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Abstract

We examine the natural rate of unemployment estimates of two international organizations (OECD and European Commission) and various release dates. Since estimates differ to a large extent, empirical research results—which use natural rate estimates—will also vary depending on the data source chosen. We highlight the extend of these effects by focussing on Spain, but also present evidence for several other EU-countries.

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1 Introduction

The natural rate of unemployment serves as an anchor in several macroeconomic models. It is used to determine the unemployment gap to compute Taylor rates.¹ Recently, Taylor rules have even gained some importance in the United States due to the 'Federal Reserve Accountability and Transparency Act of 2014 (FRAT)' (see Williams 2015, p. 8). Consequently, Taylor rules still play a role in monetary policy (Bernanke 2015). Natural rates of unemployment are also used in the determination of the structural balance of the government's budgets (Dalton 2103, 2014; The Economist 2017).

Researchers have the choice to rely on various measures:

- One could opt for the non-accelerating *inflation* rate of unemployment (NAIRU) or for the non-accelerating *wage* rate of unemployment (NAWRU).
- Databases are released by many different international organizations; for example, the Organisation for Economic Co-operation and Development (OECD) or the European Commission (EC).
- Since the databases are updated on a regular basis, one can rely on datasets released at different points in time.

We highlight the magnitude of the differences in natural rate estimates, both from the two organizations mentioned above and the variability of these estimates over time. This analysis offers important implications for policy makers, researchers, as well as referees or journal editors: Empirical research results can vary tremendously depending on the data source chosen.

Section 2 reviews the literature. Section 3 describes the datasets and quantifies the differences. Section 4 concludes.

2 Literature review

It is a well-known fact in the economic literature that official data statistics are revised over time. The first release of a data is based on preliminary estimates, so that revisions

¹Taylor (1993) relied on the output gap to characterize the current standing in the business cycle. The unemployment gap was subsequently also used in the Taylor rate literature (Rudebusch 2010, Nechio 2011).

become necessary when *more* or *more precise* information is processed.²

Orphanides (2001) highlights that Taylor rates based on real-time data show a much different pattern compared to Taylor rates that are based on revised data. Therefore, he emphasizes the importance to use real time data—that is, data that was available at that point in time when the policy maker made a decision—when evaluating monetary policy.

Croushore/Stark (2000, p. 17) summarize the variables which are included in the real-time dataset of the Federal Reserve Bank of Philadelphia. With respect to labor market data, only the civilian unemployment rate itself is covered—the unemployment gap is not covered. Within this paper, we will highlight the extent of the revisions with respect to the unemployment gap.

3 Empirical analysis

3.1 NAWRU estimates based on the European Commission's *AMECO* database

One measure for the natural rate of unemployment stems from the AMECO database (Annual Macro-Economic database of the European Commission's Directorate General for Economic and Financial Affairs). It is based on the NAWRU concept.³ To highlight the tremendous effect of data revisions, we in Figure 1 we plot the NAWRU for Spain over time *for three different releases*. In subsection 3.3, we present evidence for several other EU countries.

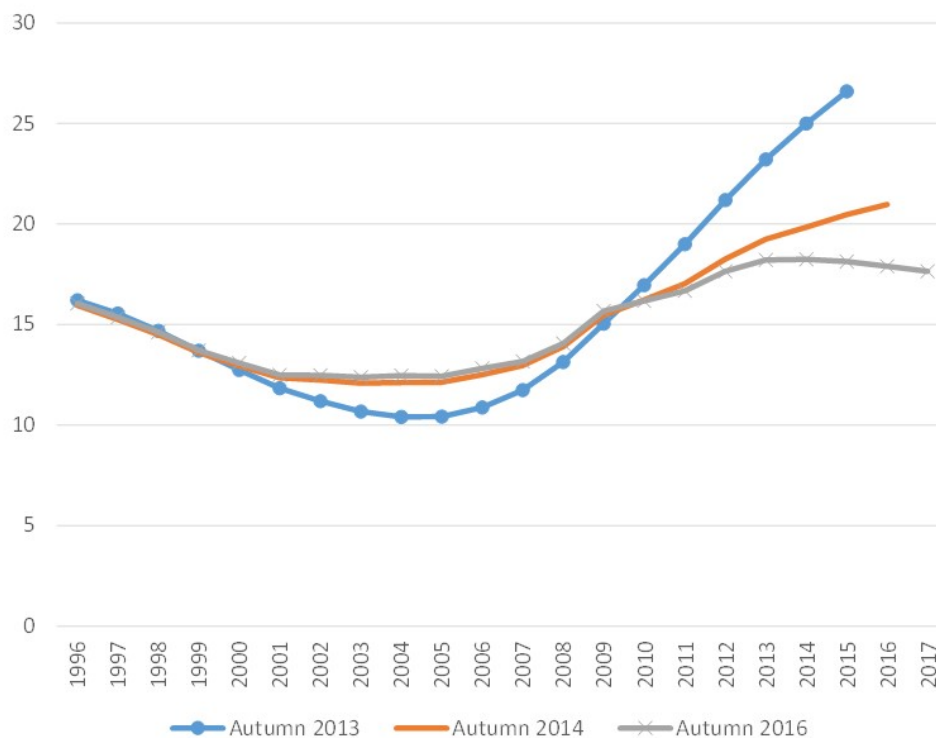
Figure 1 highlights that the natural rate is adjusted with every new release. A visual inspection of the dataset allows us to separate the overall period into three sub-periods:

- 1996–2001: More or less no difference between the different releases.

²Croushore (2011). The Federal Reserve Bank of Philadelphia offers a so-called '*Real-Time dataset for Macroeconomists*'. See Croushore/Stark (2001) for a description of this database.

³The NAWRU can be found in the section '*1. Population and Employment*' ⇒ subsection '*1.3 Unemployment*'.

Figure 1: NAWRU Spain: Different releases of the EC's AMECO database



Source: European Commission: AMECO database, different releases.

- 2002–2008: Compared to the release in autumn 2013, the natural rate was adjusted upwards in subsequent releases.
- 2010–2015: Compared to the release in autumn 2013, the natural rate was adjusted downwards in subsequent releases.

Consequently, compared to the 2013 release, all subsequent releases show a much smoother development of the NAWRU. The extent of the revisions are quite large. For example, the natural rate for the year 2015 was estimated to be 26.6 % (release autumn 2013), but took a value of 18.1 % in the autumn 2016 release, which is a difference of 8.5 percentage points.

These adjustments have a tremendous impact on the size of unemployment gaps, Taylor rates, or government budget balances.⁴ Under the assumption that the actual unemploy-

⁴The effect of data revisions on the structural balance of the government budget was discussed in the

ment rate (u) itself is not adjusted, the unemployment gap ($u - u_n$) in the period

- 1996–2001: is not affected by the different releases, so that analyses made for this time period do not vary.
- 2002–2008: During the pre-crisis period, the unemployment gap would be estimated to be lower in case subsequent releases are used instead of autumn 2013
- 2010–2015: During the post-crisis period, the unemployment gap would be estimated to be larger in case subsequent releases are used instead of autumn 2013.

3.2 NAIRU estimates based on OECD's *Economic Outlook* database

The OECD releases estimates for the natural rate of unemployment in its *Economic Outlook* database. It is released twice a year. OECD's natural rate is based on the NAIRU concept.⁵ To compare the OECD data to the EC data, we created a second graph which shows the development of the NAIRU for the same time horizon and for the same EU-country (Spain).

The blue line (with circles) of Figure 2 displays the NAIRU of the OECD Economic Outlook No. 89 (released in 06/2011) while the red line (without marker) displays the estimates of the Economic Outlook No. 90 released 12/2011. The figure reveals that NAIRU estimates were adjusted upwards. The largest difference can be detected for the year 2008: OECD89 estimates reveal a value of 9.5 % while the OECD90 estimate shows a value 13.5 %. Therefore, in case this uses the Economic Outlook database No. 90 instead of No. 89, the unemployment gap ($u - u_n$) for 2008 will be estimated 4.0 % smaller!

More recently, it seems to be that the OECD is using a stronger smoothing parameter to reduce the volatility in the NAIRU estimates. Economic Outlook No. 100 (11/2016) looks more or less like a linear time trend!

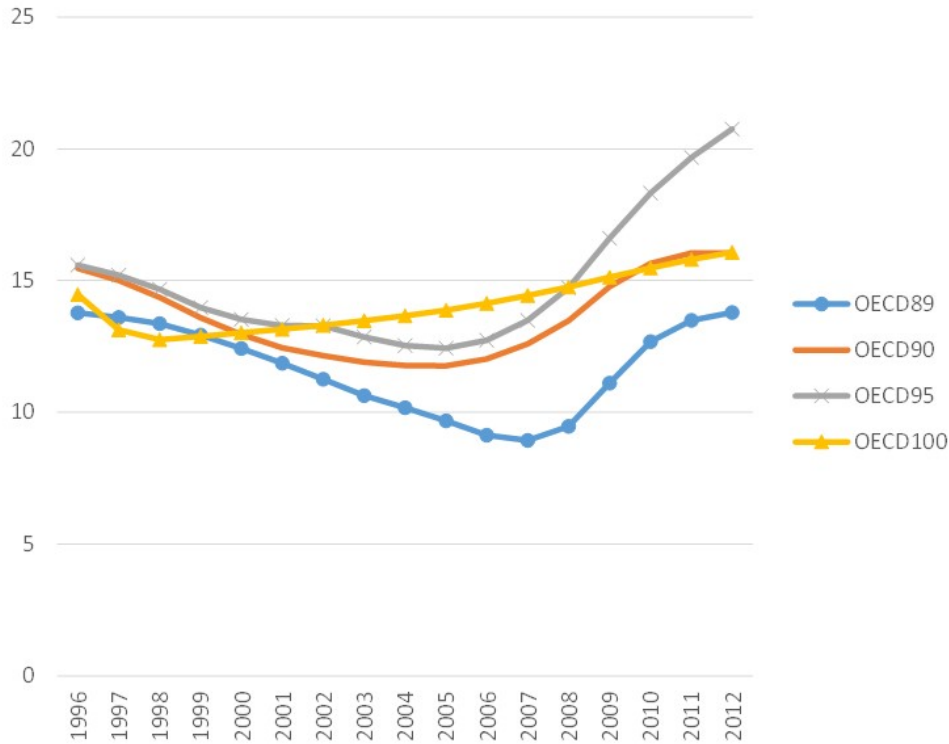
3.3 Comparisons for several EU countries

We highlight the the effects of data revisions for several other EU countries in Table 1: Column 2 contains the OECD estimates of the NAIRU for the year 2008 (release No. 89).

financial press. See, for example, Dalton (2013, 2014).

⁵Within the Economic Outlook database, the NAIRU variable can be found in the so called *Supply block*.

Figure 2: NAIRU Spain: Different releases of the OECD’s Economic Outlook database



Source: OECD Economic Outlook, various releases (OECD89: 06/2011, OECD90: 12/2011, OECD95: 05/2014, OECD100: 11/2016). Because the first release displayed in the graph (OECD89) contained data until 2012, we restricted all subsequent releases to 2012.

Column 3 contains the same information from release No. 90. Column 4 contains the difference (*No. 90* – *No. 89*). It becomes clear that the effects of data revisions is most prominent for the crisis countries: Spain (4.0), Ireland (2.6), Hungary (1.8) and Portugal (1.4).

Column 5 contains the EC estimates of the NAWRU for the year 2015, stemming from release the AMECO database as of Autumn 2013. Column 6 contains the EC estimates of the NAWRU for the year 2015, stemming from AMECO release Autumn 2016. In column 7, we once more computed the difference (*AMECO2016* – *AMECO2013*). It becomes clear that the effects of data revisions are also most prominent for the crisis countries: Spain (–8.5), Greece (–7.2), and Portugal (–4.6).

The most drastic revisions are made with respect to the natural rate of Spain. This

Table 1: Comparison for several EU countries

1	2	3	4	5	6	7
	2008	2008	2008	2015	2015	2015
Country	OECD89	OECD90	Δ OECD	AMECO2013	AMECO2016	Δ AMECO
Austria	4.3	4.3	0.0	4.5	5.4	0.9
Belgium	8.0	7.9	-0.1	8.0	7.9	-0.2
Czech Republic	5.8	6.5	0.7	6.9	5.2	-1.7
Denmark	4.4	5.1	0.7	6.3	5.4	-0.9
Finland	7.4	8.0	0.6	7.2	7.9	0.7
France	8.3	8.4	0.2	10.9	9.5	-1.4
Germany	7.8	7.7	-0.1	4.8	4.6	-0.1
Greece	8.9	9.9	1.1	22.8	15.6	-7.2
Hungary	6.8	8.6	1.8	10.2	7.2	-3.1
Ireland	5.1	7.7	2.6	12.9	9.9	-3.0
Italy	6.4	7.4	1.0	10.8	10.4	-0.4
Luxembourg	4.0	4.8	0.8	5.9	5.7	-0.2
Netherlands	3.7	3.7	0.0	6.9	5.8	-1.1
Poland	9.8	9.8	0.0	9.0	7.4	-1.6
Portugal	7.0	8.4	1.4	16.8	12.2	-4.6
Slovak Republic	12.5	13.1	0.5	13.3	10.9	-2.4
Spain	9.5	13.5	4.0	26.6	18.1	-8.5
Sweden	7.1	7.3	0.2	6.6	6.5	-0.2
United Kingdom	5.4	6.2	0.8	7.7	5.8	-2.0
Euro area (15 countries)	7.6	8.5	0.9	10.7	8.6	-2.1

Source: EC and OECD.

is the reason why we opted to choose this country in the first part of the paper. Future research should focus on the question of what is driving this result. An important driver might be the labor market settings: In cross-country studies of the Okun's law literature, Spain shows a very large absolute beta coefficient (Ball/Leigh/Loungani 2017, p. 1431; Hutengs/Stadtmann 2013, p. 823–824). Large values of Okun's beta point to the direction of a labor market, where unemployment swings within the business cycle are very pronounced. This might be related to the large data revisions highlighted in this article.

4 Conclusions

Estimates of the NAIRU or NAWRU can differ not only between organizations but also between different releases of the databases. Consequently, researchers and policy makers have to be aware of the fact that the results of empirical studies can heavily depend on the dataset employed. With respect to research governance, and especially the replicability of empirical work, it is essential to report the specific release date of the database used: Taking into consideration the long time lags between writing and publishing a paper, it is not appropriate to use terms such as "*most recent issue*".

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