Labor Market Efficiency in Spain:
A Stochastic Frontier Approach

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Abstract

An important characteristic of any labor market is its ability to allow workers to capture the returns to their investments in human capital. We study labor market efficiency in the Spanish labor market during a period of labor market reforms (1995-2002), and high, but rapidly declining unemployment. Using a stochastic frontier model with data from the Wage Structure Survey we find that female workers, temporary workers, immigrants, the unskilled, service workers, and older workers are relatively inefficient in capturing the returns to their human capital. Overall, we find a uniform reduction in labor market efficiency between 1995 and 2002.

Key Words: labor market efficiency, frontier regression, job-matching, gender discrimination, over-education

JEL Codes: P3, J3, C4

I. Introduction

Labor market rigidities are commonly blamed for the high European unemployment rates (c.f. Siebert, 1997). During late seventies and early eighties, unemployment rates in Europe spiked and have remained high ever since. The labor market rigidities are typically attributed to high firing costs, generous unemployment benefits, and strong labor unions. Poor matching between labor supply and demand has been extensively studied in previous literature that sheds light on the persistent high unemployment rates throughout the 1989s in Europe (Marimon and Zilibotti, 1999; Manacorda and Petrongolo, 1999). Based on this framework, several European

countries undertook institutional reforms aimed at deregulating labor markets in a bid to mediate the market rigidities (Toharia and Malo, 2000).

With one of the highest unemployment rates and the most protective labor regulations among the European OECD countries, Spain is unfortunately a paradigmatic case. Policymakers responded to the high unemployment rates with a series of labor market reforms. The implementation of the Employment Protection Legislation in 1984 allowed the rapid growth rate of temporary contracts. In fact, Spain has become the European country with the highest share of temporary employment: 32% in 2000. Further reforms followed in the 1990's, and in 2001, including reforms to make hiring permanent workers more attractive to employers.

 An important characteristic of any labor market is the ability of its workers to capture the returns to their human capital. This paper studies changes in the labor market efficiency of Spanish workers' during a unique period of flexible labor market reforms, and high, but rapidly declining unemployment. This view of labor market inefficiency may be particularly relevant in the case of Spain. Improving labor market flexibility can have two quite distinct effects. First, in a more flexible labor market workers can more easily change jobs and potentially improve their ability to capture their human capital potential. However, improved labor market flexibility should also reduce employer and employee search efforts which could result in less desirable job matches. Similarly, reducing unemployment could result in less well-matched workers finding employment. It is in this changing policy environment that we examine the ability of different types of workers to capture the returns to their human capital.

We find that females, temporary workers, and older workers have relatively low labor market efficiency. Immigrants in 2002 have labor market efficiencies similar to all temporary

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workers. Overall, we find a uniform reduction in labor market efficiency between 1995 and 2002.

To estimate labor market efficiency we use a stochastic frontier model with data from the Wage Structure Survey (WSS) in Spain. In the commonly used wage determination framework, observed wage differentials are attributed to human capital stocks. The earnings frontier for a labor market is defined as the highest potential income associated with a given human capital stock. We attribute the gap between realized earnings and the earning frontier to various forms of labor market inefficiency, which might be caused by incomplete information about prospective wages, labor market rigidities, discrimination, or poor job-matching. A well-known interpretation of low labor market efficiency offered is poor-matching (Cahuc and Postel-Vinay, 2002). We use the term "job-match" to denote how closely one's actual earnings are to his human capital potential earnings.[1] This interpretation may be particularly relevant in our case given the important policy changes that occurred over the time period studied. The rapid decline in unemployment in Spain suggests a possible influx of difficult-to-match workers.

The remainder of this paper is organized as follows. Section II examines changes in the Spanish labor market over the last two decades, including policy changes directed toward reducing unemployment. Section III describes our data and sketches out our labor market efficiency estimation procedures using frontier analysis. Section IV provides the empirical results while Section V provides some brief conclusions.

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[1] For studies that investigate the relationship between job match and tenure, see Glenn et al. (2001) and Harris et al. (2006).

II. Characteristics of Spanish Labor Market

We study the Spanish labor market during the 1995-2002 period as it makes an interesting case study of changes in labor market efficiency in an environment of major labor market reforms and high, but rapidly falling unemployment. At its 1995 peak, the Spanish unemployment rate was 22.8 percent, high relative to the EU average of 10.0 percent, but also high relative to its neighbors, Portugal (7.3 percent) and Italy (11.2 percent). By 2002 Spanish unemployment rate had fallen dramatically to 11.4 percent, still somewhat high relative to the EU average of 7.6 percent.

Spain also has a dual labor market, made up of permanent and temporary workers. The 1984 labor reform liberalized the use of temporary contracts, allowing employers to hire temporary workers to perform regular activities and lower their dismissal costs (Dolado et al, 2002; Cuesta, 2008). The share of temporary workers grew quickly after 1984 and stabilized at about one-third of the workforce by 1995. Importantly, women have a greater incidence of temporary contract. The reduction of unemployment benefits, an important supply-side policy change, was also introduced before the beginning of this period; in 1992 the government made eligibility requirements for unemployment benefits more restrictive and reduced benefit amounts (Alba-Ramirez, 1993; Franks, 1994). A further series of labor market reforms occurred in the 1990's and in 2001 to make permanent jobs more attractive to employers, again by reducing dismissal costs and increasing the demand for labor (see for example, Dolado et al., 2002; Arellano, 2004; Pla and Ramos, 2008).[2]

A rapidly growing group of predominately temporary workers are foreign workers. For 2002, we are able to identify immigrant status.[3] We anticipate that immigrants will be less likely

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[2] Firms were also encouraged to convert temporary jobs in to permanent jobs with a reduction in payroll taxes.
[3] The 1995 survey data does not ask about immigrant status.

to capture their human capital potential as most of their schooling and some of their experience was earned outside of Spain.

Labor market efficiency and gender are also of interest. Spain has one of the lowest female labor force participation rates in Europe. While female labor force participation rate grew from 46.2 percent in 1995 to 53.7 percent in 2002, women in 2002 suffered twice the unemployment rate as men. The relatively low female labor force participation rates and high female unemployment rates lead to questions of labor market gender equity. Our approach assumes the returns to one's human capital characteristics do not vary by gender; men and women with the same levels of schooling and experience are assumed to be equally productive and differences in earnings by gender are reflected in relative abilities to capture the returns to their human capital attributes. Equally endowed women suffer lower earnings than men as job opportunities are not made available due to labor market discrimination or due to lack of job mobility. If fewer opportunities are made available to female workers, it will be more difficult for females to match their human capital to employment opportunities, resulting in lower labor market efficiency. Search theories of discrimination (i.e., statistical discrimination) predict that women in particular will suffer if lower dismissal costs led employers to reduce search efforts.

We also address the issue of labor market efficiency and regional unemployment. The Spanish labor market is regionally segregated—the regional unemployment rate in 2002 varied from 33.1 percent in Andalusia to 13.14 percent in Navarra. In addition, there is high persistence in regional unemployment across. The high and persistent regional variation in unemployment rates in Spain has been attributed to little geographical or functional mobility (Franks, 1994). As labor market efficiency is influenced by labor mobility, this factor should also play an important role in determining the extent to which a worker captures his or her human capital.

A further issue related to labor market efficiency is the "over-education" problem. Over-education is a mismatch between a worker's formal education and the skills required to perform a given job. The size of the over-education effect in Spain has been perceived to be quite large; Garcia-Montalvo (2001) suggests that approximately 30 percent of the Spanish labor force has an education level above what is necessary for their jobs. Alba-Ramirez (1993) points out that over-education is typically attributed to young workers; by evaluating the ability of younger workers to capture their human capital potential we can investigate the "over-education" effect in Spain.

III. Estimating Labor Market Efficiency

The Spanish Wage Structure Survey

The data for this paper come from 1995 and 2002 Wage Structure Survey (WSS). The WSS is a cross-sectional random sample of workers from firms of at least 10 employees in the manufacturing, construction, and service sectors. It provides detailed information about earnings and personal characteristics for workers employed by the sample firms. We have information about both the human capital-related characteristics like age, experience, and education contract and job, as well as other important factors such as gender, occupation, type, firm size and owner ship, and region. Table 1 presents descriptive statistics. Male real earnings fell by 4% from 15,202 euros in 1995 to 14,567 euros in 2002. Female real earnings have fallen more, by 7%, from 10,869 euros in 1995 to 10,082 euros in 2002. These results are consistent with OECD *Employment Outlook* for 2007 (OECD, Statistical Annex, p. 269, 2007). The larger female earnings negative growth rate is reflected in the decline of the unadjusted gender earnings ratio from 0.715 to 0.692. Both male and female workers experienced small increases in their levels of

education, with female workers having about one-half year educational advantage over male workers. The average level of potential experience for male workers fell between 1995 and 2002 from 24.8 years to 22.7 years. In contrast, female workers show an increase in experience from 19.3 years to 19.6 years.

Finally, Table 1 reports the percentage of permanent workers in our sample. The gap between males and females is declining over time; by 2002 72.6 percent of males are permanent workers (a slight decline) and 71.8 of female workers have permanent status (a slight increase).

Stochastic Frontier Models

This paper follows a small, but growing labor economics literature that employs the stochastic frontier approach to describe the highest potential earnings associated with a given human capital stock. With perfectly functioning labor markets, (i.e., in the absence of incomplete information, discrimination, immobility, or monopsony) each worker will have the same potential and actual earnings. In the incomplete information examples, frontier analysis is used to estimate the "degree of shortfall between the wages workers earn and what they could earn assuming perfect or costless information in the labor market (Hofler and Murphy, 1992, p. 511)." In this case, efficiency measures the quality of the (job) match between earnings and human capital (Hynninen and Lahtonen, 2007). Hynninen and Lahtonen (2007) study labor market matching in Finland between regions with different population density. They use frontier analysis with panel data "to estimate differences in matching inefficiency that do not result from the educational distribution of job seekers and educational requirements of employers." In the discrimination examples, frontier analysis is used to find the "true" wage regression for both males and females. The stochastic frontier approach eliminates the need to assume "that the non-

discriminatory wage is either the male or female wage (Robinson, 1993, p.45)." Generically, the

gap between actual and potential earnings is known as "*earnings inefficiency.*" In this context,

high (low) labor market efficiency describes a "good" (poor) job match.

Labor Market Efficiency

We employ a stochastic frontier method (Aigner, Lovell, and Schmidt, 1977) to obtain a

latent efficiency measure. Stochastic frontier analysis has been employed by labor economists to

study incomplete worker information (Hofler and Polachek, 1985, among others), discrimination

(Robinson and Wunnava, 1989; Slottje, Hirschberg, and Hayes, 1994; Ogloblin and Brock,

2005), and immigrants' relative earnings performance (Daneshvary et al, 1992; Lang, 2005).

Lovell (1995) provides a useful policy oriented review of efficiency analysis.

Using a standard labor market efficiency model:

$$L_{jk}^D = \theta_1^D + \theta_2^D X_{jk} + \theta_3^D w_{jk} - u_{jk}^D, u_{jk}^D \ge 0,$$ (1)

and

$$L_{ji}^S = \theta_1^S + \theta_2^S X_{ji} + \theta_3^S w_{ji} - u_{ji}^S, u_{ji}^S \ge 0,$$ (2)

where L_{jk}^D is quantity of labor demanded for employer k in local labor market j and L_{ji}^S is

individual i's labor supply choice. The deterministic parts of equations (1) and (2) are local labor

demand and supply frontiers. The term u_{jk}^D reflects the inefficiency for employer j to identify the

potential pool of qualified workers in locale j, u_{ji}^S captures the inability of individual i to identify

the full range of potential employers, or to realize the full potential of worker's human capital, as

well as the immobility caused by cultural constraints or by local employers' monopsony.[4] Due to

the inefficiency originating from both labor demand and supply, we expect to see a sizable gap

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[4] Polachek and Robst (1998) address the assumption that efficiency can be measured as a residual. Using
independent information they find that "stochastic frontier estimates provide a reasonable measure of a worker's
incomplete wage information"p.231).

between realized earnings and earnings frontiers in Spain. As discussed above, potential sources

of labor market inefficiency are Spain's low female labor force participation rate, regionally

segregated labor markets, and Spain's dual labor market.

In the market with K_j employers and N_j potential workers in locale j, with the local

labor market clearing condition applied, we have

$$\sum_{k=1}^{K_j} L_{jk}^D = \sum_{i=1}^{N_j} L_{ji}^S .$$

(3)

We can derive the following reduced-form wage equation:

$$\ln(w_i) = \alpha + \beta X_i + \gamma R_i + v_i + u_i ,$$

(4)

where $\ln(w_i)$ is log earnings, X_i is a vector of human capital measures, R_i is an indicator for

geographical regions, $v_i \sim N(0, \sigma_v^2)$ is normal error, and $u_i \leq 0$ is a measure of earning

inefficiency due to the joint effects of u^D and u^S. While γ's may capture the differences of

living standards, they also reflect the real earning differences and disparities of the degree of

intraregional immobility in different geographical areas.

Empirically, we follow the literature and impose an exponential form on the error term

u which represents inefficiency-induced disturbances.[5] As Hynninen and Lahtonen (2007)

point out the distributional assumption on the inefficiency term in equation (4) may be relaxed in

the presence of panel data. However, given the dramatic changes in the Spanish labor market

between 1995 and 2002, we have enough variation in absolute efficiency to identify meaningful

differences in job market matches during this period. Thus, we interpret our theoretical

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[5] We also used half-normal and truncated normal forms and find that the different distribution assumptions do not alter our empirical finding regarding the changes in efficiency over time.

framework as providing efficiency estimates in two static labor markets, rather than a matching function approach where workers seek better employment over time.

An important diagnostic tool in frontier models is λ, the ratio of variance of v divided by the variance of u. For example, a λ value of 1 implies that the variances of the random and non-random errors contribute equally to the total variance. Alternatively, a λ approaching zero implies the absence of labor market inefficiency (see Hofler and Polachek, 1985).

We assume that a worker's human capital endowment is measured solely by one's education and experience. Other factors such as gender, occupation, industry, family status, immigration status, or contract status influence how *efficiently* one is able to convert their human capital into earnings. This assumption, along with our theoretical model, suggests we model (log) earnings as a function of experience, experience squared, years of schooling and a vector of regional indicators.

IV. Empirical Findings

Table 2 reports both the OLS and frontier regression results. Beginning with the OLS results we find a substantial reduction in R-squared between 1995 and 2002. In our model, this implies that the human capital components (schooling and experience) contribute less over time to worker compensation. If schooling and experience are less relevant in determining wages, then any measure of human capital matching based on these two characteristics will show a marked decline over time.

Returns to education for Spanish workers fell over time in both the OLS and frontier regressions. Similarly, we find a decline in the return to experience over the same time period. For example, using the frontier coefficients we find that a worker with 10 years of experience

earned 47.8 percent more than a first-year worker in 1995 but the experience premium fell to 35.1 percent in 2002.

As noted above, the ratio of the random error's variance and that of the non-random error, λ, is typically reported in frontier regressions. The value of λ for 2002 is 1.01 indicating that the size of the random error's variance and that of the inefficiency-induced disturbances are equal. For 1995, the ratio is 0.62 again suggesting that the variances for the two errors are approximate in size. These values of λ indicate the existence of non-negligible labor market inefficiency, but do not (unreasonably) assign the bulk of unexplained variation to inefficiency.

Table 2 also reports the predicted labor market efficiencies for 1995 and 2002. For 1995 we find that the predicted labor market efficiency is 0.8107; for 1995, we find that predicted labor market efficiency fell to 0.7384 in 2002. As suggested above, plausible explanations for the decline in labor market efficiency are the changes in labor market policy (reduced unemployment benefits, lower dismissal costs) induce employers and workers to reduce their average search time resulting in less desirable job matches as well recently unemployed workers moving back into the labor market may be less well matched than other workers.[6]

Gender Differences in Predicted Efficiency

Table 3 reports predicted labor market efficiencies by gender for age. In all cases males are more efficient at translating their human capital into earnings; i.e. males are better matched. As noted above, the ratio of male to female has been used as a measure of female earnings discrimination. In this context, a decline in the ratio of female to male efficiency from 0.939 in 1995 to 0.853 in 2002 represents an increase in female labor market disadvantage over time.

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[6] Earnings also declined as presented in Table 1. In addition, Eurostat reports a decline in Spanish labor productivity over this time period (see http://www.stat.ee/17660).

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First row of Table 3 reports efficiency by gender for education (less than 12 years and 12 or more years of schooling) groups.   Male workers with less than high school education have higher efficiencies than males with high school or above levels of schooling. This suggests that job-matching is easier for those with lower education. For females, we find the opposite result— higher educated females have higher labor market efficiencies. In this case more educated female workers face less labor market discrimination than lower educated female workers.   We note that this result is consistent with Arrazola and De Hevia's (2006) findings of higher returns to education for females than males. This implies that the high returns to female education are not due to greater female productivity, but a lower level of discrimination suffered by higher educated women.

Further, the second row of Table 3 provides the predicted efficiencies by experience group (less than mean experience and greater than or equal to mean experience). For both males and females, younger workers have higher labor market efficiencies. A possible explanation for this finding is that workers show greater heterogeneity as time passes, weakening the link between earnings, schooling, and experience. For females, we observe the added effect of discrimination—the efficiency gap between older and younger women is much greater than older and younger men. Here age heterogeneity and gender discrimination influence predicted efficiency in the same direction, implying that younger women face less job market discrimination than older women.

Occupation and Contract Status

We present predicted efficiencies by contract status in Table 3, row 3. Not surprisingly, permanent workers are more able to capture the returns to human capital than temporary contract workers, for both years and both genders. Furthermore, the results show that relative female

labor market efficiency is higher for women in permanent jobs; in 2002 permanent female labor market efficiency is 87.1 percent of male, while the percent for temporary female workers is 80.5 percent. This finding is consistent with the observation that higher dismissal costs of permanent workers may reduce the prevalence of statistical discrimination as firms are willing to expend more in hiring costs to avoid high separation costs.

Row 4 in Table 3 reports labor market efficiencies by two selected occupations, unskilled workers and technical workers. As expected, workers classified as unskilled have lower than average efficiencies. This is particularly dramatic for females in 2002 whose efficiency is less than 60 percent. While gender discrimination is likely to play a role in explaining the very low female efficiency for unskilled workers, it is also likely to reflect physical male advantages. Technical workers have higher than average efficiencies (for both genders) implying that job-matching is easier for this class of workers. In addition, technical workers have higher than average education suggesting less labor market discrimination towards females. Switching to industry classification we find much the same results. In the non-financial services sectors we find lower than average efficiencies and the efficiency values for females are particularly low. The financial services industry reports the highest efficiency values.

The last row of Table 3 provides efficiency estimates for immigrants. As noted above, the 1995 survey does not identify workers as immigrants. However, three percent of the workers in the 2002 sample are identified as immigrants, of which three-quarters are males. As expected, immigrants have lower than average labor market efficiency. Nevertheless, if we compare male immigrants to male temporary workers we find nearly identical efficiency values. While female immigrant workers have somewhat higher efficiency values (0.6496) than non-immigrant female

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temporary workers (0.6104), in general, it appears that the ability of immigrant worker to capture the returns to their human capital is similar to native temporary workers.

Over-education

Table 4 examines the much discussed 'over-education' effect in Spain. This hypothesis suggests that younger, better educated Spanish workers have difficulty making the best job match. This implies that the low efficiencies should be found among this group. Table 4 provides predicted efficiencies for males by experience (less than 10 years experience), and schooling (less than 12 years, and 12 or more years, and 15 or more years of school).[7]

As noted above less educated and more experienced males have lower labor market efficiencies. However, younger workers in the greater than or equal to 12 years education group have the same efficiency (0.817) as older male workers in the same schooling group in 1995— this does not provide support for the over-education hypothesis. In contrast, the 2002 male results are consistent with the over-education effect. For males in both upper schooling groups, labor market efficiency is lower for younger workers—for the l2 years and above schooling group the average worker has labor market efficiency of 0.763 compared to 0.753 for younger workers. In sum, we do find a decline over time in the labor market in the ability of young, higher educated males to match their skills to jobs.

Regional Analysis

As noted in the Introduction, a distinguishing feature of the Spanish labor market is the large and persistent differences in regional unemployment rates. In this section we compare predicted regional labor market efficiency to the observed regional unemployment rate. We regress regional mean efficiency on its regional unemployment rate for individual years and the

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[7] For females, the over-education hypothesis is more difficult to test as we have noted that discrimination may also vary with age and education.

pooled data. Figure 1 plots the predicted efficiency against the unemployment rate for 1995 and 2002, including the individual years and a pooled regression line. It is apparent that there is very little relationship between regional efficiency and unemployment; furthermore, it is apparent that whatever factor that caused labor market efficiency to fall over time affected all regions equally. Overall, this graph suggests that differences in regional labor market's ability to match workers do not explain the (stable) differences in regional unemployment.

V. Conclusion

This paper studies changes in Spain's labor market efficiency during a unique period of labor market reforms and high, but rapidly declining unemployment. Improving labor market flexibility can have two quite distinct effects. First, in a more flexible labor market workers can more easily change jobs and potentially improve their ability to capture their human capital potential. However, improved labor market flexibility may also reduce employer and employee search efforts which could result in less desirable job matches. Similarly, reducing unemployment could result in less well-matched workers finding employment.   It is in this changing policy environment that we assess the ability of different types of workers to capture the returns to their human capital.

A stochastic frontier estimation of the earnings equation allows us to obtain a direct measure of labor market efficiency. In general, we find a reduction in the ability of workers to capture the returns to their human capital between 1995 and 2002. Women in particular suffer large reductions in the ability to capture their human capital potential, particularly women who are less educated, more experienced, temporary workers, unskilled, or employed in the service sector.

As expected, temporary workers are less well-matched than permanent workers. However, there is little difference between native temporary workers and non-native temporary workers in terms of their ability to capture their human capital potential. We find that the unskilled, service workers, and older workers are relatively poor at capturing their returns to their human capital. Differences in workers' ability to capture their human capital potential do not appear to explain the regional differences in unemployment.

Other important findings includes the relationship between education and human capital matching is gender specific; for men, less educated workers capture a larger share of their human capital potential than more educated men. In contrast, highly educated women capture a larger share of their human capital potential than less educated women, a finding which we attribute to less discrimination. We find some evidence (in 2002) that young, well-educated men are poorly matched, providing some support for the 'over-education' effect.

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Table 1 - Summary Statistics

		1995		2002	
		mean	std.	mean	std.
Earnings					
	Male	15,202	10,597	14,567	10,166
	Female	10,869	6,925	10,082	7,028
	Total	14,197	10,036	13,173	9,533
	Ratio (m/f)	0.715	-	0.692	-
Education					
	Male	8.9	3.45	9.0	3.35
	Female	9.4	3.34	9.6	3.59
	Total	9.04	3.43	9.23	3.44
Experience					
	Male	24.8	11.99	22.7	11.80
	Female	19.3	11.14	19.6	11.50
	Total	23.58	12.02	21.79	11.79
Permanent					
Status	Male	75.9	42.8	72.6	44.6
(proportion)	Female	68.4	56.5	71.8	45.0
	Total	74.2	43.8	72.3	44.7
Sample size (N)		155,889		107,961	
	Male	119,717		74,402	
	Female	36,172		33,559	

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Table 2 – OLS and Frontier Regression Results

	1995		2002	
	OLS	Frontier	OLS	Frontier
Education	0.0911	0.0892	0.0847	0.0828
	(0.0004)	(0.0004)	(0.0005)	(0.0005)
Experience	0.0535	0.0538	0.0386	0.0401
	(0.0004)	(0.0004)	(0.0006)	(0.0005)
Experience^2	-0.0006	-0.0006	-0.0005	-0.0005
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Regional indicators	yes	yes	yes	yes
Log(likelihood)		-94837		-77467
N	155,889		107,961	
λ		0.6200		1.0014
R-Squared	0.3175		0.2040	
Mean Predicted		0.8107		0.7384
Efficiency		(.0002)		(.0004)

Notes: Standard errors are in parentheses; *** indicate that the estimated coefficients are statistically significant at the 1% level.

Table 3 - Predicted Labor Market Efficiency by Gender

	1995			2002		
	Male	Female	Ratio	Male	Female	Ratio
Schooling						
<12 Years	0.8248	0.7674	0.9300	0.7778	0.6461	0.8310
	(0.0002)	(0.0008)		(0.0004)	(0.0013)	
≥ 12 Years	(0.8168)	0.7799	0.9550	0.7637	0.6863	0.8990
	(0.0009)	(0.0009)		(0.0008)	(0.0014)	
Experience						
< Mean	0.8254	0.7830	0.9490	0.7783	0.6930	0.8900
	(0.0003)	(0.0007)		(0.0005)	(0.0011)	
≥ Mean	0.8197	0.7497	0.9150	0.7691	0.6064	0.7880
	(0.0030)	(0.0013)		(0.0005)	(0.0018)	
Contract Status						
Permanent	0.8292	0.7848	0.9460	0.7798	0.6799	0.8710
	(0.0002)	(0.0007)		(0.0004)	(0.0011)	
Temporary	0.8019	0.7438	0.9280	0.7576	0.6104	0.8050
	(0.0005)	(0.0012)		(0.0008)	(0.0020)	
Occupation						
Unskilled	0.8043	0.7055	0.8770	0.7410	0.5379	0.7260
	(0.0007)	(0.0023)		(0.0014)	(0.0026)	
Technical	0.8347	0.8113	0.9720	0.7926	0.7393	0.9320
	(0.0006)	(0.0015)		(0.0010)	(0.0017)	
Sector						
Services	0.7923	0.7046	0.8890	0.7285	0.5495	0.7540
	(0.0013)	(0.0035)		(0.0020)	(0.0027)	
Finance	0.8524	0.8305	0.9740	0.8213	0.7763	0.9450
	(0.0006)	(0.0013)		(0.0013)	(0.0021)	
Immigrants	---	---	---	0.7580	0.6496	0.8570
				(.0021)	(.0059)	
All Workers						
	0.8224	0.7718	0.9390	0.7737	0.6603	0.8530
	(0.0002)	(0.0006)		(0.0004)	(0.0010)	

Notes: Standard errors are in parentheses.

Table 4 - Male Efficiency by Schooling and Experience

	Schooling					
	1995			2002		
	< 12 yrs	≥ 12 yrs	> 15 yrs	< 12 yrs	≥ 12 yrs	> 15 yrs
Experience ≤ 10 years	.8305 (.0009)	.8168 (.0009)	.8246 (.0013)	.7915 (.0013)	.7535 (.0014)	.7581 (.0019)
All Workers	.8248 (.0002)	.8168 (.0005)	.8196 (.0009)	.7778 (.0004)	.7636 (.0008)	.7726 (.0013)

Notes: Standard errors are in parentheses.

Figure 1. Regional efficiency and unemployment rates, 1995 and 2002.
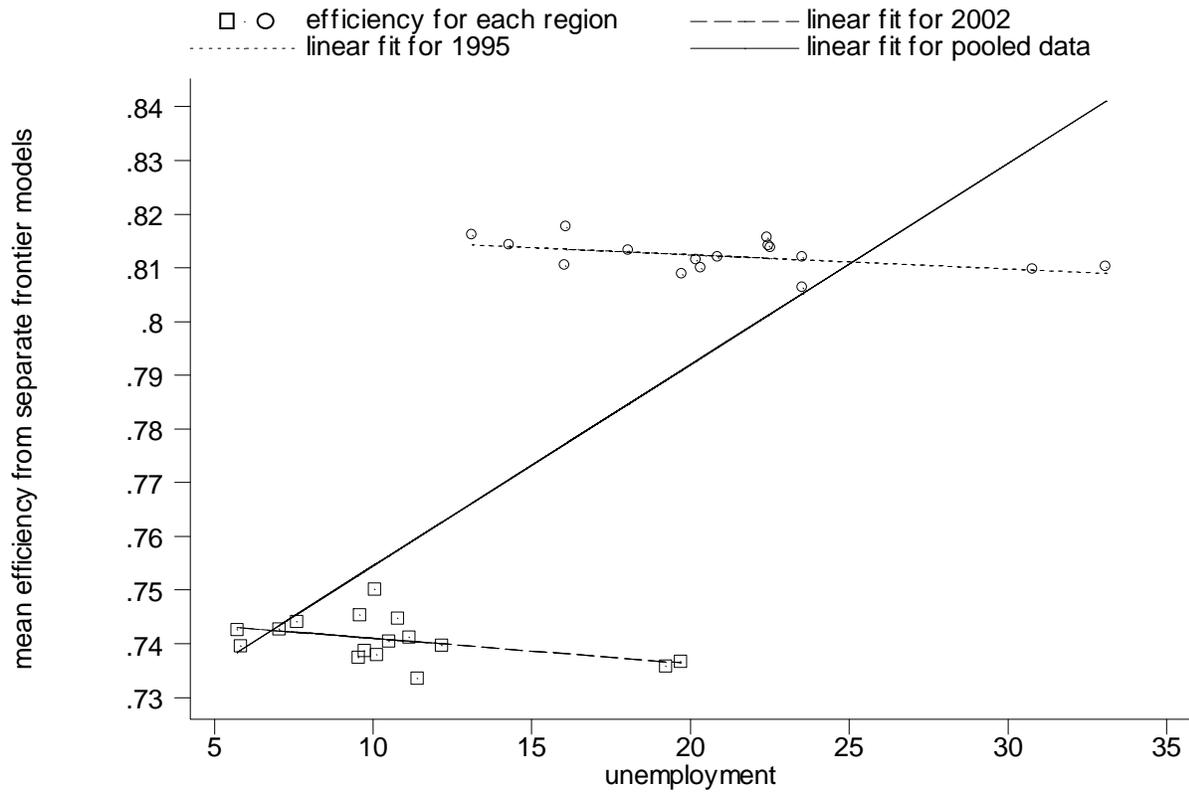
Notes: there are 17 regions in each year and the mean efficiency is used from separate frontier models; annual individual linear fit is estimated from each individual year observations (circles - 1995, squares - 2002), and the pooled prediction is estimated using all 34 region-years.