Forecasting errors by the Troika in the economic adjustment programme for Portugal

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This article presents an evaluation of the economic adjustment programme negotiated between the Portuguese government and the Troika (European Commission, ECB and IMF) in May 2011, using an assessment that is different from the usual studies. Instead of a comparison between the actual results and the proposed targets, an evaluation of the quality of the programme forecast is made, showing that errors could have been avoided if the productive (input–output) structure of the economy and also the unemployment rate/external deficit trade-off had been taken into account. The main conclusion of this assessment is that a large underestimation of the unemployment rate was made, amounting to about four percentage points, which illustrates the technical flaw of this adjustment programme and the huge economic and social costs it unnecessarily caused. The methodology used can easily be replicated for assessing other similar programmes, such those applied in Greece, Ireland and Cyprus.

Key words: Unemployment, External deficit, Economic adjustment programme, Troika, Portugal
JEL classifications: C67, D57, E61

1. Introduction

The imbalances of the Portuguese economy have a deep and lasting nature and were aggravated by the implementation of the European Economic and Monetary Union. The visibility of these imbalances became increasingly apparent from the year 2000 onwards and were exposed in an interesting paper by Blanchard, on the eve of the global financial and economic crisis, as follows: 'The Portuguese economy is in serious trouble: Productivity growth is anemic. Growth is very low. The budget deficit is large. The current account is very large' (Blanchard, 2007, p. 1).

According to Blanchard, the origin of these problems lies in the decision taken in the middle of the 1990s to join the euro, which led to a sharp fall in interest rates, a decline in private savings and an increase in investment. The first phase (1995–2000)

resulted in an increase in GDP and lower unemployment, accompanied by rising current account imbalances. In the second phase (2000–08), the investment boom (especially in non-tradable sectors) came to an end, productivity stagnated, GDP growth was almost nil, the unemployment rate doubled and private savings increased, which was only partially offset by higher budget deficits. Simultaneously, the overvaluation of the real effective exchange rate, resulting from an increase in nominal wages higher than the increase in labour productivity, led to a deterioration of external competitiveness and kept current account deficits permanently very high (the evolution of the main macroeconomic indicators in this phase is shown in Table A1 in the Appendix).

The weak economic performance of Portugal was also caused by structural shocks that occurred during the first decade of the euro, namely competition from countries of Central and Eastern Europe, China and other emerging countries, particularly in low- and medium-tech sectors, as well as the strong appreciation of the euro (40.8% between 2000 and 2008, according to Lane, 2013, p. 3).

These shocks were offset by large capital inflows, originating from the surplus countries of Northern Europe, together with a (bad) reallocation of resources for the benefit of companies that produce non-tradable goods (Reis, 2013). Given the structural weaknesses of the Portuguese economy (low endowment in human capital, insufficient investment in R&D and production in general, specialisation in low- and medium-tech sectors and the predominance of micro and small businesses, etc.), it is very difficult to respond to external shocks of this nature, as essential tools are lacking for this purpose, namely autonomous monetary and exchange rate policies, with some authors considering it to be a virtually impossible task (see, e.g., Amaral, 2013).

From the above, it can be inferred that by 2008, the imbalance in public accounts (or 'fiscal profligacy') was far from being one of the biggest problems of the Portuguese economy, as would later be broadly, and wrongly, stated. However, the Great Recession of 2008/09 brought, in addition to a huge fall in output and a catastrophic job destruction (well documented in Carneiro et al., 2014), a very negative effect on budget accounts for at least three reasons: first, the huge increase in the budget deficit in 2009, which was caused by the functioning of automatic stabilisers; second, the discretionary increase in expenditure under the anti-crisis programme, agreed at the G20 level; and third, the fiscal effort to stabilise the financial sector (although this was lower in Portugal compared with other European countries, namely Ireland and Spain). All combined, there was a sharp deterioration in public deficits and public debt that, first in Greece, then Ireland and finally Portugal, was the proximate source of sovereign funding difficulties in the financial markets and the need to ask for assistance from the EU and the IMF (the evolution of the main macroeconomic indicators in Portugal, between 2009 and 2014, is shown in Table A2 in the Appendix).

In the case of Portugal, the assistance request was made in April 2011 and the Economic Adjustment Programme was agreed (imposed?) with (by) the Troika (European Commission, ECB and IMF) in May 2011, to take effect over a three-year period (until mid-2014). This programme (described in European Commission, 2011) has three components: fiscal consolidation, financial sector stabilisation and structural reforms.

From a macroeconomic point of view, the philosophy behind the first and third components translates into very harsh fiscal austerity measures (increased revenues and reduced public expenditure) and the erosion of labour rights and the purchasing power of workers and pensioners (falling wages, pensions, unemployment benefits and other social benefits, flexibility of redundancies and collective bargaining, etc.), which could

have no effect other than the resulting retrenchment in domestic effective demand. These austerity measures were strongly pro-cyclical and generated a deep and prolonged recession (−6.6% of GDP in the Portuguese case in 2011–13), as well as a huge destruction of jobs. The unemployment rate in Portugal peaked at 17.5% in the first quarter of 2013 and since then the decline in the unemployment rate can be mainly explained by massive emigration (around 350,000 persons in 2011–13, or 6.4% of the labour force in 2011, mostly young people), a rise in discouraged workers and active employment policy measures, such as paid traineeships (it is estimated that with these factors taken into account, the 'real' unemployment rate in Portugal would be around 20%).

The recessionary effect of these programmes was clearly underestimated, largely due to the ideological belief in the supposed virtues of an expansionary austerity—what Krugman (2012) calls the 'confidence fairy'—and also incorrect assumptions about the (small) size of the Keynesian multiplier in the computational general equilibrium models used by major international institutions, which now is fortunately subject to greater scrutiny and caution (although more so by the IMF than by the ECB and the European Commission, in fact) (see Blanchard and Leigh, 2013). However, in the case of Portugal, the increase of exports and the huge contraction of imports in 2011–13 resulted in a (slight) current account surplus, which was much faster than expected. The real big question is whether this external surplus is sustainable and whether it will continue after the economy recovers and GDP starts to grow strongly.

In contrast to this kind of programme of 'austeritarianism', i.e. austerity imposed in an authoritarian manner (Lehndorff, 2015), a Keynesian approach, both of the origins and the responses to the crisis of these peripheral countries, endorses radically different policies, based on the role of increasing effective demand through fiscal stimulus (Arestis, 2012; Seidman, 2012; Zezza, 2012; Fitoussi and Saraceno, 2013), particularly in Northern countries, with lower budget deficits and current account surpluses. As a result of the new eurozone economic governance (of 'economic surveillance', 'fiscal compact', 'six pack', 'two pack', etc.), these countries did nothing to make the adjustment symmetric and more balanced (Leão and Palacio-Vera, 2012; Palley, 2013; Boyer, 2013).

As the value of the Keynesian multiplier is large when economies are running below full employment (De Long and Summers, 2012; Corsetti and Müller, 2015), a fiscal stimulus can be compatible with the sustainability of public debt weight in GDP (see Leão, 2013) and fiscal austerity may result in the opposite effect, i.e. a significant worsening of this ratio, as the Greek and, to a lesser extent, Portuguese cases seem to show. However, an important question emerges in this context, regarding the effect of these expansionary policies in the external (trade and current account) balances, which have already been mentioned.

Given the importance of their economic, political and social effects, as well as the theoretical and empirical difficulties involved, it is very useful to make a careful and rigorous assessment of the economic adjustment programmes of the Troika (Sapir et al., 2014; Gros et al., 2014). Usually, this assessment is made by comparing the actual results with the different goals set at the start or in terms of expected results in the case of a prospective analysis. However, the conclusions of these evaluation exercises depend heavily on the assumptions made. For example, in the Portuguese case, Viegas and Ribeiro (2014), using a general equilibrium model with heterogeneous agents, conclude that the adjustment programme has a positive net effect on welfare and on income distribution in the long term, despite the existence of significant adjustment costs in the short term. In contrast, with a Keynesian type of analysis,

Stockhammer and Sotiropoulos (2012) concluded that the economic costs of rebalancing the external accounts in peripheral eurozone countries (Greece, Ireland, Italy, Portugal and Spain) are huge, implying a real GDP reduction of about 47%.

In this paper, the evaluation exercise is different. It is based on a methodology that allows comparison between the economic policy that is implicit in the adjustment programmes, in terms of its objectives and macroeconomic forecasts actually made, and the results it would be possible to predict, if some basic assumptions about the productive structure of the economy and some equilibrium conditions prevailing at the time of policy formulation were taken into account (and respected).

The empirical exercises are based on a trade-off relationship between the unemployment rate and the external deficit (the trade deficit, strictly speaking), reflecting the way the economy's structure is formalised through an input–output (IO) system (based on the so-called Leontief model) and the sectoral employment coefficients (which is the inverse of labour productivity in each sector). Therefore, this is a Keynesian kind of analysis in which, fixing the value of external demand (exports) and the labour force, the unemployment rate is determined by the (endogenous) levels of domestic demand and imports that are compatible with a given (intended) value of the external deficit.

This methodology was used to make an assessment of the economic adjustment programme negotiated by the Troika and the Portuguese government. It allowed us to quantify the (large) unemployment rate errors that were predicted in the programme, from which enormous social costs emerged, which could have been anticipated and avoided and which, amongst other factors, contributed to the very failure of the central goal of fiscal consolidation.

This methodology can easily be used to evaluate this type of adjustment in other countries, namely Greece, where the actual effects on unemployment (and the corresponding forecast errors) were considerably higher.

The rest of the paper is organised as follows. In Section 2 we provide the theoretical and methodological framework, with a general presentation of the trade-off equation and its use in policy assessment (*ex ante*, *ex post* and structural) and the specific exemplification of the methodology by formalising the unemployment rate/external deficit trade-off, based on modelling the economy as an IO system with the details shown in the Appendix (Section A1). Section 3 looks at the empirical application of the proposed methodology for assessing the Portuguese economic adjustment programme, by presenting the database used—IO and socio-economic data from the World Input–Output Database (WIOD) and the Portuguese national statistics institute (INE)—describing the main assumptions in data handling and showing and discussing the empirical results of an *ex ante* and an *ex post* evaluation. Finally, concluding remarks are made in Section 4.

2. Theoretical and methodological framework

The objective of this study is, as mentioned above, to carry out an *ex ante* and an *ex post* evaluation of the economic policy that was defined in the economic adjustment programme that was agreed between the Portuguese government and the Troika for the period 2011–14.

The key objective of this programme was to improve the sustainability of public finances through a drastic reduction of the budget deficit as a percentage of GDP. However, the external account deficit and unemployment rate were also both important

variables that, although not policy objectives, were borne in mind by the programme in such a relevant way that we can consider them to be second-order objectives.

Our assessment does not compare the policy set by the programme with the actual results. A first type of evaluation that we qualify as *ex ante*, in a specific sense to be explained in Section 2.1, tries to determine the relative value of the objectives for the policy maker. A second evaluation (*ex post*) examines whether the values of the defined objectives (both those with the highest priority and also those of the second order) listed in the economic policy programme are consistent with the structure of the economy and also the prediction of exogenous variables that reflect the national and international environment in which the policy was to be enforced.

The fact that we use the values of (for our purpose) exogenous variables such as exports that were predicted in the programme means that we do not inquire on important factors that are already taken into account by the programme, such as the role of price competitiveness. The same can be said about the factors related to the prediction of the labour force.

Of course, the policy measures themselves may change the environment in which they apply and even, in some cases, some elements of the structure of the economy (reflexivity, in the sense presented in Soros, 2013). Yet it is also true that relations exist which constitute the productive structure which are relatively unaffected by short-term economic policies, and are relatively immune to the impact of the crisis on the behaviour of the economic agents. We consider that this is a strength of the methodology we use in this study.

In this paper, we consider as structural relationships relatively immune to short-term measures those that were established between the productive sectors according to the hypotheses of the Leontief IO model.

On the other hand, as we have only a single primary objective (the public deficit), which prevents the evaluation of trade-off between two or more priority objectives, assessing the coherence between objectives will focus on the objectives of the second order, namely unemployment and the deficit of goods and services account.

The values of the relevant exogenous variables are those that were provided by the government in the respective budgets for 2012 and 2013, which are the two years considered for evaluation in this paper.

2.1 Trade-off equation and policy assessment

The essential element of the evaluation is the prior calculation of the trade-off equation between goals. A trade-off equation is an equation that summarises structural relationships that are considered to be robust with respect to short-term policy actions, and which relate the values of objective variables with the values of the relevant exogenous variables.

In our case there are four relevant exogenous variables (exports of goods and services, labour force and two employment content coefficients) and two objective variables (external deficit and unemployment). There is only one trade-off equation, which is obtained using the Leontief model (see Appendix A2).

The equation for the trade-off curve can thus be written as:

$$F\left(E, N, l_D, l_E, H, u\right) = 0 \tag{1}$$

where E is exports, N is the labour force and l_D and l_E are the employment content coefficients in domestic demand and exports, respectively. H is the external deficit and u is the unemployment rate. E, N, l_D and l_E are considered exogenous variables and H and u are the objective variables. For each 4-tuple of values for E, N, l_D and l_E, the above equation tells us that the two objectives are not independent: setting a goal for an objective variable, the other one is automatically determined.

A trade-off equation can be used to evaluate economic policies in three different ways: *ex ante*, *ex post* and the assessment of structural measures.

Finally, we explain the specific sense that we attribute to the concepts of *ex ante* and *ex post* assessment. *Ex ante* and *ex post* refer, respectively, to previous and subsequent moments relative to the moment the policy was defined, rather than the moments before and after the period in which the policy was implemented. All these evaluations will be comparative statics exercises and are not to be mistaken for the comparison between the policy defined and its results.

2.1.1 Ex ante assessment.   In this assessment, what is at stake is to choose macroeconomic policy objectives for a year after the moment when the choice is made. To this end, a forecast is made for the exogenous variables, $E^\star$, $N^\star$, $l_D{}^\star$ and $l_E{}^\star$, and the following equation is obtained:

$$F\left(E^\star, N^\star, l_D{}^\star, l_E{}^\star, H, u\right) \;=\; 0 \qquad (2)$$

If $U(H,u)$ is the (decreasing for each variable) preference function of economic policy, then the optimal choice of objectives H and u results from the following maximisation:

$$\text{Max } U\left(H, u\right)$$

Subject to: $F(E^\star, N^\star, l_D{}^\star, l_E{}^\star, H, u) = 0$, and the following *a priori* constraints about the objectives: $H \le a$ and $0 \le u \le b$.

In the (probable) absence of existence of a politically determined U function, the *ex ante* evaluation can be made between different alternatives of revealed preference.

If the choice for the objectives was, respectively, $H^* < b$ and $0 < u^* < c$, this means that the (implicit) preference function was maximised at this point, subject to the constraint:

$$F\left(E^\star, N^\star, l_D{}^\star, l_E{}^\star, H, u\right) \;=\; 0$$

Therefore, calculating the derivatives in these values, $E^\star$, $N^\star$, $H^\star$ and $u^\star$, we have:

$$\left(\partial U / \partial H\right) / \left(\partial U / \partial u\right) = \left(\partial F / \partial H\right) / \left(\partial F / \partial u\right)$$

As the second member of the equality is known, we can obtain the relative value that society/government attaches to the objectives H and u, when the choice made was $H = H^\star$ and $u = u^\star$.

It is possible to compare this relative value for the objectives corresponding to any other pair H^{**} and u^{**} chosen with $H^{**} < b$ and $0 < u^{**} < c$.

In our case, as function F is linear (providing the values of exogenous variables are fixed), the relative value is given by the constant $[l_D{}^\star / (1 - va_D)]N$, which means that the 'price' of H with respect to u increases when the value of N is higher (va_D is the value-added content of domestic demand, as explained in Appendix A2).

It costs more for society to reduce by one unit the external deficit, than one unit of u when N is larger, and everything else is equal, which is understandable, as 'everything else equal' also means that the value of exports is the same. Similar considerations could be made for $l_D{}^\star$.

2.1.2 The ex post assessment of the policy effectively chosen. We can use the trade-off equation to evaluate *ex post* how a policy was defined. In the case we consider, which is given in equation (3), with the values of exports and the labour force predicted for year t, when in year $t - 1$ the policy for year t was defined, we obtain a relationship of trade-off for year t:

$$F\left(E_{tt-1}, N_{tt-1}, l_{D\,tt-1}, l_{E\,tt-1}, H, u\right) = 0 \qquad (3)$$

In which E_{tt-1}, N_{tt-1}, $l_{D\,tt-1}$ and $l_{E\,tt-1}$ are, respectively, the value of exports, the labour force and the employment content coefficients predicted in year $t - 1$ for year t.

If the values predicted in year $t - 1$ to H_t and u_t verify equation (1), then the policy in this respect will have been well defined. In contrast, if they are far from respecting this equation, then the policy was poorly defined.

The main purpose of this paper is in fact to assess whether from this point of view the policy chosen by the Troika for year t was well defined.

2.1.3 Assessment of structural policies. The assessment of structural policies proceeds studying the impact on the trade-off equation from policies that change the parameters, namely domestic technical coefficients. However, although very interesting and useful in itself, this path was not followed in this work.

2.2 The unemployment rate/external deficit trade-off

With the purpose of determining the trade-off between an austerity policy for the reduction of the external imbalance by reducing domestic final demand and the value of unemployment, we can write:

$$E + H = \left(1 - va_D\right)D + \left(1 - va_E\right)E \qquad (4)$$

where E, H and va_D are already defined, D is the value of domestic demand (the sum of private consumption, collective consumption and gross capital formation) and va_E is the value-added content of exports. The right side of expression (4) represents the value of imports, when the economy is treated as an IO system (Leontief model) and a set of explicit assumptions presented in the Appendix (Section A2) is considered.

From expression (4), we can obtain:

$$D = \left(H + va_E E\right) / \left(1 - va_D\right) \qquad (5)$$

Considering, respectively, l_D and l_E as the employment content of final demand and exports and L the value of total employment, we have (for the determination of l_D and l_E see Section A3 of the Appendix):

$$L = l_D D + l_E E = l_D \left(H + va_E E \right) / \left(1 - va_D \right) + l_E E \qquad (6)$$

If N is the labour force and $u = 1 - (L/N)$ the unemployment rate, then we have:

$$u = \left[1 - l_D va_E E / \left(1 - va_D \right) N - l_E E / N \right] - \left[l_D / \left(1 - va_D \right) N \right] H \qquad (7)$$

This expression, after fixing the values for the exogenous variables, is a straight line with a negative slope, when the independent variable is H. The negative slope of this line, $-[l_D/(1 - va_D)N]$, gives us the trade-off between external deficit and the unemployment rate.

The trade-off equation is perhaps more easily interpretable if, instead of the external deficit in absolute value, we consider it in relation to GDP (Y). In order to consider the external deficit not in absolute terms but in relation to GDP, h, we can write:

$$E + hY = \left(1 - va_D \right) D + \left(1 - va_E \right) E, \text{with } h = H / Y \qquad (8)$$

$$Y = va_D D + va_E E \qquad (9)$$

Eliminating Y, we obtain:

$$D = \left\{ va_E \left(1 + h \right) / \left[1 - \left(1 + h \right) va_D \right] \right\} E \qquad (10)$$

The expression analogous to expression (6) is now:

$$L = l_D D + l_E E = \left\{ l_D va_E \left(1 + h \right) / \left[1 - \left(1 + h \right) va_D \right] + l_E \right\} E \qquad (11)$$

And considering N and u, the trade-off expression is:

$$u = 1 - \left\{ l_D va_E \left(1 + h \right) / \left[1 - \left(1 + h \right) va_D \right] + l_E \right\} E / N \text{ or} \qquad (12)$$

$$u = 1 - l_E E / N - \left\{ l_D va_E \left(1 + h \right) / \left[1 - \left(1 + h \right) va_D \right] \right\} E / N \qquad (13)$$

As E and N are assumed constant (exogenous) variables, the trade-off can be studied by analysing the term:

$$-l_D va_E \left(1 + h \right) / \left[1 - \left(1 + h \right) va_D \right]$$

Looking at expression (10), we can see that $1 - (1 + h)va_D > 0$, which implies, as expected, that u is a decreasing function of h.

Furthermore, it can be shown that $h < (1 - va_D)/va_D$. Therefore, assuming that there is a deficit (i.e. that $h > 0$), then it is enough to attribute to h values between 0 and $(1 - va_D)/va_D$.

3. Empirical application: the Portuguese case

This section presents the results obtained by applying the methodology described in Section 2 above to the Portuguese case. The unemployment rate/external deficit trade-off in the Portuguese economy for 2011 is simulated and the unemployment rate one would expect/predict is then estimated using a careful macro- and meso-economic (sectoral) analysis, which corresponds to a situation of external equilibrium (trade deficit null).

3.1 Database and assumptions

We used the IO tables of WIOD (for a description of this database, see Timmer, 2012), namely the Domestic Flows Table at basic prices (DFTbp) in US$, which allow international comparisons (it will be useful to apply this methodology in other cases, namely the countries subject to adjustment programmes, especially those of Greece and Cyprus, as well as Spain, rather than the Irish, which has not a structural problem of external imbalance). The main assumptions used to calibrate the model, corresponding to the base year 2011, are described in the Appendix (Section A4).

3.2 Results for the unemployment rate/external deficit trade-off for the year 2011

Starting with the DFTbp, which were obtained from the WIOD database and adjusted with the assumptions described in the Appendix (Section A4), it was possible to calculate all the elements necessary to determine the equation for the unemployment rate/external deficit trade-off, namely:

(i) The domestic technical coefficients matrix, $\mathbf{A}$, and the corresponding output multipliers matrix (the so-called Leontief inverse matrix), $\mathbf{B} = (\mathbf{I} - \mathbf{A})^{-1}$.
(ii) The (row) vectors of sectoral value-added and imported intermediate input coefficients, $\mathbf{a^v}$ and $\mathbf{a^m}$.
(iii) The (column) vectors of domestic final demand and exports vertical coefficients, $\mathbf{a^d}$ and $\mathbf{a^e}$.
(iv) The coefficients of (net) indirect taxes on domestic final demand and of direct imports for domestic final demand, a^t_d and a^m_d.

Based on these values (which are available upon request), the value-added and import contents of domestic final demand and exports were calculated and their values are as follows:

$$va_D = \mathbf{a^v}\mathbf{B}\mathbf{a^d} + a^t_d = 0.744057$$

$$va_E = \mathbf{a^v}\mathbf{B}\mathbf{a^e} = 0.653484$$

$$m_D = (1 - va_D) = \mathbf{a^m Ba^d} + a^m{}_d = 0.255943$$

$$m_E = (1 - va_D) = \mathbf{a^m Ba^e} = 0.346516$$

These indicators are interesting in themselves and allow us to make a first assessment of the external dependence of the productive system of the Portuguese economy. For example, they allow us to conclude that for each additional unit value in domestic final demand of the economy, the value of total imports increase by 0.26, or that for each additional unit of exported value, imports increase by 0.35, which is a very large value (for a detailed analysis of this subject see Lopes *et al.*, 2011).

Using the values of sectoral outputs given by the DFTbp and the number of employees per sector, which is calculated by applying the employment structure of the WIOD database (socio-economic accounts) to total employment given by INE, it was possible to calculate the vector of employment coefficients (the inverse of sectoral productivities), $\mathbf{a^l}$. This in turn allows us to calculate the unitary employment content of exports, l_E, whose value is:

$$l_E = \mathbf{a^l Ba^e} = 0.020156$$

As employment is measured in thousands of persons and exports in millions of euros, this value means that an increase of €1 million in exports has the potential to generate 20.2 new jobs in the economy.

The employment content of domestic final demand, l_D, was calculated by difference, according to the procedure set out in the Appendix (Section A2), and its value is:

$$l_D = 0.019174$$

To determine the value of the parameters of the linear unemployment rate/external deficit trade-off, we further considered the following values, given by the national accounts of INE for the Portuguese economy in 2011:

$$\text{Labour force}, N : 5,428.3 \text{ (thousand persons)}$$

$$\text{Exports}, E : 60,409.869 \text{ (million euros)}$$

With $u = 1 - (L/N)$ being the unemployment rate and H the trade deficit (the symmetric of net exports), then the trade-off equation in question is (for memory):

$$u = \left[1 - l_D va_E E / (1 - va_D) N - l_E E / N\right] - \left[l_D / (1 - va_D) N\right] H$$

Based on all the aforementioned values, the estimated line is:

$$u = \mathbf{0.23086815 - 0.00001380} H$$

Table 1 presents several combinations of H and u values, which respect this line of trade-off.

Table 1. *Values of H and u, respecting the trade-off equation*

H	u
7,542.067	0.1268
5,000	0.1619
2,500	0.1964
0	0.2309

For instance, the actual value of the Portuguese trade deficit in 2011, which was €7,542 million, corresponds to the actual unemployment rate in this year, which was 12.7%. Assuming that the productive structure of this year does not change and also the value of exports, *ceteris paribus*, then the 'immediate' complete elimination of the external imbalance, by a negative shock on domestic demand (final consumption and investment), would imply an unemployment rate of 23%. In this table, two intermediate examples between these two cases are presented.

As shown in Section 2 above, this trade-off can also be studied through the relationship between the unemployment rate, u, and the relative weight of the trade deficit in GDP, $h = H/Y$:

$$u = 1 - l_E E / N - \left\{ l_D va_E (1+h) / \left[1 - (1+h) va_D \right] \right\} E / N$$

As we have seen, since the values of E and N are considered constant (exogenous), then the trade-off can be studied by analysing the term:

$$l_D va_E (1+h) / \left[1 - (1+h) va_D \right]$$

When $h = 0$, $u = 1 - l_E E/N - [(l_D va_E)/(1 - va_D)] E/N = 0.2309$, confirming the result presented above.

For the value of h corresponding to the situation verified in 2011, $h = 0.0428$ (H equal to 4.3% of GDP, i.e. 7,542/176,167), $u = 0.1268$, which was the actual unemployment rate in Portugal for that year.

For a (intermediate) value of $h = 0.025$, $u = 0.1735$, which confirms the inverse relationship between u and h.

These results can be used to make an *ex post* assessment of the unemployment forecasting errors associated with the economic policy implicit in the adjustment programme of the Troika (European Commission, ECB and IMF) applied in Portugal, which was requested in April 2011, signed in May that year and later implemented in full from 2012 onwards.

3.3 Assessment of the Troika's economic policy for 2012

3.3.1 Methodology and assumptions. In order to make an assessment of the Troika economic policy for 2012, we will proceed as follows:

(i) For 2012, we used the values provided by the government in the state budget for 2012 (SB 2012 - Ministério das Finanças, 2011 for the following variables, in terms of annual growth: GDP evolution, exports evolution, imports evolution and employment evolution.

(ii) Based on the actual values of the variables given by the DFTbp for 2011, adjusted with the official statistics of INE for that year, we obtained the absolute value of exports, imports and GDP for 2012, which allowed us to determine the value of h for 2012, implicit in the forecasts of SB 2012.

(iii) Based on the amount of employment that was actually recorded in 2011, we obtained the amount of employment forecasted for 2012 and using the unemployment rate forecasted for 2012 in the SB 2012, we obtained the value of the labour force implicit in the forecasts of SB 2012.

(iv) Based on the evolution of productivity implicit in the SB 2012 (obtained as the difference between the GDP growth rate and the growth rate of employment), we changed the l_E and l_D coefficients, making the assumption that both would have the same rate of growth (symmetric of the growth rate of productivity).

The forecast values of SB 2012 (growth rates 2011–12, except unemployment rate) are as follows: exports, +4.8%; imports, −4.3%; GDP, −2.8%; employment, −1.0%; productivity (implicit), −1.8%; and unemployment rate, 13.4%.

3.3.2 Values calculated according to previous assumptions. Values expressed in millions of 2011 euros:

$$\text{Exports} : 60,410 \times 1.048 = 63,310$$

$$\text{Imports} : 67,952 \times 0.957 = 65,030$$

$$\text{GDP at market prices } (\text{GDPmp}) = 176,167 \times 0.972 = 171,234$$

Value of employment (thousand persons): 4,740.1 × 0.99 = 4,692.7, which allows us to obtain the implicit forecast of the labour force, $N = 5,418.7$ thousand persons.

$$\text{Value of } l_E = 0.020156 / 0.982 = 0.02052534$$

$$\text{Value of } l_D = 0.019174 / 0.982 = 0.01920180$$

3.3.3 The trade-off equation (in H and h) and the ex post assessment for 2012. With the previous values, the equation of the unemployment rate/external deficit trade-off estimated for 2012 would be:

$$\boldsymbol{u} = \boldsymbol{0.18740045 - 0.00001385H}$$

As in SB 2012 the implicitly predicted value for the trade deficit, H, is 1,720, one might expect an unemployment rate of 16.36%. Once the Troika forecasted a value of 13.4%, we can conclude that the macroeconomic programme for 2012 significantly underestimated, *ex post*, the impact of the policy on unemployment by around 3%. It is interesting to note that 15.8% was the value actually recorded for the unemployment rate in Portugal during the year 2012 and 16.8% the value for the last quarter of this year.

This analysis can be done in terms of weight of the external deficit in GDP, h. Based on the figures presented above, the trade-off equation in this case will be as follows:

$$u = 0.76019599 - 0.14660305\ (1+h)\,/\,[1-0.74405694\ (1+h)]$$

For the value implicitly predicted in SB 2012, $h = 0.0100447$ (1,720/171,234), we obtain the value of the expected unemployment rate mentioned above: $u = 16.36\%$.

3.3.4 The ex ante assessment for 2012 and 2013. For 2012, based on the calculated trade-off equation, we get:

$$-\mathrm{d}u\,/\,\mathrm{d}h \equiv \partial U\,/\,\partial h\,/\,\partial U\,/\,\partial u = 0.14660305(1+h)\,/\,\left[1-0.74405694(1+h)\right]^{2}$$

With the value of h predicted on SB 2012, $h = 0.0100474$, we obtain (multiplying by -1 the dividend and the divisor to obtain positive values), and assuming that the policy chosen verified the trade-off equation:

$$-\partial U\,/\,\partial h\,/\,-\partial U\,/\,\partial u = 0.19155355$$

For 2013, using the same methodology but with the 2012 base values obtained using the values of the DFTbp adjusted for 2011, to which the actual growth rates are applied (see the details of this calculation in Section A5 of the Appendix), we get the following trade-off equation, in which the values for 2013 are those from the SB 2013 proposal (Ministério das Finanças, 2012):

$$u = 0.758498609 - \left[0.150132(1\ +h)\,/\,\left[1-0.744057(1+h)\right]\right]$$

Based on this trade-off equation, we get:

$$-\mathrm{d}u\,/\,\mathrm{d}h \equiv \partial U\,/\,\partial h\,/\,\partial U\,/\,\partial u = 0.150132(1+h)\,/\,\left[1-0.744057(1+h)\right]^{2}$$

With the value of h predicted on SB 2013, $h = -0.000127201$, we obtain:

$$-\partial U\,/\,\partial h\,/\,-\partial U\,/\,\partial u = 0.18730869$$

Regarding *revealed preference in the two budgets*, from the above calculations we can deduce that the revealed preference in SB 2013 expresses a slightly higher value for the unemployment rate relative to the trade deficit than the revealed preference in SB 2012.

4. Conclusions

After a long period of weak economic growth, following the entry into force of the single currency, during which internal and external imbalances were accumulating, the Portuguese economy suffered a sharp deterioration after the global financial and economic crisis and was forced to ask for external assistance.

The economic adjustment programme that was negotiated with the Troika (European Commission, ECB and IMF) in May 2011, to take effect during the three subsequent

years, was based on a fiscal consolidation and income cuts policy. This policy caused a strong fall in domestic demand and resulted in a long and deep recession in 2011–13, with a catastrophic destruction of jobs and a large increase in the unemployment rate, which was much higher than that expected in the programme.

The assessment of such programmes is usually carried out by comparing their actual results with those predicted from the start and, in this sense, there is widespread conviction that there was a gross underestimation of the effects of the implemented measures with regard to the fall of GDP and employment and also in achieving fiscal sustainability, although the opposite happened in terms of the resolution of the external imbalance.

In this paper, a different exercise was made, which consisted in assessing the unemployment rate forecasting errors, in comparison to what would have been possible to anticipate in the initial formulation of the programme, if the (sectoral) structure of the economy and the predicted trade deficit had been taken into account. According to our calculations, the unemployment rate expected for 2012 should have been 16.4% and not the 13.4% that was used. This represents a gross forecasting error, which illustrates the failure of this programme and caused unnecessary huge economic and social costs. If the predictions of the programme were obtained by the Troika with a macroeconomic model, something seems to be wrong with that model.

To attest the validity of our unemployment rate/external deficit trade-off equation, it should be noted that, in fact, 15.8% was the unemployment rate actually observed in Portugal during 2012 and 16.8% was the value for the last quarter of this year (2012).

The methodology used to achieve our results relies on technological relations that are comparatively robust in a context of severe economic shocks. We do not recommend this methodology for making forecasts, but we are certainly convinced that it may prove useful for assessing these types of EU/IMF adjustment programmes, especially as it can be easily replicated for the other cases of Greece, Ireland and Cyprus, as well as for other contexts, such as IMF interventions in emerging economies that face severe economic and financial crises.

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Appendix

A1. Tables with the main economic indicators for Portugal

Table A1. *Portugal: main economic indicators, 2000/08*

	2000	2008	2000/08
GDP (10^9 euros)	167.15	182.00	
GDP (annual percentage change)	3.79	0.20	1.07
GDP per capita (10^3 euros)	16.244	17.238	
GDP per capita (annual percentage change)	3.06	0.05	0.75
GDP per employee (10^3 euros)	33.152	35.825	
GDP per employee (annual percentage change)	1.55	−0.17	0.97
Private consumption (annual percentage change)	3.69	1.38	1.44
Public consumption (annual percentage change)	4.41	0.42	1.77
Gross capital formation (annual percentage change)	1.64	0.78	−0.72
Domestic demand (annual percentage change)	3.27	1.08	0.98
Exports (annual percentage change)	8.44	−0.32	4.05
Imports (annual percentage change)	5.53	2.47	3.16
Trade balance (% of GDP)	−11.04	−9.71	−8.82
Primary income balance (% of GDP)	−1.90	−3.89	−2.25
Current transfers balance (% of GDP)	1.99	1.01	1.10
Current account (% of GDP)	−10.95	−12.59	−9.97
Net external debt (% of GDP)	33.24	75.56	
Budget balance (% of GDP)	−3.21	−3.77	−4.36
Budget debt (% of GDP)	50.32	71.67	
Employment (10^3 persons)	5,057.28	5,132.46	
Employment (annual percentage change)	2.34	0.47	0.18
Unemployment rate	5.1	8.7	

*Source*s: AMECO database, Banco de Portugal and authors' calculations.

A2. Modelling the economy as an IO system

Consider the following Leontief system:

$$\mathbf{x} \; = \; \mathbf{A}\,\mathbf{x} + \mathbf{y} \tag{A.1}$$

Where **x** is the column vector of gross output values of the *n* sectors of the economy, **y** is the final demand vector and **A** is the technical coefficients matrix.

The solution of this system is:

$$\mathbf{x} = \left(\mathbf{I} - \mathbf{A}\right)^{-1}\mathbf{y} \tag{A.2}$$

Where $(\mathbf{I} - \mathbf{A})^{-1}$ is the so-called Leontief inverse matrix of output multipliers (hereafter represented by **B**), whose generic element, b_{ij}, gives the increase of sector *j*'s production caused by an additional unitary final demand directed to sector *i*. For a detailed analysis of the IO model, see Miller and Blair (2009); for examples of empirical applications to the Portuguese case using this model, see Reis and Rua (2006), Lopes *et al.* (2011) and Lopes (2012).

Table A2. *Portugal: main economic indicators, 2009–14*

	2009	2010	2011	2012	2013	2014
GDP (10^9 euros)	176.577	179.930	176.643	170.786	168.472	169.988
GDP (annual percentage change)	−2.98	1.90	−1.83	−3.32	−1.36	0.90
GDP per capita (10^3 euros)	16.708	17.018	16.731	16.242	16.110	16.375
GDP per capita (annual percentage change)	−3.07	1.85	−1.68	−2.92	−0.81	1.64
GDP per employee (10^3 euros)	35.732	36.936	36.980	37.277	37.859	37.580
GDP per employee (annual percentage change)	−0.26	3.37	0.12	0.80	1.56	−0.74
Private consumption (annual percentage change)	−2.34	2.40	−3.60	−5.19	−1.40	2.10
Public consumption (annual percentage change)	2.62	−1.31	−3.82	−4.27	−1.94	−0.45
Gross capital formation (annual percentage change)	−12.25	3.39	−14.00	−14.17	−6.48	3.33
Domestic demand (annual percentage change)	−3.57	1.88	−5.68	−6.61	−2.35	1.80
Exports (annual percentage change)	−10.21	9.52	7.04	3.05	6.43	3.76
Imports (annual percentage change)	−9.92	7.84	−5.82	−6.57	3.62	5.86
Trade balance (% of GDP)	−6.92	−7.56	−4.28	−0.67	0.98	0.89
Primary income balance (% of GDP)	−3.66	−3.47	−2.07	−2.92	−2.20	−2.22
Current transfers balance (% of GDP)	0.52	0.62	0.75	0.95	0.96	1.09
Current account (% of GDP)	−10.06	−10.41	−5.60	−2.64	−0.26	−0.24
Net external debt (% of GDP)	84.34	82.73	85.90	102.66	102.33	103.71
Budget balance (% of GDP)	−9.81	−11.17	−7.36	−5.49	−4.85	−4.60
Budget debt (% of GDP)	83.61	96.18	111.08	124.82	128.04	128.93
Employment (10^3 persons)	4,984.410	4,914.080	4,802.200	4,608.590	4,484.560	4,563.301
Employment (annual percentage change)	−2.88	−1.41	−2.28	−4.03	−2.69	1.76
Unemployment rate	10.7	12.0	12.9	15.8	16.4	14.2

Sources: AMECO database, Banco de Portugal and authors' calculations.

The vector of (total) final demand can be decomposed into two vectors: the internal (domestic) final demand (private consumption plus collective consumption plus investment), **d**; and the external final demand (sectoral exports), **e**:

$$\mathbf{y} = \mathbf{d} + \mathbf{e} \qquad (A.3)$$

In this case, the solution of the Leontief system is given by:

$$\mathbf{x} = \mathbf{B}(\mathbf{d} + \mathbf{e}) \qquad (A.4)$$

The next step is to calculate the primary factor income (salaries and profits, including also, for simplicity, net indirect taxes) and value of imports, necessary for sectoral production, **x**, and for domestic demand, D:

$$VA = \mathbf{a^v}\mathbf{B}\mathbf{a^d}D + \mathbf{a^v}\mathbf{B}\mathbf{a^e}E + a^t_{\ d}D \qquad (A.5)$$

$$M = \mathbf{a^m}\mathbf{B}\mathbf{a^d}D + \mathbf{a^m}\mathbf{B}\mathbf{a^e}E + a^m_{\ d}D \qquad (A.6)$$

where VA is the total amount of salaries and profits (plus net indirect taxes) of the economy, i.e. gross value added (VA), corresponding to GDPmp; $\mathbf{a^v}$ is the vector of value-added coefficients of n sectors ($a^v_j = VA_j/X_j$); $\mathbf{a^d}$ and $\mathbf{a^e}$ are the vertical coefficients of final demand (domestic and external, respectively) directed to the productive sectors; $a^t_{\ d}$ is the vertical coefficient of net indirect taxes on domestic final demand (consumption plus investment only, as this coefficient is null in the case of collective consumption, as well as exports); D is the value of (total) domestic final demand; E is the value of exports; M is the value of imports; $\mathbf{a^m}$ is the vector of imported input coefficients; and $a^m_{\ d}$ is the vertical coefficient of imports (directed) to the domestic final demand (again, only consumption and investment).

From equation (A.5), the value-added content of domestic and external final demand can be deducted as:

$$va_D = \mathbf{a^v}\mathbf{B}\mathbf{a^d} + a^t_{\ d}$$

$$va_E = \mathbf{a^v}\mathbf{B}\mathbf{a^e} + a^t_{\ e}$$

Similarly, from equation (A.6) the import content of domestic and external final demand are:

$$m_D = \mathbf{a^m}\mathbf{B}\mathbf{a^d} + a^m_{\ d}$$

$$m_E = \mathbf{a^m}\mathbf{B}\mathbf{a^e} + a^m_{\ e}$$

Since $VA + M = D + E$ (an equilibrium condition of the IO tables), it can be concluded that:

$$m_D = 1 - va_D$$

$$m_E = 1 - va_E$$

Thus, the (total) value of imports made by the economy can be determined as:

$$M = (1 - va_D)D + (1 - va_E)E \tag{A.7}$$

This result is used in Section 2.2 as the starting point (equation 4) to formulate the unemployment rate/external deficit trade-off equation.

A3. Determining the employment contents of domestic final demand and exports

In order to determine the employment contents of domestic final demand and exports, we start by considering the employment coefficients of the productive sectors, given by the (row) vector, $\mathbf{a^l}$. The generic element of this vector is obtained by dividing the employment (number of employees) of sector j by its gross output value: $a^l_j = L_j / X_j$.

Next, assuming that the vertical structure of sectoral domestic final demand, given by the (column) vector $\mathbf{a^d}$, remains constant, the employment content of one unit of domestic final demand value is given by:

$$l_D = \mathbf{a^l B a^d} \tag{A.8}$$

Similarly, the employment content of one unit of external demand (exports) value, is:

$$l_E = \mathbf{a^l B a^e} \tag{A.9}$$

Since there is a value component of domestic final demand that does not generate employment (net indirect taxes and imports with a direct incidence on private consumption and investment), which does not happen with exports, the indicator l_D can be calculated by difference. That is, after determining the employment associated with exports $L_E = l_E E$, L_D is calculated by difference, $L_D = L - L_E$, and then divided by D:

$$l_D = L_D / D.$$

A4. Description of the assumptions made to calibrate the model

Although we used the DFTbp of 2011, this table was projected from the structure of the 2008 DFTbp, which was the latest available for Portugal (on the construction of this table, see Dias, 2009). Therefore, all the parameters of the IO sectoral structure of the economy (domestic technical coefficients, value-added coefficients and final demand vertical coefficients) correspond to this year, which is an important limitation, given the likely structural change caused by the global crisis of 2009. However, for the calculation of the employment coefficients this problem does not arise, as we used the values of the national accounts (provided by INE) available for 2011.

To switch from the IO tables in US\$ to euros, we used the (implicit) nominal exchange rate arising from the comparison of gross outputs in US\$ and euros: US\$470,096 billion «» €330,273 billion, i.e. €1 = US\$1.4234.

All the values of the first quadrant of the DFTbp, Z_{ij} (domestic intersectoral flows of intermediate inputs) remained unchanged.

All the production values, Xj (gross outputs of the productive sectors), either in line or in column, remained unchanged.

On the third quadrant of the DFTbp (gross value added, net indirect taxes and imported inputs), the following adjustments were made: (i) the values of imported intermediate inputs and international trade margins were summed: M_j; and (ii) the gross value added (*VA*) of each sector was calculated by difference: $VA_j = X_j - Z_{0j} - M_j$ (i.e. *VA* includes indirect taxes, $T_i - Z$), with the subscript '*0*' meaning summation, in this case for each row, i.e. Z_{0j} is the value of all domestic intermediate inputs of sector *j*.

The following changes were made in the second quadrant of the DFTbp (final demand): (i) the value of total exports (*E*) was matched to the value provided by the national accounts (INE) (this latter one is about €6,000 million higher due to a more rigorous accounting of services exports, namely tourism) and considering this value for total exports, the values of sectoral exports (E_i) were calculated, based on the vertical structure of the original export and adjusting them in the cited case of exports of services (tourism); and (ii) the value of domestic final demand by sector, D_i, was calculated by difference: $D_i = X_i - Z_{i0} - E_i$ (the value of total domestic final demand, *D*, is lower than the original value by about €6,000 million, to compensate the difference in exports mentioned above).

The changes to the fourth quadrant of the DFTbp (net indirect taxes and imports with a direct incidence on final demand) were as follows: (i) the value of total imports of the economy, *M*, was matched to the value given by the national accounts (INE) (this value is about €6,000 million higher) and in doing so, and also taking into account the adjustment of total exports mentioned above, we worked with the value of trade in goods and services deficit (*H*) actually recorded in 2011, according to the official statistics (INE); (ii) the value of direct imports for domestic demand (private consumption and investment) was calculated as the difference between total imports and imports for intermediate consumption: $M_D = M - M_0$; (iii) the gross value added (*VA*) of the total economy was matched to the GDPmp given by the national accounts (INE) for 2011; and (iv) the value of net indirect taxes less subsidies with direct incidence on domestic final demand (private consumption and investment) was calculated as the difference between the total gross value added (*VA*) of the economy and the sum of gross value added of all the productive sectors: $VA_D = VA - VA_0$.

The employment coefficients were calculated using the value of employment, measured by the number of employees, given by the national accounts (INE) and respecting the sectoral employment structure of the WIOD database (socio-economic accounts). We also used the value of the labour force given by INE, in order to work with the value of the unemployment rate provided by Portuguese official statistics.

A5. Values used to calculate the trade-off equation in 2013

In the following calculations, ★ means actual value, as indicated in SB 2013, and ★★ means the value predicted in SB 2013.

Values in millions of 2011 euros:

$$\text{Exports: } 60{,}410 \times 1.043^\star \times 1.036^{\star\star} = 65{,}276$$

$$\text{Imports: } 67{,}952 \times 0.934^\star \times 0.986^{\star\star} = 62{,}579$$

$$\text{GDPmp: } 176{,}167 \times 0.97^\star \times 0.99^{\star\star} = 169{,}173.1$$

Employment (thousand persons): $4{,}740.1 \times 0.958^\star \times 0.983^{\star\star} = 4{,}463.8$, which allows one to obtain the implicit forecast of the active population, $N = 5{,}339.5$ thousand persons

$$\text{Productivity growth: } 2012 = 1.3\%^\star; 2013 = 0.7\%$$

$$\text{Value of } l_E = 0.020156 \times 0.987 \times 0.993 = 0.01917547$$

$$\text{Value of } l_D = 0.019174 \times 0.987 \times 0.993 = 0.01879227$$