

International Competitiveness: is the reduction of wages the solution?

Elsa Cristina Vaz – Economics Department of University of Évora and CEFAGE

Maria Paula Fontoura – ISEG, Technical University of Lisbon

Abstract

The purpose of this paper is to analyse the effectiveness of the wage reduction in promoting efficiency and the international competitiveness of the Portuguese economy. A static multi-sectoral and single-country general equilibrium model will be used for the Portuguese case using the data from GTAP7 Data Base. The model allows measuring the changes by sectors. The simulations performed show that the reduction of wages in all sectors lead to negative effects on the productivity and the trade balance of the majority of sectors, albeit small. Only the labour intensive sectors depict an improvement of the trade balance.

KEYWORDS: Competitiveness, wages, Stability and Growth Pact; General Equilibrium Model, Portugal.

1. Introduction

Empirical analysis shows a positive relation between growth and competitive levels. On the one hand, the most competitive economies can grow more and faster. On the other hand, high growth rates of production allow competitiveness to improve. These two achievements are the most important priorities in the European Union over the last decade. In fact, both the Lisbon Strategy from 2000 to 2010 and the Europe 2020 Strategy define them as main goals.

To respond to the last huge shocks suffered by some EU economies put into evidence in the aftermath of the financial 2008, many EU countries had to implement Stability and Growth Programmes (SGP) using very restrictive options of fiscal and other policies aiming macroeconomic stability. Nevertheless some studies show evidence of a negative correlation of the rate of real output growth with the increase in current public expenditure and a positive correlation of growth with the rate of increase in public capital spending and private investment. The implication is that growth may be at risk in countries implementing severe austerity measures to reduce the budget deficit.

Portugal is, together with Greece and Ireland, one of the three EU countries suffering such a severe sovereign debt crisis that needed to ask for external financial support in 2011. It was consequently obliged to implement, in the context of the Memorandum of Economic and Financial Policies signed with Troika (European Commission, IMF and ECB), very restrictive SGP policies. Thus, one of the most important discussions in the country – extensive to all countries involved in similar SGP programmes - is how to increase production in order to allow the country to resume a path of economic growth. In the case of Portugal, which displays accentuated decreasing levels of consumption and investment both domestic and foreign, hopes are focused in the exports increase through gains in international competitiveness.

It is general acknowledged that the promotion of international competitiveness can be done by three distinct pathways. The first is to reduce the costs of production, including labour costs, generating a decrease in the unit cost per unit of the final product. The second is based on increasing production with no change of the resources used, which is an effective increase of the productivity of each unit of productive factor used. The third is to increase product differentiation in order to reduce the market share of the international competitors. Of course, the easiest one, if viable, is to reduce wages, which has been recommended by several economists in the Portuguese case. The other two alternatives imply, respectively, a scale effect of the investment and promoting the motivation of the workers and the reorganization of business structures, and the diversification of the varieties produced, either keeping the quality or introducing changes in the production and

the management structures necessary to up-grade quality; in any case, they are not easy to implement in an economy facing a serious recession of GDP.

In the case of Portugal, the main measure already implemented which may contribute to increase competitiveness can be summarised as a renegotiation of the social contract, making the "acquired rights" renegotiable and the consequent "acquired obligations" adjustable, a way of reducing public spending, wages and promoting labour flexibility. Between 2009 and 2003, wages fall 9% on average (in the public sector, due to the cancellation of the 13th and 14th months of wages, it corresponded to approximately -14% of annual salary) and some economists estimate that decrease should still be much bigger, around 30%.

The two latter alternatives above mentioned to promote efficiency have been in practice disregarded in the short term by the majority of the Portuguese political and economic actors. The reason is that they require a significant investment, hardly achievable today in the Portuguese economy.

This paper aims to analyse the effectiveness of the wage reduction in promoting impacts on production, productivity and international trade of the Portuguese economy. For that purpose we use a static multi-sectoral and single-country general equilibrium model for the Portuguese case, using the data from GTAP7 Data Base. The results of the simulations already implemented show that the reduction of wages in all sectors lead to negative effects on the productivity and the trade balance of the majority of sectors, albeit small. Only the labour intensive sector depicts an improvement of the trade balance.

2. The model

The hypothesis to simulate with GTAP database, version 7,¹ will be the administrative reduction of costs, which corresponds to a reduction of annual salary. The reduction in the employer contributions to Social Security could be

¹ In this first exercise we will use an aggregation that is not the best for the propose of our simulation (table I, in appendix 1). However, it is our intention to replicate this exercise with a new sectorial aggregation.

another alternative to test but it has not yet been approved and there are no reasons to expect that it will be implemented in a near future.

We disentangle between skilled and unskilled labour: $\Phi q_{r,s}$ and $\Phi u_{r,s}$. For skilled and unskilled labour, respectively, we have:

$$PLQ \rightarrow PLQ \times \Phi q_{r,s}$$

$$PLU \rightarrow PLU \times \Phi u_{r,s}$$

Where PLQ and PLU are, respectively, wages for skilled and unskilled labour and $\Phi q_{r,s}$ and $\Phi u_{r,s}$ the parameters to discriminate the wages reduction by sectors.

The equations of our model are in table 1 in the Appendix. Table 2 in the appendix presents the sectoral disaggregation.

3. A simulation for the Portuguese economy

In a first simulation, we eliminated wages in all sectors. We observe that the cost reduction can improve the Value Added as well as the use of both types of labour (Table 1), reducing the unemployment. Note that the model does not consider any rigidity of labour market in any sector. In fact, the market adjustment will lead to an increase of labour price (wages) that will compensate the initial reduction.

Table 1 - Impacts on Production (%)

	LQ	LU	VAB
Res	+	+	+
Lab	+	+	+
Spe	+	+	+
Sca	+	+	+
Rd	-	-	-
Non	+	+	+

However, we can also see that with a very small impact in major sectors the trends are completely contrary to the most important objectives of the measure of economic policy since the trade balance is not increased in most sectors, especially in sector “non” where we have agricultural products and all services (Table 2). The unique sector with a positive trend is “lab” where we can find the labour intensive industries, which is an important sector for the Portuguese economy.

Table 2 - Impacts on Trade

	Exports	Imports	Trade Balance
Res	+	-	-
Lab	+	-	+
Spe	+	+	-
Sca	+	+	-
Rd	-	-	+
Non	+	-	-

Note: results in Table 2, in appendix 2.

The results on the indices of productivity (table 3) are even worse and demonstrate that this measure will not contribute to solve one of the greatest problems of the Portuguese economy – low productivity and weak competitiveness, advocated by the IMF (2010).

Table 3 - Impacts on Productivity

	Productivity Skilled Labour	Productivity Unskilled Labour	Productivity Multifactor
Res	-	-	-
Lab	-	-	-
Spe	-	-	-
Sca	-	-	-
Rd	-	+	-
Non	+	+	-

Note: results in Table 3, in appendix 2.

4. Concluding remarks

We have shown that wage reduction in the Portuguese case may not produce a transversal positive impact in productivity and in the improvement of the trade balance.

This first exercise allows us to conclude how important it is to know all the effects of a measure of economic policy. This is especially true when a deep crisis is occurring.

A possible additional step of this analysis could be to test whether the reduction of price / cost of goods in the non-tradable sector (easier to implement in the short term and achieved especially by administrative means) improves the performance of the tradable sector. The main drawback in this type of exercise is to properly disentangle between both types of sectors.

Referencies

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Appendix 1 – Sectorial Aggregation

Table I: Equations of the model

Production and trade:	
$K_{r,s} = \left[\frac{XD_{r,s}}{aF_{r,s}} \right] * \left[\frac{\gamma Fk_{r,s}}{(1+tk_{r,s}) * pk_r + pi_r * d_{r,s}} \right]^{\sigma F_{r,s}} * \left\{ \left[(1+tk_{r,s}) * pk_r + pi_r * d_{r,s} \right]^{1-\sigma F_{r,s}} * \gamma Fk_{r,s}^{\sigma F_{r,s}} + \right.$ $\left. + \left[(1+tlq_{r,s}) * plq_r * \Phi q_{r,s} \right]^{1-\sigma F_{r,s}} * \gamma Fq_{r,s}^{\sigma F_{r,s}} + \left[(1+tlu_{r,s}) * plu_r * \Phi u_{r,s} \right]^{1-\sigma F_{r,s}} * \gamma Fu_{r,s}^{\sigma F_{r,s}} \right\}^{\frac{\sigma F_{r,s}}{1-\sigma F_{r,s}}}$	
$LQ_{r,s} = \left[\frac{XD_{r,s}}{aF_{r,s}} \right] * \left[\frac{\gamma Fq_{r,s}}{(1+tlq_{r,s}) * plq_r * \Phi q_{r,s}} \right]^{\sigma F_{r,s}} * \left\{ \left[(1+tk_{r,s}) * pk_r + pi_r * d_{r,s} \right]^{1-\sigma F_{r,s}} * \gamma Fk_{r,s}^{\sigma F_{r,s}} + \right.$ $\left. + \left[(1+tlq_{r,s}) * plq_r * \Phi q_{r,s} \right]^{1-\sigma F_{r,s}} * \gamma Fq_{r,s}^{\sigma F_{r,s}} + \left[(1+tlu_{r,s}) * plu_r * \Phi u_{r,s} \right]^{1-\sigma F_{r,s}} * \gamma Fu_{r,s}^{\sigma F_{r,s}} \right\}^{\frac{\sigma F_{r,s}}{1-\sigma F_{r,s}}}$	
$LU_{r,s} = \left[\frac{XD_{r,s}}{aF_{r,s}} \right] * \left[\frac{\gamma Fu_{r,s}}{(1+tlu_{r,s}) * plu_r * \Phi u_{r,s}} \right]^{\sigma F_{r,s}} * \left\{ \left[(1+tk_{r,s}) * pk_r + pi_r * d_{r,s} \right]^{1-\sigma F_{r,s}} * \gamma Fk_{r,s}^{\sigma F_{r,s}} + \right.$ $\left. + \left[(1+tlq_{r,s}) * plq_r * \Phi q_{r,s} \right]^{1-\sigma F_{r,s}} * \gamma Fq_{r,s}^{\sigma F_{r,s}} + \left[(1+tlu_{r,s}) * plu_r * \Phi u_{r,s} \right]^{1-\sigma F_{r,s}} * \gamma Fu_{r,s}^{\sigma F_{r,s}} \right\}^{\frac{\sigma F_{r,s}}{1-\sigma F_{r,s}}}$	
$(1-txd_{r,s}) * pd_{r,s} * XD_{r,s} = \left[(1+tk_{r,s}) * pk_r + pi_r * d_{r,s} \right] * K_{r,s} + \left[(1+tlq_{r,s}) * plq_r * \Phi q_{r,s} \right] * LQ_{r,s} +$ $+ \left[(1+tlu_{r,s}) * plu_r * \Phi u_{r,s} \right] * LU_{r,s} + \sum_{ss} [io_{r,ss} * XD_{r,s} * p_{r,ss} * (1+tcf_{r,ss,s})]$	
$XDD_{r,s} = \frac{XD_{r,s}}{aT_{r,s}} * \left(\frac{1 - \sum_{rr} \gamma T_{r,rr,s}}{pdd_{r,s}} \right)^{\sigma T_{r,s}} * \left[\sum_{rr} (\gamma T_{r,rr,s}^{\sigma T_{r,s}} * pe_{r,rr,s}^{1-\sigma T_{r,s}}) + \left(1 - \sum_{rr} \gamma T_{r,rr,s} \right)^{\sigma T_{r,s}} * pdd_{r,s}^{1-\sigma T_{r,s}} \right]$	
$E_{r,rr,s} = \frac{XD_{r,s}}{aT_{r,s}} * \left(\frac{\gamma T_{r,rr,s}}{pe_{r,rr,s}} \right)^{\sigma T_{r,s}} * \left[\sum_{rr} (\gamma T_{r,rr,s}^{\sigma T_{r,s}} * pe_{r,rr,s}^{1-\sigma T_{r,s}}) + \left(1 - \sum_{rr} \gamma T_{r,rr,s} \right)^{\sigma T_{r,s}} * pdd_{r,s}^{1-\sigma T_{r,s}} \right]^{\frac{\sigma T_{r,s}}{1-\sigma T_{r,s}}}$	
$pd_{r,s} * XD_{r,s} = pdd_{r,s} * XDD_{r,s} + \sum_{rr} (pe_{r,rr,s} * E_{r,rr,s})$	
$XDD_{r,s} = \frac{X_{r,s}}{aA_{r,s}} * \left(\frac{1 - \sum_{rr} \gamma A_{r,rr,s}}{pdd_{r,s}} \right)^{\sigma A_{r,s}} * \left[\sum_{rr} (\gamma A_{r,rr,s}^{\sigma A_{r,s}} * pm_{r,rr,s}^{1-\sigma A_{r,s}}) + \left(1 - \sum_{rr} \gamma A_{r,rr,s} \right)^{\sigma A_{r,s}} * pdd_{r,s}^{1-\sigma A_{r,s}} \right]$	
$M_{r,s} = \frac{X_{r,s}}{aA_{r,s}} * \left(\frac{\gamma A_{r,rr,s}}{pm_{r,rr,s}} \right)^{\sigma A_{r,s}} * \left[\sum_{rr} (\gamma A_{r,rr,s}^{\sigma A_{r,s}} * pm_{r,rr,s}^{1-\sigma A_{r,s}}) + \left(1 - \sum_{rr} \gamma A_{r,rr,s} \right)^{\sigma A_{r,s}} * pdd_{r,s}^{1-\sigma A_{r,s}} \right]^{\frac{\sigma A_{r,s}}{1-\sigma A_{r,s}}}$	

$p_{r,s} * X_{r,s} = pdd_{r,s} * XDD_{r,s} + \sum_{rr} (pm_{r,rr,s} * M_{r,rr,s})$
$M_{r,rr,s} = E_{rr,r,s}$
$pe_{r,rr,s} = pwe_{r,rr,s} * (1 - te_{r,rr,s}) + p_{r,"non"} * emg_{r,s}$
$pm_{r,rr,s} = (1 + tm_{r,rr,s}) * pwe_{rr,r,s} + p_{r,"non"} * mg_{r,rr,s}$
$SF_{r,rr} = \sum_s (pwe_{rr,r,s} * M_{r,rr,s} - pwe_{r,rr,s} * M_{r,rr,s})$
$MARGB_r = \sum_{rr} \sum_s (mg_{r,rr,s} * M_{r,rr,s} - emg_{r,s} * E_{r,rr,s})$
Representative Household:
$YH_r = pk_r * \overline{KS_r} + plq_r * (\overline{LQS_r} - UNEMPQ_r) + plu_r * (\overline{LUS_r} - UNEMPU_r) +$ $+ TRF_r + \sum_s [plq_{r,s} * (\Phi_{q_{r,s}} - 1) * LQ_{r,s}] + \sum_s [plu_{r,s} * (\Phi_{u_{r,s}} - 1) * LU_{r,s}]$
$SH_r = mps_r * [YH_r - ty_r * (YH_r - TRF_r)]$
$CBUD_r = YH_r - ty_r * (YH_r - TRF_r) - SH_r$
$(1 + tc_{r,s}) * p_{r,s} * C_{r,s} = (1 + tc_{r,s}) * p_{r,s} * \mu H_{r,s} +$ $+ \alpha H_{r,s} * \left\{ CBUD_r - \sum_{ss} [(1 + tc_{r,ss}) * p_{r,ss} * \mu H_{r,ss}] \right\}$
Unemployment:
$\left(\frac{plq_r^t / pcindex_r^t}{plq_r^0 / pcindex_r^0} - 1 \right) = elasU_r * \left(\frac{UNEMPQ_r^t / LQS_r^t}{UNEMPQ_r^0 / LQS_r^0} - 1 \right)$
$\left(\frac{plu_r^t / pcindex_r^t}{plu_r^0 / pcindex_r^0} - 1 \right) = elasU_r * \left(\frac{UNEMPU_r^t / LUS_r^t}{UNEMPU_r^0 / LUS_r^0} - 1 \right)$
Government:
$TAXR_r = ty_r * (YH_r - TRF_r) + \sum_s [p_{r,s} * (tc_{r,s} * C_{r,s} + tcg_{r,s} * \overline{CG}_{r,s} + tci_{r,s} * I_{r,s}) +$ $+ \sum_{ss} (tcf_{r,ss,s} * io_{r,ss,s} * p_{r,ss} * XD_{r,s}) + tk_{r,s} * pk_r * K_{r,s} +$ $+ tlq_{r,s} * plq_r * \Phi_{q_{r,s}} * LQ_{r,s} + tlu_{r,s} * plu_r * \Phi_{u_{r,s}} * LU_{r,s} +$ $+ \sum_{rr} (tm_{r,rr,s} * pwe_{rr,r,s} * M_{r,rr,s} + te_{r,rr,s} * pwe_{r,rr,s} * E_{r,rr,s}) +$ $+ txd_{r,s} * pd_{r,s} * XD_{r,s}]$

$pcindex_r = \sum_s \left(\frac{(1 + tc_{r,s}^t) * p_{r,s}^t * C_{r,s}^0}{(1 + tc_{r,s}^0) * p_{r,s}^0 * C_{r,s}^0} \right)$
$TRF_r = trep_r * (plq_r * UNEMPQ_r + plu_r * UNEMPU_r) + \overline{TRO}_r * pcindex_r$
$SG_r * GDPDEF_r = TAXR_r - \sum_s \left[(1 + tcg_{r,s}) * \overline{CG}_{r,s} * p_{r,s} \right] - TRF_r$
$GDPC_r = \sum \left\{ p_{r,s} * (1 + tc_{r,s}) * C_{r,s} + p_{r,s} * (1 + tcg_{r,s}) * \overline{CG}_{r,s} + p_{r,s} * (1 + tci_{r,s}) * I_{r,s} + \right.$ $\left. + \sum_{rr} (pwe_{r,rr,s} * E_{r,rr,s} - pwe_{rr,r,s} * M_{r,rr,s}) \right\}$
$GDP_r^t = \sum_s \left\{ p_{r,s}^0 * (1 + tc_{r,s}^0) * C_{r,s}^t + p_{r,s}^0 * (1 + tcg_{r,s}^0) * \overline{CG}_{r,s} + p_{r,s}^0 * (1 + tci_{r,s}^0) * I_{r,s}^0 + \right.$ $\left. + \sum_{rr} (pwe_{r,rr,s}^0 * E_{r,rr,s}^t - pwe_{rr,r,s}^0 * M_{r,rr,s}^t) \right\}$
$GDPDEF_r = \frac{GDPC_r}{GDP_r}$
<p>Investment:</p>
$S_r = SH_r + GDPDEF_r * SG_r + \sum_{rr} SF_{r,rr} + \sum_s (d_{r,s} * pi_r * K_{r,s}) + MARGB_r * p_{r,"non"}$
$pi_r = \prod_s \left\{ \left[\frac{(1 + tci_{r,s}) * p_{r,s}}{\alpha I_{r,s}} \right]^{\alpha I_{r,s}} \right\}$
$I_{r,s} = \alpha I_{r,s} * S_r * \left[(1 + tci_{r,s}) * p_{r,s} \right]^{-1}$
<p>General Equilibrium:</p>
$\sum_s LQ_{r,s} = \overline{LQS}_r - UNEMPQ_r$
$\sum_s LU_{r,s} = \overline{LUS}_r - UNEMPU_r$
$\sum_s K_{r,s} = \overline{KS}_r$
$X_{r,s} = C_{r,s} + I_{r,s} + \sum_{ss} (io_{r,s,ss} * XD_{r,ss}) + \overline{CD}_{r,s}$

Table I I- Description of Sectorial Aggregation

Sectorial Aggregation	Number	Code	Description
Resource intensive (res)	19	cmt	Meat: cattle, sheep, goats, horse
	20	omt	Meat products nec
	21	vol	Vegetable oils and fats
	22	mil	Dairy products
	23	pcr	Processed rice
	24	sgr	Sugar
	25	ofd	Food products nec
	26	b_t	Beverages and tobacco products
	30	lum	Wood products
	32	p_c	Petroleum, coal products
	34	nmm	Mineral products nec
	36	nfm	Metals nec
Labour intensive (lab)	27	tex	Textiles
	28	wap	Wearing apparel
	29	lea	Leather products
	37	fmp	Metal products
	42	omf	Manufactures nec
Specialised suppliers (spe)	40	ele	Electronic equipment
	41	ome	Machinery and equipment nec
Scale and Capital intensive (sca)	31	ppp	Paper products, publishing
	33	crp	Chemical, rubber, plastic prods
	35	i_s	Ferrous metals
	38	mvh	Motor vehicles and parts
	48	otp	Transport nec
R&D intensive (rd)	39	otn	Transport equipment nec
Non industrial & non classified (non)	1	pdr	Paddy rice
	2	wht	Wheat
	3	gro	Cereal grains nec
	4	v_f	Vegetables, fruit, nuts
	5	osd	Oil seeds
	6	c_b	Sugar cane, sugar beet
	7	pfb	Plant-based fibers
	8	ocr	Crops nec
	9	ctl	Cattle, sheep, goats, horses
	10	oap	Animal products nec
	11	rmk	Raw milk
	12	wol	Wool, silk-worm cocoons
	13	frs	Forestry
	14	fsh	Fishing
15	coa	Coal	

Table II – Description of Sectorial Aggregation (cont.)

Non industrial & non classified (non)	16	oil	Oil
	17	gas	Gas
	18	omn	Minerals nec
	43	ely	Electricity
	44	gdt	Gas manufacture, distribution
	45	wtr	Water
	46	cns	Construction
	47	trd	Trade
	49	wtp	Sea transport
	50	atp	Air transport
	51	cmn	Communication
	52	ofi	Financial services nec
	53	isr	Insurance
	54	obs	Business services nec
	55	ros	Recreation and other services
	56	osg	Public Admin / Defence / Health / Education
	57	dwe	Dwellings

Appendix 2 - Other results

Table III - Impacts on Production (%)

	LQ	LU	VAB
Res	7.31E-09	7.05E-09	3.81E-09
Lab	2.75E-08	2.78E-08	1.00E-08
Spe	3.42E-08	3.41E-08	3.29E-08
Sca	1.90E-08	1.88E-08	1.21E-08
Rd	-3.33E-06	-3.35E-06	-3.43E-06
Non	2.39E-09	1.97E-09	5.28E-09

Table IV - Impacts on Prices (%)

	PD	P	PLQ	PLU	PK
Res	-2.94E-10	3.37E-10			
Lab	-4.96E-09	-5.28E-09			
Spe	1.84E-10	1.46E-09	7.21E-09	7.24E-09	-8.58E-10
Sca	-1.17E-09	8.39E-12			
Rd	-6.20E-08	-7.45E-09			
Non	1.07E-09	1.11E-09			

Table V - Impacts on Trade (%)

	Exports	Imports	Trade Balance
Res	2.52E-08	-4.57E-09	-5.25E-08
Lab	4.27E-08	-7.05E-09	1.78E-07
Spe	5.51E-08	1.94E-09	-5.53E-08
Sca	3.39E-08	1.43E-10	-3.93E-08
Rd	-3.29E-06	-1.05E-07	3.09E-06
Non	2.33E-08	-5.33E-09	-1.46E-07

Table VI - Impacts on Productivity (%)

	Productivity Skilled Labour	Productivity Unskilled Labour	Productivity Multifactor
Res	-3.20E-09	-2.94E-09	-8.96E-09
Lab	-1.26E-08	-1.29E-08	-3.01E-08
Spe	-1.53E-09	-1.42E-09	-7.91E-09
Sca	-5.71E-09	-5.60E-09	-1.46E-08
Rd	-3.94E-08	-1.82E-08	-3.32E-07
Non	1.83E-09	2.25E-09	-4.42E-10