin{bmatrix} b_0 \\ b_1 \end{bmatrix}$
- the variance matrix of the pre-sample state vector
 - $C_0 = \begin{bmatrix} 50 & 0 & 0 \\ 0 & 50 & 0 \\ 0 & 0 & 50 \end{bmatrix}$ or $C_0 = \begin{bmatrix} 50 & 0 \\ 0 & 50 \end{bmatrix}$

To estimate α , which can be considered as a smoothness parameter, the idea is to choose the optimal fit in the following model:

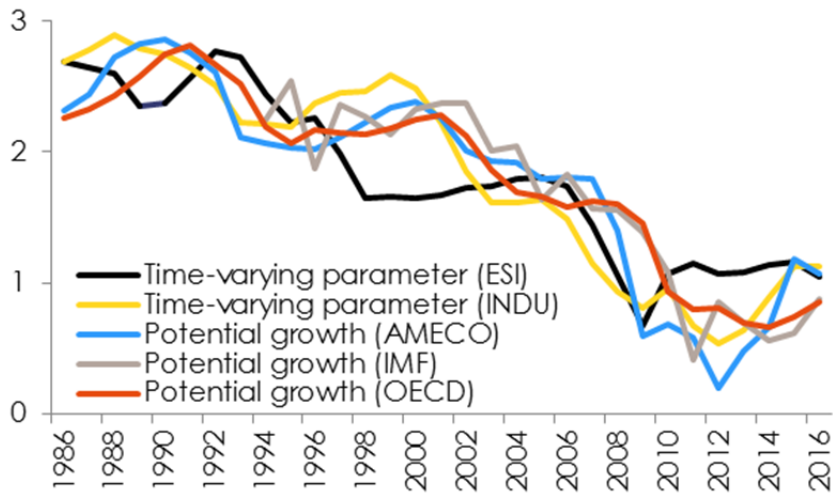
$$qoq(Y_t) = \beta_0 \cdot b_{0,t-1}(\alpha) + \beta_1 \cdot (ESI_t - \overline{ESI_t}) + \beta_2 \cdot \Delta ESI_t + \varepsilon_t$$

The rationale behind this choice for α is to improve the constant in a forecasting setup. And then compare if this model is a better fit than the same one with a constant instead of $b_{0,t-1}(\alpha)$.

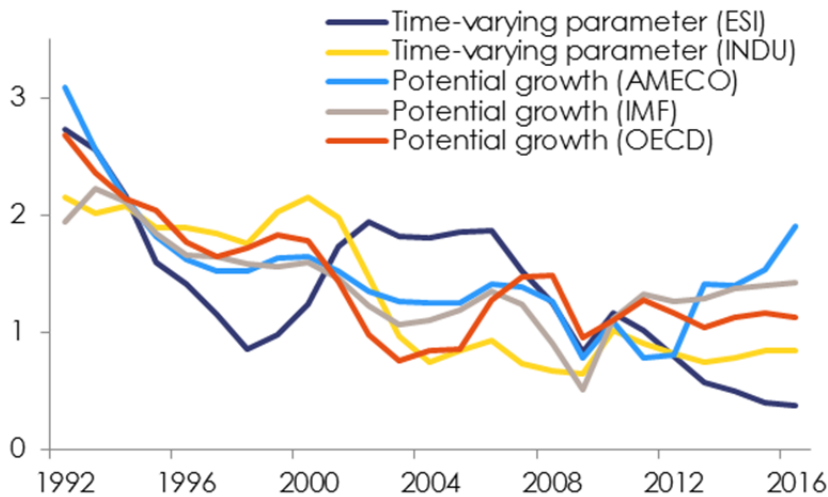
ANNEX II

'Normal' growth and other estimations of potential growth based on a production function (from OECD and IMF)

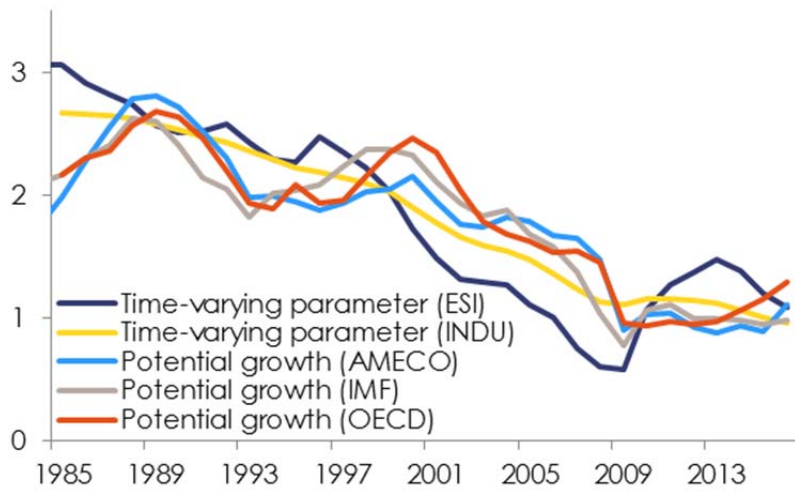
Graph A.1. 'Normal' euro area GDP growth and potential growth



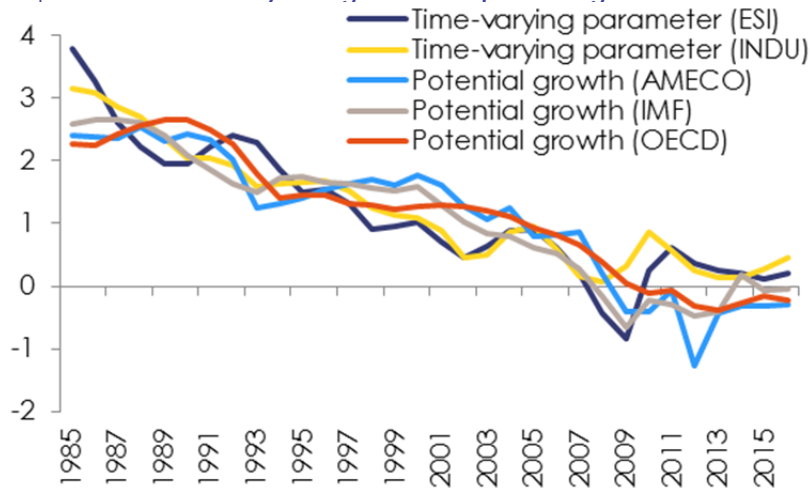
Graph A.2. 'Normal' Germany GDP growth and potential growth



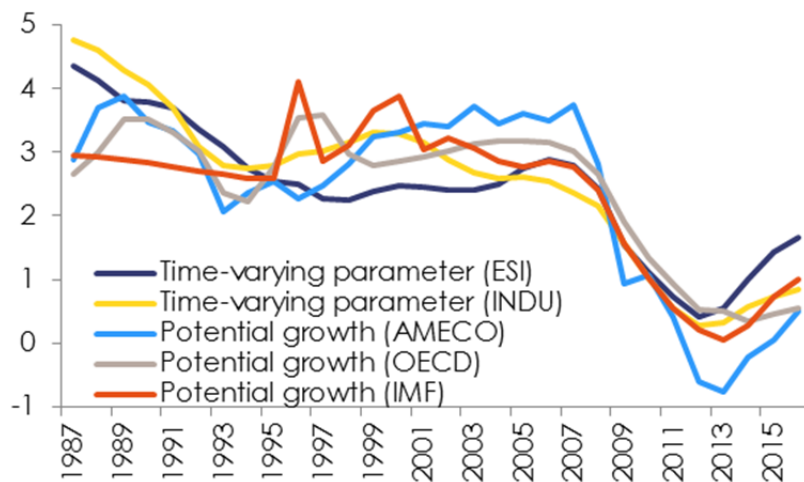
Graph A.3. 'Normal' France GDP growth and potential growth



Graph A.4. 'Normal' Italy GDP growth and potential growth



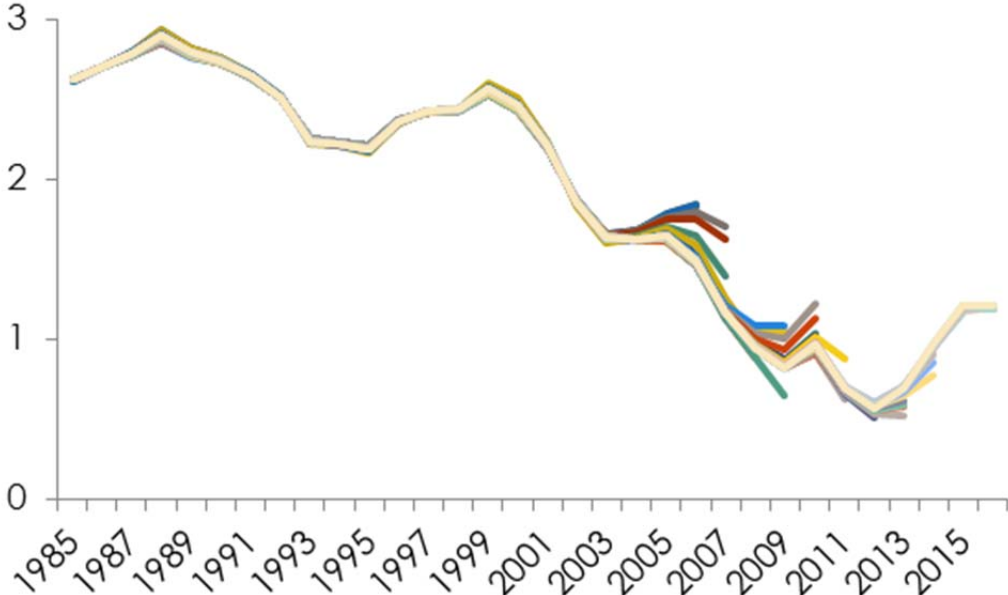
Graph A.5. 'Normal' Spain GDP growth and potential growth



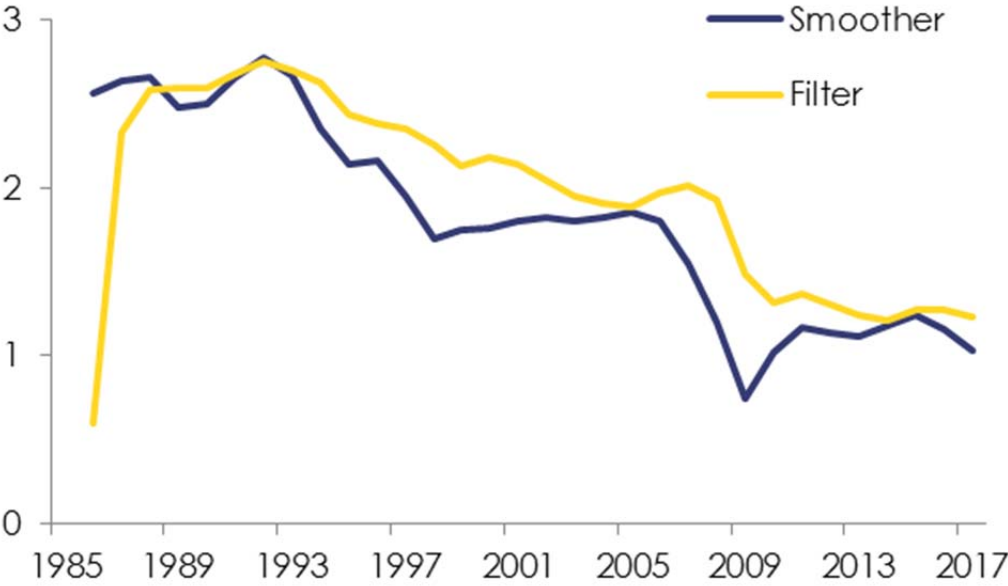
ANNEX III

Revisions in 'normal' growth

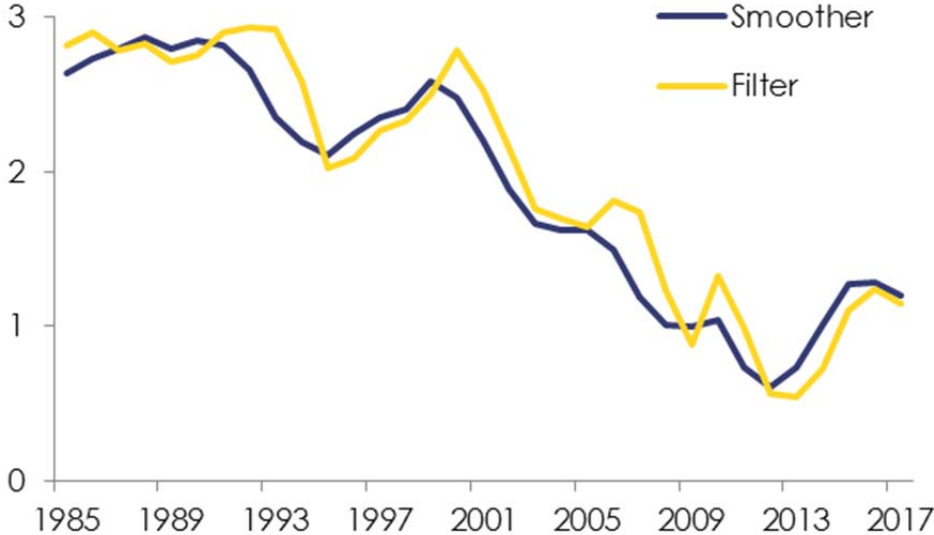
Graph A.6. Revisions in 'normal' growth in pseudo real time between 2007Q1 and 2017Q3



Graph A.7. Estimations of euro area annual GDP growth corresponding to the ESI's long-term average, based on a Kalman filter and a smoother



Graph A.8. Estimations of euro area annual GDP growth corresponding to the industry confidence indicator's long-term average, based on a Kalman filter and a smoother



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