ACTIVE AND PASSIVE LABOUR-MARKET POLICIES: THE OUTLOOK FROM THE BEVERIDGE CURVE

Sergio Destefanis* Matteo Fragetta† Nazzareno Ruggiero‡

Abstract: We appraise the impact of various indicators of active and passive labour-market policies within the framework of the Beveridge curve across 14 OECD countries from 1985 to 2013, controlling for a wide spectrum of other factors, both institutional (tax wedge, employment protection legislation) and structural (technological progress, globalisation). We embed the role of all these variables within the specification of the Beveridge curve, avoiding the potential pitfalls of two-step approaches. We find that the generosity of unemployment benefits has a detrimental impact on labour-market matching, with the duration of benefits taking a key role in driving this result. Among active labour-market policies, employment incentives and especially training have a favourable effect on matching. There is also some evidence of a virtuous interaction between active and passive policies. A significantly detrimental role emerges for the tax wedge. These results are consistent across various specifications, and structural relationships are stable throughout the 2008–2013 period.

JEL Classification Codes: E24, J20, F60, O40
Keywords: Unemployment, vacancies, training, unemployment benefits.
Acknowledgements: we would like to thank Fernanda Mazzotta and Lavinia Parisi for useful comments on a previous draft. The usual disclaimer applies.

* DISES, Via Giovanni Paolo II, 132 - 84084, Fisciano (SA), Italy, destefanis@unisa.it; CIRET, Roma.
† DISES, Via Giovanni Paolo II, 132 - 84084, Fisciano (SA), Italy, mfragetta@unisa.it
‡ DISES, Via Giovanni Paolo II, 132 - 84084, Fisciano (SA), Italy, nruggiero@unisa.it

1. Introduction

The aim of this paper is to appraise the impact of active and passive labour-market policies within the framework of the Beveridge curve across 14 OECD countries from 1985 to 2013 (our choice of sample depends primarily on the quality of available data, as explained in Section 3). An extensive, if somewhat inconclusive, literature exists on the role of active and passive labour-market policies, also from the macroeconomic standpoint.[1] However, there is not much evidence about these policies within the framework of the Beveridge curve. This is a notable gap in the literature, as both these policies are supposed to act upon the matching efficiency of labour markets.

Drawing inspiration from Jackman et al. (1990) and Nickell et al. (2003), we shed light on the role of the impact of active and passive labour-market policies, assessing the explanatory power of different indicators of these policies. In recent years, the Beveridge curve has been the object of renewed analytical attention (see, e.g., Bonthuis et al., 2013; Hobijn and Şahin, 2013; Arpaia et al., 2014; Bova et al., 2018). Yet, we are unaware of any papers that have systematically analysed the impact of active and passive labour-market policies by embedding the role of these factors within the specification of the Beveridge curve, and by testing the existence of interactions between these policies. These recent studies have explored the connections between shifts in the Beveridge curve and labour institutions and policies using a two-step approach (first ascertaining the existence of shifts through various methodologies and then relating these shifts to various factors, including certain labour-market policies). However, two-step approaches are potentially subject to empirical pitfalls. Furthermore, none of these studies allows for technological progress and globalisation as potential shift factors for the Beveridge curve (for discussions of the relevance of these variables, see Destefanis and Mastromatteo, 2015; Destefanis et al., 2020). We also consider the potential role of a wide range of other institutional factors, that is, tax wedge, employment protection legislation, and wage determination mechanisms.

This paper is structured as follows. In Section 2, we examine some empirical literature on OECD countries, motivating our analysis and focusing on the role of active and passive labour-market policies. In Section 3, we present the empirical specification and data. The results are presented in Section 4, and Section 5 provides concluding remarks.

2. A review of the literature

Jackman et al. (1990) analysed the worldwide rise in unemployment during the 1970s and 1980s through a framework based on the Beveridge curve. They employed various kinds of panel data techniques on a panel of 14 OECD countries from 1970 to 1988 and focused on an array of policies and institutions as potential shift factors for the curve. More specifically, they considered an OECD measure of corporatism, the unemployment benefit replacement ratio and duration, and active labour-market policies, such as training schemes, employment benefits, public works, and schemes of job-search counselling or assistance. Note, however, that consistent time series for active labour-market policies could be obtained only for five countries (Denmark, Finland, Norway, Sweden, and the UK). When the sample was considered as a whole, the role of active labour-market policies was represented by a set of dummy variables. Jackman et al. found that active labour-market policies had a significant and favourable effect on the vacancies–unemployment trade-off, which was also true for corporatism. On the other hand, a longer duration of unemployment benefits shifted the Beveridge curve outwards.

[1] Two recent and perceptive accounts of this literature are provided in Goulas and Zervoyianni (2018) and in Pignatti and van Belle (2018).

Nickell et al. (2003) analysed the unemployment patterns in 20 OECD countries from the 1960s to the mid-1990s through a detailed study of changes in real wages and unemployment, as well as shifts in the Beveridge curve. They sought to ascertain whether these shifts could be explained by changes in labour-market institutions (unemployment benefit replacement ratio and duration, bargaining coordination, collective bargaining coverage, union density, employment protection legislation, labour taxes, homeownership rate). They found that, as expected, union density, unemployment benefit duration, and owner occupation shifted the curve outwards (worsening the trade-off). In comparison, stricter employment protection had the opposite effect.

Nickell et al. (2003) did not include in their analysis any indicator of active labour-market policies. What is even more remarkable, from our point of view, is that although both Jackman et al. and Nickell et al. regarded certain structural factors (e.g., trend productivity or real import prices) as relevant in affecting the match between labour supply and demand, they did not include any such variables in their Beveridge curve estimates. No theoretical or empirical justification was given for this, providing a strong motivation for the inclusion of such factors in our analysis.

Recent contributions to the literature include the study conducted by Hobijn and Şahin (2013), who provided a graphical analysis of the shifts in the Beveridge curve in 14 OECD countries up to 2011; based on a two-step analysis, they argued that skill mismatch and the extended coverage of unemployment benefits had played a significant role in shifting the curve outwards since the outset of the Great Recession. More precisely, they found a sizeable outward shift for five of the 14 countries: Portugal, Spain, Sweden, the UK, and the US.

Bonthuis et al. (2013), relying mainly on graphical analysis of quarterly euro-area data up to 2012:1, found a sizeable outward shift in the Beveridge curves for France and Spain, whereas the German curve exhibited an inward shift (possibly as a result of earlier structural reforms). In the second step of their analysis, they used estimated Beveridge curve shifts as dependent variables in a probit model in order to shed light on the drivers of the shifts. This econometric exercise highlighted the importance of sectoral employment losses (mainly in construction) as shifters. Labour-force age and, to a lesser extent, skills were also associated with the probability of a shift. Labour-market institutions, on the other hand, were found to be largely insignificant.

Arpaia et al. (2014) estimated the Beveridge curve with respect to EU countries' quarterly data up to 2013:1 econometrically, attempting to isolate temporary changes from structural changes in labour-market matching efficiency. Matching efficiency appeared to worsen in the euro-area countries hardest hit by the debt crisis and to improve in other countries (notably Germany). In the second stage of the analysis, the main drivers of job matching efficiency were examined through fixed-effects panel regressions. Lengthier unemployment spells, as well as skill and sectoral mismatches, appeared to be significantly correlated with lower matching efficiency. A role was also found for labour-market institutions. Active labour-market policies favoured matching efficiency, whereas the opposite effect was found (less significantly) for more generous unemployment benefits.

Neither Bonthuis et al. nor Arpaia et al. considered a tax wedge indicator. A full array of such indicators was utilised in Bova et al. (2018), who identified shifts in the Beveridge curves for 12 OECD countries, using quarterly data from 2000:1 to 2013:4.[2] In order to do so, they adopted three complementary methodologies (visual examination, cointegration analysis, and nonlinear estimation). In the second stage of their analysis, they found that employment protection legislation and some active labour-market policies (mainly, incentives for start-ups and job-sharing programs)

[2] In fact, Bova et al. (2018) relied heavily on temporal disaggregation procedures to convert data that are available only on an annual basis into quarterly series. As is well known (see, for instance, Bisio and Moauro, 2017), the resulting series may be subject to measurement error, linked to the appropriateness of the benchmark quarterly variables utilised and to other features of the disaggregation procedure.

could facilitate matching, whereas various measures of the tax wedge, as well as the ratio of passive labour-market policies over GDP, worsened the vacancies–unemployment trade-off. No indicator is considered for the retention ratio or the duration of unemployment benefits. Moreover, labour-force growth, a greater share of employees with intermediate levels of education and higher levels of long-term unemployment turned out to be detrimental to labour-market matching.

Each of these recent contributions relied on a two-step approach, which is potentially prone to misspecification. Any specification error incurred in the first stage will be reflected in the consistency of the second-stage estimates, in the (probable) case in which first- and second-stage variables are correlated. Moreover, even if no correlation exists between variables included in the first and second stage of the analysis, the second-stage estimates are likely to underestimate the true effects of the regressors, and an adjustment of the equations' standard errors is needed.[3]

In all these papers, mismatch was often (rightly) referred to as one of the main influences on shifts in the Beveridge curve. However, because the traditional mismatch measures[4] that have been used in estimation are based on employment indicators, they render any relationship between them and the curve liable to a charge of spuriousness. Entorf (2003) addressed this point at length. It is perhaps unsurprising that Nickell et al. (2003), being well grounded in this early tradition, made no use of these indicators. Our study endeavours to solve this problem by considering certain exogenous determinants of labour-market mismatch. Few economists would deny that technological progress and globalisation have been among the fundamental socioeconomic phenomena of the last 40 years. They can be expected to have a heavy impact on the matching of labour supply and demand across the world (and, in fact, substantial attention has been devoted to their role in shaping wage and income inequality). However, in the literature related to the Beveridge curve, few contributions have considered these variables. We believe this represents an important gap in the literature. Making full allowance for technological progress and globalisation—two of the main potential determinants of mismatch—should satisfactorily deal with this phenomenon without incurring any charge of spuriousness. Attempts along these lines have already been carried out by Destefanis and Mastromatteo (2015) for 19 OECD countries from 1980 to 2007 and by Destefanis et al. (2020) for 12 OECD countries from 1985 to 2013. These papers also provided a review of the relevant literature. Their evidence pointed to a creative-destruction effect for R&D intensity (as suggested in Aghion and Howitt, 1994), shifting the Beveridge curve outwards, whereas results for other measures of technological progress and of globalisation were more mixed; this reflects an existing ambiguity in the previous literature (Nickell and Bell, 1995; IMF, 1996; Song and Webster, 2003).

3. Empirical specification and data

Following the discussion from the previous section, our specification should jointly include institutional and structural factors that can shift the trade-off between unemployment and vacancies. Specifying the Beveridge curve in this manner should avoid the potential pitfalls of the two-step procedures adopted in the recent literature. Given the primary policy interest of active and passive labour-market policies for labour-market matching, we proceed to a thorough analysis of the indicators available for these policies, including of course various measures of the generosity of unemployment benefits. We also allow for a wide array of other institutional variables: (a) the tax wedge, (b) employment protection legislation, (c) minimum statutory wages, (d) union density, and (e) collective bargaining coordination,

[3] These points were treated in detail in Dumont et al. (2005) and Schmidt (2011).

[4] These are basic measures of dispersion for age-, area-, skill-, or sector-specific employment; in the past, unemployment and vacancies have also been considered, besides employment.

Expenditure on active labour-market policies is expected to enhance matching efficiency, whereas the generosity of unemployment benefits is supposed to negatively affect the willingness of the unemployed to fill vacancies. More precisely, a higher replacement ratio and duration, or less strictness in the rules pertaining to the deployment of benefits, should shift the Beveridge curve outwards. The tax wedge (our indicator includes the employment tax rate and direct and indirect tax rates) is also supposed to discourage search rates for both the unemployed and firms. The impact of employment protection legislation is, on the other hand, an empirical issue: on one hand, it tends to make firms more prudent in filling vacancies, which slows the speed at which the unemployed move into work; on the other, it often reduces involuntary separations and leads to higher efficiency in the personnel function within firms (Daniel and Stilgoe, 1978). Minimum statutory wages discourage employers from searching for new workers but elicit more strenuous job searches from a share of the unemployed. Finally, trade union power in wage setting is likely to decrease the willingness of employers to search for new workers, but highly coordinated bargaining may completely offset this negative impact (see, e.g., Nickell and Layard, 1999, or in a slightly different context, Booth et al., 2000).

To the best of our knowledge, no previous analysis has simultaneously allowed for all these institutional factors. Moreover, our specification of the Beveridge curve includes certain structural factors (technical progress, globalisation).

We attempted three distinct indicators for globalisation. A customary measure of trade openness turned out to be the most successful one. We also experimented with the ratio of total manufacturing imports from non-OECD countries to manufacturing value added (used in a different context by Koeniger et al., 2007) and the KOF globalisation index of actual economic flows (allowing for external trade, capital flows, and outsourcing; Dreher, 2006).

Again following Koeniger et al. (2007), we take R&D intensity (the ratio of R&D expenditure over GDP, from the Main Science and Technology Indicators, OECD) as a measure of technological progress. However, this measure is likely to emphasise the role of technology embodied in new jobs, so we also include a Tornqvist index of total factor productivity (TFP) in our estimates. This index may depend on a host of factors, as was notoriously made clear by the decade-long debate on the Solow residual. At least some of these factors (e.g., changes in technical or scale efficiency or better allocation of talent and capital) are likely to affect the productivity of new and old jobs equally. Other factors, on the other hand, may be of purely cyclical origin. As the latter are not, in principle, of interest for our analysis, we experimented both with the raw index and its trend component, obtained through the application of the Hamilton (2018) filter. The latter gave much better results, to which we will return in Section 4. Subsequently, in the Appendix, we only report evidence obtained with the trend component of TFP; henceforward, all mentions of TFP refer to its trend component, unless otherwise specified.

More information on the data and their sources is provided in the Appendix, where we also provide descriptive statistics for the variables used in estimation (Table 1) and a graphical representation of both the actual and predicted unemployment-vacancies trade-off for the beginning and end of our sample period (Figure 1; we select the first and last year for which there is a considerable number of countries, which leads to the chart's exclusion of Belgium and Spain - whose data are available until respectively 2003 and 2004, and we predict the unemployment rate using Eq. III from Table 6). Considerable heterogeneity in the countries under scrutiny emerges from both descriptive statistics and graphical analysis.

Our baseline specification is the following Cobb–Douglas dynamic specification of the Beveridge curve:

(1) $ur_{it} = f(vr_{it}, Z_{it}, glob_{it}, tp_{it}, a_t, a_i)$,

where $i = 1, \ldots, N$ stands for the country, and $t = 1, \ldots, T$ stands for the year; ur_{it} is the unemployment rate, and vr_{it} is the vacancy rate (both rates are taken in natural logs); Z_{it} is the vector of institutional variables expected to influence matching efficiency, which includes active and passive labour-market policies; $glob_{it}$ and tp_{it} are, respectively, measures of globalisation and of technical progress; and a_t and a_i are vectors of year- and country-specific effects.

It has been suggested (although not in studies related to the Beveridge curve) that there may be some interaction between active and passive labour-market policies. OECD (2003) and Pignatti and van Belle (2018) argued that the combination of active and passive policies may have a favourable effect on matching efficiency in the labour market. More generous safety nets are likely to encourage people that have lost a job to stay in the labour force, heightening the impact on unemployment of a given expenditure in active labour-market policies. On the other hand, higher active labour-market policy expenditures could offset the disincentivising effects of passive labour-market policies on job search. In our empirical analysis, we thoroughly test for the existence of these interaction effects.

In contrast with many macroeconometric studies (including Nickell et al., 2003, and Koeniger et al., 2007), we do not restrict a priori the dynamic specification of our regressors. We follow Pissarides and Vallanti (2007) in introducing two lags for unemployment, whereas other variables were initially entered (1) with a current *and* a (first-order) lagged value. We then proceeded to a general-to-specific search in order to identify our preferred specifications. Hence, any variable can finally enter the curve (current or lagged) in levels or in variations.

We take the 1985–2013 period for our analysis and include 14 countries (Australia, Austria, Belgium, Finland, France, Germany, Japan, Norway, Portugal, Spain, Sweden, Switzerland, the UK, and the US) for which the OECD provides consistent vacancy data throughout the period of interest.[5] It would have been desirable to consider a wider sample, but we preferred to include only countries with data quality and a sufficiently high number of annual observations. Nevertheless, our sample includes countries with widely different labour-market institutions. The estimation sample begins at 1985 because there are no data on active labour-market policies previous to this date, and it stops at 2013 because the OECD does not provide information for some indicators (concerning unemployment benefits and employment protection legislation) after this year. At any rate, it can reasonably be surmised that data up to 2013 fully allow for the impact of the Great Recession, at least for the countries under scrutiny. There are missing data for some countries and years, and we therefore have an unbalanced panel.

Previous work (Destefanis and Mastromatteo, 2015) has emphasised that regressor endogeneity is likely to characterise the estimation of the Beveridge curve, and as a result, system-GMM (Blundell and Bond, 1988) was used in estimation. However, with only 14 cross-sectional units (countries), we had little justification for preferring system-GMM over a standard IV estimator. The latter was therefore chosen and adopted for estimation purposes in the present paper.

Finally, an examination of the literature suggests that the Great Recession may have brought about an outward shift in the Beveridge curve because of an increase in labour-market mismatch or because of hysteresis effects (which include a deterioration of human capital or of the search ability of the unemployed and a negative perception among potential employers of the long-term unemployed). Other channels may have existed through which the crisis could change the skill-demand mix, leading to an increased mismatch. A discouraged worker effect may have pushed off the market a quota of mainly marginal workers. On the other hand, skilled workers may have been brought into the market by an added worker effect. Furthermore, a sudden rise in the availability of unemployment benefits or active

[5] This is only partially true for the US, as explained in the Appendix. Exclusion of the US from the sample did not, however, result in any appreciable change in the results. See Table 7 in the Appendix.

labour-market policies may have changed the relationship between these variables and matching efficiency.[6] To allow for these possibilities, we proceed to systematic testing of the structural stability of our estimated equations across the Great Recession. More precisely, we always carry out a Chow test of our estimates of interest, taking 2007 as the potential breakpoint.

4. The econometric evidence

The focus of this paper, that is, the active and passive labour-market policies on the Beveridge curve, provides the backbone for the presentation of its empirical analysis. In Tables 2–7 of the Appendix, we present a thorough analysis of the explanatory power of various indicators available for these policies. As noted above, all the reported dynamic specifications (that is, the current or lagged values chosen for the regressors) reflect the outcome of a general-to-specific search, and estimation is carried out through a dynamic fixed-effects IV model (more information about the estimation procedure is provided in the Appendix). Table 2 explores the performance of a set of indicators for passive labour-market policies, leaving active labour-market policies aside. In Tables 3 and 4, we carry out a similar exercise for active labour-market policies (leaving passive labour-market policies aside). From Table 5 onwards, we consider passive and active labour-market policies jointly. Throughout this empirical exercise, we control for the other variables highlighted in Section 3. We provide some comments on these variables below, but we concentrate on passive and active labour-market policies first. When exploring the performance of the expenditure on either passive or active policies, we take this expenditure as a proportion of various aggregates: the total expenditure on labour-market policies, the GDP, the number of unemployed, the labour force (details on the sources and computations of all the series we utilise are provided in the Appendix). Relating policy expenditures to these aggregates is customary in the literature,[7] but to the best of our knowledge, no study has compared the explanatory power of different solutions with respect to the same data. Since comparing the explanatory power of different policy indicators is the crux of our analysis, column headings in Tables 2-5 relate to the indicator characterising each particular estimate.

Hence in Table 2, we consider the expenditure on passive labour-market policies as a proportion of the total expenditure on labour-market policies (*PLMP_t*), the number of unemployed (*PLMP_u*), the labour force (*PLMP_lf*), the GDP (*PLMP_gdp*). Details on the sources and computations of all the series we utilise are provided in the Appendix. We also rely on more explicit measures of the opportunity cost for the unemployed: a gross replacement rate (*GRR*), a net replacement rate (*NRR*), two different indicators of benefit duration (*dur* and *dur (Scruggs)*) and a measure of strictness of the rules pertaining to the deployment of benefits (*strict*), and gross and net reservation wages (obtained by weighing the replacement rates either by duration alone – *GRW1* and *NRW1* - or by a function of duration and strictness – *GRW2* and *NRW2*). It turns out that only indicators related to the opportunity cost for the unemployed achieve some significance. This is true for the gross replacement rate (*GRR*) and, more strongly, for *dur*, the measure of duration from Ruggiero (2017) and the two net reservation wages, *NRW1* and *NRW2*. All these variables have the positive sign that is expected a priori.

In Table 3, we carry out a similar exercise for the total expenditures on active labour-market policies, taking them as a proportion of the total expenditure on labour-

[6] These effects are considered in some detail for the US Beveridge curve in Dickens and Triest (2012). Dickens and Triest pointed out that shifts in the Beveridge curve during a recession may be only temporary, a possibility that was also highlighted in the historical analysis conducted by Diamond and Şahin (2014).

[7] Bova et al. (2018) used the GDP, whereas Arpaia et al. (2014) took a function of the number of the unemployed. The number of the unemployed and the labour force were taken in related contexts by Arranz et al. (2013) and Goulas and Zervoyianni (2018), respectively. It also seemed reasonable to relate active or passive labour-market policies to total labour-market policies in order to obtain a measure of policy stance.

market policies (*ALMP_t*), the number of unemployed (*ALMP_u*), the labour force (*ALMP_lf*), the GDP (*ALMP_gdp*). They are never significant (however, the expenditures divided by the unemployed or the labour force are, at the 10% level, almost significant). This is puzzling, because these policies are, in principle, constructed to improve matching efficiency. To shed more light on this matter, we take separately in Table 4 some expenditure items of active labour-market policies: public employment services and administration (*PES*), direct job creation (*direct*), employment incentives (*incentives*), sheltered and supported rehabilitation (*sheltered*), startup incentives (*startup*), and training (*training*). The evidence from Table 4 reveals some significance for incentives (when divided by the unemployed), training (both when divided by the unemployed and when divided by the labour force), and sheltered and supported rehabilitation (only when divided by the labour force, which makes sense a priori). All these variables have the negative sign that is expected a priori. Note that we do not report evidence for specific expenditure items divided by GDP or total expenditure on labour-market policies, because these variables never achieved significance (only training expenditures over the total expenditure on labour-market policies are, at the 10% level, on the verge of being significant). Hence, generally speaking, active labour-market policies matter only when related to labour-market aggregates (unemployment or labour force). This result has some relevance in its own right, because no such comparison has, to the best of our knowledge, been carried out in the literature.

In Table 5, we test for the existence of interaction effects between active and passive labour-market policies. More precisely, Table 5 presents the evidence derived from the interaction of *NRW1*, the net replacement rate weighed by the duration of unemployment benefits, with the active labour-market expenditures selected in Table 4. We consider *NRW1* for this exercise because this is the most significant variable from Table 2.[8] There is evidence of significant interaction, with the expected sign, for the expenditures on training (and, to a lesser extent, for *PES*, the expenditures on public employment services and administration).

Finally, Table 6 summarises the results obtained from combining the most significant specifications from Tables 4 and 5. Besides the ongoing significance for *NRW1*, Table 6 highlights a significant direct role for employment incentives and a much less significant for role for sheltered and supported rehabilitation. As for training, it still plays a significant role with the expected sign, but the information contained in our dataset does not allow us to favour a specification based on a direct role for this variable (Eqs. I and II, from the first and second columns of Table 6, respectively) over a specification in which its effect is mediated through *NRW1* (Eq. III, from the third column of Table 6). In the latter case, the direct effect of training is no longer significant, but there is a favourable effect of training on labour-market matching that increases with the level of *NRW1*, whereas the detrimental effect of *NRW1* on labour-market matching decreases with the level of expenditures on training. Finally, the interactions between *NRW1* and *PES* are not significant, once allowance is made for expenditures on employment incentives and training (Eq. IV, from the fourth column of Table 6). All in all, training and (to a lesser extent) employment incentives emerge as the most significant active labour-market policies, which agrees with the central conclusions of the microeconometric literature on the role of these policies. Both Card et al. (2010) and Kluve (2010) found a favourable effect of training on labour-market outcomes. Kluve (2010) also reported a particularly strong effect of employment incentives in European countries.[9] The

[8] Virtually identical results are obtained by taking *NRW2*, the net replacement rate weighed by the duration of unemployment benefits and the strictness of the unemployment benefits' protocol, instead of *NRW1*. In the future, it may be desirable to construct alternative measures for the strictness of the unemployment benefits' protocol, because in principle *NRW2* should wield more explanatory power than *NRW1*.

[9] Job search assistance, as well as services and sanctions, also emerged as significant factors in these papers. This is only partially true in our analysis. It could be argued that this happens because our data

significance of employment incentives is also consistent with the relatively large multipliers obtained for hiring subsidies by Campolmi et al. (2011) when simulating a New Keynesian dynamic stochastic general equilibrium model with matching frictions and endogenous participation.

We can now turn to the other variables included in our equations of interest. As a whole, their effects show remarkable continuity across various specifications. The tax wedge (*TW*) is always significant, and as expected, it is detrimental for the vacancies–unemployment trade-off. Employment protection legislation (*EPL*) approaches significance in only a few cases, but always has the negative sign already found and rationalised by Nickell et al. (2003). We never include in the equations of the Appendix the other institutional variables discussed in Section 3. The ratio of minimum over median wage, union density, and bargaining coordination were never found to be significant (actually, their t-ratios were virtually never above unity), and they were subsequently excluded from the specifications of interest in order to obtain more efficient estimates.

As for the structural variables, the index of trade openness (labelled *Openness*) was consistently negative and significant, thus affecting the Beveridge trade-off favourably. Even if the Beveridge curve for unskilled workers may have shifted outwards in recent years due to increasing competition from low-wage countries (Nickell and Bell, 1995; Song and Webster, 2003), matching in the labour market as a whole has apparently benefited from more internationalised exchanges (IMF, 1996). The other measures of globalisation were never significant (we only retained their lagged values as instrumental variables). We noted in Section 3 that R&D intensity and the Tornqvist index of TFP are likely to capture different aspects of technological progress, with R&D intensity (labelled *GERD*) focusing more closely on the introduction of new jobs and the obsolescence of old ones, and the TFP index being a more general indicator. Indeed, we always found a significant positive coefficient for lagged R&D intensity (corresponding to an outward shift in the curve) and, on the other hand, short- and long-run negative effects for the TFP Tornqvist index. Like for Pissarides and Vallanti (2007) in a similar context, the data squarely rejected specifications where TFP entered the Beveridge curve only in (logarithmic) variations. We also remarked in Section 3 that TFP was best modelled through its trend component only. Indeed, when using a raw Tornqvist index, we obtained results (available upon request) similar to those reported in the Appendix, with two important differences. First, TFP had an unacceptable long-run impact on unemployment (the long-run parameter was about 0.90 vs. 0.30) with the raw index. Second, and even more importantly, the structural stability of the specifications was significantly worse. Indeed, the results for the Chow test throughout Tables 2–6 convey the idea that, estimates from Table 2 aside, our specifications were sufficiently stable across the Great Recession. This was no longer true if the raw TFP index substituted trend TFP. More generally, the satisfactory structural stability performance of our specifications also emerges from the visual inspection of panels (a) and (b) of Figure 1. For all countries, actual and predicted unemployment rates are quite similar in both 1991 and 2012.

Further evidence about the robustness of our results can be seen in Table 7, which presents results for the equations in Table 6 that achieved the highest fit:

(a) estimated including the (log of the) inflow rate (the probability that employed workers will flow into unemployment), as in Nickell et al. (2003);

(b) estimated with the inclusion of country-idiosyncratic linear trends;

(c) estimated without the US (whose vacancy rates are partially calculated from a non-OECD source, as explained in the Appendix), as well as without France and Japan (whose vacancy data are flow, rather than stock, indicators);

---

for public employment services and administration include administrative expenses that have little correlation with job search assistance or with services and sanctions. Furthermore, we find a significant role for training, which is highly correlated with the expenditures on public employment services and administration.

(d) estimated considering the possibility that residuals are correlated across countries – more precisely, we utilise the nonparametric standard errors of Driscoll and Kraay (1998), robust to very general forms of cross-sectional and temporal dependence.[10]
In none of these cases do we obtain evidence that is significantly different from that presented in Tables 2–6, with the exception of the results for employment incentives when we exclude the US, France, and Japan from the sample. We then proceed to assess the economic significance of our estimates, focusing on Eqs. I and III from Table 6.

The estimates from Eq. I imply that a standard-deviation absolute variation in *NRW1*, *incentives_u*, *training_u*, and *TW* changes the rate of unemployment (all other things being equal) by 8%, -6%, -10%, and 12%, respectively (equivalent to changes of 0.58, -0.39, -0.68, and 0.82 percentage points). We carry out the same exercise for Eq. III. Because there are interaction terms for *NRW1* and *training_u*, we assess the economic significance of either variable, taking minimum, mean, and maximum sample values for the other one. Hence, the estimates from Eq. III imply that standard-deviation absolute variations in *NRW1* and *training_u* change the rate of unemployment (all other things being equal) by *ranges of values* going from 14% to 12% and 1% and from -1% to -11% and -20%. Furthermore, standard-deviation absolute variations in *incentives_u* and *TW* change in the rate of unemployment by respectively -4% and 11%.[11] On the whole, the tax wedge, the generosity of unemployment benefits and training expenditures emerge as economically significant influences on labour-market matching in the countries under scrutiny.

5. Concluding remarks

In this paper, we considered the economies of 14 OECD countries for the period from 1985 to 2013 in order to investigate the impact of various kinds of institutional and structural factors on the Beveridge curve. Our main focus was on the effects of active and passive labour-market policies on the shifts in the curve. We believe our evidence is of some policy interest, because we embed the role of all these variables within the specification of the Beveridge curve, avoiding the potential pitfalls of the two-step approaches recently adopted in the literature. Furthermore, we compare the explanatory power of a wide variety of indicators of active and passive labour-market policies.

We found that the generosity of unemployment benefits has a detrimental impact on labour-market matching, with the duration of benefits playing a key role in driving this result. Strictness of the rules pertaining to the deployment of benefits, on the other hand, does not seem to play an important role. As far as active labour-market policies are concerned, it was necessary to probe rather deeply in order to find a significant role for this institution, created in principle to favour labour-market matching. First, these policies had to be disaggregated into the various categories provided by the OECD Statistic Portal (public employment services and administration, direct job creation, employment incentives, sheltered and supported rehabilitation, startup incentives, and training). It was then necessary to consider an appropriate normalisation for these variables. Finally, we found that employment incentives and training over the number of unemployed and (to a lesser extent) sheltered and supported rehabilitation over labour force shifted the Beveridge curve

[10] In principle, these standard errors could have been used throughout the estimation process. However, when applying this procedure to IV estimates, we consistently ran into a numerical problem: the covariance matrix of moment conditions was not positive definite. Because this problem did not show up for (fixed-effects) OLS, we elected to use this estimation method only as a robustness check for our preferred estimates.

[11] In order to compute these values, we use the actual (not rounded) parameter values from Table 6 and focus on the long-run parameters, which, for *NRW1*, *incentives_u*, *training_u*, and *TW*, are semi-elasticities. We multiply these semi-elasticities by the mean values of the unemployment rate in order to obtain long-run derivatives, with which we calculate absolute changes (in percentage points) from the mean value of the unemployment rate. Dividing these absolute deviations by the mean value of the unemployment rate yields our measure of relative (percentage) changes.

inwards. This evidence agrees with the main results from the microeconometric literature on the role of active labour-market policies. There was also some evidence of a virtuous interaction between active and passive policies. The favourable effect of training on labour-market matching increased with the level of generosity in unemployment benefits, whereas the detrimental effect of the latter on labour-market matching decreased with the level of expenditures on training. It is also notable that active labour-market policies mattered only when their measures were related to a labour-market aggregate (unemployment or labour force), because we are unaware of any studies that have compared the explanatory power of various active labour-market measures on the same data.

Among the other institutional variables, union density, collective bargaining coordination, and the ratio of minimum to median wage were never significant. A very weak role was found for *EPL*, which had the negative sign evidenced by Nickell et al. (2003). On the other hand, the tax wedge had a significant detrimental effect on the curve.

On the whole, generosity of unemployment benefits, training, and the tax wedge emerge as significant policy variables. We also found that whereas R&D intensity shifts the curve outwards, TFP is consistently negative and significant in our estimates. A possible interpretation of this evidence is that creative destruction prevails as R&D is fed into new jobs, while other factors behind the growth of TFP are likely to affect the productivity of new and old jobs equally, enhancing both firms' recruiting activity and the job-finding rate among the unemployed. An index of the trade openness of the economy is also negative and significant. Apparently, the thicker markets associated with globalisation have a favourable impact on the curve.

The impact of all these variables was very consistent across our specifications of interest, and structural relationships were stable throughout the 2008 to 2013 period. In future work, we would like to extend the sample utilised here to more recent years. Arguably, it would be worthwhile to construct an alternative proxy for the strictness of the unemployment benefit rules. It would also be interesting to disaggregate the tax wedge, highlighting potentially different impacts of employment taxes. Further relevant policy evidence could emerge from a finer disaggregation of active labour-market policies, with a focus on job rotation and sharing. Finally, in a related research field, Piva and Vivarelli (2018) and Van Roy et al. (2018) recently found that innovation promotes employment in high-tech manufacturing sectors but has no impact in low-tech manufacturing and services. Future work on the Beveridge curve could benefit from the explicit modelling of cross-country differences in sectoral and skill mismatch.

References

Aghion P., Howitt P. (1994), Growth and Unemployment, *Review of Economic Studies*, 61, 477-494.

Allard G. (2005), *Measuring Job Security Over Time: In Search of a Historical Indicator*, Instituto de Empresa Working Paper, WP 05-17.

Arranz J.M., Garcia Serrano C., Hernanz V. (2013), Active labour market policies in Spain: A macroeconomic evaluation, *International Labour Review*, 152 (2), 327-348.

Arpaia A., Kiss A., Turrini A. (2014), *Is Unemployment Structural or Cyclical? Main Features of Job Matching in the EU after the Crisis*, IZA Policy Paper n. 91.

Barnichon R. (2010), Building a Composite Help-Wanted Index, *Economics Letters*, 105, 175-178.

Bisio L., Moauro F. (2017), Temporal disaggregation by dynamic regressions: recent developments in Italian quarterly national accounts, *Statistica Neerlandica*.

Blundell R., Bond S.R. (1998), Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87, 115-143.

Bonthuis B., Jarvis V., Vanhala J. (2013), *What's going on behind the euro area Beveridge curve(s)?*, ECB WP n. 1586.
Booth A., Burda M., Calmfors L., Checchi D., Naylor R., Visser J. (2000) *What do Unions do in Europe?, A Report*, Fondazione Rodolfo DeBenedetti, Milan.
Bova, E., Tovar Jalles J., Kolerus C., 2018, Shifting the Beveridge curve: What affects labour market matching?, *International Labour Review*, 157 (2), 267-306.
Campolmi, A., Faia, E., Winkler R. (2011), Fiscal Calculus and the Labor Market, B.*E. Journal of Macroeconomics*, 11(1), (Contributions), Article 38.
Card, D., Kluve J., Weber A. (2010), Active Labour Market Policy Evaluations: A Meta-analysis, *Economic Journal*, 120 (548), F452-F477.
Daniel W. W., Stilgoe E. (1978) *The Impact of Employment Protection Laws*, London, Policy Studies Institute.
Destefanis S., Mastromatteo G. (2015), The OECD Beveridge Curve: technological progress, globalisation and institutional factors, *Eurasian Business Review*, 5, 151-172.
Destefanis S., Fragetta M., Mastromatteo G., Ruggiero N. (2020), The Beveridge curve in the OECD before and after the great recession, *Eurasian Economic Review* (DOI: 10.1007/s40822-019-00140-2).
Diamond, P. A., Şahin, A. (2014). Shifts in the Beveridge curve. *Research in Economics*, 69(1), 18–25.
Dickens W.T., Triest R.K. (2012), Potential Effects of the Great Recession on the U.S. Labor Market, *B.E. Journal of Macroeconomics,* 12(3), 1-40.
Dreher A. (2006), Does Globalization Affect Growth? Evidence from a New Index of Globalization' *Applied Economics, 38* (10), 1091-1110.
Driscoll, J. C., Kraay, A. C. (1998), Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data, *Review of Economics and Statistics* 80, 549-560.
Dumont, M., Rayp, G., Thas, O., Willemé, P. (2005), Correcting standard errors in two-stage estimation procedures with generated regressands, *Oxford Bulletin of Economics and Statistics*, 67(3):421–433.
Elsby M.W.L., Hobijn B., Sahin A. (2013), Unemployment Dynamics in the OECD*, Review of Economics and Statistics,* 95, 530-548.
Entorf H. (2003), *Do Aggregate Measures of Mismatch Measure Mismatch? A Time Series Analysis of Existing Concepts*, Labor and Demography, EconWPA.
Goulas E., Zervoyianni A. (2018), Active labour-market policies and output growth: Is there a causal relationship?, *Economic Modelling*, 73, 1–14
Hamilton, J. D. (2018). Why you should never use the Hodrick–Prescott filter. *Review of Economics and Statistics*, 100, 831–843.
Hobijn B., Şahin A. (2013), *Beveridge curve shifts across countries since the Great Recession*, IMF Economic Review 61 (4), 566-600.
IMF (1996), *The Impact of Globalisation on Workers and Their Trade Unions* (Washington: IMF publishing).
Jackman R., Pissarides C., Savouri S., 1990, Labour market policies and unemployment in the OECD, *Economic Policy*, 5 (11), 449-490.
Kluve J. (2010). The Effectiveness of European Active Labor Market Programs. *Labour Economics*, 17, 904-918.
Koeniger W., Leonardi M., Nunziata L. (2007), Labour Market Institutions and Wage Inequality, *Industrial and Labour Relations Review*, 60 (3), 340-356.
Nickell S., Bell B. (1995), The Collapse in Demand for the Unskilled and Unemployment across the OECD, *Oxford Review of Economic Policy*, 11, 40-62.
Nickell S., Layard R. (1999), Labour Market Institutions and Economic Performance in Ashenfelter O. and Card C. (eds), *Handbook of Labor Economics*, vol. 3 (Amsterdam: North Holland).
Nickell S., Nunziata L., Ochel W., Quintini G. (2003), The Beveridge Curve, Unemployment and Wages in the OECD from the 1960s to the 1990s, in Aghion P., Frydman R., Stiglitz J. and Woodford M. (eds.), *Knowledge, Information and*

Expectations in Modern Macroeconomics: in honour of Edmund S. Phelps, (Princeton: Princeton University Press).
OECD (2003), *Employment Outlook* (Paris: OECD publishing).
OECD (2004), *Employment Outlook* (Paris: OECD publishing).
Pesaran M.H., Smith R.J. (1994), A Generalized R^2 Criterion for Regression Models Estimated by the Instrumental Variables Method, *Econometrica*, 62(3), 705-710.
Pignatti, C., Van Belle, E. (2018), Better together active and passive labour market policies in developed and developing economies, ILO Working Papers 995019192402676, International Labour Organization.
Pissarides C.A., Vallanti G. (2007), The Impact of TFP Growth on Steady-State Unemployment, *International Economic Review*, 48 (2), 607-640.
Piva M., Vivarelli M. (2018), Technological change and employment: is Europe ready for the challenge?, *Eurasian Business Review*, 8, 13-32.
Ruggiero N. (2017), *Unemployment and Youth Unemployment in the OECD: Empirical Evidence from the Beveridge Curve*, Ph. D. Thesis, University of Salerno.
Schmidt P. (2011), One-step and two-step estimation in SFA models, *Journal of Productivity Analysis*, 36 (2), 201-203.
Song L.L., Webster E. (2003), How Segmented Are Skilled and Unskilled Labour Markets? The Case of Beveridge Curves, *Australian Economic Papers*, 42, 332-345.
Van Roy V., Vértesy D., Vivarelli M. (2018), Technology and employment: Mass unemployment or job creation? Empirical evidence from European patenting firms, *Research Policy*, 47(9), 1762-1776.
Van Vliet O., Caminada K. (2012), Unemployment Replacement Rates Dataset Among 34 Welfare States, 1971-2009: An Update, Extension and Modification of the Scruggs' Welfare State Entitlements Data Set. NEUJOBS Special Report No. 2.

Appendix

Table Legends

The dependent variable is always the natural log of the unemployment rate, *ur*. The vacancy rate, *vr*, is given by the ratio of vacancies over total employment. Among the Z variables, GRR is gross replacement rate (income received during unemployment spell over average wage), NRR is the net replacement rate (income received during unemployment spell over average wage, net of taxation), *dur* is an index between 0 and 1 that measures the duration of unemployment benefits over a five-year period, while *dur (Scruggs)* measures the duration, in weeks, of benefits entitlements excluding times of means-tested assistance, and *strict* measures the severity of the rules and administrative procedures that govern the distribution of unemployment benefits and also ranges in the (0,1) interval. *GRW1* is given by *GRR* × *dur*, *GRW2* by *GRR* × *dur* / *strict*, *NRW1* by *NRR* × *dur*, and *NRW2* by *NRR* × *dur* / *strict*.

PLMP_gdp is the ratio of passive labour market policies expenditures to GDP, PLMP_t is the ratio of passive labour market policies expenditures to total labour market policies, PLMP_u is the ratio of passive labour market policies expenditures to total unemployment, PLMP_lf is the ratio of passive labour market policies expenditures to total labour force. Analogously, ALMP_gdp is the ratio of active labour market policies expenditures to GDP, ALMP_t is the amount of active labour market policies to total active labour market spending, ALMP_u is the ratio of active labour market policies to total unemployment, ALMP_lf represents the ratio of active labour market policies to labour force. PES_u is the ratio of public employment services and administration to total unemployment, direct_u is the ratio of direct job creation expenditures to total unemployment, incentives_u is the ratio of employment incentives expenditures to total unemployment, sheltered_u is the ratio of sheltered and supported rehabilitation expenditures to total unemployment and training_u is the ratio of training expenditures to total unemployment, PES_lf is the ratio of public employment services and administration to labour force, direct_lf is the ratio of direct job creation expenditures to labour force, incentives_lf is the ratio of employment incentives expenditures to labour force, sheltered_lf is the ratio of sheltered and supported rehabilitation expenditures to labour force and training_lf is the ratio of training expenditures to labour force.

TW is the total tax wedge (the sum of the employment tax rate, the direct tax rate and the indirect tax rate)*, EPL* the employment protection legislation overall indicator.

Globalisation is measured by *Openness*, a traditional measure of trade openness obtained by taking the sum of exports and imports and dividing it by GDP (World Bank national accounts data, and OECD National Accounts data files). Technical progress is measured both by *GERD*, a measure of gross domestic expenditure of R&D to total GDP, and *TFP*, the trend component of total factor productivity computed by applying the Hamilton filter to a Tornqvist index.

An initial l stands for a variable taken in natural logarithms, a _1 or a _2 termination indicates a first- or second-order lagged variable. Note that GERD turned out to be more significant if not logged: our reported estimates thus include its linear specification, unlike for the other indicators of technical progress and globalisation.

All estimates include country-idiosyncratic effects and year-specific effects, not shown in the interest of parsimony, in all specifications. Coefficient significances are denoted by stars: * means a p-value < .1; ** a p-value < .05; *** a p-value < .01. We use heteroskedasticity-robust standard errors throughout the estimation process. The r^2 is the coefficient of determination calculated as in Pesaran and Smith (1994). Diagnostics include the Arellano–Bond (*AB (1)*) test for first-order serial correlation, the Chow test for parameter stability (2007 is taken as potential breakpoint) and the Hansen J test of overidentifying restrictions. We provide p-values for all these tests, as well as for the significance of idiosyncratic linear trends in the robustness checks.

Estimation is always carried out through a standard dynamic fixed-effects panel IV procedure. Instruments include, besides all lagged regressors, the following list of variables: *lvr_2*, *EPL_1*, the first- and second-order lagged terms for the ratio of total manufacturing imports from non-OECD countries to manufacturing value added, the KOF index of actual economic flows, the capital stock of the business sector, and real oil prices, plus country-idiosyncratic linear trends and *linfr_1* when the estimated specification comprises trends or the (log of the) inflow rate.

Data Sources

Unemployment, labour force and employment data are taken from the OECD Annual Labour Force Statistics. The unemployment rates are based on OECD standardised rates. Statistics for annual vacancies come from the OECD Registered Unemployed and Job Vacancies Dataset. Only for the US the vacancy rate before 2001 is obtained by extrapolating the OECD data through the composite Help Wanted Index (HWI) proposed by Barnichon (2010). The computation of the inflow rate was carried out by applying the procedure proposed by Elsby *et al*. (2013). For the estimation of this variable, we relied on the yearly and quarterly harmonised unemployment rates from the OECD Short-Term Labour Market Statistics Dataset, and, for the stock of unemployed workers by duration, on the OECD Unemployment by Duration Dataset.

Statistics for NRR, GRR have been taken from the OECD Benefits, Taxes and Wages Dataset, while data for active and passive labour market policies come from the OECD Public Expenditure and Participant Stock in the Labour Market Programmes Database.

More precisely, for NRR we have also used data from Van Vliet and Caminada (2012), as OECD data were only available for period 2001-2013. We have considered the average of two different types of family compositions, namely single person and one earner married couple with two children, 100% of average wage, average worker, in the initial phase of unemployment.

Variable *dur* is computed as the ratio between the months in which unemployed workers receive benefits minus the waiting periods, over 60 months, while the *strict* indicator was computed following Lagenbucher (2015) and extrapolated using information from Ministry of Finance Denmark (1998), Hasselpflug (2005) and Venn (2012). Data for *dur (Scruggs)* were taken from the Comparative Welfare Entitlements Dataset (CWED2) of Scruggs (2014), available on the following website http://cwed2.org/. These data are available for period 1970-2011, and were updated through simple time series techniques. Further details on the sources and computations for all the policy variables are provided in Ruggiero (2017).

The total tax wedge is equal to the sum of the employment tax rate, the direct tax rate and the indirect tax rate. All three rates rely on information from the OECD National Accounts. The overall indicator for employment protection legislation is taken from Allard (2005), updating it with information from the OECD Statistic Portal. Neither this indicator nor the generosity of unemployment benefit could be updated beyond 2013 because of the lack of basic OECD information. We refer again to Ruggiero (2017) for further details.

Openness, a traditional measure of trade openness, is obtained by taking the sum of exports and imports and dividing it by GDP (World Bank national accounts data, and OECD National Accounts data files).

R&D intensity, *GERD*, is measured by gross domestic expenditure of R&D as a percentage of GDP, taken from the Main Science and Technology Indicators, OECD. It represents the share over GDP of the intramural R&D expenditures within both government and business enterprise sectors. The trend of the total factor productivity, *TFP*, is calculated by applying the Hamilton filter (Hamilton, 2018) to a Tornqvist index, using gross domestic output, employment, capital stock of the business sector and a smoothed share of labour. The source of the capital stock of the business sector (in fact, the private non-residential net capital stock) is the OECD

Analytical Database, whereas gross domestic output and employment are drawn from the OECD Statistic Portal and the smoothed share of labour from the OECD Unit Labour Costs Dataset.

Other measures of globalisation, which in the end were only used as instrumental variables, are the ratio of total manufacturing imports from non-OECD countries to manufacturing value added (both variables at current prices), and the KOF index of actual economic flows (allowing for external trade, capital flows and outsourcing). In order to compute the ratio of total manufacturing imports from non-OECD countries to manufacturing value added, total manufacturing imports from non-OECD countries are drawn from the OECD STAN Bilateral Trade Database and International Trade by Commodity Statistics, and value added from the OECD STAN Database for Industrial Analysis. We extrapolated through time-series techniques the 2012 and 2013 values for these indexes, which were not available from the original source. The KOF index for actual economic flows, comes from http://globalization.kof.ethz.ch. More information about it is provided in Dreher (2006). Other instrumental variables include the capital stock of the business sector (see above) and oil prices (for the West Texas Intermediate) taken from the US Energy information Administration. These prices are converted in each country's currency using exchange rates from the OECD Statistic Portal, and deflated by country-specific consumer price indexes from the same source to obtain a constant-price series.

Variables that were used in preliminary work, but were subsequently dropped because of their insignificance, include the minimum statutory wage (calculated using OECD methodology and data, by converting statutory annual minimum wages into hourly wages, and dividing the result by median hourly wages), an index of bargaining coordination with range {1,5} taken from OECD (2004, Table 3.5), and union density (union membership over employment, calculated using administrative and survey data from the OECD labour market statistics database).

Table 1. The main variables – some descriptive statistics, 1985-2013 *

Variable	Definition	Mean	St.Dev	Min	Max
ur	*Unemployment Rate.*	7.063	3.946	0.457	24.171
vr	*Vacancy Rate*	0.905	0.663	0.085	3.344
infr	*Inflow Rate*	1.060	0.676	0.038	4.178
PLMP_t	*Expend. in passive over total LMP's*	0.618	0.130	0.239	0.898
PLMP_u	*Expend. in passive LMP's over unemployment*	66.362	178.937	0.232	1053.916
PLMP_lf	*Expend. in passive LMP's over labour force*	2.878	6.559	0.020	41.632
PLMP_gdp	*Expend. in passive LMP's over GDP*	1.184	0.803	0.120	4.710
GRR	*Gross Replacement Rate*	29.711	10.103	9.917	60.472
NRR	*Net Replacement Rate*	61.850	14.777	20.859	92.211
dur	*Duration of unemployment benefits' entitlement*	0.610	0.289	0.075	1.000
dur (Scruggs)	*Duration, in weeks, of unemployment benefits' entitlement*	187.855	310.861	21.000	999.000
strict	*Strictness of the unemployment benefits' protocol*	0.697	0.110	0.443	1.000
GRW1	*GRR x dur*	19.077	10.988	0.908	58.489
GRW2	*GRR x dur/strict*	27.952	17.210	1.742	81.727
NRW1	*NRR x dur*	35.970	16.172	4.180	64.803
NRW2	*NRR x dur/strict*	52.591	26.416	6.647	109.652
ALMP_t	*Expend. in active over total LMP's*	0.380	0.131	0.102	0.761
ALMP_u	*Expend. in active LMP's over unemployment*	57.210	149.847	0.121	1097.623
ALMP_lf	*Expend. in active LMP's over labour force*	2.336	4.999	0.010	24.842
ALMP_gdp	*Expend. in active LMP's over GDP*	0.644	0.466	0.003	2.700
PES_u	*Expend. in PES and administration over unemployment*	27.087	112.548	0.048	923.199
direct_u	*Expend. in direct job creation over unemployment*	2.885	10.759	0.000	141.993
incentives_u	*Expend. in employment incentives over unemployment*	10.442	27.310	0.011	264.606
sheltered_u	*Expend. in sheltered and supported rehabilitation over unemployment*	4.971	10.731	0.009	66.152
startup_u	*Expend. in startup incentives over unemployment*	0.305	0.716	0.000	4.589
training_u	*Expend. in training over unemployment*	11.519	22.760	0.009	102.631
PES_lf	*Expend. in PES and administration over labour force*	0.954	3.272	0.004	20.233
direct_lf	*Expend. in direct job creation over labour force*	0.155	0.534	0.000	6.498
incentives_lf	*Expend. in employment incentives over labour force*	0.500	1.337	0.001	13.353
sheltered_lf	*Expend. in sheltered and supported rehabilitation over labour force*	0.210	0.409	0.001	2.038
startup_lf	*Expend. in startup incentives over labour force*	0.020	0.051	0.000	0.354
training_lf	*Expend. in training over labour force*	0.497	0.871	0.001	4.390
TW	*Tax Wedge*	39.065	10.361	18.405	57.421
EPL	*Employment Protection Legislation*	2.128	0.898	0.100	4.100
TFP	*Trend of Total Factor Productivity*	92.860	8.334	68.583	106.112
GERD	*Gross Domestic Expend. on R&D, % of GDP*	2.098	0.784	0.337	3.914
openness	*Imports and Exports in goods and services, % of GDP*	60.886	26.312	16.014	141.079

* Number of observations = 380, but for *infr* (= 363), and *TW* (=375).

Table 2. The Effects of Passive Labour Market Policies; dependent variable: lur

REGRESSORS	***PLMP_t***	***PLMP_u***	***PLMP_lf***	***PLMP_gdp***
lur_1	1.2198***	1.2416***	1.2356***	1.2256***
lur_2	-0.3728***	-0.3819***	-0.3808***	-0.3763***
lvr	-0.2407**	-0.2425**	-0.2480***	-0.2467**
lvr_1	0.1802**	0.1779**	0.1855**	0.1849**
PLMP_t_1	0.1079			
PLMP_u_1		-0.0000		
PLMP_lf_1			0.0036	
PLMP_gdp_1				0.0185
GRR_1				
NRR_1				
TW_1	0.0099**	0.0097**	0.0111**	0.0082**
EPL	-0.0559	-0.0572	-0.0537	-0.0573
lTFP	-1.0337**	-1.0793**	-1.1023**	-1.0321**
lTFP_1	0.8726**	0.9051**	0.9472**	0.8822**
GERD_1	0.0310	0.0327	0.0295	0.0339
lopenness_1	-0.2461***	-0.2369***	-0.2052**	-0.2285***
Country Fixed Effects	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES
Observations	362	362	362	362
R-squared	0.9838	0.9834	0.9835	0.9837
AB(1)	0.2489	0.3369	0.3423	0.2594
Chow	0.1295	0.0848	0.1059	0.2866
Hansen	0.8570	0.9026	0.8877	0.9000

Table 2. (cont.)

REGRESSORS	*GRR*	*NRR*	*dur*	*dur (Scruggs)*	*strict*
lur_1	1.2376***	1.2424***	1.2259***	1.2384***	1.2417***
lur_2	-0.3881***	-0.3829***	-0.3759***	-0.3760***	-0.3813***
lvr	-0.2536***	-0.2446**	-0.2743***	-0.2411**	-0.2372**
lvr_1	0.1933**	0.1795**	0.2044**	0.1706*	0.1736*
GRR_1	0.0025*				
NRR_1		-0.0010			
dur_1			0.1673**		
ldur_1 (Scruggs)				-0.0194	
strict_1					0.0410
TW_1	0.0090**	0.0102***	0.0092**	0.0098**	0.0100***
EPL	-0.0583	-0.0501	-0.0487	-0.0557	-0.0582
lTFP	-1.1106**	-1.0866**	-1.2170***	-1.0763**	-1.1039**
lTFP_1	0.8580*	0.8894**	0.8640**	0.9155**	0.9150**
GERD_1	0.0421*	0.0308	0.0434*	0.0329	0.0306
lopenness_1	-0.2231***	-0.2454***	-0.2213***	-0.2437***	-0.2348***
Country Fixed Effects	YES	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES	YES
Observations	362	362	362	362	362
R-squared	0.9803	0.9799	0.9802	0.9809	0.9799
AB(1)	0.3613	0.3731	0.3825	0.3030	0.3436
Chow	0.0827	0.1937	0.1322	0.0822	0.0764
Hansen	0.9277	0.9059	0.8874	0.8908	0.8946

Table 2. (cont.)

REGRESSORS	*GRW1*	*GRW2*	*NRW1*	*NRW2*
lur_1	1.2379***	1.2388***	1.2250***	1.2276***
lur_2	-0.3842***	-0.3858***	-0.3761***	-0.3816***
lvr	-0.2567***	-0.2550***	-0.2747***	-0.2722***
lvr_1	0.1921**	0.1919**	0.2055**	0.2050**
GRW1_1	0.0015			
GRW2_1		0.0011		
NRW1_1			0.0028**	
NRW2_1				0.0018**
TW_1	0.0095**	0.0091**	0.0083**	0.0073**
EPL	-0.0529	-0.0513	-0.0570	-0.0516
lTFP	-1.1243**	-1.1067**	-1.2010***	-1.1530***
lTFP_1	0.8615*	0.8644*	0.8780**	0.8933**
GERD_1	0.0386*	0.0446*	0.0478**	0.0672**
lopenness_1	-0.2235***	-0.2275***	-0.2113***	-0.2185***
Country Fixed Effects	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES
Observations	362	362	362	362
R-squared	0.9810	0.9811	0.9811	0.9811
AB(1)	0.3368	0.3293	0.3691	0.3582
Chow	0.0733	0.0703	0.0393	0.0380
Hansen	0.9230	0.9191	0.9145	0.8978

Table 3. The Effects of Active Labour Market Policies; dependent variable: lur

REGRESSORS	*ALMP_t*	*ALMP_u*	*ALMP_lf*	*ALMP_gdp*
lur_1	1.2196***	1.2269***	1.2367***	1.2435***
lur_2	-0.3724***	-0.3713***	-0.3758***	-0.3816***
lvr	-0.2404**	-0.2656***	-0.2439**	-0.2443**
lvr_1	0.1803**	0.1952**	0.1753**	0.1799**
ALMP_t_1	-0.1107			
ALMP_u_1		-0.0001		
ALMP_lf_1			-0.0040	
almp_gdp_1				-0.0139
TW_1	0.0099**	0.0088**	0.0089**	0.0101***
EPL	-0.0561	-0.0542	-0.0607	-0.0556
lTFP	-1.0345**	-1.0364**	-1.0235**	-1.0943**
lTFP_1	0.8731**	0.9140**	0.8701**	0.8930**
GERD_1	0.0312	0.0298	0.0319	0.0336
lopenness_1	-0.2473***	-0.2526***	-0.2665***	-0.2381***
Country Fixed Effects	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES
Observations	362	362	362	362
R-squared	0.9839	0.9840	0.9839	0.9838
AB(1)	0.2490	0.3144	0.3323	0.3593
Chow	0.1336	0.1029	0.2376	0.1337
Hansen	0.8590	0.8728	0.8828	0.9124

Table 4. The Effects of Disaggregated Active Labour Market Policies; dependent variable: lur

REGRESSORS	***PES_u***	***direct_u***	***incentives_u***	***sheltered_u***	***startup_u***	***training_u***
lur_1	1.2388***	1.2395***	1.2348***	1.2223***	1.2335***	1.2112***
lur_2	-0.3798***	-0.3817***	-0.3771***	-0.3733***	-0.3728***	-0.3600***
lvr	-0.2483***	-0.2452**	-0.2429**	-0.2397**	-0.2390**	-0.2648***
lvr_1	0.1821**	0.1795**	0.1783**	0.1770**	0.1732**	0.1939**
PES_u_1	-0.0000					
direct_u_1		-0.0005				
incentives_u_1			-0.0005*			
sheltered_u_1				-0.0015		
startup_u_1					-0.0167	
training_u_1						-0.0013**
TW_1	0.0092**	0.0106**	0.0116***	0.0113***	0.0104***	0.0101**
EPL	-0.0565	-0.0567	-0.0589	-0.0527	-0.0621*	-0.0445
lTFP	-1.0587**	-1.0664**	-1.0793**	-1.2508**	-1.0959**	-1.1512***
lTFP_1	0.9054**	0.8727**	0.8993**	1.0504**	0.8893**	1.0066**
GERD_1	0.0319	0.0325	0.0303	0.0302	0.0374	0.0305
lopenness_1	-0.2406***	-0.2286***	-0.2362***	-0.2633***	-0.2449***	-0.2973***
Country Fixed Effects	YES	YES	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	362	362	362	362	362	362
R-squared	0.9838	0.9839	0.9840	0.9839	0.9838	0.9842
AB(1)	0.3259	0.3600	0.3611	0.3705	0.3028	0.4296
Chow	0.0677	0.0837	0.1704	0.1487	0.1692	0.0801
Hansen	0.9055	0.8919	0.7542	0.8045	0.8696	0.8737

Table 4. (cont.)

REGRESSORS	*PES_lf*	*direct_lf*	*incentives_lf*	*sheltered_lf*	*startup_lf*	*training_lf*
lur_1	1.2427***	1.2409***	1.2409***	1.2305***	1.2401***	1.2305***
lur_2	-0.3830***	-0.3819***	-0.3802***	-0.3650***	-0.3787***	-0.3686***
lvr	-0.2390**	-0.2434**	-0.2416**	-0.2347**	-0.2409**	-0.2347**
lvr_1	0.1756**	0.1778**	0.1770**	0.1713**	0.1754**	0.1660*
PES_lf_1	0.0010					
direct_lf_1		-0.0081				
incentives_lf_1			-0.0037			
sheltered_lf_1				-0.0814**		
startup_lf_1					-0.0989	
training_lf_1						-0.0314***
TW_1	0.0103***	0.0104***	0.0102***	0.0097**	0.0098**	0.0101***
EPL	-0.0573	-0.0577	-0.0597	-0.0638*	-0.0604*	-0.0594
lTFP	-1.0918**	-1.0699**	-1.0686**	-1.1885**	-1.0746**	-1.0528**
lTFP_1	0.9064**	0.8735**	0.8918**	1.0064**	0.8856**	0.8407**
GERD_1	0.0330	0.0330	0.0321	0.0273	0.0346	0.0398*
lopenness_1	-0.2312***	-0.2312***	-0.2367***	-0.2928***	-0.2388***	-0.3038***
Country Fixed Effects	YES	YES	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	362	362	362	362	362	362
R-squared	0.9838	0.9838	0.9838	0.9841	0.9838	0.9841
AB(1)	0.3471	0.3594	0.3393	0.3640	0.3204	0.4949
Chow	0.1545	0.1635	0.1743	0.2133	0.1347	0.1261
Hansen	0.8962	0.8925	0.8413	0.6947	0.8980	0.9345

Table 5. The Effects of Combined Labour Market Policies; dependent variable: lur

REGRESSORS	*PES_u*	*direct_u*	*incentives_u*	*sheltered_u*	*startup_u*	*training_u*
lur_1	1.1927***	1.2226***	1.2119***	1.2036***	1.2214***	1.1868***
lur_2	-0.3528***	-0.3764***	-0.3664***	-0.3574***	-0.3710***	-0.3492***
lvr	-0.2780***	-0.2682***	-0.2742***	-0.2720***	-0.2672***	-0.2837***
lvr_1	0.2049**	0.1985**	0.2044**	0.2005**	0.1982**	0.2068**
NRW1_1	0.0038***	0.0028**	0.0033**	0.0038**	0.0025**	0.0044***
PES_u_1	0.0007					
NRW1_1*PES_u_1	-0.0001					
direct_u_1		-0.0014				
NRW1_1*direct_u_1		0.0001				
incentives_u_1			0.0000			
NRW1_1*incentives_u_1			-0.0000			
sheltered_u_1				0.0016		
NRW1_1*sheltered_u_1				-0.0001		
startup_u_1					-0.0162	
NRW1_1*startup_u_1					0.0002	
training_u_1						0.0002
NRW1_1*training_u_1						-0.0000**
TW_1	0.0081**	0.0096**	0.0097**	0.0079**	0.0091**	0.0092**
EPL	-0.0596*	-0.0584	-0.0613	-0.0587	-0.0599	-0.0514
lTFP	-1.3581***	-1.2295***	-1.2221***	-1.3819***	-1.2008***	-1.3571***
lTFP_1	1.0943**	0.9066**	0.9319**	1.0667**	0.8605**	1.0542**
GERD_1	0.0445*	0.0465*	0.0441*	0.0471*	0.0504**	0.0497**
lopenness_1	-0.2412***	-0.2113***	-0.2177***	-0.2324***	-0.2203***	-0.2603***
Country Fixed Effects	YES	YES	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	362	362	362	362	362	362
R-squared	0.9785	0.9783	0.9785	0.9784	0.9783	0.9791
AB(1)	0.4482	0.4626	0.4091	0.4354	0.3368	0.6777
Chow	0.0900	0.0616	0.1337	0.1136	0.1333	0.2216
Hansen	0.7246	0.8051	0.7137	0.8223	0.8786	0.6397

Table 5. (cont.)

REGRESSORS	*PES_lf*	*direct_lf*	*incentives_lf*	*sheltered_lf*	*startup_lf*	*training_lf*
lur_1	1.2084***	1.2215***	1.2235***	1.2053***	1.2268***	1.1974***
lur_2	-0.3571***	-0.3749***	-0.3758***	-0.3532***	-0.3781***	-0.3545***
lvr	-0.2642***	-0.2762***	-0.2759***	-0.2664***	-0.2646***	-0.2882***
lvr_1	0.1935**	0.2053**	0.2067**	0.1951**	0.1982**	0.2083**
NRW1_1	0.0044***	0.0028**	0.0025**	0.0041***	0.0026**	0.0055***
PES_lf_1	0.0263*					
NRW1_1*PES_lf_1	-0.0029*					
direct_lf_1		-0.0194				
NRW1_1*direct_lf_1		0.0007				
incentives_lf_1			-0.0103			
NRW1_1*incentives_lf_1			0.0005			
sheltered_lf_1				0.0352		
NRW1_1*sheltered_lf_1				-0.0028		
startup_lf_1					-0.2807	
NRW1_1*startup_lf_1					0.0110	
training_lf_1						0.0259*
NRW1_1*training_lf_1						-0.0019***
TW_1	0.0071*	0.0091**	0.0095**	0.0067*	0.0090**	0.0082**
EPL	-0.0750**	-0.0580	-0.0543	-0.0677*	-0.0548	-0.0654*
lTFP	-1.2126***	-1.2115***	-1.2210***	-1.3154***	-1.1951***	-1.1487***
lTFP_1	0.9789**	0.8769**	0.8574**	1.0505**	0.8504*	0.8343**
GERD_1	0.0434*	0.0477**	0.0488**	0.0431*	0.0499**	0.0585**
lopenness_1	-0.2274***	-0.2086***	-0.2092***	-0.2519***	-0.2199***	-0.2388***
Country Fixed Effects	YES	YES	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	362	362	362	362	362	362
R-squared	0.9785	0.9783	0.9783	0.9785	0.9782	0.9794
AB(1)	0.4617	0.4145	0.3891	0.4440	0.3707	0.8324
Chow	0.1533	0.0865	0.1195	0.1326	0.1359	0.2660
Hansen	0.7087	0.8457	0.8596	0.7789	0.9189	0.6153

Table 6. The Preferred Specifications; dependent variable: lur

REGRESSORS	*Equation I*	*Equation II*	*Equation III*	*Equation IV*
lur_1	1.1906***	1.1871***	1.1810***	1.1813***
lur_2	-0.3508***	-0.3418***	-0.3447***	-0.3413***
lvr	-0.2949***	-0.2878***	-0.2902***	-0.2871***
lvr_1	0.2199**	0.2138**	0.2128**	0.2148**
NRW1_1	0.0025**	0.0021*	0.0043***	0.0035***
incentives_u_1	-0.0006**	-0.0005**	-0.0004*	-0.0001
training_u_1	-0.0012**	-0.0012**	0.0000	-0.0016**
sheltered_lf_1		-0.0491		
PES_lf_1				0.0218
NRW1_1*training_u_1			-0.0001**	
NRW1_1*PES_lf_1				-0.0016
TW_1	0.0107**	0.0105**	0.0105**	0.0114**
EPL	-0.0467	-0.0504	-0.0516	-0.0513
lTFP	-1.2519***	-1.2994***	-1.3484***	-1.3595***
lTFP_1	0.9687**	1.0333**	1.0418**	1.0653**
GERD_1	0.0415*	0.0365	0.0476**	0.0430*
lopenness_1	-0.2702***	-0.3070***	-0.2610***	-0.2616***
Country Fixed Effects	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES
Observations	362	362	362	362
R-squared	0.9844	0.9844	0.9845	0.9844
AB(1)	0.4940	0.4914	0.6852	0.6691
Chow	0.0869	0.2192	0.2478	0.1882
Hansen	0.6213	0.4938	0.4826	0.4947

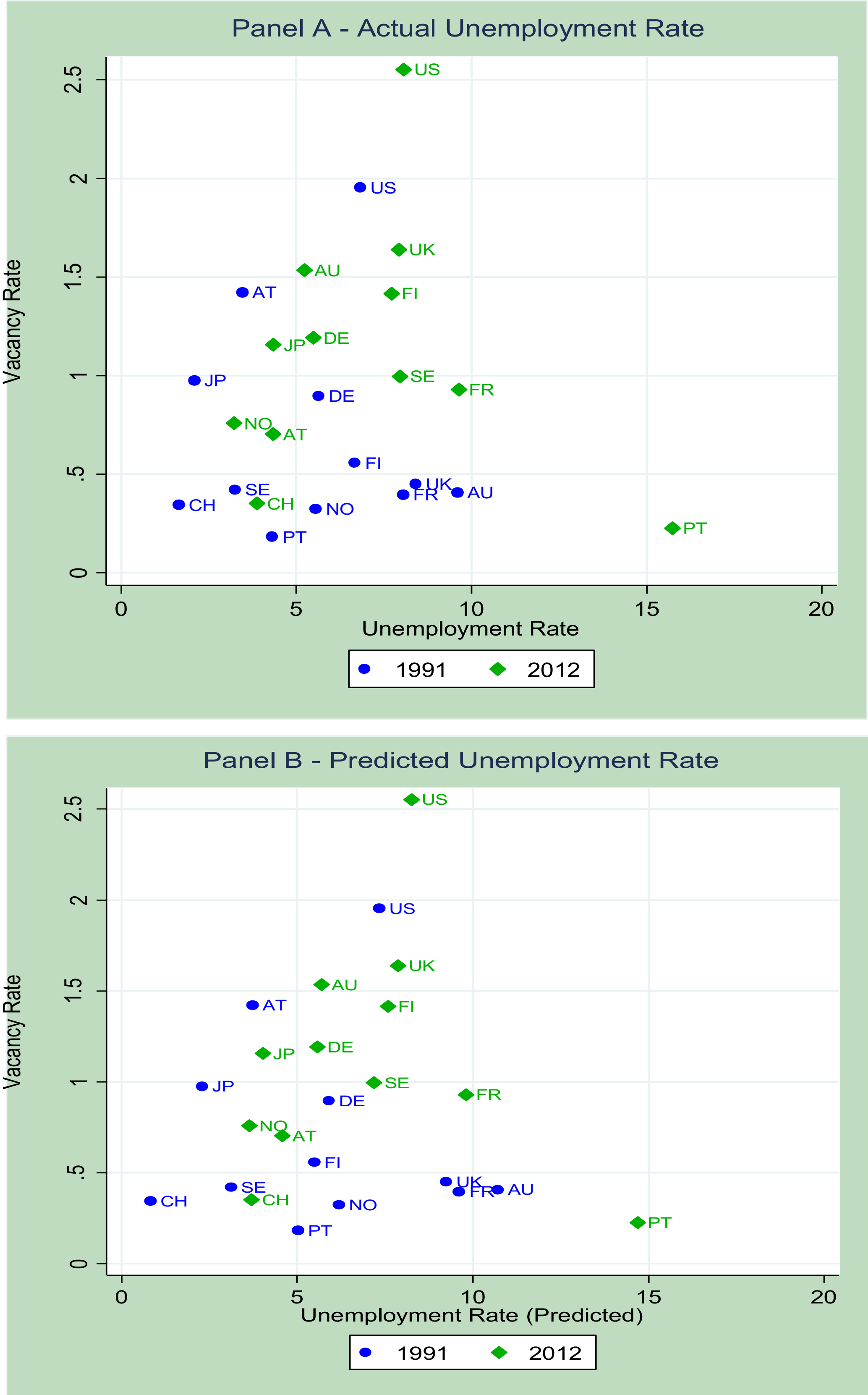
Table 7. Some Robustness Checks; dependent variable: lur

REGRESSORS	*Equation I with Inflow Rate*	*Equation I with Trends*	*Equation I No France, No Japan, No US*	*Equation I FE-OLS Driscoll-Kraay SE's*
lur_1	1.1371***	1.1890***	1.1913***	1.1820***
lur_2	-0.3218***	-0.3678***	-0.3542***	-0.3415***
lvr	-0.3046***	-0.2419**	-0.1978*	-0.3264***
lvr_1	0.2099***	0.1772**	0.1387	0.2471***
linfr	0.0182			
NRW1_1	0.0018*	0.0024**	0.0025**	0.0026*
incentives_u_1	-0.0006***	-0.0005**	0.0016	-0.0005***
training_u_1	-0.0010**	-0.0013**	-0.0024***	-0.0011**
NRW1_1*training_u_1				
TW_1	0.0136***	0.0126***	0.0171***	0.0102***
EPL	-0.0660**	-0.0574	-0.0283	-0.0565
lTFP	-1.2880***	-1.3482***	-1.4945***	-1.2302***
lTFP_1	1.1686***	1.0569***	1.1505**	0.9301**
GERD_1	0.0506***	0.0428*	0.0412*	0.0427***
lopenness_1	-0.2574***	-0.2802***	-0.2495***	-0.2712***
Country Fixed Effects	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES
Trends	--	YES	--	--
Observations	346	362	283	362
R-squared	0.9844	0.9847	0.9616	0.9790
AB(1)	0.1927	0.6329	0.7349	0.4373
Chow	0.0394	0.0210	0.1942	0.0415
F-Stat (trends)	--	0.3483	--	--
Hansen	0.6716	0.7487	0.4577	--

Table 7. (cont.)

REGRESSORS	*Equation III with Inflow Rate*	*Equation III with Trends*	*Equation III No France, No Japan, No US*	*Equation III FE-OLS Driscoll-Kraay SE's*
lur_1	1.1284***	1.1812***	1.1861***	1.1695***
lur_2	-0.3141***	-0.3630***	-0.3512***	-0.3325***
lvr	-0.3057***	-0.2474**	-0.1950*	-0.3316***
lvr_1	0.2075***	0.1786**	0.1309	0.2482***
linfr	0.0265			
NRW1_1	0.0036***	0.0040***	0.0037*	0.0046***
incentives_u_1	-0.0004**	-0.0004*	0.0012	-0.0004*
training_u_1	0.0003	-0.0003	-0.0012	0.0002
NRW1_1*training_u_1	-0.0001**	-0.0000	-0.0000	-0.0001*
TW_1	0.0130***	0.0120***	0.0161***	0.0097***
EPL	-0.0650**	-0.0604	-0.0345	-0.0629*
lTFP	-1.3719***	-1.4051***	-1.4644***	-1.3300***
lTFP_1	1.2469***	1.0931***	1.1607**	1.0018**
GERD_1	0.0567***	0.0494*	0.0408	0.0496***
lopenness_1	-0.2398***	-0.2676***	-0.2404**	-0.2602***
Country Fixed Effects	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES
Trends	--	YES	--	-
Observations	346	362	283	362
R-squared	0.9844	0.9847	0.9655	0.9794
AB(1)	0.4895	0.8228	0.7678	0.6169
Chow	0.1767	0.0745	0.2225	0.0870
F-Stat (trends)	--	0.3452	--	--
Hansen	0.5280	0.7335	0.4470	--

Figure 1 - The Beveridge curve across the OECD sample, actual and predicted ur, 1991-2012.



Legend: AU=Australia, AT=Austria, CH=Switzerland, DE=Germany, FI=Finland, FR=France, JP=Japan, NO=Norway, PT=Portugal, SE=Sweden, UK=United Kingdom, US=United States.