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# ECONOMIC AND POLICY DEVELOPMENTS

OUTLOOK FOR THE PORTUGUESE ECONOMY: 2012-2014

### **OUTLOOK FOR THE PORTUGUESE ECONOMY: 2012-2014**

### 1. Introduction

Current projections indicate a 1.9 per cent contraction in economic activity in 2013, following an estimated drop of 3.0 per cent in 2012 (Table 1.1). This development implies a cumulative decline of 7.4 per cent in gross domestic product during the 2009-2013 recession. In the context of the economic adjustment process, the implementation of fiscal consolidation measures included in the State Budget for 2013 is likely to play a key role in domestic demand developments – a substantial drop in 2013, albeit more subdued than previously estimated for 2012. In cumulative terms, the drop in domestic demand during the 2009-2013 period is expected to be approximately 17 per cent. Developments in exports will continue to contribute to mitigate the impact of a decline in domestic demand on economic activity, albeit to a more limited extent in 2013. Similarly to 2012, external demand growth is expected to be close to zero in 2013 (0.3 per cent). Imports will likely contract further in 2013, similarly to that estimated for 2012.

For 2014, economic activity is projected to increase by 1.3 per cent, without taking into account any fiscal consolidation measures other than those included in the State Budget for 2013. In view of the above, economic growth projected for 2014 relies on a subdued recovery in domestic demand, including public consumption, sustained by an increase in household disposable income and an improvement in demand prospects with impact on GFCF. These developments are expected to be accompanied by an increase in exports, on the basis of an upturn in economic activity in the main destination markets for Portuguese exports.

There are downside risks to economic activity projections, particularly in 2014. These risks mainly stem from the fact that these projections only take into account the fiscal measures that have already been approved or announced and are specified in sufficient detail, in line with the Eurosystem rules. As such, projections for 2014 should be interpreted with particular caution, given that authorities have already

PROJECTIONS OF BANCO DE PORTUGAL: 2012-2014   ANNUAL RATE OF CHANGE, PER CENT							
	Weights	EB Winter 2012			EB Autumn 2012		
	2011	2012 <sup>(p)</sup>	2013 <sup>(p)</sup>	2014 <sup>(p)</sup>	2012 <sup>(p)</sup>	2013 <sup>(p)</sup>	
Gross Domestic Product	100.0	-3.0	-1.9	1.3	-3.0	-1.6	
Private consumption	66.5	-5.5	-3.6	0.1	-5.8	-3.6	
Public consumption	20.0	-4.5	-2.4	1.5	-3.9	-2.4	
Gross fixed capital formation	17.9	-14.4	-8.5	2.8	-14.9	-10.0	
Domestic demand	104.4	-6.9	-4.0	0.8	-6.8	-4.5	
Exports	35.8	4.1	2.0	4.8	6.3	5.0	
Imports	40.1	-6.9	-3.4	3.5	-4.7	-2.3	
Contribution to GDP growth (in p.p.)							
Net exports		4.2	2.1	0.6	4.0	2.8	
Domestic demand		-7.2	-4.0	0.8	-7.0	-4.5	
of which: change in inventories		0.0	0.2	0.0	0.2	-0.1	
Current plus capital account (% of GDP)		-0.1	3.1	4.4	-0.2	4.0	
Trade Balance (% of GDP)		0.3	3.1	4.1	0.8	4.5	
Harmonised Index of Consumer Prices		2.8	0.9	1.0	2.8	0.9	

#### Table 1.1

Source: Banco de Portugal.

**Notes:** (p) - projected. For each aggregate, this table shows the projection corresponding to the most likely value, conditional on the set of assumptions considered, which are based on the information available up to mid December 2012.

announced the need to define additional measures in order to comply with fiscal targets set over the projection horizon.

The far-reaching change in the composition of expenditure, particularly the sharp drop in domestic demand accompanied by a significant increase in exports, has led to a rapid adjustment of external borrowing requirements of the Portuguese economy. The combined current and capital account balance moved from a deficit of 9.4 per cent of GDP in 2010 to a close-to-balance position in 2012. The materialisation of current projections would imply the continuation of this trend and a combined current and capital account surplus of 4.4 per cent of GDP in 2014. A very significant share of this adjustment mirrors an improvement in the goods and services account over this period, for which a surplus of 3.1 and 4.1 per cent is projected in 2013 and 2014, respectively, after decades of chronic deficits.

Inflation, as measured by Harmonised Index of Consumer Prices (HICP) growth, is expected to stabilise at around 1 per cent in 2013-2014, *i.e.* a decline from 2.8 per cent in 2012. This slowdown should start as early as the beginning of 2013, as the effects of an increase in both indirect taxes and administered prices in the beginning of 2012 start to unwind. Risk assessments point to the possibility of higher-than-projected inflation, mainly in 2014, particularly if fiscal consolidation measures with an impact on consumer prices were to be adopted.

These projections imply a downward revision of GDP growth expectations in 2013 compared with the autumn edition of the *Economic Bulletin*, which mainly reflects the materialisation of the then identified risk of less favourable than expected global economic growth. The materialisation of this risk had a negative impact on the projected growth of exports and, consequently, economic activity.

### 2. Recent information and background assumptions

Current projections incorporate a broad set of information on recent developments in the Portuguese economy. This includes information released by *Instituto Nacional de Estatística – INE* (Statistics Portugal) in the beginning of December within the scope of the Quarterly National Accounts for the third quarter of 2012, with revisions since 2010.<sup>1</sup> Moreover, projections are conditioned by prospective developments in a number of variables on the international environment, public finances and the economy's financing conditions. These assumptions are based on information available up to mid-December 2012.

### *Sharp contraction in economic activity in 2012, reflecting the broadly based decline in domestic demand, mitigated by export growth*

Information on recent developments in Portuguese economic activity points to a 3.0 per cent contraction in output in 2012 (Table 1.1). These developments result from a sharp and broadly based fall in domestic demand, which contrasts with export growth in the course of the year. In intra-annual terms, the fall in activity seems to have intensified in the second half of the year.

In 2012, private consumption is likely to have contracted by 5.5 per cent, while GFCF is expected to have dropped by around 14 per cent, reflecting a decline across all components, in particular public and residential investment. Public consumption is projected to have declined by 4.5 per cent for the second consecutive year. Slowdown in overall demand, despite a significant increase in exports, has contributed to a fall in imports by around 7 per cent, reflecting the considerable decline in import-intensive demand components – consumption of durable goods and corporate GFCF.

<sup>1</sup> For more details, see the press release published by Statistics Portugal in December 2012 (in Portuguese only; http://www.ine.pt/ngt\_server/attachfileu.jsp?look\_parentBoui=149571701&att\_display=n&att\_download=y).

# *Substantial downward revision of external demand in 2013, followed by a subdued recovery in 2014*

Assumptions about the external demand for Portuguese goods and services are based on projections for the euro area published in the December issue of the ECB Monthly Bulletin. This information points to contained developments in global economic activity in 2013 and a gradual recovery in 2014, which indicates an increased buoyancy in economies outside the euro area. As such, external demand for Portuguese goods and services is expected to grow only marginally in 2013, similarly to 2012, and to increase by 4.7 per cent in 2014 (Table 2.1). Economic activity developments in advanced economies, particularly in a large group of euro area countries, is likely to remain conditioned by the need for fiscal adjustment and private sector deleveraging. Projections released in the December 2012 issue of the ECB Monthly Bulletin point to changes in GDP ranging between -0.9 and 0.3 per cent in 2013, and between 0.2 and 2.2 per cent in 2014. Current assumptions reflect a very significant downward revision of external demand growth in 2013 (around 2 percentage points) compared with the autumn edition of the Economic Bulletin.

Developments projected for exchange rates rely on technical assumptions, which presuppose that the average levels seen in the two weeks prior to the cut-off date will remain unchanged over the projection horizon. These developments led to a slightly appreciation of the euro in 2013, both against the US dollar and in effective terms. The price of a barrel of oil, according to information available in futures markets, is expected to decline by around 5 per cent in 2013 and 2014.

### Portuguese economy's financing conditions are expected to remain tight over the projection horizon

The deleveraging process of the banking sector is likely to continue over the projection horizon, which implies that tight credit standards will be maintained. However, the spreads between bank lending interest rates and the money market reference rate are expected to increase slightly, falling gradually as of the second half of 2013 against a background of gradual recovery of the economy, with an impact on the materialisation of credit risk.

For the short-term interest rate, the assumption underlying the current projections, based on expectations regarding developments in the three-month EURIBOR implied in futures contracts, points to a stable path over the projection horizon at a level close to that seen at the end of 2012. These assumptions imply the maintenance of reference interest rates at very low levels and below those recorded in 2012.

PROJECTION ASSUMPTIONS							
		E	B Winter 20	12	EB Autu	umn 2012	
		2012	2013	2014	2012	2013	
External demand	aar	0.2	0.3	4.7	0.3	2.5	
Interest rate							
3-month EURIBOR	%	0.6	0.1	0.3	0.6	0.2	
State financing cost <sup>(a)</sup>	%	2.6	2.6	4.1	2.2	2.7	
Euro exchange rate							
Euro effective exchange rate	aar	-5.4	0.2	0.0	-5.4	-0.2	
Euro-dollar	aav	1.28	1.30	1.30	1.28	1.29	
Oil price							
in dollars	aav	111.9	106.8	102.1	112.4	107.8	
in euros	aav	87.2	82.2	78.6	87.5	83.4	

#### Table 2.1

Sources: Bloomberg, ECB, Thomson Reuters and Banco de Portugal calculations.

**Notes:** annual average rate of change, % – per cent, aav – annual average value. An increase in the exchange rate represents an appreciation. (a) This assumption reflects the cost of financing of the sources relevant to the Portuguese State in this period, amongst which the estimated cost of financing associated with the Economic and Financial Assistance Programme.

Current projections assume that the cost of financing the Portuguese State over the projection horizon evolves in accordance with the estimate for the average cost of external financing by the European Union, the euro area countries and the International Monetary Fund under the EFAP,<sup>2</sup> as well as with an estimate of the interest rate underlying the issuance of securities by the Portuguese State in 2013 and 2014. This estimate also takes into account the cost of financing by these institutions and the assumptions point to a gradual increase in financing costs over the projection period, following two years of gradual decline. As of the end of 2013, the gradual return to market financing by the Portuguese State should imply a hike in financing costs in 2014.

# Underlying the projections is the ongoing fiscal consolidation process broadly based on an increase in taxes on households in 2013 and the absence of additional adjustment measures for 2014

With regard to public finance variables, and according to the procedures used in the Eurosystem projection exercises, only the fiscal policy measures already approved or highly likely to be approved and specified in sufficient detail were taken into account. Therefore, recently approved measures under the State Budget for 2013 were included. No additional fiscal policy measures have been considered for 2014, given that measures compliant with the above requirements have yet to be released.

The State Budget for 2013 establishes a consolidation strategy focused mainly on revenue and, in particular, taxes on households. On the expenditure side, the State Budget for 2013 envisages a number of measures, particularly the further reduction in the number of civil servants and general government investment expenditure (for more detailed and complete information, see "Box 3.2 *Fiscal outlook for 2013*" in the autumn 2012 issue of the *Economic Bulletin*). These measures imply further cuts in public consumption and investment in 2013, albeit to a lesser extent than in 2012. In turn, the substantial increase in taxes on households implies a drop in disposable income, the magnitude of which (in real terms) is expected to be close to that seen in 2012.

### 3. Supply, Demand and External Accounts

Projections for the Portuguese economy indicate that the recession experienced in the previous two years will continue in 2013, reflecting a substantial drop in domestic demand accompanied by a slowdown in exports. However, in intra-annual terms, a limited upturn in economic activity is expected in the second half of the year, as a result of a reversal of the decline in domestic demand.

Current projections point to a 1.9 per cent decline in GDP in 2013, followed by 1.3 per cent growth in 2014 (Table 1.1), resulting in a downward revision in 2013 compared with the autumn issue of the *Economic Bulletin*.

### *Broadly based contraction in economic activity and employment in 2013, followed by a limited recovery in 2014*

Over the projection horizon, economic activity will likely remain conditioned by domestic demand developments, stemming in particular from the fiscal consolidation process. The contraction in economic activity in 2013 will be more substantial in the private sector, although a downturn in activity is also expected for the public sector, against a backdrop of further cuts in the number of public servants. In 2014, private sector activity is projected to increase further, associated with a gradual upturn in external demand and an increase in households' disposable income, which will have a positive impact on the outlook for domestic demand.

**<sup>2</sup>** For a detailed description of sources and financing costs associated with the adjustment programme, see http:// www.bportugal.pt/en-US/OBancoeoEurosistema/ProgramaApoioEconomicoFinanceiro/Pages/default.aspx.

Turning to the labour market, current projections envisage a 1.9 per cent reduction in employment in 2013 (after a 3.7 per cent drop in 2012), followed by some stabilisation in 2014. These developments reflect a decline in employment in the public and private sectors in 2013, followed by an increase in the private sector during 2014, amid a recovery in economic activity. In the case of the public sector, the gradual reduction in the number of civil servants is projected to continue until the end of the projection horizon.

The contribution of labour to GDP developments in 2013 is expected to be highly negative, while capital stock and total factor productivity should make marginally negative contributions (Chart 3.1). For 2014, underlying the current projections is a contribution of 1.5 p.p. from total factor productivity, which will be crucial for output growth. For the consolidation of total factor productivity developments, as typically seen in the early stages of recovery, the structural nature of the productive sector restructuring is particularly important. However, this process will continue to imply the loss of jobs and the closure of less productive enterprises, with an immediate negative impact on the contribution from labour. This reallocation of resources is crucial in order to ensure sustained growth in the medium to long run.

Measuring potential output is particularly uncertain during this period of structural adjustment of the economy. Typical methods suggest, in general, a virtual stagnation of potential GDP in 2013, followed by slight growth in 2014 (Chart 3.2).<sup>3</sup> Current projections do not incorporate the effects from the implementation of structural reforms, given the difficulty in estimating their magnitude and time profile.

# Marked reduction in private consumption and gross fixed capital formation in 2013 and gradual recovery during 2014

The contraction in domestic demand projected for 2013 will likely extend to all its components. In 2014, domestic demand is expected to grow moderately, particularly as regards corporate investment, amid a gradual upturn in global economic activity, with an impact on export developments, and a gradual increase in household consumption expenditure.

Current projections point to a 3.6 per cent drop in private consumption in 2013, after a 5.5 per cent contraction in 2012, totalling a cumulative reduction of 12.4 per cent in the 2011-2013 period (Chart 3.3). This drop in private consumption is nearly identical to the cumulative reduction in real disposable income, which implies that the savings rate will remain at around 11 per cent, *i.e.* clearly above the average in the 2006-2010 period (8.6 per cent).

The absence of private consumption smoothing reflects, on the one hand, the maintenance of tight financing conditions, which is likely to have implied greater liquidity restrictions and, on the other hand, the perception of a permanent adjustment. Moreover, the high degree of uncertainty about the duration of the adjustment period may have led to an increase in savings for precautionary reasons. It should be noted that the maintenance of the household savings rate is set against a sharp drop in real disposable income, which seems to have resulted from a sizeable increase in direct taxes, a decline in employment and wage moderation. Developments in the household savings rate over the projection horizon is in contrast with that seen in previous recessions, which were set against backdrops of pro-cyclical fiscal policies and accommodative financing conditions (Chart 3.4).

Consumption of durable goods is the component for which a more pronounced reduction is projected in 2013. Consumption of this type of goods should record a cumulative reduction of nearly 50 per cent in the 2011-2013 period, contributing to a significant extent to an adjustment in the goods and services account, given its high import content. The deterioration in permanent income prospects will also imply a drop in consumption of non-durable goods. The materialisation of the current projections implies that private consumption in 2014 will stand at levels close to those seen in 2000 (Chart 3.5).

**<sup>3</sup>** The unobserved components methodology (UCM) is presented in Centeno, Novo and Maria (2009), "Unemployment: supply, demand and institutions", included in The Portuguese economy in the context of economic, financial and monetary integration, Economic Research Department, Banco de Portugal.



Turning to gross fixed capital formation (GFCF), current projections point to a 8.5 per cent contraction in 2013, after a drop by around 14 per cent in 2012, followed by a 2.8 per cent increase in 2014. The decline in GFCF projected for 2013 should be seen across all institutional sectors, associated with different underlying motives (Chart 3.6).

The decline in corporate GFCF mainly results from a sharp contraction in domestic demand, particularly in the most recent period, and very uncertain prospects for the near future. The maintenance of tight financing conditions and the need to deleverage non-financial corporations are additional constraints. In this context, current projections point to a 7.4 per cent drop in corporate GFCF in 2013, totalling a cumulative fall of nearly 36 per cent in the 2009-2013 period, with an impact on capital stock developments and the ability to incorporate technical progress and, ultimately, on potential output growth. For



**Sources:** *INE* and Banco de Portugal.

**Notes:** (p) – projected. The savings rate is expressed as a percentage of disposabale income.

Sources: INE and Banco de Portugal.

**Note:** t – corresponds to the year in which GDP registered a negative growth rate for the first time in a sequence of years.



2014, this investment component is expected to increase, amid a recovery in external demand and a gradual increase in domestic demand.

The continued contraction projected for residential investment in 2013 reflects a deterioration in the permanent income prospects of households and a growing uncertainty associated with deteriorating labour market conditions. These developments are enhanced by the maintenance of tight financing conditions over the projection horizon. For 2014, a slight increase in this investment component is expected, amid some recovery in household disposable income. Finally, public investment will likely fall by nearly 10 per cent in 2013, while remaining broadly unchanged in 2014, in line with assumptions about public finance variables.

# Deceleration in exports in 2013 and gradual stabilisation of the market share over the projection horizon

Exports of goods and services will continue to be the aggregate demand component with the highest growth over the projection horizon, although marked deceleration is expected in 2013, amid a virtual stagnation in external demand, followed by an acceleration in 2014. Projections point to export growth of 2.0 and 4.8 per cent in 2013 and 2014 respectively, *i.e.*, a considerable slowdown compared with the average increase of 5.7 per cent in the 2011-2012 period (Chart 3.7). The deceleration seen in 2013 reflects a strong downturn in activity in euro area economies, which account for around two thirds of the destination markets for Portuguese exports, despite continued robust growth in emerging market economies. Developments projected for exports imply an additional market share gain of 1.7 percentage points in 2013, followed by some stabilisation in 2014. Over the 2011-2012 period, the cumulative market share gain exceeded 7.0 percentage points.

Recent export developments show a diversification of the respective destination markets towards the enhancement of extra-Community markets, which have grown more buoyantly. Moreover, exports to these markets have contributed very significantly to strong market share gains in recent years. Over the projection horizon, market share gains are expected to stabilise, against a background where the capacity for geographical diversification by Portuguese enterprises may be conditioned by greater competition from several trading partners. Given the contraction in domestic demand in their countries, enterprises may trigger processes aimed at diversifying their exports, similarly to that seen in the case of Portuguese enterprises.

### Chart 3.7



Note: (p) – projected.

With regard to imports of goods and services, projections point to a 3.4 per cent decrease in 2013, following a 6.4 per cent reduction, in annual average terms, over the 2011-2012 period. The decline in imports in 2013 should be largely determined by a contraction in domestic demand, particularly as regards components with higher import content, such as consumption of durable goods and corporate investment, as well as a slowdown in exports. For 2014, imports are expected to grow by 3.5 per cent, reflecting an upturn in aggregate demand, particularly in terms of corporate investment and exports of goods.

### Continuation of the external imbalance adjustment process, and an expected sizeable surplus in both the goods and services account and the combined current and capital account

One aspect of the current Portuguese economy's adjustment process that merits particular attention is the rapid reduction in external financing needs. Such needs, as measured by the combined current and capital account balance, seem to have declined from around 9.4 per cent of GDP in 2010 to levels close to balance in 2012, while surpluses of 3.1 and 4.4 per cent are expected in 2013 and 2014 respectively (Chart 3.8).

This decrease in financing needs is mainly the result of developments in the goods and services account balance, which moved from a deficit of 7.2 per cent of GDP in 2010 to levels close to balance in 2012, and is expected to increase to 3.1 and 4.1 per cent of GDP in 2013 and 2014, respectively (Chart 3.9). This adjustment has benefited from both the buoyancy of exports and a marked fall in imports due to a decline in domestic demand. The materialisation of current projections implies an increase in the weight of exports in GDP from around 30 per cent in 2010 to 42 per cent in 2014, while the weight of imports in GDP is not expected to change significantly.

The income account deficit should decline gradually, from 4.4 per cent in 2012 to 3.7 per cent of GDP in 2014, mainly reflecting lower return on investments by non-resident agents, particularly against a background of gradual deleveraging of private agents. Finally, current and capital transfers will likely stabilise at around 4 per cent of GDP, over the projection horizon, partly reflecting assumptions about European Union transfers.

### Chart 3.8

#### Chart 3.9





**Sources:** *INE* and Banco de Portugal. **Note:** (p) – projected.

#### 4. Prices and Wages

### Stabilisation of inflation at around 1 per cent in 2013 and 2014, amid subdued domestic inflationary pressures and favourable developments in international prices

Inflation, as measured by the Harmonised Index of Consumer Prices (HICP), is expected to decline from an annual average of 2.8 per cent in 2012 to levels close to 1 per cent in 2013-2014. The value recorded in 2012 largely reflects the impact of fiscal consolidation measures, particularly changes in indirect taxes and administered prices. This slowdown in prices is expected to occur in early 2013, with the unwinding of the effects of such fiscal measures. It should be noted that the inflation rate had already dropped significantly at the end of 2012, due to the unwinding of the impact of an increase in indirect taxes on the prices of a number of energy goods over the same period in 2011.

Domestic inflationary pressures should remain contained over the projection horizon, amid a sharp contraction in domestic demand and a marked deterioration in labour market conditions – net decline in employment and increase in the unemployment rate –, which should contribute to the continued wage moderation already seen in 2012. Data released by the Ministry of Solidarity and Social Security for 2012 point to a stagnation in average wages, year on year, over the first three quarters of the year. According to the current projections, labour unit costs in the private sector should stabilise in 2013 and decline by 0.6 per cent in 2014 (-1.2 per cent in 2012). External pressures on prices should also remain contained, given the weak developments in global economic activity and subdued growth in import prices over the projection horizon.

Current projections point to the virtual stabilisation of prices in the energy component in 2013 and a slight decline in 2014, mainly reflecting lower euro-denominated oil prices as well as developments projected for electricity and gas prices (Chart 4.1). In turn, prices of non-energy goods are projected to experience a major slowdown in 2013 and continued subdued growth in 2014, in line with their macroeconomic determinants. Projections for inflation in 2012 and 2013 remain unchanged from those published in the autumn 2012 issue of the *Economic Bulletin*.

**Sources:** *INE* and Banco de Portugal. **Note:** (p) – projected.

### Chart 4.1



#### 5. Uncertainty and Risks

Projections included here represent the most likely scenario for the Portuguese economy over the projection horizon, based on the assumptions presented in Section 2. The non-materialisation of these assumptions, as well as the possible occurrence of idiosyncratic shocks, cannot, however, be neglected. This section presents a quantified analysis of the risks and uncertainty surrounding the projections, based on a range of factors detailed below.<sup>4</sup>

### National and international environment marked by high levels of uncertainty with associated downside risk factors

Over the projection horizon, risk and uncertainty factors stem from both the international framework and domestic factors. As regards the external environment, the adjustment of economic imbalances in a broad range of advanced economies is surrounded by high uncertainty. In particular, in terms of euro area countries, the persistence of the sovereign debt crisis has highlighted the difficulties in the institutional design of mechanisms to ensure its resolution. Despite the progress made, the persistence of these uncertainty factors will tend to contribute to a deterioration in the confidence of economic agents, with negative effects on expenditure decisions of households and enterprises. The materialisation of this risk would imply a slowdown in external demand higher than that indicated by the current projections, with negative effects on Portuguese exports. This risk factor may also determine a greater depreciation of the euro, should there be investment portfolio shifts towards assets denominated in other currencies.

At domestic level, additional fiscal adjustment measures must be specified, in order to ensure compliance with the fiscal targets under the EFAP, namely as regards 2014. As previously mentioned, current projections do not take into account additional fiscal policy measures for 2014, besides those established in the State Budget for 2013, given that no measures have been established with sufficient detail. The materialisation of this scenario would undoubtedly imply lower public consumption than that assumed in the projection and/or an increase in tax revenues. In any case, its materialisation will likely result in

<sup>4</sup> The methodology used in this section is based on the article published in Pinheiro, M. and P. Esteves (2010), "On the uncertainty and risks of macroeconomic forecasts: Combining judgements with sample and model information", Empirical Economics, pp. 1-27.

lower household and corporate income with consequences for the domestic demand. Upside risks to the economic activity result from the possible impact of structural reforms on productivity and income levels, which, as previously mentioned, was not taken into account in the projection. However, many of these reforms are still in the process of implementation and their effects are particularly uncertain, especially during a recession. Their full impact should become apparent mostly in the medium to long run.

The identified risk factors point to a possible more pronounced slowdown in global demand and a depreciation of the euro when compared with the projection values. At domestic level, the adoption of additional fiscal measures would imply an incorporation of downside risks to public consumption and private consumption, as well as an incorporation of upside risks to consumer prices, particularly if administered prices were to increase (Table 5.1).

### Sharp downside risks to economic activity in 2014 and upside risks to inflation

The identified risk factors imply upside risks to economic activity in 2013 and, more markedly, in 2014 (Chart 5.1). These risks cover all overall demand components, particularly affecting private consumption and exports (Table 5.2). There are upside risks to consumer prices over the projection horizon (Chart 5.2), reflecting the effects of fiscal risk factors and the impact of a possible depreciation of the euro, which are greater than the potential effects on wages and profit margins stemming from downside risks to economic activity.

#### Table 5.1

RISK FACTOR PROBABILITIES   PER CENT							
	2013	2014					
Conditioning variables							
Exchange rate	55	55					
External Demand	55	55					
Public consumption	55	60					
Endogenous variables							
Private consumption	55	60					
HICP	45	40					

PROBABILITY OF AN OUTCOME BELOW THE CURRENT PROJECTIONS   PER CENT							
	Weights 2011 (%)	2013	2014				
Gross Domestic Product	100	55	60				
Private consumption	66	57	61				
GFCF	20	52	54				
Exports	36	54	54				
Imports	39	57	60				
НІСР		45	38				

**Source:** Banco de Portugal.

#### Source: Banco de Portugal.

### 6. Conclusions

Prospects for Portuguese economy in 2013 and 2014 continue to be determined by the adjustment of structural macroeconomic imbalances, namely the immediate impact of fiscal consolidation measures, as well as tight financing conditions amid a gradual and orderly deleveraging of the banking sector.

The adjustment of macroeconomic imbalances, which has an inevitable and early recessive impact, has become particularly demanding in an international environment marked by a slowdown in the global economy in 2012 and 2013, which should only be reversed in 2014. One of the most noticeable signs of the adjustment has been the rapid correction of the external imbalance, which, over the projection horizon, should lead to very sizeable current and capital account surpluses. Reducing the high external indebtedness of the Portuguese economy to sustainable levels implies the maintenance of these surpluses for a long period of time. This will only be possible against a background where structural reforms, aimed at fostering a more efficient resource allocation, allow for an increase in factor productivity, potential output and the income of resident agents.

#### Table 5.2



Currently, a major challenge for Portugal is to promote economic development in a new institutional framework. The coherent implementation of labour and product market reforms, greater efficiency of the judicial system and the redefinition of the State's role are crucial to promote investment, innovation and technical progress, without which no sustainable growth is possible, but above all, no economic development is feasible. Both the efforts and the resources used to implement policies supporting job creation will only be successful if all obstacles to investment are removed. The economic development challenge depends on the acceptance by economic and social agents of the need and the benefits of any reform ensuring welfare compatible with the maintenance of institutional consensus and social cohesion.



THE EVOLUTION OF PUBLIC EXPENDITURE: PORTUGAL IN THE EURO AREA CONTEXT

A VIEW ON INCOME REDISTRIBUTION IN PORTUGAL AND IN THE EUROPEAN UNION

WHAT ACCOUNTS FOR PORTUGUESE REGIONAL DIFFERENCES IN STUDENTS' PERFORMANCE? EVIDENCE FROM OECD PISA

THE WAGE GAP OF IMMIGRANTS IN THE PORTUGUESE LABOUR MARKET

# THE EVOLUTION OF PUBLIC EXPENDITURE: PORTUGAL IN THE EURO AREA CONTEXT\*

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### ABSTRACT

The objective of this article is to present the main aspects of the evolution of public expenditure in Portugal from 1995 to 2011. Developments in the current composition of the euro area are used as a benchmark. Primary expenditure in Portugal increased substantially up to 2010, particularly in the period 1995 - 2005. In terms of the economic classification of expenditure, social benefits in cash, mostly pension expenditure, and, to a lesser extent, social benefits in kind and intermediate consumption were the main contributors to the strong growth in spending. The total expenditure to GDP ratio, however, was, throughout the period, below the euro area average and has shown a similar pattern of evolution in the recent years, when correcting for the impact of temporary measures and special factors in Portugal. However, Portugal as a euro area member state, despite its negligible increase in GDP per capita, recorded one of the highest increases in public spending as a percentage of GDP in the period under analysis. In 2011, its level of total public expenditure to GDP ratio was higher than in many other euro area countries, including several ones with substantially higher GDP per capita. This relationship is also reflected in the four main types of expenditure by functional classification (defence and security and public order, health, education and social protection). Portugal converged to the euro area average functional structure. A simple evaluation of efficiency in the health sector shows a substantial improvement in health status indicators in Portugal between 1995 and 2010. In the last year of that period, expenditure was slightly below that of the countries with the best results. Regarding the education sector, in spite of the improvement in terms of participation rates and in international exams, Portugal emerged in 2009 as a country with unfavourable results in terms of its educational process and high expenditure in relative terms.

### 1. Introduction

The level of public expenditure should ideally result from the informed choice of citizens regarding the public goods and services and social benefits they desire to be provided by the budget and taxes and other charges they will have to pay to finance them. These choices are implemented in each country through a collective decision-making process, in which citizens' elected representatives play an essential role. Historically, between 1960 and 1980, public expenditure and the tax burden expanded considerably in most developed countries.<sup>1</sup> This evolution was boosted by rapid economic growth and rested on the belief that State intervention is intrinsically benign, ensuring the correction of market failures, an equitable distribution of income and economic stabilisation. The prevailing view in most countries did

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<sup>1</sup> For further details see Tanzi and Schuknecht (2000).

not sufficiently take the need to adjust the level of public revenue and expenditure to the productive capacity of the economy into account in order to ensure the sustainability of the public finances, nor was the possibility of State failures resulting from limitations on information and biases of various kinds in the collective decision-making process considered (e.g. those associated with electoral cycles, inconsistencies between the goals of different levels of government and rent-seeking behaviours).

Portugal followed the general trend of developed countries, albeit with a considerable time lag largely explained by the pattern of evolution of its income. However, in the period from 1995 to 2010, the public expenditure to GDP ratio converged to the average of the euro area as its growth remained strong, while already declining in several other countries. The substantial increase in public expenditure in Portugal throughout the period made a major contribution to the expansionary stance of fiscal policy and the ensuing deterioration of the public finances. A reduction in public spending has only very recently been noted, in the context of the Economic and Financial Assistance Programme binding upon Portugal since mid 2011.

The main areas of public expenditure are the provision of services through the budget and include, inter alia, defence and security, justice, education and health and transfers to ensure a certain level of income in situations such as old age, disability and unemployment. It is mainly funded by mandatory contributions from other sectors of the economy, in the form of taxes and social contributions. In this regard several observations are warranted. Firstly, unlike transfers, the provision of services that can be broadly associated with public consumption and investment compete directly with the rest of the economy for resources (labour and capital). As such, its value as a GDP ratio, is *per se*, a relevant item of information. Secondly, public expenditure related to the provision of non-market services, in the absence of market prices and good physical indicators, measures outputs from the cost of the inputs used. An analysis of the efficiency of these processes is complex, but particularly relevant in the design of fiscal consolidation programmes, as it enables potential savings of resources to be identified without hindering the level of services provided. Thirdly, from a social welfare perspective, the objectives encompass the promotion of human capital formation and citizens' health and not the maximisation of the services provided. Diminishing returns are observed, i.e. above certain spending levels new rises may not be very effective in improving economic and social indicators, which should be the ultimate goal of the workings of general government. Fourthly, it is important to make sure that transfers to cover social risks are suitably targeted and that there is consistency between social goals and their practical implementation, avoiding the wastage of resources. Finally, the proper design and subsequent stability of public revenue raising systems and government spending programmes are crucial in reducing the net costs in terms of welfare (excess burden) that they entail and the uncertainty faced by economic agents and therefore increasing the potential growth of the economy.

The objective of this article is to present the main aspects of the evolution of public expenditure in Portugal from 1995 to 2011. The analysis is based on the National Accounts for the general government sector, using both the economic and functional classifications for public expenditure. Developments in the current composition of the euro area, are used as a benchmark. Section 2 refers to several of the major limitations affecting international public spending comparison and also focuses on the difficulties inherent in assessing its efficiency and effectiveness.<sup>2</sup> Section 3 presents the evolution of total public expenditure in Portugal, in the context of the euro area. The main drivers behind the growth of public expenditure in Portugal, from an economic classification viewpoint are explained in Section 4. Section 5 provides a breakdown of general government expenditure based on its functional classification in Portugal and compares it with the situation in the euro area, emphasising efficiency/effectiveness issues in the health and education sectors. Finally, Section 6 presents the concluding remarks.

<sup>2</sup> In the literature, the concept of efficiency is usually linked to performance based on output, while effectiveness is considered to be a broader concept also relating performance to the final outcome. As a simplification, a systematic distinction between the two concepts will not be made in the analysis carried out in this article.

### 2. Limitations in the comparative analysis of public expenditure

The analysis developed in this article is essentially based on the National Accounts for the general government sector, using the economic and functional classifications for public expenditure. In addition to developments in Portugal between 1995 and 2011 (2010 in the case of the functional classification), a comparative analysis is provided of the developments in the current composition of the euro area.

Three limitations should be underlined regarding international comparisons between different levels of spending. Firstly, the analysis is affected by the delimitation of the general government sector. Information on the extent to which goods and services in the budget are provided to citizens by entities classified within or outside the general government sector, particularly in the health and education sectors, must be provided on a country by country basis. It is important to note that in the cases in which the general government sector does not directly supply the goods and services but pays most of their cost to entities outside the sector (e.g. corporate hospitals in Portugal), a comparison between the level of spending as a whole, together with an analysis based on the functional classification, is still a valid exercise. Item by item comparability problems only emerge when the economic classification is used. There may also be other cases in which the differences in the delimitation of the sector generate different spending time patterns, affecting the yearly analysis (e.g. public-private partnerships). Secondly, differences in the taxation of social benefits and the existence of tax benefits instead of explicit expenditure may have a non-negligible impact in international comparisons between spending levels. Finally, other country-specific factors are also an important limitation in this type of analysis. For example, the recording of expenditure on the public employees' pension subsystem in Portugal in the period prior to 2005, by considering the overall amount of the State transfer aimed at ensuring the financial stability of the system as social contributions/compensation of employees, artificially increased this expenditure item.

An analysis of public expenditure is often linked to the issue of efficiency in the provision of goods and services by general government.<sup>3</sup> In general, this efficiency is measured by a comparison between the resources used and the quantity/quality of goods and services provided. It should be noted, however, that there are several difficulties with this kind of analysis for various reasons. Firstly, such analyses are very demanding in terms of data and require very detailed information. Secondly, there are often problems with the definition of the production process, particularly related with the idenfication of inputs and outputs, and the choice of indicators that summarise the final outcomes. Thirdly, the absence of market prices for valuing the provision of non-market services creates difficulties in output measurement. Lastly, it should be noted that there are several alternative methodologies and there is no consensus in the literature over their relative merits.

### 3. Analysis of the evolution of total public expenditure: Portugal in the euro area context

Since the mid nineteen nineties<sup>4</sup>, public spending<sup>5</sup> in Portugal, measured in nominal terms, recorded a continuous increase, only reversed in 2011 (Table 1).<sup>6</sup> This evolution is, however, affected by interest expenditure, the impact of several temporary measures - which basically reduce capital spending - and

**<sup>3</sup>** For a recent Banco de Portugal analysis on public expenditure efficiency see Economics and Research Department (2009), Pereira (2010) and Pereira (2011).

<sup>4</sup> Period from which the information does not have any structural breaks.

<sup>5</sup> The concept used corresponds to total general government expenditure on a National Accounts basis.

**<sup>6</sup>** For further details on the evolution of public expenditure in Portugal in the period 1986 - 2008 see Cunha and Braz (2009).

### Table 1

PUBLIC EXPENDITURE IN PORTUGAL									
	1995	Change 1995- 2005	2005	2006	2007	2008	2009	2010	2011
Total public expenditure	36 792	35 098	71 890	72 701	75 006	76 933	83 810	88 941	84 441
as a % of GDP	41.9	4.7	46.6	45.2	44.3	44.7	49.7	51.5	49.4
Interest expenditure	4 912	-977	3 935	4 455	4 978	5 188	4 775	4 845	6 930
Temporary measures	0	202	202	0	-195	-1 853	0	-133	0
Special factors	0	0	0	0	0	0	0	4 938	1 985
Primary expenditure excluding temporary measures and									
special factors	31 879	35 873	67 753	68 246	70 224	73 597	79 035	79 290	75 526
as a % of GDP	36.3	7.6	43.9	42.4	41.5	42.8	46.9	45.9	44.2

Sources: National Statistical Institute and Banco de Portugal.

special factors - that in 2010 and 2011 transitorily increased several expenditure items.<sup>7,8</sup> Therefore, correcting for the effects of interest expenditure and temporary measures, nominal public spending doubled in value between 1995 and 2005. On average, during this period, primary expenditure, excluding temporary measures, increased by 3.6 billion euros per year. In 2006 this trend was mitigated and, in 2007, moderate growth recorded, albeit accelerating rapidly in 2008 and 2009. 2010 was greatly affected by one-off transactions that significantly increased expenditure. Expenditure, if adjusted to exclude these operations would have almost stabilised at a level of more than 79 billion euros in the said year. The same indicator showed a very significant reduction in 2011, albeit still remaining above pre-crisis levels. In 2012, a further decrease of around 4.5 billion euros was witnessed. The 2012 evolution is largely explained by the suspending of the payment of summer and Christmas bonuses to public sector employees and pensioners. The State Budget for 2013 envisages the partial reintroduction of these subsidies, together with various measures to reduce spending, pointing to a relative stabilisation of primary expenditure excluding temporary measures and special factors.

In addition to the analysis based on nominal values, it is important to express public spending in relative terms. Public expenditure's share of nominal GDP is the preferred indicator for time-series analyses and international comparisons. Chart 1 illustrates the annual change in the primary expenditure to GDP ratio in Portugal between 1995 and 2011, excluding temporary measures and special factors. This indicator rose every year up to 2005, by 7.6 percentage points (p.p.) in cumulative terms. The change in total spending to GDP ratio, in this period, was considerably lower, as the fiscal leeway created by the reduction in interest expenditure as a percentage of GDP (of around 3 p.p.) was greatly offset by a strong increase in primary expenditure. In 2006 and 2007, primary expenditure, excluding temporary measures and special factors as a ratio to GDP declined, returning to a strong expansionary trend in 2008 and 2009. The 4.1 p.p. increase in GDP, observed in 2009, is noteworthy on account of its magnitude. This was followed by a reversal of the upward trend of primary expenditure excluding temporary measures and special factors to GDP ratio, which decreased by around 1.0 and 2.0 p.p. of GDP in 2010 and 2011, respectively. According to available information, in 2012, it is expected to be down once again, by around 1.0 p.p. of GDP.

Public spending is also affected by cyclical developments. In general, the cyclical adjustment methodologies of the budget balance consider that this effect is limited to spending on unemployment benefits. For the

<sup>7</sup> For a detailed description of these special factors see "Chapter 3 Fiscal policy and situation", Annual Report 2011, Banco de Portugal, and "Box 3.1 Some considerations on the assessment of the fiscal policy stance", Economic Bulletin Autumn 2012, Banco de Portugal.

<sup>8</sup> Although public spending is also affected by the cyclical conditions of the economy, because the magnitude of this cyclical component is generally small, in this article it will only be considered in the presentation of the values of structural expenditure as a ratio to trend GDP.

sake of consistency, the presentation of cyclically adjusted expenditure should be as a ratio to nominal trend GDP. In this article both the cyclical component of unemployment benefits and real trend GDP are based on the cyclical adjustment methodology used by the Eurosystem.<sup>9</sup> Chart 1 also shows the change of primary expenditure, excluding the cyclical component, temporary measures and special factors as a percentage of trend GDP, between 1995 and 2011. The chart shows that the differences compared to the previous series are not very significant and that it was only in 2007 and 2010 that the conclusions based on each of the indicators were different in terms of sign. In the remaining years, though the sign was the same, its magnitude according to the two indicators may differ significantly.<sup>10</sup>

The rate of change of expenditure also gives a useful insight into the analysis of budgetary developments, particularly when measured in real terms. As prices have a very different effect on the various expenditure components, the calculation of a public expenditure deflator may involve some complexity. In this context, chart 1 (right-hand scale) shows the real rate of change of structural primary expenditure (excluding the cyclical component and temporary measures), adjusted for special factors, using the private consumption deflator. Since 1998 it has been possible to observe a deceleration profile, although up to 2005 the annual rates of change of this indicator were on average more than 2 p.p. above the change in real GDP. The period between 1995 and 2005, therefore witnessed an increase of around 60 per cent in structural primary expenditure, measured in real terms, more than twice the change in real GDP for the same period (around 28 per cent). In 2006, this expenditure indicator decreased and came close to stabilising in the following year. 2008, witnessed a return to positive growth, with a sharp acceleration to 9.5 per cent in 2009, a year of pronounced recession. The last two years of the period under review, witnessed a trend reversal in structural primary expenditure (adjusted for special factors) with declines of -1.1 and -8.0 per cent in 2010 and 2011, respectively, which continued through 2012.

Chart 2 presents the evolution of the total public expenditure to GDP ratio in Portugal and in the euro area over the period 1995 to 2011.<sup>11,12</sup> It shows that, while the euro area witnessed a reduction followed by stabilisation up to almost 2007, in Portugal there was a sharp rise in this indicator up to 2005. The increase in the public spending to GDP ratio in 2008 and 2009 was common to Portugal and the euro area as a whole, resulting from both fiscal stimulus packages aimed at alleviating the effects of the decline in activity (suggested, in particular, by international – including European – organisations) and the reduction of economic activity. The ensuing decrease resulted from the urgency of the need for fiscal consolidation made inevitable by the sovereign debt crisis in the euro area. The public spending to GDP ratio in Portugal converged to the euro area average. However, correcting for the effect of temporary measures and special factors, the public spending to GDP ratio in Portugal has been consistently below the euro area average, with a difference of 1.2 p.p. of GDP in 2011.<sup>13</sup>

Chart 3 shows the change in levels of the total public expenditure to GDP ratio in each of the euro area countries<sup>14</sup> and its relation to the variation of the respective GDP per capita, measured in purchasing

<sup>9</sup> For further details on the cyclical adjustment methodology adopted by the Eurosystem see Braz (2006).

**<sup>10</sup>** This result justifies that, although the use of the structural expenditure to trend GDP ratio is preferred for yearly analyses, for longer periods and assessment of trends the expenditure to GDP ratio is perfectly suited as an indicator.

**<sup>11</sup>** In this article, references to euro area aggregates represent weighted averages of the indicators, with the exception of situations in which explicit reference is made to the use of a simple average.

<sup>12</sup> In the charts of this article, the countries are represented by the following acronyms: Austria (AT), Belgium (BE), Cyprus (CY), Germany (DE), Estonia (EE), Greece (EL), Spain (ES), Finland (FI), France (FR), Ireland (IE), Italy (IT), Luxembourg (LU), Malta (MT), the Netherlands (NL), Portugal (PT), Slovenia (SI) and Slovakia (SK).

**<sup>13</sup>** If a simple average of the public expenditure to GDP ratio in the euro area countries had been used, public expenditure in Portugal would have been above the average, with the difference having totalled 0.5 p.p. in 2011.

<sup>14</sup> Luxembourg is not considered as it is clearly an outlier in this analysis.



**Sources:** National Statistical Institute and Banco de Portugal. **Notes:** The cyclical component of expenditure and real trend GDP are calculated according to the methodology of the Eurosystem. Nominal trend GDP is obtained by multiplying real trend GDP by the GDP deflator. The private consumption deflator is used to calculate primary expenditure in real terms. Sources: Eurostat, National Statistical Institute and Banco de Portugal. Note: Total public expenditure includes interest outlays.

power standard, between 1995 and 2011. This analysis shows that Portugal was one of the member states of the euro area that, despite the negligible increase in GDP per capita, recorded one of the highest rises in its public spending to GDP ratio.

Chart 4 provides an international comparison between the level of the public spending to GDP ratio and the level of GDP per capita, measured in purchasing power standard in 2011. It shows that Portugal's level of total public expenditure to GDP ratio is higher than that of many countries, including several with substantially higher GDP per capita.

### 4. Breakdown of expenditure based on economic classification: Portugal

Regarding the economic classification of public expenditure in Portugal<sup>15</sup>, the two most important items are social benefits and compensation of employees, which, in 2011, represented 46 and 24 per cent of total spending, respectively (50 and 26 per cent of primary expenditure).

Between 1995 and 2011, social benefits increased by 9.6 p.p. of GDP, of which around 2/3 through the expansion of transfers to households in cash and the remainder associated with social benefits in kind (Chart 5). In the case of social benefits in cash, about 80 per cent of the observed variation in the period (corresponding to 5.2 p.p. of GDP) stems from the evolution of pension expenditure. This is undoubtedly one of the main factors accounting for the strong growth in primary spending, particularly after 2000. Underlying its evolution was the significant growth both in the number of pensioners and the average pension (excluding the annual update).<sup>16</sup> The latter developments are partly explained by the maturation of the Social Security subsystem (Chart 6). In terms of annual pensions updates, the period prior to the Social Security reform<sup>17</sup> witnessed several years of discretionary increases higher than expected inflation,

**<sup>15</sup>** The analysis for Portugal carried out in this section is based on expenditure values that exclude the effects of temporary measures and special factors.

**<sup>16</sup>** According to the authors' calculations, in 2011, the average monthly pension in the Social Security subsystem totalled around 350 euros and approximately 975 euros in the *Caixa Geral de Aposentações* subsystem.

<sup>17</sup> See Law no. 4/2007 of January 16 and Decree-law no. 187/2007 of May 10 for specific regulation.

### Chart 3

PUBLIC EXPENDITURE AS A RATIO TO GDP AND GDP PER CAPITA MEASURED IN PPS 15 ¢ Change in total public expenditure as a % of GDP 10 ♦ PT ¢ EL IE 5 FR ф МТ BE 0 EA\* EE ES + IT -5 NL Δ٦ DESK FI -10 -15 5 7 9 11 13 15 17 19 Change in GDP(10^3 euros per capita, measured in PPS)

CHANGE BETWEEN 1995 AND 2011 OF TOTAL

**Sources:** Eurostat, National Statistical Institute and Banco de Portugal.

**Notes:** Total public expenditure includes interest outlays. The values for all countries, including Portugal, do not exclude temporary measures and special factors. Luxembourg is not considered. The simple average of the euro area is represented by  $EA^*$ .

### Chart 4

TOTAL PUBLIC EXPENDITURE AS A RATIO TO GDP AND GDP PER CAPITA MEASURED IN PPS IN 2011



**Sources:** Eurostat, National Statistical Institute and Banco de Portugal.

**Notes:** Total public expenditure includes interest outlays. The values for all countries, including Portugal, do not exclude temporary measures and special factors. Luxembourg is not considered. The simple average of the euro area is represented by  $EA^*$ .

### Chart 5



### Chart 6



CHANGE IN PENSION EXPENDITURE AND IN THE

NUMBER OF PENSIONERS | SOCIAL SECURITY AND

**Sources:** National Statistical Institute and Banco de Portugal. **Note:** The items are corrected by the effects of temporary measures and special factors which, essentially, impact intermediate consumption, investment and other primary expenditure. Sources: Social Security and Caixa Geral de Aposentações.

particularly in the general subsystem. The new pension indexation formula came into effect in 2008 and links the update of pensions with inflation, real GDP growth and the level of pensions. It should be noted that the application of the formula was suspended in 2010, since when the value of pensions (except for minimum pensions) has been frozen. The new Social Security Law also introduced a sustainability factor, made changes to the initial pension calculation formula and increased the penalties on early retirement. This reform, whose effects will mainly be felt in the medium and long term, was an important step towards improving the sustainability of the public finances. This result naturally implies the reduction in the value of future pensions relative to what had been expected prior to the reform. This decrease in replacement rates will also occur in the euro area as a whole.<sup>18</sup> As for the Caixa Geral de Aposentações subsystem, the very favourable rules are being gradually changed, albeit in the meantime, accelerating to a certain extent in terms of convergence to the rules of the general subsystem.<sup>19</sup> By contrast, the transfer of pension funds to general government, given its self-reversing nature<sup>20</sup>, has contributed to one-off increases in the pension expenditure level in both public subsystems.<sup>21</sup> Altogether, the impact of the measures adopted largely justifies the decrease in the growth rate of spending on pensions. However, in 2011, it still stood at about 4 per cent.<sup>22</sup> The remaining social benefits in cash<sup>23</sup> also increased gradually as a ratio to GDP, declining only over the last two years as a result of the implementation of control measures and changes in eligibility rules.

Developments in social benefits in kind should be analysed in conjunction with the evolution of compensation of employees and intermediate consumption. The transformation of hospitals into public corporations since 2002, although fundamentally neutral in accounting terms, has led to an increase in social benefits in kind, through the payment of services to corporate hospitals, and a reduction in compensation of employees and expenditure on the acquisition of goods and services.<sup>24</sup> With regard to social benefits in kind, the increase totalled 3.1 p.p. of GDP between 1995 and 2011 (0.8 p.p. of GDP excluding the amounts related to the payment of services to corporate hospitals). A substantial series of measures adopted in the health sector, with a particular focus on spending on medicines, has helped to mitigate this item's growth trend.

Apart from the above-mentioned effect related to corporate hospitals, compensation of employees also reflects the recording of the *Caixa Geral de Aposentações* in the National Accounts in the period prior to 2005.<sup>25</sup> The wage bill (which is not affected by the issue of the recording of *Caixa Geral de Aposenta-ções*) decreased by 2.1 p.p. of GDP between 1995 and 2011. If this evolution had been adjusted for an

**22** In 2012, pension expenditure is expected to decline following the suspending of the summer and Christmas bonuses, with significant growth being resumed in 2013 as a result of the reintroduction of 1.1 bonuses.

<sup>18</sup> See Economic Policy Committee and European Commission (2012).

**<sup>19</sup>** The consecutive changes in the rules of the *Caixa Geral de Aposentações* subsystem have led to a considerable increase in requests for retirement, an important proportion of which corresponds to early retirement, subject to penalties.

**<sup>20</sup>** The transfers of pension funds to general government reduce the deficit in the year they occur, but increase pension expenditure of this institutional sector in the following years. In principle, the amount initially received should equal the present value of the additional pensions payable in the future. The calculation of this value is, however, dependent on several factors, particularly related to the discount rate and mortality tables, which involve some uncertainty.

**<sup>21</sup>** The impact of these transfers on general government pension expenditure totalled around 0.3 per cent of GDP in each of the subsystems in 2012. In terms of additional pensioners, around 32,000 individuals in the Social Security subsystem and close to 40,000 in the *Caixa Geral de Aposentações* subsystem resulted from these operations.

<sup>23</sup> This aggregate includes, inter alia, unemployment benefits, sickness and family allowances and social programmes for the support of the elderly and poor households.

<sup>24</sup> See "Box 6.1 Corporate hospitals and public expenditure", Annual Report 2007, Banco de Portugal.

**<sup>25</sup>** In the period prior to 2005, employer contributions related with general government employees who were subscribers to *Caixa Geral de Aposentações* are still determined as the amount needed to balance the system in each year. As the pension expenditure of this subsystem grew substantially in this period, contributions and consequently compensation of employees increased on average at a higher rate than wages.

estimate of the impact of the transformation of hospitals into public corporations, it would have totalled no more than 0.6 p.p. of GDP. The strong growth of this item, particularly up to 2002 (1.1 p.p. of GDP), was associated with a highly significant increase in the number of general government employees and extraordinary career revisions. These developments are illustrated in Chart 7 which provides information on the rates of change in wages expenditure and the number of general government employees, as well as the difference between the two series. This difference essentially captures the effects of the updates of wage scales, regular career advancements, extraordinary revisions in careers and changes in the average wage due to the hiring and exiting of workers (mainly due to retirements). The analysis, prior to 2002, was not affected by the creation of corporate hospitals, classified outside the general government sector. Thereafter, the two series represented in the chart reflect the breaks associated with the "corporatisation" of hospitals, which implies that only the difference between them is relevant for the analysis.<sup>26</sup> Since 2002, tighter control on admissions together with retirement-based exits<sup>27</sup>, changes in career advancement plans<sup>28</sup>, a certain restraint in the annual update of the wage scale (with a quasi-freeze in 2003, 2004 and 2010, but well above inflation in 2009) and, in 2011, an average cut in salaries of 5 per cent, enabled the growth trend of this item to be moderated and latterly reversed.<sup>29</sup> The wage reduction of 2011, as well as the suspending of the summer and Christmas bonuses in 2012, was implemented progressively, contributing to the narrowing of the wage premium relative to the private sector which, in 2005, was already only slightly positive in the case of higher wages.<sup>30</sup> As for the number of general government employees, an estimate produced by the authors, correcting the breaks due to the "corporatisation" of hospitals points to an increase of around 80,000 individuals (approximately 13 per cent) over the period 1995 to 2011, which can be broken down between an increase of approximately 120,000 up to 2002 followed by a latter reduction of close to 40,000. In this respect, in the current context of a significant number of retirements, the importance of preventing the reduction in the number of public employees from undermining the priorities established for the provision of public services should be highlighted.

Intermediate consumption as a percentage of GDP, corrected for the impact of the "corporatisation" of hospitals, shows an increase in almost every year up to 2009, only declining in the last two years of the period under analysis. As a consequence, the value for 2011 is about 1.5 p.p. of GDP higher than in 1995. The opposite occurred in the case of public investment, which reduced its ratio to GDP from a peak of 5.3 per cent in 1997 to a historically low level of 2.3 per cent in 2011. Part of this trend is explained by the creation of public-private partnerships in this period and the fact that this item of expenditure is easier to cut in times of budgetary difficulties. It should be noted, however, that in economic terms the reduction of public investment does not necessarily corresponds to an unfavourable evolution, if it allows projects with very low or even negative rates of return to be eliminated.

- **29** In 2012, spending on salaries will decline following the suspending of the summer and Christmas bonuses, with significant growth being resumed in 2013 as a result of the partial reintroduction of the bonuses.
- **30** In this regard see Campos and Pereira (2009). According to the authors, the wage premium (*i.e.*, the wage gap between general government and the private sector workers that remains after controlling for a set of observable characteristics) when evaluated at the mean of the distribution of wages was around 17 per cent in 2005. However, it declined along the wage distribution and was particularly reduced in the last deciles.

**<sup>26</sup>** The difference itself may still be affected by the "corporatisation" of public hospitals which, in addition to the number of workers, also influences the average wage in the general government sector.

**<sup>27</sup>** As well as the reduction in the number of teachers and other personnel with fixed-term employment contracts in the recent period.

<sup>28</sup> The process began in 2004 and is currently governed by Law no. 66-B/2007 of December 28, which established the integrated management and performance evaluation system for public administration (*SIADAP*). In practice, career advancements are actually slower and linked to the performance of public employees.

### 5. Breakdown of expenditure based on functional classification: Portugal in the euro area context

Another perspective of the public expenditure analysis focuses on its breakdown by functional classification.<sup>31</sup> The COFOG classification is compiled by National Statistical Institutes and regularly sent to Eurostat, in accordance with the respective rules.<sup>32</sup> As in the case of the economic classification, the information for the general government sector is presented on a National Accounts basis. The items of expenditure in this classification are: i) general public services, ii) defence; iii) public order and safety; iv) economic affairs; v) environmental protection; vi) housing and community amenities; vii) health; viii) recreation, culture and religion; ix) education; and x) social protection. This type of classification is commonly used for analyses of public spending efficiency. In terms of international comparisons, and as mentioned above, limitations on the use of the functional classification are less important than in the case of the economic classification. For example, although the creation of "corporate hospitals" in Portugal has affected several items of the economic classification, it is essentially neutral in terms of health expenditure according to the functional classification. On the contrary, the content of several items of the functional classification is less intuitive, e.g. expenditure on general public services, which includes almost all interest on public debt, or spending on economic affairs which encompasses a major share of expenditure on subsidies and investment.

Chart 8 shows the evolution of the public expenditure to GDP ratio by function, in Portugal, from 1995 to 2010. In this period it is possible to observe a very sharp increase in expenditure on social protection as a percentage of GDP (6.3 p.p.). This result is consistent with the conclusions based on the economic

### Chart 7



Source: National Statistical Institute.

**Note:** The number of general government employees is based on data from the National Statistical Institute for the stock at the end of the year. In order to better reflect the evolution of wages in each year it was used the average stock at the end of the year and at the end of the previous year to determine the rate of change of the number of employees. The exceptions were the years 2003 and 2006 in which it was considered only the stock at the end of the year, as they were very affected by the creation of corporate hospitals in 2002 and 2005, respectively.

### Chart 8



**Sources:** Eurostat and National Statistical Institute.

**Note:** a) Includes expenditure on environmental protection, housing and community amenities and recreation, culture and religion.

31 It should be noted that this information is only available up to 2010 for the euro area countries.

32 For further details see Eurostat (2007).

classification, as "social protection" in the functional classification essentially corresponds to spending on social benefits in cash in the economic classification. Public expenditure on health as a percentage of GDP has been rising gradually between 1995 and 2005 (from 5.4 to 7.2 percent of GDP), followed by several fluctuations and stood at 6.8 per cent of GDP, in 2012. According to OECD (2012) data, private spending on health has remained relatively stable as a ratio of GDP since 2000, at around 3 per cent, having increased in the most recent period (to 3.7 per cent of GDP in 2010). The trajectory of public expenditure on education also showed sustained growth between 1995 and 2005, increasing its share to GDP from 5.6 to 6.8 per cent, followed by a decrease in 2008, to a slightly higher level than noted at the beginning of the period considered in the analysis. In 2009 and 2010 this type of expenditure recorded a further increase, which may be partly explained by investment expenditure by the Parque Escolar corporation in the modernisation of secondary schools. According to preliminary data for 2011, compiled by the National Statistical Institute, the spending on social protection and health to GDP ratio remained stable, as opposed to a reduction in the case of education.

As for each function's share of overall spending, Portugal, in 1998<sup>33</sup>, in comparison to the euro area average, spent a higher percentage on defence and public order and safety, economic affairs, health and education and a lower percentage of expenditure on general public services, especially social protection (Chart 9). These differences vis-à-vis the euro area average were, in 2010, significantly mitigated. Portugal still had a slightly higher share of expenditure on defence and public order and safety and education in 2010, although spending on health was below and expenditure on general public services above the euro area average, with spending on social protection recording a very considerable increase, while maintaining its share of the total below the euro area.

Underlying the average value of the euro area are very different situations in each of the 17 member states. A country-by-country analysis of the relationship between expenditure and the respective GDP for the most relevant functions: defence and public order and safety, health, education and social protection is therefore important. Chart 10 shows the results for the year 2010. Reference should be made to the fact that Portugal's level of expenditure as a percentage of GDP was relatively high, even compared to countries with higher per capita income, particularly in defence, public order and safety and education.<sup>34</sup> As for public spending on education, Portugal is often referred to in the literature as a country with a high proportion of staff costs. In this respect, it should be noted that the difference between the share of compensation of employees in total expenditure on education compared to the euro area average peaked at about 10 p.p. in 2003, decreasing substantially in the following years (in 2010, the difference stood at approximately 4 p.p.). This development is explained to a large extent by both the horizontal measures affecting the wages of general government workers and the reduction of the number of teachers hired. In contrast, public spending on health and social protection in Portugal is below the euro area average, although the pension expenditure to GDP ratio is already close to the value for the euro area.

Due to its importance and the availability of data, analyses of the efficiency of public expenditure often focus on the health and education sectors. In the case of the health sector in Portugal, the growth of public expenditure occurred simultaneously with the substantial improvement of health status indicators. Between 1995 and 2010, the infant mortality rate<sup>35</sup> decreased from 7.4 to 2.5 per thousand, making

**<sup>33</sup>** It was decided to produce a chart for 1998 instead of 1995 to minimise the impact of the significant reduction in interest expenditure in Portugal that occurred in the period immediately preceding the creation of the euro.

**<sup>34</sup>** It should be noted that in the case of expenditure on social protection and, particularly health expenditure, the set of observations suggests a positive relationship between the expenditure to GDP ratio and respective GDP *per capita* measured in purchasing power standard. The relationship for education spending is unclear and in the case of expenditure on defence, public order and safety, the correlation appears to be negative, although statistically not significant. If linear relationships were assumed, Portugal would have greater expenditure in relative terms in the four functions considered.

<sup>35</sup> Number of deaths of children up to the age of one year, per thousand live births in the same period.

### Chart 9





Sources: Eurostat and National Statistical Institute.

Notes: (a) Includes expenditure on environmental protection, housing and community amenities and recreation, culture and religion. (b) Excludes Slovenia.

it the second lowest amongst euro area countries and average life expectancy at birth increased from 75.4 to 79.8 years, approaching the euro area average.<sup>36</sup> A simple method for the first evaluation of the efficiency of health expenditure consists of a graphical comparison between spending levels and health status indicators.<sup>37</sup> Charts 11 and 12 show the relationship between the two selected health status indicators and public expenditure on health as a percentage of GDP compared to a reference group for the most recent year for which data are available. The reference group is composed of the three euro

**36** Journard *et al.* (2008) have produced an extensive analysis of the available indicators and conclude that, although imperfect, the two indicators selected are possibly the best for assessing the health status of the population.

**37** For a survey of the literature on the efficiency analysis of health expenditure in Portugal see Banco de Portugal, Economics and Research Department (2009), pages 373 to 383.



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area countries with the best results in terms of health status indicators in the year in question. Public expenditure on health in each country is given as a ratio of the simple average of the reference group (if the ratio is greater than one the country spends more than the average of countries with the best performance and if less than one spends less). When the infant mortality rate indicator is used, Portugal belongs to the reference group in 2010 and has a public expenditure on health to GDP ratio of slightly less than one, measured in relative terms. This situation is in contrast to 1995, when Portugal was in the chart area with reduced spending in relative terms but with poor results in terms of this health status indicator. Regarding average life expectancy at birth, the results are not so favourable, given that in 2009, despite continuing to show relative expenditure below unity, Portugal turned in a poor level of performance. These findings are consistent with the results in the literature which usually classify Portugal in an intermediate position with respect to its efficient use of resources in the health sector. In this respect it should also be noted that, in the period under review, several measures have been adopted to improve the level of efficiency of the system in this sector. They include: i) the transformation of several

**Sources:** Eurostat and National Statistical Institute. **Note:** The euro area simple average is represented by EA\*.

#### Chart 11





EE

0.6

Chart 12

results

75

0.4

**Sources:** Eurostat and National Statistical Institute. **Note:** The reference group is composed by Slovenia, Finland and Portugal. **Sources:** Eurostat and National Statistical Institute. **Notes:** The analysis is made for 2009 as the 2010 values for Italy (and, as a consequence, for the euro area) are not available. The reference group is composed by Spain, France and Italy.

0.8

Public expenditure in health relative to the "reference group'

SK

1.2

1.0

public hospitals into public corporations with a certain autonomy in terms of management and with their activity being based on contracts with targets for the level of services and the respective setting of unit payments, ii) the rationalisation of the hospital network and other entities providing public health services such as permanent support health services and health centres, iii) the reduction of benefits in public health subsystems iv) the promotion of the use of generic drugs and changes to the rules for co-financing medicines, v) the introduction of several measures in human resources management, particularly related to the type of employment contract and compensation system.

Regarding the education sector, there have been important changes in Portugal in recent decades.<sup>38</sup> Although the reduction in the birth rate has, in the most recent period, contributed to a decline in the number of students enrolled in schools, the participation rate, defined as the ratio between the number of students and the total population for a given age group, has increased significantly, particularly at the more advanced levels of education. The percentage of students at ISCED<sup>39</sup> levels 1 to 6 as a percentage of the population between the ages of 5 - 24 increased from 76.3 per cent in 1998<sup>40</sup> to 93.6 per cent in 2010. This result places Portugal in a very favourable position when compared to other euro area countries. However, in recent years, especially since 2007, the number of non-regular education students has recorded a significant increase as a result of attendances at educational and training courses for adults and young people at risk or who have already left the school system and processes for the recognition, validation and certification of skills covered by the New Opportunities initiative.<sup>41</sup> The same participation rate in Portugal considering only regular education, at 85.4 per cent, was still higher than the euro area average of 82.8 per cent. In terms of the breakdown between non-higher and higher education, the number of regular education students at ISCED levels 1-4 as a percentage of the population between

**<sup>38</sup>** For an analysis of evolution in the education sector and a survey on the literature see Economics and Research Department (2009), pages 383 to 393.

**<sup>39</sup>** International Standard Classification of Education. According to the 1997 classification level 1 corresponds to primary education and levels 5 and 6 to higher education.

<sup>40</sup> Starting date for the information available from Eurostat.

<sup>41</sup> See Gabinete de Estatística e Planeamento da Educação (2011).
the ages of 5 and 19 totalled 93.9 per cent (average euro area: 90.7 per cent), while at ISCED levels 5 and 6 the ratio relative to the population between the ages of 20-24 corresponded to 62.4 per cent (average euro area: 61.8 per cent). It should be noted that the evolution of the participation rate in Portugal was more pronounced in higher education, totalling around 20 p.p. between 1998 and 2010 for the selected indicator.

The participation rate of the student population is not a good indicator for assessing the efficiency of expenditure as it does not take the results of the educational process into account. In this context, the classifications of PISA (Programme for International Student Assessment) students have frequently been used in the literature as a proxy for the results of the educational system in international comparisons. Generally, Portuguese students have not performed well in tests although the rankings showed considerable improvement in the 2009 international edition of PISA, both in maths and reading, after a relative stabilisation between the 2003 and 2006 editions, placing Portugal in an intermediate position in the ranking of European Union countries. However, according to Pereira (2011), the improvement in the scores in the last three editions of PISA (2003, 2006 and 2009) was gradual, if results are corrected for student characteristics and family background. Chart 13 shows the simple average of the results of the three PISA 2009 tests (maths, reading and science) and public expenditure on education as a percentage of GDP in the same year relative to a reference group of euro area countries. As in the case of expenditure on health, the reference group was made up of the three countries with the best scores. It shows that Portugal was located in the area of the graph with higher expenditure than the reference group and with more unfavourable results than the euro area average, being the only country located in this area of the chart. In short, the reduction in the education expenditure to GDP ratio seems to have been accompanied by improved education indicators and suggests that progress has been achieved in terms of the efficiency of spending in the sector. The measures adopted in the most recent period have contributed to this outcome, most notably the closure of schools with few students and the reduction of the teacher-student ratio. However, there is clearly scope for expenditure restraint and additional gains in terms of efficiency in this sector.

#### Chart 13



#### PUBLIC EXPENDITURE IN EDUCATION AND PISA RESULTS, 2009

Sources: OECD and Eurostat.

Notes: There are no PISA 2009 data for Cyprus and Malta. The reference group is composed by Estonia, Finland and the Netherlands.

#### 6. Concluding remarks

The persistently rapid expansion of primary public expenditure, in Portugal, when the economy entered a phase of very moderate growth and savings on interest expenditure resulting from the nominal convergence process came to a halt, requires an analysis that, in many aspects, remains to be done. However, it is possible to highlight several important explanatory factors. Firstly, particularly generous rules included in past legislation were interpreted as giving rise to acquired, unchallengeable rights, in some cases set out in the Constitution and in others simply because they were politically/electorally inconvenient, creating significant rigidity in expenditure. Secondly, the use of temporary measures, measures with a transitory impact on the rate of change of expenditure and the reduction of government investment (although partially offset by investment made by public-private partnerships) enabled those structural reforms which were politically less expedient, to be postponed. Thirdly, the limitations of the budgetary procedures in Portugal, in conjunction with the weaknesses of the multilateral budgetary surveillance system of the European Union, made it difficult to achieve significant progress in streamlining and effectively controlling public expenditure in Portugal. Finally, the long-term trend towards an aging population made an important contribution to the increase in expenditure, particularly in the case of public pension and health systems. In terms of the fiscal policy context, it should be emphasised that there was a certain wishful thinking over the potential growth of the Portuguese economy, which led to a poor assessment of the sustainability of the public finances. The perception that growth based on domestic demand and easy credit would lead to a stagnation of the economy took several years to become almost consensual.

The troubled path of fiscal policy in Portugal since the beginning of this century should not camouflage several important developments that have mitigated the pressure on spending, increased the transparency and quality of information on the public finances and improved budgetary procedures. In the first case special mention should be made of: the reform of the public pension systems in 2006-2007, which per se reduced the unsustainability of the Portuguese public finances; the limitation of career advancements in public administration, which were linked to performance appraisals; and rationalisation of public service networks, faster in some periods than in others, with particular emphasis on the health and education sectors. Regarding the transparency and quality of information special reference should be made to the broadening of the scope of the information published monthly by the Ministry of Finance, progress in the preparation of other entities and closer monitoring by Eurostat. Concerning budgetary procedures, an important step was the approval of a series of amendments to the Budgetary Framework Law in 2011, which included the establishment of a medium-term goal for the structural balance, the definition of a multi-year framework for budgetary planning and the creation of an independent fiscal council.

The Economic and Financial Assistance Programme, following the packages of austerity measures that preceded it, has as one of its main objectives the reduction of the general government deficit and the reversal of the growth trajectory of the public debt ratio. It also includes a series of structural changes to allow an evolution of public expenditure consistent with the potential growth of the economy beyond the programme horizon. The reduction in expenditure has been predominantly based on horizontal measures, affecting all items of primary expenditure. Given their relevance, reference should be made to the freezing of the wage scales of general government and public enterprises and pensions of the public systems (except minimum pensions), the drastic limitation of career advancements, the very tight control of admissions and the reduction in the number of personnel with fixed-term employment contracts, the reduction of salaries and pensions above a certain threshold and total/partial suspending of summer and Christmas bonuses to employees of general government, public enterprises and to pensioners. These measures have a major impact on the disposable income of many households and could not be implemented outside the framework of an emergency situation such as the current one. However, they are, by their nature, potentially easily reversible. It should also be noted that they may possibly have major costs

in terms of the overall functioning of general government and public enterprises. They do not adequately correct the existing wage premium in the public sector and suspend the incipient performance incentive schemes approved in recent years, making increasingly difficult to attract and retain qualified staff. Further, they do not reflect a clear set of priorities and are based on a centralised approach, which leaves very little scope for managing the sectoral programmes and the services and public companies themselves.

Even in the most optimistic scenario for the evolution of the Portuguese economy, it will not be possible to return to the pattern of public expenditure growth that, albeit with several interruptions, existed prior to 2010. The need for restraint and cuts in expenditure is unavoidable given the requirement to adjust the level of public spending to the productive capacity of the economy and the fiscal burden that economic agents as a whole are willing to bear. If national institutions, through a rigorous and disciplined performance, are not able to do so selectively, reflecting informed and clear collective choices, the reduction of spending will be imposed by the multilateral supervision mechanisms of the European Union and by financial markets. In this context, two points should be made. On the one hand, expenditure has, *per se*, implications on the services provided through the budget which may, however, be mitigated by increasing the efficiency and effectiveness of public expenditure. Progress in this area depends, to some extent, on the improvement of the quality of governance and budgetary management, which should be understood as a gradual and continuous process, implying a major commitment of all entities and agents directly involved and society in general.

## **References:**

- Braz, C. (2006), "The calculation of cyclically adjusted balances at Banco de Portugal: an update", *Economic Bulletin Winter*, Banco de Portugal.
- Campos, M. e Pereira, M. (2009), "Wages and incentives in the Portuguese public sector", *Economic Bulletin Summer*, Banco de Portugal.
- Cunha, J. e Braz, C. (2009), "The main trends in public finance developments in Portugal: 1986-2008", Occasional Papers no.1, Banco de Portugal.
- Economics and Research Department (2009), *The portuguese economy in the context of the economic, financial and monetary integration* Chapter 6, Banco de Portugal.
- Economic Policy Committee and European Commission (2012), "The 2012 Ageing Report: economic and budgetary projections for the 27 EU Member States (2010-2060)", *European Economy no. 2*, European Commission.
- Eurostat (2007), Manual on sources and methods for the compilation of COFOG statistics, Eurostat.
- Gabinete de Estatística e Planeamento da Educação (2011), *Educação em números: Portugal 2011*, Ministério da Economia.
- Joumard et al. (2008), "Health status determinants: lifestyle, environment, health care resources and efficiency", OECD Economics Department Working Papers no.627.
- OECD (2012), Health at a glance: Europe 2012, OECD.
- Pereira, M. (2010), "Educational attainment and equality of opportunity in Portugal and in Europe: the role of school versus parental influence", *Economic Bulletin Winter*, Banco de Portugal.
- Pereira, M. (2011), "An analysis of Portuguese students' performance in the OECD Programme for International Student Assessment", *Economic Bulletin Autumn*, Banco de Portugal.
- Tanzi, V. e Schuknecht, L. (2000), Public spending in the 20th century: a global perspective, Cambridge.

# A VIEW ON INCOME REDISTRIBUTION IN PORTUGAL AND IN THE EUROPEAN UNION\*

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"A too great disproportion among the citizens weakens any state."

David Hume, Of Commerce

## ABSTRACT

This article assesses the impact and efficiency of redistributive policies in Portugal and in the European Union. The analysis is based on microdata from EU-SILC 2010 and focuses on the role of cash benefits (excluding pensions) and income taxes. The Portuguese economy has a high level of income inequality in the context of the European Union and a degree of redistribution close to the European average. In terms of efficiency, the evidence suggests that cash benefits (excluding pensions) in Portugal are relatively well targeted towards the lower income levels and income taxes have a higher degree of progressivity compared to the European average. The analysis also highlights the heterogeneity of the redistributive process in the various income deciles in Portugal.

#### 1. Introduction

The market equilibrium tends to generate an excessive level of income inequality among economic agents. Public policies in advanced economies have therefore as one of their goals ensuring a more equitable redistribution of resources. This redistribution is essentially based on transfers targeted to the most vulnerable segments of the population, as well as on the progressivity of income taxes. The society values this redistribution not only for strictly utilitarian reasons – assuming that the marginal utility of consumption decreases with the level of income – but mainly to correct distortions in the income distribution arising from the absence of an effective equality of opportunity among citizens. However, the maximization of this objective should take into account the potential adverse incentives on labour supply and on the generation of income. This trade-off between equity and efficiency – whose magnitude depends on the elasticity of labour supply to changes in the structure of taxes and transfers – is the basis of an extensive economic literature (see Piketty and Saez, 2012). Nevertheless, when income inequality is excessive and based on market failures, an increase in income redistribution can actually promote a more efficient and more stable economic system (see Stiglitz, 2012).

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This study aims to analyze the role of redistribution policy in Portugal, framing the results in the context of the European Union. As usual in the literature, the term "redistribution" should be understood as a decline in income inequality arising from public policies (see Immervoll and Richardson, 2011). Due to the superior quality and comprehensiveness of national databases, empirical studies on redistributive policies are typically based on individual countries. However, a reading of these policies across countries can be useful in that it allows organizing the evidence around some common benchmarks. In this context, this paper builds on some recent contributions studying the impact of redistributive policies in the European Union (see Atta-Darkua and Barnard, 2011). To this end, we use the 2010 cross-section data of the European Union Survey on Income and Living Conditions (EU-SILC).

This study presents a number of weaknesses that should be emphasized at the outset. These weaknesses require some restraint in interpreting the results. First, the EU-SILC database, although arguably the most suitable for the present analysis, presents some limitations associated inter alia with the degree of disaggregation of the data and the fact that the sample does not fully represent the two extremes of the income distribution. Second, this study strictly focuses on the role of social benefits in cash (excluding pensions) and income taxes. Thus, we do not evaluate the role of social benefits in kind - which are the majority of social benefits, if one excludes pensions - or the impact of other taxes, in particular consumption taxes. Thus, the object of analysis does not cover the full set of public redistribution policies. Thirdly, the analysis is based on cross-sectional data for a single year, so it does not allow assessing the impact of the tax and transfer system on the intertemporal redistribution of income or the dynamic decisions of agents throughout their life-cycle (see, for a recent contribution, Brewer et al., 2012). Finally, the analysis of the redistributive impact of income taxes and cash benefits shall be based solely on direct comparisons of the income distribution before and after transfers and before and after income taxes. This immediately raises a problem of lack of counter-factual. In fact, redistributive policies affect the incentives and budgetary constraints facing individuals, thus altering their economic decisions, particularly in terms of labor market participation and household composition. Identifying this counterfactual typically requires an approach based on general equilibrium models or quasi-experimental evidence, which is beyond the scope of this paper and remains a challenge to the literature in this area.

Conditional on the limitations described above, the analysis aims to answer several questions: (i) What is the importance of cash benefits (excluding pensions) in reducing income inequality?; (ii) What is the share of these benefits targeted at the lowest income deciles?; (iii) What is the degree of progressivity of income taxes?; (iv) In the European context, is the redistribution of income associated mainly with the tax system or with benefits in cash?; (v) How does Portugal compare with its European partners in terms of the efficiency of the redistributive process? The goal of this article is to gather evidence about these (and other) issues and thus help to inform some ongoing discussions on the Portuguese economy.

The paper is organized as follows. Section 2 briefly presents the database and defines the three concepts of income on which the analysis is based: original income (before taxes and cash benefits), gross income (after cash benefits and before taxes) and disposable income (after taxes and cash benefits). Section 3 describes some facts about income inequality in the European Union, using the various income concepts. This section will compare the degree of income redistribution in the different European Union countries. Section 4 distinguishes between the redistributive effectiveness and efficiency of cash benefits and income taxes. Section 5 summarizes the main conclusions and presents some avenues for future research.

#### 2. The Database And The Income Definitions

## 2.1. The database

This study is based on the EU-SILC database, which is the ultimate source for research on income and living conditions of individuals and households in Europe. The EU-SILC 2010 is the latest available microdata for

research. The information on income refers to 2009 for the vast majority of countries, including Portugal. The analysis considers a set of twenty-seven countries, including most euro area and European Union countries.<sup>1</sup> In the following sections, references to the euro area and the European Union correspond to simple averages of the indicators calculated for the different countries.

The sample size in 2010 for all European Union countries amounts to about 550000 individuals. The sample for Portugal includes over 13000 individuals. All results presented in this article were calculated using the cross-sectional weights available in the database. The results thus correspond to an extrapolation of the indicators to the whole population in each country (see European Commission, 2010).

### 2.2. The income definitions

Underlying all comparisons of income inequality is an analytical framework of the income redistribution process. The analysis in this article is based on a comparison of three successive phases underlying the generation of disposable income. In a first step, we consider all types of income generated from market sources, plus pensions. This aggregate will be called original income. In a second step, social benefits in cash are added to original income, in order to obtain gross income. Finally, disposable income results from subtracting income taxes, as well as Social Security contributions paid by the workers, from gross income. Following this sequence assumes that cash benefits are received primarily and that the entire gross income is then subject to income taxes. The soundness of this assumption depends on the legal framework in each country (see Immervoll and Richardson, 2011). Note, however, that the results would remain qualitatively unchanged if a different sequencing was assumed (*i.e.*, the initial payment of taxes and the subsequent receipt of benefits). It is worth detailing the composition of each of the three income aggregates, namely because it allows clarifying the constraints imposed by the available information in the database (see also European Commission, 2010).

Original income includes employees' cash or near-cash income, non-cash employee income, cash benefits from self-employment, income from rental of a property or land, regular inter-household cash transfers received, interest, dividends, income received by people aged under 16, as well as old age and survivors' benefits.<sup>2</sup> The inclusion of pensions in original income, and not as social benefits in cash, is an important methodological choice in this study. This choice is based on three types of reasons. Firstly, the redistribution operated via the pension system has a very different nature from the other cash benefits, due to its intergenerational nature and to the fact that it is mostly based on contributory schemes. Secondly, given the weight of pensions in overall social benefits in cash (about two-thirds across the European Union and about 70 per cent in Portugal, according to Eurostat data), their redistributive impact requires an autonomous study, distinct from the other benefits. Finally, the exclusion of pensions from original income would imply that many pensioners would have an original income near zero. This methodological choice is implausible from an economic point of view, particularly when the social security systems are relatively mature. In the remainder of the article, and for simplicity of exposition, all references to cash benefits should thus be interpreted as excluding income from old-age and survivors' benefits.

Gross income is computed by adding cash benefits to original income. Cash benefits comprise benefits related to unemployment, sickness/accident, disability, child protection/family, social exclusion, benefits for education purposes and housing allowances (the latter are not strictly cash transfers). It should be

<sup>1</sup> Iceland and Norway also participate in the EU-SILC and are included in the analysis. In the charts and tables, the countries are identified with the following acronyms: Austria (AT), Belgium (BE), Bulgaria (BG), Czech Republic (CZ), Germany (DE), Denmark (DK), Estonia (EE), Spain (ES), Finland (FI), France (FR), Greece (GR), Hungary (HU), Iceland (IS), Italy (IT), Lithuania (LT), Luxembourg (LU), Latvia (LV), Malta (MT), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Sweden (SE), Slovenia (SI), Slovakia (SK) and United Kingdom (UK).

<sup>2</sup> In the EU-SILC database, survivors' benefits received by individuals older than the legal retirement age are reported together with old-age benefits.

noted that some of these benefits have a contributory nature, especially unemployment benefits. The distinction between the redistributive role of contributory and non-contributory benefits is an interesting area for future research.

Disposable income corresponds to gross income minus income taxes – including taxes on labor income, profits and capital gains – and workers' contributions to Social Security.<sup>3</sup> On the basis of EU-SILC data, it is not possible to distinguish income taxes from those Social Security contributions. Additionally, it should be noted that income taxes reported in the survey correspond to the tax actually paid in each year, so tax refunds from prior years but received during the reference period are deducted in the calculation of income taxes and, similarly, any future tax refunds/payments relating to the reference year are not taken into account. This is an additional weakness of the information contained in the database. Again, for simplicity of exposition, all references to income taxes should be interpreted as including workers' contributions to Social Security.

Finally, it is worth noting that, in line with the official methodology in the European Union, this analysis is based on measures of equivalised income. Household income was thus re-scaled based on the size and composition of each household. In this article, we use the OECD modified equivalence scale, which gives a weight of 1.0 to the first adult in the household, 0.5 to other adults and 0.3 to each child (under 15 years). The equivalized income is attributed to all household members, thus assuming that the monetary resources – including the impact of redistributive policies – are equitably shared in each household. Note that this hypothesis is inescapable given that a significant share of redistributive policies is determined at the household level. All income measures reported in this article are therefore defined per equivalent adult.

#### 3. (Re) Distribution Of Income In The European Union: Some Fundamental Traits

This section aims at uncovering some facts about income inequality based on each of the three income aggregates described above. The analysis will allow assessing the main features of the redistributive role of cash benefits and income taxes at the European level.

Chart 1 shows, for each European Union country, the 10th, 50th and 90th percentiles of the distribution of original income. The countries are sorted by median original income. Chart 2 mimics Chart 1 for disposable income. The charts immediately illustrate some important distribution and redistribution features in the European Union. Firstly, there is a high dispersion in original income in most countries, both in the lower and in the upper medians of the distribution. This essentially results from the inequality in labor income, influenced by the dispersion of wages and by the employment and unemployment characteristics in each country (see European Commission, 2012). In the Portuguese case, inequality is particularly marked in the upper median of the income distribution. In fact, the ratio between the 90th and 50th percentiles of original income in Portugal is the maximum across all European Union countries. Secondly, Chart 2 reveals that income taxes and cash benefits substantially decrease the income dispersion in all European Union countries, both by increasing the lowest incomes (in the case of the 10<sup>th</sup> percentile, by about 35 per cent, on average) and by decreasing the highest incomes (in the case of the 90th percentile, by about 25 per cent, on average). In Portugal, the income increase in the 10<sup>th</sup> percentile (15 per cent) is comparatively lower than the European average and the income decline in the 90th percentile (22 per cent) is close but still lower than the European average. Finally, it is interesting to note that the country rankings by level of median income do not change substantially after the redistribution of income. As an illustration, Portugal maintains its position regarding the level of median income between the Czech Republic and Malta.<sup>4</sup>

**<sup>3</sup>** In strict terms, the computation of disposable income, as undertaken by Eurostat, would imply deducting also regular inter-household cash transfers paid. In order to focus the analysis on the redistribution achieved by public policies, these transfers were not deducted. All results are virtually unchanged by this methodological option.

**<sup>4</sup>** For a detailed analysis of the evolution of inequality in Portugal throughout the last decades, see Rodrigues *et al.* (2012).



Chart 3 shows the income inequality for the three income concepts described in Subsection 2.2, based on the Gini index. The Gini index measures the degree to which the distribution of income among individuals deviates from an equal distribution, and ranges from zero (perfect equality) to one (where a single individual would receive all the income generated in the economy). The countries are sorted by the level of disposable income inequality. On average, cash benefits and income taxes reduce income inequality – as measured by the Gini index – by 22 per cent in the European Union and by 20 per cent in Portugal. In absolute terms, the Gini index is reduced by about 0.08 percentage points in both the European Union and in Portugal. The chart uncovers that, on average, countries with lower (higher) inequality in original income are also those with lower (higher) inequality in disposable income. The chart also allows concluding that, on average, cash benefits contribute more to reducing inequality than income taxes.

In order to provide a more aggregated reading of these results, Chart 4 shows simple averages of the indicators presented in Chart 3 for different sets of countries, in the spirit of the decomposition of welfare states proposed by Esping-Andersen (1990). The chart allows identifying rather different situations in the distribution and redistribution of income. At one extreme lie the Nordic countries, with levels of original income inequality which are already relatively low, and which are coupled with high levels of redistribution - mainly via cash benefits - implying particularly low levels of disposable income inequality. The continental European countries participating in the euro area also share these characteristics, albeit with a slightly higher level of inequality before and after the redistribution of income. At the other extreme lie the southern European countries – including Portugal – and the Baltic countries. These two groups are characterized by a relatively high inequality in original income, coupled with a relatively low income redistribution. In the case of southern European countries, the particularly low redistributive impact of cash benefits is on average even below the one stemming from income taxes.<sup>5</sup> This evidence is broadly consistent with the so-called "Robin Hood paradox", i.e., with the idea that income redistribution is less prevalent precisely where it is most needed (see McCarty and Pontusson, 2009). Finally, it is worth underlining the case of the United Kingdom, which has unique features, given that a high level of original income inequality is accompanied by a relatively high redistributive effort, both through cash benefits and income taxes.

Chart 5 allows quantifying more precisely the importance of each instrument in the income redistribution. The countries are sorted by the redistributive impact of cash benefits. It is apparent that, in most countries,

5 This result is highly influenced by the case of Italy, which has a meager unemployment insurance mechanism.

Π



Source: Author's calculations based on EU-SILC

# Chart 5



Source: Author's calculations based on EU-SILC.

income redistribution is mostly associated to cash benefits. This result is robustly found in the literature (see Bastagli et al., 2012, OECD, 2012, or Atta-Darkua and Barnard, 2011). Nevertheless, it should be noted that the tax system always plays a key role in the redistributive process, since it allows obtaining the resources to implement, among other objectives, the set of social transfer policies. This endogeneity hinders a strict accounting of the contribution of each instrument in the redistribution process.

Finally, Charts 6 and 7 display, respectively for Portugal and the European Union, the impact of redistributive policies in each original income decile. In particular, the charts highlight the role of cash benefits in moving from original income to gross income and the role of income taxes in moving from gross to disposable income. Three main ideas emerge from the charts. Firstly, all income deciles visibly increase their income levels through benefits in cash, although more sharply - in absolute value and, obviously, relative to original income - in the lower income deciles. This impact on lower income levels is particularly



Source: Author's calculations based on EU-SILC.

Source: Author's calculations based on EU-SILC.

marked in the European Union, with the lowest original income decile nearly tripling its income due to cash benefits. Secondly, income taxes decrease disposable income at all income deciles, but in particular in the highest. Finally, it is interesting to note that, in Portugal, income taxes net of cash benefits are negative in the first three deciles of original income, with increasingly positive values from the fourth decile onwards. In the European Union, the third original income decile already displays a relatively balanced level of income taxes and cash benefits. In all EU countries income taxes are progressive, with a strong incidence in the highest income deciles, and social transfers are targeted at the lower income brackets. It should be noted, however, that this evidence is partial, since it does not include all taxes paid by the population (in particular consumption taxes) and does not account for benefits in kind, as well as the provision of other functions of the State, which benefit the majority of citizens.

# 4. The Efficiency In The Redistribution Of Income In Portugal And In The European Union

The previous section identified the main features of the income redistribution process in Portugal and in the European Union, focusing on the impact of cash benefits and income taxes. However, a fundamental issue is to evaluate the efficiency of each of these redistributive policies, *i.e.* the extent to which resources are effectively targeted at the reduction of income inequality. This is the goal of this section. The section is organized as follows. In Subsection 4.1 the conceptual framework is presented. Subsections 4.2 and 4.3 sequentially apply this framework to social benefits in cash and income taxes, for each European Union country.

## 4.1. The conceptual framework

The overall redistributive impact of a policy is due, on one hand, to its magnitude – for example, the level of the income tax rate or the amount of cash benefits as a percentage of original income – and, on the other, to its efficiency. In this article, we will refer primarily to the notion of progressivity to assess the efficiency of each policy.

In simplified terms, a tax is progressive if the average tax rate increases with the level of before-tax income. In other words, a progressive tax implies that individuals with higher income levels pay a fraction of total taxes higher than the fraction of total income they receive. Although there is a general consensus around this definition of progressivity, there is no strong consensus on the precise measurement of progressivity.

In this article, we adopt the progressivity indicator proposed by Kakwani (1977, 1979). This indicator measures the deviation of the distribution of the tax (or cash benefit) from a situation of proportionality.<sup>6</sup>

The redistributive effect of a tax can be decomposed according to the following formula:

$$Gini^{before tax} - Gini^{after tax} = \frac{g}{1-g} P^{Kakwani} - R,$$
(1)

where  $Gini^{before tax}$  and  $Gini^{after tax}$  are respectively the Gini coefficients before and after tax, g is the average tax rate (computed in relation to before-tax income),  $P^{Kakwani}$  is the progressivity indicator proposed by Kakwani and R captures the decline in inequality due to the re-ranking of individuals along the income distribution after the change in tax (this last element does not weigh significantly on our results so it will not deserve further attention). Note that typically, in the case of income taxes, g > 0 and  $P^{Kakwani} > 0$ . In turn, cash transfers can be interpreted as a negative tax, thus typically implying g < 0 and  $P^{Kakwani} < 0$ .

Equation (1) is rather instructive to frame the analysis regarding the progressivity of taxes (and benefits). The redistributive effect of a tax, *i.e.* the impact on  $(Gini^{before tax} - Gini^{after tax})$ , works mainly through two channels: (i) the average tax rate (note that  $\frac{g}{1-g}$  is a positive monotonic function in g) and (ii) the tax progressivity ( $P^{Kakwani}$ ). A tax that is proportional to before-tax income has no progressivity ( $P^{Kakwani} = 0$ ) and will thus have no redistributive effect, regardless of the level of the tax rate g. In turn, in a progressive tax system (where  $P^{Kakwani} > 0$ ), income inequality will decline not only with an increase in progressivity but also with an increase in the average tax rate.

In this article, the Kakwani progressivity indicator will be the key indicator to assess the efficiency of the redistributive system. In fact, for the same level of tax (of cash benefits), the higher the progressivity, evaluated based on  $P^{Kakwani}$ , the greater the redistributive impact of the policy instrument.<sup>7</sup> This analysis will be complemented with additional indicators measuring the extent to which the redistributive policies target the different deciles of the income distribution.

### 4.2. The efficiency of redistribution via social benefits in cash

This sub-section evaluates the redistributive efficiency of cash benefits in the European Union countries. Recall that these benefits include all cash transfers received by individuals/households related to unemployment, sickness/accident, disability, child protection/family, social exclusion, benefits for education and other housing allowances. It is important to highlight that the EU-SILC does not cover all the elements that are included in the official Eurostat statistics reported in the European System of Integrated Social Protection Statistics (ESSPROS) (see European Commission, 2010). In addition, as usual in these types of surveys, there is a tendency for some underreporting of income levels by households. In Portugal, the levels reported in the EU-SILC 2010, extrapolated to the total population, underestimate by about one quarter the total value of cash benefits for 2009 contained in the Bulletin of the Directorate General

<sup>6</sup> The Kakwani progressivity indicator corresponds to the difference between the tax concentration coefficient and the Gini index of gross income. In this article, all computations of the Kakwani index were undertaken using the STATA program sgini (see Van Kerm, 2009).

<sup>7</sup> In strict terms, cash benefits should be labeled as regressive, given that they tend to decline with the level of income. Therefore, one should in principle state that the redistributive effect would increase the greater the regressivity of a cash benefit and the greater the progressivity of a tax. However, for exposition purposes, this article will denominate a cash transfer as progressive if it declines income inequality, in line with the common intuition and the usual language in policy debates.

for the Budget,<sup>8</sup> and by about one third the value of cash benefits (excluding pensions) in the National Accounts of INE.<sup>9</sup>

Table 1 presents, for each of the countries under review, the impact and efficiency of cash benefits in reducing income inequality. The countries are sorted by original income inequality. The first columns of the table display the size of cash benefits as a percentage of original income, the Kakwani progressivity indicator (negative, since we are analyzing "negative taxes") and the overall redistributive impact of these benefits. The table shows that the overall redistributive impact of cash benefits stems from the combination of very different situations in terms of magnitude and efficiency of those transfers. Firstly, countries with higher levels of income inequality do not engage in higher income redistribution via cash benefits. In fact, with the important exception of the United Kingdom, the evidence points in the opposite direction, as was already visible in Chart 3. Secondly, there is a strong positive relationship between the magnitude of cash benefits (as a percentage of original income) and the respective redistributive impact (the correlation between these two variables in the sample countries is greater than 0.50). The association between the progressivity indicator and the overall redistributive impact is not as strong, but is also significant. Finally, there is not a statistically significant association between the size of benefits and the progressivity indicator.

According to data from the EU-SILC, the countries with the highest levels of cash benefits (as a percentage of original income) are the Nordic countries and the Baltic States. In turn, the countries in which cash benefits are more progressive (*i.e.*, in which the Kakwani progressivity indicator is more negative) are the United Kingdom, Portugal, the Netherlands, Denmark and Germany. This conclusion is generally robust when assessing the share of cash benefits targeted towards the two lowest deciles of the original income distribution.

In the specific case of Portugal, the impact of cash benefits in reducing inequality is slightly lower than the European Union average. This is usually interpreted as reflecting not only a lower degree of effectiveness but also a lower degree of efficiency of these benefits. Table 1 allows deconstructing this statement. In fact, the smaller redistributive effect of cash benefits in Portugal stems strictly from the fact that spending on these benefits is relatively low (about 6 per cent of original income, which compares with more than 8 per cent in the euro area and in the European Union).<sup>10</sup> In contrast, in terms of efficiency, Portugal stands out as one of the countries where cash benefits are more progressive. It should be noted that this conclusion for Portugal is in contrast with some results presented in Immervoll and Richardson (2011), in which cash benefits excluding pensions exhibit a relatively low degree of progressivity in the OECD context. This may be related to some methodological options adopted in that analysis.<sup>11</sup> Nevertheless, this discrepancy highlights the importance of assessing the robustness of these results – particularly when aimed at informing policy decisions – and should be the subject of future analysis.

<sup>8</sup> This value corresponds to the sum of unemployment insurance, sickness subsidies, family/children subsidies, Rendimento Social de Inserção (RSI), Complemento Solidário para Idosos (CSI), other social exclusion benefits and disability benefits.

**<sup>9</sup>** Given that data from EU-SILC are the basis for the official statistics from Eurostat on the redistributive role of social benefits, it would be important to assess, in a comparative perspective, what is the relative impact of this underestimation across EU countries. This analysis goes beyond the scope of this article.

**<sup>10</sup>** According to the SEEPROS statistics of the Eurostat, social benefits in cash (excluding old age and survivors' benefits) in 2009 stood at 5.0 per cent of GDP in Portugal and slightly above 6 per cent of GDP in the European Union.

<sup>11</sup> In particular, the progressivity analysis is based on concentration indices in which individuals are ranked by disposable income and not by original income (which would be the correct theoretical option). In an annex, Immervoll e Richardson (2011) show that the degree of progressivity depends significantly on this methodological option. In fact, while in the first case the degree of progressivity of the tax and transfer system in Portugal stands clearly below the OECD average, in the latter case the degree of progressivity of the tax and transfer system in Portugal stands clearly above the OECD average.

## Table 1

IMPACT OF CASH BENEFITS ON INEQUALITY AND POVERTY								
		Im	pact on inequal	ity	Impact on poverty			
	Cash benefits over original income	Kakwani progressivity index	Total redistributive effect (decline in Gini index)	Share of cash benefits towards the two lowest original income deciles (as a percentage of total cash benefits)	Decline in poverty rate	Decline in poverty intensity	Share of cash benefits contributing to a decline in poverty intensity	
	%			%	p.p.	p.p.	%	
UK	9.1	-0.95	0.054	0.58	13.2	11.0	50.1	
LT	13.0	-0.59	0.037	0.36	9.8	6.0	21.0	
PT	5.8	-0.82	0.037	0.45	7.2	4.7	34.0	
LV	10.7	-0.37	0.024	0.24	6.5	4.5	18.8	
GR	2.9	-0.72	0.018	0.40	3.5	1.7	23.6	
DE	8.3	-0.75	0.045	0.47	6.5	7.2	36.5	
RO	6.4	-0.63	0.028	0.34	4.5	3.9	27.2	
ES	7.1	-0.70	0.037	0.41	6.5	4.5	31.0	
FR	9.1	-0.73	0.046	0.45	9.6	6.3	31.6	
BE	11.0	-0.75	0.061	0.48	9.7	8.6	36.2	
EE	9.7	-0.49	0.029	0.32	6.6	4.3	21.0	
FI	11.4	-0.75	0.064	0.46	10.5	7.5	30.6	
IT	4.3	-0.49	0.016	0.27	3.3	1.7	16.6	
LU	9.8	-0.72	0.049	0.42	11.1	6.1	28.1	
BG	7.7	-0.43	0.023	0.24	4.9	3.0	19.4	
DK	11.6	-0.78	0.066	0.52	10.2	6.8	24.9	
MT	5.9	-0.73	0.034	0.47	6.6	4.4	35.1	
PL	4.5	-0.73	0.027	0.46	5.2	3.0	27.8	
NO	13.0	-0.73	0.067	0.44	9.7	7.1	25.1	
HU	12.9	-0.67	0.056	0.42	12.6	7.8	29.2	
AT	8.2	-0.67	0.040	0.41	7.0	4.6	23.8	
SI	11.4	-0.62	0.050	0.35	8.8	5.4	22.6	
NL	6.1	-0.78	0.040	0.50	6.6	4.0	24.5	
IS	9.0	-0.75	0.046	0.47	7.7	4.4	20.6	
SE	11.3	-0.70	0.055	0.44	8.5	5.9	24.0	
CZ	8.3	-0.68	0.040	0.44	6.8	4.2	24.7	
SK	7.6	-0.69	0.035	0.48	7.3	4.3	29.7	
Euro area	8 1	-0.70	0.040	0.42	74	5.0	28.3	
European	5.1	5.70	0.010	0.12		5.0	20.0	
Union	8.7	-0.68	0.040	0.42	7.7	5.3	27.7	

Source: EU-SILC 2010.

**Notes:** The cash benefits exclude old-age and survivor pensions. The countries are sorted by the level of original income inequality. Data weighted with cross-sectional weights.

Table 1 also allows assessing the impact of cash benefits in the poverty rate and in poverty intensity across countries. Consistent with the poverty line definition adopted at a European level, an individual is considered poor when her disposable income is below 60 per cent of median disposable income in the respective country.<sup>12</sup> As in the case of inequality, a simple comparison between the rate and intensity of poverty before and after cash benefits was undertaken, keeping the poverty line fixed. In addition, the last column of the table presents the share of benefits which effectively contribute to reduce poverty intensity, regardless of actually raising individuals above the poverty line. The main conclusion from this exercise is that cash benefits contribute to significantly reduce the level and intensity of poverty in Euro-

**12** The poverty rate corresponds to the proportion of the population which is poor; the poverty intensity corresponds to the average gap between the income of the poor population and the poverty line, measured as a fraction of the poverty line.

pean Union countries. However, in the cross section of countries, there is not a significant relationship between the initial poverty rate and the size of cash benefits, although there is a slight positive association in the case of poverty intensity.<sup>13</sup> In addition, it is interesting to note that there are some parallels between the efficiency of cash benefits in reducing inequality and the respective efficiency in declining the poverty rate and the poverty intensity. In Portugal, cash benefits have a slightly lower contribution than the European average in decreasing the poverty rate and the poverty intensity, but the share of benefits specifically targeted towards the poor is higher than the European average. In this sense, the evidence regarding the impact of cash benefits on poverty is similar to the one described for the case of inequality.

An intuitive way to evaluate the redistributive impact of a given policy is to analyze its importance in the various deciles of the income distribution. This assessment is presented in Charts 8 and 9. Chart 8 shows the share of cash benefits in total disposable income for each income decile. In turn, Chart 9 shows the fraction of total cash benefits received by each income decile. Note that the charts are based on disposable income deciles and not on original income deciles. The reason for this choice is due to the fact that cash benefits are much higher than original income in the first decile of the original income distribution (as evidenced in Chart 7), which would make Chart 8 unreadable for the remaining deciles.

The charts compare the data for Portugal with data for the euro area average, the European Union average, and the maximum and minimum values across the countries in the sample (which determine the shaded area). The charts illustrate some key ideas. Firstly, as expected, the magnitude of cash benefits declines with disposable income, reflecting the progressivity of these benefits already evidenced above (for Portugal and for all European Union countries). Secondly, cash benefits as a percentage of disposable income are generally lower in Portugal than in the European average, particularly in the two lowest deciles and in the two highest deciles of the disposable income distribution. This fact is also reflected in a relatively smaller fraction of total transfers targeted to these income deciles.

Finally, it is worth assessing briefly the potential redistributive impact of some policy developments regarding cash benefits in Portugal after 2009 (the reference year for income in the database). In recent years, cash benefits underwent significant changes in Portugal, particularly as regards the rules for calculating unemployment benefits, the degree of restrictiveness in accessing cash benefits, as well as their overall magnitude. According to information from the Directorate General for the Budget, expenditure on social benefits in cash remained relatively stable in nominal terms between 2009 and 2012, reflecting a significant increase in unemployment benefits – mainly associated to an unprecedented increase in unemployment – and a decline in family and youth allowances and in the minimum guaranteed income (Rendimento Social de Inserção) – which were primarily associated with changes in the rules underlying these benefits. These changes contributed to mitigate the redistributive impact of these benefits in Portugal – due to the decline in transfers with a relatively high degree of progressivity – and in this sense should have contributed to an increase in income inequality.

#### 4.3. The efficiency of redistribution via income taxes

The analysis of the redistributive efficiency of income taxes is presented in Table 2. It should be recalled that these taxes include the workers' contributions to Social Security. The latter typically contribute to mitigate the tax progressivity computed in this article (for a simulation of this impact in Portugal, see Rodrigues *et al.*, 2012).

The table suggests that countries with higher average tax rates have, on average, a lower degree of progressivity, although this association is not particularly strong. This suggests that in some countries there may be some compensation between the level of the income tax rate and its degree of progressivity. Additionally, the comparison of Table 1 with Table 2 allows once again to conclude that the redis-

# Chart 8





Source: Author's calculations based on EU-SILC.

**Note:** The shaded area is bounded by the maximum and minimum across countries in the sample. **Source:** Author's calculations based on EU-SILC. **Note:** The shaded area is bounded by the maximum and minimum across countries in the sample.

tributive effect of cash benefits is globally higher than the one originated by income taxes, despite the weight of income taxes in gross income being about two and a half times the weight of cash benefits in original income.

Chart 9

According to the evidence in the EU-SILC, the countries with the highest income tax rates are some Nordic countries (Norway and Sweden) and some continental European countries (The Netherlands and Austria). Income taxes are progressive in all countries. The countries with the highest degree of progressivity are Hungary, the United Kingdom, the Czech Republic and Slovakia. Portugal has an income tax rate lower than the European average and a degree of progressivity above the European average. The combination of these elements implies that the redistributive impact of income taxes in Portugal is actually higher than the European average.

Table 2 also presents evidence on the share of income tax paid by the two highest deciles of gross income. According to the evidence from the EU-SILC, the highest income deciles in Portugal pay a fraction of total income taxes clearly above the European average (around 60 per cent in Portugal, compared with about 50 per cent, on average, in the European Union). This figure for Portugal has only parallel in the United Kingdom. It is important to assess whether this stems from particularly high tax rates on the highest income brackets in Portugal or whether it reflects the high income inequality in Portugal, as evidenced in Section 3.

Chart 10 aims to evaluate this issue, by showing the average income tax rate for each gross income decile, comparing the Portuguese economy with the European average, as well as with the maximum and minimum of the countries in the sample. The chart reveals that, in Portugal, the income tax rates across all income deciles stand below the European average, although there is a convergence in the upper income deciles. The relative disproportion in the fraction of income taxes paid by the highest income deciles in Portugal seems therefore to essentially translate the high income inequality prevailing in the Portuguese economy. Finally, Chart 11 shows the fraction of total income taxes paid by each income decile. Again, the uniqueness of the Portuguese case stands out, not only in the high share of income taxes paid by the highest income deciles, but also in the relatively small share of income taxes paid by those income deciles immediately above the median.

## Table 2

IMPACT OF INCOM	IE TAXES ON INEQUAL	11 Y				
	Tax rate (income taxes over gross income) %	Kakwani progressivity index	Total redistributive effect (decline in Gini index)	Share of income taxes paid by the two highest gross income deciles (as a percentage of tota income taxes) %		
LT	15.5	0.13	0.022	54.6		
LV	17.2	0.16	0.030	55.8		
PT	18.9	0.20	0.042	61.2		
UK	21.1	0.23	0.058	62.4		
GR	22.3	0.16	0.042	55.2		
RO	18.3	0.16	0.030	53.1		
IT	24.0	0.14	0.041	52.5		
ES	13.2	0.16	0.022	53.3		
DE	24.6	0.16	0.044	52.3		
BG	9.2	0.13	0.012	49.9		
EE	14.2	0.17	0.028	51.9		
PL	21.9	0.07	0.016	45.0		
FR	17.4	0.12	0.023	48.9		
MT	15.6	0.19	0.034	53.0		
LU	21.3	0.16	0.036	52.0		
AT	26.4	0.14	0.046	50.6		
BE	24.1	0.18	0.047	49.0		
NL	33.2	0.11	0.047	44.9		
FI	23.1	0.15	0.043	48.2		
SI	22.2	0.22	0.057	53.2		
HU	21.4	0.24	0.057	57.8		
DK	32.1	0.08	0.037	42.8		
IS	25.3	0.09	0.028	42.6		
NO	26.2	0.14	0.044	45.8		
CZ	14.2	0.23	0.036	52.7		
SE	26.1	0.09	0.030	43.6		
SK	9.8	0.23	0.019	53.3		
<b>F</b>	20.7	0.17	0.020	52.0		
Euro area	20.7	0.17	0.038	52.0		
European Union	20.3	0.16	0.036	51.9		

Source: EU-SILC 2010.

**Notes:** Income taxes include employees' social security contributions. The countries are sorted by the level of gross income inequality. Data weighted with cross-sectional weights.

Interestingly, the ranking of the different European Union countries in terms of average tax rates remains relatively unchanged over the various income deciles. Focusing on the highest income decile, the lowest average income tax rates, at around 15 per cent, are found in Bulgaria and Slovakia, and the highest, at about 40 per cent, are recorded in the Netherlands and in Denmark.

Finally, as in the case of cash benefits, it should be noted that in the recent past there have been changes in the income tax system with a significant redistributive impact. Since 2009, two developments in this field are worth highlighting. Firstly, there was a concentration of certain tax benefits in the lowest income brackets. This should have contributed to increase the progressivity of the income tax in Portugal. Secondly, it is worth underlining the set of changes in income taxation approved under the State Budget for 2013. These changes imply a significant increase in the average tax rate across all income deciles. The income tax rate on the highest income brackets in Portugal should now stand above the European average. The available information suggests that there should be a slight decline in the degree of progressivity of income taxes after these changes, since households with lower average income tax rates will record a



## Chart 10





**Note:** The shaded area is bounded by the maximum and minimum across countries in the sample. **Source:** Author's calculations based on EU-SILC. **Note:** The shaded area is bounded by the maximum and minimum across countries in the sample.

higher per cent increase in payable taxes.<sup>14</sup> In terms of redistributive impact, the increase in the average income tax rate, by its magnitude, should dominate the decline in the degree of progressivity of the tax. These changes should thus contribute to reducing income inequality in Portugal. It should be noted however that this is a partial equilibrium assessment, since it does not address the general equilibrium impact on the generation and on the distribution of income in the economy.

#### 5. Conclusions

Income redistribution is an important dimension of State intervention in a market economy. In fact, to a greater or lesser extent, redistributive policies aim at promoting greater equity and a greater equality of opportunity for all citizens. These goals are achieved through the strengthening of mechanisms of risk-sharing, through ensuring – conditionally or unconditionally – certain income floors, as well as through correcting market failures that generate an excessive level of income inequality. This paper aimed at analyzing the effectiveness and efficiency of redistributive policies in Portugal and in the European Union, focusing on the role of cash benefits (excluding pensions) and income taxes. The analysis was based on microdata from EU-SILC 2010. Despite some limitations of the database, several conclusions may be highlighted.

First, redistributive policies significantly reduce income inequality in the European Union, although with a high heterogeneity across countries. Countries with the lowest disposable income inequality combine a relatively low level of original income inequality with sizeable income redistribution via cash benefits and income taxes. This outcome is necessarily founded on a set of institutions, policies and social preferences geared towards reduced income disparity among citizens. In turn, Portugal has one of the highest levels of income inequality in the European Union – particularly marked in original income and in the upper half of the income distribution – and a degree of redistribution via cash benefits and income taxes close to the European average.

Source: Author's calculations based on EU-SILC.

<sup>14</sup> It should be noted that this fact is consistent with a higher increase, in percentage points, of average tax rates in the higher income brackets. In fact, when a tax is progressive to start with, even a proportional increase – which, by definition, does not alter its progressivity – implies a higher increase, in percentage points, of income tax rates in the higher income brackets.

Secondly, the redistribution of income in European countries operates mainly via cash benefits – clearly targeted at the lower income brackets – and, to a lesser extent, through the progressivity of income taxes. Nevertheless, the tax systems always play a key role in the redistributive process, since they ensure the provision of social benefits and, *inter alia*, the financing of the most powerful tool for fighting inequalities in the long run: the investment in education.<sup>15</sup> In a society with excessive inequalities as the Portuguese, there is a marked discrepancy between those who sustain the tax base and those who benefit the most from cash benefits. This discrepancy implies important dilemmas, in particular due to the need to undertake interpersonal comparisons of welfare gains and losses, as well as to the fact that the political institutions and social choices do not always favour a further redistribution of income, even when it obeys to the Pigou-Dalton principle (*i.e.*, when it generates greater social equality).

Thirdly, a comprehensive evaluation of the redistributive process should seek to identify the efficiency of each policy instrument. The Portuguese case clearly illustrates this assertion. In fact, the evidence based on EU-SILC suggests that cash benefits (excluding pensions) in Portugal have a relatively low redistributive impact in the European context. However, the decomposition of this impact shows that it arises exclusively from the relatively small size of those benefits in Portugal. In terms of efficiency, Portugal is actually one of the countries in which cash benefits (excluding pensions) are more targeted towards the lowest incomes. With respect to income taxes, their redistributive impact in Portugal. This article also showed that the high fraction of total income taxes paid by the top income deciles in Portugal – one of the highest in the European Union – is due primarily from the high gross income inequality in Portugal, given that average income tax rates paid by those income deciles do not differ substantially from the European average.

Finally, it should be noted that this article did not address several important issues in the ongoing debate on redistributive policies in Portugal. First, the pension system - due to its intertemporal impact on public finances and its importance as an intergenerational solidarity instrument – deserves a particularly careful sustainability analysis, which goes beyond the scope of this article. There is also a set of policies implementing a universal provision of goods and services which are deemed essential to the community and which have a crucial role in reducing inequality in the long run. These policies, with a significant impact in terms of social welfare, were also not object of analysis in this study. Secondly, an assessment of redistributive policies in a country must be accompanied, or even preceded, by an examination of predistributive policies, *i.e.*, the institutional framework and policies that determine the market generation and distribution of income. Competition policies, the functioning of the judicial system, research and development policies, the functioning of the labor market and, crucially, the policies aimed at enhancing human capital in the medium term, are key elements in this pre-distribution process. Thirdly, there is a broad consensus that redistribution through the tax and transfer system should become increasingly integrated and coherent in order to increase social welfare for the same level of resources. Some recent contributions of exceptional quality may establish a benchmark in terms of international best practices (see Mirrlees et al., 2011). These issues require further study in the future and, hopefully, should be part of the set of available information for structural decision-making in these areas.

Π

#### REFERENCES

- Alves, N., M. Centeno and A. Novo (2010), "Investment in Education in Portugal: Returns and Heterogeneity", *Economic Bulletin Spring*, Economics and Research Department, Banco de Portugal.
- Atta-Darkua and A. Barnard (2011), "Distributional effects of direct taxes and social transfers (cash benefits)" in *Income and Living Conditions*, Eurostat.
- Bastagli, F., D. Coady and S. Gupta (2012), "Income Inequality and Fiscal Policy", *IMF Staff Discussion Note*, SDN/12/08.
- Brewer, M., M. Dias and J. Shaw (2012), "A dynamic perspective on how the UK personal tax and benefit system affects work incentives and redistributes income", *IFS Briefing Note* BN132.
- Comissão Europeia (2010), EU-SILC 065 (2010 operation) Description of target variables, Eurostat.
- Comissão Europeia (2012), *Employment and Social Developments in Europe 2011*, Chapter 2 "Are our societies working fairly? Recent changes in income inequality".
- Esping-Andersen, G. (1990), The Three Worlds of Welfare Capitalism, Princeton University Press.
- Immervoll, H. and L. Richardson (2011), "Redistribution policy and inequality reduction in OECD countries", *IZA Discussion Paper* No. 6030.
- Joumard, I., M. Pisu and D. Bloch (2012), "Less income inequality and more growth are they compatible? Part 3. Income redistribution via taxes and transfers across OECD countries", OECD Economics Department Working Paper, No. 926.
- Kakwani, N. (1977), "Measurement of tax progressivity: an international comparison", *The Economic Journal*, 87(345), pp. 71-80.
- Kakwani, N. (1979), "Measurement of tax progressivity: a reply", *The Economic Journal*, 89(355), pp. 653-657.
- McCarty, N. and J. Pontusson (2009), "The political economy of inequality and redistribution", Chapter 26 in W. Salverda, B. Nolan, T. Smeeding (eds.), *The Oxford Handbook of Economic Inequality*, Oxford University Press.
- Mirrlees, J, S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba (2011), *Tax by Design: the Mirrlees Review*, Oxford University Press.
- OCDE (2011), Divided We Stand: Why Inequality Keeps Rising, OECD.
- OCDE (2012), "Income inequality and growth: The role of taxes and transfers", OECD Economics Department Policy Notes, No. 9.
- Piketty, T. and E. Saez (2012), "Optimal labor income taxation", *NBER Working Paper* 18521, a publicar no *Handbook of Public Economics*, Volume 5.
- Rodrigues, C. F. (coord.), R. Figueiras and V. Junqueira (2012), *Desigualdade Económica em Portugal*, Fundação Francisco Manuel dos Santos.
- Stiglitz, J. (2012), The Price of Inequality, Allen Lane, Penguin Books.
- Van Kerm, P. (2009), "sgini Generalized Gini and concentration coefficients (with factor decomposition) in Stata", CEPS/INSTEAD, Luxembourg.

# WHAT ACCOUNTS FOR PORTUGUESE REGIONAL DIFFERENCES IN STUDENTS' PERFORMANCE? EVIDENCE FROM OECD PISA\*

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#### ABSTRACT

This paper studies regional differences in students' educational performance and inequality in Portugal. Despite the centralized nature of the Portuguese educational system, there are significant differences across regions. We consider firstly the role of school and family factors. Results suggest that individual and family backgrounds play an important role in explaining both achievement and inequality. School characteristics are also important but only in terms of performance, while the role of "pure" regional effects is limited. From a policy perspective there is scope for school intervention, namely regarding school organization and teachers' responsibilities. Nevertheless, to target educational inequality, educational policy needs to take into account the school-family-community context and should not focus exclusively on schools.

### **1. Introduction**

Despite some improvements in various educational statistics in the last decade, Portugal still ranks low among OECD countries. For instance, only 32 per cent of working-age population has attained at least upper secondary education in 2010 compared to the OECD average of 75 per cent.<sup>1</sup> Furthermore, the high drop-out rate associated with low skills remains a major problem. These disturbing figures are not homogeneous across Portuguese regions. For example, the percentage of working-age population that has attained at least upper secondary education in 2010 goes from 20 per cent in Madeira and Azores to around 45 per cent in Lisboa. The illiteracy rate goes from around 3 per cent in Lisboa and Porto to about 10 per cent in Alentejo. Moreover, indicators of educational achievement in Portugal, such as the results of national examinations, show important territorial variation. It is worth noting that the regional profile of educational outcomes and educational achievement seem to be positively associated. The OECD's Programme for International Student Assessment (PISA) 2009 included, for the first time, detailed information about the Portuguese regional distribution of the students in the sample<sup>2</sup>, which confirms the mentioned regional disparities. Therefore, given the highly centralized nature of the Portuguese Educational System, for instance, as far as teacher hiring and pay and definition of curricula are concerned, it is important to understand what is behind such differences.

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<sup>1</sup> Among the OECD countries only Turkey presents similar values. For the youngest group (aged 25-34) figures are better (52 per cent) but still well below the OECD average of 82 per cent.

<sup>2</sup> The regional breakdown takes as a reference the Nomenclature of Territorial Units for Statistics (NUTS) – level 3 (see Appendix 1).

This paper investigates the determinants of regional differences regarding the level and inequality of students' performance<sup>3</sup>, using the standard education production function approach (Todd and Wolpin, 2003), *i.e.* the knowledge of the process by which education is produced. Education production functions provide the means for understanding this process by estimating the effects of the various inputs on student achievement measured by test scores. The explanatory variables are individual characteristics, family background and school resources. We will also examine the relationship between regional disparities and characteristics.

We start by studying students' achievement. One natural explanatory factor for regional heterogeneity is the diverse socioeconomic background of student population across regions. As a first step, one quantifies and nets out the effect of this background on observed gaps in average scores throughout regions. We then investigate to what extent the remaining differences can be ascribed to schools and pure regional factors. In Portugal, one may expect the existence of very little institutional variation (except as far as public versus private schools are concerned, but then the reduced number of the latter in the PISA sample, precludes taking full advantage of this). Nevertheless, there may be differences among schools, for instance, regarding their organizational features and teachers (e.g. schools located in more affluent areas may attract better teachers). Lastly we examine the sources of education inequality. In the spirit of the Coleman Report (1966)<sup>4</sup>, and following Carneiro (2008) and Carneiro and Reis (2009), one compares again the role of family and school factors in determining achievement inequality within regions.

Identifying the sources of achievement level and inequality is particularly relevant for the design of public policies targeting students or schools. Such evidence may, for example, lead to a better perception of how equality of opportunity can be achieved. As far as we are aware, for Portugal, this regional field has hardly been explored (beyond the descriptive level of analysis). Despite being a first analysis, our results are a good starting point to get some insights for the debate on the educational system. In particular, the effectiveness of a centralized educational system compared to a decentralized one, namely regarding school organization, responsibility and accountability.

The estimation of education production functions raises a number of issues. Some of the teacher and school characteristics are unobservable, giving raise to unexplained variation of outcomes across schools and regions. At the same time, the effect of socioeconomic composition of schools (both direct and through peers') on outcomes may not be fully captured by family variables. Moreover, differences in achievement across regions may also reflect pure regional factors which are as well unobservable, for instance, the valuation of knowledge and human capital may vary across regions. Finally, family, school and regional characteristics (observable and unobservable) interact and are most likely correlated with each other. In this case, some variables in the education production function may be endogenous and reflect, to some extent, the effect of unobservables. In spite of these caveats, trying to provide an estimate of the relative importance of family, school and regional environment is an interesting and instructive exercise.

Our study contributes to the vast literature on educational performance. In particular, it belongs to the strand of literature devoted to regional analyses of PISA outcomes such as Wössman (2007), for Germany, Bratti et al. (2007), for Italy, and Ferrera et al. (2010), for Spain. Some of these regional studies, notably for Germany, take advantage of within-country institutional variation given the decentralized nature of their educational systems. The article is organized as follows. In Section 2, we describe overall patterns in the data. Section 3 presents the regional analysis of educational achievement. Section 4 examines within- and between-region educational inequality. Section 5 concludes.

**<sup>3</sup>** Portuguese achievement levels in PISA showed some convergence to the OECD average between 2000 and 2009 (Pereira, 2011). Unfortunately, we cannot explore the regional dimension of such evidence due to data restrictions.

**<sup>4</sup>** The Coleman Report was a seminal study, for the United States, investigating the relative role of family factors and school resources in achievement, highlighting the importance of students' socieconomic background and social inequality (segregation).

## 2. The database and descriptive analysis

The PISA 2009 database for Portugal comprises 6298 students belonging to 214 schools of which 209 are assigned to regions of NUTS3. The student, family and school variables used in the regressions throughout the paper are basically those already employed in previous studies using PISA data, such as Pereira (2010, 2011). There are a couple of additions, nevertheless, which are worth highlighting (a full list of the variables used, and respective means by region, is given in Appendix 2).<sup>5</sup> An indicator of year repetition was computed from questions included in the student questionnaire, which allows separating the effect of repetition from the effect of exposure to different curricula (captured by grade, also part of the set of regressors). In this context, the variable age entering the regressions in previous studies becomes redundant (see the discussion in Pereira, 2010, about the interaction of grade and age). A wide group of school variables existing in the PISA 2009 database and covering aspects for which information is normally less readily available was taken on board as well. These variables include, in particular, indicators capturing aspects of students' and teachers' behavior that may affect school outcomes, the way activities of teachers are monitored (e.g. through peer review), and the existence of extra-curricular activities at schools. In addition to using data from PISA, we also comment on the correlation of certain results with regional indicators covering economic characteristics, literacy, attitude towards education, attractiveness of the region and social behaviour.

#### **Regional breakdown**

The NUTS3 breakdown divides the Portuguese territory into 28 regions. PISA is a sampling survey and for some of these regions only a reduced number of students and schools were sampled (namely, around 50 students belonging to 2 schools). Therefore, it was necessary to use a more aggregated regional breakdown. At the same time, similarities among some regions of the NUTS3 allow further aggregation without raising big homogeneity concerns. We have aggregated the 28 regions of the NUTS3 into 12 - Norte Interior, Norte Litoral, Grande Porto, Centro Interior, Centro Litoral, Vale do Tejo, Grande Lisboa, Alto Alentejo, Península de Setúbal, Baixo Alentejo, Algarve e Ilhas (Chart 1) - which in our view strike the right balance between aggregation needs and capturing regional variability across Portugal<sup>6</sup>. The correspondence between the NUTS3 and this 12-region breakdown is presented in appendix 1.

#### **Test scores**

Chart 2 shows the mean score in PISA 2009 for mathematics and reading by region. We found it useful to show for comparison the mean score in the 2009 national exams at the end of basic education for mathematics and Portuguese language (re-scaled to have the mean of PISA scores). As far as PISA scores are concerned, the results generally correspond to what one would expect, especially in that Lisboa, Porto and coastal regions in-between feature the highest levels of achievement. There are a couple of more unexpected findings though, for instance, the high scores of students in Centro Litoral, slightly surpassing their colleagues in Lisboa and Porto in mathematics, and the low achievement levels of Algarve and Setúbal, in spite of the fact that these regions have relatively favourable development indicators. The difference between the maximum and minimum score across regions (50 to 60 points) is around 2/3

<sup>5</sup> Similarly to previous studies, missing values for several regressors were imputed through a regression procedure (see Pereira, 2010, Appendix 2, for more details) taking as core variables grade, age, gender, school location and region.

**<sup>6</sup>** It is worth noting that our regional breakdown is still more disaggregated than those used in studies for other countries, given the respective sizes. For instance, the aforementioned studies for Germany, Italy and Spain are based on breakdowns with, respectively, 16, 18 and 11 regions.

## Chart 1

**TWELVE - REGION BREAKDOWN** 



# Chart 2



Source: Authors' calculations.

**Notes:** PISA mean scores are computed averaging out the means for the five plausible values (student data). National examination mean scores are computed from the results by NUTS3 reported in GAVE (2012) and are scaled to have the overall mean of PISA scores; the figure for Ilhas includes Madeira only, as Azores results are not reported.

of one standard deviation both for mathematics and reading, a figure very similar to the one for Spain<sup>7</sup> which has performance levels similar to Portugal.

In order to illustrate better what the PISA regional gaps mean in practice, we place the Portuguese regions against the group of 34 OECD countries for which results are available. The best region in mathematics, Centro Litoral, would come just after the 12th country, Iceland, while the worst, Ilhas, would be placed at the bottom of the ranking after the 31st position, occupied by Israel. A similar comparison for reading indicates more marked disparities, with the top-performing region, Lisboa, in the 6th place, slightly above the Netherlands, and Norte Interior, which has the lowest score, after the 32th country, Turkey. In short, there are important differences in schooling outcomes across Portuguese regions, as measured by PISA scores.

We now compare the outcomes in PISA and in the national exams. Chart 2 shows visible correlation between the regional scores in each source (though there are a few exceptions, namely, Lisboa and Setúbal for mathematics, and again Lisboa for reading).<sup>8</sup> Therefore the findings of an analysis based on PISA outcomes, such the one presented here, would most likely remain valid, if the investigation was based on outcomes of formal testing procedures like the national exams. The differences in measured achievement according to the two sources may be accounted for by several reasons. Firstly, PISA is geared toward assessing the acquisition of skills believed useful for productive life, while the national exams evaluate the knowledge of a pre-defined curriculum. Secondly, the target population does not entirely match in the two sources (students aged 15, spreading throughout several grades in PISA vs. students in the 9th grade in the national exams). Thirdly, the PISA survey is based on a sample that covers only a fraction of the relevant student population.

Chart 3 presents the regional breakdown of PISA results in terms of the proficiency levels, which link scores to the actual degree of difficulty of the tasks students can perform (see, for instance, PISA, 2010,



#### Chart 3

Source: Authors' calculations.

Note: The percentages shown are computed averaging out the relevant percentages of students for the five plausible values.

- 7 Considering the regional breakdown presented in the Annex B2 of PISA (2010) and excluding the region Ceuta y Melilla which has much worse outcomes than any other Spanish region.
- 8 The better educational outcomes of Lisboa in PISA relative to national exams could reflect the fact that the advantage of living in a large city is more visible under PISA-type testing than under curricula-based assessments. Another possible reason could be that a particularly favourable sample of students was gathered for this region in PISA 2009. As regards Setúbal, the very goods results in the 2009 mathematics exam may have been an outlier; in 2011 the region has results at an intermediate-low level.

Chapters 2 and 3). The charts show in red the proportion of students who are not able to perform tasks which enable them to participate productively in society (proficiency level 1 and below), and in blue the share of students who are in a position to complete rather demanding tasks. Regions are sorted according to their average score. There is a high proportion of students at a very low proficiency level, especially in mathematics, in the five worst-performing regions. Furthermore, for mathematics, the decrease in the proportion of students at the lower cohorts, as average performance goes up, is matched by an increase at the upper cohorts. This indicates that the regional distributions are shifting to the right, but are about equally compressed. In contrast, for reading, the increase in the average score is mainly due to the decrease of the number of students at lower performance cohorts, meaning that the regional distributions become somewhat more compressed as the mean increases.

#### **Explanatory variables**

We end this section with a brief analysis of regional statistics for the explanatory variables (see Appendix 2). Starting with the repeater indicator, it shows a marked regional variation with values going from 28 per cent in Centro Litoral and Porto to 52 per cent in Algarve. Given the observed regional heterogeneity, it is not reasonable to presume that the indicator is reflecting only disparities in students' innate ability.<sup>9</sup> The condition of repeater may reflect other factors associated to families, schools and even regions (thus although classified as a student variable for convenience, the scope of the repeater indicator is broader). Considering the breakdown by grade, there is also important variation throughout regions: the proportion of students in the 10th grade ranges from 37 per cent in Algarve to 68 per cent in Centro Litoral. There is obvious correlation between the distribution by grades and the repeater condition. However, such distribution is also influenced by PISA sampling procedures (see Pereira, 2011).

Concerning family variables, the pattern of variation seems to be in general the expected one, in line with the relative living standards prevailing in the regions. Ilhas stands out for having a much worse situation than any other region, included the disadvantaged ones, as far as the wealth and educational resources indicators are concerned. As regards parental education and occupations, it is the higher position of Lisboa that stands out, even vis-a-vis the other best-performing regions. For example, the share of students who have at least one parent with tertiary education is 47 per cent in Lisboa, and 28 per cent while in Centro Litoral, the second highest. Regions with low levels of achievement, such as Ilhas and Norte Interior, visibly lag behind in terms of socieconomic indicators, although there are exceptions and performance and socioeconomic variables do not always move in the same direction.

This study considers a large number of school variables. Although there is much heterogeneity in the patterns of variation across regions, a number of general points can be made. Given the centralized nature of the Portuguese school system, it is understandable that some institutional variables point to regional uniformity. Such is the case of the indicators of autonomy in allocation of resources, curricula definition and assessment methods<sup>10</sup>, and hours of regular lessons. The average school size has important discrepancies, ranging from around 400 students in Baixo Alentejo to 1200 in Ilhas. Considering this indicator in conjunction with grade amplitude, one can further observe that the size of schools in these two regions is associated, respectively, with the narrower and wider scope of grades offered; in other cases, such as Norte Interior, schools are relatively small despite having a wide scope of grades.

The resource indicators show a mixed picture. The class size shows some variability, ranging from around 19

**<sup>9</sup>** One may suppose that for a large number of students (for instance, if the full population was being considered), innate ability could average out to similar values across regions. In the PISA case, though, the sampling process may introduce some regional heterogeneity in this respect.

**<sup>10</sup>** These indicators are standardized to having mean zero and unit standard deviation across the OECD. Therefore, the figures for Portugal (-0.44 and -0.93, respectively, for the autonomy of resources and curricula/assessment indicators) imply that Portuguese schools enjoy little autonomy for OECD standards.

students in Ilhas to 24 in Porto, assuming larger values in the more populated areas; the same tendency, in this case showing smaller figures, can be observed for the student-teacher ratio. In contrast, schools report uniformly throughout regions an absence of teacher shortage and a high proportion of full-time teachers. As regards material resources, variables related to availability of computers and internet connections do not differ much across regions (except for Ilhas which has a very high figure for the former variable), while the indicator of educational resources at school (that have a broader scope than just IT equipment) reveals more marked gaps across regions. Some of the remaining variables considered measure potentially important explanatory factors, but are at the same time more prone to being affected by the subjective judgment of who filled in the questionnaire. Indicators for student and teacher attitudes that can affect the school climate show some regional heterogeneity, as do the indicator of leadership, measuring the involvement of the management in school affairs, and the indicator of teacher monitoring (tests and peers). The proportion of schools that report parental pressure to raise standards is generally low (the highest figure is 27 per cent for Lisboa) and completely absent in some regions.

### 3. Regional profile of educational achievement

## 3.1 The role of individuals and families

We saw in the previous section that students in wealthier regions tend to have better performance and that other variables, such as their distribution between the 9th and the 10th grade, also showed considerable regional variation. In face of this evidence, our investigation starts by quantifying the impact on performance of the student and family variables and determining what remains of the initial regional gaps after these variables are controlled for. We follow the education production function approach, which relates test scores with student, family and school factors. Note that there are unobservable variables that affect test scores and, at the same time, are likely to be correlated with some of those regressors. Hence, estimation results cannot be given a straightforward casual interpretation. Nevertheless, the use of school fixed-effects (i.e. binary variables for each school), as explained below, allows us to control for all observed and unobserved school characteristics. Moreover, the fixed-effects for the full set of schools within a given region add up exactly to the respective regional fixed effect, and will thus capture regional variability as well. We estimate by OLS (pooling data for all regions) the following education production function:

$$T_{ijr} = \alpha + \beta F_{ijr} + \gamma \phi_{jr} + \varepsilon_{ijr} \tag{1}$$

where  $T_{ijr}$  is the test score of student *i* of school *j* in region *r*,  $F_{ijr}$  is a vector including regressors for gender, repeater condition, grade and the set of socioeconomic characteristics listed in appendix 2, and  $\phi_{jr}$  is a vector of school fixed-effects. As said, their inclusion allows a more accurate estimation of the coefficients of regressors in  $F_{ijr}$ . The conditional mean for a given region can be retrieved as the (weighted) average of the estimated coefficients of the fixed-effects for all schools located there (i.e. averaging out the coefficients of  $\phi_{jr}$  over each region).

We first report briefly on the estimation results for the regression above (see Appendix 3). These are very much the expected ones, with the repeater and grade indicators clearly significant and having the strongest impact on test scores (note that the size of the coefficients can be directly compared for binary variables). Family indicators are as well generally significant and, as it is often the case, the number of books at home stands out as the most important regressor in this set. As far as parental education and occupations are concerned, only the upper categories (respectively, upper secondary or tertiary and white

collar/highly skilled) seem to make a difference for test outcomes although with a relatively small impact.<sup>11</sup>

The results are shown in Chart 4, in terms of the gap of each region vis-a-vis a reference region<sup>12</sup> - for which Lisboa was chosen. For the sake of comparison, the corresponding results for the unconditional mean are also shown. When the conditional mean is taken, the gap between Lisboa (or, more generally, the top-performers) and the regions with intermediate to low achievement shortens, albeit remaining negative, both for reading and mathematics. Such regions appear in the charts to the left of the 45° line, and the distance to this line measures the magnitude of the difference between the two means (which is greatest for Ilhas, Norte Interior and Algarve). This reflects a comparatively unfavourable situation vis-a-vis Lisboa as far as socioeconomic composition and/or student variables are concerned. In contrast, the situation of Porto and Centro Litoral in relation to Lisboa barely changes, indicating similar characteristics in terms of the variables which are being held constant. Vale do Tejo builds an exception in that, having already relatively high test scores, it clearly improves the position against the other top-performers, when conditional mean scores are taken (especially in mathematics).

The evidence resulting from Chart 4 indicates that student and family variables although important explain only part of the unconditional regional gaps. Note, in particular, that the initial relative position of the various regions is roughly preserved after student and family variables are controlled for.<sup>13</sup> Nevertheless, some shrinkage of the gaps across regions follows and, in line with this, the respective statistical significance becomes less sharp.<sup>14</sup> For instance, in the unconditional analysis Lisboa's mean in mathematics is significantly different to every region except for the other three in the group of four top performers (Centro Litoral, Porto and Vale do Tejo); in the conditional analysis the mean gap to Lisboa becomes, in addition, not significant vis-a-vis Algarve, Alto Alentejo and Centro Interior. This weakening of the statistical significance of gaps, holding constant the family and student variables, is clearer for reading.



## Chart 4

Source: Authors' calculations.

**Notes:** The y-axis shows the regional averages of the coefficients of school fixed-effects in regression (1), estimated pooling the data for all regions; the x-axis shows the unconditional mean.

- **11** A more unexpected result concerns the estimated positive influence on scores of belonging to a monoparental family. This variable could be capturing a possible higher socieconomic standing of such families, but this should be controlled for by the other family regressors included in equation (1).
- **12** We show the results as gaps between regions rather than absolute values because the level of conditional means is of difficult interpretation.
- 13 This issue is addressed in more detail at the end of Section 3.2.
- 14 Matrices with the significance of mean differences for all pairs of regions are available upon request.

In this case, if one excludes the best-performing region, Lisboa, and the three worst performers, Norte Interior, Ilhas and Baixo Alentejo, the other regions belong to an intermediate group whose mean scores are statistically not different from each other.

We finalize this section by presenting a decomposition of the regional average gaps vis-a-vis Lisboa by means of a Oaxaca-type decomposition, into what is accounted for by student variables proper (gender and repeater indicator), grade indicators and socieconomic variables, i.e. the regressors included in vector F, and an unexplained part which we assign to schools and regions. This unexplained part reflects the difference in the estimated coefficients for the constant and student and family variables between each region and Lisboa, plus the difference accounted for by the school-fixed effects.<sup>15</sup> These results complement the evidence presented in Chart 4, since the difference between the unconditional and conditional gaps is conceptually the sum of the student, grade and family effects, while the remaining gap corresponds to the unexplained part. Chart 5 confirms that the influence of schools and regions (yellow bar) is generally at least as important as the impact of families and individuals (which corresponds to the sum of the remaining bars). The charts indicate for all regions an unfavourable socioeconomic composition vis-a-vis Lisboa. In most of them the distribution of students by grade also contributes negatively to the gap to Lisboa, and in certain cases (notably, Algarve, Setúbal and Alto Alentejo) has an effect comparable to that of family. The role of student variables is essentially driven by the repeater indicator, as the average figure for gender has very little regional variation. Most regions are penalized in the results for having a higher proportion of repeaters than the reference region, particularly those with an intermediate to low level of performance. Note that, as already mentioned, this indicator is most likely capturing a mixture of effects, going from students' innate ability to family, school and regional influences.



# Chart 5

Source: Authors' calculations.

**Notes:** The decomposition is based on the estimation of equation (1) by region. The effects of student, grade and family variables are calculated as  $\beta_{L}(F_{gr}^{*} - F_{gr}^{*})$ , where  $F_{gr}^{*}$  and  $F_{ls}^{*}$  are, respectively, the averages of *F* regressors in region *r* and Lisboa, and  $\beta_{L}$  are the respective estimated coefficients for Lisboa. The school/region effect is calculated subtracting the effects of student, grade and family variables from the difference in the unconditional means between region *r* and Lisboa (this corresponds to  $(\beta_{r} - \beta_{L}) F_{gr}^{*} + \gamma_{r} \phi_{gr}^{*} - \gamma_{r} \phi_{L}^{*} + \alpha_{r} \alpha_{u}$ , where  $\beta_{r}$ ,  $\gamma_{r} \gamma_{u}$ ,  $\alpha_{r}$  and  $\alpha_{u}$  are the additional estimated coefficients for region *r* and Lisboa in equation (1), and  $\phi_{gr}^{*}$  and  $\sigma_{u}^{*}$  the average fixed-effects).

**15** This Oaxaca-type decomposition deviates from the traditional version in that it includes the school fixed-effects that cannot be compared across regions. Therefore, in our decomposition the unexplained part comprises not only the traditional difference between the coefficients estimated for each region (for the regressors in F and the constant term), but also what is accounted for by the school fixed-effects.

#### 3.2 The role of school characteristics

In this section we want to understand to what extent observable school characteristics explain the remaining regional differences described in previous section, i.e. after controlling for individual and family background. More specifically, we regress the estimated school fixed effects from Section 3.1 ( $\hat{\gamma}\phi_{jr}$ ), on observable school variables<sup>16</sup> ( $S_{jr}$ ) and regional fixed effects ( $\varphi_r$ );  $\xi_{jr}$  represents the usual error term.

$$\hat{\gamma}\phi_{jr} = \eta S_{jr} + \varphi_r + \xi_{jr} \tag{2}$$

Chart 6 presents, for mathematics and reading, the regional fixed effects (the remaining regional gap) of the two specifications estimated from equation (2). One using exclusively school variables (red dots), and another one in which we add the possible effect of student peers (yellow dots). In general, observable school characteristics appear with the expected sign and are jointly significant (F-test). Results can be found in appendix 3. As before, the regional results represent differences to Lisboa. Notice that, if observable school variables are not enough to explain such differences, it means that there is a role for unobservable school characteristics and pure regional effects.

Firstly, for mathematics, the chart shows an improvement of the position of all regions relative to Lisboa, except for Porto, after controlling additionally for observable school characteristics. These regions appear in the charts to the left of the 45° line (not shown), reflecting a negative contribution of the observable school resources to the respective scores in comparison to Lisboa. In particular, for Norte Interior, Baixo Alentejo and Centro Interior this effect is very strong, which is suggestive, for example, of the low levels of educational resources and parental pressure. Moreover, after controlling for both family and school characteristics, the number of regions with better performance than Lisboa increases considerably, with the gap changing sign in several cases (Alto Alentejo and Centro Interior stand out in this respect).

Note that, the remaining differences among regions are, in general, not statistically significant with the exception of Vale do Tejo and Centro Litoral, on the positive side, and Ilhas on the negative. A student with the same family background and attending a similar school would perform better in Vale do Tejo and Centro Litoral than in any other region. Despite the observed convergence, a pupil with the same



#### Chart 6

#### Source: Authors' calculations.

**Notes:** Red - the regression used only school variables; yellow - the regression included also a proxy for peer effects (average of books at home at the school level). In the x-axis we have equation (1) in which we regress school fixed-effects only on regional fixed effects (conditional on individual and family). In the y-axis we have equation (2) results (conditional on individual, family and school).

16 A full description of the variables can be found in appendix 2.

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family background and attending a similar school in Ilhas would still perform worse than in Lisboa and other regions.

The results in reading show a similar pattern. In general, observable school variables are contributing for worse results in the various regions in comparison to Lisboa, except for Porto. The remaining differences among almost all regions fade away, *i.e.* with the same familiar and school context performance would be similar. Only Ilhas and Norte Litoral continue to present statistically significant worse results than other regions: given the family background and school resources, a student there would still perform worse.

An additional exercise was performed to infer the potential regional differences in terms of peer effects. We add to equation (2) a family background variable at school level to proxy the peer effects.<sup>17</sup> As we can see in Chart 6 (yellow dots), the impact of peer effects seems to be relatively modest, except for Ilhas. In this case, the remaining gap becomes smaller, albeit remaining negative and significant.

Although our observed school variables may not vary exogenously and may reflect the effect of unobserved school variables, it is clear that schools and not only the family background have an important role in determining test scores. The importance of schools emphasizes that there is scope for educational policy to reduce existing differences regarding school resources and organization, notably as far as teachers' role is concerned. In contrast, using PISA 2000 Carneiro (2008) found that school resources were particularly unimportant. One possible explanation for this result is that few teacher variables were available in 2000. Nevertheless, our results do not invalidate that an innovative education policy is needed so that the resources accessible to schools are better used and the role of family should be taken into account.

This article contributes to the discussion of whether educational policy may be more decentralised in terms of school responsibility, organization and accountability. The results suggest that among the observable characteristics policy should focus on quality of educational resources and pay more attention to extracurricular activities. Educational policy should also focus on the allocation of resources by school staff, in particular, attributing more responsibility to teachers and paying attention to the way teachers are monitored (more peer review). Finally, it should be given the correct incentives for more parents' participation in school activities and discussions. In this particular case, families' contribution is likely to be as important as schools'.

A range of past and current reforms in education are underway in Portugal and cover some of the issues mentioned before. In particular, reforms related to school autonomy, teacher appraisal, school leadership and student learning standards (for details see the OECD Report Reviews of Evaluation and Assessment in Education 2012). Nevertheless, it is important to guarantee the enforcement and correct evaluation of the effectiveness of such policies, namely through school and teacher accountability. In terms of educational resources, despite the importance of providing more and better resources to schools, some of the past programs revealed inefficient.

Finally, table 1 presents the correlation at regional level between the three different regional gaps studied in this paper: (i) unconditional regional fixed-effects; (ii) regional fixed-effects after controlling for family background and (iii) remaining regional difference after controlling for observable school variables as well. Interestingly, the two first measures are highly correlated, while after adding school resources the correlation is substantially lower. This is indicative that family regional differences are not enough to change the initial profile of PISA test scores. In contrast, controlling in addition for schools, changes the pattern of the regional gap initially observed, in particular in the case of reading.

17 We used the more than 200 books dummy variable as a proxy of family background at school level.

#### Table 1

CORRELATION BETWEEN MEASURES OF REGIONAL DIFFERENCES									
		Mathematics		Reading					
	Unconditional	Conditional on family	Conditional on family and school	Unconditional	Conditional on family	Conditional on family and school			
Unconditional	1			1					
Conditional on family	0.92*	1		0.92*	1				
Conditional on family and school	0.56*	0.69*	1	0.39	0.58*	1			

Source: Authors' calculations.

**Notes:** unconditional: test scores - regional average; conditional on family: test scores - regional average controlling for individual and family characteristics; conditional on family and school: test scores - regional average controlling for individual, family and school characteristics. \* statistically significant at 10%.

#### **Remaining regional differences**

Despite the fact that most of the unconditional gap is strongly reduced after controlling for family and school resources, it is important to understand what can explain the remaining disparities. Therefore, we perform a simple correlation analysis of these regional differences and the regional environment (Table 2).<sup>18</sup> More specifically, we look at the interior/rural desertification (the inability of some regions to get the best professionals as for example experience of teachers in the regions, number of doctors per habitant), structural educational problems (drop-out and literacy rates) and social behaviour as divorce rate and crime rate. Only drop-out rate differences seem to be of some importance as is also highlighted in Chart 7.<sup>19</sup> In the light of this result, we could interpret the persistent difference of Ilhas to other regions as reflecting a relatively low valuation of education and human capital investment. All other analysed variables do not present any significant correlation, which is in line with the modest role left to a pure regional effect on student performance after controlling for family and school resources.

#### Table 2

REGIONAL GAP AND REGIONAL CHARACTERISTICS (CORRELATION)						
	Mathematics	Reading				
GDPpc	-0.23	-0.18				
Regional Development Index	0.10	0.31				
Illiteracy rate	0.12	0.15				
Drop-out rate	-0.49*	-0.58*				
Compulsary education	-0.11	0.12				
Higher education	-0.13	0.06				
Pre-school	0.30	0.19				
Teachears experience	0.21	0.44				
Doctors per habitant	0.02	0.01				
Divorce rate	-0.12	-0.05				
Crime rate	-0.08	0.06				

Source: Authors' calculations.

Note: \* statistically significant at 10%.

18 As said before, we cannot exclude that these disparities may also reflect school unobservables.

**19** Despite the limited number of observations at regional level (12), the drop-out results remain valid after performing some regressions with 2 and 3 variables.

## Chart 7



Source: Authors' calculations

**Note:** y-axis - remaining differences represent the regional fixed effects estimated in equation (2) and are shown as differences to Lisboa; x-axis: average drop-out rates in percentage by region.

#### 4. Sources of inequality in educational achievement

This section studies inequality in the school performance in the spirit of the Coleman Report. We compare the role of school and family factors in determining inequality within each region. Inequality is a topic of major concern in all open societies and it is likely to emerge well before individuals enter the labour market. Despite the centralised nature of the Portuguese educational system, it is also useful to study if the magnitude of achievement inequality explained corresponds to any difference in regional environment. Chart 8 displays regional standard deviations for test scores in mathematics and for an OECD composite indicator of family background (ESCS), suggesting that higher achievement inequality is associated with more family background inequality.<sup>20</sup>

## Chart 8

#### STANDARD DEVIATION: TEST SCORES AND FAMILY BACKGROUND



Source: Authors' calculations.

**Notes:** The ESCS is a composite indicator of family background constructed by OECD with PISA data. The  $R^2$  of a regression of this indicator on the family variables used in the article is around 0.9.

20 Notice that higher performance seems to be also associated with more inequality.

We evaluate the sources of inequality in educational achievement among Portuguese regions through a regression-based decomposition approach. We examine the amount of inequality in each region that results from inequalities (i) in family background, (ii) in school resources and organization, and (iii) stemming from poorer families being segregated in worse schools. Then, we relate the importance of each factor (family, school and segregation) to the characteristics of each region such as wealth and development level, region attractiveness, structural educational indicators, and social behaviour.

The measure of inequality we use, the variance, can be easily obtained and decomposed from the estimation of equation (1), by region, as follows:

$$Var(T_{ij}) = Var(\beta F_{ij}) + Var(\gamma \phi_j) + 2Cov(\beta F_{ij}, \gamma \phi_j) + Var(\varepsilon_{ij})$$
(3)

where the first element represents the contribution of inequality in family characteristics and the second of inequality across schools. The covariance term represents the relationship between school and family factors, i.e. giving an idea if school is exacerbating, being neutral or decreasing initial inequality. In the last case schools are promoting equality of opportunity. The relative contribution can also be easily assessed dividing each element by the total explained variance.

Overall in Table 3 the decomposition shows heterogeneity among Portuguese regions. The variance explained by observable variables ranges from 50 per cent in Ilhas to 62 per cent in Alto Alentejo. Interestingly, these figures are much smaller than differences among European countries, where the differences go from 17 per cent to around 70 per cent (Carneiro and Reis (2008)<sup>21</sup>). Notice that the part left unexplained is still important.

Despite different magnitudes, student and family characteristics play a crucial role in all regions, while school features have a smaller impact on educational inequality. Variance decompositions depend not

VARIANCE DECOMPOSITION (VARIANCE EXPLAINED BY DIFFERENT COMPONENTS)													
	Mathematics												
	Portu- gal	Algarve	Alto Alen- tejo	Baixo Alen- tejo	Centro Interior	Centro Litoral	llhas	Lisboa	Norte Interior	Norte Litoral	Porto	Setubal	Vale do Tejo
Var(F)	3302.4	3248.0	3525.9	3354.9	2848.9	3169.3	3771.6	3036.5	3409.6	3585.8	2628.9	4039.6	3526.6
Var(S)	738.7	382.8	1067.7	632.4	561.2	585.4	525.4	837.6	190.6	567.5	991.3	169.1	500.5
Cov(F,S)	451.2	220.2	-200.4	-392.7	489.3	895.1	-944.2	359.6	16.0	155.7	1074.9	144.0	350.0
Var(exp)	4492.4	3851.0	4393.3	3594.6	3899.4	4649.9	3352.8	4233.6	3616.3	4309.0	4695.1	4352.7	4377.1
Var(unexp)	3515.5	3192.1	2714.2	2849.9	3738.5	3550.4	3370.8	3429.3	3013.3	3486.4	3374.0	3300.1	3356.4
	Reading												
	Portu- gal	Algarve	Alto Alen- tejo	Baixo Alen- tejo	Centro Interior	Centro Litoral	llhas	Lisboa	Norte Interior	Norte Litoral	Porto	Setubal	Vale do Tejo
Var(F)	2753.5	2860.2	2716.2	2971.9	2469.7	2740.6	3375.7	2299.9	3278.4	3038.1	1850.3	3598.1	3506.5
Var(S)	594.4	395.2	356.9	876.4	574.9	477.7	387.8	490.8	546.9	602.6	823.7	328.6	196.1
Cov(F,S)	542.9	594.8	299.2	-715.7	756.2	851.6	-320.1	422.1	942.4	111.2	1088.7	217.4	28.8
Var(exp)	3890.7	3850.2	3372.3	3132.6	3800.8	4069.8	3443.4	3212.8	4767.7	3752.0	3762.7	4144.1	3731.4
Var(unexp)	3260.5	2967.7	2415.9	2900.1	3714.4	3266.4	3178.3	2938.8	2796.5	3061.3	3379.7	3161.8	3031.5

#### Table 3

Source: Authors' calculations.

**Notes:** Var(F): individual and family contribution to total test score variance; Var(S): school contribution to total test score variance; Cov(F,S): relationship between school and family factors; Var(exp): variance explained by equation (3); Var(unexp): unexplained variance as a result of equation (3).

21 Carneiro and Reis (2009) used the 2003 PISA dataset.

only on the variance of the regressors but also on the coefficients themselves. In our case, student and family variables are important to explain differences in achievement but their variance does not change much across regions. Therefore, the higher contribute of pupil and family inequality in certain regions stems from a larger impact of these variables on school performance (as estimated by the coefficients).

In addition, the covariance term presents also distinct results, suggesting the existence of regions more stratified than others in educational terms. In particular, Porto and Centro Litoral present the highest level of segregation, while in Ilhas and both Baixo and Alto Alentejo there is a negative association between observable student/family and school characteristics. In these cases the figures are mainly influenced by the coefficients and not by the covariance level.<sup>22</sup> In the former regions, schools seem to exacerbate initial inequality, while in the latter, schools contribute to decrease inequality. This may be due to several reasons. On the one hand, if students with better individual characteristics and/or from richer families tend to sort into better schools, this correlation will be positive. On the other hand, if a government tries to compensate inequalities in family background and provide extra support to failing schools<sup>23</sup>, there may be a negative correlation between school and family features. Both phenomena are likely to be present in our results.

Given the heterogeneity among Portuguese regions it is instructive to document how the importance of each factor is related to some features of each region (Table 4). Using the same characteristics of the previous section, results suggest that regions where school contributes to increase initial inequality are associated with: better structural educational outcomes, higher development and higher inequality in teachers' experience. This result may be, to some extent, related to the availability of more schools in these areas, despite the relatively absence of school choice in the Portuguese educational system.<sup>24</sup> Opposite features are presented by more disadvantaged regions, where schools seem to contribute to reduce inequality of opportunities.

CORRELATION BETWEEN VARIANCE DECOMPOSITION AND REGIONAL CHARACTERISTICS								
	VAR(F)	VAR(S)	COV(F,S)					
GDPpc	-0.12	0.46	-0.10					
Regional Development Index	-0.51*	0.32	0.49*					
Illiteracy rate	0.43	0.13	-0.49*					
Drop-out rate	0.45	-0.14	-0.52*					
Compulsary education	-0.28	0.07	0.37					
Higher education	-0.45	0.23	0.42					
Pre-school	0.09	0.21	-0.28					
Teachears experience (years)	-0.32	0.30	0.43					
Teachears experience (standard deviation)	-0.55*	0.22	0.72*					
Doctors per habitant	-0.67*	0.42	0.57*					
Divorce rate	-0.13	-0.01	0.25					
Crime rate	-0.12	-0.26	0.25					
Source: Authors' calculations								

#### Table 4

**Note:** \* statistically significant at 10%.

22 The strong positive and negative results in Porto and Ilhas, respectively, are reflecting the impact of individual variables (repeater status and grade).

23 In Portugal, there are several initiatives and programs with that aim. For instance, accompanied study at schools and the national program supporting educational development in socially segregated and excluded areas - Educational Territories of Priority Intervention (Territórios Educativos de Intervenção Prioritária).

24 This is in line with those that advocate that school choice may increase segregation, by moving good peers to other schools, and may produce competition in irrelevant attributes if parents are careless about educational outcomes. In contrast, those in favour of school choice advocate that school choice may create incentives for schools to increase productivity, offering a product closer to students demand, and expand the choice set for poor students.

Summing up, most inequality is within schools (driven by individual and family factors), and not between schools, which means that schools by themselves cannot explain a large portion of the observed disparities. Therefore, education policy measures alone may be not enough to address achievement inequality, as regional gaps in educational opportunities and outcomes have a wider scope. Policies that focus on poverty and related issues are expected to be more successful than purely educational policy.

## 5. Conclusions

This article studies educational achievement and inequality throughout Portuguese regions, using data from the OECD PISA 2009. The main findings are the following.

• There are important regional differences in educational performance as measured by PISA scores, and their pattern seems to broadly match the one revealed by scores in national exams. A descriptive analysis indicates that territorial gaps appear to conform to discrepancies in socioeconomic characteristics and educational outcomes across Portugal.

• As expected, student and family variables explain part of the unconditional gaps. Specifically, regions with intermediate to low achievement levels are penalized by an unfavourable socioeconomic composition, a higher proportion of repeaters and a prevalence of students in the 9th or lower grades vs. the 10th grade. Holding these variables constant, there is a shrink of the initial differences and a fading of their statistical significance, although the starting relative position of regions is not substantially changed.

• Schools are found to play an important role in explaining performance differences across the territory. Therefore, when school observables are brought into the analysis, the gaps close further and there are noticeable modifications in the original ranking of regions.

• The role played by schools suggests that there is room for policy interventions to improve their contribution in the regions lagging behind. In particular, the enhancement of school autonomy in the allocation of resources, teacher participation and monitoring, and involvement of parents appear to be fruitful areas of intervention.

• The scope for an important contribution of pure regional factors seems small, although evidence hints at a potential influence of regional disparities concerning the way education is valued.

• The analysis of inequality in educational achievement also reveals some territorial heterogeneity across Portugal. The driving forces behind such inequality seem to be mostly related to students and families rather than schools.

• There is some evidence that schools tend to exacerbate inequality in educational achievement in the more developed regions, and the opposite in the less developed ones. These findings may be related, among other factors, with wider school availability in the first case, as well as the impact of programs targeting the performance of students coming from socially segregated backgrounds in the second.
#### References

- Bratti, M., Checchi, D. and Filippin, A. (2007), "Territorial Differences in Italian Students' Mathematical Competencies: Evidence from PISA 2003," *IZA Discussion Papers 2603*, Institute for the Study of Labor (IZA).
- Carneiro, P. (2008), "Equality of opportunity and educational achievement in Portugal", *Portuguese Economic Journal*, vol. 7(1), pp. 17-41.
- Carneiro, P. and Reis, H. (2009), "Sources of inequality in educational achievement: an international comparison", UCL manuscript.
- Coleman, J., Campbell, E., Hobson, C., McPartland, J., Mood, A., Weinfeld, F. and York, R. (1966), "Equality of educational opportunity", *US government printing office*, Washington, DC.
- Ferrera, J., Cebada, E. and González, D. (2010), "Factors affecting regional attainment: Evidence from Spanish PISA 2006 results", *Regional and Sectoral Economic Studies*, vol. 10(3).
- GAVE (2012), Exames Nacionais Relatório 2011, Gabinete de Avaliação Educacional, Lisboa: Ministério da Educação.
- OECD (2010), PISA 2009 Results: What Students Know and Can Do, Volume I, Paris: Organization for Economic Co-operation and Development.
- OECD (2012), Education at a glance, Paris: Organization for Economic Co-operation and Development.
- Pereira, M.C. (2010). "Educational Attainment and Equality of Opportunity in Portugal and in Europe: The Role of School Versus Parental Influence", *Summer Economic Bulletin*, Banco de Portugal, pp.23-45.
- Pereira, M.C. (2011), "An analysis of Portuguese students' performance in the OECD Programme for International Student Assessment", *Autumn Economic Bulletin*, Banco de Portugal, pp.123-136.
- Santiago, P., Donaldson, G., Looney, A. and Nusche, D. (2012), OECD Reviews of Evaluation and Assessment in Education: Portugal 2012, Paris: Organization for Economic Co-operation and Development.
- Todd, P. and Wolpin, K. (2003), "On the Specification and estimation of the Production Function for Cognitive Achievement", *Economic Journal*, 113, F3-F33.
- Wössman, L. (2007), "Fundamental Determinants of School Efficiency and Equity: German States as a Microcosm for OECD Countries," *IZA Discussion Papers 2880*, Institute for the Study of Labor (IZA).

# APPENDICES

# Appendix 1

CORRESPONDENCE BETWEEN THE NUTS3	AND THE 12-REGION	BREAKDOWN	
	12-region breakdown	Stud. weights population	Schools in sample
Alentejo Central	Alto	0.022	12
Alto Alentejo	Alentejo		
Alentejo Litoral	Baixo	0.019	9
Baixo Alentejo	Alentejo		
Lezíria do Tejo	Vale do	0.074	18
Médio Tejo	Тејо		
Oeste			
Algarve	Algarve	0.029	22
Baixo Mondego	Centro	0.097	19
Baixo Vouga	litoral		
Pinhal Litoral			
Beira Interior Norte	Centro	0.070	18
Beira Interior Sul	Interior		
Cova da Beira			
Dão Lafões			
Pinhal Interior Norte			
Pinhal Interior Sul			
Serra da Estrela			
Alto Trás-os-Montes	Norte	0.036	8
Douro	Interior		
Grande Lisboa	Lisboa	0.178	29
Península de Setúbal	Setúbal	0.068	11
Ave	Norte	0.230	35
Cávado	Litoral		
Entre Douro e Vouga			
Minho Lima			
Tâmega			
Grande Porto	Porto	0.142	20
Madeira	Ilhas	0.035	8
Acores			

# Appendix 2 (continue)

DESCRIPTIV	E STATI	ISTICS (A	VERAG	GES)									
Student variables	Portu- gal	Algarve	Alto Alen- tejo	Baixo Alen- tejo	Centro Interior	Centro Litoral	Ilhas	Lisboa	Norte Interior	Norte Litoral	Porto	Setubal	Vale do Tejo
9th grade <sup>(b)</sup>	0.27	0.39	0.25	0.31	0.29	0.23	0.24	0.27	0.31	0.27	0.27	0.22	0.36
10th grade <sup>(b)</sup>	0.58	0.37	0.51	0.52	0.60	0.68	0.53	0.59	0.53	0.60	0.63	0.53	0.48
repeater <sup>(b)</sup>	0.35	0.52	0.43	0.39	0.37	0.28	0.39	0.33	0.48	0.32	0.28	0.41	0.46
female <sup>(b)</sup>	0.51	0.49	0.55	0.46	0.51	0.52	0.58	0.51	0.48	0.52	0.49	0.51	0.52

Source: PISA database. Note: (b) stands for binary variables.

	Family variables	Portu- gal	Algarve	Alto Alen- tejo	Baixo Alen- tejo	Centro Interior	Centro Litoral	Ilhas	Lisboa	Norte Interior	Norte Litoral	Porto	Setubal	Vale do Tejo
	wealth (ind.)	0.49	0.49	0.56	0.46	0.32	0.56	-0.05	0.54	0.34	0.48	0.59	0.46	0.55
	educ. resourc. home (ind.)	0.18	0.05	0.15	0.13	0.22	0.27	-0.08	0.30	0.14	0.12	0.20	0.12	0.21
	books at home 25-200 <sup>(b)</sup>	0.48	0.46	0.51	0.48	0.47	0.48	0.33	0.51	0.44	0.45	0.51	0.48	0.53
	books at home > 200 <sup>(b)</sup>	0.15	0.15	0.15	0.11	0.10	0.21	0.07	0.26	0.10	0.10	0.15	0.12	0.16
	immigrant status <sup>(b)</sup>	0.05	0.11	0.02	0.05	0.03	0.04	0.00	0.12	0.01	0.02	0.03	0.16	0.03
-	foreign lang. at home <sup>(b)</sup>	0.02	0.05	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.02	0.01
	blue collar/ high. skilled <sup>(b)</sup>	0.22	0.15	0.15	0.20	0.30	0.21	0.31	0.09	0.26	0.34	0.20	0.17	0.22
	low. skilled <sup>(b)</sup>	0.34	0.47	0.37	0.50	0.35	0.34	0.44	0.32	0.33	0.26	0.31	0.46	0.40
	high. skilled <sup>(b)</sup>	0.35	0.31	0.34	0.25	0.25	0.39	0.13	0.53	0.24	0.30	0.40	0.32	0.28
_	lower sec. educ. <sup>(b)</sup>	0.23	0.25	0.22	0.28	0.27	0.22	0.26	0.18	0.21	0.24	0.21	0.28	0.27
	upper sec. educ. <b><sup>(b)</sup></b>	0.24	0.28	0.28	0.34	0.23	0.27	0.19	0.24	0.25	0.17	0.25	0.34	0.26
	tertiary educ. <b>(b)</b>	0.26	0.25	0.26	0.20	0.15	0.28	0.12	0.47	0.14	0.20	0.26	0.23	0.20
	one parent home <sup>(b)</sup>	0.11	0.14	0.12	0.13	0.09	0.09	0.08	0.17	0.13	0.09	0.11	0.11	0.09
	no parents home <sup>(b)</sup>	0.02	0.02	0.03	0.05	0.04	0.02	0.03	0.02	0.05	0.02	0.02	0.04	0.03
	ESCS (índ.)	-0.32	-0.38	-0.27	-0.39	-0.63	-0.18	-1.05	0.23	-0.73	-0.56	-0.24	-0.30	-0.42

Source: PISA database. Note: The ESCS index is used in variance decompositions only. (b) stands for binary variable.

# Appendix 2 (continue)

DESCRIPTIVE	STAT	STICS (A	VERAG	GES)									
School variables	Portu- gal	Algarve	Alto Alen- tejo	Baixo Alen- tejo	Centro Interior	Centro Litoral	Ilhas	Lisboa	Norte Interior	Norte Litoral	Porto	Setubal	Vale do Tejo
school size (1000 stud.)	0.94	0.71	0.61	0.41	0.51	0.77	1.20	1.06	0.71	1.10	1.05	0.98	0.82
percentage of girls	50.5	49.6	52.7	44.9	50.0	50.2	49.4	49.6	50.6	51.6	51.0	50.1	51.0
located town 15-100 inh. <sup>(b)</sup>	0.42	0.84	0.73	0.38	0.33	0.32	0.52	0.18	0.64	0.44	0.53	0.47	0.45
located town > 100 ihn. <sup>(b)</sup>	0.22	0.01	0.00	0.00	0.00	0.27	0.21	0.66	0.00	0.15	0.18	0.09	0.03
grade ampl. (max-min)	5.7	4.4	5.2	4.9	5.0	5.9	6.2	5.5	6.4	5.7	6.0	5.9	5.9
percentage of repeaters	0.10	0.10	0.14	0.11	0.10	0.08	0.13	0.10	0.09	0.07	0.08	0.16	0.13
non-native speak.>10% <sup>(b)</sup>	0.02	0.27	0.00	0.00	0.00	0.05	0.00	0.00	0.07	0.00	0.00	0.08	0.00
auton. resources (ind.)	-0.44	-0.64	-0.57	-0.62	-0.40	-0.34	-0.62	-0.47	-0.40	-0.51	-0.13	-0.58	-0.58
auton. curric./ assess.(ind.)	-0.93	-1.05	-0.96	-1.09	-1.05	-1.01	-0.94	-0.88	-0.96	-0.85	-0.90	-0.98	-0.97
private school <sup>(b)</sup>	0.14	0.01	0.04	0.21	0.13	0.20	0.04	0.12	0.08	0.18	0.23	0.00	0.10
student record <sup>(b)</sup>	0.16	0.00	0.16	0.09	0.14	0.00	0.04	0.34	0.30	0.09	0.27	0.09	0.06
parental pressure <sup>(b)</sup>	0.13	0.00	0.06	0.00	0.00	0.09	0.00	0.27	0.00	0.15	0.19	0.08	0.12
school competition <sup>(b)</sup>	0.79	0.73	0.68	0.62	0.76	0.90	0.25	0.93	0.72	0.83	0.78	1.00	0.53
perc. comp. with web	0.95	0.90	0.87	0.98	0.96	0.94	1.00	0.97	1.00	0.95	0.94	0.92	0.96
comp school size ratio	0.56	0.52	0.57	0.79	0.60	0.43	1.03	0.57	0.72	0.53	0.46	0.54	0.60
extra-curric. activ. (ind.)	0.29	0.20	-0.33	-0.32	0.16	0.50	0.44	0.09	-0.49	0.52	0.51	0.28	0.11
educ.resources sch. (ind.)	-0.17	-0.26	-0.07	0.01	-0.04	-0.39	-0.39	-0.08	-0.32	-0.13	-0.04	-0.45	-0.26
teacher particip. (ind.)	-0.78	-0.82	-0.61	-0.94	-1.00	-0.85	-0.39	-0.72	-0.98	-0.83	-0.73	-0.69	-0.74
teacher shortage (ind.)	-0.80	-0.77	-0.41	-0.93	-0.68	-0.91	-0.96	-0.71	-0.77	-0.82	-0.80	-1.02	-0.82
teacher behav. (ind.)	0.13	0.08	0.02	0.20	-0.16	0.00	-0.55	-0.11	-0.05	0.48	0.60	-0.16	-0.05
perc. full-time teachers	0.87	0.86	0.88	0.81	0.81	0.89	0.85	0.88	0.77	0.89	0.84	0.94	0.87
leadership (index)	-0.15	-0.42	-0.15	0.12	-0.13	0.11	-0.26	0.05	-0.43	-0.18	-0.09	-0.65	-0.25

# Appendix 2 (continuation)

DESCRIPTIVI	e stati	ISTICS (A	VERAC	GES)									
School variables	Portu- gal	Algarve	Alto Alen- tejo	Baixo Alen- tejo	Centro Interior	Centro Litoral	Ilhas	Lisboa	Norte Interior	Norte Litoral	Porto	Setubal	Vale d Tejo
student behav. (ind.)	0.03	-0.43	-0.25	-0.11	-0.15	-0.18	-0.68	-0.16	0.04	0.47	0.36	-0.42	0.07
teac. monitor.: tests <sup>(b)</sup>	0.51	0.31	0.38	0.75	0.38	0.30	0.71	0.73	0.42	0.54	0.40	0.53	0.50
teac. monitor.: peers <sup>(b)</sup>	0.80	0.85	0.63	0.87	0.73	0.90	0.77	0.89	0.51	0.69	0.85	0.89	0.81
teac. monitor.: sen. staff <sup>(b)</sup>	0.22	0.21	0.36	0.12	0.23	0.30	0.36	0.27	0.07	0.13	0.14	0.34	0.28
teac. monitor.: external <sup>(b)</sup>	0.04	0.05	0.00	0.00	0.09	0.08	0.32	0.00	0.00	0.02	0.04	0.00	0.03
class size (students)	22.3	21.2	19.6	19.8	19.7	22.4	19.3	23.2	19.6	23.0	24.0	22.8	21.5
student- teacher ratio	8.5	7.6	7.4	7.6	6.7	8.6	7.0	9.0	7.0	9.6	9.3	8.1	7.5
reg. lessons math. (hours)	4.4	4.1	4.3	4.8	4.6	4.3	5.0	4.8	4.1	4.0	4.5	4.4	4.4
reg. lessons lang. (hours)	3.8	3.6	3.8	4.5	4.0	3.5	4.7	4.0	3.4	3.5	3.8	3.7	3.9

**Source:** PISA database. **Note:** (b) stands for binary variable.

Regional variables	Portu- gal	Algarve	Alto Alen- tejo	Baixo Alen- tejo	Centro Interior	Centro Litoral	Ilhas	Lisboa	Norte Interior	Norte Litoral	Porto	Setubal	Vale do Tejo
GDPpc - 2008	15647	15883	13299	18626	10959	15089	17653	25353	10799	10946	15726	11459	13581
reg. develop. ind 2010	100.0	97.0	98.4	94.4	96.6	99.5	93.4	109.8	94.8	97.7	99.8	98.7	96.7
illiteracy rate (%) - 2011	5.2	5.4	10.0	11.3	8.2	6.4	5.8	3.0	9.5	5.3	3.1	3.9	6.4
drop-out rate (%) - 2001	2.8	2.0	2.6	2.8	2.4	1.9	3.8	1.8	4.3	3.8	2.6	2.0	2.6
comp. educ. (%) - 2001	38.0	39.0	31.7	28.7	27.3	36.6	32.2	53.9	26.6	27.1	43.4	48.0	33.3
higher educ. (%) - 2001	8.6	7.0	6.1	4.9	5.3	8.4	6.4	15.1	5.8	4.9	10.8	8.9	5.9
pre-school (%) - 2007/2008	78.3	78.0	92.2	98.4	97.4	85.5	83.3	75.3	94.1	74.0	69.2	58.1	88.2
divorce rate - 2010	17.2	15.8	18.0	16.9	16.6	17.1	15.3	18.8	18.2	17.0	17.8	17.1	17.2
doctors (per 1000) - 2010	3.9	3.0	2.8	1.7	2.0	5.5	2.6	6.6	2.2	1.9	6.9	2.4	1.6
teacher exp. (years) - 2005	2.6	3.0	2.4	2.0	1.9	2.6	2.8	2.8	2.2	2.2	3.1	3.0	2.6
crime rate (%) - 2011	39.4	57.3	27.8	28.2	27.1	36.0	35.0	48.1	32.0	29.9	38.8	43.2	36.5

Sources: INE for all variables except teacher experience that was computed from data in database Recursos Humanos da Administração Pública 2005.

# Appendix 3 (continue)

REGRESSION (1) – THE ROLE OF STUDENT AND FAMIL	Y VARIABLES	
	Mathematics	Reading
repeater <sup>(b)</sup>	-53.1	-44.6
	[3.8]***	[4.2]***
female <sup>(b)</sup>	-28.3	22.1
	[1.8]***	[1.8]***
9th grade <sup>(b)</sup>	50.0	44.9
	[4.2]***	[3.4]***
10th grade <sup>(b)</sup>	74.9	71.0
	[5.8]***	[6.0]***
wealth (index)	0.7	-2.2
	[1.4]	[1.3]*
educat. resources home (index)	5.1	2.8
	[1.5]***	[1.0]***
books at home 25-200 <sup>(b)</sup>	15.3	12.1
	[2.6]***	[2.3]***
books at home > 200 <sup>(b)</sup>	31.3	25.4
	[3.4]***	[3.2]****
immigrant status <sup>(b)</sup>	-12.3	-11.5
	[5.2]**	[4.5]**
foreign language at home <sup>(b)</sup>	16.9	1.0
	[9.1]*	[8.5]
blue collar/highly skilled <sup>(b)</sup>	-2.3	-6.6
	[4.6]	[4.2]
white collar/ lowly skilled <sup>(b)</sup>	0.5	2.4
	[4.2]	[3.6]
white collar/highly skilled <sup>(b)</sup>	10.6	11.7
	[5.1]**	[4.2]***
lower secondary education <sup>(b)</sup>	0.5	4.6
	[3.1]	[2.9]
upper secondary education <sup>(b)</sup>	7.2	6.9
	[3.1]**	[3.1]**
tertiary education <sup>(b)</sup>	12.3	6.5
	[3.1]***	[3.4]*
one parent home <sup>(b)</sup>	14.3	12.5
	[3.7]***	[3.2]***
no parents home <sup>(b)</sup>	-2.5	-11.2
	[6.7]	[6.6]*
Observations	5913	5913
R-squared	0.56	0.55

**Source:** Authors' calculations. **Notes:** (b) stands for binary variable. Computed on the basis of the 5 p-values for test scores. Standard errors in brackets. The regressions include also school-fixed effects which are not shown. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

# Appendix 3 (continue)

REGRESSION RESULTS		
	Mathematics	Reading
percentage of computers with web	8.4	1.1
	[16.3]	[14.4]
computers - school size ratio	10.3	0.5
	[6.9]	[6.1]
percentage of girls <sup>(b)</sup>	0.1	0.4
	[0.3]	[0.3]
school size (1000 students)	10.2	11.1
	[5.6]*	[4.9]**
class size (students)	2.5	1.3
	[0.8]***	[0.7]*
student-teacher ratio	-1.1	-1.1
	[1.2]	[1.0]
private school <sup>(b)</sup>	-16.1	-7.0
	[10.9]	[9.5]
extra-curricular activ. (index)	2.1	5.8
	[2.3]	[2.0]***
educ. resources school (index)	4.5	3.9
	[2.5]*	[2.2]*
teacher participation (index)	7.4	4.3
	[3.8]**	[3.3]
teacher shortage (index)	6.2	5.8
	[4.0]	[3.6]
teacher behaviour (index)	-0.2	-0.2
	[2.8]	[2.4]
parental pressure <sup>(b)</sup>	9.3	8.8
	[5.4]*	[4.7]*
located town 15-100 inh (b)	16	17
	[4 3]	[3.8]
located town $> 100$ ibn (b)	0.3	10 /
	[5 9]	[5 2]**
school competition(b)	[5.5]	[3:2]
school competition.	-0.1	0.0
percentage of full time teachers	[J. I] 21.1	[4.4] 22 1
percentage of full-time teachers	[17.6]	[15 5]
rogular lossons (bours)	0.8	[15.5]
	[3 3]	[2.6]
leadership (index)	[5.5]	[2.0]
	[2 8]	[2 5]
student behaviour (index)	3.8	2.9
	[2 6]	[2 3]
toochor monitoring: toots(b)	0 8	4 1
teacher monitoring, tests	[4 0]	[3 5]
toochor monitoring, near(b)	[4.0]	[5.5]
teacher monitoring: peers."	[[.9	7.9
c(b)	[5.0]**	[4.3]"
teacher monitoring: senior staff.	-1.8	-2.8
(6)	[4.9]	[4.3]
teacher monitoring: external <sup>(b)</sup>	-6.3	-3.9
	[14.2]	[12.5]
autonomy resources (index)	7.7	3.3
	[4.0]*	[3.5]
autonomy. curricula/ assess. (index)	-5.0	7.9
	[7.1]	[6.2]

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# Appendix 3 (continuation)

REGRESSION (2) – THE ROLE OF SCHOOL VARIABLES		
	Mathematics	Reading
non-native speakers > 10 % <sup>(b)</sup>	-1.2	-17.4
	[10.9]	[9.6]*
student record consideration <sup>(b)</sup>	9.2	7.0
	[5.4]*	[4.7]
percentage of repeaters	-19.7	-6.4
	[28.7]	[24.9]
grade amplitude (max-min grade)	0.9	-0.5
	[0.9]	[0.8]
Constant	337.4	365.3
	[33.7]***	[30.0]***
Observations	209	209
R-squared	0.42	0.44
F- Test (all school variables)	2.72	3.04
p-value	0.00	0.00

**Notes:** (b) stands for binary variable. Standard errors in brackets. The regressions include also regional-fixed effects which are not shown.\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

# THE WAGE GAP OF IMMIGRANTS IN THE PORTUGUESE LABOUR MARKET\*

Sónia Cabral\*\* | Cláudia Duarte\*\*

#### ABSTRACT

Using matched employer-employee data, we examine the wage gap upon arrival between immigrant and native workers in the Portuguese labour market in the 2002-2008 period. We use the relation between Gelbach's and Oaxaca-Blinder's decompositions to split the unconditional average wage gap as the sum of a composition effect and a wage structure effect. Our results show that most of the wage gap is not due to worst endowments of the immigrants compared to natives but to differences in the returns to those characteristics and to the immigrant status effect. In particular, education and foreign experience of the average immigrant are significantly less valued in the Portuguese labour market than natives' education and experience. Total immigrants are a heterogeneous group of different nationalities, with immigrants from the EU15 and China starring as the two extreme cases.

### 1. Introduction

Portugal has traditionally been a country of emigration and significant immigration flows began more recently. Until the mid-nineties, immigration in Portugal was relatively modest in international terms, comprising mainly nationals from Portuguese speaking countries. In the late nineties, immigration accelerated and there was an important change in the main countries of origin. A substantial part of these more recent arrivals originated from Central and Eastern European countries, with no particular historical or cultural link with Portugal, and, more recently, from Brazil.

The rapid increase of immigration in Portugal, together with the change in its nationality composition, raises new questions regarding the economic performance of immigrants. Do they earn the same wages as natives upon arrival? If not, what accounts for the difference? Are these results homogeneous across main immigrant nationalities? This article aims at answering these questions using a matched employer-employee longitudinal database (*Quadros de Pessoal*) from 2002 to 2008. A related question is how the immigrant-native wage differential evolves as experience in Portuguese labour market increases (wage assimilation). This issue will not be examined in detail in this article, remaining a question for future research.

Starting with Chiswick (1978), it is commonly observed that immigrants earn less upon arrival than comparable native workers. The imperfect portability of human capital, in particular education and work experience, acquired in the country of origin, as well as the lack of fluency in the destination language were found to be important determinants of this wage gap (Friedberg (2000)). Over time, immigrants' wages tend to catch up to natives' wages as they engage in a process of acquiring skills relevant for the destination country.

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In this article, we examine the wages of immigrants in the Portuguese labour market identifying the major differences with native employees upon arrival. In the line of Friedberg (2000), we investigate if education and labour market experience obtained in different countries are rewarded differently in the Portuguese labour market. Given the nature of recent immigration flows in Portugal, we also examine immigrants by main regions of origin, to see if the returns to these characteristics are homogeneous across different immigrant groups.

The article is organized as follows. Section 2 presents the longitudinal database used (*Quadros de Pessoal*) and section 3 describes the main characteristics of immigrants relative to those of native workers. The estimation methodology is outlined in section 4. Section 5 presents our main empirical results, accounting for the potential heterogeneity of the immigrants by country of origin. Finally, section 6 presents some concluding remarks.

#### 2. Database and identification strategy

The database used in this article is *Quadros de Pessoal* (QP), a longitudinal dataset matching workers and firms based in Portugal. The data are made available by the Ministry of Labour and Social Solidarity, drawing on an annual mandatory employment survey that covers virtually all establishments with wage earners in Portugal in a reference month (October), outside of Public Administration and domestic work. Given that it is compulsory, it does not suffer from the non-response problems that often plague standard household and firm surveys. Apart from the advantage of its comprehensive coverage, it is also generally recognized that this dataset is reliable by virtue of its public availability.

Reported data cover the establishment itself (establishment identifier, location, economic activity, employment, etc), the firm (firm identifier, location, economic activity, employment, sales, ownership, etc) and each of its workers (social security identifier, gender, age, education, skills, occupation, tenure, employment status, hours worked, earnings, etc). The information on earnings is very complete, including the base wage, regular and irregular wage benefits and overtime pay.

The worker-level data cover all years since 1986, except for 1990 and 2001, but information on the nationality of the worker only starts in 2000, so our sample period starts in 2002 and ends in 2008. The exact nationality at the country level of the worker is the only information available that helps to identify migrant workers in QP, since neither the place of birth nor the year of arrival to Portugal are recorded. Nevertheless, given the nature of recent immigration in Portugal and the low naturalisation rate, the sample of immigrants covered in QP database seems to be a reasonable approximation of the target population. Since some workers do not report their nationality in every year considered, we further assumed that individuals that declare at least once to be foreign nationals are immigrants and maintain that nationality throughout the whole period (see D'Amuri *et al.* (2010) for a similar assumption).

Regarding data on formal education, the QP dataset has information on the highest level of education completed by each worker but not on the country where that level of education was attained. So, we cannot differentiate between foreign and domestic schooling. However, recent immigrant flows in Portugal were linked with employment opportunities and, hence, it is reasonable to assume that most of these immigrants completed their education in the country of origin. We defined 6 education categories based on the International Standard Classification of Education (ISCED): illiterate (no formal education or below ISCED 1), 4 years completed (primary education) and 6 years completed (first stage of basic education) are both included in ISCED 1, 9 years completed refers to ISCED 2 (lower secondary education), 12 years completed refers to ISCED 3-4 (upper-secondary) and tertiary refers to ISCED 5-6.

The QP database has no information on the date of arrival in Portugal, hence we can not directly obtain the variable of the time spent in the destination country, commonly referred to as years since migration. However, we can obtain information on the date that each individual (native and immigrant) first entered private employment (legally) in Portugal. When this occurs, each worker is given an identification number that is unique and remains constant over time. We used this property of the data to trace back each worker present in the 2002-2008 database to its first record. The database also has information on the date of admission of each worker in each firm. Since the QP database only starts in 1986, we used the minimum of the two records (year the worker first appears in the database and first year of admission in a firm) as the date of entry in the Portuguese labour market. For immigrants, this information is used to compute a proxy of time spent in Portugal, *i.e.*, years since migration. A caveat of this measure is that the date of entry in private employment does not necessarily coincides with the actual date of entry in Portugal, since a significant part of the recent immigration flows in Portugal were of irregular nature, as evinced by the series of regularisations that occurred since 2000 (see Marques and Góis (2007) for a description of recent Portuguese immigration policies).

Nevertheless, the detailed characteristics of the QP database still make it suitable to study the wage performance of immigrants in Portugal. At present, empirical evidence on the behaviour of immigrants in the Portuguese labour market is relatively scarce, probably reflecting the novelty of the phenomenon. Some exceptions are Carneiro et al. (2012) who study the wage assimilation of immigrants in the Portuguese labour market in 2003-2008 and Cabral and Duarte (2010) that provide a comprehensive description of the main features of recent immigration flows in Portugal from 2002 to 2008, both using the QP database.

Some additional filters were imposed on the database to eliminate erroneous, inconsistent or missing reports. First, the analysis was restricted to individuals for whom there was information available for a set of key variables, such as gender, age, nationality, industry and tenure. Second, we further restricted our sample to workers aged between 15 and 80 years and with a job tenure below 65 years. Third, we focused our analysis on the full-time employees segment and we only considered those employees that reported a base wage of at least 80 per cent of the minimum legal wage.<sup>1</sup> Whenever a worker was present more than once in a given year we kept the register corresponding to maximum earnings or maximum hours worked. Fourth, we use a regular wage measure that includes the base wage (monthly gross pay for normal hours of work) and the regular subsidies and premiums paid on a monthly basis like seniority payments.

#### 3. Exploratory analysis

Historically, Portugal has been a country of emigration, but in the late nineties immigration flows grew strongly driven by high labour demand. A significant share of this new immigration flows came from Central and Eastern European countries (CEEC), *i.e.*, from countries with no evident cultural link with Portugal.<sup>2</sup> More recently, there was a very significant increase in immigrants from Brazil. Immigration from China, although growing strongly in the last decade, still represents a small share of total immigrant workers. At present, three major groups make up the bulk of immigration in Portugal, representing around 75 per cent of total: Brazil, Portuguese speaking countries in Africa (PALOP) and CEEC.<sup>3</sup>

Full-time employed immigrants in Portugal increased by 47 per cent in cumulative terms from 2002 to 2008, representing 6.4 per cent of the total in 2008. Table 1 reports the sample means of some relevant variables for natives and immigrants, as well as for the main nationalities of immigrant employees in Portugal.

<sup>1</sup> By law, the minimum wage of apprentices and trainees can be reduced at most by 20 per cent.

<sup>2</sup> CEEC (Central and Eastern European countries) in the QP database includes Slovakia, Poland, Czech Republic, Hungary, Estonia, Slovenia, Latvia, Lithuania, Romania, Russian Federation, Moldova, Ukraine and Serbia.

**<sup>3</sup>** PALOP (*Países Africanos de Língua Oficial Portuguesa*) refers to the former Portuguese colonies in Africa (Angola, Cape Verde, Guinea Bissau, Mozambique, and São Tomé and Príncipe).

#### Table 1

# MAIN CHARACTERISTICS OF NATIVE AND IMMIGRANT FULL-TIME EMPLOYEES IN PORTUGAL, AVERAGE 2002-2008

	Natives I	mmigrants	EU15	PALOP	CEEC	Brazil	China
Levels in 2008	2 324 699	159 539	13 294	39 305	37 638	42 266	2 670
Share in total, 2008	93.6	6.4	8.3	24.6	23.6	26.5	1.7
Employment status (%)							
Permanent contract	77.6	45.2	66.3	49.6	35.4	35.9	44.0
Fixed-term contract	22.4	54.8	33.7	50.4	64.6	64.1	56.0
Age							
Average years	37.9	35.7	36.5	36.5	36.3	33.0	34.3
% workers aged less than 35 years	43.4	50.5	51.1	45.7	47.5	62.4	53.9
Gender (%)							
Male	57.0	65.0	56.6	58.9	75.4	61.1	64.0
Female	43.0	35.0	43.4	41.1	24.6	38.9	36.0
Work experience in Portugal							
Average years	13.0	5.1	7.4	6.7	2.9	2.9	3.1
Educational attainment (%)							
Illiterate	1.2	4.1	0.5	4.8	6.3	1.7	15.4
4 years completed	24.0	23.2	7.9	34.1	20.6	16.7	38.8
6 years completed	22.1	17.0	11.7	16.9	16.9	18.5	15.0
9 years completed	21.6	24.3	19.9	21.8	26.7	27.9	20.0
12 years completed	20.0	23.0	29.7	16.7	23.7	29.3	7.6
Tertiary	11.0	8.5	30.2	5.8	5.9	5.8	3.2
Main sectors of activity (%)							
Manufacturing industry	28.4	15.7	20.6	8.8	22.0	10.7	1.4
Construction	11.4	23.7	8.2	28.5	31.9	19.2	0.6
Services, of which:	57.6	57.6	68.9	61.9	40.0	68.3	98.0
Wholesale and retail trade	20.0	13.5	19.9	11.1	9.1	15.8	49.9
Hotels and restaurants	6.2	15.3	11.5	14.6	10.6	23.5	45.1
Business services	9.6	15.5	12.8	23.6	10.7	15.2	1.1
Other sectors	2.6	3.0	2.3	0.8	6.1	1.9	0.1
Average real monthly wage							
In Euros	853.7	745.7	1463.4	681.2	609.3	723.7	456.1
Wage gap to natives							
In Euros		-108.0	609.8	-172.4	-244.3	-129.9	-397.6
In log points		-15.0	33.2	-16.9	-24.3	-19.3	-49.5
% Minimum wage earners	8.0	12.6	6.8	8.4	13.3	16.7	57.3

Sources: Quadros de Pessoal and authors' calculations.

**Notes:** The shares of main immigrant groups are computed as a percentage of total immigrants. EU15 includes the initial 15 Member-States of European Union except Portugal. CEEC (Central and Eastern European countries) includes Slovakia, Poland, Czech Republic, Hungary, Estonia, Slovenia, Latvia, Lithuania, Romania, Russian Federation, Moldova, Ukraine and Serbia. PALOP (*Países Africanos de Língua Oficial Portuguesa*) refers to the former Portuguese colonies in Africa (Angola, Cape Verde, Guinea Bissau, Mozambique, and São Tomé and Príncipe). Illiterate refers to no formal education or below ISCED 1, 4 years completed (primary education) and 6 years completed (second stage of basic education) are both included in ISCED 1, 9 years completed refers to ISCED 2 (lower secondary education), 12 years completed refers to ISCED 3-4 (upper-secondary) and tertiary refers to ISCED 5-6. ISCED stands for International Standard Classification of Education. The wage gap in log points corresponds to the difference in log real hourly wages between natives and immigrants. The percentage of minimum wage earners was computed considering workers with wage in the interval of +/- 1 euro centered on the minimum wage.

One of the most notable differences between immigrants and natives in the Portuguese labour market relates to the nature of the contract, *i.e.*, permanent versus fixed-term. In the 2002-2008 period, more than half of immigrant workers had a fixed-term contract, compared to around 22 per cent for native employees. By main nationality groups, the proportion of workers with fixed-term contracts is the highest for workers from Brazil and CEEC.

Immigrant workers in Portugal are younger than natives. Workers with less than 35 years account for around 43 per cent of total natives but represent about 50 per cent of immigrants. This difference is higher in the case of workers from China and, especially, from Brazil.

The percentage of females in immigrant employment is lower than in native employment, but the exclusion of domestic work from the analysis tends to underestimate female employment in Portugal. The share of female workers is higher in the case of the EU15 and PALOP (more than 40 per cent in both cases) and lower in the case of CEEC.<sup>4</sup>

As expected, given the recent nature of most immigrant flows in Portugal, the effective work experience of immigrant workers in Portugal is much lower than that of natives. Within immigrants, experience in Portugal is higher for workers from the EU15 and, to a lesser extent, from PALOP, which are the immigrant groups that have been longer in the country.

The differences in educational attainment between natives and immigrants as a whole are not substantial, even if the share of illiterates is higher for immigrants. However, there are important differences among the main immigrant groups. Immigrants from China stand out by their extremely low educational level, with around 15 per cent of illiterates and only around 3 per cent of workers with tertiary education. The proportion of workers with a tertiary education is very similar in immigrants from the PALOP, CEEC and Brazil, but the Brazilians have a smaller share of individuals with very low education levels. In contrast, the educational attainment of immigrants from the EU15 is significantly higher than that of all other nationality groups, including the natives, with more than 30 per cent of them having tertiary education.

Immigrant employment in Portugal is concentrated in a few sectors, namely construction and some services activities. Construction is the main sector of immigrant employment in Portugal, accounting for almost 24 per cent of the total. The employment share of the services sector as a whole is similar for natives and immigrants but the breakdown within services is very different. Immigrants are especially concentrated in three sub-sectors: hotels and restaurants, real estate and business services, and whole-sale and retail trade.

Regarding wages and not controlling for any differentiating factors, immigrants in Portugal are, on average, paid below the wages of native workers in the 2002-2008 period.<sup>5</sup> The average real hourly wages of immigrant workers are 15.0 log points or 13.9 per cent ( $= \exp(-0.150) - 1$ ) below the average wages of natives, but there are substantial differences among immigrants. The average wage of workers from the EU15 is about twice as high as the average immigrant wage and substantially higher than the average native wage. In contrast, Chinese immigrants earn wages significantly lower than other migrant groups.

The proportion of workers that are paid the minimum wage is higher for immigrants than for natives.<sup>6</sup> Immigrants from the EU15 have the lowest share of minimum wage earners, even lower than that of natives, while more than 57 per cent of Chinese workers are reported as earning the minimum wage in this period.

<sup>4</sup> EU15 includes the initial 15 Member-States of European Union except Portugal.

<sup>5</sup> In the regression analysis of the next section, real hourly wages are the dependent variable. We also included the real monthly wage in this descriptive analysis as it results in more intuitive values and the conclusions remain unaltered.

**<sup>6</sup>** The percentage of minimum wage earners was computed considering workers with a monthly wage in the interval of +/- 1 euro centered on the minimum wage.

#### 4. Estimation strategy

Most of the studies on wage assimilation of immigrants treat education and labour market experience obtained in different countries as perfect substitutes. However, Friedberg (2000) highlights the importance of taking into account differences between immigrants and natives in their returns to human capital. The imperfect portability of education and experience acquired in the country of origin results in lower returns to foreign human capital of immigrants in comparison to natives' domestic human capital. In addition, returns to experience and education obtained in the destination country were also found to differ between natives and immigrants. Given the characteristics of our sample, we cannot completely differentiate returns to education of natives and immigrants because we have no information on the place where the formal education was obtained. Nevertheless, we can allow for different returns to education for natives of the place where the formal grade was obtained. As regards labour market experience, we can allow the returns to foreign and domestically acquired experience of immigrants to differ, as well as the returns of domestic work experience of natives and immigrants.

For this purpose and following Friedberg (2000), let us start with:

$$\log W_{ii} = \alpha + \beta_0 imi + \beta_1 ysm + \beta_2 pexp + \gamma_2 imi * pexp + \sum_{j=1}^{5} \beta_{3j} edu_j$$
$$+ \sum_{j=1}^{5} \gamma_{3j} imi * edu_j + \psi X_{ii} + \varepsilon_{ii}$$
(1)

where  $\log W_{it}$  is the natural logarithm of the real hourly wage of individual *i* at time *t*, *imi* is a dummy variable for immigrant status, *ysm* is a proxy for years since migration,  $edu_j$  are the formal education categories described in section 2 (illiterate workers are the omitted category), *pexp* is the traditional potential work experience, or education-corrected age, computed as age minus 6 minus years of education, and  $\varepsilon_{it}$  is a conventional stochastic error term. Other characteristics that potentially affect wages are included in the vector  $X_{it}$ . As we analyse both males and females,  $X_{it}$  has a variable on the worker's gender (the reference group being male). A dummy variable identifying fixed-term contracts is also included. The equation also controls for sector, geographical and year-specific effects. The reference categories are 2002 for the time dummies, Lisboa for the geographical location and manufacturing industry for the sectoral classification. Appendix A describes all variables used in the analysis.

In equation 1, the coefficient  $\beta_0$  measures the wage gap upon arrival between an immigrant and a comparable native, both illiterate and without any work experience. As denoted by this interpretation, the wage gap is computed throughout the text as the wage of immigrants minus the wage of natives. The  $\gamma_{3j}$  coefficients measure the difference in the returns to education between immigrants and natives for the other 5 educational levels considered, with  $\beta_{3j}$  denoting the returns to the different education categories for natives. Ignoring higher order polynomials, the  $\gamma_2$  coefficient captures the difference between the returns of one year of work experience of an immigrant in his home country and one year of experience of a native worker in Portugal, and the  $\beta_1$  coefficient captures the difference between the returns to domestic and foreign experience of immigrant workers. The sum of  $\beta_1$  and  $\gamma_2$  captures the difference in the returns to experience of immigrants and natives in the Portuguese labour market.

In this article, we estimated a more flexible version of equation 1, allowing for the impact of all variables to vary between natives and immigrants (coefficients  $\gamma$  in equation 2), as follows

$$\log W_{it} = \alpha + \beta_0 imi + \sum_{j=1}^m \beta_j x_j + \sum_{j=1}^m \gamma_j imi * x_j + \varepsilon_{it}$$
(2)

where m denotes the total number of covariates included in the model. When including interactions between all variables considered and the immigrant dummy this is equivalent to estimating separate regressions for native and immigrant workers.

While the above specification permits the distinction between natives and immigrants, in the case of immigrants it assumes that the effects are homogeneous across different nationality groups. As described in section 3, immigrant workers in Portugal are not a homogeneous group and considering immigrants as a whole conceals important differences among nationalities. In an alternative specification, we augmented equation 2 by replacing the immigrant dummy variable with a set of indicators for the major immigrant communities in Portugal (Brazil, PALOP and CEEC) and also for EU15 and China. Immigrants from the EU15 are quite different from the average immigrant worker, as these workers are much more qualified and earn much higher wages, on average. At the other extreme are the immigrants from China, which grew strongly in recent years: they are the least qualified and earn the lowest wages, on average.

#### 4.1. Decomposition analysis

Let us focus on the following questions: whether immigrants earn the same wages as natives upon arrival and, if not, how this wage gap is influenced by differences in endowments and returns to worker and firm characteristics. Instead of resorting to the sequential comparison across specifications of the coefficient of interest (in this case, the  $\beta_0$  coefficient, denoting the wage gap upon arrival), which is a quite common procedure but can lead to misleading conclusions, we use the decomposition technique proposed by Gelbach (2010). While the results obtained from the simple comparison of the estimates for different specifications are influenced by the sequence of specifications, Gelbach's procedure is path--independent and consistently delivers the individual contribution of each additional variable, conditional on all other regressors.

Consider as base model the regression of  $\log W_{it}$  in a constant and a dummy variable for immigrant status (*imi*) and as full model the one specified in equation 2. The aim of this analysis is to have a better grasp on how  $\beta_0$  is influenced by introducing additional regressors in the base model. Gelbach shows that the difference between the coefficient of interest in both models ( $\beta_0^{base} - \beta_0^{full}$ ) can be additively decomposed into  $\delta_i$  contributions, where *i* represents the regressors added to the full model and not included in the base model.<sup>7</sup> The contributions can be calculated as

$$\delta = (X'_{base} X_{base})^{-1} X'_{base} X_{full} \beta^{full}$$
(3)

where  $X_{base}$  denotes the regressors included in the base model - dummy variable for immigrant status -,  $X_{full}$  are the regressors included only in the full model and  $\beta^{full}$  are the coefficients in the full model associated with  $X_{full}$  variables. The  $\delta_i$  contributions are the mean gap between immigrants and natives over the *i* regressors scaled by the coefficient of these regressors in the full model.

Another way of seeing this is by saying that  $\beta_0^{base}$ , *i.e.*, the unconditional average wage gap, is the sum of two terms - the composition effect and the wage structure effect. The composition effect represents the part of the unconditional wage gap that can be attributed to differences (relative to natives) in the average levels of the variables included in the model, except ysm.<sup>8</sup> The wage structure effect is the sum of the contributions associated with ysm and with all the interaction variables (differences in returns) and the unexplained part of the gap due to "group membership" (the immigrant dummy,  $\beta_0^{full}$ , that also captures all potential effects of differences in unobserved variables). Analytically,

7 Since this decomposition is additive, one can obtain  $\delta_i$  contributions for groups of regressors, e.g. J sector dummies, as the sum of group-wise components,  $\delta_{sector} = \sum_{j=1}^{J} \delta_j$ . Furthermore, robust standard errors clustered at the individual level are considered. For more details, see Gelbach (2010).

<sup>8</sup> The differences in the covariates are weighted by the coefficients of natives. This procedure resumes to building a counterfactual scenario where the returns to the covariates for immigrants are assumed to be the same as for natives, being exclusively assessed the impact of differences in the levels of the covariates.

$$\beta_{0}^{base} = \underbrace{(\overline{X}_{full}^{imi} - \overline{X}_{full}^{natives})\beta_{natives}^{full}}_{\text{Composition effect}} + \underbrace{\overline{X}_{full}^{imi}(\beta_{imi}^{full} - \beta_{natives}^{full}) + \beta_{0}^{full}}_{\text{Wage structure effect}}$$
(4)

where  $\overline{X}$  are the sample averages. This reasoning owes to the well-known strand of the literature on decompositions of mean wage differentials, namely the Oaxaca-Blinder decomposition (Oaxaca (1973) and Blinder (1973)).

As discussed in Fortin *et al.* (2011), to include categorical variables with more than two categories - in our case, educational attainment, sectors, regions and time effects - raises some difficulties in the interpretation of the results of the wage structure effect. In particular, the possibility of separating the differences in the returns of the omitted category from the "true" unexplained component is hindered. Although the overall wage structure effect is independent of the omitted categories chosen, the differences in the returns to individual variables, as well as  $\beta_0^{full}$ , vary with this choice. One should bear in mind the fact that these individual effects are always conditional on the choice of the omitted categories and, thus, should be interpreted carefully.

#### 5. Empirical results

In this section, we begin by examining the wage differences between immigrants and natives, using the database for the 2002-2008 period presented in section 2 and the estimation strategy outlined in section 4. Then, we analyse the heterogeneity of the results by main regions of origin of immigrants in section 5.2.

#### 5.1 Base results

As shown in the second column of Table 1, the simple difference in means between log wages of immigrant and native workers amounts to -15.0 log points. How does controlling for other variables affect this unconditional wage gap? The first column of Table 2 includes the estimation results of equation 2 that allows the impact of all characteristics to vary between natives and immigrants. Using these estimates, the coefficient of the immigrant dummy is 20.5 log points, meaning that the wage upon arrival of an immigrant whose characteristics match the omitted categories is 20.5 log points, or 22.8 per cent, higher than the wage of a comparable native, both without any work experience. Recall that the omitted categories are: illiterate, male, manufacturing sector, Lisbon, permanent contract and 2002. So, what are the main drivers behind the unconditional average wage gap of -15 log points between immigrants and natives? The first column of Table 3 shows the results of applying Gelbach's decomposition. The total composition effect amounts to -2.1 log points and the total wage structure effect is -12.9 log points. Starting from the -15.0 log points of unconditional wage gap of the average immigrant, -2.1 log points reflect differences in the average values of the variables between immigrant and native workers and -12.9 log points result from differences in the returns of these variables compared to natives and from the immigrant status effect. So, the majority of the wage gap is explained by differences in the returns of the covariates and by the "group membership" effect, and not by differences in endowments.

Let us look into more detail to each individual contribution to the composition effect, starting with the characteristics whose differences in means favour the immigrants. Controlling for gender increases the wage gap, as in our database the share of female workers is smaller among immigrants and there is a wage penalty associated with female workers. If the share of female workers was the same for natives and immigrants, then the average wage gap would be 1.9 log points higher. Similarly, since immigrant workers are more concentrated in regions with higher wages, on average, and higher employment growth (see Cabral and Duarte (2010)), if the geographical concentration of immigrants and natives was the same, then the wage gap would be 3.9 log points higher.

Table	2

WAGE	ESSION ESTIMA	ATES, 2002-200	8, DEPENDEN	VARIABLE: LC	OG OF REAL HO	DURLY
	Immigrants	EU15	PALOP	CEEC	Brazil	China
imi	0.205	0.073	0.221	0.254	0.274	0.255
	[0.000]	[0.121]	[0.000]	[0.000]	[0.000]	[0.000]
pexp	0.034	0.034	0.034	0.034	0.034	0.034
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
pexp <sup>2</sup>	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
imi*pexp	-0.023	0.012	-0.022	-0.030	-0.027	-0.033
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
imi*pexp <sup>2</sup>	0.0002	-0.0002	0.0002	0.0003	0.0003	0.0004
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
ysm	0.025	-0.009	0.020	0.025	0.038	0.012
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
ysm <sup>2</sup>	-0.0004	0.0004	-0.0002	-0.0002	-0.0007	0.000
	[0.000]	[0.000]	[0.000]	[0.003]	[0.000]	[0.985]
gender	-0.237	-0.237	-0.237	-0.237	-0.237	-0.237
5	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
imi*gender	0.049	-0.055	0.059	0.068	0.062	0.219
5	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
edu.	0.070	0.070	0.070	0.070	0.070	0.070
1	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
edu,	0.192	0.192	0.192	0.192	0.192	0.192
2	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
edu.	0.379	0.379	0.379	0.379	0.379	0.379
3	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
edu,	0.623	0.623	0.623	0.623	0.623	0.623
4	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
edu.	1.281	1.281	1.281	1.281	1.281	1.281
5	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
imi*edu.	-0.065	-0.031	-0.053	-0.054	-0.054	-0.068
1	[0.000]	[0.492]	[0.000]	[0.000]	[0.000]	[0.000]
imi*edu.	-0.141	-0.024	-0.140	-0.170	-0.151	-0.188
	[000.0]	[0.583]	[0.000]	[0.00.0]	[0.000]	[0.00.0]
imi*edu.	-0.260	0.028	-0.256	-0.339	-0.294	-0.356
	[000.0]	[0.537]	[0.000]	[0.00.0]	[0.000]	[0.00.0]
imi*edu	-0.395	0.051	-0.375	-0.571	-0.456	-0.572
	[0,000]	[0 253]	[0 000]	[0 000]	[0,000]	[0 000]
imi*edu	-0.435	0 112	-0 391	-1 059	-0 582	-0.941
	[0000]	[0 014]	[0 000]	[0 000]	[0 000]	[0 0 0]
contract	-0.078	-0.078	-0.078	-0.078	-0.078	-0.078
conduct	[0,00,0]	[0,00]	[0 000]	[0,000]	[0,00,0]	[0,000]
imi*contract	0.031	-0 034	0.040	0.087	0.058	0.043
contract	[0 000]	[0 000]	[0.00.0]	[0 000]	[0 000]	[0 000]
Other controls	-Yes-	-Yes-	-Yes-	-Yes-	-Yes-	_0.000] -Yes-
No. of observations	15 932 970	15 060 001	15 215 980	15 247 469	15 174 975	14 990 179
R <sup>2</sup>	0.4515	0.4588	0.4576	0.4571	0.4567	0.4585
<pre>imi pexp2 imi*pexp2 ysm ysm2 gender imi*gender edu, edu2 edu4 edu4 edu5 imi*edu1 imi*edu2 imi*edu4 imi*edu4 imi*edu4 imi*edu5 contract imi*contract Other controls No. of observations R2</pre>	[0.000] 0.0002 [0.000] 0.025 [0.000] -0.0004 [0.000] 0.049 [0.000] 0.070 [0.000] 0.192 [0.000] 0.192 [0.000] 0.379 [0.000] 0.379 [0.000] 0.623 [0.000] 0.0260 [0.000] 0.0260 [0.000] 0.0260 [0.000] 0.031 [0.000] 0.031 [0.000] 0.031 [0.000] 0.4515	[0.000] -0.0002 [0.000] -0.009 [0.000] 0.0004 [0.000] -0.237 [0.000] -0.055 [0.000] 0.192 [0.000] 0.192 [0.000] 0.379 [0.000] 0.379 [0.000] 0.623 [0.000] 1.281 [0.000] -0.031 [0.492] -0.024 [0.583] 0.028 [0.537] 0.051 [0.253] 0.051 [0.253] 0.051 [0.253] 0.112 [0.014] -0.078 [0.000] -0.034 [0.000] -0.034 [0.000] -0.034 [0.000] -Yes- 15 060 001 0.4588	[0.000] 0.0002 [0.000] 0.020 [0.000] -0.0002 [0.000] 0.059 [0.000] 0.070 [0.000] 0.192 [0.000] 0.379 [0.000] 0.379 [0.000] 0.623 [0.000] 0.623 [0.000] 0.623 [0.000] 0.623 [0.000] 0.623 [0.000] 0.553 [0.000] -0.553 [0.000] -0.553 [0.000] -0.256 [0.000] -0.256 [0.000] -0.375 [0.000] -0.375 [0.000] -0.375 [0.000] -0.375 [0.000] -0.375 [0.000] -0.375 [0.000] -0.375 [0.000] -0.375 [0.000] -0.375 [0.000] -0.778 [0.000] -0.778 [0.000] -0.778 [0.000] -0.778 [0.000] -0.778 [0.000] -0.778 [0.000] -0.4576	[0.000] 0.0003 [0.000] 0.025 [0.000] -0.0002 [0.003] -0.237 [0.000] 0.068 [0.000] 0.070 [0.000] 0.192 [0.000] 0.379 [0.000] 0.379 [0.000] 0.623 [0.000] 0.623 [0.000] 1.281 [0.000] 0.623 [0.000] 0.623 [0.000] 0.623 [0.000] 0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.571 [0.000] -0.574 [0.000] -0.574 [0.000] -0.571 [0.000] -0.574 [	[0.000] 0.0003 [0.000] 0.038 [0.000] -0.0007 [0.000] -0.237 [0.000] 0.062 [0.000] 0.070 [0.000] 0.192 [0.000] 0.379 [0.000] 0.379 [0.000] 0.379 [0.000] 0.623 [0.000] 0.623 [0.000] 0.623 [0.000] 0.523 [0.000] -0.544 [0.000] -0.054 [0.000] -0.151 [0.000] -0.542 [0.000] -0.542 [0.000] -0.582	[0.00 0.000 [0.00 0.01 [0.00 0.01 [0.00 0.21 [0.00 0.21 [0.00 0.21 [0.00 0.15 [0.00 0.37 [0.00 0.37 [0.00 0.37 [0.00 0.37 [0.00 0.37 [0.00 0.37 [0.00 0.37 [0.00 0.37 [0.00 0.37 [0.00 0.37 [0.00 0.02 [0.00 -0.06 [0.00 -0.35 [0.00 -0.35 [0.00 -0.57 [0.00][0.00 -0.57 [0.00][0.00

Source: Authors' calculations. Notes: p-values in brackets (implicit standard errors are worker-cluster robust). See the main text and Appendix A for a full description of all variables included.

#### Table 3

DECOMPOSING THE IMMIGRANT-NATIVE WAGE GAP (OAXACA-BLINDER DECOMPOSITION): CONTRIBUTION OF REGRESSORS INCLUDED IN FULL MODEL WITH INTERACTIONS

Reference group:	Illiterate	12 years of education
Unconditional wage gap	-0.150	-0.150
Composition effect: of which:	-0.021	-0.021
Potential work experience	-0.015	-0.015
Gender	0.019	0.019
Contract	-0.025	-0.025
Sector	-0.024	-0.024
Region	0.039	0.039
Time effects	0.000	0.000
Education	-0.014	-0.014
Wage structure effect: of which:	-0.129	-0.129
Years since migration	0.101	0.101
Potential work experience	-0.371	-0.371
Gender	0.017	0.017
Contract	0.017	0.017
Sector	0.052	0.052
Region	0.072	0.072
Time effects	0.008	0.008
Education	-0.230	0.165
Immigrant dummy	0.205	-0.189

**Source:** Authors' calculations.

**Notes:** The immigrant dummy represents the unexplained part of the gap due to "group membership". The decomposition of the unconditional wage gap follows the strategy described in equation 4. Please refer to the text for more details. All coefficients reported are statistically significant at a level of significance of 1 per cent.

In turn, immigrants tend to be employed in sectors with below average wages, namely construction, hotels and restaurants and wholesale and retail trade, as shown in Table 1. Hence, part of the unconditional average wage disadvantage of immigrants is due to their sectoral concentration. Regarding the type of contract, there is a much higher proportion of immigrants with fixed-term contracts and there is an average wage penalty associated with these contracts, so controlling for this composition effect leads to a decline in the wage gap. A similar reasoning applies to the educational attainment. Finally, wages increase with potential experience and immigrants have, on average, lower values for this variable. If mean potential experience of immigrants was the same of natives, the wage gap would be 1.5 log points lower.

Regarding the breakdown of the wage structure effect, let us start with the difference in the returns to potential work experience. This difference has a strong negative contribution to the wage gap. If the returns to potential work experience were the same between natives and immigrants, the wage gap would be 37.1 log points lower. However, based on the standard errors of the Gelbach's decomposition procedure, the hypothesis of different returns is not rejected. Recall from the discussion in section 4 that the coefficients associated with potential work experience have different interpretations for natives and immigrants in the full model regression. For natives, it captures the impact on wages of an additional year of experience in the Portuguese labour market. For immigrants, the coefficient associated with the interaction of the immigrant dummy with the variable potential work experience measures the difference between the returns of one year of work experience of an immigrant in his home country and one year of experience of a native in Portugal. This estimated difference is negative, meaning that pre-immigration work experience of immigrants is less valued than domestic experience of natives, which is consistent with the idea of imperfect portability of human capital across countries. Using the estimates of the first column of Table 2, one additional year of experience in the Portuguese labour market increases the average real hourly wages of native workers by 3.4 log points, while one additional year of foreign experience

increases the real hourly wages of immigrant workers by 1.0 log points (3.4 - 2.3).<sup>9</sup> So, foreign potential experience of immigrants is rewarded by less than one third than domestic potential experience of natives. Thus, for comparable workers with the same amount of potential experience, one additional year of potential experience deepens the wage gap upon arrival between immigrants and natives.

Controlling for the variable years since migration (ysm) leads to an increase of 10.1 log points in the conditional wage gap. The coefficient  $\beta_0$  in the full model measures the wage gap upon arrival of immigrants to the host country, while in the base model we have the average wage gap across all immigrants. The coefficient associated with ysm ( $\beta_1$ ) captures the difference between the returns to domestic and foreign experience of immigrant workers. The estimated  $\beta_1$  coefficient is positive, meaning that foreign experience of immigrant workers is less valued than their domestic experience. This difference between the returns to an additional year of domestic experience between immigrants and natives shows how the relative initial situation of immigrants changes with years in Portugal (Borjas (1999)). Ignoring the squared terms for the sake of simplicity, this difference in returns is only 0.2 log points (2.5 – 2.3). Although the study of the wage assimilation of immigrants in the Portuguese labour market is beyond the scope of this article, this result points to no substantial evolution of the relative wage of the average immigrant compared to the average native over time.

The returns to gender and type of contract have similar positive (though small) contributions to the wage gap upon arrival. If returns to gender were the same between native and immigrant workers then the wage gap would increase by 1.7 log points. This evidence implies that the wage penalty associated with being a female worker is smaller in the case of immigrants. The same reasoning applies to the type of contract. If the penalty associated with having a fixed-term contract relative to a permanent contract was the same for natives and immigrants, the wage gap would also be 1.7 log points higher.

Recall that in the presence of categorical variables, the contributions of these variables to the wage structure effect are always conditional on the choice of the omitted categories. In addition, the immigrant status coefficient includes the average wage gap for the omitted categories, as well as the potential effect of unobserved variables. The comparison of the two columns of Table 3 illustrates this point, focusing on the educational attainment variable. The only difference between the two columns is the reference group, or omitted category, of the education variable, which is 12 years of schooling (upper-secondary education) in the second column.

Starting with the first column, conditional on the choice of illiterate, manufacturing, Lisboa and 2002 as omitted categories, the returns to education of immigrants are lower than those of natives for the other schooling levels. If the returns to an additional level of education relative to being illiterate were the same between immigrant and native workers, the wage gap would be 23.0 log points lower. However, this does not mean that the contribution of different returns to education is -23.0 log points because this value can not be dissociated from the estimate obtained for the immigrant dummy (20.5 log points), which also includes the impact of the difference in returns for the omitted category of education. Given that we have more than one categorical variable, this value also includes the implicit contribution of the difference in returns of the omitted categories of the sector, region and time effects.

Turning to the second column of Table 3, omitting the category of 12 years of education and keeping the rest constant, from the Gelbach's procedure we obtain a positive contribution of different returns to education to the respective wage gap (16.5 log points). If the returns to the other levels of education relative to having 12 years of schooling were the same for natives and immigrants, the wage gap would

**<sup>9</sup>** For the sake of simplicity, this discussion ignores the squared terms. This simplification does not affect the signal of the impacts, only their magnitude over time. For instance, when evaluated at 5 years of experience, an additional year of foreign experience of the immigrants increases the average wage by 0.8 log points, while the return of an additional year of domestic experience is 2.9 log points for a native.

be 16.5 log points higher. Again this effect can not be detached from the value estimated for the immigrant dummy: conditional on all other variables, an immigrant with 12 years of education would earn upon arrival less 18.9 log points than a comparable native. Note that the sum of the contribution of the difference in returns to education and the immigrant dummy is the same in both columns: -2.4 log points.

Given the relevance of differences in returns to formal education in the literature on immigration and the magnitude of the estimated parameters in our regression, let us summarize the conditional wage gap upon arrival by educational attainment level. As these wage gaps are obtained by summing the coefficients associated with the immigrant status variable and the interaction of the different education levels with the estimated immigrant dummy, they are independent of the reference group chosen for the education variable, but still conditional on the omitted categories of the other variables.

As can be seen in the first column of Table 2, the estimated coefficients of the interaction of education and the immigrant status are all negative and the returns on completing one more educational level (compared to being illiterate) of immigrants relative to a comparable native worker are progressively lower as we move up the educational ladder. The wage difference between an illiterate male immigrant worker in the manufacturing sector, in Lisboa, with a permanent contract, without work experience (foreign or in host country), in 2002 and a comparable native is positive and amounts to 20.5 log points, while the wage difference for similar individuals but with 4 years of schooling is 14.1 log points (20.5 - 6.5) and 6.4 log points (20.5 - 14.1) for comparable individuals with 6 years of education completed. This conditional wage gap of immigrants upon arrival becomes increasingly negative for the three higher educational grades: -5.4 log points (20.5 - 26.0) for workers with 9 years of schooling, -18.9 log points for those with 12 years of schooling (20.5 - 39.5) and, finally, -22.9 log points (20.5 - 43.5) for individuals with tertiary education. So, the wages of immigrants with more formal education are relatively more penalised in Portuguese labour market, a result that supports the idea of imperfect transferability of human capital and that the international transferability of education also depends on its grade.

#### 5.2 Accounting for heterogeneity by immigrant origin

In this section, we examine the heterogeneity of the wage gap upon arrival of immigrants in the Portuguese labour market by main nationality groups. We individualise immigrants from the EU15, PALOP, CEEC, Brazil and China. We allow all the coefficients to vary between immigrants and natives and among immigrant groups, which is equivalent to estimating separate regressions for each nationality group.<sup>10</sup> In this section, we focus on the main results by nationality, highlighting the key contrast points among immigrant groups. The columns (2) to (6) of Table 2 include a selection of the main results of replacing the immigrant dummy variable by a set of indicators for each of the main nationalities considered.

As described in section 3, we find a negative unconditional wage differential between the main groups of immigrants and natives, except in the case of immigrants from the EU15. How are these wage differences affected when we control for the characteristics of individuals and firms? As before, we use Gelbach's technique for implementing the Oaxaca-Blinder decomposition. All the gains and caveats of using this decomposition technique discussed above remain valid. Figure 1 shows the general results of this decomposition for each immigrant group, dividing the differential in average wages relative to natives into two terms, a composition effect and a wage structure effect.

Let us start with immigrants from EU15, which have very distinct results from the other immigrant groups examined. Immigrants from EU15 earn, on average, more 33.2 log points than natives, reflecting a positive wage structure effects and, especially, a substantial positive composition effect. The relative difference in the magnitudes of the wage determinants included in the regression largely favours immigrants from the EU15, a result that is in sharp contrast with the other immigrant groups considered. If the average

**<sup>10</sup>** The full set of results of all individual regressions is available from the authors upon request.

#### Chart 1



DECOMPOSING THE IMMIGRANT-NATIVE WAGE GAP (OAXACA-BLINDER DECOMPOSITION) FOR THE

Source: Authors' calculations.

Note: This decomposition follows the technique proposed by Gelbach (2010) and described in section 4.1.

level of the variables included was the same for immigrants from the EU15 and natives, then the wage difference would be 20.9 log points lower. Moreover, if there were no differences in the gains/penalties associated with each variable and no unexplained component, then the wage difference would be 12.3 log points lower. Hence, this result suggests that the EU15 immigrants not only have better endowments but also tend to earn better returns on those variables.

The results of the composition and wage structure effects of Chinese immigrants are guite the opposite. Both effects are negative and substantial, contributing almost evenly to the relative wage disadvantage of these immigrants. From the -49.5 log points of unconditional wage gap to natives, -22.3 log points result from level differences in wage determinants and -27.2 log points reflect differences in the returns of the variables compared to natives and the immigrant status effect.

With the exception of these two extreme cases, the results of the other immigrants groups are broadly in line with those obtained for the average immigrant: both effects contribute to the unconditional wage gap but the wage structure effect clearly dominates. That is, most of the wage gap is not due to worst endowments of the immigrants compared to natives but to differences in the returns of the covariates and to the "group membership" effect.

This decomposition technique also provides a detailed breakdown of the contribution of each covariate for both the composition and wage structure effects. Table 4 depicts the detailed breakdown for the different immigrant groups. Starting again with immigrants from EU15, the main contribution to the positive composition effect is associated with the education variable. This highly positive contribution results from the fact that the educational attainment of immigrants from EU15 is significantly higher than that of natives (see Table 1). In contrast, potential work experience gives a negative contribution, as average potential work experience among immigrants from the EU15 is lower than for natives. As the share of male and female workers is very similar between these immigrants and natives, the composition effect associated with gender is not statistically significant.

Turning to the positive wage structure effect, the contribution of allowing for different returns on potential work experience between natives and immigrants from the EU15 is positive, which contrast sharply with the results for the other immigrant groups. The foreign work experience of immigrants from the EU15 is better rewarded than the domestic experience of natives, as can be seen from the positive coefficient associated with the interaction of the EU15 immigrant dummy and the potential work experience variable in Table 2. Ignoring the squared terms for the sake of simplicity, one additional year of foreign work experience of these immigrants results in a wage increase of 4.6 log points (3.4 + 1.2), while in the case of natives the increase amounts to 3.4 log points.

In contrast to the average immigrant, for which the wage penalty associated with female and fixed term workers is smaller than for natives, female and fixed term workers from EU15 have a higher wage penalty than similar natives. In addition, their positive wage differential compared to natives declines (although at a decreasing rate) with years since migration. So, controlling for this effect increases the positive wage difference between immigrants from the EU15 and natives.

The breakdown of the composition and wage structure effects for Chinese immigrants is, to some extent, symmetric to the one just described for EU15 immigrants, as least regarding the major contributions to each effect. Firstly, the extremely low educational attainment of Chinese workers contributes strongly to the negative composition effect. Secondly, the negative difference in returns to pre-immigration work experience of Chinese immigrants and domestic experience of natives is the main element behind the negative wage structure effect. Using the regression estimates of Table 2 and ignoring quadratic terms, an additional year of labour market experience abroad increases mean wages of Chinese workers by only 0.1 log points (3.4 - 3.3), which suggests that work experience acquired in China has no substantial wage value in the Portuguese labour market.

Regarding the other wage determinants, the individual contributions for decomposing the wage gap upon arrival obtained for the main groups of immigrants, excluding the EU15, are qualitatively similar to the ones obtained for total immigrants, though with differences in magnitudes. Gender has a positive contribution both in the composition and wage structure effect. This result indicates that for these groups of immigrants the share of females is smaller than for natives and the wage penalty associated with female workers is smaller in the case of immigrants. However, female immigrants from China earn wages that are only 1.8 log points (-23.7 + 21.9) below their male counterparts, the smallest penalty estimated for all nationalities, which compares to a penalty of 23.7 log points for native workers and 18.8 log points (-23.7 + 4.9) for the average immigrant.

The contribution of the type of contract associated with the composition effect is negative, while the contribution associated with the wage structure effect is positive. Hence, immigrant workers from these origins tend to have proportionally more fixed-term links to the labour market but their wage penalty associated with that link is smaller than for natives. However, in contrast with a penalty of 7.8 log points for natives and 4.7 log points (-7.8 + 3.1) for the average immigrant, immigrants from the CEEC working under a fixed-term contract have wages that are slightly above the ones of their compatriots with a permanent contract (0.9 log points).

As it was done for the average immigrant in the previous section, let us finalize by examining the wage gap upon arrival for the different immigrant groups by educational attainment level. The regression estimates included in Table 2 show that, with the exception of immigrants from the EU15, the returns to education (in comparison to an illiterate worker) of the various immigrant groups are always lower than those of native workers across all educational levels. This result confirms the idea of imperfect transferability of education across borders, but there are important differences among immigrant groups. The highest difference in the returns to education compared to natives is obtained for workers from the CEEC and China, especially in the highest educational level. An average immigrant from the CEEC with tertiary education earns only more 22.2 log points (128.1 – 105.9) than a comparable illiterate worker of the same nationality, compared to 128.1 log points for a native worker and 84.6 log points for the average immigrant. The returns to tertiary education for an average Chinese worker (34.0 log points) are also significantly lower than the average immigrant. In addition, for Chinese workers, there are basically no wage returns of having 4 and 6 years of schooling compared to being illiterate.

#### Table 4

DECOMPOSING THE IMMIGRANT-NATIVE WAGE GAP (OAXACA-BLINDER DECOMPOSITION) FOR THE MAIN IMMIGRANT GROUPS: CONTRIBUTION OF REGRESSORS INCLUDED IN FULL MODEL WITH INTERACTIONS

	Immigrants	ELIAE	DALOD	CEEC	Brozil	China
	iningrants	EUIS	PALOP	0.242	DIdZII	0.405
Unconditional wage gap	-0.150	0.332	-0.169	-0.243	-0.193	-0.495
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Composition effect:	-0.021	0.209	-0.046	-0.025	-0.062	-0.223
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
of which:						
Potential work experience	-0.015	-0.058	0.011	0.002	-0.063	0.009
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Gender	0.019	-0.001	0.005	0.043	0.010	0.017
	[0.000]	[0.281]	[0.000]	[0.000]	[0.000]	[0.000]
Contract	-0.025	-0.009	-0.022	-0.033	-0.032	-0.026
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Sector	-0.024	-0.010	-0.026	-0.022	-0.031	-0.059
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Region	0.039	0.019	0.078	0.020	0.053	0.026
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Time effects	0.000	0.000	-0.001	0.001	-0.002	-0.001
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Education	-0.014	0.268	-0.090	-0.036	0.003	-0.187
	[0.000]	[0.000]	[0.000]	[0.000]	[0.029]	[0.000]
Wage structure effect:	-0.129	0.123	-0.124	-0.218	-0.131	-0.272
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
of which:						
Years since migration	0.101	-0.028	0.115	0.070	0.095	0.036
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Potential work experience	-0.371	0.110	-0.385	-0.480	-0.373	-0.513
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Gender	0.017	-0.024	0.024	0.017	0.024	0.079
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Contract	0.017	-0.011	0.020	0.056	0.037	0.024
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Sector	0.052	-0.003	0.017	0.060	0.043	-0.078
	[0.000]	[0.728]	[0.001]	[0.000]	[0.000]	[0.213]
Region	0.072	-0.031	0.052	0.094	0.071	0.106
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Time effects	0.008	-0.012	-0.005	0.038	-0.015	0.017
	[0.000]	[0.018]	[0.008]	[0.000]	[0.000]	[0.007]
Education	-0.230	0.049	-0.183	-0.328	-0.287	-0.199
	[0.000]	[0.262]	[0.000]	[0.000]	[0.000]	[0.000]
Immigrant dummy	0.205	0.073	0.221	0.254	0.274	0.255
	[0.000]	[0.121]	[0.000]	[0.000]	[0.000]	[0.000]

Source: Authors' calculations. Notes: p-values in brackets (implicit standard errors are worker-cluster robust). See the main text and Appendix A for a full description of all variables included.

Since immigrants' schooling is progressively less valued than natives, the wage gaps upon arrival of the various immigrant groups (excluding EU15) become negative for the top-three educational levels (Figure 2). Taking the case of Brazil as an example, an illiterate male Brazilian worker in the manufacturing sector in 2002, in Lisboa, with a permanent contract and without any work experience has an average wage that is 27.4 log points higher than a comparable native. This positive wage difference vanishes as the educational attainment increases and becomes negative for the top three educational levels: -2.1 log points (27.4 - 29.4) for 9 years of education completed, -18.2 log points (27.4 - 45.6) for 12 years and -30.8 log points (27.4 - 58.2) for tertiary education. For workers with tertiary education, the wage gap upon arrival compared to natives is especially high for immigrants from the CEEC (-80.5 log points) and China (-68.6 log points).

The estimates of returns to education for immigrants from the EU15 are very different from the other immigrant groups. Although results in Figure 2 show a positive wage gap upon arrival for all educational levels, the positive gap for illiterate workers is not statistically significant and the same occurs in most differences in returns to education compared to natives. The differences in the returns to tertiary education of EU15 immigrants, which are higher and statistically significant at a 5 per cent level, are the exception. The idea that the returns to education are similar between natives and immigrants from the EU15 was already evinced in the fact that the contribution of the educational variables to the wage structure effect was not statistically significant for these immigrants.<sup>11</sup> The fact that formal education acquired in EU15 countries is more easily transferable to Portugal is not surprising and is in line with results found for other countries of higher international portability of education between developed countries (see, for instance, Basilio and Bauer (2010)).



#### Chart 2

WAGE GAP UPON ARRIVAL BETWEEN IMMIGRANTS AND NATIVES BY EDUCATIONAL LEVEL | WAGE DIFFERENCE RELATIVE TO A COMPARABLE NATIVE WORKER IN LOG POINTS

Note: See the main text and Appendix A for a detailed description of the different educational levels.

Source: Authors' calculations.

<sup>11</sup> Recall, however, that this contribution to the wage structure effect is conditional on the reference group chosen for the categorical variable. We replicated the calculations using 12 years of education as the reference category and the contribution of the education variables to the wage structure effect continued to lack statistical significance for EU15 immigrants.

### 6. Conclusions

The increase in immigration flows in the late nineties and the substantial change in its nationality mix makes it relevant to analyse the relative wage performance of immigrant workers in Portugal. A large strand of the empirical research on immigration in the last decades focused on several aspects of labour market adjustment of immigrants. Most of this research is based on the "positive assimilation" model of Chiswick (1978) and assumes the pre-migration skills are not perfectly transferable when immigrants move from a lower to a higher income area. As a result the immigrants face a wage penalty upon arrival in the destination country. In Portugal, over the period 2002-2008, the simple difference in means between wages of immigrant and native workers amounts to -15.0 log points, or -13.9 per cent.

In this article, we use a longitudinal matched employer-employee database (*Quadros de Pessoal*) in the 2002-2008 period to analyse the wages of immigrants in the Portuguese labour market, identifying the major differences against native workers upon arrival. To disentangle the main drivers of this wage gap we apply the decomposition procedure proposed by Gelbach (2010). We exploit the relation between Gelbach's decomposition and the Oaxaca-Blinder decomposition (Oaxaca (1973) and Blinder (1973)), describing the unconditional average wage gap as the sum of a composition effect - associated with differences in the average magnitude of variables included in the model - and a wage structure effect - differences in the returns to the variables considered in the model and the unexplained part of the gap due to the immigrant status.

The wage gap upon arrival between comparable immigrant and native workers is mainly associated with the wage structure effect and not with differences in endowments. In particular, foreign work experience of immigrants is rewarded by less than one third of natives' domestic experience. Moreover, the estimated returns to education (compared to being illiterate) of immigrants relative to natives are lower for all educational levels and become progressively lower as we move up the educational ladder. So, on average, the wages of immigrants with more formal education are relatively more penalised in the Portuguese labour market. Both these results support the idea of imperfect portability of human capital across countries (Friedberg (2000)).

We also assess the wage gap upon arrival by main nationality groups of immigrants - EU15, PALOP, CEEC, Brazil and China. There are significant differences among these nationalities and we find that treating immigrants as a homogeneous group conceals distinct results across nationalities. The average wage of workers from the EU15 is substantially higher than the average native wage, while Chinese immigrants earn wages significantly lower than other migrant groups. Our decomposition results show that the EU15 immigrants not only have better endowments but also tend to earn better returns to those characteristics. In particular, their educational attainment is significantly higher than that of natives and their foreign work experience is better rewarded than the domestic experience of natives. The results for Chinese workers are strikingly different: both the composition and wage structure effects are negative and substantial, contributing almost evenly to the relative wage disadvantage of these immigrants. In particular, they have an extremely low educational attainment and their pre-immigration work experience is not significantly valued in the Portuguese labour market. With the exception of these two extreme cases, the results of the other groups are broadly in line with those obtained for the average immigrant: most of the wage gap is not due to worst endowments of the immigrants compared to natives but to differences in the returns of the covariates and to the immigrant status effect.

#### References

- Basilio, L. and Bauer, T. (2010), "Transferability of human capital and immigrant assimilation: An analysis for Germany", *IZA Discussion Papers 4716*, Institute for the Study of Labor (IZA).
- Blinder, A. S. (1973), "Wage discrimination: Reduced form and structural estimates", *The Journal of Human Resources 8(4)*, 436–455.
- Borjas, G. J. (1999), "The economic analysis of immigration", in O. Ashenfelter and D. Card, eds, Handbook of Labor Economics, Vol. 3, Part A, Elsevier, chapter 28, pp. 1697–1760.
- Cabral, S. and Duarte, C. (2010), "Employment and wages of immigrants in Portugal", *Working Paper* 31-2010, Banco de Portugal.
- Carneiro, A., Fortuna, N. and Varejão, J. (2012), "Immigrants at new destinations: how they fare and why", *Journal of Population Economics 25*, 1165–1185.
- Chiswick, B. R. (1978), "The effect of americanization on the earnings of foreign-born men", *Journal of Political Economy* 86(5), 897–921.
- D'Amuri, F., Ottaviano, G. I. and Peri, G. (2010), "The labor market impact of immigration in Western Germany in the 1990s", *European Economic Review 54(4)*, 550–570.
- Fortin, N., Lemieux, T. and Firpo, S. (2011), "Decomposition methods in economics", in O. Ashenfelter and D. Card, eds, *Handbook of Labor Economics*, Vol. 4, Part A, Elsevier, chapter 1, pp. 1–102.
- Friedberg, R. M. (2000), "You can't take it with you? Immigrant assimilation and the portability of human capital", *Journal of Labor Economics* 18(2), 221–251.
- Gelbach, J. B. (2010)," When do covariates matter? And which ones, and how much?", *mimeo*, University of Arizona.
- Marques, J. C. and Góis, P. (2007), Ukrainian migration to Portugal. From non-existence to the top three immigrant groups, Migrationonline.cz mimeo, Multicultural Center Prague.
- Oaxaca, R. (1973), "Male-female wage differentials in urban labor markets", *International Economic Review 14(3)*, 693–709

DEFINITIONS OF VARIABLES				
Dependent variable	Description			
log W <sub>it</sub>	Natural logarithm of the real hourly wage of individual $i$ at time $t$ .			
Explanatory variables	Description			
imi	Dummy variable for immigrant status. Equals 1 if worker is immigrant.			
pexp	Age - 6 - years of education.			
ysm	Proxy of years since migration. Only for immigrant workers (equals zero for native workers). Based on the date that each worker first entered private employment (legally) in Portugal. Using QP records, it is possible to trace back each worker to its first record and also to obtain the first year of admission in a firm. This proxy corresponds to the difference between the reference year $t$ and the minimum of these two dates.			
Educational attainment	These variables record total years of education reported by the worker. The categories used are based on the International Standard Classification of Education (ISCED).			
edu <sub>o</sub>	Illiterate, meaning no formal education or below ISCED 1.			
edu,	4 years completed (primary education). Included in ISCED 1.			
edu <sub>2</sub>	6 years completed (second stage of basic education). Included in ISCED 1.			
edu <sub>3</sub>	9 years completed (lower secondary education). Refers to ISCED 2.			
edu <sub>4</sub>	12 years completed (upper-secondary education), Refers to ISCED 3-4.			
edu <sub>5</sub>	Tertiary education. Refers to ISCED 5-6.			
Variables included in X <sub>it</sub>				
Gender	Dummy variable for gender. Equals 1 if worker is female.			
Contract	Dummy variable for distinguishing permanent from fixed-term contracts. Equals 1 in case of fixed term contracts.			
Sector	Dummy variables for different industries, namely agriculture, mining and quarrying, manufacturing, construction, wholesale and retail trade, hotels and restaurants, transportation, financial services,real estate and business services, public administration, education and health, and other services. The reference group is manufacturing industry.			
Region	Dummy variables for different geographical locations, namely Aveiro, Braga, Faro, Leiria, Lisboa, Porto, Santarém, Setúbal and other regions. The reference group is Lisboa.			
Time effects	Year-specific fixed effects. The reference year is 2002.			

Articles **6**