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Abstract

The "Magic Square of Economic Policy" highlights four main goals of economic policy: growth, full employment, price stability, and balanced trade. A Macroeconomic Performance Index can be used to assign relative weights to the different goals within the Magic Square, giving a single index number per year per country. The legitimacy of the simplest weighting scheme that assigns equal weight to all four goals is discussed. The macroeconomic performance of eleven euro zone area countries is evaluated over time and across countries.

Keywords: Macroeconomic Policy, Economic Performance, Misery Index, Magic Polygon, Magisches Vieleck, Magisches Viereck, Magic Rectangle, Macroeconomic Imbalances
JEL codes: E60, E61, P52, I31, C82

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Contents

1 Introduction

This section provides a brief introduction to the "Magic Square of Economic Policy" (MS) in Section 1.1 and to the concept of a Macroeconomic Performance Index (MPI) in Section 1.2. Selected literature with respect to the two concepts is summarized in Section 2. The reader who is familiar with the literature and impatient to learn about my index should skip to Section 3, where the concept of the Magic Square is made operational in quantitative terms by employing a specific MPI that is further explained in Section 3.2. Its components are discussed in detail in Section 3.1. The uniform weighting scheme used is compared to alternative approaches and defended in Section 3.2.1. An overview of the empirical results of the index is presented in Section 4. Section 5 concludes.

The main contribution of the paper is twofold. Firstly, it provides an update of a Macroeconomic Performance Index based on the Magic Square for eleven euro zone countries. Secondly, it discusses the legitimacy of the traditional uniform weighting scheme that assigns equal weight to each of the four goals. In particular, it is evaluated against the evidence from Macroeconomics of Happiness research as well as other approaches to estimate or derive weights endogenously. In this debate, I conclude that simple uniform weights are not only the most practical and tractable set of weights, but may conform surprisingly well to weights provided in the latest studies of alternative approaches.

The index is constructed for the academic, the policymaker, and even the interested non-educated reader alike. Its main purpose is to provide the policymaker with a tractable index of macroeconomic performance based on a simple, yet well-known concept (The Magic Square) that has strong roots in policy-making. For the academic reader, the index gives a benchmark against which to assess the results of many other indices that have similar variables and different, perhaps endogenously derived, weighting schemes. For the layman, the comparison across countries is the most interesting part.

1.1 The Magic Square

The "Magic Square" of economic policy (MS) is a popular representation of the main goals of economic policy. It features prominently at the beginning of most textbooks and introductory presentations on economic policy in the German-speaking world[1]. In the visualization in Figure 1, the four major economic policy goals are to be found at the four corners of the square: A high and steady GDP growth rate, a high employment rate, a low inflation rate, and a balanced current account. Historically, the German "Bundestag" (parliament) included precisely these four goals in a piece of legislation passed in 1967 that was called the "law to ensure the stability and growth of the economy" (Bundesregierung, 1967). The square typically serves as a teaser for a thorough discussion of the individual goals and their mutual interaction. While some are complementary (high GDP growth and low unemployment), others may be prone to unfavorable trade-offs (unemployment and inflation via the Phillips curve, or high GDP growth and a balanced current account).[2]

The selection of these four goals is considered the core of the general version of the square, the so-called "Magic Polygon" of economic policy.[3] Any number of goals may be added. Goals that are often included in varying composition of the polygon include environmental sustainability, economic equality, and stable government activity. The name of the polygon adjusts according to the number of corners, where a hexagon for six goals and an octagon for eights goals are most commonly found in the literature.[4]

[1] For the US, the misery index, a related concept, is even more (in)famous.

[2] In the interest of staying on topic, I do not concern myself with a thorough discussion of policy trade-offs in this paper.

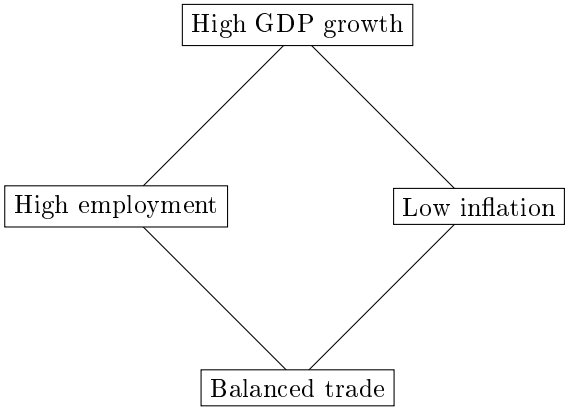
[3] In German: *Magisches Vieleck*

[4] In German: *Magisches Sechseck* and *Magisches Achteck*.

Obviously, the choice of economic policy goals in the polygon is, while not arbitrary, subject to both the "objective" historical necessities of the time and the subjective view (or bias) of the author within the discourse of that time. For instance, a hypothetical polygon of the 1960s might lack any reference to the environment, whereas a contemporaneous version with more than the four core goals would find it harder to justify the absence of an environmental goal. Nonetheless, the present paper is restricted to the original square.

In economic policy textbooks, the introduction of the Magic Square is followed by a discussion of how to measure the broad goals quantitatively, which, for the four core goals, should be straightforward in principle but does leave the researcher with more choice than one would initially believe. Although some researchers have created Macroeconomic Performance Indices based on the Magic Square, most textbooks stop short of it. I create such an index that gives a single number to measure the overall "success" of a nation to achieve its macroeconomic goals.

Figure 1: The four goals of Bundesregierung (1967) represented in the form of a rectangle



1.2 Macroeconomic Performance Indices

In a separate strand of literature, Macroeconomic Performance Indices (MPIs) have been designed to do as their name suggests. They take a group of macroeconomic measures, decide on a weighting scheme to scale each measure to its relative importance with respect to all other measures, and sum up the weighted measures to get a single index number.[5] In as far as economic data is available for a group of countries over time, a panel dataset allows for time series as well as cross sectional comparisons of the index numbers. It almost goes without mention that such an index number merely shows a better performance according to given criteria, but is unable to explain whether the

[5] Alternatively, only a ranking instead of an index number may be desired. Welsch (2011, Section 3.1) gives a brief statistical discussion of the difference.

relative success of a country is due to better economic policy by the government, a difference in the the relative quantity and size of favorable and unfavorable exogenous shocks, or the historical and political realities of the time.

2 Literature review

2.1 Literature on measuring macroeconomic performance

The literature on measuring macroeconomic performance is vast, which is why I focus on selected contributions that actually attempt to form a single quantitative index.

The best known version of an MPI is the "Economic Discomfort Index" developed by Arthur Okun, Chairman of the Council of Economic Advisors during the Johnson administration in the 1960s. It adds up the unemployment rate and the inflation rate, with equal weight for both variables.[6] Robert Barro then added the nominal interest rate and the deviation from the historical GDP average, took all four variables in changes instead of levels, and created the "Barro Misery Index".[7] Steve Hanke then used a slightly modified Barro index by adding the levels of the unemployment rate, the inflation rate and the nominal interest rate, and subtracting the year-over-year percent change in per-capita GDP growth. Continuing the conservative free-market tendency of the academic advocates of the misery index in recent years, the D.C.-based Cato Institute, a libertarian think-tank, publishes yearly updates on misery index values world-wide (Hanke, 2015). The index presented in this paper is similar to Hanke's index although the nominal interest rate is replaced with the current account balance deviation. Despite this similarity, the misery index debate is generally focused on the United States rather than Europe. In contrast, an early European MPI with regard to the Dutch economy was created by van der Hoek (1992). He brings in a political view on the index issue when examining the Dutch economy's performance compared to the remainder of the European Union. He uses seven "objective indicators", or goals, and combines them to three different indices (left, center, right) that each give different relative weights to unemployment and government debt according to assumed political party preferences. Hutton et al. (1998) evaluate the UK's performance through a composite index of national economic performance in the 1980s, using different variables and weights based on economic ideology. They also introduce a new approach to the MPI literature that draws on a methodological innovation for the Human Development Index.[8] The "HDI approach to MPIs" subjects all data to a common transformation to make them

[6] It was later popularized by an article in the WSJ (Janssen, 1971) and used by George McGovern, Jimmy Carter, Ronald Reagan, Walter Mondale, and Bill Clinton in their campaigns for U.S. presidency. Reagan renamed it the "Economic Misery Index" (Lovell and Tien, 2000, p. 2).

[7] See his 1999 newspaper article, Barro (1999). His index has been criticized for double-counting inflation because of the Fisher effect in the nominal interest rate (Nolan, 2015).

[8] Desai (1994) explains the methodological considerations that were deliberated in the development of the HDI. For further details, See also the references therein.

numerically commensurate, i.e. it makes comparable data that is given on different scales. In this case, the variables need to be normalized before a weighted average can be taken. Setterfield (2009) takes up the methodology to develop an Index of Macroeconomic Performance that includes five components (unemployment, inflation, growth per capita, inequality and economic insecurity), and explicitly leaves out the current account balance to focus on domestic indicators.[9] In the inclusion of inequality, he is preceded by Asher et al. (1993), who criticized the misery index for a lack of distributive justice (economic inequality), which they introduce by means of a PAIN index (poverty and inequality). It yields quite different results than the misery index for the US over the last few decades. Building upon the non-technical discussion in Kaldor (1971), several authors have suggested "Kaldor indices" based on the four goals in the Magic Square, sometimes adding other variables. Firme and Teixeira (2014) give a good overview of the individual country or region studies that have been conducted under this name. Econometric contributions to the debate have typically aimed to demonstrate correlations between components of the the misery index or other MPIs (as explanatory variables) and economic happiness or life satisfaction (as explained variables).[10] Using different econometric methods, the result of these studies is twofold: Firstly, they find empirical evidence that a linear form of a theoretical social welfare function that includes unemployment and inflation as arguments exists. Secondly, they estimate the weights that should be associated with these variables. While Setterfield (2009) and Liyeung (2013) provide an overview of the econometric Macroeconomics of Happiness results that can be used to derive a weighting scheme that is connected to life satisfaction and happiness, a further discussion of empirical regression coefficients as weights is relegated to the third remark in Section 3.2.1. There, a weighting scheme from the Data Envelopment Analysis (DEA) approach to MPIs is discussed as well. DEA assumes that the decision maker achieves her goals, granting her the "benefit of the doubt". In the comparison of two countries, the weighting scheme is tailored to each country based on weights derived from a minimization problem, and only the overall index is compared (Lovell et al., 1995). The approach is interesting for our purposes because it often uses the four variables of the Magic Square (Cherchye, 2001).

2.2 Literature on the Magic Square

Apart from the obvious reference which was already introduced above (Bundesregierung, 1967), of which the intellectual father was the former German Minister of the Economy and Finance Karl Schiller, related laws in other countries feature similar macroeconomic policy objectives. Kaldor (1971) discusses the goals in the UK's White Paper on Employment Policy (Her Majesty's Government, 1944), and the US had the Employment Act of 1946 (Congress of the United States, 1946) which stipulated to "promote maximum employment, production, and purchasing power", as dis-

[9] See Setterfield (2009, p. 628). The work is continued in Liyeung (2013).
[10] Presidential approval ratings are used in political science for Misery Index studies.

cussed by Santoni (1986). The OECD knows the Magic Square under the name "Magic Diamond", a geometric figure (OECD, 1987, p. 4).[11]

Dullien and van Treeck (2012), as well as Dullien (2015), should be mentioned. They seek to redefine the Magic Square from the four classic macroeconomic variables to four groups of sustainability indicators which, however, are combined into a single index number.[12] Their goal, however, is to redefine the Magic Square as a measure of well-being and the quality of life (Dullien and van Treeck, 2012, p. 13), placing it well within the debate on sustainability and the problematic measurement of GDP.[13] The aim of my index is narrower, and more traditional. I only wish to evaluate macroeconomic performance ex-post, and not well-being or life satisfaction. The current trend, however, is on their side, as several of the proposed measurements for well-being are of the scoreboard type rather than taking the form of a single index number (Dullien and van Treeck, 2012, 13-17).[14]

3 The index for the Magic Square

3.1 Measurement of indicators

In this section, I discuss the four indicators in the standard version of the Magic Square. It includes some form of the the GDP growth rate, the unemployment rate, the inflation rate, and the current account balance. The aggregation to a single macroeconomic performance indicator, however, requires three more (subjective but justified) judgment calls. The first task is to set a standard or reference value to compare each variable to. The second question is in what form to punish (or reward) a deviation from that target.[15] Finally, a set of weights has to be established that decides the relative importance of each variable for the aggregate indicator.[16]

For GDP, I use the growth rate of real GDP per capita. Per capita GDP is used because dif-

[11] Medrano-B and Teixeira (2013) extend the geometrical discussion of the Magic Square.

[12] They argue that a single indicator is difficult to communicate to the public. However, the misery index is a powerful counterexample to that. They also argue that a set of weights has to be employed that would be a political-normative question and not a scientific question (Dullien, 2015, p. 6). However, the choice of the indicators, as well as defining the groups of indicators to be of equal importance, is already part of a political-normative judgment.

[13] One example of the latter is the Fitoussi-Stiglitz Commission established by former French President Sarkozy. An overview of studies is given in Klär et al. (2013). The German Bundestag has taken up this line of thinking in an enquete (Bundeszentrale für politische Bildung, 2013), for which the Social Democratic Friedrich Ebert Foundation has commissioned the work by Dullien and van Treeck.

[14] The Macroeconomic Imbalance Procedure is based on a scoreboard by the EU Commission that refuses to provide weights for the individual indicators, which may, however, also be for political reasons to allow more flexibility in the final judgment.

[15] To formulate the first two questions in quantitative terms, a function has to be specified for each of the four variables of interest (like unemployment) that includes the variable itself and the target value. For instance, if x is the variable, then we have to specify a function $f(x, x^T)$, where x^T is the target value.

[16] For four variables, if one sets the weight of one variable to 1, then three relative weights have to be found for the other variables.

ferences in population growth rates would otherwise distort the results. Another route not taken here is to utilize an output gap of some form, e.g. a deviation of the actual GDP growth rate from the potential GDP growth rate. The reason for this is that potential output estimations are subject to a lot of uncertainty and have performed poorly during the financial crisis.[17]

For the unemployment rate, the target value is set to zero, corresponding to full employment. Since the concept of full employment itself is ambiguous (Philip, 2016), I define it here as an unemployment rate of 0%. The function therefore measures the distance from full employment in percentage points. Moreover, it punishes all forms of unemployment (demand-deficient, structural, and frictional) equally. To an extent, all of them can be reduced through good economic policy. The idea of a unemployment rate of zero is also not too far-fetched if one looks at historical examples. Several countries achieved rates close to zero during the time and build-up to the Second World War, and a few European countries essentially experienced full employment in the 1960s and early 1970s. Clearly, an alternative path not chosen is to use a natural rate of unemployment as the target rate. However, there is severe uncertainty on what the natural rate precisely is at a specific point in time. Estimating it would introduce an unnecessary source of error and make our index more complicated than it needs to be.[18] Another road not taken is to allow for frictional unemployment on the order of 1-2%. Following a satisficing approach of Rothschild (1999), anything within the range of 0 and the frictional unemployment maximum would be set to 0 in the unemployment contribution of the index, and only values above that would count. While this approach is entirely plausible, estimates of the frictional unemployment boundary would be needed for each country.[19,20]

For the inflation rate, the deviation from target in both directions is punished symmetrically.

[17] Among others, the labor component of the potential output estimation of the European Commission is based on the NAWRU, their version of the natural rate of unemployment. As discussed in the next footnote, the NAWRU, however, fluctuates with the business cycle. Therefore, potential output growth varies with the business cycle. This is quite straightforward because investment, the most variable business cycle component, determines the capital stock, which in turn determines potential output. However, the consequence is that potential output is not a variable that is independent of the business cycle for more than the very short term, say, for a year. For an index that attempts to do intertemporal comparisons, it is thus not an ideal variable.

[18] Furthermore, there is a more fundamental problem. Even with new methodology using a production function approach as opposed to a simple Hodrick-Prescott filter, the NAWRU, the EU version of the natural rate, is strongly pro-cyclical and driven mostly by the cycle, which contradicts the very idea of the NAWRU, see e.g. Havik et al. (2014, p. 26-27). Their solution, following Orlandi (2012), is to introduce an econometric estimation that correlates the NAWRU with structural and non-structural (cyclical) factors. They show that movements in the NAWRU are overwhelmingly driven by cyclical factors, while the structural components remain fairly stable. However, the estimation is only available from 1990 onwards for Germany and from 1985 for Spain. This leaves entirely unexamined the most interesting aspect of the time series, namely the massive rise in unemployment from the 1970s to the 1990s in most EU countries (Havik et al., 2014, p. 28-30)

[19] There may also be some uncertainty as to whether frictional unemployment can be clearly distinguished from structural and cyclical unemployment.

[20] The Rothschild approach of satisficing targets could also be used for all other variables in the MPI. This, however, would introduce the additional value judgment of defining the boundaries for the range within which each target is satisfied.

At least since 1999, the ECB has provided a target for the overall Eurozone inflation rate.[21] If individual Euro Area countries wish to uphold their (cost-) competitive position relative to other countries in the Eurozone under the condition that the overall inflation target is achieved, then the Euro Area inflation target applies to each Member State as well (Flassbeck and Spiecker, 2011). For data prior to 1999, it is less clear which target value should be used. However, for reasons of tractability (in order to avoid a moving or even country-specific target) we use the same 1.9% rate for previous decades as well, even though higher inflation rates were a common occurrence back then.[22] We concur with the typical reasoning for punishing very low positive, zero, and negative inflation rates despite the fact that they might better fulfill the literal definition of price stability. In case of unexpected developments such as a sudden large oil price and raw materials price decreases or the burst of a local real estate or financial market bubble, a negative inflation rate may result that may be hard to counter with economic policies once deflationary expectations begin to form.[23]

For the current account balance, the overall approach is to punish deviations from a balanced current account at zero percent in both directions equally. A current account balance of say, -6%, is therefore given the same negative value as one of +6%. For a negative current account, a large imbalance implies a much greater risk of sudden capital flight. For an economy with a positive current account balance, the risk is arguably not comparable to a negative one.[24] However, there is a social externality argument to be made: Since one country's deficit is necessarily the surplus of at least one other country by accounting identity, both should be punished – especially in a relatively closed trading bloc such as the Euro Area. Assume a situation in which there is full employment in country A and B as well as a balanced current account. Then, country B shifts to a mercantilist strategy of wage moderation, bringing down both its domestic demand (and thus restricting its im-

[21] It phrases it as "not exceeding, but close to 2%", which is often interpreted as 1.9%, see also the price stability definition at `https://www.ecb.europa.eu/mopo/strategy/pricestab/html/index.en.html`

[22] In the decades before 1999, this benefits countries with low and stable inflation rates such as Germany and Austria. During the time of regular devaluations of the Italian Lira before summer time – conducted by the Banca d'Italia, anticipated by the general public, and increasing tax revenues through seigniorage for the government in light of insufficient tax collection – the higher inflation rate may not have been a great detriment to society at large. Nevertheless, Italy would be punished for the failure to keep inflation rates low in our scheme.

[23] For the Euro Area, these arguments are all the more relevant. Exchange rate and monetary policies are centralized on the European level and also affect individual countries differently. In case of a local shock, the European policy may therefore not be able to react sufficiently to an individual country's needs. Moreover, the potential for expansionary fiscal policy on the country level is at least to an extent limited by the fiscal framework of the European Union.

[24] Exchange rate adjustments (in the pre-euro period) as a result of a sudden correction of the imbalance did pose a risk for profits and employment. In the euro crisis period, however, Northern European countries with strong current account surpluses mostly profited from the special construction of the euro zone (and the financial markets reaction that followed as a consequence) and the political decisions taken during that time. In as far as the positive balance is brought about by internal devaluation, the economy follows a beggar-thy-neighbor strategy that damages the international economic reputation of the country in the eyes of its trade partners. More importantly, it deprives the population in the country of a part of the consumption of the local production. The counterpart to that is the build-up of net foreign assets. The foreign assets of the creditor country may, however, fall in value during a revaluation of the exchange rate (financial assets) or a recession (real assets) in the debtor country.

ports) and improving its external cost-competitive position. Employment suffers in both countries, but country B manages to compensate some of the unemployment caused by lower wages (and less consumer demand) by additional net exports to country B, i.e. it exports some of its unemployment. As a consequence, country A suffers a current account deficit as country B manages to run a surplus. Although country B is clearly at fault for the trade imbalance, only country A would get punished unless a symmetric punishment of current account deviations is applied.

3.2 A theoretical formulation

The aggregate indicator, MPI_{MS} (Macroeconomic Performance Index: Magic Square), can be formulated as the following function.

$$\text{MPI}_{\text{MS}} = \lambda_{\hat{y}} \cdot \hat{y} - \lambda_{\pi} \cdot \left|\pi - \pi^{T}\right| - \lambda_{cab} \cdot \left|cab - cab^{T}\right| - \lambda_{u} \cdot \left|u - u^{T}\right| \tag{1}$$

The four parameters λ with subscripts $\hat{y}$, π, cab, and u represent the set of weights associated with the functional forms of the variables $\hat{y}$ (the real GDP per capita growth rate), π (the inflation rate), cab (the current account balance), and u (the unemployment rate). Variables with a T superscript, such as u^{T}, indicate the target value of the respective variable, in this case the unemployment target rate. Unlike the first variable, the latter three variables are formulated as deviations from target.[25] Thus, they can only contribute negatively to the MPI_{MS}, generally leading to negative overall index values. Still, a higher value (more positive or less negative) indicates a better overall index performance.

If the first weight, $\lambda_{\hat{y}}$, is set to one, the three remaining weights give the relative weight of each variable with respect to the real GDP growth rate – defining the trade-offs implicit in the weighting scheme. For example, a one percentage point increase in real GDP growth improves the index by as much as a λ_{π} percentage point reduction in the deviation of inflation from from its target rate.

3.2.1 The set of weights

I use the simplest conceivable weighting scheme, in which each variable (in its functional form) has an equal weight, and set $\lambda_{\hat{y}} = \lambda_{\pi} = \lambda_{cab} = \lambda_{u} = 1$. For the total index value, an additional deviation of inflation by one percentage point from its target is therefore "worth" as much as an additional one percentage point deviation of the current account balance from its target, a one percentage point decrease in the per capita growth rate, or a one percentage point increase in the unemployment rate.

[25] The previous rejection of the output gap as an unreliable variable comes to haunt me in the form of foregone elegance for the formulation of the index since it could otherwise have been formulated as a loss function following the political business cycle and theoretical central banking literatures.

While any weighting scheme is necessarily subjective, three remarks should be made on the specific choice.

The first one refers to the original intention in the law. While Bundesregierung (1967) first mentions a balanced current account, it then stipulates that any economic policy measures taken must simultaneously achieve the other three goals. Thus, it does not give priority to any single goal, but puts all four of them on equal footing. This speaks for identical weights in the aggregate index once the quantitative measurement of the four variables (its functional form) has been operationalized.

The second remark discusses the criteria I employed in selecting a weighting scheme. The most important (subjective) criteria for the functional forms and weights were simplicity, tractability, and their capability for intertemporal and cross-country comparisons. With regard to the latter, the defining quality that an index should possess is that the relative importance of individual variables remains constant over time and across countries. For example, a one percentage point increase in the unemployment rate in a given country needs to decrease the overall index value of that country by the same amount in 1965 as it does in 2005. Similarly, if the increase in unemployment occurs only in one country, but not another, the same relative deterioration in the first country's MPI should take place in 1965 as in 2005. The underlying idea is that we are interested to measure variations in macroeconomic performance, but not to accurately impute the welfare implications of such variations, which may call for time and country-varying weights. Therefore, we rule out weighting schemes that apply different weights over time or per country, such as DEA-derived weighting schemes.

The aggregate index should be tractable. In concrete terms, this means that new data should not lead to a complete recalculation of all past index values. Weighting schemes such as the The Human Development Index (HDI) normalize each variable to an index between 0 and 1 to solve the incommensurability of the original scales of the variables. The most common transformation used is $\frac{x_t - x_{min}}{x_{max} - x_{min}}$ which normalizes each variable with the distance of its maximum and minimum value. Once extreme new data points appear, they have to recalculate the value for any given *past* change. For e.g. a new and higher x_{max}, the index value for x (and thus the contribution to the total MPI) of all past x_t decreases. If variable x is unemployment, an increase of 1 percentage point in unemployment in a past year now gives a smaller value and is suddenly "worth" less as soon as new global maximum is reached. Thus, these weighting schemes may change the relative contribution of a 1 percentage point. increase in unemployment to the aggregate index value over time as well as compared to other variables.[26,27]

In practical terms, this would not be an issue if the latest values were within the min-max range of

[26] While Setterfield (2009) follows this approach for the calculation of his MPI, his footnote 6 discusses both the endpoint problem (of new data coming in) and the "hidden" weighting implicit in the normalization in more detail than is done here.

[27] On a side note, the same critique applies to weighting schemes that subtract the sample mean from the variable value and divide by the standard deviation of the sample.

the past. However, in our current times of record unemployment, high current account imbalances, "Great Recessions", and low inflation, new minimum or maximum values have be reached for several of the variables.[28]

In terms of simplicity, the guiding principle is that if not a layman, then at least an economist should be able to understand the construction of the index effortlessly.[29]

The third and rather lengthy remark is on the consistency of the basic "uniform" weighting scheme with alternative approaches. The latter typically attempt to derive or estimate the set of weights from procedures that do not involve an explicit subjective choice by the researcher, but merely a choice of the method. Remarkably, the weights so derived are sometimes not too far off from the basic uniform scheme.

The first of the two approaches is the Macroeconomics of Happiness approach which is based on econometrically estimating the effects (coefficients) that variables like unemployment and inflation have on general life satisfaction. Di Tella et al. (2001, p. 337) find that unemployment matters 2.3 times more than inflation for the life satisfaction of individuals. Welsch (2007), likewise using the Eurobarometer question on subjective life satisfaction, find a smaller relation between the coefficients, namely 1.2.[30] In a second regression that includes the growth rate of GDP, the unemployment and inflation coefficients are practically equal (1.027).[31] The two coefficients compared to the new growth rate coefficient are roughly six times as high (6.16 for inflation and 6.33 for unemployment) in his ordered probit model, or eight times as high in the the least squares model.[32,33] There is one caveat in these studies, as Welsch (2007, p. 242) points out: The unemployment variable merely measures the "general unemployment risk", "over and above individual unemployment"

[28] Using the functional forms without applying weights to them from our dataset of eleven countries, new global minima have been reached recently by Finland (2009) and Greece (2011) for the per capita growth rate and in France (2005) and Germany (2001) for inflation. New global maxima were observed in Greece (2013) and Spain (2012) with respect to the unemployment rate and in Greece (2013) for the current account. In the new millenium, the past and present index values of a hypothetical HDI-style index would therefore have been recalculated in 2001, 2005, 2009, 2011, 2012 and 2013.

[29] The beauty of simplicity also comes out in the figures of Appendix B that include contributions to the overall index by individual components. The contribution can then be read directly from the figure as the (measured deviation of the) variable itself – without a distortionary weighting hindering a timely interpretation.

[30] The ratio between the two coefficients is the "utility-constant trade-off a representative individual would be willing to make (marginal rate of substitution)" (Welsch, 2007, p. 241).

[31] In the case of a representative agent with a utility function, her marginal rate of substitution between unemployment and inflation is constant and equal to unity.

[32] We only consider regressions 1 and 2 in in Tables 2 and 3 Welsch (2007), i.e. those that include unemployment and inflation, and the growth rate of GDP. We disregard those that include the nominal interest rate, following the critique of Nolan (2015). Generally, as an alternative estimation strategy not followed by Welsch (2007), it would probably be worthwhile to first assume a model of how the economy works and then estimate a reduced form, e.g. the one that is derived for the misery index by Cohen et al. (2014) using a standard New Keynesian Phillips curve and a gap version of Okun's law.

[33] While the econometric results appear to be robust to a few alternative estimation methods, an altogether different question is the robustness of the life satisfaction variable, i.e. if a different satisfaction or happiness variable, with different questions asked from another survey, would yield similar results. Although not ideal as an explanatory variable for our purposes, Lovell and Tien (2000) use consumer sentiment and find a ratio of the unemployment to inflation coefficients of 0.58, giving a higher weight to inflation – quite the opposite of the life satisfaction findings.

that has a separate strong effect on the life satisfaction of the individuals concerned. If one simply takes the coefficient for unemployment found in the study, the decreased life satisfaction of unemployed persons remains unaccounted for in a perceived social welfare function. Welsch (2011) calculates the total effect resulting from the individual plus the societal effects for the growth rate and the unemployment rate. While for income growth, individual income makes up most of the total effect (82%), individual unemployment only makes up 8% – with a 92% share for the general unemployment risk.[34] If one uses his adjusted coefficients that he also uses to construct an MPI, one arrives at a remarkably close set of weights $(1, 1.18, 1.05)$ for the growth rate of GDP per capita, the unemployment rate, and the inflation rate.

The second approach is based on a linear programming exercise (DEA) that endogenously assigns a set of weights. Cherchye (2001) present the weights derived from three different DEA methods for a limited set of six countries (three non-European) and a short time period of five years, but use precisely the four variables of the Magic Square. For the most advanced procedure[35], the weight for unemployment and inflation is equal in all but four out of thirty sets of weights, and the weight for all four variables is equal in more than a third of occurrences (twelve out of thirty).

Finally, both approaches have their shortcomings if one's sole interest is to borrow their coefficients to use them as a set of relative weights. In the DEA approach, the derived weights presented in Cherchye (2001) fluctuate quite a bit across the different methods. Even less ideal for our purpose is that each country gets a different set of weights each year, violating our self-imposed principles of tractability and simplicity. In the life satisfaction regressions, omitted variable bias may influence the findings, and a regression that also includes the current account does not exist to the best of my knowledge. Even if it did, a grounding of the weights of a macroeconomic performance index, an index most relevant for politicians and economists, in the personal life satisfaction of the people might naturally underestimate the importance of the current account balance – a variables that political leaders and policy experts have to manage and care about largely out of sight of the general public. The Easterlin paradox, namely that per capita income increases typically do not bring about a corresponding average rise in happiness, may also bias a weighting scheme based on life satisfaction against growth (Welsch, 2011, p. 85). Nevertheless, it is a positive and unexpected surprise that one comes across an equal weight of inflation and unemployment quite frequently across several approaches and studies. This might leave the "objectivist" reader with sufficiently good will open to the possibility that the subjective uniform weighting scheme of the original Magic Square is not too far from the "true" and "objective" one.

To conclude section 3.2, we can reprint the index formula in equation (1) with the chosen

[34] In a similar vein, it could be the case that individuals are differentially affected by inflation, e.g. by an individual variable that lists that share of their income in the form of pensions or fixed income (in the banking sense), but this is not controlled for in his regression.

[35] Their Table 3 gives the results. Each year and each country get a different set of weights as a result of the minimization exercise.

weighting scheme and target values.

$$\text{MPI}_{\text{MS}} = \hat{y} - |\pi - 1.9| - |cab| - |u| \tag{2}$$

4 Cross-country and time series comparisons

We are now in a position to use the Macroeconomic Performance Index based on the Magic Square devised in the previous section to compare the economic performance of selected countries. Eleven euro area countries have been chosen: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain.[36] The aim is to provide the bigger picture, the developments over decades both within and across countries. All data is sourced from AMECO[37], and details on data transformations and the chosen time series are given in Appendix A. All figures can be found in Appendix B. The index values based on equation (2) are provided in Table 1 from 1961 to 2015 for all eleven countries.

Focusing at first on the recent performance, the developments in each country's MPI in the 2000-2015 period are depicted in Figure 2. In many ways, common knowledge of which country fared better or worse since the inception of the Eurozone is confirmed by the index values. Greece, whose MPI value falls from -18 to -31 in the new millennium, has a firm grip on the last position for the most part of the period. It is once beaten by Portugal and three times by Spain, both of which hover on a declining trend close to the Greek values until 2010. After that, the Spanish index temporarily deteriorates further, while Portugal catches up to the majority of the other countries and surprises with a 4th place in 2015. From 2010-2013, Portugal manages to close its current account deficit, as shown in Figure 13. The simultaneous temporary increase in unemployment is not enough to drag down the overall improvement. Contrary to the Portuguese case, Spanish austerity also leads to the closing of the current account deficit beginning in 2007/08, but is overshadowed by a massive increase in unemployment, which pushes the country's MPI to a new decade minimum.

The top spot is held by Austria for most of the latter part of the short sample (after 2006), which ranks second behind Ireland until then. Historically, this is not new as the Alpine nation has had the best MPI value for most of the 1980s and 1990s as well, as shown in Figures 17 and 18. Austria's fairly good growth performance, combined with a not too excessive current account surplus and a (comparatively) low unemployment rate, are the reason for its first place. It was faced with a pronounced decline of its macroeconomic performance over the sample, however, starting at -1.6 and ending at -10.1, which narrowed its lead on the other countries. The high unemployment rates,

[36] These are the largest euro zone countries from Western, Northern, Southern and Central Europe. The New Member States of the EU are excluded due to a lack of time series for the decades before the 1990s.

[37] The macroeconomic database of DG ECFIN, accessible at `http://ec.europa.eu/economy_finance/db_indicators/ameco/index_en.htm`

reinforced by low or even negative growth rates, have affected all countries, resulting in an decrease of -7 in the average MPI over the period. Two countries, Finland and Portugal, are exceptions to the rule. Finland records the same MIP in 2015 as in 2000, and Portugal even a 1.7 higher one (after a strong fall in between). For both countries, a strong reduction in their current account deviation is coupled with a limited or constant unemployment contribution. Belgium, with a similar reduction in the current account, has a limited decrease of -2.8, while all other countries are in the range of a -6.1 and -12.2 decrease. Together with the former two, the remaining countries (France, Germany, Netherlands, Italy) are found in close proximity in the middle MPI section, occasionally switching positions over the sample period. The composition of the MPI of those four countries, however, shows a stark contrast: Italy and France are overwhelmingly affected by a bad employment performance. The MPIs of Germany and the Netherlands are dominated by an increase in the current account surplus.[38] Clearly, the results are quite sensitive to the weighting scheme that punishes equally an unemployment and a current account deviation of one percentage point. A scheme with a higher relative weight (punishment) of unemployment would have Germany and the Netherlands ahead, while one that emphasizes balanced trade over local employment conditions would favor France and Italy as the "lesser sinners".[39]

If we widen the angle to include the whole sample range (1961-2015) into our analysis, a few broad elements that have dominated economic policy over the last 55 years are reflected in the contributions to the MIP of almost every country. As shown in Figure 3, macroeconomic performance has worsened profoundly since 1961. In the 1960s, MPI values fluctuated around zero for several countries. In years with a positive MPI, strong per capita growth coincided with minor imbalances in inflation, unemployment and the current account. Since then, MPI values have fallen dramatically. Naturally, GDP per capita growth rates have never reached the levels of the 1960s again, although significant growth spurts can be found in between the more frequent recessions between 1970 and 2015.[40] Unemployment rates began to rise in 1975, preceded by inflation rates in 1973 or the early 1970s in the case of a few countries. The current account was an infrequent problem for several economies, but fades in importance compared to inflation and unemployment, the two components of the "misery index". Eventually, inflation subsides and is brought under control after a decade – by around 1983-84 in the majority of countries, but a few take another decade until

[38] Germany experiences a very positive employment development, but also a large current account change, while the Netherlands already starts with a higher current account and sees a limited change in both the current account and unemployment.

[39] The example given is not chosen arbitrarily. The weighting scheme proposed in this article is justified both by the theoretical concept of a Magic Square and by the endogenous estimation of coefficients based on welfare consideration. From a purely welfare-theoretic perspective that only considers as legit empirically estimated coefficients grounded in the Macroeconomics of Happiness literature, the "weakest link" is arguably the relationship between the current account balance and the other variables due to a lack of studies that consider the current account. A sensitivity analysis with respect to the current account balance may therefore be a fruitful aspect of future research.

[40] An exception is Ireland.

around 1993. Generally, MPI values are at their lowest for several future euro area countries in the early 1980s, right before the end of the inflationary decade. While the end of inflation brings up MPIs until 1990 across most nations, ever higher unemployment rates became a new problem that prevented MPIs from reaching more positive levels in the 1990s. Current account problems arose in a selected set of countries over the 1990s and the 2000s as well, such as Finland, Belgium, or Greece. Detailed results per country, including the individual contributions of the four MPI component, can be found in the series of eleven barcharts from Figure 4 to Figure 14.[41] Another interesting observation is that for several countries (Spain, Netherlands, Greece, Germany, Austria), the macroeconomic performance during and after the financial crisis (including up to 2015) is close to the worst they have seen since 1961. In the case of Germany and the Netherlands, this points to a significant current account imbalance, while the rest is mostly affected by high unemployment rates compared to previous decades.

5 Conclusion

In the present paper, I have used the classical Magic Square to calculate a Macroeconomic Performance Index for eleven Euro Area countries. For an aggregate index combining the four variables in the square (GDP per capita growth, unemployment rate, inflation rate, current account balance), the measurement of the variables, the choice of the target rate, the precise functional form of the measured deviation of the variable from the target, and the weighting scheme all matter. The latter is arguably of paramount importance as it sets the relative importance between the variables. For my index, I argue that a simple uniform weighting scheme that gives equal weight to all four components is the simplest, most tractable, and most useful approach for comparing macroeconomic performance over time and across countries for two reasons. Firstly, equal weights for all four policy goals are stressed in the original conception of the Magic Square. Secondly, even when checking the simple weighting scheme against the most recent literature that attempts to derive or estimate a set of weights endogenously (e.g. Macroeconomics of Happiness regressions), it conforms surprisingly well regarding unemployment, inflation, and (partially) GDP per capita growth. One weakness with regard to the second reasoning is the current account balance, which is simply not included in the regressions.

Applying the index to macroeconomic data, a few key results stand out. Firstly, the macro performance of all eleven countries has significantly worsened over the decades. While increasing unemployment rates play the largest role for most countries, high inflation rates in the 1980s combined with current account imbalances are even more important for the overall index values

[41] The black dot connected through a line shows the MPI for a given year, while the bars show the contributions of each components to the MPI. Contrary to the fixed vertical axis scale in the visualization of Figure 3 which allows for easy comparison across countries, the vertical axis features a variable scale in this series of figures. The reader is warned not to compare the height of the bars across two figures (two countries) of the set from Figure 4 to Figure 14.

of other countries. The fall of the high per capita growth rates of the 1960s also contributes its share, particularly in the early part of the sample. This turns index values permanently negative after the 1960s, indicating the end of the Golden Age of the Post-War period. Secondly, the Great Financial Crisis has not been overcome. For all countries, their aggregate macroeconomic performance during the last years has been either the worst since 1961 or at least come close to the previous (negative) records of the high-inflation period of the 1980s. For most countries, this is due to high unemployment. For a minority of countries, such as Germany and the Netherlands, the current account surplus plays a more dominant role. This is due to the fact that deviations from target are (rightly so) punished symmetrically for inflation and the current account.

6 Bibliography

Asher, Martin A, Robert H Defina, and Kishor Thanawala (1993) "The Misery Index: Only part of the story," *Challenge*, Vol. 36, pp. 58–62.

Barro, Robert J. (1999) "Reagan vs. Clinton: Who's the economic champ?" *Businessweek*, February 22.

Bundesregierung (1967) "Gesetz zur Förderung der Stabilität und des Wachstums der Wirtschaft," Bundesgesetzblatt, Jahrgang 1967, Teil 1, June 8.

Bundeszentrale für politische Bildung (2013) "Schlussbericht der Enquete-Kommission 'Wachstum, Wohlstand, Lebensqualität–Wege zu nachhaltigem Wirtschaften und gesellschaftlichem Fortschritt in der Sozialen Marktwirtschaft'."

Cherchye, Laurens (2001) "Using data envelopment analysis to assess macroeconomic policy performance," *Applied Economics*, Vol. 33, pp. 407–416.

Cohen, Ivan K, Fabrizio Ferretti, and Bryan McIntosh (2014) "Decomposing the misery index: A dynamic approach," *Cogent Economics & Finance*, Vol. 2, p. 991089.

Congress of the United States (1946) "Employment Act of 1946," *Public Law 30 – 79th Congress*, Chapter 33 – 2d Session, S. 380.

Desai, Meghnad (1994) "The measurement problem in economics," *Scottish Journal of Political Economy*, Vol. 41, pp. 34–42.

Di Tella, Rafael, Robert J MacCulloch, and Andrew J Oswald (2001) "Preferences over inflation and unemployment: Evidence from surveys of happiness," *The American Economic Review*, Vol. 91, pp. 335–341.

Dullien, Sebastian (2015) "Das neue 'Magische Viereck' im Realitätscheck," *Denkwerk Demokratie*, Working Paper Nr. 7.

Dullien, Sebastian and Till van Treeck (2012) "Ein neues Magisches Viereck: Ziele einer nachhaltigen Wirtschaftspolitik und Überlegungen für ein neues Stabilitäts- und Wohlstandsgesetz," *Denkwerk Demokratie*, Working Paper Nr. 7.

European Commission (2010) "Annual macro-economic database (AMECO) of the European Commission's Directorate General for Economic and Financial Affairs (DG ECFIN)," Brussels.

Firme, Vinícius de Azevedo Couto and Joanílio Rodolpho Teixeira (2014) "Index of macroeconomic performance for a subset of countries: A Kaldorian analysis from the magic square approach focusing on Brazilian economy in the period 1997-2012," *Panoeconomicus*, Vol. 61, p. 527.

Flassbeck, Heiner and Friederike Spiecker (2011) "The euroŮa story of misunderstanding," *Intereconomics*, Vol. 46, pp. 180–187.

Hanke, Steve (2015) "The World Misery Index: 108 Countries," Cato Institute Blog, January 22, URL: `http://www.cato.org/blog/world-misery-index-108-countries`, accessed on September 6, 2016.

Havik, Karel, Kieran Mc Morrow, Fabrice Orlandi, Christophe Planas, Rafal Raciborski, Werner Röger, Alessandro Rossi, Anna Thum Thysen, and Valerie Vandermeulen (2014) "The Production Function Methodology for Calculating Potential Growth Rates & Output Gaps," *Economic Papers*, pp. 1–120.

Her Majesty's Government (1944) "White Paper on Employment Policy," Cmd. 6527.

van der Hoek, Peter M (1992) "Judging the performance of an economy with an application to the Netherlands," *Review of Political Economy*, Vol. 4, pp. 79–94.

Hutton, Alan, Alexander Dow, and Terry Deeney (1998) "Meaning and measurement of national economic success: UK relative economic performance in the 1980s," *Economic Issues*, Vol. 3.

Janssen, R.F. (1971) "Appraisal of Current Trends in Business and Finance," *The Wall Street Journal*, January 4.

Kaldor, Nicholas (1971) "Conflicts in national economic objectives," *The Economic Journal*, Vol. 81, pp. 1–16.

Klär, Erik, Fabian Lindner, and Kenan Sehovic (2013) "Das neue magische Viereck nachhaltiger Wirtschaftspolitik," *WISO-Diskurs*, Friedrich Ebert Stiftung.

Liyeung, Leo (2013) "An Index of Macroeconomic Performance," April 11, Unpublished manuscript: Thesis submitted to Department of Economics, Trinity College.

Lovell, CA Knox, Jesus T Pastor, and Judi A Turner (1995) "Measuring macroeconomic performance in the OECD: A comparison of European and non-European countries," *European Journal of Operational Research*, Vol. 87, pp. 507–518.

Lovell, Michael C and Pao-Lin Tien (2000) "Economic discomfort and consumer sentiment," *Eastern Economic Journal*, Vol. 26.

Medrano-B, René and Joanilio Teixeira (2013) "A Kaldorian Macroeconomic Index of Economic Welfare," *Revista de História Econômica & Economia Regional*, Vol. 8.

Nolan, Ed (2015) "What Ever Happened to the Misery Index?," Economonitor (Blog), February 2, URL: http://www.economonitor.com/dolanecon/2015/02/02/what-ever-happened-to-the-misery-index/, accessed on September 6, 2016.

OECD (1987) "Economic Outlook," *Economic Outlook*, Vol. 41, June.

Orlandi, Fabrice (2012) "Structural unemployment and its determinants in the EU countries,"Technical report, Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

Philip, Harvey (2016) "What is full employment and why does it matter?," Paper Presented at the International Post Keynesian Conference.

Rothschild, Kurt W (1999) "Maximising, satisficing, weights and the evaluation of macroeconomic comparisons," *International Review of Applied Economics*, Vol. 13, pp. 207–217.

Santoni, GJ (1986) "The Employment Act of 1946: Some history notes," *Federal Reserve Bank of St. Louis Review*, pp. 5–16.

Setterfield, Mark (2009) "An index of macroeconomic performance," *International Review of Applied Economics*, Vol. 23, pp. 625–649.

Welsch, Heinz (2007) "Macroeconomics and life satisfaction: Revisiting the 'misery index'," *Journal of Applied Economics*, Vol. 10, p. 237.

——— (2011) "The Magic Triangle of Macroeconomics: How do European countries score?" *Oxford Economic Papers*, Vol. 63, pp. 71–93.

Appendix A Data sources

The data source is AMECO, the macroeconomic database of the European Commission (European Commission, 2010). It was accessed on August 27, 2016. The following variables were used:

- RVGDP (GDP per head of population at 2010 reference prices)
- ZUTN (Unemployment rate, Eurostat definition)
- ZCPIH (Harmonised consumer price index: CPI inflation rate)
- ZCPIN (National consumer price index: CPI inflation rate)
- UBCA (Balance of current transactions with the rest of the world)

The growth rates was calculated for GDP per capita, and the inflation rate from the price indices. 1997 is the first year for which a complete set of harmonized inflation rates is available for all eleven countries. Up to and including 1996, the national inflation rate is used instead. Regarding Germany, West German data (excluding the former German Democratic Republic) is used up to and including 1991.

Appendix B Figures

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List of Tables

Figure 2: Cross country comparison of MPI in recent years, Eurozone 11, 2000-2015

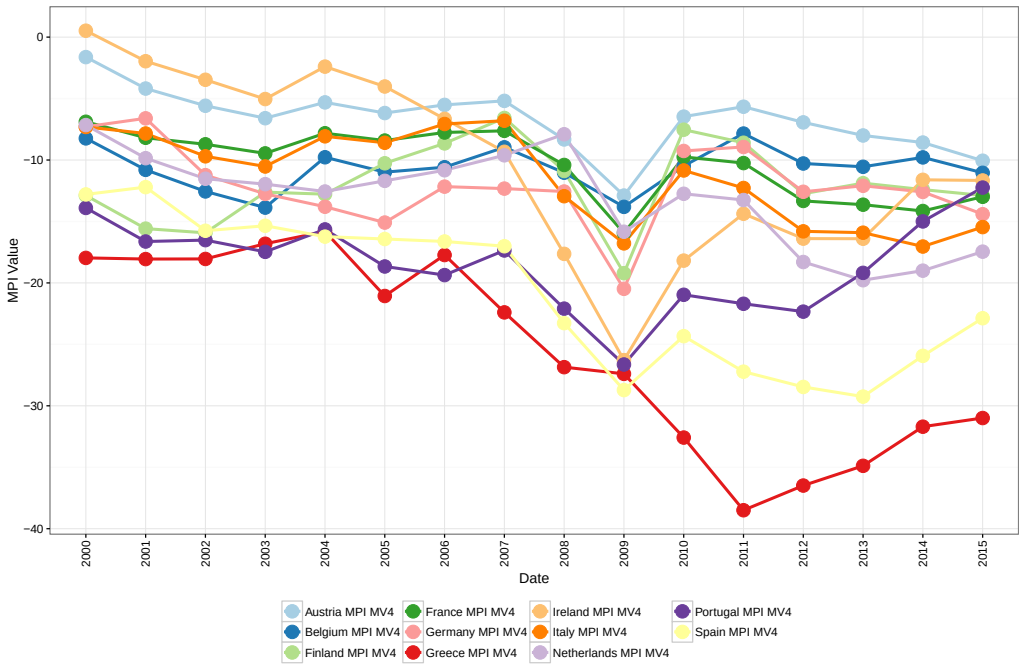

Figure 3: MPI for each Eurozone 11 member, 1961-2015

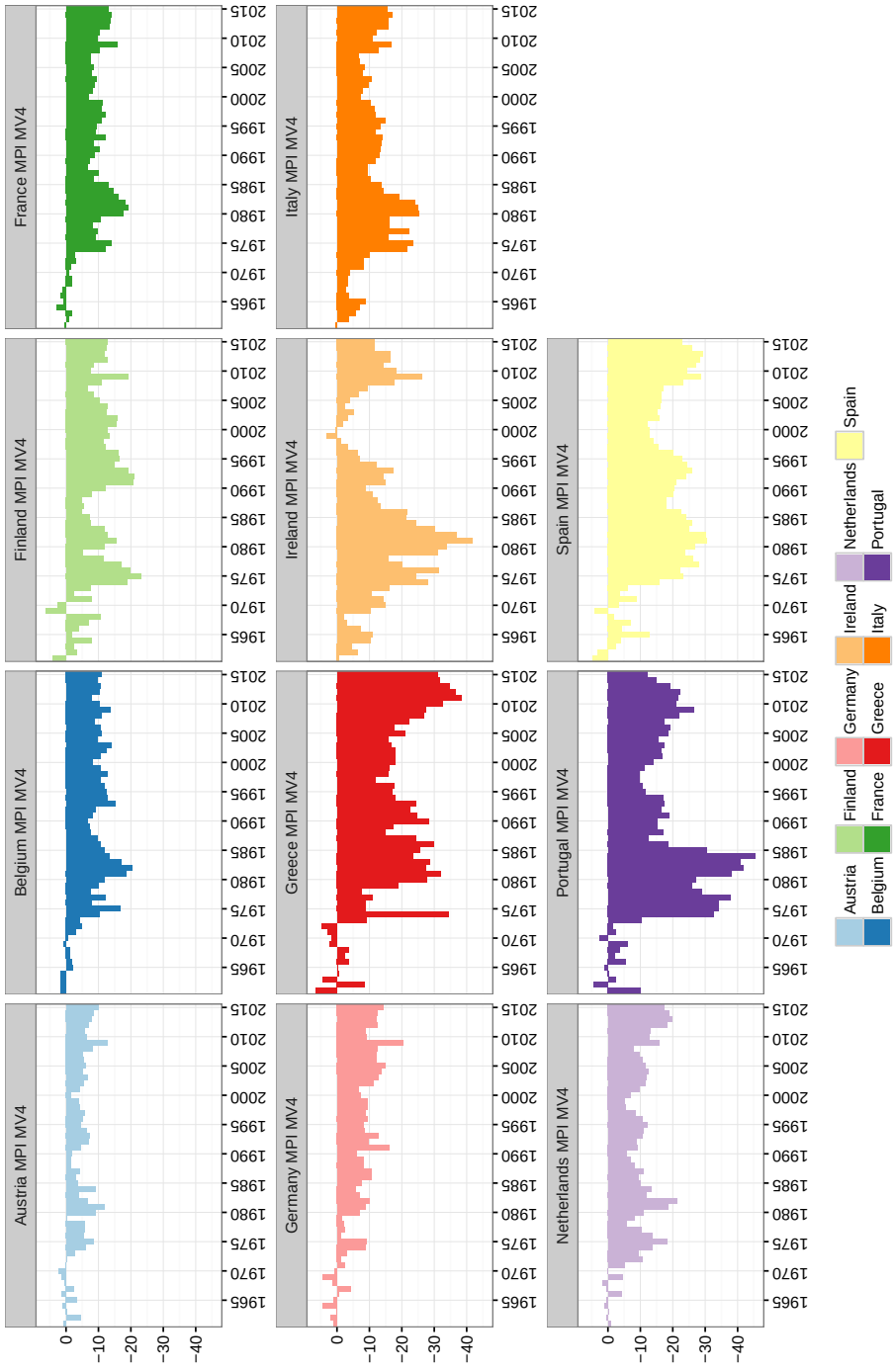

Table 1: Macroeconomic Performance Index (MPI), Eurozone 11, 1961-2015

Year	AUT	BEL	FIN	FRA	GER	GRE	IRE	ITA	NED	POR	ESP
1961	0.9	1.7	4.1	0.3	1.2	6.7	-0.7	0.3	-0.9	-10.2	4.7
1962	-4.4	1.7	-3.3	-0.8	2.0	-8.6	-6.5	-3.5	0.3	4.3	3.2
1963	-0.3	1.7	-2.5	-1.9	0.0	4.4	-4.6	-5.6	-0.2	-2.4	-2.6
1964	1.2	1.8	-7.9	2.9	4.5	-0.6	-10.2	-7.1	1.2	-0.4	-4.0
1965	-3.4	-2.1	-1.8	0.7	1.2	-0.2	-10.9	-8.9	0.4	1.2	-12.7
1966	1.5	-1.8	-4.0	1.8	-0.5	-3.7	-7.2	-3.7	-4.2	-5.6	-4.4
1967	-2.5	-1.3	-7.1	1.1	-4.3	-2.4	-3.0	-2.6	0.6	-2.1	-6.9
1968	0.5	-1.3	-10.6	-2.0	1.3	-3.6	-2.1	-3.4	1.7	-3.7	-1.9
1969	1.5	0.6	6.2	-1.9	4.4	2.2	-10.4	-3.3	-4.5	-6.0	4.1
1970	2.3	-0.7	2.6	-0.8	0.9	1.6	-14.8	-4.1	0.1	2.5	-3.3
1971	0.1	-3.1	-7.9	-1.6	-2.4	3.0	-14.4	-8.1	-5.1	-2.5	-8.7
1972	-0.2	-5.0	-2.4	-3.1	-1.3	4.8	-10.7	-8.2	-10.8	-1.6	-3.6
1973	-2.7	-4.4	-7.5	-2.7	-3.1	-9.1	-16.1	-10.1	-9.6	-10.2	-6.1
1974	-6.2	-10.3	-18.8	-12.1	-8.8	-34.4	-28.2	-21.6	-13.7	-32.7	-15.7
1975	-8.4	-16.7	-23.2	-14.0	-9.0	-8.9	-24.5	-23.4	-18.2	-34.2	-23.1
1976	-5.6	-8.0	-19.8	-9.2	-1.1	-8.8	-31.4	-15.8	-13.7	-34.0	-22.3
1977	-5.7	-12.2	-17.1	-9.6	-2.4	-11.0	-20.2	-22.1	-10.5	-37.7	-27.9
1978	-5.8	-7.8	-11.7	-8.1	-2.2	-7.5	-15.7	-16.1	-5.9	-28.9	-26.2
1979	-0.2	-10.2	-5.2	-10.7	-1.5	-19.0	-31.0	-16.0	-8.1	-26.0	-23.9
1980	-9.0	-11.8	-12.0	-17.6	-7.0	-27.9	-33.9	-25.4	-11.1	-27.1	-27.0
1981	-11.7	-18.6	-15.4	-19.1	-8.7	-32.1	-41.9	-24.9	-18.6	-38.3	-30.5
1982	-6.6	-20.4	-12.9	-18.3	-10.1	-27.4	-37.0	-23.9	-21.3	-41.9	-30.3
1983	-4.1	-17.0	-12.0	-16.1	-7.1	-28.7	-30.3	-19.3	-12.0	-41.0	-25.0
1984	-9.1	-13.3	-7.7	-14.7	-5.9	-23.6	-24.3	-14.3	-13.4	-45.5	-25.8
1985	-3.6	-11.8	-7.2	-13.1	-7.6	-25.5	-21.3	-13.7	-10.0	-30.4	-24.0
1986	-3.1	-10.7	-4.8	-8.6	-10.6	-29.8	-21.7	-10.4	-9.6	-18.6	-22.7
1987	-4.1	-9.7	-5.6	-9.9	-10.7	-24.5	-13.4	-9.5	-10.9	-12.5	-18.0
1988	-1.4	-7.5	-4.9	-6.6	-8.3	-14.8	-12.4	-9.5	-8.2	-17.2	-18.1
1989	-1.4	-7.4	-7.9	-7.4	-8.2	-17.5	-11.1	-12.0	-7.0	-15.2	-20.2
1990	-1.7	-6.8	-12.1	-8.7	-6.1	-28.5	-8.9	-13.0	-5.9	-15.1	-20.5
1991	-4.6	-8.3	-20.6	-10.2	-16.1	-24.6	-15.1	-13.4	-9.2	-18.8	-20.9
1992	-7.0	-9.2	-20.9	-8.5	-9.8	-22.4	-14.3	-13.7	-8.8	-16.4	-24.1
1993	-7.4	-15.2	-19.1	-12.3	-12.9	-24.4	-17.5	-14.0	-10.6	-17.5	-26.0
1994	-6.3	-12.9	-14.8	-9.2	-8.5	-18.0	-12.1	-11.8	-10.9	-17.1	-24.3
1995	-4.7	-12.5	-16.4	-9.3	-8.2	-17.0	-6.9	-13.5	-12.3	-11.6	-23.0
1996	-5.2	-12.0	-16.2	-10.9	-9.5	-17.6	-6.5	-14.8	-10.7	-10.7	-20.2
1997	-5.7	-10.7	-12.2	-12.1	-8.8	-11.8	-3.4	-12.0	-8.4	-9.9	-15.7
1998	-4.2	-12.9	-11.7	-10.9	-9.4	-16.0	-1.3	-11.4	-5.5	-9.9	-14.0
1999	-3.8	-10.7	-13.4	-11.2	-9.3	-16.1	3.2	-10.4	-5.3	-11.3	-12.8
2000	-1.6	-8.2	-12.9	-6.9	-7.3	-18.0	0.5	-7.3	-7.2	-13.9	-12.8
2001	-4.2	-10.8	-15.6	-8.2	-6.6	-18.1	-2.0	-7.8	-9.8	-16.6	-12.2
2002	-5.6	-12.6	-15.9	-8.7	-11.2	-18.0	-3.5	-9.7	-11.5	-16.5	-15.8
2003	-6.6	-13.9	-12.6	-9.5	-12.8	-16.8	-5.0	-10.5	-12.0	-17.5	-15.3
2004	-5.3	-9.8	-12.8	-7.8	-13.8	-15.8	-2.4	-8.1	-12.6	-15.6	-16.2
2005	-6.2	-11.0	-10.3	-8.4	-15.1	-21.1	-4.0	-8.6	-11.7	-18.7	-16.4
2006	-5.5	-10.6	-8.6	-7.8	-12.2	-17.7	-6.6	-7.1	-10.8	-19.4	-16.6
2007	-5.2	-9.0	-6.6	-7.6	-12.3	-22.4	-9.3	-6.8	-9.6	-17.4	-17.0
2008	-8.3	-11.0	-10.9	-10.4	-12.6	-26.9	-17.6	-12.9	-7.9	-22.1	-23.3
2009	-12.9	-13.8	-19.2	-15.9	-20.5	-27.4	-26.3	-16.8	-15.8	-26.6	-28.7
2010	-6.5	-10.5	-7.5	-9.7	-9.3	-32.6	-18.2	-10.8	-12.7	-21.0	-24.3
2011	-5.7	-7.8	-8.6	-10.2	-8.9	-38.5	-14.4	-12.3	-13.3	-21.7	-27.2
2012	-6.9	-10.3	-12.7	-13.3	-12.6	-36.5	-16.4	-15.8	-18.3	-22.3	-28.5
2013	-8.0	-10.5	-11.9	-13.6	-12.1	-34.9	-16.4	-15.9	-19.8	-19.2	-29.2
2014	-8.6	-9.8	-12.4	-14.1	-12.6	-31.7	-11.6	-17.0	-19.0	-15.0	-25.9
2015	-10.1	-11.0	-12.9	-13.0	-14.4	-31.0	-11.7	-15.5	-17.5	-12.2	-22.9

Figure 4: Contributions to MPI of its four weighted components, Austria, 1961-2015

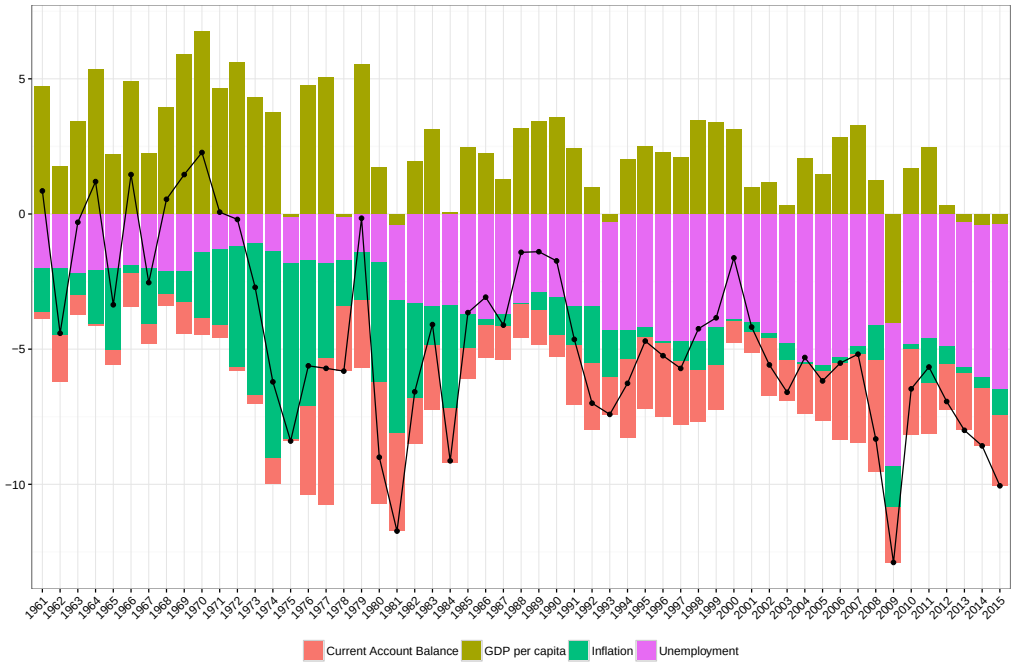

Figure 5: Contributions to MPI of its four weighted components, Belgium, 1961-2015

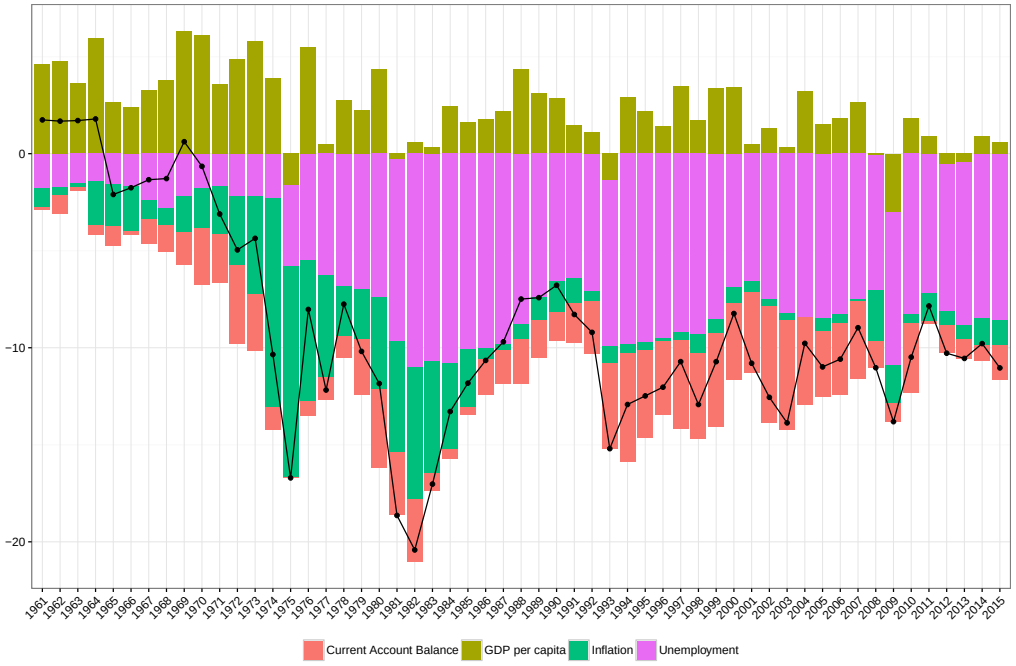

Figure 6: Contributions to MPI of its four weighted components, Finland, 1961-2015

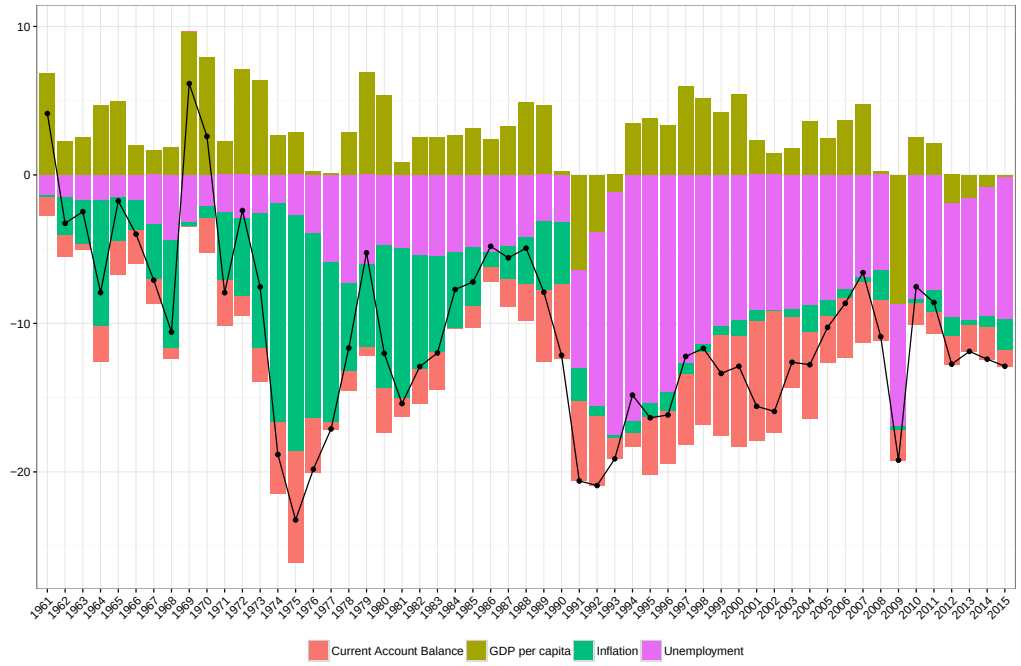

Figure 7: Contributions to MPI of its four weighted components, France, 1961-2015

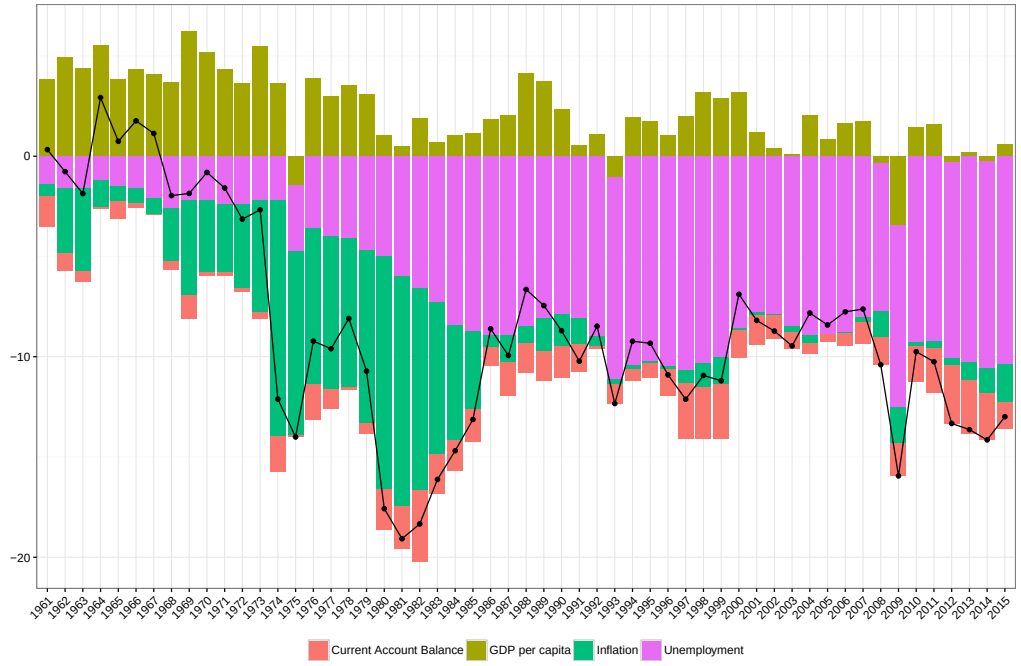

Figure 8: Contributions to MPI of its four weighted components, Germany, 1961-2015

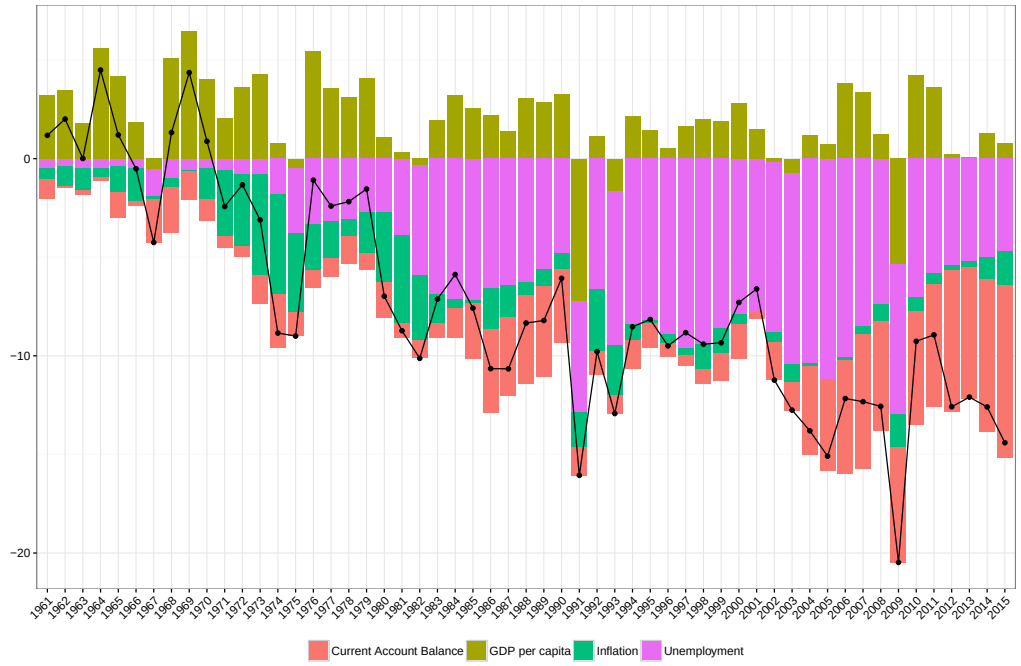

Figure 9: Contributions to MPI of its four weighted components, Greece, 1961-2015

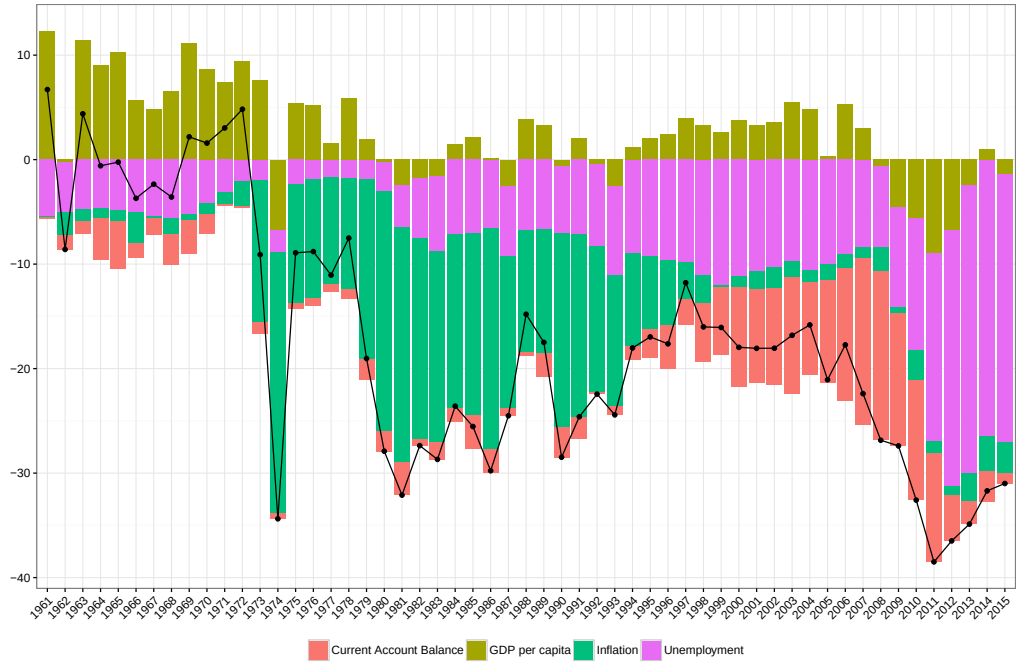

Figure 10: Contributions to MPI of its four weighted components, Ireland, 1961-2015

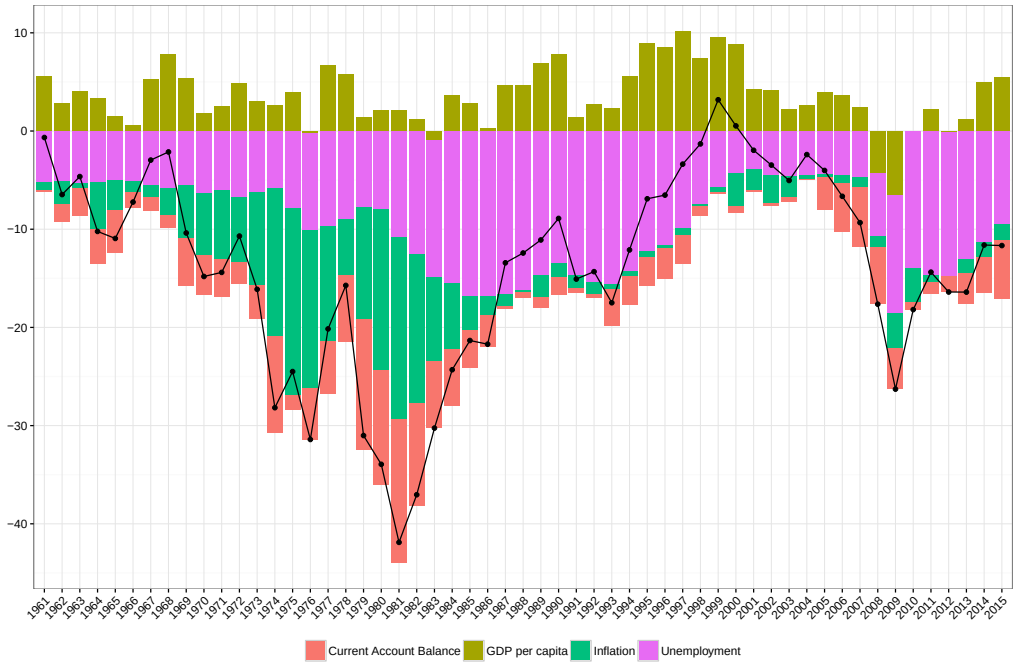

Figure 11: Contributions to MPI of its four weighted components, Italy, 1961-2015

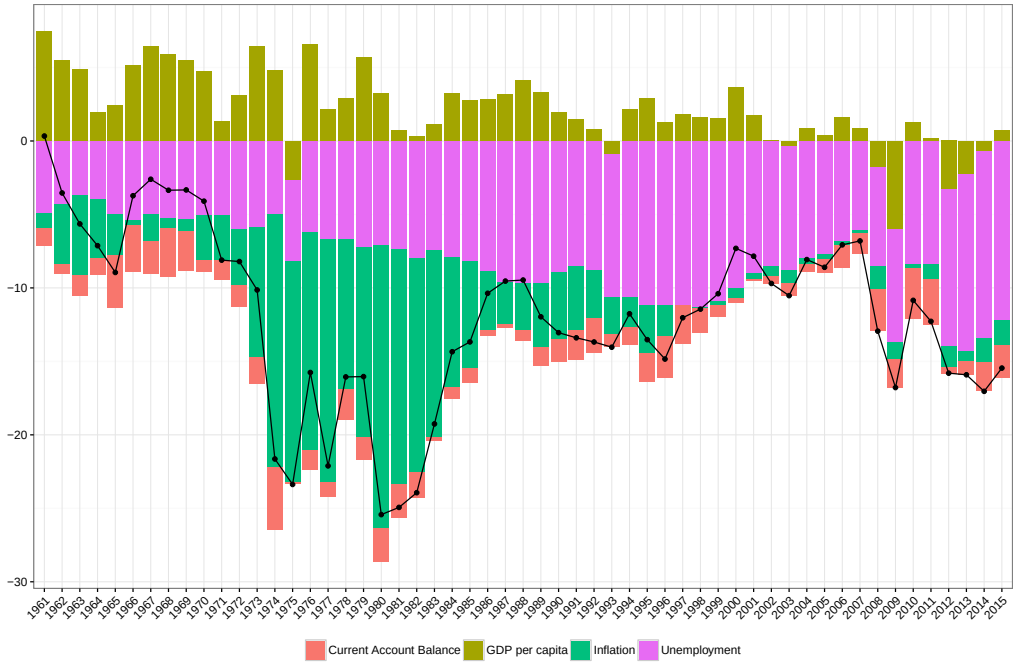

Figure 12: Contributions to MPI of its four weighted components, Netherlands, 1961-2015

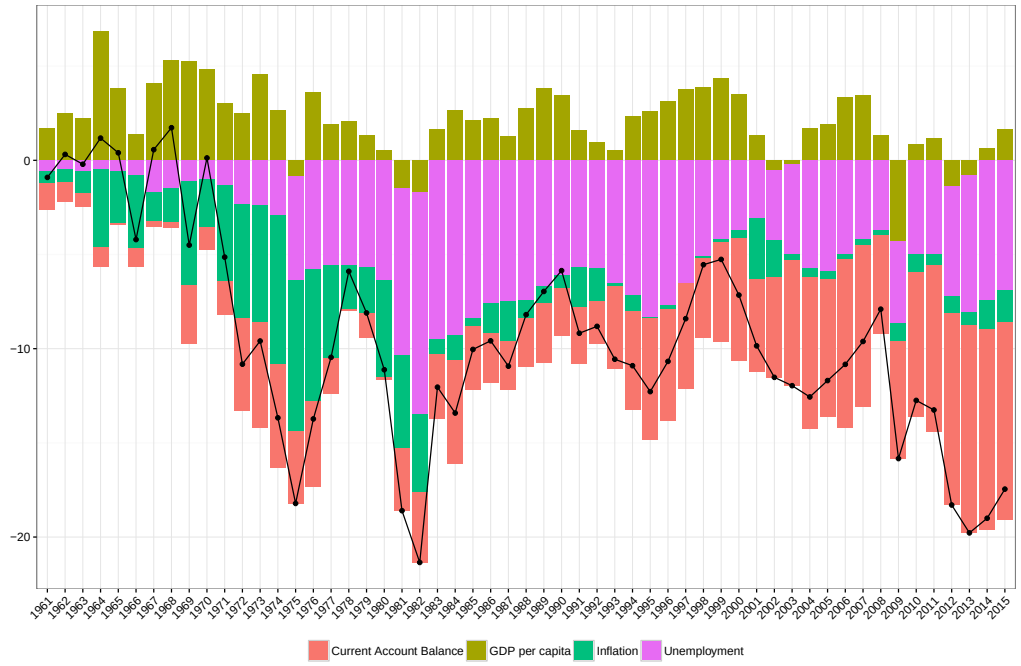

Figure 13: Contributions to MPI of its four weighted components, Portugal, 1961-2015

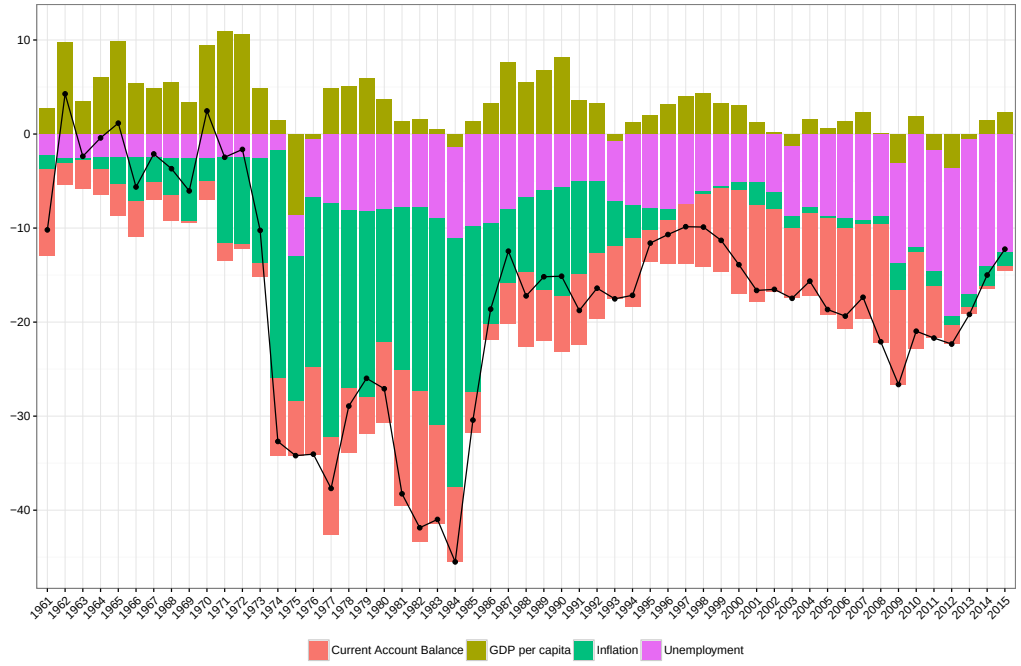

Figure 14: Contributions to MPI of its four weighted components, Spain, 1961-2015

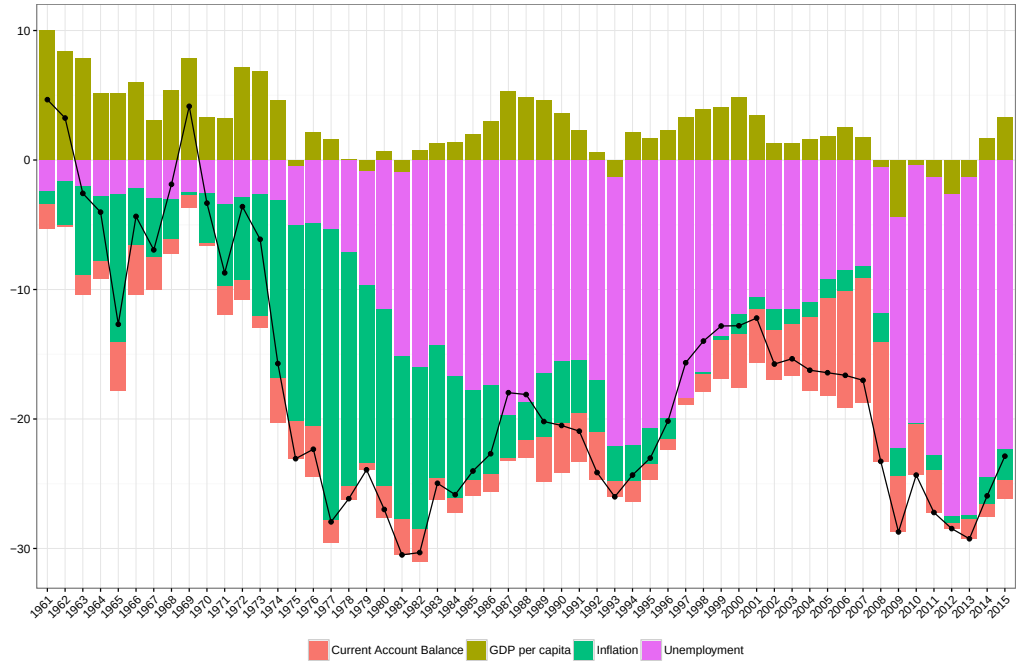

Figure 15: Cross country comparison of MPI in recent years, Eurozone 11, 1961-69

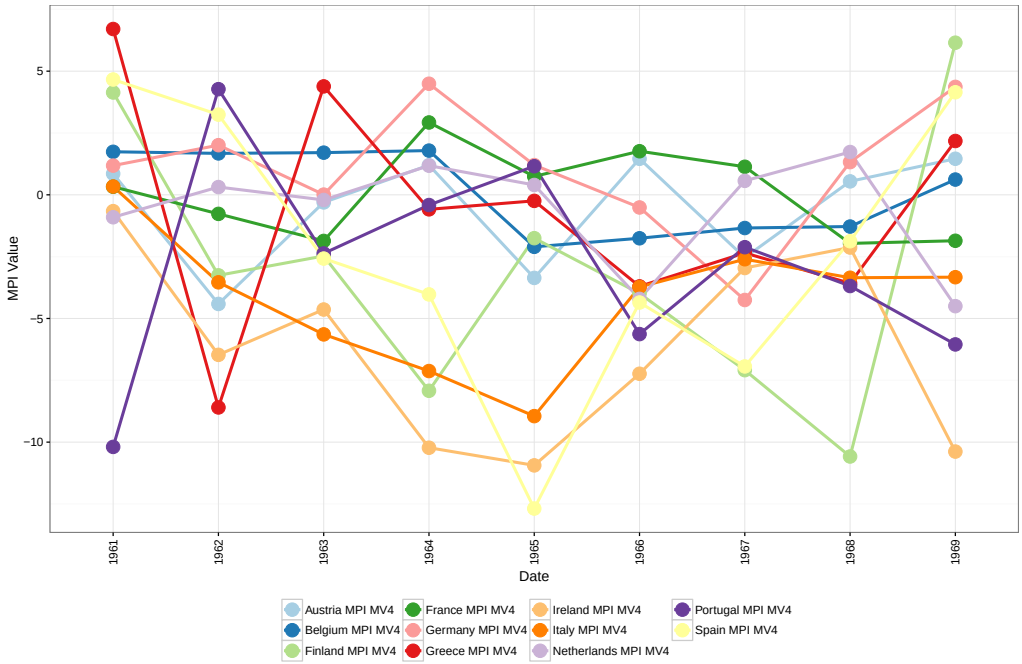

Figure 16: Cross country comparison of MPI in recent years, Eurozone 11, 1970-1979

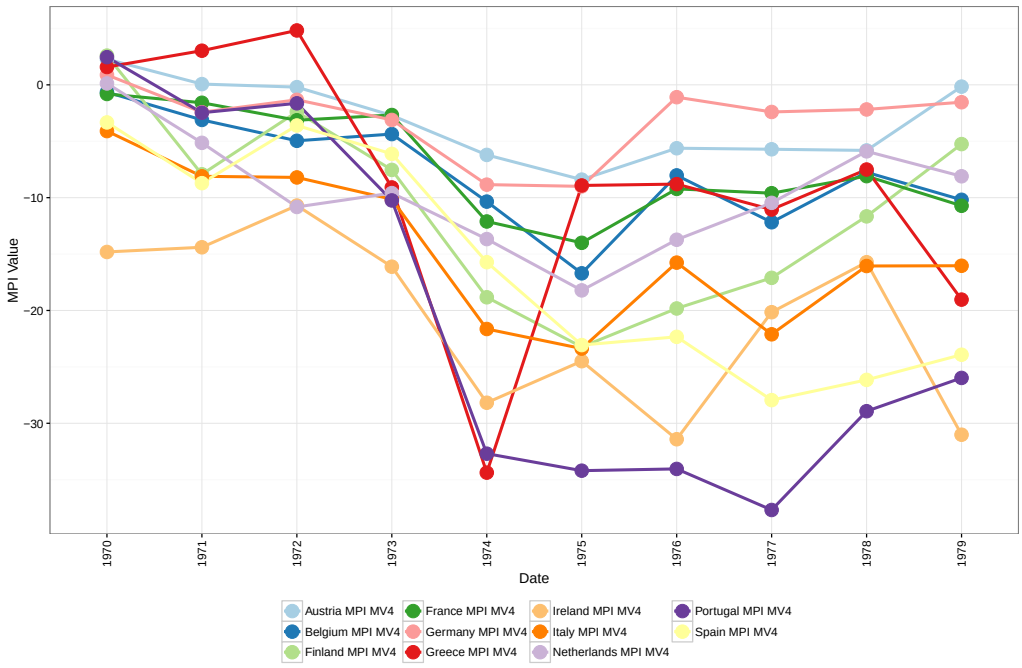

Figure 17: Cross country comparison of MPI in recent years, Eurozone 11, 1980-89

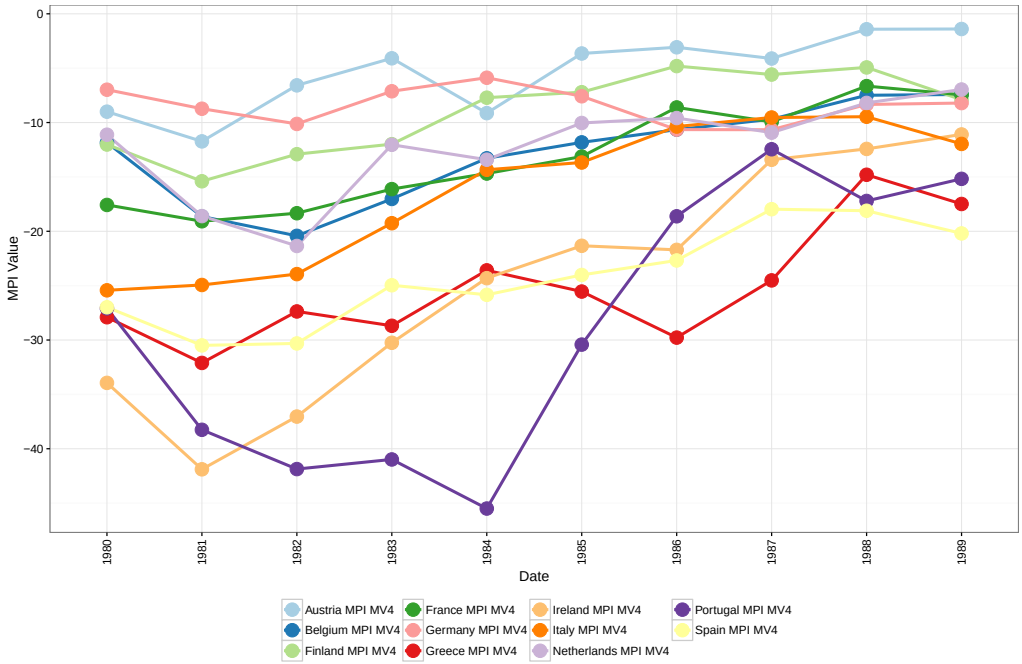

Figure 18: Cross country comparison of MPI in recent years, Eurozone 11, 1990-1999