

A SECTORAL PERSPECTIVE ON NOMINAL AND REAL WAGE RIGIDITY IN PORTUGAL*

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The world economy today is vastly different from the 1930's (...). Economics is very different, too. Both the science and its subject have changed, and for the better, since World War II. But there are some notable constants. Unemployment and inflation still preoccupy and perplex economists, statesmen, journalist, housewives, and everyone else.

Inflation and Unemployment

J. Tobin (1972)

1. INTRODUCTION

Wage rigidity (nominal and real) is associated with labour market frictions that prevent the normal adjustment of wages to labour demand. Firms' ability to accommodate to disturbances in the demand for their products is limited by wage rigidity. As opposed to wage flexibility, a rigid wage framework may lead to an adjustment that generates unemployment. Wage rigidity in the labour market is often pointed out, with varying emphasis, as one of the reasons that contribute to explain the higher level of unemployment in the European Union *vis-à-vis* the United States (Solow, 2000).

In the context of nominal wage rigidity (resistance to nominal wage decline) and low productivity growth, a low inflation regime, as recently experienced by developed economies, contributes to reduce firms' wage accommodation ability, in real terms, being associated with wages and unemployment higher than in the flexible wage situation (Akerlof *et al.* 1996). Real wage rigidity (resistance to a wage growth below the inflation rate or the bargaining reference value) has also been attracting increasing attention. In New Keynesian literature, the presence of real rigidity helped to a better understanding of both the dynamics behind the traditional trade-off between inflation and unemployment, and inflation persistence or inertia (Blanchard and Galí, 2007). At the microeconomic level, one of the stylised facts of firms' behaviour, as regards price setting, identified within the scope of the Inflation Persistence Network (IPN),¹ is the lower frequency of price adjustments – more persistent prices – in more labour-intensive firms and thus in firms potentially more exposed to wage rigidity constraints (Álvarez *et al.* 2005).

In addition to the important consequences for price setting and for inflation and unemployment dynamics, the growing attention paid to the wage rigidity issue is also associated with significant improvements in data collection techniques, both at the firm and individual level. The existence of longitudinal

* The author thanks *Instituto de Informática da Segurança Social* for making available the database and N. Alves, M. Centeno, A. C. Leal and P. Portugal for their comments and suggestions. Lucena Vieira's excellent computational support is gratefully acknowledged. The opinions expressed in this article are the responsibility of the author and do not necessarily coincide with those of Banco de Portugal. The usual disclaimer applies.

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(1) The Inflation Persistence Network (IPN) consists of a team of Eurosystem economists undertaking joint research on inflation persistence in the euro area and in its member countries.

databases containing information on wages and on different characteristics of workers and firms propelled the development of a new strand of the literature on wage rigidity, based on microeconomic data, which includes the works associated with the International Wage Flexibility Project (IWFP) (Dickens *et al.* 2007 and Du Caju *et al.* 2007, for instance).

The use of disaggregated data for the analysis of wage rigidity allows avoiding some of the caveats of macroeconomic approaches. In particular, when considering aggregate information for analysing the cyclical developments of wages, the evidence from these approaches is contaminated by the difficulties associated with aggregating the behaviour of heterogeneous agents. An example of these aggregation problems is the decrease in the weight of workers receiving lower wages (possibly less skilled workers), in the cyclical downturns, inducing a positive bias in aggregate wages (Abraham and Haltiwanger, 1995).

The microeconomic approach allows not only the analysis of the composition effects of the labour force, but also the construction of indicators of nominal and real wage rigidity based on the distribution of wages and wage changes. The methodology developed by the IWFP for calculating the rigidity measures is precisely based on the distributions of wage changes. In this case, nominal wage rigidity is associated with the share of workers with nil wage change, who would experience a wage cut, in the absence of rigidity. In turn, real wage rigidity refers to the share of workers with wage changes close to the expected inflation rate (or the bargaining reference value) who would experience a lower wage growth, in the absence of rigidity.

This article aims to describe and assess nominal and real wage rigidity in the Portuguese economy, by using the methodology developed within the scope of the IWFP. Extending the analysis of Portugal (2006)², this article also evaluates the impact of the breakdown by activity sector and firm size on rigidity measures, as in Messina *et al.* (2008). Though bearing in mind the sectoral heterogeneity, some emphasis is laid on the textile sector, in order to illustrate the importance of the composition effects in the labour force. The longitudinal database used was made available by *Instituto de Informática* (II) (Portuguese social security data-processing office) and covers the period from 2001 to 2007.

This article proceeds as follows. Section 2 describes the database and presents an analysis of wage developments in the different activity sectors over the period considered. Then, after a brief presentation of the IWFP methodology for the calculation of the rigidity measures, the results obtained for the total economy (Section 3.1) and for the different activity sectors (Section 3.2) are reported. In particular, the case of the textile sector is looked at in more detail (Section 3.2.1). Finally, Section 4 concludes.

2. DATA

In this article it was used a longitudinal database made available by Instituto de Informática (Portuguese social security data processing office), which includes all workers who paid contributions to the social security general regime, covering the period from 2001 to 2007. One of the advantages of using this database is related to its administrative nature (in this case, registers of social security contributions). Usually, the information in administrative databases is seen as more reliable, being less prone to measurement errors in wages (such as reporting or rounding errors) (Du Caju *et al.* 2007).

In addition to wages, which refer to the values reported each year in October, this database also contains other variables, namely the number of days worked in a month, job tenure, and variables referring to some characteristics of workers (such as gender, age, worker status – employees, self-employed or

(2) In Portugal (2006) the nominal and real rigidity measures are calculated only for the total economy.

other) and firms (for instance, region and size), covering all activity sectors. Monthly wage data may fall into four categories: permanent, variable, vacation and Christmas bonuses and other pay.

To increase comparability, the initial database was restricted to the employees that reported permanent wages not inferior to the minimum wage and worked a full month.³ These workers are, on average, approximately 1.8 million and are mostly concentrated in the services sector, a fact that illustrates the tertiarisation process of the Portuguese economy (Table 1). In line with the gradual population ageing, the employees considered show a slightly positive trend in both age and job tenure. The wages of this group of workers (*i.e.* the permanent compensation per worker) had relatively stable developments, particularly in the last four years of the sample (Chart 1).

However, the apparent stability at the aggregate level masks relatively differentiated developments at the sectoral level. Except for the services sector, which follows more closely the total economy, the wage developments in the other sectors were more volatile. In terms of contributions to the wage change, the services sector contributed the most to the annual rate of change of wages over the period 2002-2007 (Chart 2). This reflects not only the evolution of wages in this sector but also its weight on total employment, in the sample used, which has been increasing, being approximately 46 per cent, on average, over the period analysed. At a more disaggregated level, the sectors which contribute the most to wage developments in services are the “Wholesale and retail trade” and the “Real-estate activities, renting and leasing, and business services” (Chart 3).

The contribution to the wage developments of the aggregate “Other” is also associated with an increase in the weight, in terms of total employment, of sectors such as “Public administration”, “Health” and “Education”.⁴ Conversely, the manufacturing sector has been losing weight, accounting for about 24 per cent, on average, of total employment. This is reflected in the small contribution of this sector to the annual rate of change of wages in the total economy over the period considered. It is worth stressing that “Textiles and textile products; leather, leather products and footwear” sector had a positive contribution to the annual rate of change of wages in manufacturing over the last two years of the sample, in spite of gradually losing weight in terms of employment – which is probably one of the most visi-

Table 1

| DESCRIPTIVE STATISTICS | | | | | | | |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
| Number of workers | 1 689 213 | 1 692 594 | 1 822 972 | 1 858 169 | 1 895 943 | 1 926 282 | 1 988 824 |
| Weight (per cent) | | | | | | | |
| Manufacturing industry ^(a) | 27.6 | 26.5 | 24.9 | 24.0 | 23.1 | 22.5 | 21.7 |
| Construction | 10.5 | 10.6 | 10.0 | 9.9 | 9.9 | 9.7 | 9.9 |
| Services | 45.1 | 45.7 | 46.1 | 46.6 | 46.8 | 46.9 | 47.1 |
| Other ^(b) | 16.8 | 17.2 | 19.0 | 19.5 | 20.2 | 20.9 | 21.3 |
| Average age (years) | 36.5 | 36.7 | 37.1 | 37.3 | 37.6 | 37.8 | 38.1 |
| Average tenure (months) | 61 | 63 | 65 | 67 | 69 | 71 | 71 |

Sources: II and own calculations.

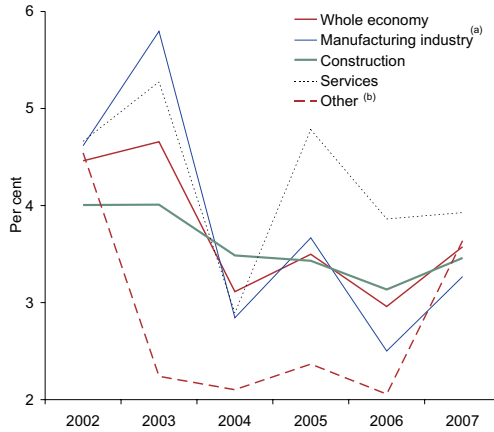
Notes: Data refer to employees with a declared permanent wage not below the minimum wage, who worked a full month and for whom there is information for the several variables considered. (a) Includes “Electricity, gas and water supply”. (b) Includes the following activity sectors: “Agriculture”; “Fishing”; “Mining and quarrying”; “Manufacture of coke and refined petroleum products”; “Manufacture of chemicals and chemical products, rubber and plastic products”; “Financial and insurance activities”; “Public administration”; “Human health”; “Education”; and “Other”.

(3) Additionally, the analysis was restricted to individuals for whom there was information available for different variables, such as gender, age, type of wage, activity sector and job tenure.

(4) It is worth noting that these sectors only include individuals not belonging to the *Caixa Geral de Aposentações* (Portuguese public pension scheme).

Chart 1

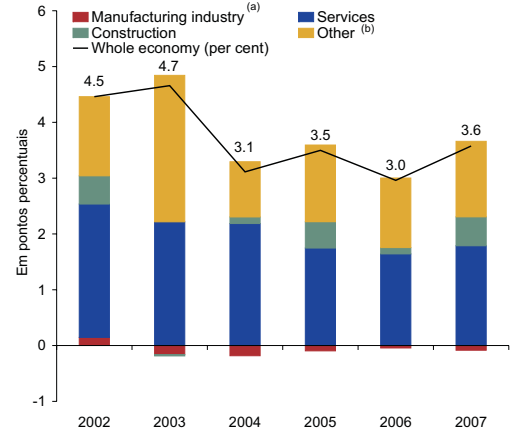
DEVELOPMENTS OF THE ANNUAL RATE OF CHANGE OF WAGES



Sources: II and own calculations.
 Notes: (a) Includes "Electricity, gas and water supply". (b) Includes the following activity sectors: "Agriculture"; "Fishing"; "Mining and quarrying"; "Manufacture of coke and refined petroleum products"; "Manufacture of chemicals and chemical products, rubber and plastic products"; "Financial and insurance activities"; "Public administration"; "Human health"; "Education"; and "Other".

Chart 2

CONTRIBUTIONS FOR THE ANNUAL RATE OF CHANGE OF WAGES IN THE WHOLE ECONOMY



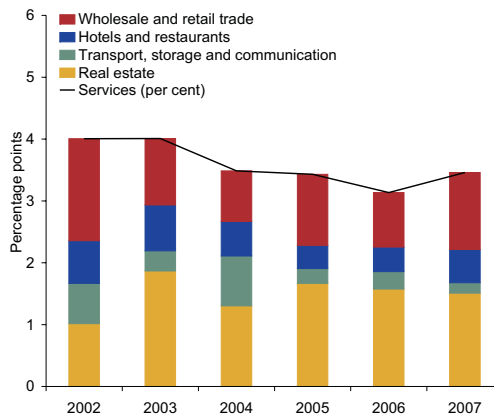
Sources: II and own calculations.
 Notes: (a) Includes "Electricity, gas and water supply" (b) Includes the following activity sectors: "Agriculture"; "Fishing"; "Mining and quarrying"; "Manufacture of coke and refined petroleum products"; "Manufacture of chemicals and chemical products, rubber and plastic products"; "Financial and insurance activities"; "Public administration"; "Human health"; "Education"; and "Other".

ble signs of the important change in the structure of sectoral employment undergone by the Portuguese economy in the recent years (Chart 4).

From the database obtained after imposing the above-mentioned restrictions, for calculating the rigidity measures a 10 per cent random sample of the employees who have at least one register over the

Chart 3

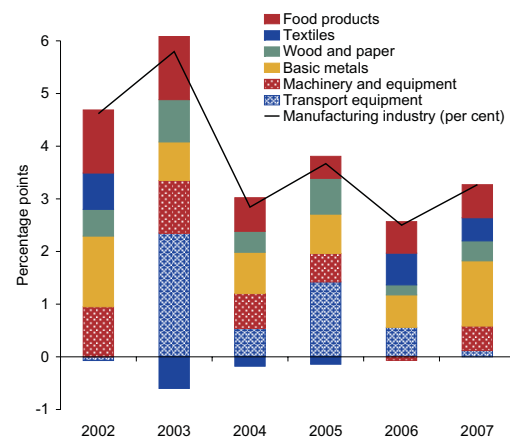
CONTRIBUTIONS FOR THE ANNUAL RATE OF CHANGE OF WAGES IN THE SERVICES



Sources: II and own calculations.
 Note: The "Wholesale and retail trade" sector includes repairs. The "Real estate" sector includes renting and business activities.

Chart 4

CONTRIBUTIONS FOR THE ANNUAL RATE OF CHANGE OF WAGES IN THE MANUFACTURING INDUSTRY



Sources: II and own calculations.
 Note: Detailed description of the sectors: Food products - Food products, beverages and tobacco; Textiles - Textiles and textile products; leather, leather products and footwear; Wood and paper - Wood and products of wood and cork; pulp, paper, paper products, printing and publishing; Basic metals - Other non-metallic mineral products; basic metals and fabricated metal products; Machinery and equipment - Machinery and equipment, nec; equipment; and Transport equipment - Transport equipment; manufacturing nec; recycling; electricity, gas and water supply.

period 2001-2007 was selected. Following the IWFP methodology, which analyses wage changes that are not influenced by worker mobility (Dickens *et al.* 2007), this sample was restricted so as to only include the individuals who worked for at least two consecutive years in the same firm. Comparing wage changes of workers who stayed in the same firm for at least two consecutive years (for instance 2006 and 2007) with new recruitments, it seems that mobility leads, on average, to higher wage increases (0.083 compared to 0.046). However, wage changes of new recruitments are much more volatile (standard deviation of 0.286 *vis-à-vis* 0.119), which is in line with the results obtained by Du Caju *et al.* (2007) for Belgium.⁵

3. WAGE RIGIDITY MEASURES

The IWFP methodology for calculating the wage rigidity measures is based on the analysis of wage change distributions, obtained from databases with information broken down by individual. According to this methodology, the nominal rigidity concept is associated with the share of workers who have nil wage change and would see their wages fall in the absence of rigidity. In turn, real rigidity reflects the share of workers whose wage change is close to expected inflation (or to the bargaining reference value), but would be lower in the absence of rigidity.

In a nutshell, the rigidity measures result from comparing the actual distribution of wage changes with a theoretical distribution that tries to reflect a flexible wage scenario (assumed to be a symmetric Weibull distribution). The higher the concentration in the nil wage change of the actual distribution *vis-à-vis* the theoretical distribution, the greater the evidence in favour of nominal rigidity and, hence, the higher the measure of nominal rigidity calculated according to the IWFP methodology. Similarly, the higher the concentration of the actual distribution, *vis-à-vis* the theoretical distribution, in a wage change close to the expected inflation (or the bargaining reference value), the greater the evidence in favour of real rigidity, and the higher the value of the measure.⁶

The calculation procedure of these rigidity measures makes it possible to obtain simultaneously nominal and real rigidity measures, as well as the reference value for the real rigidity.⁷ However, in the years for which this reference value is relatively low, close to zero, the best identification conditions for the two types of rigidity cease to occur, making it more difficult to distinguish between nominal and real rigidity.

Moreover, in case any measurement errors are detected, the procedure for calculating the rigidity measures, developed by the IWFP, tries to purge these errors from the wage change distribution, by computing a new distribution, known as the “true distribution”, which takes the place of the empirical distribution in the comparison with the theoretical distribution.⁸

3.1. Total economy

In Portugal, the wage-setting procedure is mainly determined by three thresholds: first, the lower limit is defined, at the national level, through the legal mechanism of the minimum wage; second, since the 1950s, the impossibility of cutting nominal wages is enshrined in the law; finally, in the context of wage bargaining, the vast majority of the lower limits of wages for each professional group are defined by

(5) Results remain qualitatively unchanged in the other years of the sample.

(6) For a more detailed description of the IWFP methodology, see Dickens *et al.* (2007).

(7) It should be noted that the reference value for calculating the real wage rigidity may not coincide with the expected inflation rate.

(8) The detection of measurement errors is based on the analysis of the wage change autocorrelation. Positive changes followed by negative changes are assumed to be a sign of the existence of measurement errors (for further details, see Dickens *et al.* 2007).

sectoral agreements (firm agreements are the exception). Hence, there is not an automatic wage indexation mechanism.

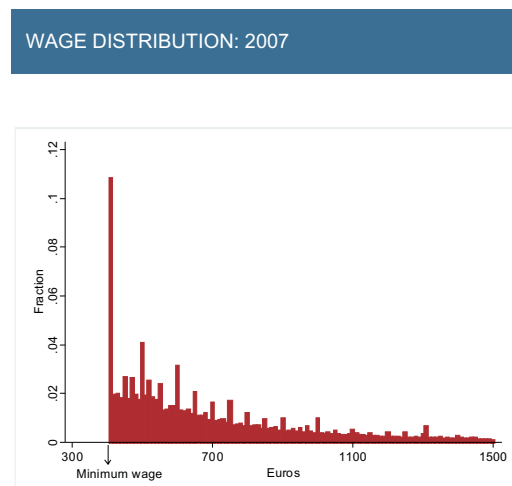
As expected, the distributions of both wages and wage changes reflect these thresholds.⁹ On the one hand, in 2007 the distribution of wages in the total economy shows a mode in wages equal to, or very close to, the minimum wage. In this year, approximately 7 per cent of workers reported wages equal to the minimum wage (€ 403), which corresponds to about 45 per cent of the average wage (Chart 5).

On the other hand, the empirical distribution of wage changes shows only a small fraction of negative nominal changes and a very high concentration on the nil change, confirming the resistance to nominal wage declines (nominal rigidity) (Chart 6). Furthermore, the existence of a second mode in the expected inflation rate and a smaller concentration in rates immediately below are evidence in favour of real wage rigidity.¹⁰

Comparing the empirical distribution with the “true” distribution, it can also be concluded that the differences between both distributions are virtually nil, thus confirming that measurement errors are more limited in administrative databases.

The indications given by the histograms are confirmed by the results of the nominal and real wage rigidity measures (Chart 7).¹¹ As expected, the nominal rigidity indicator is high throughout the period analysed. On average, about 63 per cent of the individuals who would have a nominal wage cut, in the absence of rigidity, have instead nil wage changes. This result not only is influenced by the legal framework associated with the existing barriers to nominal wage cuts, but is also related to the fact that, even in the absence of legal constraints, firms tend to avoid nominal wage cuts for motivation reasons (Bewley, 2002).

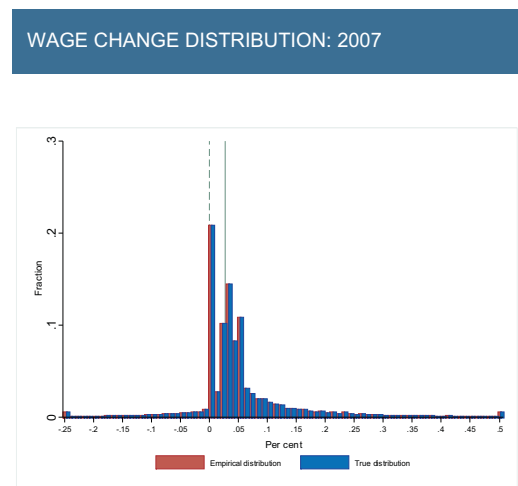
Chart 5



Sources: II and own calculations.

Note: About 7 per cent of employees declared a wage equal to the minimum wage (403 euros) and approximately 11 per cent of employees declared a wage lying in the interval between the minimum wage and up to more 10 euros.

Chart 6



Sources: II and own calculations.

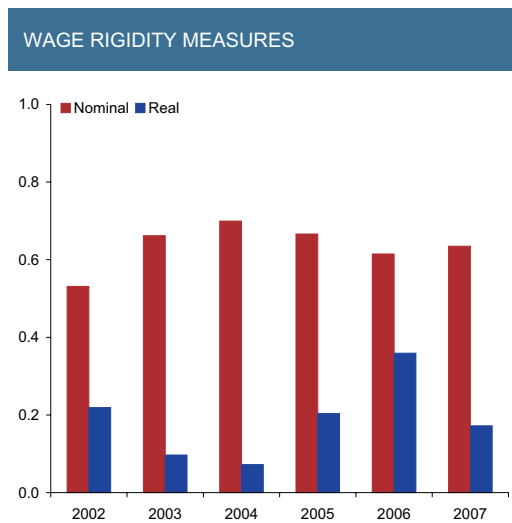
Note: The dotted line denotes the zero change and the straight line denotes the expected inflation.

(9) The information used for calculating the distributions refers to workers who reported permanent wages not inferior to the minimum wage, worked a full month and stayed for at least two consecutive years in the same firm.

(10) The results do not significantly change in the other years of the sample.

(11) For calculating the (nominal and real) rigidity measures it was used the most recent version available of the IWFP procedure, which is not fully comparable with the versions used in previous publications of these indicators by Banco de Portugal.

Chart 7



Sources: II and own calculations.

The real wage rigidity measure shows more irregular developments. Given its own definition, and taking into account the low inflation in Portugal in recent years, calculating and interpreting this measure is naturally more challenging. After a decline from 2002 to 2004, in 2005 and 2006 the real rigidity measure increased, and in this latter year it was approximately 30 percentage points above the 2004 value. In 2007 it decreased again to a value close to the one observed in 2005. On average, about 20 per cent of the workers who would face a decline in their real wages, in a context of wage flexibility, see their wages increase in line with the expected inflation rate. Comparing across countries, this figure is relatively high (Dickens *et al.* 2007).

These results are qualitatively similar to those previously reported in Portugal (2006). Even though obtained from an alternative database,¹² the latter results also point to high nominal wage rigidity. Regarding real rigidity, evidence in Portugal (2006) also suggests a more irregular evolution of this measure.

When introducing firm size in the analysis of the rigidity measures, the results obtained suggest that nominal wage rigidity is lower in larger firms (Table 2). Greater wage flexibility in large companies, which is also found in Du Caju *et al.* (2007) for Belgium, may reflect a higher incidence of firm agreements, and a higher ability to implement broader compensation schemes.

By analysing job flows broken down by firm size, Centeno *et al.* (2007) conclude that the rates of job creation and destruction fall as firm size increases. Combining this piece of information with the results for the wage rigidity measures, it is possible to conclude that in the larger firms there are less job creation/destruction flows and less wage rigidity, while the contrary applies to smaller firms. Therefore, after taking into account firm size, the evidence on both job flows and wage rigidity seems to suggest the existence of a positive relationship between wage rigidity, in particular nominal rigidity, and job creation/destruction flows. In a way, wage rigidity in smaller firms seems to be offset by a more noticeable external exposure of the workers, *i.e.* larger job creation/destruction flows.

The constraining effect of high nominal rigidity is particularly stringent in the context of a low inflation regime, such as the one Portugal is currently experiencing, and maintenance of low productivity

(12) In Portugal (2006) it was used information from *Quadros de Pessoal* of the *Ministério do Trabalho e da Solidariedade Social* (Ministry of Labour and Social Solidarity).

Table 2

| IMPACT OF FIRM DIMENSION ON THE WAGE RIGIDITY MEASURES | | |
|--|---------|------|
| Wage rigidity measures | | |
| Average 2002-2007 | | |
| | Nominal | Real |
| Whole economy | 0.63 | 0.19 |
| By firm dimension: (number of workers) | | |
| up to 25 | 0.85 | 0.27 |
| from 26 to 50 | 0.66 | 0.16 |
| from 51 to 250 | 0.49 | 0.27 |
| more than 250 | 0.44 | 0.28 |

Sources: II and own calculations.

growth. Given wage rigidity constraints, when confronted with the need to adjust to disruptions in the markets for their products, firms will tend to resort to job creation/destruction flows, generating important composition effects, namely at the sectoral level.

3.2. Sectoral heterogeneity

In the same way as the evolution of the aggregate rate of change of wages masks relatively differentiated developments in the different activity sectors, wage rigidity measures for the total economy also conceal noticeable differences in terms of sectoral wage rigidity (Table 3 and Chart 8).

The results of the rigidity measures for the different sectors suggest a negative relationship between the nominal and the real rigidity measures.¹³ Moreover, both nominal rigidity and real rigidity seem to be higher in services than in manufacturing industry.¹⁴ The higher wage rigidity in the services sector, which is a more labour-intensive sector, is probably related to the higher rigidity in prices in this sector, as reported in Martins (2005).

When examining the evidence on job creation/destruction flows for the different activity sector, as reported in Centeno *et al.* (2007), job reallocation rates are higher in services and construction than in manufacturing.¹⁵ Additionally, according to Centeno *et al.* (2008), the services sector also shows higher excess worker rotation, in terms of job creation/destruction flows, than manufacturing.¹⁶ Therefore, by taking into account sectoral heterogeneity, a positive relationship between the different job (creation/destruction) and worker (rotation) flows and the wage rigidity can again be identified.

At a more disaggregated level, the sectors with the highest nominal rigidity, on average, over the period 2002-2007, are the "Wholesale and retail trade" and "Construction". According to Centeno *et al.*

(13) Wage rigidity measures were not calculated for the following sectors: "Agriculture"; "Fishing"; "Mining and quarrying"; "Manufacture of coke and refined petroleum products"; "Manufacture of chemicals and chemical products, rubber and plastic products"; "Financial and insurance activities"; "Public administration"; "Health"; "Education"; and "Other". This choice was due to the high representativity of specific contribution schemes in these sectors (namely in "Public administration", "Health", "Education" and "Financial activities"), and also to their small weight in terms of employment (other sectors).

(14) International comparisons suggest that the differences across countries are more significant than across sectors. For instance, evidence in Messina *et al.* (2008) points to the fact that any sectoral comparison between Portugal and Belgium is dominated by institutional differences in the wage-setting process. In Portugal the nominal rigidity is predominant, whereas in the case of Belgium real rigidity prevails, as a result of the automatic wage-indexing mechanism.

(15) Job reallocation refers to the sum of all employment gains and losses that occur between time t and $t-1$.

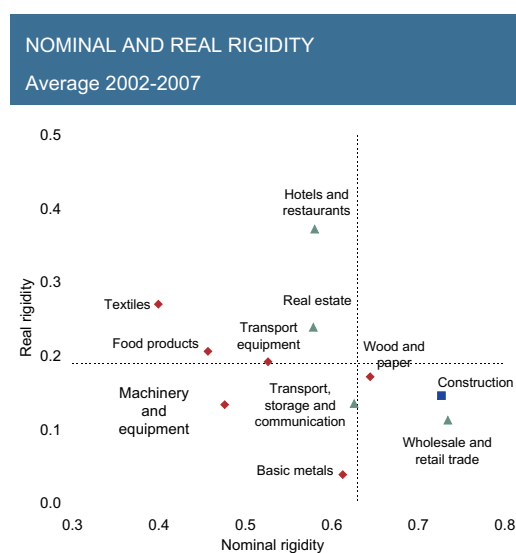
(16) Excess worker rotation refers to the difference between the total number of hires and separations and net job creation, at each moment in time.

Table 3

| IMPACT OF ACTIVITY SECTOR ON THE WAGE RIGIDITY MEASURES | | |
|--|------------------------|------|
| | Wage rigidity measures | |
| | Average 2002-2007 | |
| | Nominal | Real |
| Total economy | 0.63 | 0.19 |
| By activity sector: | | |
| Manufacturing industry | 0.57 | 0.16 |
| Construction | 0.73 | 0.15 |
| Services | 0.67 | 0.18 |
| Food products, beverages and tobacco | 0.46 | 0.21 |
| Textiles and textile products; leather, leather products and footwear | 0.40 | 0.27 |
| Wood and products of wood and cork; pulp, paper, paper products, printing and publishing | 0.64 | 0.17 |
| Other non-metallic mineral products; basic metals and fabricated metal products | 0.61 | 0.04 |
| Machinery and equipment, nec; equipment | 0.48 | 0.13 |
| Transport equipment; manufacturing nec; recycling; electricity, gas and water supply | 0.53 | 0.19 |
| Wholesale and retail trade; repairs | 0.73 | 0.11 |
| Hotels and restaurants | 0.58 | 0.37 |
| Transport, storage and communication | 0.63 | 0.14 |
| Real estate, renting and business activities | 0.58 | 0.24 |

Sources: II and own calculations.

Chart 8



Sources: II and own calculations.

Notes: The dotted lines denote the whole economy. The lozenges denote the manufacturing industry sectors and the triangles denote the services. Detailed description of the sectors: Food products - Food products, beverages and tobacco; Textiles - Textiles and textile products; leather, leather products and footwear; Wood and paper - Wood and products of wood and cork; pulp, paper, paper products, printing and publishing; Basic metals - Other non-metallic mineral products; basic metals and fabricated metal products; Machinery and equipment - Machinery and equipment, nec; equipment; Transport equipment - Transport equipment; manufacturing nec; recycling; electricity, gas and water supply; Wholesale and retail trade - Wholesale and retail trade; repairs; and Real estate - Real estate, renting and business activities.

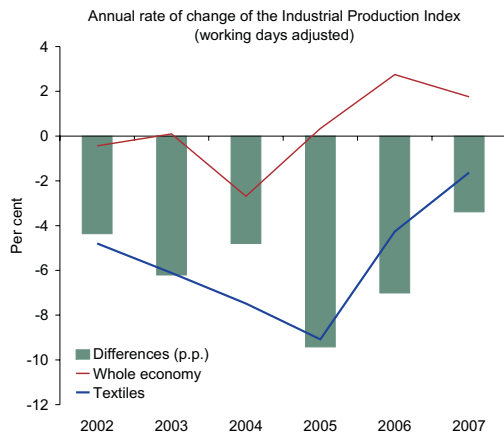
(2007), these two sectors have rather high job reallocation rates, with the construction sector recording the maximum value. At the other end, the sector with the lowest nominal rigidity is the textile sector, also recording a relatively high real rigidity level, when compared to other sectors, namely other manufacturing industry sectors. Recalling the results in Centeno *et al.* (2007), the textile sector shows a high job reallocation rate, when compared to the other manufacturing sectors, chiefly reflecting the job destruction rate, which is the highest across all sectors considered.

3.2.1. The textile sector

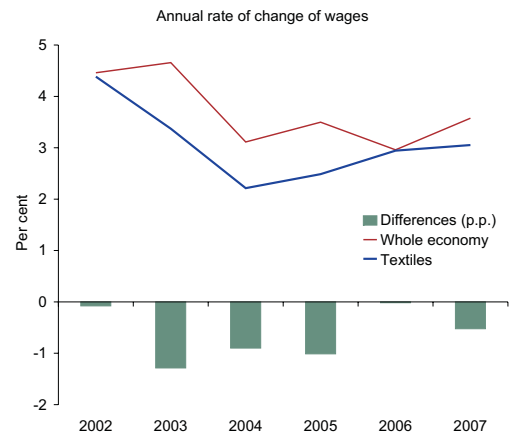
In recent years, activity in the textile sector has had unfavourable developments (Chart 9). In terms of employment, the weight of this sector has also fallen continuously. In turn, in the same period, wage rates remained relatively close to the average for the total economy, which is reflected in the above-mentioned positive contribution to the manufacturing wage change, in 2006 and 2007. Moreover, the results of the rigidity measures indicate that the textile sector has relatively high real wage ri-

Chart 9

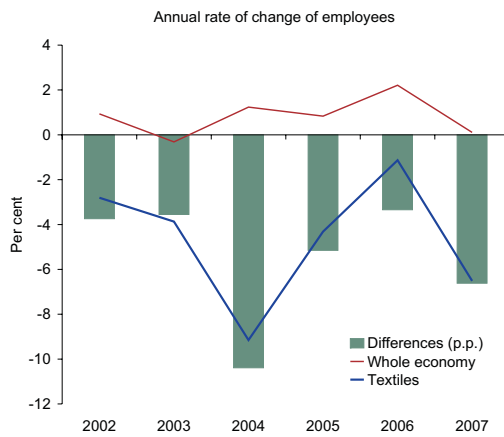
DEVELOPMENTS IN THE TEXTILE SECTOR



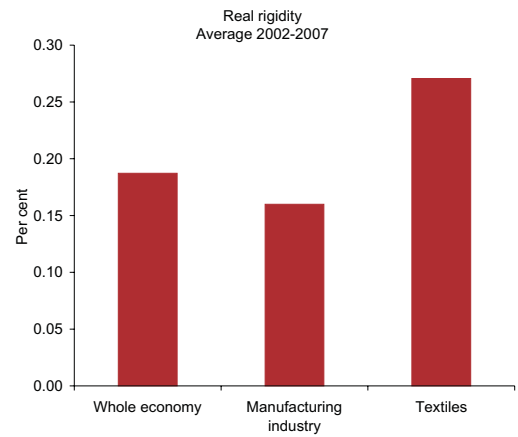
Source: INE.



Sources: II and own calculations.



Source: INE – Employment survey.



Sources: II and own calculations.

gidity, above the average for the total economy, and the third highest value among all sectors considered (Table 3).

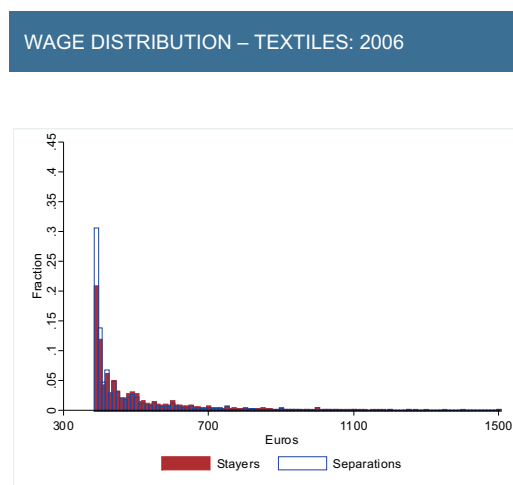
Important gross job flows (hire and separation of workers), which are not reflected in the aggregation of information at sectoral level, are associated with these developments. For example, consider 2006 and 2007. In these years, there were significant changes in the composition of employment in the textile sector, when measured in terms of the worker/firm pairs. During these two years, creation and destruction of worker/firm pairs affected about one third of the number of employees working for the same firm, but the job destruction flow was approximately 5 per cent higher than the job creation one.

By comparing the wage distribution, in 2006, of workers in the textile sector who stayed in the same firm in 2006 and 2007 with the wage distribution of workers whose jobs were destroyed between these two years, there seems to be a higher concentration on the left-hand tail of the wage distribution of the separations (Chart 10). Similarly, wage distribution, in 2007, of new recruitments exhibits the same type of bias *vis-à-vis* the wage distribution of workers who stayed in the same firm for the two consecutive years (Chart 11). Given the smaller size of job creation flows, the combination of the net job flows with the information on wages results in a positive effect on the average wage in the textile sector.

As previously mentioned, wage changes of new recruitments show more volatility than the wage changes of the workers who stay in the same firm. The apparent greater wage rigidity among stayers is in line with indications of the insider-outsider theory (Lindbeck and Snower, 2001). Also Carneiro and Portugal (2004) conclude that wages of new recruitments are more sensitive to the cycle than of workers staying in the same firm. Hence, given that the calculation of the rigidity measures here presented is based on the group of workers who stay in the same firm for at least two consecutive years, their values may be seen as an upper limit for wage rigidity.

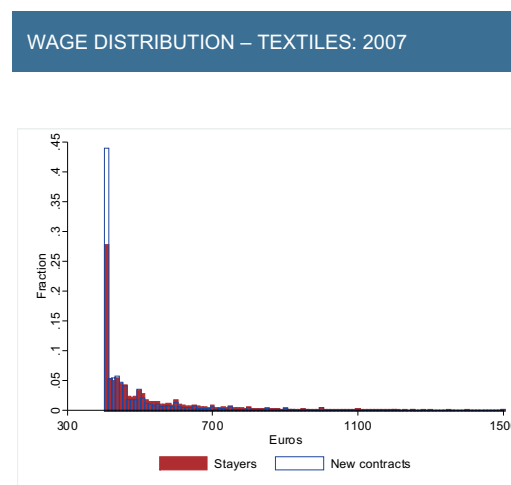
In line with the real rigidity measure, the distribution of wage changes of the workers in the textile sector who stayed in the same firm in 2006 and 2007 has a greater concentration on lower wage changes than the distribution for the total economy, except in changes equal or close to zero (Chart 12). This fact, together with the effects associated with job creation and destruction flows, contributed, in net terms, to maintain the wage changes in a sector under restructuring and with a downward trend in size (both in terms of employment and activity level) rather close to the average for the total economy.

Chart 10



Sources: II and own calculations.

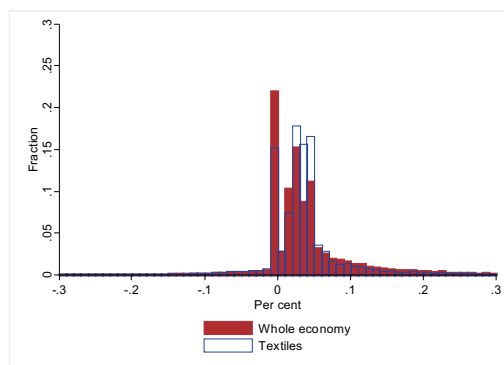
Chart 11



Sources: II and own calculations.

Chart 12

WAGE CHANGE DISTRIBUTION: 2007



Sources: II and own calculations.

4. CONCLUSIONS

Nominal wages are typically among the stickiest prices in the economy, a fact that is due both to economic reasons and legal constraints. In particular, in the Portuguese case, specific legislation leads to the existence of nominal rigidity. This notion is confirmed when using a longitudinal database, broken down by individual, to calculate wage rigidity measures according to the methodology developed within the scope of the IWFP. The results obtained suggest high nominal wage rigidity and, in spite of more irregular developments, the real rigidity is also relatively high, when compared across countries. In the context of a low inflation system, the combination of nominal wage rigidity and weak productivity growth constrains firms' adjustment ability to disturbances in the market for their products. In the presence of wage-setting restrictions, firms will tend to adjust employment to the detriment of wages.

Given this potential accommodation in terms of employment, using a microeconomic database is twice as relevant, since it also allows analysing the composition effects of the labour force.

Moreover, firm heterogeneity seems to have an impact on the wage rigidity in the different sectors and in the total economy. Considering the firm size, the results obtained point to lower nominal wage rigidity in larger firms. Regarding sectoral heterogeneity, the services sector seems to have greater nominal and real wage rigidity than manufacturing.

REFERENCES

- Abraham, K. and Haltiwanger, J. (1995) Real Wages and Business Cycle, *Journal of Economic Literature*, vol. XXXIII, pp. 1215-1264.
- Akerlof, G., Dickens, W., Perry, G., Gordon, R. and Mankiw, G. (1996) The Macroeconomics of Low Inflation, *Brookings Papers on Economic Activity*, vol. 1996, No 1, pp. 1-76.
- Álvarez, L., Dhyne, E., Hoerberichts, M., Kwapil, C., Le Bihan, H., Lünemann, P., Martins, F., Sabbatini, R., Stahl, H., Vermeulen, P., and Vilmunen, J. (2005) Sticky Prices in the Euro Area – A Summary of New Micro Evidence, *ECB Working Paper Series*, No 563.

- Bewley, T. (2002) Fairness, reciprocity, and wage rigidity, Cowles Foundation *Discussion Paper*, No 1383.
- Blanchard, O. and Galí, J. (2007) Real Wage Rigidities and the New Keynesian Model, *Journal of Money, Credit and Banking, Supplement* to vol. 39, No 1, pp. 35-65.
- Carneiro, A. and Portugal, P. (2004) Workers' Flows and Real Wage Cyclicalities, Banco de Portugal *Working Paper*, No 9-04.
- Centeno, M., Machado, C. and Novo, A. (2007) Job creation and destruction in Portugal, *Economic Bulletin*, Winter, Banco de Portugal.
- Centeno, M., Machado, C. and Novo, A. (2008) The anatomy of employment growth in Portuguese firms, *Economic Bulletin*, Summer, Banco de Portugal.
- Dickens, W., Goette, L., Groshen, E., Holden, S., Messina, J., Schweitzer, M., Turunen, J. and Ward, M. (2007) How Wages Change: Micro Evidence from the International Wage Flexibility Project, *Journal of Economic Perspectives*, vol. 21, No 2, pp. 195-214.
- Du Caju, P., Fuss, C. and Wintr, L. (2007) Downward Wage Rigidity for Different Workers and Firms: An Evaluation for Belgium Using the IWFP Procedure, *ECB Working Paper Series*, No 840.
- Lindbeck, A. and Snower, D. (2001) Insiders versus Outsiders, *Journal of Economic Perspectives*, vol. 15, No 1, pp. 165-188.
- Martins, F. (2005) The Price Setting Behaviour of Portuguese Firms: Evidence from Survey Data, *ECB Working Paper Series*, No 562.
- Messina, J., Du Caju, P., Duarte, C., Izquierdo, M. and Hansen, N. (2008) The Causes and Consequences of Nominal and Real Wage Rigidity: a Sectoral Approach, available at http://www.ecb.eu/events/conferences/html/wage_dynamics_network.en.html.
- Portugal, P. (2006) Wage setting in the Portuguese labor market: a microeconomic approach, *Economic Bulletin*, Autumn, Banco de Portugal.
- Solow, R. (2000) Unemployment in the United States and in Europe: A contrast and the reasons, *CESifo Working Paper Series*, No 231.
- Tobin, J. (1972) Inflation and Unemployment, *American Economic Review*, vol. 1/2, pp. 1-18.