LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

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WP04/2015/DE/UECE

WORKING PAPERS

ISSN 2183-1815

LISBOA
UNIVERSIDADE DE LISBOA

The Trade-off Unemployment Rate/External Deficit: Assessing the Economic Adjustment Program of the Troika (European Commission, ECB and IMF) for Portugal using an Input-Output Approach

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Abstract. This article presents an evaluation of the economic adjustment program negotiated between the Portuguese government and the Troika (European Commission, ECB and IMF) in May 2011, with an assessment different from the usual exercises. Instead of an ex-post comparison between the actual results and the proposed targets, an ex-ante assessment of the forecast errors is made. It is shown that these errors could be avoided if the productive (input-output) structure of the economy and the unemployment/external deficit trade-off were taken into account. The main conclusion of this assessment, a large under-estimation of the unemployment rate of about 4 percentage points, illustrates the technical incompetence of this adjustment program and the huge economic and social costs it unnecessarily caused. The methodology used can easily be replicated in assessing other similar programs, such those applied in Greece, Ireland and Cyprus.

Keywords: Unemployment, External deficit; Input-output analysis; Economic adjustment program; Troika; Portugal

JEL Classification: E61; C67; D57

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1. Introduction

The imbalances of the Portuguese economy have a deep and lasting nature and were accentuated with the implementation of the Economic and Monetary Union. The visibility of these imbalances became apparent especially from the year 2000 onwards, and was exposed in an interesting article by Blanchard (2007), 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 "(p. 1).

According to this author, 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. In the first phase (1995-2000), there has been an increase in GDP and lower unemployment, accompanied by rising current account imbalances. In the second phase (2000-2008), the investment boom (especially in non-tradable sectors) ended, productivity stagnated, GDP growth was almost nil, the unemployment rate doubled and private savings increased, being 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 labor productivity, led to a deterioration of external competitiveness and kept current account deficits permanently very high (the evolution of the main macroeconomic indicators at this stage can be seen in Table A1, presented in Appendix 1).

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 percent between 2000 and 2008, according to Lane, 2013, p.3).

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

From the foregoing 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, said. But the Great Recession of 2008/2009 brought, in addition to a huge fall in output and a catastrophic job destruction (well documented in Carneiro et al, 2014) a very pernicious effect on budget accounts, for at least three reasons: first, the huge increase in the budget deficit in 2009 due to the functioning of automatic stabilizers; second, the discretionary increase in expenditure under the anti-crisis program, agreed at the G20 level; and third, the fiscal effort to stabilize the financial sector (although lower in Portugal, compared to 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, were the proximate source of sovereign funding difficulties in the financial markets and the need to ask for assistance by 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 Portuguese case, the assistance request was made in April 2011 and the Economic Adjustment Program was agreed (imposed?) with (by) the Troika (European Commission, ECB and IMF) in May 2011, to take effect over a 3 year period (until mid-2014). This program (described in European Commission, 2011) has three components: fiscal consolidation, financial sector stabilization 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 labor 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.) that could have no other effect than a retrenchment in domestic effective demand, strongly pro-cyclical and generating a deep and prolonged recession (-6.6 percent of GDP, in the Portuguese case, in 2011-2013) and a huge job destruction (the unemployment rate in Portugal peaked at 17.5% in the first quarter of 2013; since then the decline in the unemployment rate is mainly explained by a massive immigration, especially of young people, rising discouraged persons and employment policy measures, e.g., paid traineeships; it is estimated that, these factors taken into account, the "real" unemployment rate in Portugal would be more than 20 per cent).

The recessionary effect of these programs was clearly under-rated, largely due to the ideological belief in the supposed virtues of an expansionary austerity (what Krugman (2012) calls the "confidence fairy") and the incorrect assumptions about the (small) size of the Keynesian multiplier in computational general equilibrium models (CGEM) used by major international institutions, which is now fortunately under greater scrutiny and caution (more by the IMF than the ECB and the EC, in fact) (see Blanchard and Leigh, 2013). However, in the Portuguese case (but not in the Greek), the increase of exports and the huge contraction of imports in 2011, 2012 and 2013, resulted in a (slight) current account surplus, much faster than expected. The real big question is whether this external surplus is sustainable and will remain after the economy recovers and GDP starts to grow well.

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

Since the value of the Keynesian multiplier is large when economies are below full employment, 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, that is, a significant worsening of this ratio, as the Greek and, if to a lesser extent, the Portuguese cases seem to show. However, an important question emerges, in this context, about the effect of these expansionary policies in the external (trade and current account) balances, already mentioned.

Given the importance of their economic, political and social effects, and the theoretical and empirical difficulties involved, it is very useful to make a careful and rigorous assessment of the economic adjustment programs of the Troika (Sapir et al, 2014; Gros et al, 2014). Usually, this assessment is made comparing its actual results with the different goals set in from the start, or in terms of expected results in the case of a prospective analysis. But 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 program has a positive net effect on welfare and on income distribution in the long run, 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 euro zone countries (Greece, Ireland, Italy, Portugal and Spain) are huge, implying a real GDP reduction of about 47 per cent.

In this paper, the evaluation exercise is different. It is based on a methodology allowing a comparison between the economic policy implicit in the adjustment programs, 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 are considered (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), due to the economy's structure formalized through an input-output (IO) system (upon the so-called Leontief model) and the sectoral employment coefficients (the inverse of labor productivity in each sector). Therefore, it 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 levels of domestic demand and imports (endogenous) compatible with a given (intended) value of the external deficit.

This methodology was used to make an assessment of the economic adjustment program negotiated (or should we say, imposed) by the Troika and (to) the Portuguese government. It allowed us to quantify the (large) errors in the unemployment rate predicted in that program, from which enormous social costs emerged, that could have been anticipated and avoided, and that, among 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 organized as follows. In Section 2 we provide the theoretical and methodological framework, with the 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 formalizing the trade-off unemployment rate / external deficit, based on modeling the economy as an input-output system, with the details shown in one appendix. Section 3 makes the empirical application of the proposed methodology, assessing the Portuguese economic adjustment program, by presenting the database used (input-output and socio-economic data from WIOD and 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, some concluding remarks are given in Section 4.

2. Theoretical and methodological framework

The purpose of this work is, as mentioned, that of making an ex-ante and ex-post evaluation of the economic policy defined in the Economic Adjustment Program agreed between the Portuguese government and the Troika for the period 2011-2014.

The key objective of this Program 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 were also important variables that, although not policy objectives, the program had in mind, in such a relevant way that we can consider them as 2nd-order objectives.

Our assessment does not compare the policy set by the program with the actual results. A first type of evaluation that we qualify as ex-ante in a specific sense to be explained below tries to determine the relative value of the objectives for the policy maker. A second evaluation (ex-post) examines if the values of the defined objectives, both those with highest priority and the 2nd order ones, listed in the economic policy program, are consistent with the structure of the economy and to the prediction of exogenous variables that reflect the national and international environment in which the policy will be enforced.

Of course the very policy measures may change the environment in which they will hold and even, in some cases, the structure of the economy (reflexivity, in the sense presented in Soros, 2013). But it is also true that there are relations that constitute the productive structure that are relatively unaffected by short-term economic policies and relatively robust to the impact of the crisis on the behavior of the economic agents. This we think is a strong point of the methodology we use in this paper.

In this paper we consider as structural relationships relatively immune to short-term measures the relationships established between the productive sectors according to the hypotheses of the Leontief input-output model.

On the other hand, as we only have 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 2nd order, which are unemployment and the deficit of goods and services trade account.

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

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 summarizes the structural relationships considered robust with respect to short-term policy actions and relating to each other the values of objective variables and the relevant exogenous variables.

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

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

$$\text{(1)} \qquad \mathrm{F}(E, N, l_D, l_E, H, u) = 0$$

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

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

It is now the place to 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 relatively to the moment the policy was defined and not to the moments before and after the period in which the policy was implemented. All these evaluations will be exercises of comparative statics and are not to be mistaken with 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^*, N^*, l_D^* *e* l_E^* and the following equation is obtained:

(2) $$F(E^*, N^*, l_D^*, l_E^*, H, u) = 0$$

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

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

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

In the (probable) absence of existence of a function U politically determined, 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 maximized at this point, subject to the constraint:

$$F(E^*, N^*, l_D^*, l_E^*, H, u) = 0$$

So, calculating the derivatives in these values, E^*, N^*, H^* *e* u^* we have:

$$(\partial U/\partial H)/(\partial U/\partial u) = (\partial F/\partial H)/(\partial F/\partial u).$$

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

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 the function F is linear (as long as the values of exogenous variables are fixed) the relative is given by the constant $[l_D^*/(1-va_D)]N$, 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 below).

It costs more to society to reduce in one unit the external deficit than one unit of u when N is larger and everything else equal, which is understandable because "everything else equal" also means that the value of exports is the same. Similar considerations could be made for l_D^*.

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 are considering, given in equation (3) 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:

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

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. 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 equation of trade-off from policies that change the parameters, namely domestic technical coefficients. However, although very interesting and useful in itself, this is a path not followed in this work.

2.2 The trade-off external deficit / unemployment rate

With the purpose to determine 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:

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

where E, H, va_D were 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 input-output system (Leontief model) and considering a set of explicit assumptions presented in Appendix 2.

From expression (4), we can obtain:

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

Considering l_D and l_E the employment content of final demand and exports, respectively and L the value of total employment, we have (for the determination of l_D and l_E see Appendix 3):

(6) $$L = \mathrm{l_D}D + \mathrm{l_E}E = \mathrm{l_D}(\mathrm{H} + \mathrm{va_E}E)/(1\text{-}\mathrm{va_D}) + \mathrm{l_E}E$$

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

(7) $$u = [1\text{-}\ l_D\ va_E E/(1\text{-}va_D)N - l_E E/N] – [l_D/(1\text{-}va_D)N]H,$$

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, $-[l_D/(1\text{-}va_D)N]$, give us the trade-off between the external deficit and the unemployment rate.

The equation of trade-off 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:

(8) $$E + hY = (1\text{-}va_D)D + (1\text{-}va_E)E \ \text{ com } h = H/Y$$

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

Eliminating Y, we obtain:

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

The expression analogous to expression (6) is now:

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

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

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

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

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

$$- l_D va_E(1+h))/[1- (1+h)va_D].$$

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 $h>0$, 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 to the Portuguese case. The trade-off unemployment/external deficit in the Portuguese economy for 2011 is simulated and it is estimated the unemployment rate one would expect / predict, with a careful macro and meso-economic (sectoral) analysis, corresponding to a situation of external equilibrium (trade deficit null).

3.1 Database and assumptions

The database and the main assumptions used to calibrate the model, corresponding to the base year 2011, are described below.

We used the input-output tables of the World Input-Output Database (WIOD) (for the description of this database see Timmer et al, 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 programs, especially those of Greece and Cyprus, as well as Spain, rather than the Irish, which is has not a structural problem of external imbalance).

Although we used the DFTbp of 2011, this table was projected from the structure of the 2008 DFTbp, 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, 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 the Portuguese national statistics institute, INE) available for 2011.

To switch from the IO Table in $ US to EUR, we used the (implicit) nominal exchange rate arising from the comparison of Gross Outputs in US $ and EUR: US $ 470.096 billion «» EUR 330.273 billion, that is US $ 1 = € 1.4234.

All the values of the first quadrant of the DFTbp, Z_{ij} (domestic inter-sectoral 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:

- The values of imported intermediate inputs and international trade margins were summed: M_j
- 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, that is to say: 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):

- The value of total exports (E) was matched to the value provided by the National Accounts (INE) (this latter one is about EUR 6,000 million (m.e.) higher, due to a more rigorous accounting of services exports, namely tourism); 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).

- 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 m.e., 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:

- The value of total imports of the economy, M, was matched to the value given by the National Accounts (INE) (this value is about 600 m.e. higher). 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 defit (H) actually recorded in 2011, according to the official statistics (INE).

- 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:

$$M_D = M – M_0$$

- The gross value added (VA) of total economy was matched to the Gross Domestic Product at market prices (GDPmp) given by the National Accounts (INE) for 2011.

- 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 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 WIOD database (Socioeconomic Accounts). We also used the value of the labor force given by INE, in order to work with the value of the unemployment rate provided by Portuguese official statistics.

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

Starting with the Domestic Flows Table at basic prices obtained from the WIOD database, adjusted with the assumptions described above, it was possible to calculate all the necessary elements to determine the equation of trade-off unemployment rate / external deficit, namely:

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

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

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

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

$m_D = (1- va_D) = \mathbf{a^m}\,\mathbf{B}\,\mathbf{a^d} + \mathrm{a}^{\mathrm{m}}{}_{\mathrm{d}} = 0.255943$

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

These indicators are interesting by 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, a very large value (for a detailed analysis of this subject see Lopes et al, 2011).

Using the values of sectoral output given by the DFTbp and the number of employees per sector, calculated by applying the employment structure of the WIOD database (socioeconomic accounts) to total employment given by INE, it was possible to calculate the vector of employment coefficients (the inverse of sectoral productivities), $\mathbf{a^l}$, used in the calculation of the unitary employment content of exports, l_E, whose value is:

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

The employment content of domestic final demand, l_D, was calculated by difference, according to the procedure set out in Appendix 2, and its value is:

$l_D = 0.019174$.

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

Labour force, N: 5,428.3 (thousand persons)
Exports, E: 60,409.869 (million euros)

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

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

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

(7’) $$\boldsymbol{u = 0.23080371 - 0.00001291 \, H}$$

The following table presents several combinations of *H* and *u* values, which respect this line of trade-off:

H	***u***
7542.067	**0.1268**
5000	0.1619
2500	0.1964
0	**0.2309**

For instance, the actual value of the Portuguese trade deficit in 2011, 7542 million euros, corresponds to the actual unemployment rate in this year, 12.7 per cent. Assuming that the productive structure of this year does not change, as well as the value of exports, *ceteris paribus*, 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 per cent. 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, $h = H/Y$:

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

As we have seen, since the values of *E* and *N* are considered constant (exogenous) the trade-off can be studied by analyzing the term: $l_D va_E(1+h)/[1-(1+h)va_D]$.

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 per cent of GDP, i.e. 7542/176167), $u = 0.1267$, the actual unemployment rate in Portugal for that year.

For an (intermediate) value of $h = 0.025$, $u = 0.1735$, confirming the inverse relationship between *u* and *h*.

These results can be used to make an ex-ante assessment of the unemployment forecast errors associated with the economic policy implicit in the adjustment program of the Troika (EC, ECB and IMF) applied in Portugal, which was requested in April 2011, signed in May this year and implemented in full from the year 2012 onwards.

3.3 Ex-ante assessment of the Troika's economic policy for 2012

3.3.1 Methodology and assumptions

In order to make an ex-ante assessment of the Troika economic policy for 2012 we will proceed as follows:

1 – For 2012, we used the values provided by the Government in the State Budget for 2012 (SB 2012) for the following variables, in terms of annual growth: GDP evolution, Exports evolution, Imports evolution and Employment evolution.
2 - Based on the actual values of the variables given by the Domestic Flows Table at basic prices for 2011, adjusted with the official statistics of INE for that year, we obtained the absolute value of Exports, Imports and the GDP for 2012, which allowed us to determine the value of h for 2012 implicit in the forecasts of SB 2012.

3 - Based on the amount of Employment 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.

4 - 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 hypothesis that both would have the same rate of growth (symmetric of the growth rate of productivity).

The values are the following:
Forecasts of the SB 2012 (growth rates 2011-2012, except unemployment rate)
Exports: + 4.8%

Imports: - 4.3%

GDP: -2.8%

Employment: -1.0%

Productivity (implicit): -1.2%

Unemployment rate: 13.4%

3.3.2 Values calculated according to previous assumptions

Values expressed in 10^6 euros of 2011:

Exports: 60,410 x 1.048 = 63,310

Imports: 67,952 x 0,957 = 65,030

GDPmp = 176,167 x 0,972 = 171,234

Value of employment (10^3 persons): 4,740.1 x 0.99 = 4,692.6, which allows to obtain the implicit forecast of the labour force, N = 5,418.7 10^3 persons.

Value of l_E = 0.020156/0.99 = 0.0203596

Value of l_D = 0.019174/0.99 = 0.0188889.

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 trade-off unemployment / trade deficit estimated for the year 2012 would be:

$$u = 0.198656346 - 0.00001362\, H$$

Since that in the SB 2012 the implicitly predicted value for the trade deficit, H, is 1720, one might expect an unemployment rate of 17.5%. Once the Troika forecasted a value of 13.4%, we can conclude that the macroeconomic program for 2012 significantly underestimated ex-post the impact of the policy on unemployment at around 4.1%. It is interesting to note that 17.5% was the value actually assumed by the unemployment rate in Portugal in the first quarter of 2013.

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

$$\boldsymbol{u = 0{,}762128 - 0{,}144216818\,(1+h)/[1-0.744057(1+h)]}$$

For the value implicitly predicted in the SB 2012, h = 0.0100474 (1720/171234), we obtain the value of the expected unemployment rate mentioned above, u = 17.5%.

3.3.4 The ex-ante assessment for 2012 and 2013

For 2012

Based on the calculated trade-off equation we get, deriving:

$$-du/dh \equiv \partial U/\partial h\,/\partial U/\partial u = 0.144216818\,(1+h)/[1-0.744057(1+h)]^2$$

With the value of h predicted on the 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:

$$-\partial U/\partial h\,/-\partial U/\partial u = 2.359498$$

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 the Appendix 4), we get the following equation of trade-off, in which the values for 2013 are those from the SB 2013 proposal:

$$\boldsymbol{u = 0{,}758498609 - [0.150132(1+h)/[1-0.744057(1+h)]}$$

Based on this trade-off equation we get, deriving:

$$-du/dh \equiv \partial U/\partial h\,/\partial U/\partial u = 0.150132(1+h)/[1-0.744057(1+h)]^2$$

With the value of h predicted on the SB 2013, h = 0.0100474, we obtain:

$- \partial U/\partial h \,/- \partial U/\partial u = 2.289824$

Revealed preference in the two budgets

From the above calculations, we can deduce that the revealed preference in the State Budget for 2013 gives a very slightly higher value to the unemployment rate relatively to the trade deficit than the revealed preference in the State Budget for 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 program negotiated with the Troika (European Commission, ECB and IMF) in May 2011, to take effect in the three subsequent years, was based on fiscal consolidation and income cuts policy. This policy caused a strong fall in domestic demand and a long and deep recession in 2011, 2012 and 2013, with a catastrophic destruction of jobs and a large increase in the unemployment rate, much higher than expected in the program.

This fiscal consolidation effort has not translated, as projected, into an inversion of the increase in public debt, the central objective of the program. However, it was possible to solve the external imbalance through a significant fall of imports and a reasonable growth of exports, which caused a slight surplus of the trade in goods and services account, more quickly than it was expected.

The assessment of such programs is done usually by comparing their actual results and those predicted from the start, and in this sense it can already be concluded that there was a gross under-estimation of the effects of implemented measures in the fall of GDP and employment and in achieving fiscal sustainability, although the opposite happened in terms of external imbalance resolution.

In this article, a different exercise was made, consisting on assessing the unemployment rate forecast errors, compared to what would have been possible to anticipate in the initial formulation of the program, if the (sectoral) structure of the economy and the trade deficit predicted were taken into account. According to our calculations, the unemployment rate expected for 2012 should be 17.5 percent and not 13.4 percent, as it was, representing a gross forecast error that illustrates the failure of this program and the huge economic and social costs it, unnecessarily, caused. To attest the validity of our external deficit/unemployment equation, it should be noted that 17.5 percent was the unemployment rate actually observed in Portugal in the first quarter of 2013.

The methodology used to achieve our results is very useful in assessing this type of EU/IMF adjustment programs and can be easily replicated to the other cases, of Greece, Ireland and Cyprus, as well as to other contexts, such as the IMF interventions in emerging economies facing severe economic and financial crises.

Aknowledgments. We thank the financial support from national funds given by the FCT (Fundação para a Ciência e a Tecnologia). This paper is part of the Strategic Project: *PEst-OE/EGE/UI0436/2011*

References

Amaral, J. F. (2013), *Porque Devemos Sair do Euro*, Lua de Papel, Lisboa.

Arestis, P. (2012), Fiscal policy: a strong macroeconomic role, *Review of Keynesian Economics,* 1: 93-108.

Blanchard, O. (2007), Adjustment within the Euro: The Difficult Case of Portugal, *Portuguese Economic Journal*, 6: 1-21.

Blanchard, O. and D. Leigh (2013), Growth Forecast Errors and Fiscal Multipliers, IMF WP/13/1.

Carneiro, A., P. Portugal and J. Varejão (2014), Catastrophic job Destruction during the Portuguese Economic Crisis, *Journal of Macroeconomics*, 39: 444-457.

Dias, A. M. (2009), Sistema Integrado de Matrizes Input-Output para Portugal, 2008 Documento de trabalho. Lisboa, Departamento de Prospectiva e Planeamento e Relações Internacionais.

European Commission (2011), The Economic Adjustment Programme for Portugal' Occasional Paper 79.

Governo de Portugal (2012), Orçamento de Estado para 2012, Ministério da Finanças, Lisboa.

Governo de Portugal (2013), Orçamento de Estado para 2013, Ministério da Finanças, Lisboa.

Gros, D., C. Alcidi, A. Belke, L. Coutinho and A. Giovannini (2014), State-of-play in implementing macroeconomic adjustment programmes in the euro area, ROME Discussion Paper Series, No. 14-05.

Krugman, P. (2012), Expectations and the Confidence Fairy, The Conscience of a Liberal: The Opinion Pages, New York Times, September 23.

Lane, P. (2013), Growth and Adjustment Chalenges for the Euro Area, IIIS Discussion Paper No. 427, Trinity College, Dublin.

Leão, P. (2013), The Effect of Government Spending on the Debt-to-GDP Ratio: Some Keynesian Arithmetic, *Metroeconomica*, 64(3) : 448-465.

Leão, P. and Palacio-Vera, A. (2012), Portugal's Best Way out of Economic Stagnation: Institutional Reform of the Eurozone, in *The Euro Crisis*, P. Arestis, and M. Sawyer, M. (eds), London: Palgrave Macmillan.

Lehndorff, D. (2015), Europe's divisive integration – an overview, in *Divisive integration: The triumph of failed ideas in Europe – revisited*, D. Lehndorff, ed., European Trade Union Institute (ETUI), Brussels.

Leontief, W. (1951), *The Structure of the American Economy, 1919-1939*, 2nd ed. New York, Oxford University Press.

Lopes, J. C. (2012), High Employment Generating Sectors in Portugal: an Interindustry Approach, *International Journal of Latest Trends in Finance and Economic Sciences*, 2(2): 125-135.

Lopes, J. C., J. F. Amaral and J. Dias (2011), *External dependency, value added generation and structural change: an interindustry approach*, Notas Económicas, 33, 6-19.

Miller, R. E. and P. D. Blair (2009), *Input-Output Analysis: Foundations and Extensions*, Second edition. New York: Cambridge University Press.

Ministério das Finanças (2011), Orçamento do Estado para 2012 – Relatório, Lisboa, disponível em: http://www.min-financas.pt

Ministério das Finanças (2012), Orçamento do Estado para 2013 – Relatório, Lisboa, disponível em: http://www.min-financas.pt

Palley, T. (2013), Europe's crisis without end: The consequences of neoliberalism run amok, IMK Working Paper 111-2013, Hans Boeckler Foundation, Macroeconomic Policy Institute.

Reis, H. and A. Rua (2006), An Input-Output Analysis : Linkages vs Leakages, Working Papers, 17 | 2006, Banco de Portugal.

Reis, R. (2013), The Portuguese Slump-Crash and the Euro-Crisis, *Brooking Papers on Economic Activity*, Spring, 143-210.

Sapir, A., G. Wolff, C. Sousa and A. Terzi (2014), The Troika and financial assistance in the euro area: successes and failures, Study on the request of the Economic and Monetary Affairs Committee, European Union.

Seidman, L. (2012), Keynesian stimulus versus classical austerity, *Review of Keynesian Economics*, 1: 77-92.

Soros, G. (2013), Fallibility, reflexivity, and the human uncertainty principle, *Journal of Economic Methodology*, 20 (4): 309-329.

Stockhammer, E. and D. Sotiropoulos (2012), Rebalancing the Euro area: the costs of internal devaluation, Post Keynesian Economics Study Group - Working Paper 1206.

Timmer, M. P. (ed., 2012), The World Input-Output Database (WIOD): Contents, Sources and Methods, WIOD working paper nr. 10, available at: www.wiod.org.

Viegas, M. and A. P. Ribeiro (2014), The Economic Adjustment Program for Portugal: assessing welfare impact in a heterogeneous-agent framework, *Portuguese Economic Journal*, 13: 53-70.

Zezza, G. (2012), The impact of fiscal austerity in the Eurozone, *Review of Keynesian Economics*, 1: 37-54.

APPENDIX 1: Tables with the Main Economic Indicators for Portugal

Table A1: Portugal - Main Economic Indicators, 2000/2008

	2000	**2008**	**2000/08**
GDP (10^9 EUR)	167.15	182.00	
GDP (annual % change)	3.79	0.20	1.07
GDP per capita (10^3 EUR)	16.244	17.238	
GDP per capita (a. % change)	3.06	0.05	0.75
GDP per employee (10^3 EUR)	33.152	35.825	
GDP per employee (a. % change)	1.55	-0.17	0.97
Private Consumption (a. % change)	3.69	1.38	1.44
Public Consumption (a. % change)	4.41	0.42	1.77
Gross Capital Formation (a. % change)	1.64	0.78	-0.72
Domestic Demand (a. % change)	3.27	1.08	0.98
Exports (a. % change)	8.44	-0.32	4.05
Imports (a. % change)	5.53	2.47	3.16
Trade Balace (% of GDP)	-11.04	-9.71	-8.82
Primary Income Bal. (% of GDP)	-1.90	-3.89	-2.25
Current Transfers Bal. (% 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 (a. % change)	2.34	0.47	0.18
Unemployment rate	5.1	8.7	

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

Table A2: Portugal - Main Economic Indicators, 2009/2014

	2009	2010	2011	2012	2013	2014
GDP (10^9 EUR)	176.577	179.930	176.643	170.786	168.472	169.988
GDP (annual % change)	-2.98	1.90	-1.83	-3.32	-1.36	0.90
GDP per capita (10^3 EUR)	16.708	17.018	16.731	16.242	16.110	16.375
GDP per capita (a. % change)	-3.07	1.85	-1.68	-2.92	-0.81	1.64
GDP per employee (10^3 EUR)	35.732	36.936	36.980	37.277	37.859	37.580
GDP per employee (a. % change)	-0.26	3.37	0.12	0.80	1.56	-0.74
Private Consumption (a. % change)	-2.34	2.40	-3.60	-5.19	-1.40	2.10
Public Consumption (a. % change)	2.62	-1.31	-3.82	-4.27	-1.94	-0.45
Gross Capital Formation (a. % change)	-12.25	3.39	-14.00	-14.17	-6.48	3.33
Domestic Demand (a. % change)	-3.57	1.88	-5.68	-6.61	-2.35	1.80
Exports (a. % change)	-10.21	9.52	7.04	3.05	6.43	3.76
Imports (a. % change)	-9.92	7.84	-5.82	-6.57	3.62	5.86
Trade Balace (% of GDP)	-6.92	-7.56	-4.28	-0.67	0.98	0.89
Primary Income Bal. (% of GDP)	-3.66	-3.47	-2.07	-2.92	-2.20	-2.22
Current Transfers Bal. (% 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 (a. % 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

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

APPENDIX 2: Modeling the economy as an IO system

Consider the following Leontief system:

(A1) $\mathbf{x} = \mathbf{A}\,\mathbf{x} + \mathbf{y}$,

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:

(A2) $$\mathbf{x} = (\mathbf{I}\text{-}\mathbf{A})^{-1}\,\mathbf{y},$$

Wherein $(\mathbf{I}\text{-}\mathbf{A})^{-1}$ is the so called Leontief inverse matrix of output multipliers (hereinafter represented by **B**), whose generic element, b_{ij}, gives the increase of setors' *j* 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); examples of empirical applications to the Portuguese case using this model are, among others, Reis and Rua (2006), Lopes et al (2011) and Lopes, 2012).

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**; the external final demand (sectoral exports), **e**:

(A3) $$\mathbf{y} = \mathbf{d} + \mathbf{e}$$

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

(A4) $$\mathbf{x} = \mathbf{B}\,(\mathbf{d} + \mathbf{e}).$$

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

(A5) $VA = \mathbf{a^v}\,\mathbf{B}\,\mathbf{a^d}\,D + \mathbf{a^v}\,\mathbf{B}\,\mathbf{a^e}\,E + a^t{}_d\,D$

(A6) $M = \mathbf{a^m}\,\mathbf{B}\,\mathbf{a^d}\,D + \mathbf{a^m}\,\mathbf{B}\,\mathbf{a^e}\,E + a^m{}_d\,D,$

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 GDP at market prices; $\mathbf{a^v}$ is the vector of value added coefficients of the *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; am is the vector of imported inputs coefficients; $a^m{}_d$ is the vertical coefficient of imports (directed) to the domestic final demand (again, only consumption and investment).

From (A5) 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 (A6) 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 Table), it can be concluded that:

$m_D = 1 – va_D$

$m_D = 1 – va_{E.}$

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

(A7) $M = (1 – va_D)\,D + (1 – va_E)\,E.$

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

APPENDIX 3: 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 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:

(A8) $$l_D = \mathbf{a^l}\,\mathbf{B}\,\mathbf{a^d}$$

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

(A9) $$l_E = \mathbf{a^l}\,\mathbf{B}\,\mathbf{a^e}$$

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: $l_D = L_D / D$.

APPENDIX 4: Values used to calculate the trade-off equation in 2013

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

Values in 10^6 euros of 2011:

Exports: 60,410x 1.043*x1.036** = 65,276

Imports: 67,952 x 0.934*x0.986** = 65,254

GDPmp: 176,167 x 0.97*x 0.99** = 169,173.1

Employment (10^3 persons): 4,740.1 x 0.958* x 0.983** = 4,463.8, which allows to obtain the implicit forecast of the active population, N = 5,339.5 10^3 persons.

Productivity growth: 2012= 1.3%*; 2013 = 0.7%

Value of l_E = 0.020156x0.987x0.993 = 0.019174305

Value of l_D = 0.019174x0.987x0.993 = 0.018792564.