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ADELAIDE MARIA FIGUEIREDO*
FERNANDA OTÍLIA FIGUEIREDO**
NATÁLIA PIMENTA MONTEIRO***

*LIAAD/INESC-PORTO, FAC. DE ECONOMIA, UNIVERSIDADE DO PORTO
**CEAUL, FACULDADE DE ECONOMIA, UNIVERSIDADE DO PORTO
***NIPE, DEPARTAMENTO DE ECONOMIA, UNIVERSIDADE DO MINHO

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Labor adjustments in privatized firms: a Statis approach

Adelaide M. Figueiredo*, Fernanda O. Figueiredo† and Natália P. Monteiro‡

Abstract

This paper examines labor adjustments in ten Portuguese banks after the ownership transfer to the private sector. The results show that the restructuring process is a very complex phenomenon, with firms exhibiting diverse adjustments in terms of either speed or path. In addition, our findings also show that the pay level in the banking industry is by far the workforce attribute that changed more, reflecting substantial changes in terms of composition and not size of the workforce. In particular, firms tend to reduce the share of workers in managerial occupations and replace the most experienced employees with younger and more educated workers. Our empirical evidence also suggests that privatization is associated with a higher level of rent sharing.

Keywords: Labor adjustments; Portuguese banking industry; privatization; Statis

Jel classification: D21; J31; J51; L13

*Faculty of Economics and LIAAD/INESC-Porto, University of Porto; Rua Dr. Roberto Frias, 4200-464 Porto; e-mail: adelaide@fep.up.pt

†Faculty of Economics, University of Porto and CEAUL; Rua Dr. Roberto Frias, 4200-464 Porto; e-mail: otilia@fep.up.pt.

‡Corresponding author: Department of Economics and NIPE, University of Minho; Campus de Gualtar, 4710-057, Braga; e-mail: N.Monteiro@eeg.uminho.pt

1 Introduction

A growing body of research examines the effects of privatization on labor outcomes in an increasing number of different economies. For instance, Haskel and Szymansky (1993), La Porta and Silanes (1999), Brainerd (2002), Ho *et al.* (2002), Galiani and Sturzenegger (2008) and Monteiro (2009) analyze the effects of privatization in the UK, Mexico, Russia, China, Argentina and Portugal, respectively. While this line of research has mainly addressed the impacts on the wage structure and wage distribution, less attention has been given to similar adjustments in terms of employment.[1] Yet, there is still little understanding of how firms adjust the labor force after the transfer of ownership rights to the private sector. Which labor force attributes change more during the reform? Is the labor force more affected in terms of pay level, skill composition or size? Which employees are the most affected – those in top-level or in low-level occupations? Are these changes related to changes in firms' productivity, market share or capital intensity? Is firm restructuring a short or a medium-term process?

This study aims to answer these questions by using the Statis (Structuration des Tableaux a Trois Indices de la Statistique) and the dual Statis approaches to explore the main changes that occurred in ten Portuguese banks that were privatized between 1989 and 1997. These methods, developed in particular by L'Hermier des Plantes (1976), Lavit (1988) and Lavit *et. al* (1994), are exploratory techniques of multivariate data analysis based on linear algebra and especially on euclidean vector spaces. The central idea is to compare configurations of the same individuals or variables in different circumstances or moments in time. Therefore, these methods allows us not only to identify the moments in time in which the most significant (total) changes occurred, but also to rank variables and individuals according to their contributions to the total changes. We are also able to draw the trajectory of each individual (bank) or variable around its *compromise* (average) position.

In the empirical analysis, we rely on aggregate data at firm-level collected annually since 1988 by the *APB* - Associação Portuguesa de Bancos (Portuguese Banking Association) and available in the *Boletim Económico*. This rich data offers, beyond the conventional financial information, several firm characteristics and portrays the workforce in different attributes. Thus, while we draw our attention mainly to developments in different aspects of the labor force (such as size,

[1] Some notable exceptions include Gimpelson and Lippoldt (1999), Brown and Earle (2002) and Christev and FitzRoy (2002).

seniority and payment), we are able to relate them to changes in other firms' characteristics such as profitability, market share and capital intensity. Ultimately, we use these results to shed some light on the effects of ownership transfer on the rent sharing level, an issue that has been fairly neglected in the economics literature.[2]

2 The Statis methodology

2.1 Statis

In the Statis methodology, a *study* is a statistical triplet (X_k, Q_k, D), where $(X_k)_{n\times p_k}$ with $k = 1, \ldots, K$ denotes the data table associated to the kth point in time, n refers to the total number of individuals and p_k is the number of variables in the kth data table. Q_k is the metric in the individuals space and, in general, is defined by the identity matrix or by a diagonal matrix whose main elements are the reciprocal of the variance of variables. The metric in the variables space D is defined by a diagonal matrix whose elements are the weights associated to the individuals. The Statis method requires that the same individuals are observed in all data tables.

The Statis method involves different steps. In the first step, termed *interstructure*, we compare globally the series of studies. In the second step, termed *intrastructure*, we define a *common structure* of individuals in all data tables. Finally, we identify which individuals contribute the most (or least) to the observed differences among the *studies*.

In the interstructure step, we start by defining an *object* for each data table as the matrix of the scalar products between individuals. More precisely, we associate to each X_k a matrix of the scalar products W_k given by

$$W_k = X_k Q_k X_k^T, \tag{1}$$

where X_k^T denotes the transpose matrix of X_k. For obtaining the distances between *objects* at stages k and k' we compute the scalar product of Hilbert-Schmidt given by

$$\langle W_k, W_{k'} \rangle_{HS} = Tr\left(W_k D W_{k'} D\right), \tag{2}$$

[2]There is some consensus that public firms tend to exhibit a higher level of rent sharing when compared to privately owned firms; see for example Dobbelaere (2004) and references therein. Nevertheless, the effect on rent sharing due to a transfer of ownership from the public to the private sector has not yet been analyzed.

where Tr denotes the trace operator of a matrix. Note that $\|W_k\| = \sqrt{\langle W_k, W_k \rangle_{HS}}$.

The vectorial correlation coefficient RV proposed by Robert and Escoufier (1976) is equivalent to the scalar product of Hilbert-Schmidt between normed *objects* and is defined by

$$RV\left(k,k'\right) = \left\langle \frac{W_k}{\|W_k\|}, \frac{W_{k'}}{\|W_{k'}\|} \right\rangle_{HS} = \frac{Tr\left(W_k D W_{k'} D\right)}{\sqrt{Tr\left(W_k D\right)^2}\sqrt{Tr\left(W_{k'} D\right)^2}}. \tag{3}$$

The RV coefficient varies between 0 and 1, meaning that the higher it is the closer are the two *objects* being compared.

The distance between the normed *objects* is given by

$$d_{HS}\left(\frac{W_k}{\|W_k\|}, \frac{W_{k'}}{\|W_{k'}\|}\right) = \left\| \frac{W_k}{\|W_k\|} - \frac{W_{k'}}{\|W_{k'}\|} \right\| = \sqrt{2 - 2RV\left(k,k'\right)}. \tag{4}$$

Denoting by S the matrix of coefficients RV and by Δ the diagonal matrix of weights π_k associated to each table, a principal component analysis (PCA) based on the matrix $S\Delta$ gives us the euclidean image of the series of *studies*. The coordinates of the points A_k associated with the *studies* on the ith axis, are the components of the vector $\sqrt{\tau_i}\boldsymbol{\gamma}_i$, where τ_i represents the ith largest eigenvalue of $S\Delta$ associated with the eigenvector $\boldsymbol{\gamma}_i$. Note that if the weights π_k are equal it is enough to base the PCA on the matrix S.

For obtaining a centered euclidean image of the *studies*, we base the PCA on the matrix

$$\widetilde{S} = \left(I_K - \mathbf{1}\mathbf{1}^T\Delta\right) S \left(I_K - \Delta\mathbf{1}\mathbf{1}^T\right), \tag{5}$$

where I_K is the identity matrix of order K and $\mathbf{1}$ is a vector of dimension K with all components equal to 1.

In the intrastructure step we summarize all the *studies* through the *object* W, called the *compromise*, defined by the weighted mean

$$W = \sum_{k=1}^{K} \alpha_k \frac{W_k}{\|W_k\|}, \tag{6}$$

where the coefficients α_k are given by $\alpha_k = \frac{1}{\sqrt{\tau_1}}\pi_k\gamma_1^k$ and γ_1^k is the kth coordinate of the vector $\boldsymbol{\gamma}_1$. A PCA based on the matrix W enables us to obtain the euclidean image of the *compromise*. The coordinates of the points B_i, $i = 1, \ldots, n$, associated with the individuals on the kth axis

of the euclidean image of the *compromise* are the components of the vector $\sqrt{\mu_k}\boldsymbol{\varepsilon}_k$, where μ_k denotes the eigenvalue of the matrix WD associated with the eigenvector $\boldsymbol{\varepsilon}_k$. The correlations of the variables with the *compromise* axes, enable us to interpret the *compromise* axes and the *compromise* positions of the individuals.

In the last step of the method, we identify the individuals responsible for the deviations between the series of *studies*, through the decomposition of the squared distances between two pairs of *objects* into percentages of individual contributions, i.e., we calculate the following quantities

$$C_{ind\,i,d^2_{HS}} = \frac{d_{ii}\sum_{j=1}^{n} d_{jj}\left[W_k^{ij} - W_{k'}^{ij}\right]^2}{d^2_{HS}\left(W_k, W_{k'}\right)}, \tag{7}$$

where $C_{ind\,i,d^2_{HS}}$ represents the contribution of the ith individual to the squared distance d^2_{HS}, d_{ii} denotes the ith diagonal element of the matrix D and W_k^{ij} denotes the ij-element of the matrix W_k.

For visualizing graphically the individuals responsible for the deviations between the series of *studies*, we represent the different positions of the individuals for each *object* on the *compromise* euclidean image, i.e., their trajectories. The coordinates of the points $B_1^k, ..., B_n^k$, $k = 1, ..., K$ on ith axis are given by $\frac{1}{\sqrt{\mu_i}} W_k D \boldsymbol{\varepsilon}_i$.

2.2 Dual Statis

This method, analogous to Statis, focuses on the metric of variables instead of the metric of individuals and thus requires that the same variables are observed in all data tables. Let us consider again the triplet (X_k, Q, D_k) defined as previously.[3]

In the dual Statis method the structure for each data table is given by either the covariance or correlation matrix (in case of standardized data) computed as the *object*

$$V_k = X_k^T D_k X_k. \tag{8}$$

We start by defining the scalar product of Hilbert-Schmidt between two *objects* at stages k and k' as

$$\langle V_k, V_{k'} \rangle_{HS} = Tr\left(Q V_k Q V_{k'}\right). \tag{9}$$

[3]Note that Q and D_k are, as previously, the metric in the individuals and variables space, respectively.

The diagonalization of the matrix $Z\Delta$, where Z denotes the matrix of the scalar products between the *objects*, allow us to obtain the euclidean image of the series of *studies*. In a second step, we define a *compromise*, the *object* given by

$$V = \sum_{k=1}^{K} \beta_k V_k. \tag{10}$$

The diagonalization of the matrix VQ enables us to obtain the euclidean image of the *compromise*.

Finally, we decompose the squared distances between two pair of *objects* into percentages of contributions of individual variables, i.e., we calculate the following quantities

$$C_{var\, i, d^2_{HS}} = \frac{q_{ii} \sum_{j=1}^{p} q_{jj} \left[V_k^{ij} - V_{k'}^{ij} \right]^2}{d^2_{HS}\left(V_k, V_{k'}\right)}, \tag{11}$$

where $C_{var\, i, d^2_{HS}}$ represents the contribution of the ith variable to the squared distance d^2_{HS}, q_{ii} denotes the ith diagonal element of the matrix Q and V_k^{ij} denotes the ij-element of the matrix V_k. We also represent the variables' trajectories on the *compromise* euclidean image.

3 Data and empirical analysis

In this study we examine the effects of privatization in the Portuguese banking industry. We select this industry for different reasons. First, until the mid-1990s, the privatization programme was asymmetric and biased sectorially. Its major incidence, either in terms of number of firms or in terms of volume of revenues generated was in banking. The privatization comprised eleven companies, which accounted for more than 83% of banking employment in 1985 and raised 3,3 billions of EUROS, the bulk (48%) of total sales of state enterprises until the second quarter of 1995. Moreover, in contrast with some other economic sectors, where privatization is less advanced and still ongoing, privatization of the entire industry was started and completed between 1989 and 1996.

In the empirical analysis, we use aggregate data at firm level provided by *APB*. Given the restrictions imposed by the Statis methodology mentioned earlier, we ended up with a balanced panel data for ten privatized banks observed during nine years (between 1989 and 1997) with

information on ten variables to describe both the labor and product market of the banking sector. Regarding the labor workforce, we have information on the number of employees per bank, wage per worker (obtained as the ratio between labor costs and bank size), share of workers in three occupational categories defined within the job hierarchy; share of workers in three seniority groups (seniority is coded as below 6 years, greater than 10 years or other) and share of workers in commercial or in other activities. For the variables that characterize the employment structure (in terms of occupation, seniority and main activity) we follow the tradition in the econometrics analysis by selecting only two variables concerning the occupational and seniority categories and one variable to describe the main activity of workers. In practice, we use two occupational variables (managerial (top) and middle level), two seniority groups (below 6 years and between 6 and 11 years), and one variable measuring the share of workers in commercial activities.[4] In terms of product market, we compute market share as the bank's revenues share and capital labor ratio as the ratio of total assets and bank size. For measuring firm profitability, we follow the rent sharing literature (Hildreth and Oswald, 1997) by computing profits per employee as the ratio of total sales net of worker costs and employment. All monetary measures are expressed in 1997 real prices, using the Consumer Price Index (IPC) and the GDP deflator for wages and profits (capital intensity), respectively.

We start by identifying the points in time (years) in which the group of banks globally diverge more (less).

Table 1: Matrix of RV coefficients.

	89	90	91	92	93	94	95	96	97
89	1.000								
90	**0.926**	1.000							
91	0.934	*0.967*	1.000						
92	0.915	0.916	0.945	1.000					
93	0.854	0.833	0.832	**0.919**	1.000				
94	0.870	0.832	0.827	0.913	0.955	1.000			
95	0.820	0.841	0.789	0.853	0.861	**0.914**	1.000		
96	0.811	0.840	0.784	0.869	0.892	0.916	*0.979*	1.000	
97	0.730	0.787	0.744	0.846	0.867	0.853	0.912	0.943	1.000

The RV coefficients (Table 1) are high in any two pair of consecutive years, indicating

[4]The results remain qualitatively similar if we include all omitted categories in the analysis.

closeness among banks over time and, hence, a continuous and smooth adjustment to the reform. Nevertheless, in 1990, 1993 and 1995 we observe the largest differences compared with the preceding years (see values in *bold*). As these points in time correspond to one year before or after the privatization took place in all privatized banks, this finding suggests that the adjustment occurred mainly around the introduction of the reform. In contrast, in 1991 and 1996 we observe the strongest similarities between two pairs of consecutive years (see values in *italic*).[5] Therefore, the graphical representation of the centered interstructure (Figure 1), where the axes of the plan explain 69.64% of total variance, allows us to identify three distinct periods according to similarities across banks over time. The first period includes the years 1989, 1990 and 1991, the second period includes 1993 and 1994, and the last period includes the years after 1994.

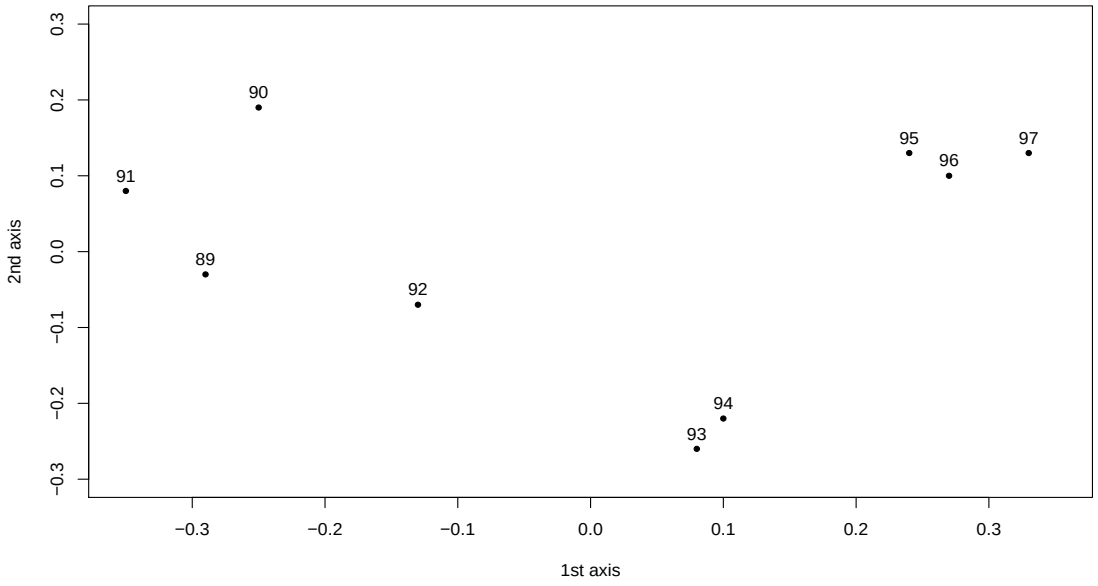

Figure 1: Euclidean image of the interstructure (Statis).

We now explore which banks explain (most of) these changes and relate to date of reform. The decomposition of the squared distances across the banks allows us to identify which banks experienced the largest changes and at which points in time. Table 2 indicates for each bank the year of privatization (column 1) and the respective contribution for the total variation between

[5]The same conclusions are reached from the corresponding table of distances not shown.

two consecutive years (columns 2 to 9) or between the most divergent years 1989 and 1997 (column 10). Column 11 shows the contribution of each bank for the total variation considering all years. We also highlight in *bold* the banks which contribute the most to total changes in the most changing years.

Table 2: Decomposition of the distance between two years across banks in percentage.

Banks		**90**	91	92	**93**	94	**95**	96	97	89-97	Mean
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
BTA	89	**25.4**	4.7	7.7	**10.3**	30.4	5.8	13.3	16.6	13.6	8.8
BPA	90	7.5	6.0	12.1	**15.2**	7.1	**9.9**	15.0	13.1	8.5	9.7
BES	91	3.8	6.5	3.1	**16.5**	0.4	4.8	6.2	6.4	4.2	6.3
BFB	91	2.8	10.9	6.8	7.1	10.0	5.1	6.5	2.5	6.0	6.3
CPP	92	4.7	19.7	3.3	7.7	4.4	2.9	8.5	10.1	4.5	5.4
UBP	93	**13.2**	6.5	2.5	2.9	13.8	**9.1**	7.1	12.4	5.8	6.3
BPSM	94	**19.9**	16.2	6.2	4.5	2.4	**37.3**	4.8	6.9	12.8	12.7
BFN	94	9.8	10.1	18.9	**10.2**	6.7	**18.2**	24.1	17.2	18.3	15.7
BBI	94	7.3	1.9	4.7	2.0	2.0	3.4	9.8	5.4	4.6	3.7
BCA	96	5.7	17.5	34.9	**23.5**	11.7	3.5	4.6	9.3	21.6	25.3

Some important conclusions can be reached. First, privatization can hardly explain some of the largest changes in banks observed in the most changing years. In fact, the largest changes in banks registered in the most changing years do not often coincide with one year before or after the privatization took place, as previously advanced. For instance, between 1989 and 1990, the changes in the banking sector were explained mainly by BTA, BPSM, and UBP. If the changes in BTA can be associated with a change in the ownership since privatization took place in 1989, this explanation becomes much less plausible for the other two banks considering the year of privatization 1994. These banks changed noticeably, probably due to the increased competition resulting from the abolishment of entry and price barriers during the late eighties in the industry. In 1993 and in 1995 a similar pattern is observed – only the changes in BFN, BPSM, and to a much lesser extent UBP, can be attributed more clearly to the reform. For the remaining six banks, a relation between the magnitude of the contribution to the total change and the timing of privatization is not discernible.

Nevertheless, the results appear to suggest different speeds of adjustment. Some banks, such as BTA and BPSM, seem to adopt instantaneous adjustments after ownership change, while others, such as BFN and UBP seem to prefer more lasting medium-term adjustments.

Finally, between the most divergent years, 1989 and 1997, the banks did not contribute equally to the total changes as four out of ten banks – BCA, BPSM, BFN and BTA – explain more than 60% of the total changes between these two years. Moreover, if we consider all years, a similar pattern is found: the same banks explain a similar proportion (62.5%) of all changes between all years. This finding implies that the privatized banks are a heterogeneous group before the implementation of the reform and therefore some banks *adjust* more than others. Figure 2, which represents the trajectory of each bank around its *compromise* position, confirms that indeed some banks changed more than others. The narrowest trajectory shows a lower level of adjustment.

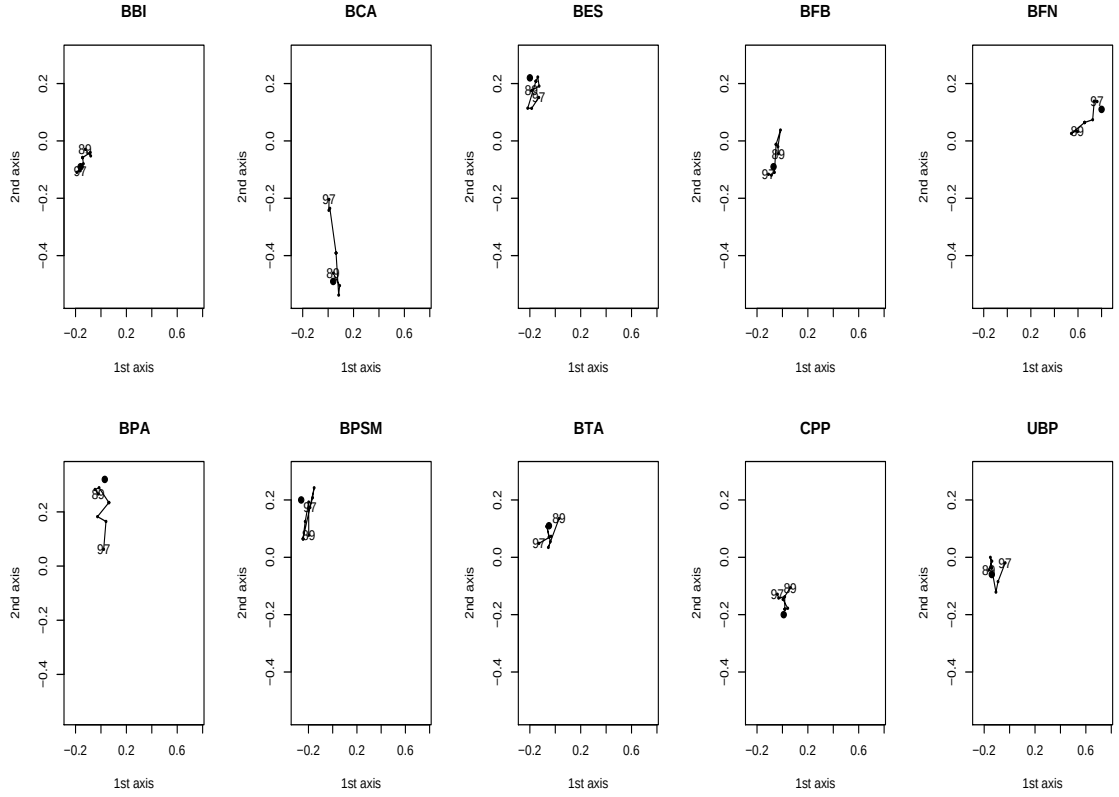

Figure 2: Trajectory of each bank around its compromise position.

The dual Statis methodology allows us to identify when the variables globally diverge more (less). Inspection of Figure 3, which represents the euclidean image of the interstructure for the dual Statis, shows us that the years between 1989 and 1991 contrasts substantially with 1996

and 1997. In fact, the correlation matrices are very close in 1996-1997 and diverge considerably from corresponding figures in the period 1989-1991.

We now explore which variables changed the most in the most changing years. Table 3 replicates Table 2 by decomposing the squared distances between the correlation matrices across years according to the variables used in the study. For clarity of exposition, we only include figures relating variables whose contribution to the overall changes is above 9.5% ($\simeq 100/10$). We highlight in *bold* the variables which contribute the most to total changes in the most changing years.

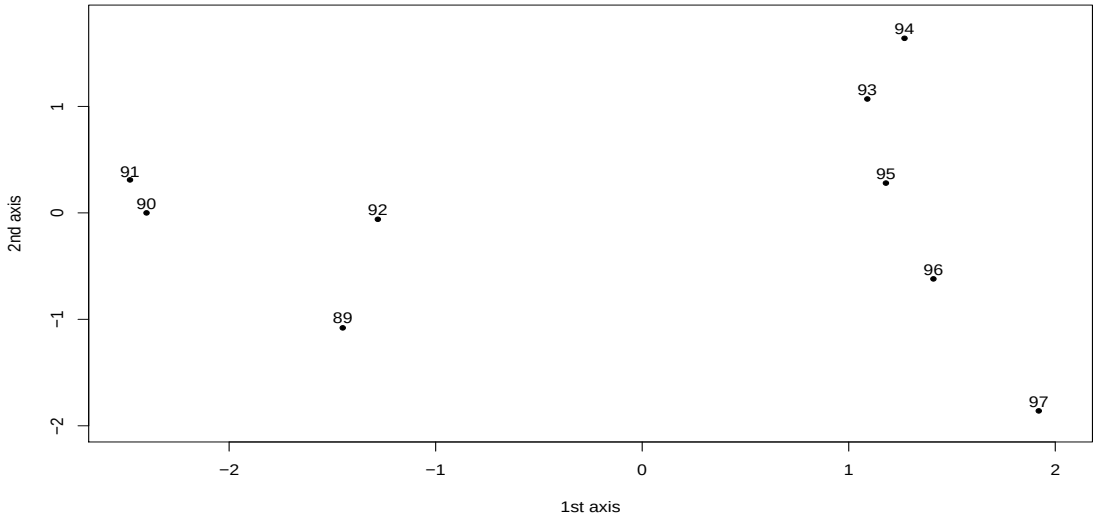

Figure 3: Euclidean image of the interstructure (dual Statis).

Considering all years (column 11), the pay level in the banking industry is by far the variable that changed the most, with a contribution of 20% of the total variation. This variation reflects mainly substantial changes in the quality, and not quantity, of the workforce, either in terms of seniority or occupational groups. In particular, the correlation matrices across years show that after 1994, higher wages are associated with a lower share of senior workers and with a lower share of workers in managerial occupations. Seniority in our context also works as a proxy for educational attainment. Hence, young and more educated employees are better paid according to the human capital theory. Nevertheless, the magnitude of the change in the pay level is likely to be also mirroring gains in terms of market share, profits and capital per worker, in

Table 3: Decomposition of the distance between two years across variables in percentage.

Variables	**90** (2)	91 (3)	92 (4)	**93** (5)	94 (6)	**95** (7)	96 (8)	97 (9)	89-97 (10)	Mean (11)
Employment								9.8		
Occupations										
Managerial	**19.4**	13.6	20.2		10.8	**17.9**	16.1	9.8	10.3	10.2
Middle			9.8			**15.8**			14.3	
Commercial activity			10.1				11.1			
Tenure, in years										
$[0-6[$		9.8						12.0		
$[6-11[$		13.9			36.6		32.0	17.5	14.6	13.2
Market share					14.7	**17.9**				
Wage per worker	**31.9**	18.2		**32.1**		**13.5**			12.4	20.0
Profit per worker						**11.0**			11.7	
Capital labor ratio		10.4	26.2	**12.5**				9.9	10.5	12.2

particular after 1994. In fact, the correlations between wages, profits and capital per worker become stronger and positive over the period 1989-1997. This finding may suggest that wages are responding to the profitability conditions of the banks. If so, this means that privatization leads to a positive effect on rent sharing.

Table 3 also suggests that the banks initially began to change the workforce and to invest in capital equipment. These changes led after 1994 to important changes in the product labor market – profits and market share – which fed further changes in wages.

The trajectory of each variable around its compromise position (Figure 4) also confirms that some variables have changed more than others. In particular, the variables wage per worker, managerial occupation, tenure below 6 years and capital labor ratio exhibit ample trajectories across both axes, implying sizeable changes in the variables over time.

4 Conclusion

This paper examines labor adjustments in ten privatized banks using the Statis and the dual Statis approach. Our empirical findings pinpoint three important lessons. First, the analysis of privatization effects using aggregate data can be a dangerous exercise as it might obscure diverse adjustments occurring at individual firm level. Second, apart from the wage effect, our

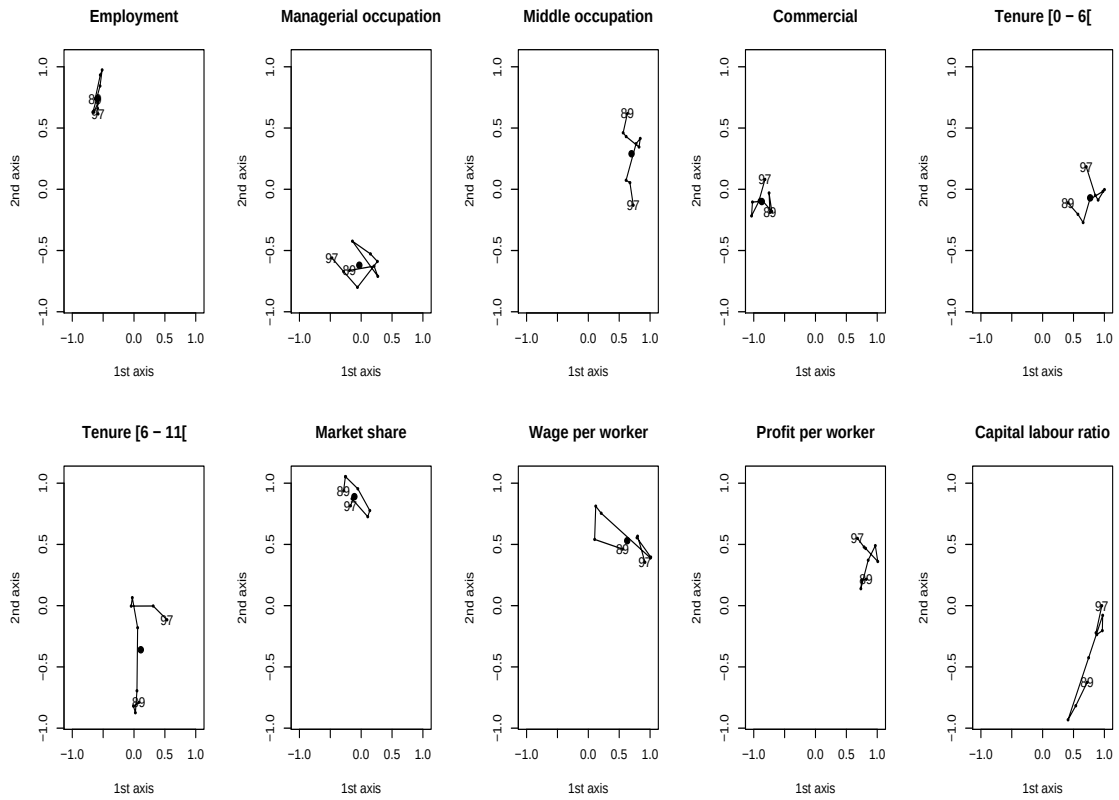

Figure 4: Trajectory of each variable around its compromise position.

results also indicate significant skill compositional effects, a dimension almost absent in the literature concerning the labor market effects of privatization. Finally, we also provide empirical evidence suggesting that privatization is associated with a higher level of rent sharing, a topic that deserves further research.

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References

[1] Brainerd, E. (2002) Five Years after: The Impact of Mass Privatization on Wages in Russia, 1993-1998, *Journal of Comparative Economics,* **30**, 160-190.

[2] Brown, J. and J. Earle (2002) Gross Job Flows in Russian Industry Before and After Reforms: Has Destruction Become More Creative?, *Journal of Comparative Economics*, **30**, 96-133.

[3] Christev, A. and F. FitzRoy (2002) Employment and Wage Adjustment: Insider-Outsider Control in a Polish Privatization Panel Study, *Journal of Comparative Economics*, **30**, 251-275.

[4] Galiani, S. and F. Sturzenegger (2008) The impact of privatization on the earnings of restructured workers: Evidence from the oil industry, *Journal of Labor Research*, **29**, 162-176.

[5] Gimpelson, V. and D. Lippoldt (1999) Private sector employment in Russia: Scale, composition and performance, *The Economics of Transition, The European Bank for Reconstruction and Development,* **7**, 505-533.

[6] Haskel, J. and S. Szymanski (1993) Privatization, Liberalization, Wages and Employment: Theory and Evidence for the UK, *Economica*, **3**, 161-182.

[7] Hildreth, A. and A. Oswald (1997) Rent-Sharing and Wages: Evidence from Company and Establishment Panels, *Journal of Labor Economics*, **15**, 318-37.

[8] Ho, S., X. Dong, P. Bowles, and F. MacPhail (2002) Privatization and enterprise Wage Structures during Transition, Evidence from Rural Industry in China, *Economics of Transition*, **10**, 659-688.

[9] La Porta, R. and F. Lopez-de-Silanes (1999) Benefits of Privatization-Evidence from Mexico, *Quartely Journal of Economics*, **114**, 1193-1242.

[10] Lavit, C. (1988) Analyse conjointe de tableaux quantitatifs. Editions Masson.

[11] Lavit, C., Y. Escoufier, R. Sabatier and P. Traissac (1994) The ACT (Statis method). *Computational Statistics and Data Analysis*, **18**, 97-119.

[12] L'Hermier des Plantes, H. (1976) Structuration des tableaux à trois indices de la statistique. Thèse de 3 ème cycle, Université de Montpellier.

[13] Monteiro, N. (2009) Using propensity matching estimators to examine the effect of privatization on wages, *Applied Economics*, forthcoming.

[14] Robert, P. and Y. Escoufier (1976) A unifying tool for linear multivariate statistical methods: the RV coefficient, *Applied Statistics*, **25**, 257-265.

[15] Dobbelaere, S. (2004) Ownership, firm size and rent sharing in Bulgaria, *Labour Economics*, **11**, 165-189.

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Faculdade de Economia da Universidade do Porto
Rua Dr. Roberto Frias, 4200-464 Porto | Tel. 225 571 100
Tel. 225571100 | www.fep.up.pt