

The performativity of potential output: Pro-cyclicality and path dependency in coordinating European fiscal policies

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ABSTRACT

This paper analyzes the performative impact of the European Commission's model for estimating 'potential output', which is used as a yardstick for measuring the 'structural budget balance' of EU countries and, hence, is crucial for coordinating European fiscal policies. In pre-crisis years, potential output estimates amplified the build-up of private debt, housing bubbles and macroeconomic imbalances. After the financial crisis, they were revised downwards, which increased fiscal consolidation pressures. By focusing on the euro area's economies during 1999-2014, we identify two performative aspects of the potential output model. First, the political implications of the model led to a pro-cyclical feedback loop, reinforcing general economic developments. Second, the model has contributed to national lock-ins on path dependent debt trajectories, fueling 'structural polarization' between core and periphery.

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1. Introduction

This paper poses the question about the impact of macroeconomic theory and modeling on economic development in Europe in the run-up to and in the aftermath of the global financial crisis 2008/2009 (GFC). In doing so, we take the claim that economic models “do not merely record a reality [...] but contribute powerfully to shaping, simply by measuring, the reality”, as emphasized by Callon (1998, p. 23) as our main vantage point. While this performativity of economic models (Callon 1998; MacKenzie, 2003; 2006) has been studied extensively in microeconomic contexts, especially in financial markets (e.g. MacKenzie & Millo, 2003; Beunza & Stark, 2004; MacKenzie, 2011; Svetlova, 2012; Lockwood, 2015), the scholarly literature has so far remained silent on the performative impact of macroeconomic models on overall economic performance. This gap in the performativity literature is remarkable, given that the role of macroeconomic theory and models has been the subject of intense academic debate, especially when it comes to explaining the GFC (e.g. Colander et al., 2009; Cochrane, 2009) and economic policies in Europe in the aftermath of the financial crisis (e.g. Blyth, 2013; Truger, 2013). Similarly, the impact of (macro) economic thought on politics in general is a classic theme in the economic literature (e.g. Hall, 1989; Skidelsky, 2003; Mirowski & Plehwe, 2009).

In this paper, we aim to partly fill this research gap by analyzing the performative effects of the European Commission’s (EC) model for estimating potential output with a particular focus on the Eurozone (EZ) over the time period 1999-2014. In the EU’s fiscal regulation framework, estimates of potential output play a crucial role. Potential output (PO) is defined as the (unobservable) level of output in an economy at which all production factors are employed at ‘non-inflationary levels’ (Havik et al. 2014) and estimated by an in-house model of the EC (Planas & Rossi, 2015). PO estimates have important implications for the scope of policy as they are used to calculate ‘structural budget balances’, which in turn translate into country-specific fiscal policy restrictions.

More specifically, the EC uses the PO model for constructing estimates of the ‘output gap’ – the difference between actual GDP and unobservable PO – as an indicator for the cyclical position of an economy: When the output gap is positive, an economy is said to be overheated; vice versa, a negative output gap is interpreted as underutilization of economic resources. The EC’s estimate of the output gap is translated into a judgment on how much of the fiscal deficit (or surplus) in a particular country is ‘structural’ in the sense that it cannot be attributed to variations in the business cycle. Additionally, the structural balance corrects for one-off and temporary effects – such as costs related to bailing-out financial institutions (Mourre et al., 2014) –, which are determined in political negotiations. Since 2005, the Stability and Growth Pact (SGP) makes use of the structural balance as the most important control indicator for fiscal conduct (ECFIN, 2013); and rules in the Fiscal Compact also stipulate deficit limits in terms of the structural balance (Fiscal Compact, 2012).

Due to this institutionalization of the structural balance in the EU’s fiscal regulation framework, an increase in the structural deficit amplifies the pressure to implement fiscal consolidation, while a decrease in the structural deficit (or an increase in the structural surplus) reduces the urgency for fiscal adjustment. Against this backdrop, we analyze the PO model not primarily as a scientific device that allows economists to assess the position of an economy in the business cycle and to draw conclusions on the ‘structural component’ of the

fiscal balance, but rather as a conceptual foundation for an authoritative political practice that structures the room for fiscal policy maneuvering in EU countries.

This paper is structured as follows. In section 2, we provide a framework for studying economic developments in the EZ since the introduction of the Euro to provide an adequate background for understanding the performative effects of the PO model introduced in section 3. In section 4, we theoretically explore and empirically illustrate the pro-cyclicality of the EC's model estimates and discuss their performative impact on macroeconomic developments. Section 5 provides an empirical analysis on the role of the PO model in shaping private and public sector debt trajectories in Europe. Section 6 concludes our arguments.

2. A tool and its context: Financialization, current account imbalances and the Eurozone crisis

In order to understand the contribution of the PO model to shaping European economic developments in recent years, we provide a simple framework for assessing the channels through which both the build-up of imbalances and fragilities before the GFC of 2008/2009 as well as their prolonging during the EZ crisis from 2010 onwards can be summarized. In doing so, we supply information on the specific economic contexts in which the PO model was applied.

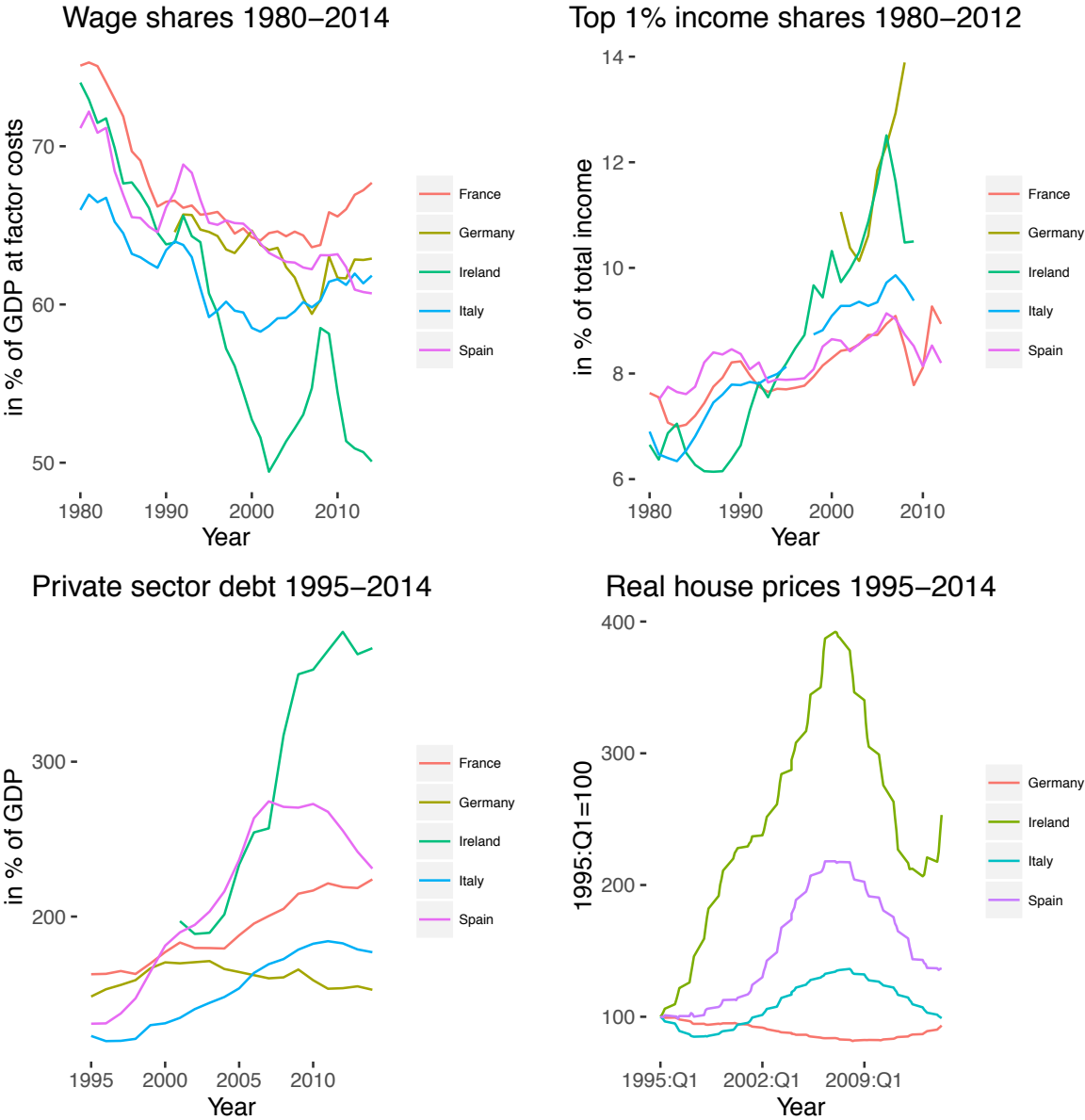
The framework builds on four stylized empirical facts, illustrated in Figure 1 for five selected EZ countries (France, Germany, Ireland, Italy and Spain): First, wage shares have shown a falling trend across the EZ from the early 1980s to the GFC. Second, income inequality has increased markedly over the same time period. Third, private sector debt has witnessed a significant rise in many EZ countries after the introduction of the Euro, with the remarkable exception being Germany, where private sector debt to GDP has been falling since the turn of the millennium. Finally, real housing prices have risen in many, but not all EZ countries, with some economies experiencing sharp increases in housing prices before the financial crisis and corresponding declines in more recent years.

In our framework, financialization – characterized by an increase in income inequality in conjunction with the deregulation of financial markets – drives pre-crisis economic developments in the EZ. Falling and more unequally distributed wage shares put downward pressure on domestic demand (e.g. Stockhammer, 2015; Cynamon & Fazzari, 2016) and contributed to increasing private sector indebtedness before the GFC (e.g. Stockhammer & Wildauer, 2015; Perugini et al., 2016; Storm & Naastepad, 2016).

Two theoretical explanations for the link between income concentration and private sector debt may be put forward. First, households confronted with stagnant or declining incomes may try to preserve their living standards or to keep up with socially mediated consumption standards, which increases the propensity to incur debt (e.g. Kapeller & Schütz, 2014). Second, stagnant or declining real wages also make it more difficult for low- and middle-income groups to cover rising living costs. In the short-term, such an increase in household debt may compensate for the impact of wage losses on aggregate demand, “thus providing the solution to the contradiction between the necessity of high and rising consumption levels, for the growth of the system's actual output, and a framework of antagonistic conditions of distribution which keeps within limits the real income of the vast majority of society” (Barba & Pivetti, 2009, p. 113).

In the context of our framework, it is financial innovations and the liberalization of capital flows in the EZ that ensure that the households' demand for credit – which increased in pre-crisis years due to higher income inequality – is met by sufficient credit supply. In Europe, free flows of capital were accelerated by the integration of financial markets in association with the introduction of the Euro.

Figure 1: Distribution, debt and housing prices in five countries



Data: Wage shares were obtained from AMECO (November 5th 2015), data on income shares from the World Wealth and Income Database (March 29th 2015), data on private sector debt from OECD.Stat (December 2nd 2015), and real house prices from the Dallas Fed (International House Price Database, 2015:Q3; no data on France).

Aside from the importance of the GFC as a trigger, the EZ crisis – which has manifested in a sovereign debt crisis (from 2010 onwards) accompanied by bail-outs for several countries on the condition of austerity measures (e.g. Lane, 2012; Sapir et al., 2014) – finds its essential roots in the build-up of severe macroeconomic imbalances (e.g. Stockhammer & Sotiropoulos, 2014) in conjunction with the loss of monetary sovereignty, which constrains the ability of EMU member countries to counteract crisis dynamics (de Grauwe, 2012). The emerging fragilities of individual EZ countries during the pre-crisis years were fueled by credit-led economic growth and large capital flows from EZ ‘core countries’ like Germany, France and the Netherlands to ‘periphery countries’ such as Spain, Ireland, Portugal and Greece (e.g. Hobza & Zeugner, 2014; Baldwin et al., 2015).¹

In Spain and Ireland, capital inflows and private sector credit expansion triggered the build-up of major bubbles in housing markets, manifesting in construction sector booms (e.g. Drudy & Collins, 2011; Ruiz et al., 2015). Moreover, interest rates and risk premia in many EZ countries had declined markedly from 1995 to 2007, as financial market actors anticipated and reacted to the introduction of the Euro (e.g. Mody & Sandri, 2012). As a consequence, loans in large parts of the EZ were cheaper and more easily available to households and companies alike. In interaction with capital inflows and rising asset prices, the build-up of private sector debt stimulated unsustainable economic expansions (e.g. Chmelar, 2013; Storm & Naastepad, 2016).

On a national level, there are three possibilities to compensate for a demand stagnation tendency triggered by financialization. First, an economy may compensate the downward pressure on domestic demand by expanding its exports. This is what has happened in Germany (e.g. Storm & Naastepad, 2015b) and – to a lesser extent – in other surplus countries like Austria and the Netherlands. Second, the decrease in demand may be compensated by expansionary fiscal policy – as in Greece and Portugal during pre-crisis years (e.g. Lane, 2012). Third, the economies concerned may develop a growth model that is driven by private sector debt accumulation. Since the adoption of the Euro, debt-led growth regimes have especially characterized the experiences of large parts of the EZ’s periphery (e.g. Stockhammer & Wildauer, 2015).

Periphery countries like Spain, Ireland, Portugal and Greece accumulated large current account deficits before the GFC. As the EZ’s pre-crisis current account balance was close to zero, other EZ countries – such as Germany, Austria and the Netherlands – had to run correspondingly large current account surpluses (e.g. Tressel et al., 2014). As imbalances built up, ‘deficit countries’ lost ground to ‘core countries’. In the periphery, it was not only that both unit labor cost increases and consumer price inflation were higher than the EZ average. Even more importantly, structural change affected deficit countries in adverse ways. The export bases of periphery countries deteriorated in relation to the core, as their economies became dependent on foreign-financed imports (Storm & Naastepad, 2015a, 2015b).

Hence, although the Euro had raised high hopes for economic convergence (e.g. Blanchard & Giavazzi, 2002), economic reality was characterized by the build-up of large macroeconomic imbalances, which did not reflect a healthy ‘catch-up process’ in the periphery but rather the emergence of an unsustainable mix of debt-led and export-led growth regimes across EZ countries. As long as a seemingly benign financial environment masked the fragilities

¹ Hence, the roots of the EZ crisis in the years prior to the GFC of 2008/2009 lie *not* in excessive fiscal deficits and public debt, although the crisis has created severe sovereign debt problems from 2010 onwards (e.g. Lane, 2012; deGrauwe & Ji, 2014).

corresponding to the build-up in private debt and the rising dependencies regarding the financing of current account deficits, the emergence of macroeconomic imbalances stimulated the real economy in large parts of the EZ.

The outbreak of the financial crisis, however, revealed the existing fragilities with a bang, as deficit countries suffered a ‘sudden stop’ in capital inflows, followed by massive capital outflows, implying that large current account deficits had to be unwound (e.g. Giavazzi & Spaventa, 2010). The reversal in capital flows triggered a fall in economic growth and increases in unemployment, as over-indebted private sector actors were forced to deleverage by cutting back on their spending. Public debt and fiscal deficits rose sharply, while the public sector in many EZ countries socialized private sector and financial sector debt in order to avoid a financial system breakdown.

In this damaging process, Greece, Portugal, Ireland and Cyprus were forced to apply to be bailed-out by the Troika, consisting of the EC, the ECB and the IMF. Financial assistance was granted only on the condition that stressed countries implement drastic cuts in government spending and wages (Sapir et al. 2014). In the countries that were forced to implement the harshest fiscal austerity measures, demand was squeezed the most (e.g. de Grauwe & Ji, 2013), which contributed to a crash in imports. The process of unwinding pre-crisis imbalances and reducing the private sector debt overhang has had a strong negative effect on the real economy in the EZ (e.g. Koo, 2015), consistent with historical evidence that debt deleveraging weighs heavily on aggregate demand, implying sluggish recoveries (Jorda et al., 2016) – with the most pronounced impact on countries that had previously accumulated the largest current account deficits.

These are the relevant contexts for this paper’s performativity analysis of the EC’s PO model. The purpose in the remaining sections is to analyze how the model has been employed as an authoritative political practice that – through its institutionalization in the EU’s fiscal regulation framework – has helped to structure and shape the contexts described in this section, thereby modulating the budgetary conduct in the countries concerned and influencing macroeconomic developments.

3. The European Commission’s potential output model and its use in European fiscal policy-making

In what follows, we open the ‘black box’ of the EC’s PO model, where ‘black box’ is understood as a device that is opaque to outsiders, because its content is regarded to be overly ‘technical’ (MacKenzie, 2005). The ‘unpacking’ of the model will foster our understanding about how it structures the contexts introduced in section 2.

The EC’s model for computing PO is essential for judging which components of the fiscal balance in EU countries are ‘structural’, that is, the part of the fiscal deficit (or surplus) that is driven neither by the business cycle nor by one-off and temporary effects such as costs related to averting the break-down of the financial system (Havik et al., 2014; Mourre et al., 2014; Costantini, 2015). Estimates of the ‘structural balance’ directly depend on the EC’s measure of the output gap, as can be seen from the corresponding formula:

$$SB_t = FB_t - \varepsilon_t OG_t - OE_t.$$

Here, SB_t refers to the structural balance; FB_t denotes the fiscal balance reported by individual countries; ε_t measures the reaction of the fiscal balance to the output gap, called ‘semi-elasticity parameter’; OG_t is the output gap, measured as the difference between actual GDP and PO (in percent of PO). Finally, OE_t are one-off and temporary effects on the fiscal balance (Mourre et al., 2014). Subtracting $\varepsilon_t OG_t$ from FB_t yields the cyclically-adjusted budget balance (CAB_t).²

The PO model is the EC’s preferred operational surveillance tool for evaluating and controlling fiscal policies, as PO estimates are transformed into estimates of the structural balance. The institutional importance of these estimates derives from the SGP, which defines countries’ medium-term budgetary objectives (MTOs) in terms of the structural balance. In case of a deviation from the MTO, a country has to correct ‘excessive structural deficits’ by fiscal consolidation measures, as the SGP requires the structural balance to improve by 0.5% of GDP per year (ECFIN, 2013). Moreover, the Fiscal Compact uses estimates of the structural balance to assess fiscal policies: Governments are legally obliged to ensure that the structural deficit does not exceed 0.5% of GDP per year – a rule that signatory states had to codify into national law, preferably as a constitutional safeguard (Fiscal Compact, 2012). Hence, higher structural deficits amplify the pressure to implement fiscal consolidation measures; vice versa, a fall in the structural deficit (or a rise in the structural surplus) reduces the need for fiscal adjustment.

Drawing on usual practices in the neoclassical growth literature (e.g. Solow, 1957; Aghion & Howitt, 2009), the EC employs a Cobb-Douglas production function³ of the form

$$PO_t = L^\alpha K^{1-\alpha} TFP_t$$

to obtain estimates of unobservable potential output PO_t (Havik et al., 2014). In doing so, the production factor labor L_t is operationalized as a Hodrick-Prescott-filtered trend of the share of total working hours offered by the active Labor Force, *which would be employed given the EC’s NAIRU estimates*. Total Factor Productivity (TFP_t) is first calculated as average output per hours worked, then corrected for ‘cyclical’ deviations by a Kalman-Filter and eventually reinserted into the model. Finally, estimates for the capital stock K_t are taken from the AMECO database. Hence, the Cobb-Douglas function merely serves as a simple calculatory vehicle for processing empirical data, while the essential economic question – ‘Which components of unemployment and productivity growth are to be judged ‘structural’ or ‘cyclical’?’ – is delegated to the statistical de-trending of the respective time-series on unemployment and TFP. The de-trending procedure makes use of a Kalman-filter approach (Kalman, 1960; Durbin & Koopman, 2012), which is at the heart of the EC’s PO model.

In what follows, we specifically focus on the estimation of the contribution of labor supply (L) to PO for two reasons: First, the EC defines PO as the level of output at which inflation remains stable. Hence, the NAIRU – the unemployment rate at which (wage) inflation does not accelerate – is of central importance for the theoretical framework (European Commission, 2014) and also serves as blueprint for corresponding policy suggestions to increase labor market flexibility (e.g. Orlandi, 2012). The second reason for focusing on the role of NAIRU estimates refers to their empirical impact: Several researchers have pointed

² See Costantini (2015) for a historical analysis on the evolution of the concept of the CAB and its political aspects.

³ The Cobb-Douglas framework used by the EC is well established, although there exist many criticisms challenging its theoretical foundations and empirical usage (e.g. Felipe and McCombie, 2014).

out that since the GFC, revisions in NAIRU estimates have been the most important reason for changes in PO for many EZ countries (e.g. Cohen-Setton & Valla, 2010; Klär, 2013; Krugman, 2013). Moreover, Spain and other countries have raised political objections against the EC's NAIRU estimates (e.g. Kingdom of Spain, 2013; Ciucci & Zoppe, 2016). In section 4, we will make use of the EC's revisions in NAIRU estimates for the purpose of empirically illustrating the performative effects of the model.

The EC defines the NAIRU as the 'trend component' of the unemployment rate, stripped of all cyclical factors (European Commission, 2014; Planas & Rossi, 2015). From a theoretical perspective, the EC therefore connects the NAIRU with the idea of a 'natural rate of unemployment' (Friedman, 1968; Phelps, 1967), which is assumed to exist for any economy and at any point in time, independently of all cyclical and seasonal influences. In the EC's theoretical framework, a Kalman-filter approach is used to supply NAIRU estimates, which are interpreted as a proxy for 'structural unemployment' (Orlandi, 2012; Lendvai et al., 2015).

Hence, the Kalman-filter employed to calculate NAIRU estimates is of crucial importance for the model's outcomes. Regrettably, the Kalman-filter technique comes with a series of drawbacks, which are either due to the general statistical properties of Kalman-filtering or related to the specific implementation of the Kalman-filter employed by the EC. Without going into the technical details of the underlying dynamic state-space model – which is basically a concise reconstruction of the underlying statistical and economic hypotheses in matrix notation (Durbin & Koopman 2012; Harvey, 1990) – these drawbacks can be summarized as follows: The Kalman-Filter is based on a recursive procedure, which updates its predictions every time new empirical information becomes available. Due to this crucial role assigned to the most recent observations – a phenomenon that the statistical filtering literature calls the 'end point bias' (e.g. Kaiser & Maravall, 2001; Ekinci et al., 2013; Havik et al., 2014) – NAIRU estimates based on the Kalman-Filter exhibit a pro-cyclical bias. For the very same reasons – the filter's recursive structure and the associated quick adaption to new inputs – estimates given by the Kalman-Filter are not consistent over time, as they are subject to changes when additional or revised observations are brought into the filtering process, which may cause new de-trended estimates to represent strong revisions of past estimates that also contradict past policy-prescriptions (e.g. Darvas, 2013; Klär, 2013; Palumbo, 2015).

The implementation of the Kalman-Filter offered by the EC also draws on an idiosyncratic interpretation of the underlying economic relationships, as the 'cyclical component' of unemployment is simply modeled as statistical noise surrounding the 'trend component', i.e. the NAIRU (Planas & Rossi, 2015). Hence, ontologically spoken, the business cycle is not interpreted as an economic phenomenon on its own, but rather as a purely statistical property (Hoover, 2015). This model setup leads to a strongly empiristic take on estimating the NAIRU, where the only remaining theoretical argument is the implementation of a Phillips-curve relationship between the unemployment rate and wage inflation.⁴ However, this relationship is only used as an auxiliary construct as it is not employed to predict values of the NAIRU but rather of wage inflation. These predictions are used by the Kalman-filter to determine the relative importance of past statistical projections relative to new data obtained (the so-called 'Kalman gain'; e.g. Durbin & Koopman, 2012). Hence, the Phillips-curve only

⁴ The Phillips-curve specification either builds on forward-looking agents ('Traditional Keynesian Phillips-curve') or on a combination of perfectly forward-looking as well as backward-looking agents ('New Keynesian Phillips-curve'; see European Commission, 2014; Havik et al., 2014). See Stirati (2016) for a summary concerning recent academic discussions on the links between the Phillips-curve, the NAIRU and economic policy.

serves as an instrument for calibrating the Kalman-filter, not as a theoretical argument for explaining the structural development of unemployment (Laubach, 2001).

4. The pro-cyclicality of NAIRU and potential output estimates: Effects on macroeconomic developments and fiscal-policy-making

We proceed by embedding the model within our broader account of general economic dynamics from section 2. In this context, we identify two distinct pro-cyclical feedback loops for the EZ during 1999-2014: First, an ‘optimist loop’ operated from the introduction of the Euro up to the GFC, which reinforced private debt-driven economic growth and the development of asset-price bubbles in the pre-crisis period, but also contributed to an increase in the vulnerability of single economies by further amplifying macroeconomic imbalances. Second, a ‘pessimist loop’ has emerged in the period after the outbreak of the GFC, which is characterized by austerity policies, i.e. by a combination of fiscal tightening and deflationary wage pressure geared towards increasing international competitiveness throughout the Eurozone.

We argue that three mechanisms are crucial for understanding the pro-cyclicality of NAIRU and PO estimates in both the pre-crisis and the post-crisis loop. First, the EC’s model estimates *reaffirm prevailing beliefs* among economists and policy-makers by providing additional support for established policies. Second, estimates of NAIRU and PO affect the *timing and speed of fiscal policies*, which is due to their importance for calculating structural balances in the EU’s fiscal regulation framework. Finally, reaffirmation of beliefs and the model-induced pro-cyclical fiscal policy bias trigger *a reinforcement of cyclical trends*, which were largely shaped by two events in the period under study, namely by the introduction of the Euro and the GFC. In what follows, we illustrate these three mechanisms in detail for both the pre-crisis and the post-crisis loop.

4.1 Pre-crisis years in the euro area: The ‘optimist loop’

In the pre-crisis ‘optimist loop’, the seemingly favorable real economic developments in large parts of the EZ lead to downward revisions in NAIRU and upward revisions in PO estimates, which suggested ‘structural’ macroeconomic improvements – especially in EZ periphery countries (Klär, 2013; Palumbo, 2015). The corresponding reaffirmation of optimistic pre-crisis beliefs about economic convergence justified policy inaction with respect to the build-up of private debt, housing bubbles and macroeconomic imbalances. European policy-makers and mainstream economists largely ignored these factors or interpreted them as being part of a healthy ‘catch-up process’ in the EZ (e.g. Blanchard & Giavazzi, 2002; Giavazzi & Spaventa, 2010) – an interpretation fully supported by pre-crisis estimates of the EC’s PO model.

As a consequence, the pre-crisis loop was also characterized by an increase in fiscal leeway, as model estimates signified an improvement in structural balances. Table 1 uses the case of Spain to empirically illustrate this aspect. In the run-up to the recent crisis, Spain experienced a housing boom, which led to a reduction in unemployment (e.g. Ruiz et al., 2015). In Autumn 2007, the EC’s official NAIRU estimate for the year 2006 was 8.6%, which implied a PO of €773.6 billion, an output gap of -0.6% and a cyclically-adjusted budget surplus of 2.1%. In order to better understand the effects of NAIRU downward revisions in pre-crisis years on PO and CAB, we employ a replication of the EC’s model by taking data from Autumn 2007, but using the NAIRU estimates from Spring 2005, when the EC had forecast that the Spanish NAIRU in the year 2006 would stand at 9.6%. In Table 1, it can be seen that

if the Spanish NAIRU in Autumn 2007 had not been revised in comparison to Spring 2005 on the basis of pro-cyclical estimates, PO would have been estimated 0.7% lower. As a consequence, the model would have shown overutilization of resources (instead of underutilization) and the CAB would have stood at 1.8% of PO instead of at 2.1%. The case of Spain therefore demonstrates that NAIRU estimates in pre-crisis years were revised in connection with the growth direction of the economy. The performative impact resides not only in the model's reaffirmation of optimistic assessments of pre-crisis growth trajectories and economic policies, but also in the use of pro-cyclical NAIRU estimates, which are fed into the potential output model and thereby increase the leeway for fiscal policy.

Table 1: Pro-cyclical NAIRU estimates and their impact on PO, the output gap and structural balances

	NAIRU	PO	OG	CAB
Pre-crisis BOOM	↑	↓	↑	↓
Spain, Year 2006				
Estimate from Autumn 2007	8.6	773.6	-0.6	2.1
Estimate from Autumn 2007 with Spring 2005 NAIRU	9.6	767.8	0.1	1.8

Notes. All potential output numbers were calculated at constant prices with the base 2000=100. NAIRU, non-accelerating (wage) inflation rate of unemployment (in %); PO, potential output (in billion €); OG, output gap (in % of PO); CAB, cyclically-adjusted budget balance (in % of PO).

Summing up, pro-cyclical model estimates justified unsustainable developments driven by an increase in private debt and reinforced general macroeconomic developments by the mechanisms of belief reaffirmation and a model-induced pro-cyclical bias of fiscal policy. The resulting 'optimist loop' lasted until it was broken by the GFC, which triggered an unwinding of the macroeconomic imbalances accumulated in pre-crisis years.

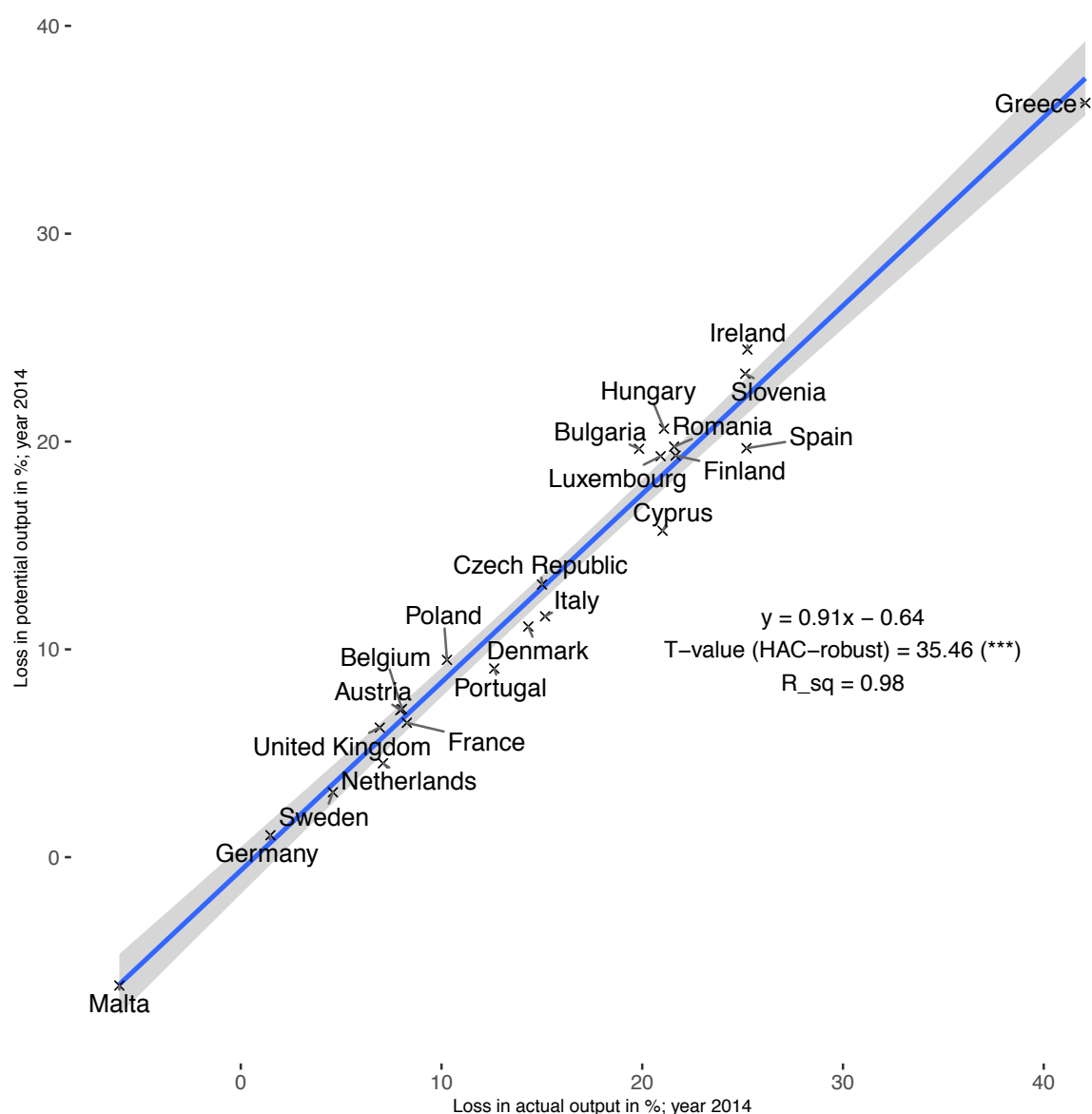
4.2 Post-crisis years: The 'pessimist loop'

Positive feedback effects introduced by the model's application are also apparent in the post-crisis period. The financial crisis and the ensuing EZ crisis had a strong impact on production function measures of PO in European countries (e.g. Ball, 2014; Palumbo, 2015). In order to empirically illustrate this point, we employ the methodology proposed in Ball (2014) to examine the paths for PO that European countries were following according to the EC's estimates shortly before the GFC in 2007 (PO**) and compare them with recent PO estimates from November 2015 (PO*).⁵ From the y-axis values in Figure 2, it can be seen that PO losses – measured against the extrapolated pre-crisis PO trend – for the year 2014 vary markedly across European countries, ranging from 36.3% in Greece and 24.4% in Ireland to relatively small losses in 'core countries' such as Germany, which posted a PO loss of 1.1%. The y-axis values depict how much actual output in 2014 was below the extrapolated pre-crisis trend in PO. It can be seen that the losses in actual output and PO are almost perfectly correlated, suggesting that the countries most (least) affected by the crisis suffered the largest (smallest) PO downward revisions.

⁵ The EC's forecast from December 2007 provides time-series data for potential output for all EU countries through 2009 (we exclude 5 countries for which the 2007 data could not be compared to 2015 data). We take this pre-crisis data, denote them by PO**, and extend all time-series beyond 2009 by means of log-linear extrapolation. Specifically, we compute the average annual change in the logarithm of PO** during 2000-2009, and then assume that potential output has increased at a constant rate from 2010 to 2014 (see Ball, 2014, p. 150).

Downward revisions in PO have supported the dominant narrative that ‘excessive fiscal deficits’ are at the roots of Europe’s economic crisis (e.g. Blyth, 2013; Storm & Naastepad, 2016). The turn to fiscal austerity in 2010/2011 was apparent in the design of the Troika adjustment programs for Greece, Ireland, Portugal and Cyprus (Sapir et al., 2014), the reform of the SGP in 2011 and the introduction of the Fiscal Compact in 2012. In this process, the structural balance has gained additional importance when it comes to coordinating fiscal policies in Europe (ECFIN, 2013).

Figure 2: The close correlation of actual and potential output losses



Data: AMECO (December 2007, November 2015); authors' calculations.

Loss in potential output = $(PO^{**}-PO^*)/PO^{**}$

Loss in actual output = $(PO^{**}-Y)/PO^{**}$

PO^{**} ... extrapolated estimate of pre-crisis PO. See Ball (2014, p. 150) for details on the extrapolation methodology.

PO^* ... EC's PO estimate (AMECO, November 2015).

Y ... real GDP (AMECO, November 2015).

*** denotes statistical significance at the 1% level.

Via the institutionalization of structural balances in the EU's fiscal regulation framework, downward revisions in PO increased fiscal consolidation pressures in Europe (Tereanu et al., 2014). Table 2 illustrates this relationship for five EZ periphery countries and five core countries. Negative output gaps would have been much larger than the EC's official numbers provided in November 2015 if one assumes that PO during 2009-2014 had grown at a constant average pre-crisis growth rate (as in Figure 2). For example, the official OG estimate for Spain in 2014 was -6.9% of PO, which corresponded to a CAB of -2.2%. However, assuming that the PO loss computed in figure 2 has not occurred, we find that the output gap is -25.2% (OG**), which indicates a much more severe underutilization of economic resources than the EC's official estimate.

Whoever finds the OG** estimates in table 2 implausibly large should take the pro-cyclical nature of pre-crisis PO estimates into account, which underscores our point about the optimistic nature of the pre-crisis loop described in the previous subsection. On the basis of its OG** estimate, Spain would not have posted a cyclically-adjusted deficit, but a large surplus of 7.7%. Table 3 shows the same pattern not only for the other periphery countries, but also for the core countries, although to a lesser extent. Without the substantial PO downward revisions, which vary across European countries depending on how hard the respective country was hit by the crisis (see Figure 2), fiscal consolidation pressures would have been much less severe, because model estimates would have indicated substantial cyclically-adjusted budget surpluses.

Table 2: Downward revisions in PO estimates increased fiscal consolidation pressures: all numbers for the year 2014

	Output gap	Output gap**	Cyclically-adjusted balance	Cyclically-adjusted balance**
<u>Periphery countries</u>				
<i>Greece</i>	-9.1%	-42.1%	0.8%	16.6%
<i>Ireland</i>	-1.1%	-25.2%	-3.3%	9.5%
<i>Portugal</i>	-3.9%	-12.6%	-5.2%	-0.7%
<i>Spain</i>	-6.9%	-25.2%	-2.2%	7.7%
<i>Italy</i>	-4.0%	-15.2%	-0.9%	5.1%
<u>Core countries</u>				
<i>Austria</i>	-0.9%	-7.9%	-2.2%	1.9%
<i>Germany</i>	-0.4%	-1.4%	0.5%	1.1%
<i>France</i>	-1.9%	-8.3%	-2.8%	1.0%
<i>Netherlands</i>	-2.7%	-7.1%	-0.6%	2.2%
<i>Belgium</i>	-1.0%	-8.0%	-2.5%	1.8%

Data: AMECO (December 2007, November 2015); authors' calculations.

Output gap = $(Y-PO^*)/PO^*$

Output gap** = $(Y-PO^{**})/PO^{**}$

Cyclically-adjusted balance = $FB - \varepsilon * OG$

Cyclically-adjusted balance** = $FB - \varepsilon * OG^{**}$

FB: fiscal balance (AMECO, November 2015).

ε : budgetary semi-elasticity (Mourre et al., 2014, p. 21).

See Figure 2 for details on Y , PO^* and PO^{**} .

To further demonstrate the pro-cyclicity of the EC's model, table 3 shows that, as the NAIRU tends to shoot up during a crisis, PO shrinks (ceteris paribus), so that the output gap becomes less negative (more positive) and the CAB deteriorates. We provide replicated estimates for Spain – this time for the crisis year 2009 – to illustrate the NAIRU model's pro-cyclical impact in the post-crisis period. In Autumn 2007, shortly before the GFC, the EC forecast that the Spanish NAIRU in 2009 would stand at 8.2%. However, as the Spanish economy experienced a severe and long-lasting recession after the bursting of its housing bubble and the GFC, Spain's NAIRU estimate for 2009 was revised upwards to 14.2% in Autumn 2011. Table 3 demonstrates that PO would have been estimated €45.5 billion higher if the EC had used the Autumn 2007 NAIRU estimate for its Autumn 2011 calculations.

Hence, the negative OG would have nearly doubled from -4.7% to -8.9%, so that the CAB would have been -6.9%, which is markedly lower than the official estimate of -8.9%. These calculations show that against the backdrop of the underlying fiscal regulation framework, the pressure on the Spanish government to implement fiscal consolidation measures would have been markedly lower if the pre-crisis NAIRU estimates had not been revised.

Table 3: Pro-cyclical NAIRU estimates and their impact on potential output, the output gap and structural balances

	NAIRU	PO	OG	CAB
Post-crisis BUST	↓	↑	↓	↑
Spain, Year 2009				
Estimate from Autumn 2011	14.2	998.0	-4.7	-8.9
Estimate from Autumn 2011 with Autumn 2007 NAIRU	8.2	1043.5	-8.9	-6.9

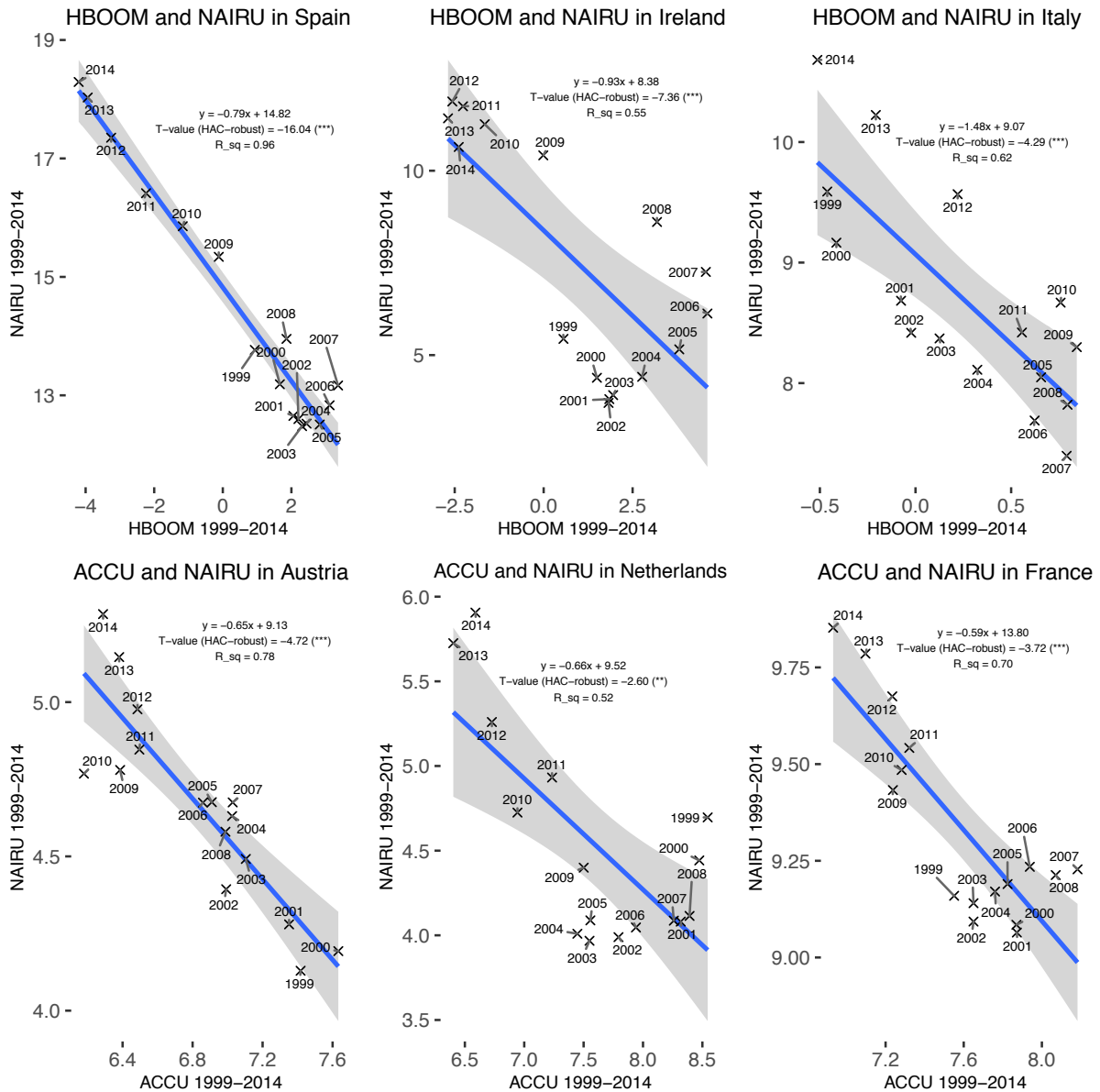
Notes. All potential output numbers were calculated at constant prices with the base 2005=100. NAIRU, non-accelerating (wage) inflation rate of unemployment (in %); PO, potential output (in billion €); OG, output gap (in % of PO); CAB, cyclically-adjusted budget balance (in % of PO).

It becomes clear from this illustration that the implicit imperative of the EC's model during a crisis is fiscal austerity. A broad literature has shown in recent years that pro-cyclical fiscal tightening has pronounced negative effects on economic growth and employment (e.g. Blanchard & Leigh, 2014; Jorda & Taylor, 2016), which explains the finding that in those European countries that implemented the harshest fiscal austerity measures, demand was squeezed the most (de Grauwe & Ji, 2013). Thereby, it is no coincidence, but rather an implicit consequence of the 'end-point bias' in Kalman-filtering and the collapse in the growth rate of the capital stock (e.g. Darvas, 2013; Klär, 2013; Palumbo, 2015) that downward revisions in PO were most pronounced where the crisis struck hardest, which systematically subjected Europe's weakest economies to austerity measures.

4.3 Reaffirming beliefs, fiscal policy guidance and the issue of cyclical reinforcement

While we have illustrated so far that the pro-cyclical impact of NAIRU estimates derives from the reaffirmation of policymakers' beliefs and the prominent role of PO estimates in fiscal policy coordination, it remains to be shown how cyclical factors – which, as we argue, are reinforced by the application of the EC's model – influence these estimates in the first place. For this purpose, we constructed two auxiliary variables measuring typical cyclical phenomena: a proxy for boom-bust patterns related to housing (HBOOM) and a capital accumulation variable to cover investment booms and busts (ACCU). In Figure 3, we estimate the correlation between these two variables reflecting cyclical fluctuations and NAIRU estimates for three selected EZ countries, respectively, to signify the close relationship between NAIRU estimates and cyclical factors. For illustrative purposes the selection of countries considers especially those cases where the association of the NAIRU estimates to a single cyclical factor is especially pronounced.

Figure 3: NAIRU estimates are driven by cyclical factors



Data: AMECO (November 2015); authors' calculations.

ACCU: ratio of real gross fixed capital formation to the real net capital stock (multiplied by 100). HBOOM: deviation of the ratio of employment in the construction sector to total employment in all domestic industries from its mean (multiplied by 100).

** and *** denote statistical significance at the 5% and 1% level, respectively.

For Ireland, Spain and Italy we find a strong, statistically significant association between HBOOM and NAIRU estimates during 1999-2014. In the case of Spain, the housing boom-bust proxy even explains about 96% of the variation in the NAIRU. For Austria, France and the Netherlands, we find close correlations between the capital accumulation variable and NAIRU estimates. Taken together, these findings suggest that – contrary to the EC's theoretical NAIRU framework (see section 3) – NAIRU estimates were to a large extent driven by cyclical factors. This is both the case for pre-crisis and post-crisis years, which supports our argument that the model had a pro-cyclical impact, both before and after the crisis.

In summary, we have argued that the EC's model has produced pro-cyclical estimates in pre-crisis and post-crisis years. The use of these estimates in turn had a pro-cyclical performative

impact amplifying general macroeconomic developments in the EZ during 1999-2014. In the pre-crisis ‘optimist loop’, pro-cyclical model estimates justified policy non-action regarding the build-up of private debt, asset-price bubbles and macroeconomic imbalances and provided additional scope for fiscal policies, thereby reinforcing boom-bust-patterns in several EZ countries. In the post-crisis ‘pessimist loop’, downward revisions in PO increased the pressure to implement fiscal consolidation measures via the institutionalization of structural balances in the EU’s fiscal regulation framework. The austerity-burden caused by model-induced deteriorations in structural deficits has clearly affected those periphery countries the most, which had accumulated the largest current account deficits and debt overhangs in pre-crisis years. Against this backdrop, the next section turns to an analysis on the model’s performative impact on structural development paths in Europe.

5. Model performativity and debt trajectories in Europe: The self-defeating nature of the Stability and Growth Pact

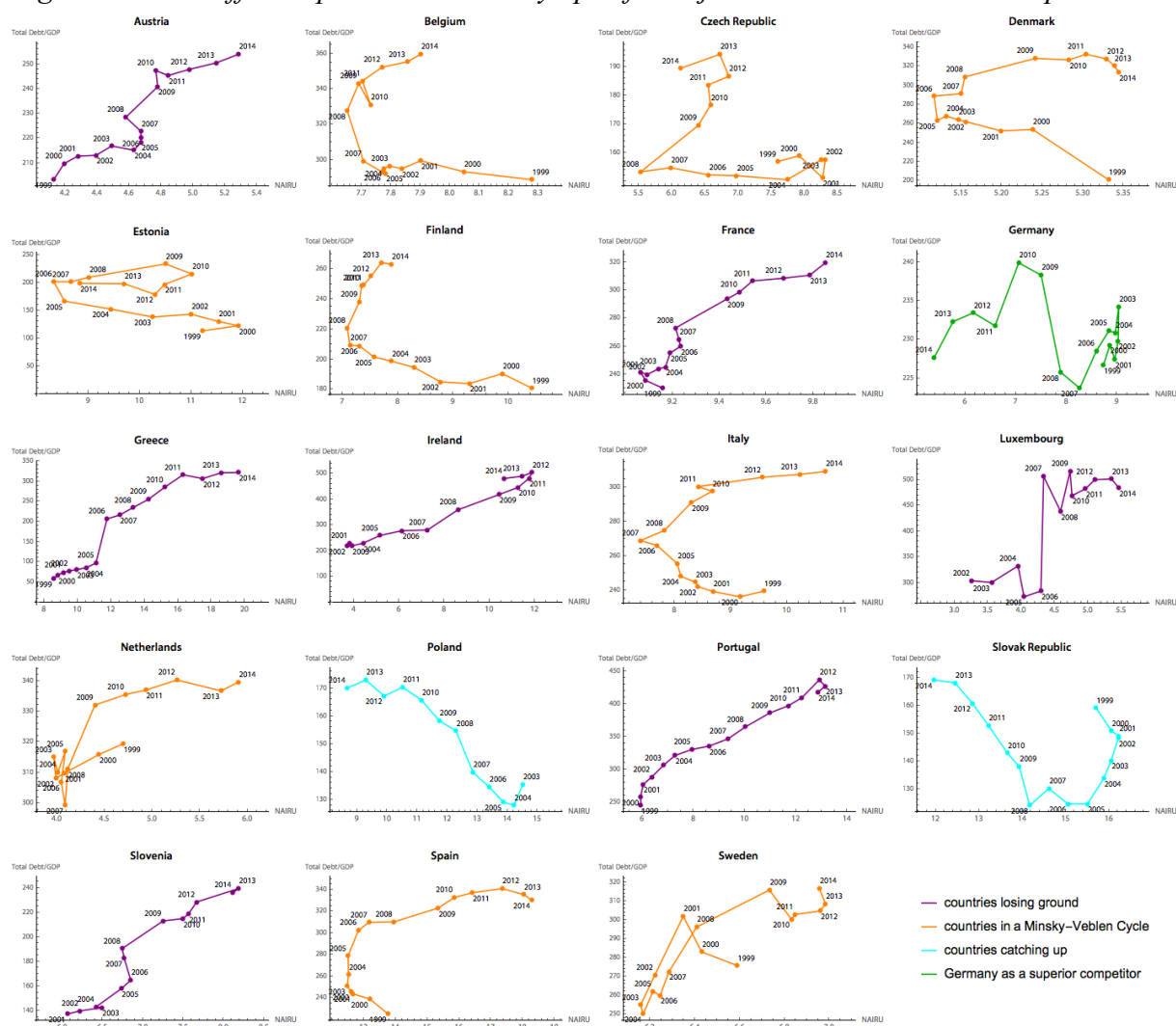
In the previous section, we described the pro-cyclical impact arising from the application of the EC’s NAIRU and PO estimates as authoritative guides for designing fiscal policies across Europe by highlighting the role of these estimates in reinforcing national growth paths. In this section, we go beyond this argument by incorporating an additional dimension, namely the role of private and public sector indebtedness in the context of international competition. In section 2, we sketched three possible ways out of financialization-induced economic stagnation on a national level, namely to increase aggregate demand either by rising private sector debt, expansionary fiscal policies or an economic expansion via the export side. Only the first two imply a rise in a country’s aggregate debt (*ceteris paribus*), while the latter strategy requires other countries to accumulate additional debt. Against this backdrop, we argue in this section that the NAIRU and PO model does not only amplify cyclical fluctuations and growth paths of national economies in Europe (see section 4), but also influences their overall structural development. As developmental trajectories are currently diverging, the underlying spirit of the SGP – to coordinate and to harmonize economic developments across Europe – is successively undermined.

At its core, our argument goes as follows. While the performative impact of the political application of the EC’s PO model was rather uniform across countries in pre-crisis years, reinforcing optimism only to slightly varying degrees across countries, largely independent of a country’s specific growth model, this tide turned rather quickly in the post-crisis period. In the aftermath of the GFC, countries focusing on compensating deficiencies in domestic demand via the export side faced mainly financial risks and were continually granted comparably positive assessments of their real economic development (Storm & Naastepad, 2015a, 2015b). However, those European countries that in the pre-crisis years had relied on increases in private and public sector debt to increase spending and thereby accumulated large current account deficits, were confronted with a much more intense economic downturn and a reversal of their developmental trajectories in close correspondence with the extent of their private and public sector debt overhang. The application of the PO model has amplified this structural divergence between export-led creditor-countries and (overly) indebted countries by providing political and fiscal leeway to those already successful, while delegitimizing and shackling already stressed periphery countries via model-induced deteriorations in ‘structural unemployment’ (NAIRU), PO and structural deficits.

In exploring this argument in more depth, we first provide an empirical analysis of the development paths of individual economies in a plane constructed out of national time-series

for the NAIRU and the sum of private and public sector debt in % of GDP (Figure 4) in order to assess the intensity of structural polarization in Europe. As a first step to making sense of the information contained in Figure 4, we suggest focusing on the developmental trajectories of individual countries. In doing so, four basic types emerge: (a) countries experiencing a rough non-linearity in their developmental path when the GFC hit, resembling the structure of a ‘Minsky-Veblen Cycle’ (Kapeller & Schütz, 2014); (b) countries, which are – either very slowly or rather rapidly – ‘losing ground’, as debt-levels and NAIRU estimates rise simultaneously; (c) countries with rising debt levels, but a decreasing NAIRU, which are ‘catching up’ to the EZ’s core countries; and (d) a single country – Germany – exhibiting both decreasing levels of debt and a falling NAIRU, thereby signifying Germany’s position as the powerful ‘victor’ in the European race for competitiveness (Simonazzi et al., 2013; Storm, Naastepad, 2015b).

Figure 4: Four different patterns in country-specific trajectories on a NAIRU-Debt plane



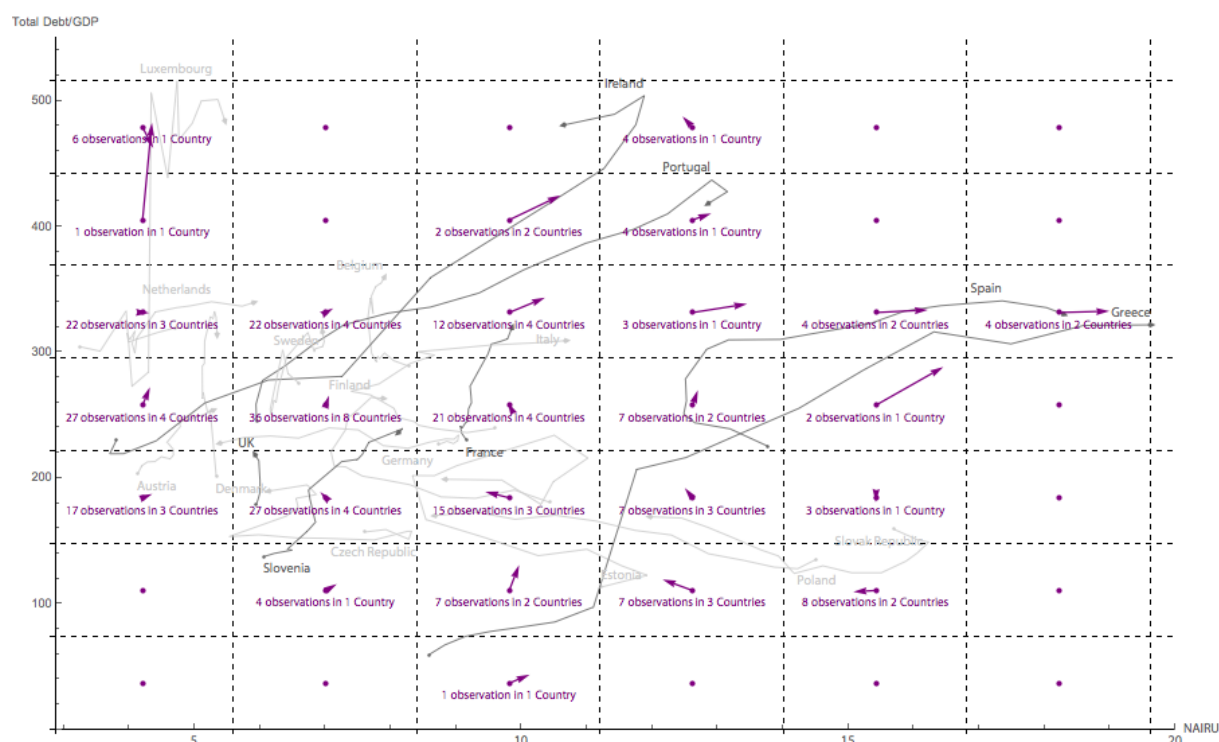
Data: OECD (private sector debt in % of GDP), AMECO (November 2015); authors’ calculations. Total debt (y-axis) is the sum of private sector and public sector debt in % of GDP.

While this approach supplies us with an overview on the individual countries’ developmental trajectories that are reinforced by the EC’s model, a major disadvantage of this perspective is that it hardly allows for synthesizing data and interpretation across countries. In order to remedy this fact, we provide an aggregate NAIRU-debt plane for 20 EU countries, including 15 EZ countries. Figure 5 is based on a simple aggregation of all time-series provided in

Figure 4. Its main feature is that it separates the whole plane into grids and thereby calculates the average movement per period within the respective grid and plots these averages as arrows.⁶ This setup is inspired by the complexity economics approach developed in Cristelli et al. (2015), who argue that a vector-like representation in a plane such as ours allows for a better understanding of the complex trajectories of different countries.

Dividing the NAIRU-debt plane into grids not only allows for visualizing average dynamics within a pooled set of countries, but also for assessing the relative strength of diverging moves within more densely populated areas, i.e. grids characterized by many observations: while for a certain, more extreme, range of NAIRU-debt values clear patterns emerge, in more densely populated areas the dynamics across countries tend to level each other out. In order to stress the performative role of the PO model, we also printed the trajectories of all those countries in emphasis where the EC has opened an ‘excessive deficit procedure’ in the aftermath of the GFC, which could not be resolved till today. Regarding the sensitivity of the results in the NAIRU-debt plane, we find that they are robust with respect to variations in the number of grids applied.

Figure 5: Europe on a NAIRU-Debt plane: An aggregate view



Data: OECD (private sector debt in % of GDP), AMECO (November 2015); authors' calculations.

In this bird's-eye view on developmental trajectories in Europe, several areas with distinct properties emerge from Figure 5, which roughly resemble the individual trajectories depicted in Figure 4. First, there is a small group of highly financialized countries (Luxembourg, Netherlands and Ireland) with high debt-levels and varying NAIRU estimates. Second, there is a slightly larger group of countries where the NAIRU is estimated to be high, while the burden of indebtedness is also enormous (Greece, Portugal, Spain as well as, less pronounced, France and Italy). These countries seem to have fallen into an austerity-trap from which there

⁶ In the online appendix, we provide a detailed description on how we constructed the vector field in the NAIRU-debt plane in Figure 5 and provide code for replication purposes.

is no clear way out. The ongoing deleveraging in the private and/or public sector leads these countries ever deeper into debt-deflationary territory (e.g. Koo, 2013; Mastromatteo & Rossi, 2015), from which the EC's pro-cyclical PO estimates make it nearly impossible to escape, because the model's implicit imperative in a prolonged crisis is simply more fiscal austerity (see section 4). Third, there is a densely populated middle area, where the trajectories of individual countries largely cancel each other out. The only exception is a small 'path of hope' exemplified by Poland, Slovakia and (partially) the Czech republic, signaling the possibility that an increase in debt might allow for a sustainable catch-up process – but only for those countries starting with rather low levels of total debt.

While there are not too many data points underlying the pattern exhibited by the second group, consisting of countries in an austerity-trap, these observations are still of high economic and political significance as the main questions, i.e. how to bring them back into the game and how to reset their developmental trajectories, remain unanswered by current policy approaches. On the contrary, the policy tools currently in place further reinforce the underlying divergence, as the EC's PO model provides no escape route from a debt-deflationary path that causes countries to move further into the (upper) right 'grids of despair' in the NAIRU-debt plane (Figure 5).

These countries are caught in self-defeating debt-deflation since the European regulatory innovations introduced in the aftermath of the GFC place strong restrictions on their political and fiscal leeway. In this context, Figure 5 also indicates that most of the countries in the upper right part of the NAIRU-debt plane are under direct disciplinary supervision regarding their debt outlooks. This means that according to the prevailing rules in the corrective arm of the SGP, they are legally obliged to bring down 'excessive structural deficits'. Hence, countries in an ongoing 'excessive deficit procedure' are only granted limited financial autonomy, which undermines the introduction of alternative policies ensuring a more sustainable economic development (e.g. the buildup of competitive industries).

While it is evident that policies aiming at improvements in the structural development path due to increased competitiveness can never succeed in all countries at the same time, the performative impact of the EC's model is not only to be found in fiscal restriction: by providing ever more pro-cyclical downward revisions of PO estimates as well as correspondingly higher numbers on 'excessive structural deficits' in times of crisis, the PO model translates an econometric problem (the 'end-point bias' in calculating NAIRU and TFP by means of Kalman-filtering) into political momentum ('We have previously overestimated the 'structural health' of the economies in the EZ periphery; hence, they now have to implement drastic austerity measures'). Accordingly, the NAIRU and PO model also contributes to lopsided attributions of 'blame' for the dire macroeconomic developments in Europe (e.g. Varoufakis, 2015). The decrease in political scope in debt-burdened countries makes alternative political proposals or economic visions for European economic policy more difficult to defend.

6. Conclusions

This paper argues that the EC's model for estimating the non-accelerating inflation rate of unemployment and potential output has contributed powerfully to shaping macroeconomic developments and fiscal policy-making in Europe, with particular focus on the euro area's economies during 1999-2014. Our arguments fill a gap in the performativity literature, which has so far mostly neglected the role of macroeconomic models in economic policy-making.

We identified two performative dimensions: First, the EC's estimates were demonstrably pro-cyclical – both in the pre-crisis years from the introduction of the Euro to the GFC, and in the post-crisis period. The application of these estimates for macroeconomic coordination in turn reinforced general economic developments not only by affecting national fiscal policies but also by reaffirming and amplifying established views on economic conditions and appropriate policies in Europe. The second performative aspect lies in the model's impact on structural development paths in Europe. During the recent crisis, the periphery countries of the EZ have experienced a harsh reversal in their developmental paths, as both the private and the public sector were simultaneously forced into deleveraging. The EC's PO model blocks any promising possibility to overcoming the resulting austerity-trap, because the massive downward revisions in PO in the hardest hit countries have put persistent fiscal consolidation pressure on the respective governments.

Counteracting the drag on aggregate demand exerted by private sector deleveraging and overcoming the divergence in structural development trajectories in Europe within the given focus on improving competitiveness eventually requires fiscal scope for public investments, which foster structurally improved and more innovative industries (e.g. Koo, 2015; Mazzucato, 2013). The EC's model, however, has systematically failed to grant the necessary policy leeway. Hence, it has proven self-defeating in the sense that it contributes to the increase in structural divergence between the EZ's core and periphery countries – a phenomenon that contradicts the spirit of convergence allegedly embedded in the Stability and Growth Pact. While the practical idiosyncracies of surveilling budgetary discipline gave rise to the PO model in the first place, today it serves as a restrictive and intransparent 'experts' cage' for confining democratic policy-making, which underscores the relevance of macroeconomic models for politics in general.

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