Labour Market Reform and the Beveridge Curve in Italy.
A Frontier Approach.

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ABSTRACT: A matching theory approach is utilised to assess the impact on the Italian labour market of the so-called 1997 Treu Act (*legge Treu*), which considerably eased the discipline of temporary work and favoured the development of this institution in Italy. The paper is also of some interest since the unemployment-vacancy relationship has been very seldom analysed for Italy, and no estimates of it basically exist for recent years. We re-parameterise the matching function as a Beveridge Curve, and estimate it as a production frontier. We find existence in favour of a Beveridge Curve in the 1990s across the main territorial areas. Huge differences in matching efficiency show up between the South and the rest of the country. The Treu Act appears to have favoured a rise in vacancy supply, especially in the North and in the Centre of Italy, while there are signs of an outward shift of the Beveridge Curve in the South of Italy. As a consequence, we conclude that the Treu Act brought about a reduction of unemployment in the more developed regions of the country, but did not much affect the matching efficiency of the Italian labour market.

1. Introduction

During the last two decades European countries have enacted a liberalisation of employment protection regulations in order to combat their high rates of unemployment. Italy is no exception to this. According to the OECD (1994, 2000), Italy used to be, along with Spain, one of the countries with higher labour market rigidity index within the OECD. Quite recently, the situation underwent some change: labour legislation (related to part-time, temporary employment, fixed-term contracts, …) was modified and the share of temporary over total employment in Italy has changed from 5.4% in 1983 to 7.8% in 1997 to 10% in 2000.

At the same time, in the last two decades a very rich literature (both theoretical and empirical) developed from the theory of matching proposed in Pissarides (1990). As is well known, this framework is characterised by the existence of some imperfections in the process of labour market allocation. Transactions in this market are supposed to be characterised by high costs and co-ordination problems, which originate difficulties in the matching between jobs

and workers and bring about the existence in the same labour market of unemployment and vacancies. Naturally these problems are heightened by the presence of wide disparities across skill, age, gender groups, industries or regions as well as by the existence of large flows across these entities. Hence the interest of the framework for the Italian labour market, well known for being characterised by serious regional and skill mismatch.

This paper aims to investigate in what measure the recent changes in Italian labour legislation, and in particular the so-called Treu Act (a law which considerably eased the discipline of temporary work and favoured the development of this institution in Italy), have affected the unemployment-vacancy relationship across regional and skill labour markets. Although the Treu Act elicited considerable interest in the press and among labour market participants, there has not been so far extensive scientific work on its effects.

Previous studies of this process of de-regulation include Adam and Canziani (1998). They study the labour policy measures in the 1980s. In particular, they analyse fixed-term training contracts and compare the economic impact of their de-regulation in Italy vis-à-vis the Spanish case. Fixed-term training contracts have been massively used in Spain while their adoption was more contained in Italy. More recent studies include Nannicini (2001, 2002), and are centred on temporary employment in Italy. Nannicini (2001) analyses the diffusion of this type of "non-standard" employment (legalised by the Treu Act) at industry level. He concludes that industries that have used temporary employment more intensively experienced an after-liberalisation drop of their share of permanent employment. Nannicini (2002) analyses throughout some industries the tendency of temporary work to become permanent. Closer to our focus is the study of Centra *et al*. (2001), which analyse temporary work at regional and skill level. They investigate region by region the duration of temporary work and its probability to become permanent.

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We aim to see whether the liberalisation of employment protection laws improved the matching between vacancies and unemployed at the regional and skill level. The general idea is that with higher flexibility, both hirings and firings could be easier for the firm, with an ambiguous final effect on labour market tightness. As job turnover increases, labour market tightness may fall or rise depending on different heterogeneities across jobs, regions and workers: shifts in the Beveridge Curve may subsequently be indeterminate.

Our work is also of some interest since the unemployment-vacancy relationship has been very seldom analysed in the Italian literature, mainly because of the lack of official vacancy data, and no estimates of the Beveridge Curve basically exist after 1990. We adopt a fairly recent empirical approach. The matching function, re-parameterised as a Beveridge Curve, is modelled and estimated as a production frontier.

In empirical labour economics the efficiency of labour markets has often been analysed through matching functions. Furthermore, the interpretation of the matching function as a production function is quite common, and some research has been devoted to unveiling the micro foundations of this ”black box” (see Petrongolo and Pissarides, 2001). However, only recently the matching function has been used for analysing matching efficiency with the tools of production frontier analysis (after the seminal contribution of Warren, 1991, see Ibourk *et al*., 2001, for France; Fahr and Sunde, 2002, for Germany; Ilmakunnas and Pesola, 2003, for Finland).

Here we apply this relatively novel technique on Italian data,[2] with the effects of the Treu Act as a main focus of interest. We concentrate on the 1993-2000 period, adopting two different measures for vacancies, the ISFOL-CSA help-wanted ads collected from some important daily newspapers and the ISAE labour scarcity indicator, and compare their performance. Our evidence shows that the Treu Act did indeed foster a higher vacancy supply, especially in the North and in the Centre of Italy. There are also signs of a slight outward shift of

the Beveridge Curve in the South of Italy. As a consequence, it may be concluded from our evidence that the Treu Act brought about a reduction of unemployment in the more developed regions of the country.

The paper has the following structure. Section 2 provides a fairly brief account of the main features of the Treu Act, as well as its main implications in the light of Pissarides (1990, 2000). Section 3 considers the relationships between matching functions and production frontiers, introducing the empirical specification adopted, while the Italian literature on the Beveridge Curve is surveyed in Section 4. Data and econometric results are presented and commented in Section 5. Section 6 contains some concluding remarks.

2. The Treu Act: Main Features and Implications

In recent years one of the major structural changes that affected OECD economies is the advent and success of some previously uncommon forms of job relationships (part-time, temporary employment, fixed-term contracts, ...).[3] The label of non-standard employment has often been used to cover all these "new" types of employment, which share the characteristic of differing from what was usually defined standard employment: a job with a full-time, open-ended and secure contract. In Italy the growth of non-standard employment has become important only very recently. It is widely believed that the Italian labour legislation evolving during the 1960s and the 1970s produced a system characterised by important hiring and firing costs.[4] In practice, these regulatory rigidities were bypassed through some peculiar (the lay-off scheme known as *Cassa Integrazione Guadagni*), ad hoc (industrial rescues) or informal (shadow economy) forms of flexibility. However, a very slow drift to non-standard employment already begun in the late 1980s. In 1987 (Law 56/1987), collective

[2] To the best of our knowledge, the first application of frontier analysis to the Italian labour market is to be found in Destefanis and Fonseca (2004).
[3] See on this Felstead and Jewson (1999).
[4] See Sestito (1996), Bertola and Ichino (1995), OECD (1999).

agreements were allowed to include fixed-term contracts for specific target groups and reasons. Still, the utilisation and renewal of fixed-term contracts continued to be strictly regulated: the contract is converted into an open-end one if the job relationship continues over the fixed term. Other moves toward flexibility included the repeated changes undergone during the 1990s by the regulation for on-the-job training for workers aged between 16 and 32 (Law 451/1994, article 16; Law 608/1996, article 9).

The most decisive legislative step in favour of non-standard employment has been the Law 196/1997, the so-called *legge Treu* (Treu Act, by the name of the then minister of Labour and Welfare, Tiziano Treu). In particular,[5] the Treu Act made temporary work agencies legal (Law 196/1997, articles 1-11). The typical job relationship which ensues is the following: a temporary work agency hires a worker (usually for a fixed term) with a view to placing this worker in a client firm for a temporary assignment. The Act stated that this kind of relationship was forbidden in some cases: lowest positions of the job ladder, replacement of workers on strike, firms that made collective dismissals in the last twelve months, firms that experienced a time-of-work reduction, jobs that require medical vigilance. The 2000 Budget Law ruled out the prohibition of temporary work for the lowest positions of the job ladder. The Treu Act does not set a limit for the cumulated duration of temporary contracts or legal motivations for using temporary work, leaving the set-up of such regulations to collective bargaining. Collective agreements usually stipulate that temporary workers cannot exceed the 8-15% of normal employees (depending on the industry) and state some accepted reasons for their adoption: peak activity; one-off work; expertise not available within the firm. According to the collective agreement for agency workers, firms cannot extend an individual contract more than four times and for a cumulated period longer than 24 months.

Th Treu Act, whose actual implementation took place in the second half of 1998, brought about a decisive growth in the number of temporary workers: they

were already 250 000 in 1999 and 470 000 in 2000 (Confinterim, 2000). Temporary, fixed-term, employment quickly expanded, particularly in manufacturing and in the more developed Northern regions of Italy.

The impact of the Treu Act on the diffusion of non-standard employment naturally calls for an evaluation of the economic and social effects of this new institution. An obvious question, which has already been analysed in a few studies (Centra *et al*., 2001; Ministero del Lavoro e della Previdenza Sociale, 2001, pp. 123-125; Nannicini, 2001, 2002) is whether temporary work leads to some kind of permanent job relationship. More generally, it can be asked whether temporary work brings in the formal labour market workers previously excluded from it. Most of the uncertainty relating to the economic outcomes of the Treu Law boils down to the following question: the greater flexibility implied by temporary work increases the chance for unemployed to find jobs, but also the probability of a subsequent job separation: which is the stronger among the two effects? A novel and potentially interesting approach to this issue involves the modelling and specification of matching functions.

The matching function is based on the idea that the existence of frictions on the labour market implies that firms (jobs) and workers can match each other only with some delay (this account is largely based on the approach developed in Pissarides, 1990, 2000). New matches between workers and jobs produce new hirings, a process which can be described by the following function:

$$(1)\quad H_{it} = h\,(U_{it-1}, V_{it-1})\, e_{it}$$

where *i* are the units defining the labour market (areas, industries, occupations, …), *t* is the time period, H are hirings, U the number of job-seekers (here proxied by the unemployed) and V the number of vacancies. Higher levels of e_{it}, usually defined in the literature as the efficiency term, bring about higher H_{it} levels, for given U_{it-1} and V_{it-1} stocks. This term is influenced by the search intensity of firms

[5] The Treu Act also contained some items on the regulation of on-the-job training for workers aged

and workers, by the effectiveness of search channels, by the labour mismatch across micro markets defined over areas, industries or skills. Obviously, it is extremely important to ascertain whether e_{it} varies across time and categories.

There is a spreading literature which analyses the implications of short-term contracts for unemployment (Saint-Paul, 1996, is a very important reference in this field). An important intuition relates to the screening device role of fixed-term contracts (Jovanovic, 1979, 1984). They should allow employers to observe the productivity of the job-worker pair during a maximum probation period, improving matching efficiency. For our purposes a particularly important study is Wasmer (1997), which uses a matching model à la Pissarides with two kinds of jobs in order to explain the rising share of non-standard employment across Europe. Wasmer concludes that the rise in the share of non-standard jobs shifts the Beveridge Curve to the right, as a larger number of job vacancies is needed to keep employment constant and the bargaining position of workers is affected in favour of labour demand. Given a constant vacancy rate, temporary contracts increase the equilibrium rate of unemployment. However, in order to know the total effect of the diffusion of non-standard work on unemployment, one should also look at its impact on firm supply of vacancies. Depending on the value of the probability of getting a renewal or a permanent contract the vacancy supply curve moves to the right or to the left, and the total effect on unemployment is ambiguous.

In Section 5 we will explore the explanatory power of this framework, concentrating on the impact of the de-regulation of employment protection legislation on the Italian Beveridge Curve during the 1990s. The production frontier set-up will easily allow to focus on the possible differences arising at the regional level.

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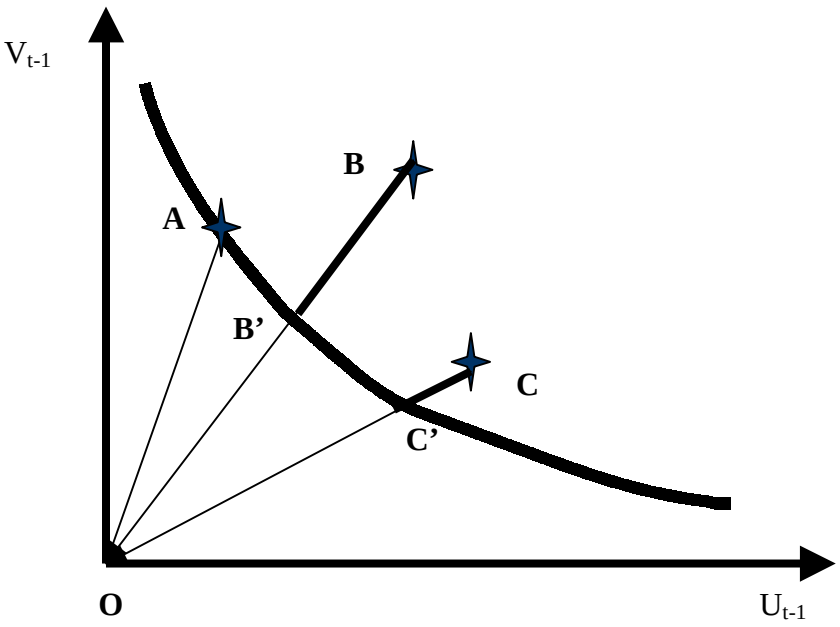
between 16 and 32 (Law 196/1997, articles 15-16), extending previous changes in this field.

3. Matching Functions and Production Frontiers

Some interesting contributions have been appearing in the empirical analysis of the matching function, which exploit the deep conceptual and analytical resemblance between this function and the commonly adopted production function. Consider again equation (1). If the estimation of this function concentrates upon the term e_{it}, its evolution and its determinants, then the analysis can profit of the methodologies developed in the field of the stochastic production frontiers (see in particular Kumbhakar and Lovell, 2000).

Stochastic production frontiers are based on the assumption that the technical efficiency of a productive unit is measured by the distance between the input and output mixes observed for the unit itself and the input and output mixes on the point of the production frontier relevant for the observed unit. In the case of the matching function, consider Figure 1, where various mixes of U_{t-1} and V_{t-1}, all of them capable of producing the output H_t (H_{0t}), are considered along an isoquant.

Figure 1



Obviously, the U_{t-1} and V_{t-1} combinations on the isoquant are efficient points. For each value of U_{t-1} on the isoquant they single out the minimum V_{t-1} value consistent with obtaining H_{0t}, and conversely for each U_{t-1} value. It will always be possible to obtain H_{0t} for U_{t-1} and V_{t-1} values higher than those on the isoquant, but this will not be technically efficient. Then, both points B and C are inefficient, while A is technically efficient. Adopting the measure of technical efficiency proposed in Farrell (1957), that is the largest radial input contraction consistent with obtaining a given output (in this case H_{0t}), the technical efficiency of C is OC'/OC, that of B is OB'/OB and that of A is OA/OA. The latter, being fully efficient, has an efficiency score equal to one. On the other hand, the technical efficiency of C is higher than that of B, which is situated further away from the isoquant.

This framework can be utilised not only for measuring the distance of each observation from the isoquant, but also to assess which factors determine the efficiency of these observations. More precisely, consider for simplicity the following specification (it is assumed that panel data are available):

$$(2)\quad h_{it} = \alpha + \mathbf{x}_{it-1}\beta + \varepsilon_{it} - \upsilon_i$$

where h_{it} is the natural log of H_{it}; $\mathbf{x}_{it-1}$ is the vector containing the natural logs of U_{it-1} and V_{it-1}; β is a parameter vector; ε_{it} is a stochastic variable assumed to be iid. N $(0, \sigma_\varepsilon^2)$ and independent from $\mathbf{x}_{it-1}$ and υ_i. The latter is a stochastic non-negative variable measuring technical inefficiency (the complement to one of the above defined notion of technical efficiency). By assumption, the inefficiency terms υ_i do not vary through time. Furthermore, without any loss of generality, we consider a Cobb-Douglas functional form. Naturally, α is the constant term of the function. Now, if we put $\alpha_i = \alpha + \upsilon_i$, we obtain the model proposed in Schmidt and Sickles (1984):

$$(3)\quad h_{it} = \alpha_i + \mathbf{x}_{it-1}\beta + \varepsilon_{it}$$

This model can be easily estimated through a within procedure. If we define now $\hat{\alpha} = \max_i \{\hat{\alpha}_i\}$, the technical efficiency of observation *i* is defined by:

$$(4)\ ET_i = \exp\{-\hat{\upsilon}_i\} = \exp\{\hat{\alpha} - \hat{\alpha}_i\}$$

The above model can be straightforwardly modified in order to allow variations through time of technical efficiency. Take for instance the model proposed in Cornwell *et al*. (1990):

$$(5)\ h_{it} = \alpha + \mathbf{x}_{it-1}\boldsymbol{\beta} + \varepsilon_{it} - \upsilon_{it}$$
$$= \alpha_{it} + \mathbf{x}_{it-1}\boldsymbol{\beta} + \varepsilon_{it}$$

where $\alpha_{it} = \alpha + \upsilon_{it} = \delta_{i1} + \delta_{i2}\, t + \delta_{i3}\, t^2$. If we define $\hat{\alpha}_t = \max_i \{\hat{\alpha}_{it}\}$, from the within estimates of this model one obtains:

$$(6)\ ET_{it} = \exp\{-\hat{\upsilon}_{it}\} = \exp\{\hat{\alpha}_t - \hat{\alpha}_{it}\}$$

Through the terms $\delta_{i1} + \delta_{i2}\, t + \delta_{i3}\, t^2$ this model nests the explanation of inefficiency within the estimation of the production function. Yet, more can be done in this sense, including in (5), beside the $\mathbf{x}_{it-1}$ vector, a $\mathbf{z}_{it}$ vector of variables potentially determining the technical efficiency of observation i at time t. Instead of this one-stage approach, papers in the literature often adopt a two-stage approach, where the efficiency scores are first computed through a production function only including conventional inputs and then regressed on a set of potential determinants. Econometric considerations (relating to both consistency and efficiency) usually militate in favour of the one-stage approach.

The literature treating matching functions within the frontier approach is still rather recent. The seminal contribution, still valid from the conceptual standpoint is Warren (1991). Three much more recent studies have been carried out for European countries and should be carefully considered as a starting point for the present empirical work. All these studies share the assumption of a Cobb-Douglas functional form for the matching function. They fundamentally differ for the data-sets utilised and the variables considered in the explanation of inefficiency.

Ibourk *et al*. (2001) consider monthly data for the 22 French regions from March 1990 to February 1995. They include in the estimates (beside a linear trend), a rather considerable number of potential determinants for inefficiency. The list of the latter is reported in Table 1.

Table 1 – The potential efficiency determinants considered in Ibourk et al. (2001).

Factors	**Variables**
Search Intensity **Discrimination Effects** **Ranking Effects**	share of workers less than 25 years of age share of workers more than 50 years of age share of immigrants share of women share of long-term unemployed
Firm Effects **Industry Effects**	rate of turnover share of open-end contracts[6] net rate of growth in employment[7]
Other Factors	share of workers in training programmes density of population

The results suggest the existence of wide regional differences in efficiency and that on average a decline in efficiency occurs over the time period considered. The hypothesis of constant returns to scale for the matching function is not rejected. The variables considered in Table 1 explain about 30% of the variability in efficiency (across both time and space). More in particular, the most significant

[6] Beside this share (referring to total vacancies), shares refer to the total of unemployed.
[7] This variable is taken with a one-month lag in order to avoid spurious correlation.

variables are, with positive sign, the share of workers less than 25 years of age, the share of workers in training programmes and, with negative sign, the share of long-term unemployed. Also of some significance are the density of population (if entered as a quadratic function) and the women and immigrant shares. However, the signs on these variable coefficients change over different periods or specifications (without the Ile de France; with constant returns to scale). Interestingly, the decline occurring in open-end contracts over the time period considered has apparently little impact on hirings.

Ilmakunnas and Pesola (2003) consider annual data for the 14 Finnish regions from 1988 to 1997. They too include in the estimates a linear trend and allow for some potential determinants of inefficiency (see Table 2). Among the latter of particular interest are the average unemployment and vacancy rates of the neighbouring regions. The authors believe that in this way allowance can be made for the spillover effects recently highlighted by Burda and Profit (1996), Burgess and Profit (2001).

Table 2 – The potential efficiency determinants considered in Ilmakunnas and Pesola (2003).

Factors	**Variabili**
Search Intensity **Discrimination Effects** **Ranking Effects**	share of workers less than 35 years of age[8] share of workers with higher education home ownership index share of long-term unemployed
Firm Effects **Industry Effects**	Level of GDP per capita rate of job reallocation rate of churning
Other Factors	average rate of unemployment in neighbouring regions average rate of vacancy in neighbouring regions

Indeed, the average unemployment and vacancy rates of the neighbouring regions enter significantly and with the expected signs in the estimates (the average unemployment rate of the neighbouring regions has a negative impact on efficiency, while the average vacancy rate has a positive impact). Still, the share of workers less than 35 years of age has a positive effect on matching efficiency. Surprisingly, the share of long-term unemployed also has a similar positive effect. It is possible that this result spuriously derives from the enormous rise in unemployment in Finland from the early 1990s (the rise in the share of long-term unemployed is simultaneous with a strong growth in the exit flows from unemployment). Finally, also the evidence in Ilmakunnas and Pesola (2003) is favourable both to the hypothesis of constant returns to scale for the matching function and to the decline of average efficiency over the period under examination.

The analysis by Fahr and Sunde (2002) relates to two different types of annual data, both referring to German economy. In the first case 117 local labour markets are considered from 1980 to 1997. In the second case data are taken from 1980 to 1995 for 82 occupational groups. Hence these authors consider the

occupational as well as the territorial dimension of matching. This enrichment of the analysis is counterbalanced by the smaller number of potential efficiency determinants allowed for. Beside the linear trend, they include the share of unemployed less than 25 years of age, more than 50, with higher education, some spillover indicators similar to those utilised in Ilmakunnas and Pesola (2003), and a labour market tightness indicator, the natural log of the vacancy/unemployment ratio. The results suggest that, both across areas and occupations, wide efficiency differentials exist. Furthermore, similarly to the above obtained evidence, average efficiency seems to decrease over time.

A common feature to all the above considered works is that no dynamic specification of the matching function is considered. This is somehow curious both because of the annual or infra-annual frequency of the data, and, of the notorious presence of dynamics in this ambit (the Beveridge Curve "loops"). This consideration will be duly taken into account in our empirical analysis.

4. The Beveridge Curve in Italy. The Literature

In Italy there are no official data on vacancies. However, there are two surveys allowing the empirical appraisal of the Beveridge Curve, also over a regional dimension. A survey is carried out by CSA (Centro di Studi Aziendali, Florence) and by ISFOL, Rome, on the help-wanted ads published in some important daily newspapers.[9] Another data source relates to the quarterly business survey carried out by ISAE (formerly ISCO) in manufacturing. Among other things, firms are asked whether the scarcity of labour prevents them from expanding their activity. Furthermore, until 1999 it was also possible to utilise another (administrative) source: the data from the Ministry of Labour (*Ministero del Lavoro e della Previdenza Sociale*) relating to the vacancy notices posted by

[8] Here shares are calculated relative to labour force.

[9] These daily newspapers are: La Stampa, il Corriere della Sera, il Secolo XIX, il Gazzettino, il Piccolo, il Resto del Carlino, la Nazione, il Tirreno, il Tempo, il Messaggero, il Mattino, la Gazzetta del Mezzogiorno, il Giornale di Sicilia, il Giorno, la Nuova Sardegna, l'Unione Sarda, l'Alto Adige, l'Adige, il Giornale, la Repubblica, il Sole 24 Ore, la Sicilia and la Gazzetta del Sud.

the firms carrying out some types of hirings (usually firms only posted these notices when they already had actually decided upon the hiring).

Perhaps because of the absence of official data on vacancies, not many studies have examined in Italy the nature and evolution of the Beveridge Curve. Sestito (1988) and Bragato (1990) utilise the ISFOL-CSA data on vacancies, and find a significant relationship between unemployment and vacancies only in the presence of a growing linear trend. Bragato (1990) also finds a significant Beveridge Curve for the North and the Centre, but not for the South. A significant difference between the Southern labour market and the rest of the country also shows up in Sestito (1991a), where vacancies are measured using the data from the ISAE survey. In this case, however, there is no need to include any linear trend in the estimates to find a significant relationship between unemployment and vacancies. The analysis in Di Monte (1992) is based on a similar econometric specification, but utilises the Ministero del Lavoro data on vacancies. The main difference in the results obtained by Di Monte relative to previous evidence is that a significant Beveridge Curve also shows up for the South.

More recent evidence is provided by Mocavini and Paliotta (2000), who examine Beveridge Curve plots based on the ISFOL-CSA data, and by Destefanis and Fonseca (2004), who estimate and compare some Beveridge Curves based on all available indicators (ISFOL-CSA, ISAE and Ministry of Labour). The evidence from these works is largely consistent with the previous one. A Beveridge Curve shows up also in the 1990s, with some outer shift over this period. Also similarly to previous works, the Southern labour market behaves somehow differently from the rest of the country.

Finally there are some interesting studies that evaluate measures of labour market mismatch without proceeding to the estimation of Beveridge Curves. Padoa-Schioppa (1991) finds that mismatch worsens over the 1980s. In that paper, the ISAE indicator was used within a macroeconomic rationing model. Sestito (1991b) utilises the ISFOL-CSA vacancy measure to compute various mismatch

indices for the 1979-1990 period, for the whole country as well as for the three main areas, also finding that mismatch increases after the mid 1980s.

5. The Treu Act, Vacancies and Unemployment. The Econometric Estimates

In the Italian literature the existing empirical evidence relates to the Beveridge Curve (and not to the matching function proper). Three different indicators are used for vacancies (ISFOL-CSA help-wanted ads, ISAE indicator of labour scarcity, Ministry of Labour data from hiring procedures). Only in Destefanis and Fonseca (2004) a direct comparison of the three indicators is carried out, obtaining, at least as far as the 1990s are concerned, substantially similar results.

A feature common to all these estimates of the Beveridge Curve is the presence of significant dynamic effects. This obviously strengthens the above voiced perplexity on the simple static structure of the matching functions surveyed in Section 3. It is well known that, under the hypotheses of constant returns to scale for the matching function and of the existence of a steady state with constant average rate of unemployment, the Beveridge Curve can be obtained as a re-parameterisation of the matching function. In the literature, it is commonly believed that the hypotheses of constant returns to scale and of a steady state with constant average rate of unemployment are not particularly restrictive. Hence the empirical exercise here undertaken consists in the estimation of a Beveridge Curve, with some particular attention bestowed on its dynamic specification. The re-parameterisation of the matching function as a Beveridge Curve leaves unchanged in any case the size and the interpretation of the efficiency term. Under the hypothesis of constant returns to scale, equation (1) becomes:

$$(7)\quad H_{it} / U_{it-1} = h\,(V_{it-1} / U_{it-1})\, e_{it}$$

In its turn, this function can be rewritten as:

$$(8)\ (H_{it} / N_{it-1}) [(L_{it-1} / U_{it-1}) - 1] = h [(V_{it-1} / L_{it-1}) / (U_{it-1} / L_{it-1})] e_{it}$$

In a steady state with constant rate of unemployment, the hiring rate (H_{it} / N_{it-1}) is equal to s + g, where s is the separation rate and g is the rate of growth in the labour force, L. Hence equation (8) becomes an inverse relationship between the unemployment and the vacancy rates, the Beveridge Curve, whose position depends on s, g, and e_{it}. The interpretation of the last term does not change vis-à-vis equation (1).

The main data source used is the quarterly Labour Force Survey from ISTAT (*Indagine trimestrale sulle forze di lavoro*). This survey involves every quarter about 200 000 persons in 1400 municipalities from all over the country. In particular, individual data from 1992:4 to 2001:2 are utilised to measure stocks of unemployed and labour force for the three main areas of Italy (North, Centre, South – as we explain below, the level of territorial disaggregation of our analysis is constrained by the vacancy measures). We utilise data only from 1992:4 onwards because individual data are not previously available. These data are very important not only for the information they give on unemployment, but also for the construction of a series of potential determinants of matching efficiency. Following the works surveyed in Section 3, we considered variables controlling for search intensity, for discrimination or ranking effects, for firm or industry effects, and for other residual factors. All these potential determinants of efficiency are listed in Table 3.

Table 3 – The potential efficiency determinants from the *Indagine trimestrale sulle forze di lavoro,* ISTAT

Factors	**Variables**
Search Intensity **Discrimination Effects** **Ranking Effects**	share of unemployed less than 25 years of age share of unemployed less than 35 years of age share of unemployed more than 55 years of age share of female unemployed share of long-term unemployed
Firm Effects **Industry Effects**	share of labour force in agriculture share of labour force in industry share of labour force in services share of labour force in public administration
Other Factors	share of part-time employment share of open-end contract employment

We utilise three different indicators for vacancies (the ISFOL help-wanted ads divided by labour force, the ISAE indicator of labour scarcity, and ISAE-G, the inverse transformation of the labour scarcity indicator suggested in Sestito (1991). Focusing on the impact of the Treu Act means that it is highly desirable to extend as much as possible the sample after the second half of 1998. Going beyond 1999 subsequently implies relinquishing the Ministry of Labour data on vacancies. It should be kept in mind that both our vacancy indicators have some problems. Help-wanted ads mostly refer to skilled labour, while the ISAE survey relates to manufacturing only. Moreover the help-wanted ads are not currently available at a very fine level of territorial disaggregation (indicators are only produced for the three main areas: North, Centre and South). This effectively constrains the level of territorial disaggregation of our analysis, as we want to compare estimates obtained with both indicators.

Following customary praxis, a Cobb-Douglas functional form was initially assumed for the Beveridge Curve, implying a log-linear relationship between unemployment and vacancy rates. Actual estimation of the Curve suggested however that slightly different functional forms sometimes gave better results (see tables A.1-A.3 in the Appendix). Because of the notorious presence of loops in the

Beveridge Curve, we proceeded to a dynamic specification search within an error correction mechanism, where the log differences of the dependent variable depend not only on current and lagged log differences of other variables (as well as of the dependent variable itself), but also on lagged *levels* of the dependent variable and of other variables. For the sake of clarity, we write below an equation almost identical to the most successful empirical specifications obtained in estimation:

$$(9)\quad \Delta u_{it} = \beta_1 \Delta u_{it-1} + \beta_2 \Delta u_{it-4} + \beta_3 u_{it-1} + \beta_4 f(V)_{it-j} + $$
$$+ \sum_{i=1}^{3} \beta_{4+i} C_i + \sum_{i=1}^{3} \beta_{7+i} T_i + \sum_{i=1}^{3} \beta_{10+i} T^2{}_i + \sum_{m=1}^{p} \beta_{13+m} Z_{mit-1}$$

where i = 1, 2, 3, stands for the territorial area, and t for the time period (quarter). In (9) the log differences of the rate of unemployment are a linear function of their own one- and four-quarter lagged values, of the one-quarter lagged natural log of the rate of unemployment, of a function of the vacancy rate taken at an unspecified lag,[10] and of a variable vector standing for the potential determinants of matching efficiency. This vector will always include, following the suggestions from Cornwell et al. (1990), a constant term, C, a linear trend term, T, and a quadratic trend term, T^2, for each one of the three territorial areas. Besides, there is set of variables denoted by Z, where we find the control variables presented in Table 9 (all taken with a one-quarter lag in order to avoid simultaneity problems) and a variable standing for the impact of the Treu Act. The significance of the latter was tested through a binary variable equal to one from 1998:3 onwards, and through a variable (INTERIM) constructed using the information available from Confinterim (various years). Knowing for the whole of Italy the number of temporary work contracts, it was possible to construct a variable equal to zero until 1998:2, and taking values of 0.2 for 1998:3 and 1998:4, of 0.4 for the year 1999, and of one from 2000:1 onwards (these values are roughly proportional to the actual numbers of temporary work contracts). No allowance was made for

regional differences in the numbers of temporary work contracts, as they are more or less stable through time.

Following the specification already adopted for constant terms and trends, the Treu Act indicators could take different values across the main areas. Moreover, we allowed for the possibility that the Act could affect the slope of the vacancy term. More in detail, we considered three cases: the Act only affected regional intercepts (case 1), it also affected the slope, but uniformly throughout the country (case 2), it affected both intercepts and slopes in a different manner across areas (case 3).

With a view to getting as much information as possible from the data, equation (9) was estimated not only on unemployment and vacancy rates relating to the whole labour force, but also on unemployment and vacancy rates calculated on skilled and unskilled labour forces. The criterion utilised to segment the labour force for this purpose consists in considering as skilled the labour force with university or (non-vocational) high-school diploma and as unskilled the rest of the labour force (see on this Sneessens *et al*., 1998).

Before dwelling on the econometric results, it is instructive to consider the Beveridge Curve plots for the ISFOL and the ISAE vacancy proxies (see Figures A.1-A.6 in the Appendix). Both vacancy indicators suggest that in 1999 and 2000 vacancies decisively arose in the North and the Centre, shifting along a largely stable Beveridge Curve and reducing unemployment. This rise in vacancies cannot simply be explained by cyclical factors since the Italian labour market had already been picking up for some years (see ISTAT 2003, 2004). In the South the evidence is less clear, and there could be room for an outward shift of the Beveridge Curve along the lines suggested in Wasmer (1997). All in all, the graphical analysis suggests that the Treu Act favoured a reduction of unemployment, especially in the North and in the Centre of Italy, but did not much affect matching efficiency.

Turning now to the econometric evidence (in order to save space we report

[10] The nature of the function and the order of the lag will be specified below.

in the Appendix only the most significant results in our opinion), we find for all vacancy indicators evidence largely favourable to the existence of a Beveridge Curve in the 1990s across the main territorial areas. Although all vacancy indicators fundamentally point to evidence of the same kind, by and large the most significant results were obtained with ISAE. There is also a ranking in the sense that estimates for unskilled and total rates of unemployment were more significant than estimates for the skilled rate of unemployment. In the latter case, significant coefficients for the vacancy rate could only be obtained dropping the Cobb-Douglas specification in favour of a hyperbolic functional form which more markedly penalises high values of the vacancy indicator.

The hypothesis that the slope of the Curve differs across regions can be comfortably rejected.[11] However, huge differences show up between the South and the rest of the country. The Southern labour market turns out to be much less efficient than that of the other two areas. In Figure A.7 we depict the efficiency scores obtained with the ISAE indicator for skilled, unskilled and total labour force in the Centre and the South (the North turns out to be always on the efficiency frontier). Total matching efficiency varies from 63 to 44% in the Centre and from 34 to 18% in the South. On the whole, matching efficiency decreases over the sample period. This evolution compounds a clear negative trend in the matching efficiency for skilled labour with a change in composition in the stock of unemployment (see Figure A.8). Throughout the sample period in the North there is a drop in skilled (versus unskilled) unemployment. This widens the divide between this area and the rest the country as the efficiency gap between the North and the other regions is almost always larger for unskilled labour.

The dynamic specification of the Curve is very similar to that found in Destefanis and Fonseca (2004). An interesting feature arises concerning the lags of the vacancy measures. The most significant results are obtained taking the ISFOL measure with a three-quarter lag, and the ISAE and ISAE-G indicators

[11] We tested for this hypothesis allowing the vacancy coefficients to differ across areas. The test values, available on request, almost invariably do not reject the null hypothesis of a common coefficient.

with a two-quarter lag. The time sequence among the two measure can be easily explained in the following terms. First, firms foresee the need to post a vacancy and pay for this purpose a newspaper ad; secondly, in a subsequent time, they undergo the consequences of labour scarcity and accordingly report their state.

As far as the significance of the control terms listed in Table 3 is concerned, only the share of labour force in industry (negative sign for the skilled, positive sign for the unskilled), the share of labour force in services (positive sign for the skilled, negative sign for the unskilled; less significant than the former variable), the share of female unemployed and the share of unemployed less than 35 years of age (both with a negative sign for the unskilled) reach some degree of significance. When these controls are included in the equation in various combinations the highest fit is obtained with the share of labour force in industry plus the share of female unemployed. This would indicate that matching efficiency is positively related to the share of female unemployed and negatively related to the share of labour force in industry. The fact that other controls are not significant does not mean *per se* that these factors are not relevant. An obvious alternative interpretation of this result is that territorial disparities in these factors are sufficiently well caught by the regional fixed effects and trends.

If we focus now more closely on the impact of the Treu Act, two main questions arise. Is INTERIM more significant than a simple binary indicator? Do these variables act only through the intercept or also through the slope of the vacancy term? In virtually all the estimates, INTERIM is more significant, sometimes to a large extent. Also, the evidence indicates that INTERIM only acts through different regional intercepts, especially when vacancies are measured through the (most significant) ISAE proxy (indeed, in the Appendix we only report estimates for case 1, the regional intercept specification of INTERIM). Interestingly, the effect of INTERIM is negative (on unemployment) for the North, insignificant for the Centre, and positive for the South. This obviously means that the Treu Act had a positive impact on matching efficiency in the North, but a negative impact in the South. Only the latter is consistently

significant, especially if the control variables are included in the estimates (see also Figure A.7).

All in all, the evidence suggests that the Treu Act brought about a reduction of unemployment in the more developed regions of the country, but, if anything, had an unfavourable effect on the matching efficiency of the Southern labour market. For the South of Italy and for unskilled labour in particular, there is some evidence of a slight outward shift of the Beveridge Curve. This could be explained along the lines of Wasmer (1997): a larger number of job vacancies is needed to keep employment constant and the bargaining position of workers is affected in favour of labour demand. Hence, the rise in the share of non-standard jobs shifts the Beveridge Curve to the right.

6. Concluding Remarks

In this paper we utilised a matching theory approach to assess the impact on the Italian labour market of the so-called 1997 Treu Act (*legge Treu*). Although the Treu Act elicited considerable interest in the press and among labour market participants, there has not been so far extensive scientific work on its effects. Our work is also of some interest since the relationship between unemployment and vacancies has been very seldom analysed in the Italian literature, mainly because of the lack of official vacancy data (the only other estimates of the Italian Beveridge Curve in the 1990s that we know of are those in Destefanis and Fonseca, 2004). We adopt a fairly recent empirical approach. The matching function, re-parameterised as a Beveridge Curve, is modelled and estimated as a production frontier.

We find largely favourable evidence to the existence of a Beveridge Curve in the 1990s across the main territorial areas. Huge efficiency differences show up between the South and the rest of the country. The matching efficiency of observations from the Southern labour market varies between one third and one fifth. Our evidence suggests that the Treu Act favoured a rise in vacancy supply,

especially in the North and in the Centre of Italy. However, for the South of Italy and for unskilled labour in particular, there is some evidence of a slight outward shift of the Beveridge Curve, along the lines suggested in Wasmer (1997). As a consequence, it may be concluded from our evidence that the Treu Act brought about a reduction of unemployment in the more developed regions of the country, but did not much affect the matching efficiency of the Italian labour market. In future work, we plan to get more robust evidence on these matters by pursuing our analysis at a finer level of territorial disaggregation.

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Fig. A.1 - Beveridge Curve - ISAE - North

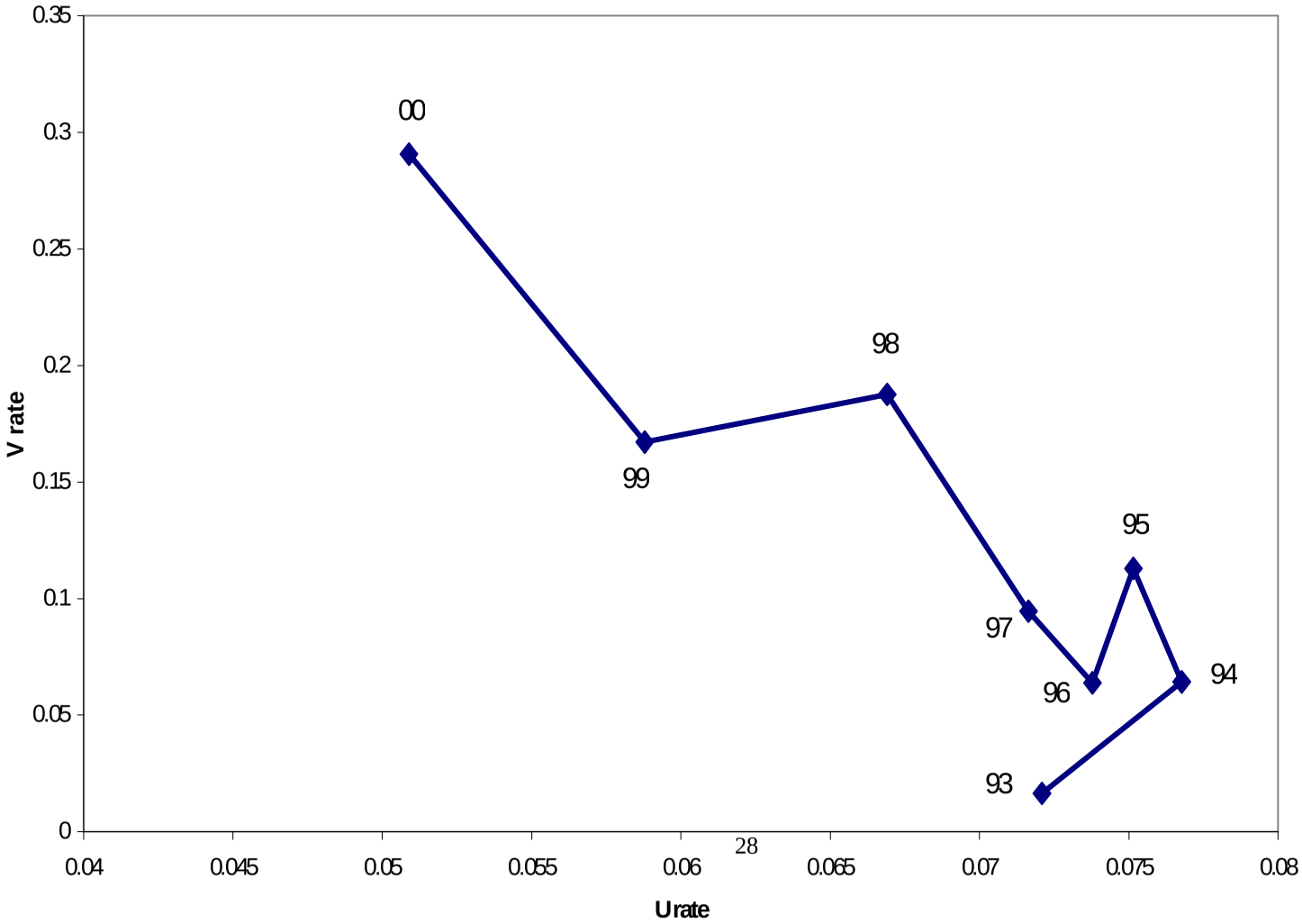

Fig. A.2 - Beveridge Curve - ISAE - Centre

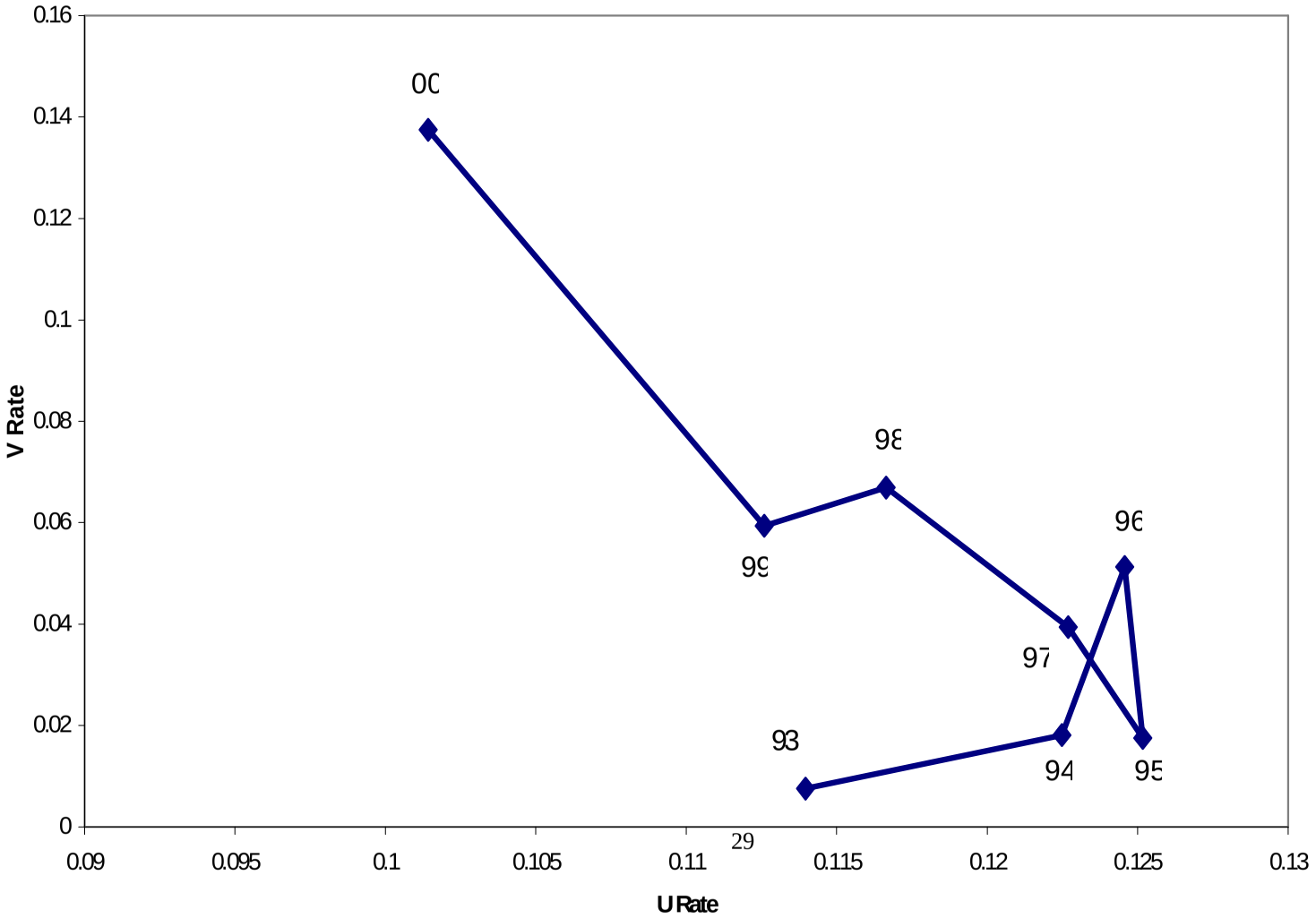

Fig. A.3 - Beveridge Curve - ISAE - South

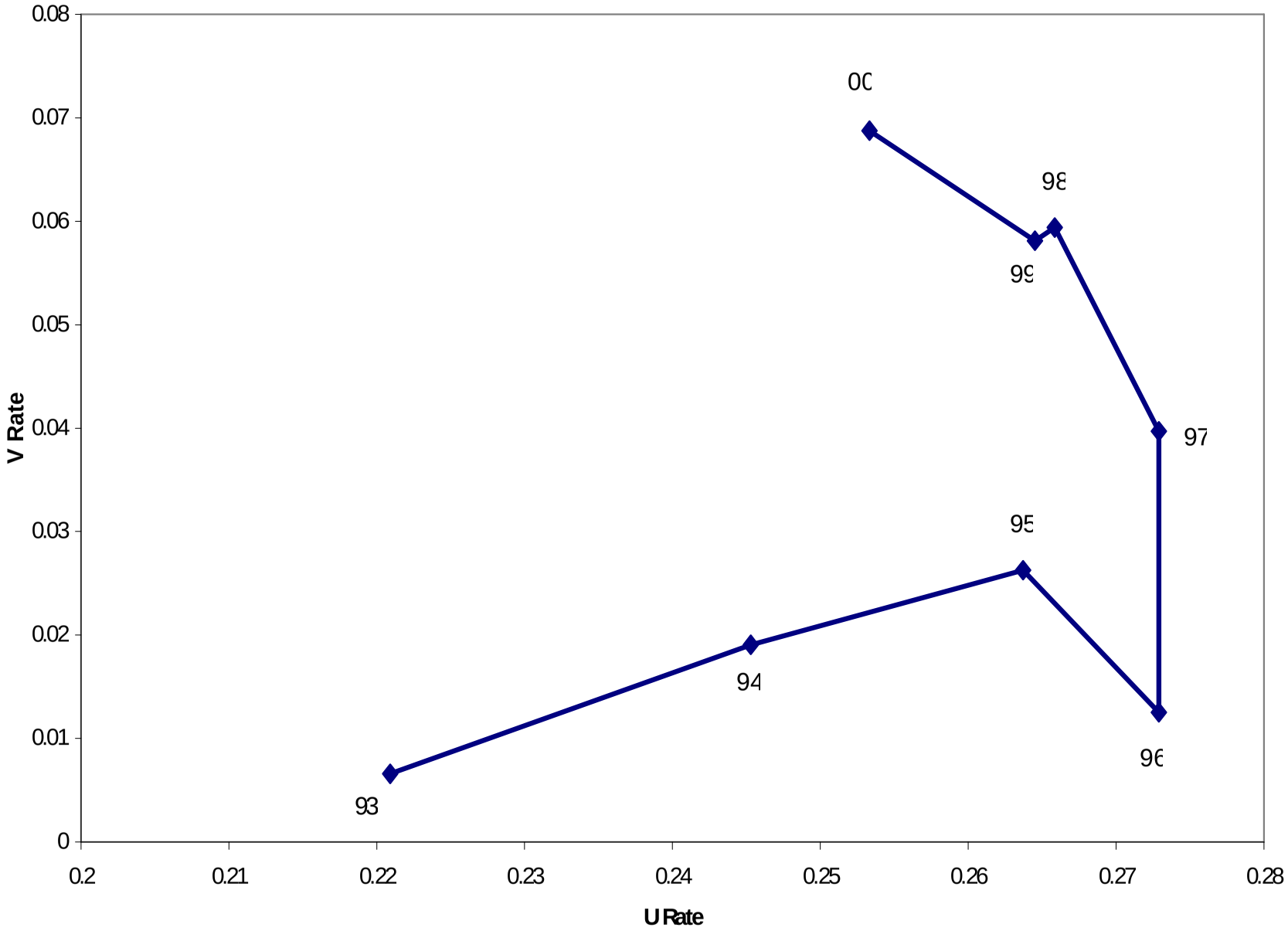

Fig. A.4 - Beveridge Curve - ISFOL - North

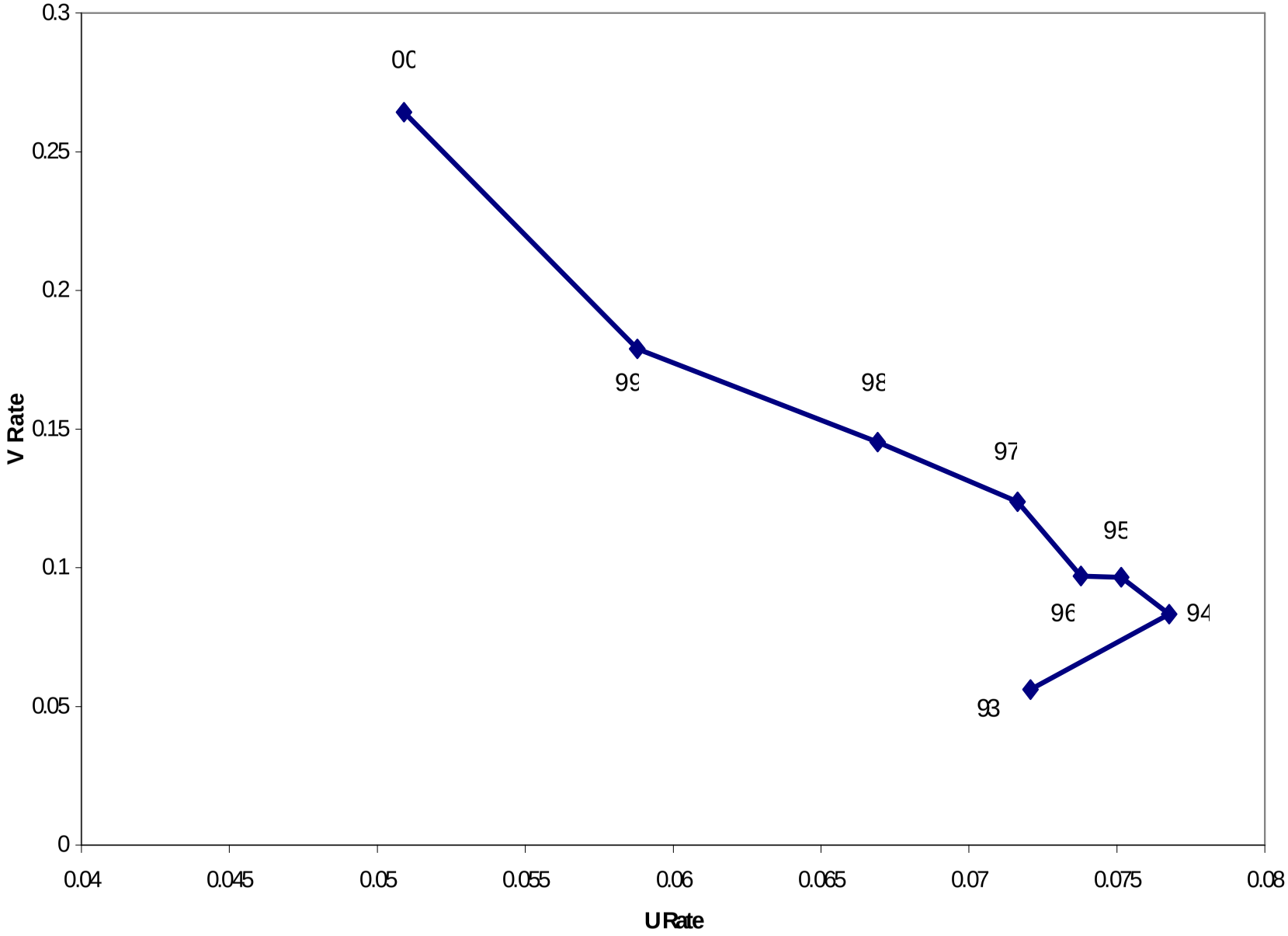

Fig. A.5 - Beveridge Curve - ISFOL - Centre

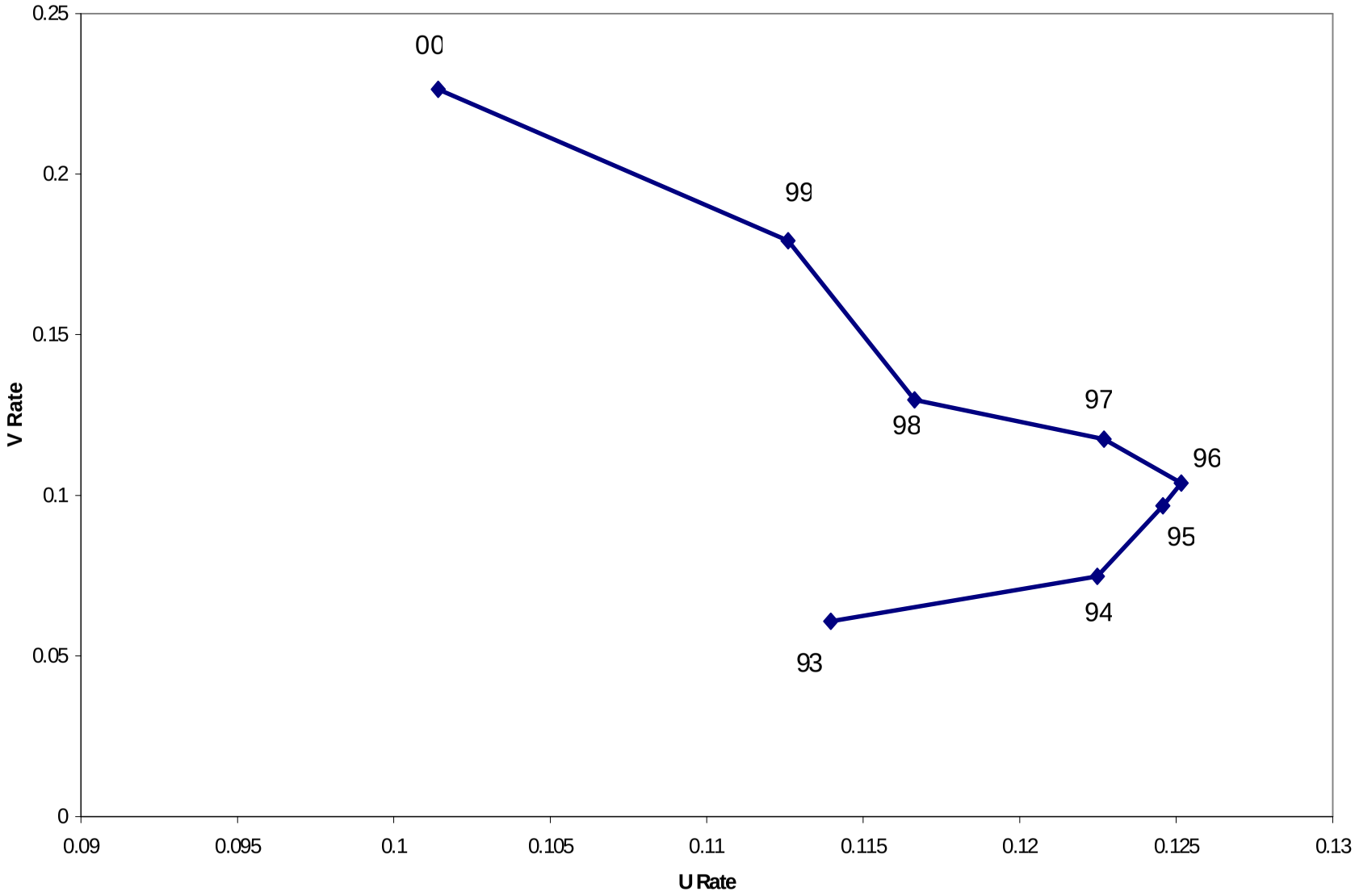

Fig. A.6 - Beveridge Curve - ISFOL - South

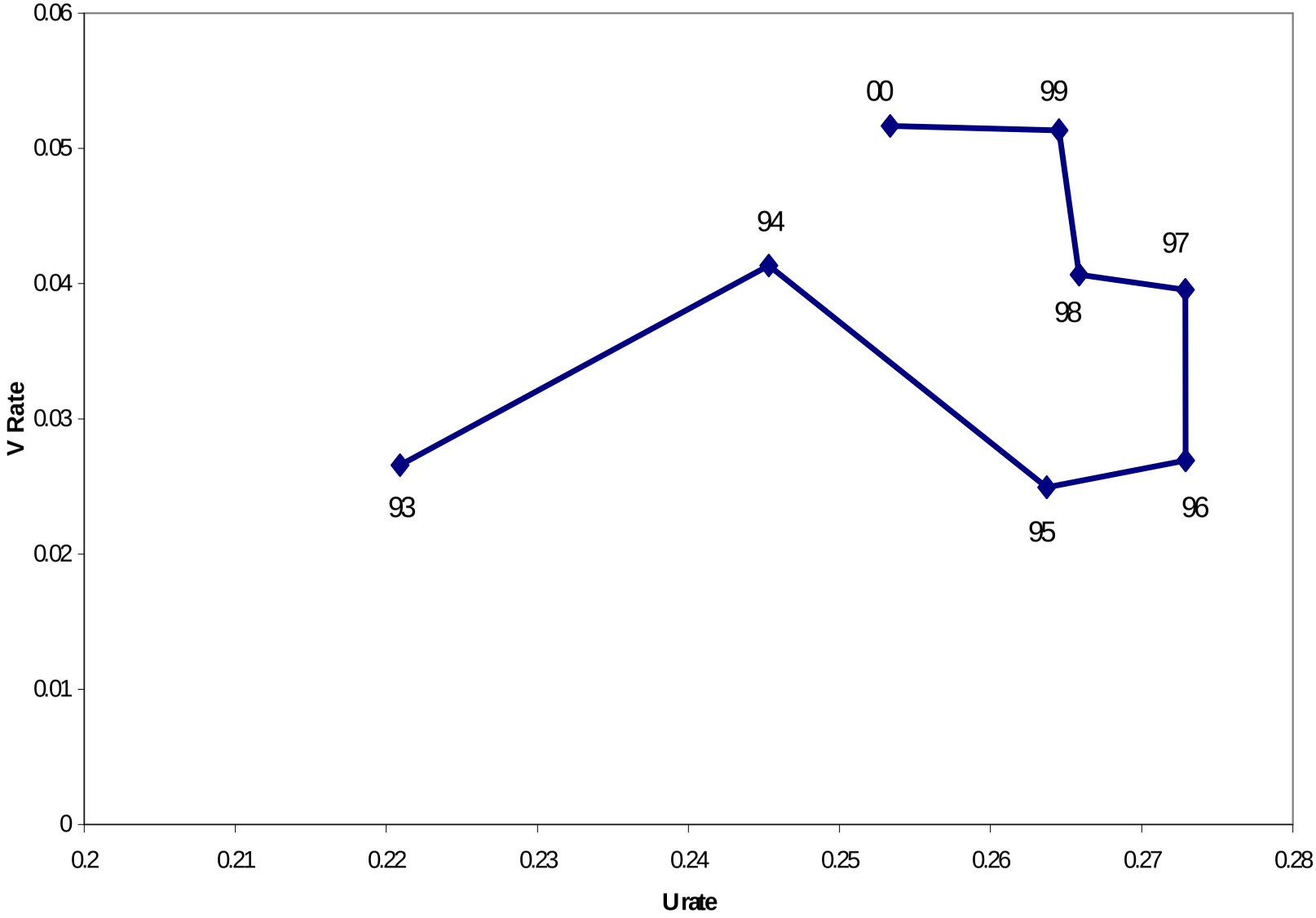

TABLE A.1

Measure of vacancies: ISAE Indicator of Labour Scarcity – *No Control Variables among Regressors*

	Total Labour Force		**Skilled Labour Force**		**Unskilled Labour Force**	
	Coeff.	*t-ratio*	*Coeff.*	*t-ratio*	*Coeff.*	*t-ratio*
Δu_{it-1}	0.14	1.11	0.27	2.52	0.01	0.03
Δu_{it-4}	-0.09	-1.15	-0.09	-1.05	-0.20	-2.16
u_{it-1}	-0.89	-6.39	-0.78	-5.63	-0.69	-5.30
$f(V)_{it-2}$	-0.0021	-2.87	0.0006	3.45	-0.0037	-4.34
C_North	-2.31		-2.04		-1.75	
C_Centre	-1.94		-1.71		-1.48	
C_South	-1.39		-1.25		-1.04	
T_North	0.0078	1.36	0.0123	1.39	-0.0004	-0.08
T_Centre	0.0151	3.03	0.0209	3.69	0.0044	0.87
T_South	0.0247	5.14	0.0184	3.20	0.0202	3.74
T^2_North	-0.0005	-2.30	-0.0007	-2.17	-0.0001	-0.57
T^2_Centre	-0.0006	-3.24	-0.0007	-4.10	-0.0002	-1.21
T^2_South	-0.0007	-5.32	-0.0005	-3.13	-0.0005	-3.93
INTERIM_North	-0.08	-1.60	-0.06	-0.79	-0.07	-1.74
INTERIM_Centre	-0.01	-0.16	-0.00	-0.06	-0.01	-0.14
INTERIM_South	0.06	2.76	0.04	1.14	0.06	2.96
Adjusted R^2	0.49		0.33		0.50	

Measure of vacancies: ISAE Indicator of Labour Scarcity – *Significant Control Variables among Regressors*

	Total Labour Force		**Skilled Labour Force**		**Unskilled Labour Force**	
	Coeff.	*t-ratio*	*Coeff.*	*t-ratio*	*Coeff.*	*t-ratio*
Δu_{it-1}	0.20	1.32	0.30	2.35	0.08	0.03
Δu_{it-4}	-0.10	-1.22	-0.08	-1.00	-0.19	-2.16
u_{it-1}	-0.91	-6.33	-0.87	-5.69	-0.77	-5.30
$f(V)_{it-2}$	-0.0022	-2.92	0.0005	2.35	-0.0038	-4.34
C_North	-2.25		-1.89		-2.06	
C_Centre	-1.84		-1.66		-1.61	
C_South	-1.29		-1.25		-1.09	
T_North	0.0095	1.55	0.0135	1.58	0.0034	0.62
T_Centre	0.0153	2.84	0.0247	3.86	0.0046	0.91
T_South	0.0251	5.14	0.0206	3.38	0.0225	4.31
T^2_North	-0.0005	-2.35	-0.0007	-2.47	-0.0002	-1.18
T^2_Centre	-0.0006	-3.04	-0.0008	-4.23	-0.0002	-1.27
T^2_South	-0.0007	-5.42	-0.0005	-3.21	-0.0006	-4.36
INTERIM_North	-0.07	-1.32	-0.10	-1.05	-0.05	-1.14
INTERIM_Centre	-0.01	-0.16	0.00	0.11	-0.01	-0.20
INTERIM_South	0.06	2.79	0.03	0.94	0.07	2.84
Industry share$_{it-1}$	0.34	0.62	-1.30	-1.42	1.34	2.64
Female share$_{it-1}$	-0.40	-1.26	-0.02	-0.03	-0.58	-2.18
Adjusted R^2	0.49		0.33		0.54	

TABLE A.2

Measure of vacancies: ISAE-G Indicator of Labour Scarcity- *No Control Variables among Regressors*

	Total Labour Force		**Skilled Labour Force**		**Unskilled Labour Force**	
	Coeff.	*t-ratio*	*Coeff.*	*t-ratio*	*Coeff.*	*t-ratio*
Δu_{it-1}	0.14	1.11	0.24	2.32	0.02	0.14
Δu_{it-4}	-0.09	-1.15	-0.07	-0.75	-0.20	-1.93
u_{it-1}	-0.90	-6.39	-0.78	-5.62	-0.68	-5.15
$f(V)_{it-2}$	0.0295	2.87	-0.0127	-0.90	0.0454	3.91
C_North	-2.40		-2.05		-1.82	
C_Centre	-2.03		-1.72		-1.56	
C_South	-1.47		-1.26		-1.13	
T_North	0.0094	1.36	0.0132	1.49	0.0016	0.29
T_Centre	0.0167	3.03	0.0208	3.65	0.0066	1.10
T_South	0.0255	5.14	0.0185	3.29	0.0204	3.76
T^2_North	-0.0005	-2.30	-0.0007	-2.26	-0.0002	-0.91
T^2_Centre	-0.0006	-3.24	-0.0007	-4.04	-0.0003	-1.29
T^2_South	-0.0007	-5.32	-0.0005	-3.21	-0.0005	-3.88
INTERIM_North	-0.08	-1.60	-0.07	-1.05	-0.09	-1.83
INTERIM_Centre	-0.00	-0.16	-0.01	-0.20	-0.01	-0.11
INTERIM_South	0.06	2.76	0.03	0.96	0.06	2.95
Adjusted R^2	0.48		0.32		0.45	

Measure of vacancies: ISAE-G Indicator of Labour Scarcity - *Significant Control Variables among Regressors*

	Total Labour Force		**Skilled Labour Force**		**Unskilled Labour Force**	
	Coeff.	*t-ratio*	*Coeff.*	*t-ratio*	*Coeff.*	*t-ratio*
Δu_{it-1}	0.21	1.35	0.27	2.13	0.10	0.71
Δu_{it-4}	-0.10	-1.23	-0.06	-0.70	-0.20	-1.94
u_{it-1}	-0.92	-6.19	-0.88	-5.88	-0.76	-6.21
$f(V)_{it-2}$	0.0320	3.02	-0.0127	-0.87	0.0522	4.32
C_North	-2.39		-1.91		-2.25	
C_Centre	-1.97		-1.69		-1.78	
C_South	-1.40		-1.27		-1.23	
T_North	0.0115	1.77	0.0143	1.67	0.0064	1.10
T_Centre	0.0170	2.96	0.0250	3.98	0.0070	1.21
T_South	0.0260	5.26	0.0208	3.48	0.0232	4.43
T^2_North	-0.0006	-2.56	-0.0008	-2.54	-0.0003	-1.65
T^2_Centre	-0.0007	-3.07	-0.0009	-4.34	-0.0003	-1.40
T^2_South	-0.0007	-5.52	-0.0005	-3.29	-0.0006	-4.42
INTERIM_North	-0.08	-1.43	-0.11	-1.41	-0.06	-1.26
INTERIM_Centre	-0.00	-0.09	0.00	0.01	-0.01	-0.13
INTERIM_South	0.06	2.92	0.02	0.76	0.07	2.91
Industry share$_{it-1}$	0.51	0.92	-1.43	-1.62	1.61	3.14
Female share$_{it-1}$	-0.42	-1.35	0.05	0.08	-0.61	-2.30
Adjusted R^2	0.48		0.33		0.50	

TABLE A.3

Measure of vacancies: ISFOL Help-Wanted Ads - *No Control Variables among Regressors*

	Total Labour Force		**Skilled Labour Force**		**Unskilled Labour Force**	
	Coeff.	*t-ratio*	*Coeff.*	*t-ratio*	*Coeff.*	*t-ratio*
Δu_{it-1}	0.15	1.12	0.25	2.43	0.07	0.48
Δu_{it-4}	0.01	0.18	-0.06	-0.69	-0.05	-0.51
u_{it-1}	-0.86	-5.91	-0.77	-5.61	-0.69	-4.99
$f(V)_{it-3}$	-0.0222	-2.13	0.0001	2.12	-0.0272	-2.28
C_North	-2.41		-2.03		-1.96	
C_Centre	-2.06		-1.70		-1.69	
C_South	-1.52		-1.26		-1.26	
T_North	0.0087	1.51	0.0124	1.44	0.0014	0.24
T_Centre	0.0170	2.96	0.0207	3.67	0.0084	1.26
T_South	0.0239	4.86	0.0188	3.37	0.0205	3.63
T^2_North	-0.0005	-2.35	-0.0007	-2.21	-0.0002	-0.79
T^2_Centre	-0.0006	-3.03	-0.0007	-4.06	-0.0003	-1.35
T^2_South	-0.0006	-5.12	-0.0005	-3.19	-0.0005	-3.81
INTERIM_North	-0.08	-1.79	-0.06	-0.77	-0.10	-1.72
INTERIM_Centre	-0.00	-0.11	-0.00	-0.11	-0.01	-0.14
INTERIM_South	0.06	2.83	0.04	1.21	0.07	2.88
Adjusted R^2	0.47		0.33		0.41	

Measure of vacancies: ISFOL Help-Wanted Ads - *Significant Control Variables among Regressors*

	Total Labour Force		**Skilled Labour Force**		**Unskilled Labour Force**	
	Coeff.	*t-ratio*	*Coeff.*	*t-ratio*	*Coeff.*	*t-ratio*
Δu_{it-1}	0.20	1.28	0.28	2.25	0.14	0.97
Δu_{it-4}	0.01	0.12	-0.06	-0.70	-0.03	-0.33
u_{it-1}	-0.87	-5.76	-0.87	-5.61	-0.75	-5.82
$f(V)_{it-3}$	-0.0220	-2.15	0.0001	1.64	-0.0279	-2.39
C_North	-2.34		-1.90		-2.22	
C_Centre	-1.96		-1.68		-1.80	
C_South	-1.44		-1.27		-1.30	
T_North	0.0102	1.66	0.0135	1.61	0.0050	0.83
T_Centre	0.0172	2.81	0.0245	3.83	0.0087	1.30
T_South	0.0242	4.80	0.0209	3.50	0.0226	4.15
T^2_North	-0.0005	-2.39	-0.0007	-2.50	-0.0003	-1.29
T^2_Centre	-0.0006	-2.86	-0.0008	-4.19	-0.0003	-1.39
T^2_South	-0.0006	-5.15	-0.0005	-3.26	-0.0006	-4.24
INTERIM_North	-0.08	-1.55	-0.10	-1.03	-0.08	-1.38
INTERIM_Centre	-0.01	-0.12	0.00	0.08	-0.01	-0.19
INTERIM_South	0.06	2.84	0.03	0.99	0.07	2.95
Industry share$_{it-1}$	0.27	0.49	-1.30	-1.41	1.20	2.23
Female share$_{it-1}$	-0.35	-1.11	0.03	0.99	-0.55	-1.97
Adjusted R^2	0.46		0.33		0.43	

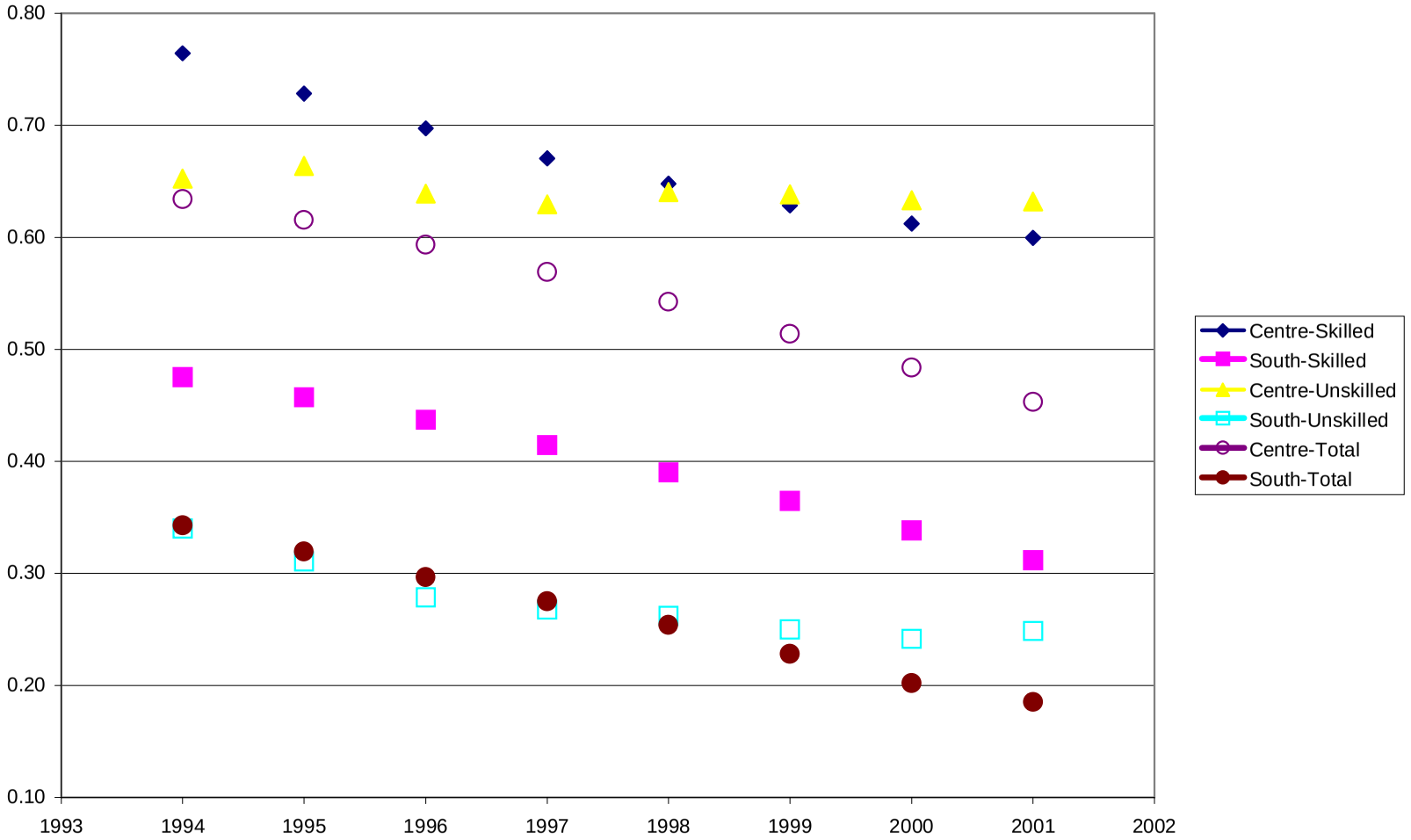

Figure A.7 – Matching Efficiency with the ISAE indicator

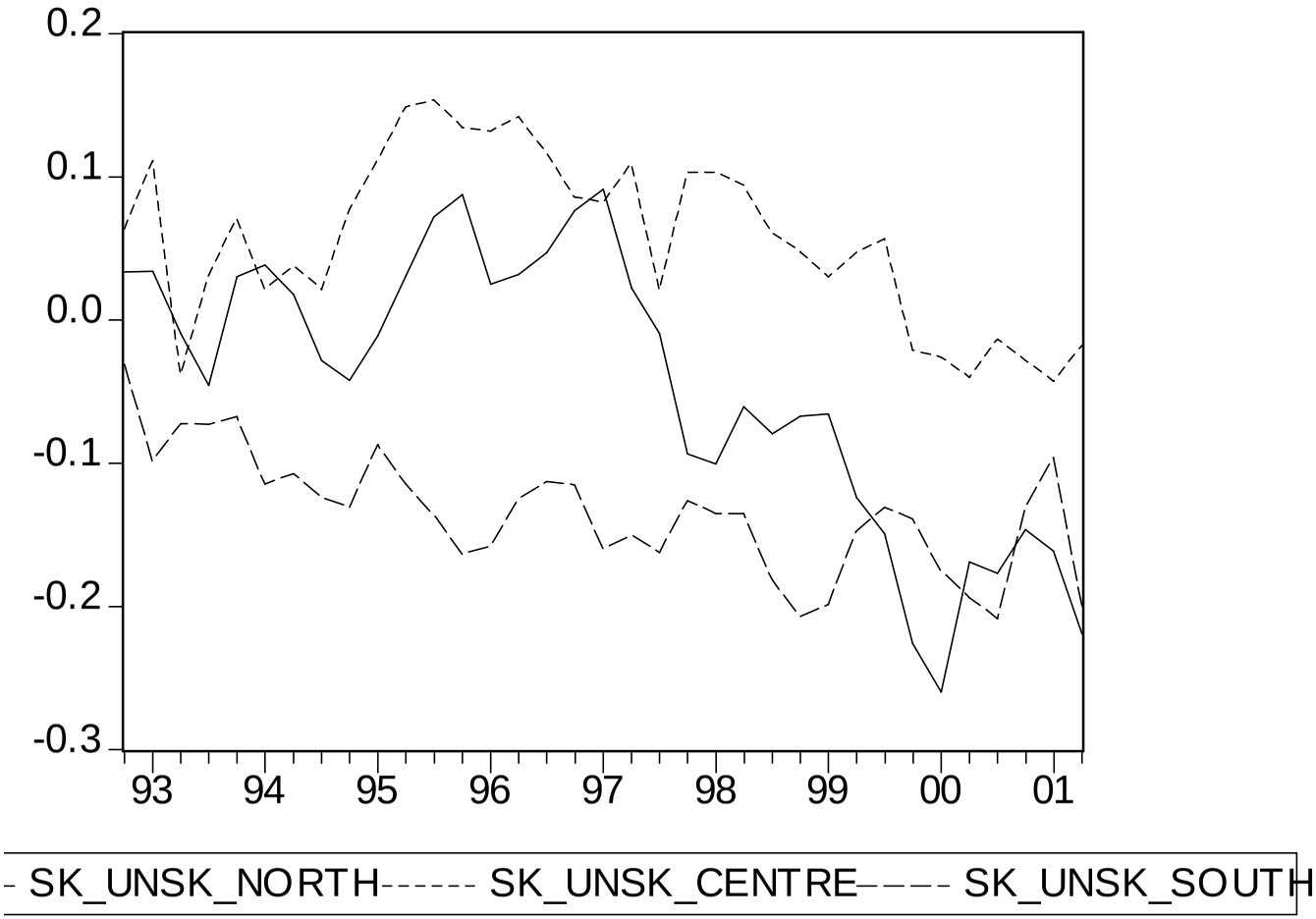

Figure A.8 – Logarithmic Difference between Skilled and Unskilled Rates of Unemployment in North, Centre and South.

LEGEND OF TABLES AND FIGURES:

The dependent variable is always Δu_{it}, where i = 1, 2, 3, stands for North, Centre and South, and t is a given quarter.
In the case of the skilled labour force, $\boldsymbol{f}(\mathbf{V})$ always stands for the hyperbolic function $\mathbf{1/(V^3)}$.
Otherwise $\boldsymbol{f}(\mathbf{V})$ is a linear function for ISAE and ISAE-G, and a natural log function for ISFOL.
All variables are deseasonalised.
The sample relates to the 1994:1 - 2001:2 period, for a sum total of 30×3 = 90 observations.
T-ratios are obtained from variance-covariance matrices corrected for heteroskedasticity through White procedure.
Adjusted R^2 is the coefficient of determination corrected for degrees of freedom.

Figure A.7: the efficiency scores were calculated applying expression (6) to the Beveridge Curve of Table A.1 with control variables. Only coefficients significant to approximately the 10% level were included in the formulae.

Figure A.8: logarithmic difference are taken between the rates of unemployment for skilled and unskilled labour in North, Centre and South of Italy, since the regressions consider the natural logarithms of these rates.