International Capital Mobility and Unemployment Dynamics: Empirical Evidence from OECD Countries*

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February 2014

Abstract

We use a panel of 20 OECD countries over a 30-year period to estimate the implications of international capital mobility for unemployment. We find that the increase in capital flows since the mid 1980s has contributed to an amplification of the impulse response of unemployment to country-specific shocks and to a fall in the persistence of unemployment in response to the same shocks.

Key words: unemployment persistence, unemployment volatility, international capital flows, OECD countries

JEL Classification: E24, E32, F15, F21

*I thank Christopher Pissarides, Barbara Petrongolo and Steve Nickell for their valuable comments and suggestions.

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1 Introduction

This paper focuses on the labour market effects of international capital mobility. Specifically, our aim is to assess whether and to what extent the remarkable increase in capital mobility experienced by the OECD countries in the last two decades has contributed to unemployment persistence and volatility.

The benefits of capital mobility are well known: the removal of barriers to factor mobility increases efficiency and, by lowering the cost of financial transactions, improves saving and investment. Both from a quantitative and qualitative point of view. In the long run, higher capital mobility enhances capital accumulation and economic growth. However, in a world in which labour is less mobile than capital, perfect capital mobility will also amplify the impact of country-specific productivity shocks on domestic employment.

The reason why this happens is easy to understand if one considers how an economy adjusts to a temporary reduction in productivity. In an economy without capital mobility, a temporary decrease in productivity leads to a reduction in the rate of return to capital and then to a temporary fall in capital accumulation and labour demand. But in presence of low barriers to international capital mobility, investors diversify country-specific productivity shocks across countries. As a consequence, when a domestic negative shock hits the economy, capital flows abroad, where the rates of return are relatively higher. This further shrinks labour demand and deepens the recession. Conversely, if the shock is positive, the inflow of foreign capital accelerates the increase in the demand for labour. These forces result in bigger and sharper fluctuations in labour demand and real wages than would be observed in a closed economy, while the mean unemployment rate is not substantially affected.

Stemming from the theoretical contribution of Azariadis and Pissarides (2007), in this paper we test the link between capital mobility and unemployment dynamics by using a panel of 20 OECD countries for the past 30 years. In particular, we are interested in exploring two possible roles played by capital mobility - first its effect on the persistence of unemployment and second its impact on the response of unemployment to idiosyncratic productivity shocks. In our analysis we find evidence of both mechanisms: larger penetration of international capital significantly amplifies the impact of idiosyncratic shocks on domestic unemployment and reduces the duration of the response to the shocks. The overall effect on unemployment volatility remains undetermined.

The reminder of the paper is organized as follows. In section 2, we present the theoretical motivations of our study. Section 3 defines the key measures and concepts of unemployment volatility and capital mobility that we use in the empirical analysis along with a preliminary analysis of the data. In section 4 we present the empirical results and simulate the effects of changes in capital mobility on unemployment volatility. Section 5 concludes.

2 Theoretical motivations and empirical evidence

The importance of international capital mobility has been extensively examined in the trade theory. However, little attention has been devoted to the macroeconomic effects of capital market integration. Indeed, increased capital mobility can produce undesirable effects in economies whose domestic capital becomes more responsive to productivity or price shocks.[1]

A direct implication of increased international capital mobility is an increase in investment volatility as the substitution between domestic and foreign investment becomes larger. Using a simple neoclassical model, Razin and Rose (1994) show that a reduction in barriers to capital mobility enhances investment opportunities and increases therefore the volatility of investment. These effects are larger when the underlying shocks are idiosyncratic and permanent. A non structural empirical analysis is also performed to test the link between

[1] There is a large theoretical and empirical literature which relates changes in the business cycle volatility to changes in the degree of capital mobility. On the theoretical side, the effects of increased capital market integration on macroeconomic volatility are in fact not clear, and depend on the nature of the underlying shocks. For a discussion of this literature, see the survey of Buch (2002). The analysis of the effects of capital market integration on business cycle volatility goes beyond the scope of this paper. From now on, we will focus our discussion on the implications of increased capital mobility for labour market volatility.

openness and volatility suggested by the theory, finding little support for the theoretical conclusions.[2]

Regarding the effects of increasing international capital mobility on the labour market, Rodrik (1997) is one of the first who emphasizes the link between openness and labour market instability in a world where labour is intrinsically less mobile than capital. The main implication of this asymmetry is that workers have to face greater instability in earnings and hours worked in response to country specific shocks when international mobility of capital increases. Using a simple static model of an open economy, he shows that the elasticity of demand for domestic labour increases with the degree of "openness" of the economy.[3] The intuition is easy to understand. The demand for any factor used in the production process becomes more sensitive to changes in its own price when other production factors (as for example capital) respond quicker and to a larger extent to economic changes.[4] When an idiosyncratic shock hits the economy (such as an exogenous shock to labour demand caused by an unexpected change in labour productivity) a flatter demand curve will result in larger changes in both employment and wages.[5]

Azariadis and Pissarides (2009) analyse the impact of capital mobility on unemployment dynamics using a labour search framework.[6] Their one-sector equilibrium life-cycle model combines two important characteristics: (1) non-Walrasian labour markets with search frictions, and (2) asymmetry between international mobility of capital and labour, with capital

[2] One of the main limitations of this kind of study is the difficulty of designing appropriate measures of the degree of capital mobility. The most frequently used indicators indicate the existence of barriers to capital mobility but they do not measure the intensity of such barriers. As a consequence the data (mainly cross sections) are not powerful enough to deliver any clear-cut implication.

[3] The degree of "openness" of the economy is captured by the increasing cost incurred by firms as capital moves across the national borders.

[4] As Rodrik pointed out, this can be seen as a direct consequence of the Le Chatelier- Samuelson principle.

[5] The distribution of volatility between wages and employment depends on the slope of the labour supply curve.

[6] The model is a open-economy version of models previously used to study the implications of search theory in explaining certain phenomena of the business cycle that the standard neoclassical framework cannot explain in a satisfactory way. See among the others Merz (1995), Andolfatto (1996) and den Haan et al. (1997).

being perfectly mobile across countries and labour perfectly immobile. In this framework, unemployment arises in equilibrium because of the presence of frictions in the matching process between vacancies (opened by firms at a constant unit cost) and available workers. Temporary international differences in total factor productivity determine the allocation of capital across national borders and, through capital adjustments, affect the domestic employment (and unemployment) rate. They show that in an open economy unemployment fluctuations caused by idiosyncratic TFP shocks are larger though less persistent than in a closed economy. The intuition is the following. In a closed economy adjustments of capital stock (and consequently of employment) after a productivity shock occur gradually and are driven by changes in domestic savings. In an economy with capital mobility, accumulation and decumulation of capital stock do not occur entirely through changes in domestic savings. Capital is imported from abroad when a positive TFP shock hits the domestic economy and is exported abroad in the case of a negative shock. As a consequence, the adjustment of employment is faster (instantaneous under extreme assumptions) in an open economy than in a closed economy. Under quite general assumptions, the main implications for the unemployment dynamics are that: (1) international capital mobility amplifies the impact on domestic unemployment of idiosyncratic TFP shocks; (2) it shortens the duration of the effect; and (3) it raises the volatility of unemployment. Moreover, the impact of capital mobility on unemployment dynamics is stronger for small countries than large countries, since large economies exhibit a higher degree of synchronization of business cycles.[7] Numerical calibrations of the model show that the variance of the unemployment rate with perfect capital mobility is almost three time larger than in an economy without capital mobility. These results appear to be consistent with the observation that the variability of unemployment has increased in recent decades in almost all the OECD countries, in parallel

[7] The authors aregue that when shocks are perfectly (positively) correlated, each country operates as if capital is not mobile.

with the liberalization of international capital markets.

Increased labour market volatility in the United States over the last three decades has been documented in a number of studies. Gottschalk and Moffitt (1994) show a substantial increase in earnings dispersion in the US manufacturing sector between the 70s and 80s, half of which has been related to the increase in the variance of "transitory" movements in earnings.[8] Recent evidence in Farber (1996, 2003) also shows an increase in job insecurity between the 80s and 90s in the United States. Focusing on the incidence of job loss over the periods 1982-1996 and 1996-2001, Farber finds an increase in job loss rates over time after accounting for the state of the labour market.[9] As Rodrik (1997) pointed out, these facts appear to be consistent with an economy in which greater openness interacted with fluctuations in labour demand has led to greater instability in wages and employment.

Regarding the effects of "globalisation" on labour demand, as predicted by Rodrik (1997) and Azariadis and Pissarides (2004), a number of papers analyse the link between international market integration and labour demand elasticity (Slaughter, 2001; Faini et al., 1999; Bruno et al., 2003).[10] In general, these papers show that the production-labour demand becomes more elastic over time in the overall manufacturing sector in the US, Italy, France and the UK.

[8] The increase of the variance of "transitory" or *short-term* changes in earnings captures an increase of the fluctuations of worker's earning from year to year.

[9] In the early 90s (during a weak labour market) job loss rates have been found to be higher than those recorded during the recession in the early 80s. Job loss also increased substantially in the 1999-2001 period in concomitance with the beginning of the recession.

[10] The indicators of international market integration used in the analysis include both measures of trade and capital openness. In fact the effect of international trade on the elasticity of labour demand is analogous to that of international capital mobility. The reason is that firms and consumers can substitute foreign workers for domestic workers by either investing abroad or by importing goods produced abroad (Rodrik, 1997). As explained before, higher labour demand elasticity triggers more volatile responses of wages and employment to any exogenous shocks to labour demand.

3 Employment dynamics and capital mobility: a preliminary analysis

As we have seen in the previous section, the theory predicts that economies with larger international capital flows have higher volatility of investment (Razin and Rose, 1994) and unemployment (Azariadis and Pissarides, 2004). In this section we consider some preliminary evidence of the relationship between capital mobility and unemployment volatility by looking at the correlation between different measures of international capital mobility and the volatility of unemployment. The analysis is based on annual data for 20 OECD countries over the period 1970-2003[11].

The measurement of capital mobility is not an easy task, especially for the peculiarities of the theory underlying this paper. Two broad approaches can be found in the literature: one based on measuring *de jure* openness and one measuring *de facto* openness. The basis for measuring *de jure* openness is the removal of restrictions to capital account transactions, as published in line E.2 of the IMF's AREAR or the OECD Code of Liberalisation of Capital Movements (only for OECD countries). The key advantage of these measures, which have been used in different forms in the literature, is that they allow for a clear and easy identification of when a country had removed all barriers to capital account transactions. However, a drawback is that countries may liberalise their capital accounts by removing individual barriers gradually over time. As an alternative to the *de jure* measures, various *de facto* proxies of openness have been developed by the literature. The rationale for looking at actual openness is that a country that is open *de jure* may not necessarily experience such inflows. The literature has looked at various capital flows as related to FDI, portfolio flows and debt flows (e.g. Kraay 1998). One key difficulty of using *de facto* openness measures is due to the fact that actual capital flows may not be purely exogenous, or at least may

[11] We restrict our analysis to the period 1970-2003 since data on the labor market institutions which will be used in the estimates, are drawn from Bassanini and Duval (2006) and available until 2003. The full list of the countries included in the analysis and the definition of variables used is given in Appendix A.1.

be correlated with other developments in the economy such as, for example, investment opportunities, the economic and political environment etc.

In our analysis we use both measures of the penetration of foreign capital in the OECD countries, namely (1) an index that measures the extent of openness in capital account transactions ($KAopen$) provided by Chinn and Ito (2007) as a proxy of the *de jure* international capital openness and (2) the sum of FDI inflows and outflows ($KAsum$) normalized for domestic investment as a proxy of the overall FDI activity as a measure of *de facto* capital mobility.[12] The Chinn-Ito index is based on the information on restrictions on cross-border financial transactions as reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) and it is available for 182 countries for the period 1970-2013.[13] The data on actual FDI flows are available from the International Financial Statistics of the IMF for almost all the OECD countries for the period under investigation.[14] Measures of capital mobility based on FDI intensity have the advantage that data on FDI are readily available on a comparable basis for a large number of countries. However, some limitations remain due to existing divergences in the compilation methodologies, definitions and classifications.[15]

Table1 reports the sample average volatility of the unemployment rate[16] and the average of our measures of capital mobility for the whole period (1970-2003), for two sub-periods,

[12] The *de facto* and *de iure* indicators are positively correlated in our sample. The spearman correlation coefficients of $KAopen$ with FDI inflows, FDI outflows and their sum ($FDIsum$) are 0.32, 0.68 and 0.53 respectively, and all of them are highly statistically significant.

[13] The index was originally available for 181 countries for the 1970 – 2005 period. Note that in the analysis we use the 2013 version of the dataset (containing data up to only 2011), which may slightly differ from the original version of the dataset.

[14] The IMF publishes annual data on FDI inflows (direct investment in the reporting economy) and FDI outflows (direct investment abroad) in the Balance of Payments Statistics Yearbook, which are also available in the International Financial Statistics.

[15] For a discussion on the international comparability of FDI statistcs, see the excellent survey by Falzoni (2000).

[16] Following a standard approach in the real business cycle literature, we calculate the unemployment rates volatility as the standard deviation of the cyclical component of the time series under investigation. We detrended the data using the Hodrick-Prescott filter, setting the smoothing parameter λ equal to 100 as suggested for annual data (Hodrick and Prescott, 1997). Raw data on unemployment are available from the OECD National Account Statistics and Economic Outlook.

before and after 1985, and for small and large countries separately.

[TABLE 1 AROUND HERE]

The striking feature of the data is the remarkable increase in international capital mobility after the mid 1980s. The sharp increase in FDI inflows affected almost all the countries in the sample[17] and, in accordance with the prediction of the theory, this coincides with an increase in the volatility of unemployment. On average the standard deviation of the unemployment rate is almost 43 percent higher in the period 1986-2001 than in the previous period.

A preliminary assessment of the cross country correlation between unemployment volatility and our measures of capital mobility is provided in Figure 1, where each measure of capital mobility is plotted against the volatility of unemployment rate. The figure clearly shows that countries with a higher degree of openness to international capital flows measured by both by *de iure* and *de facto* indicators, are also characterized by higher unemployment volatility. This relationship holds irrespective of the measure for capital mobility used.

In what follows we present more systematic evidence of the effects of capital mobility on unemployment dynamics.

4 Empirical analysis

4.1 Empirical specification

In this section we present econometric evidence bases on macro-panel data of the effects of capital mobility on unemployment persistence and on the adjustment dynamics of unemployment in response to idiosyncratic TFP shocks. In particular, we test empirically three main theoretical implications of the Azariadis and Pissarides model: (1) capital mobility increase the response of unemployment to domestic (idiosyncratic) productivity shocks; (2)

[17] Tables 1A-3A in appendix **??** report FDI statistics and unemployment volatility for the individual OECD countries in the sample.

it shortens the duration of the effect; (3) the effects on unemployment dynamics are larger in small countries than in large countries. Data are drawn from Chinn and Ito (2008) and IMF for capital mobility indicators, Bassanini and Duval (2006) for the labour market institutions OECD national accounts for unemployment and other macro data.

The baseline framework is a reduced form dynamic equation for unemployment where we include controls for labour market institutions and the (ex ante) real interest rate, which may affect the equilibrium rate of unemployment. We also control for a TFP shock, a price shock and an import shock which may affect the short run dynamics of unemployment. The set of institutional variables includes indicators of the duration and generosity of unemployment insurance systems (benefit duration and benefit replacement ratio), the tax wedge between the real (monetary) labour cost faced by the firms and the consumption wage received by the employees and union density. Country fixed effects capture unobserved heterogeneity between countries, country specific trends and time dummies control for common and country-specific trends and business cycle effects.[18] Finally, we capture the endogenous persistence of unemployment by adding lags of the dependent variable among the regressors.

The baseline unemployment equation is as follows:

$$\begin{aligned} u_{it} \;=\; & \sum_{j=1}^{p}\theta_j u_{it-j} + \sum_{j=0}^{q}\gamma_j tfp\_sh_{it-j} + \boldsymbol{\alpha}_1'\mathbf{inst}_{it} + \alpha_2 rint_{it} \\ & + \alpha_3 pr\_sh_{it} + \alpha_4 imp\_sh_{it} + c_{it}t + \lambda_t + c_i + \varepsilon_{it} \end{aligned} \tag{1}$$

where $i = 1,..,20$, $t = 1,...,31$, tfp_sh is the TFP shock, **inst** denotes the set of institutional variables included in the regression, $rint$ is the (ex ante) real interest rate, pr_sh is an inflationary shock and imp_sh is an import price shock as defined in Nickell *et al.*

[18] The reduced form for the unemployment equation we estimate is in line with the literature which investigates the dynamics of unemployment over time (see Layard et al, 1991; Nickell et al., 2005; Bassanini and Ducal, 2006; Bertola et al, 2007)

(2001). c_i and λ_t capture country-specific effects and time effects respectively and c_{it} reflects those country-specific factors which may have an impact on the change of unemployment. Finally, ε_{it} captures all the other shocks to the unemployment rate, and it is assumed to be serially uncorrelated.[19]

Equation 1 is our benchmark where unemployment is explained by its lagged values and other standard determinants in the literature. As a measure of persistence we use the sum of the coefficients on the lags of unemployment, that is $\bar{\theta} = \sum_{j=1}^{p} \theta_j$. For $\bar{\theta} \in (-1, 1)$ the cumulative effect of a shock on unemployment is given by $1/(1 - \bar{\theta})$. A larger $\bar{\theta}$ is then associated with shocks having a larger cumulative effect on unemployment over time, implying larger persistence (Pivetta and Reis, 2001).

Following Nickell et al. (2001), the TFP shock (tfp_sh in the equation) has been measured as the deviation of the Solow residual from its Hodrick-Prescott filtered trend. This variable is an "authentic" shock since it is stationary and mean reverting, though its effects can be long lasting depending on the endogenous persistence of the unemployment rate. The existence of a negative relationship between the variable shock and the unemployment rate implies that the sum of the coefficients on the current and lagged TFP shock ($\bar{\gamma} = \sum_{j=0}^{q} \gamma_j$) has be negative.[20] We choose both p and q equal to 2 and 1 respectively, in order to satisfy standard dynamic properties of the model. In particular, the two lags of the dependent variable have been chosen in order to obtain serially uncorrelated residuals.

As suggested in the above discussion we are interested in exploring two possible roles

[19] The inclusion of lagged dependent variables can lead to finite sample biases with the within-group estimator. The results in Nickell (1981), however, show that the magnitude of the bias diminishes in the length of the time series in the panel. Since the sample runs for 31 years, the size of this bias is likely to be small. The asymptotic unbiasedness of the coefficients crucially depends on the absence of serial correlation in the errors. This will be investigated by using a serial correlation test described by Baltagi (1995). The test we use is an LM statitistic which tests for an $AR(1)$ and/or an $MA(1)$ structure in the residuals in a fixed-effects model. It is asymptotically distributed as $N(0, 1)$ under the null.

[20] The productivity shock captures real wages resistence. A change in productivity growth as a temporary impact on unemployment since wages adjust to productivity with a long lag (Ball and Moffit, 2001; Grubb et al., 1983).

played by capital mobility - first its effect on unemployment persistence and second its impact on the response of unemployment to an idiosyncratic TFP shock. We thus interact our measures of capital mobility[21] with the lags of unemployment to capture the effect on persistence, and with the TFP shock (both current and lagged) to capture the effect on the response to productivity shocks. We also enter the measures of capital mobility in levels to control for any possible effect of capital mobility on the level of unemployment rate. The equation we estimate takes then the following form:

$$\begin{aligned} u_{it} &= \sum_{j=1}^{p}(\theta_j + \theta_j' KA_{it-1})u_{it-j} + \sum_{j=0}^{q}(\gamma_j + \gamma_j' KA_{it-1})tfp\_sh_{it-j} \\ & \beta KA_{it-1} + \boldsymbol{\alpha}'\mathbf{z}_{it} + c_{it}t + \lambda_t + c_i + \varepsilon_{it} \end{aligned} \tag{2}$$

where $KA = KAopen$, $KAsum$ and z_{it}[22] denotes a set of other controls as in equation 1. We use lagged rather than current values of FDI flows in order to avoid endogeneity arising from potential correlation between the error term and current FDI flows caused, for example, by unexpected aggregate shocks on unemployment[23].

The measure of persistence now becomes $\rho = \sum_{j=1}^{p}(\theta_j + \theta_j' \overline{KA}_m)$. If we expect that capital mobility reduces unemployment persistence, the null hypothesis we want to test is $H_0: \sum_{j=1}^{p}\theta_j' \geqq 0$ versus $H_1: \sum_{j=1}^{p}\theta_j' < 0$. If the null is rejected, we can conclude that higher capital mobility leads to a lower persistence of unemployment. Similarly, capital mobility increases the impact of a TFP shock on unemployment if the sum of the coefficients on the variable shock interacted with our proxies for capital mobility is significantly lower than zero. Formally, $H_0: \sum_{j=0}^{q}\gamma_j' \geqq 0$ versus $H_1: \sum_{j=0}^{q}\gamma_j' < 0$.

[21] In order to smooth out spurious fluctuations in capital flows and obtain a more reliable measure of capital mobility, we use four-year moving avarages of FDI inflows and outflows.

[22] $\mathbf{z}_{it} = (union_{it}, bd_{it}, brr_{it}, tw_{it}, rint_{it}, pr\_sh_{it}, imp\_sh_{it})$

[23] The issue of endogeneity is less relevant when we use the *de iure* index if capital mobility.

We finally test if the magnitude of the effects on both persistence and responsiveness differ significantly for large and small countries, by estimating the following specification:

$$
\begin{aligned}
u_{it} \;=\; & \sum_{j=1}^{p}(\theta_j + \theta'_j KA_{it-1})u_{it-j} + \sum_{j=0}^{q}(\gamma_j + \gamma'_j KA_{it-1})tfp\_sh_{it-j} \qquad (3)\\
& + \sum_{j=1}^{p}(\theta''_j + \theta'''_j KA_{it-1}) \times small \times u_{it-j} + \sum_{j=0}^{q}(\gamma''_j + \gamma'''_j KA_{it-1}) \times small \times tfp\_sh_{it-j}\\
& + \beta KA_{it-1} + \beta' KA_{it-1} \times small + \boldsymbol{\alpha}'\mathbf{z}_{it} + c_{it}t + \lambda_t + c_i + \varepsilon_{it}
\end{aligned}
$$

The theory predicts both the sum $\sum\limits_{j=0}^{p}\theta'''_j$ and $\sum\limits_{j=0}^{q}\gamma'''_j$ to be significantly less than zero. Formally, we test the following assumptions: $H_0 : \sum\limits_{j=0}^{p}\theta'''_j \geqq 0$ versus $H_1 : \sum\limits_{j=0}^{p}\theta'''_j < 0$; $H_0 : \sum\limits_{j=0}^{q}\gamma'''_j \geqq 0$ versus $H_1 : \sum\limits_{j=0}^{q}\gamma'''_j < 0$.

4.2 Empirical results

The main results of our estimation are reported in Table 2 for both the *de jure* and *de facto* indicators of capital mobility. Column 1 shows the estimates of the coefficients of a baseline model with no interactions with lagged unemployment and TFP shock. We then estimate the effects of capital mobility on the unemployment persistency (column 2), the response of unemployment to productivity shocks (column 3) and on persistency and responsiveness simultaneously (column 4).

[TABLE 2 AROUND HERE]

We first note that the sum of the coefficients on lags of the dependent variable is significant and different from zero indicating persistence of unemployment and that positive productivity shocks reduce unemployment. Also all the other controls behave as predicted with union density, benefit duration and tax wedge having a positive and significant impact on unemployment. Real interest rate is positively signed and significant as well. These results are robust across specifications and consistent with Nickell et al (2005) and Bassanini and Duval (2006) who use similar specifications.

Second we find the capital mobility reduces the coefficient on the first lag of unemployment and increases the coefficient on the second lag. The net effect on persistence (the sum of the two coefficients) is negative and significant as revealed by the t-test reported at the bottom of the table.[24] This result is robust to the two measures of capital mobility considered. Moreover, the sum of the coefficients of the interaction terms between the indicators of capital mobility and the productivity shock has the expected negative sign, though it turns to be significant at the 10% level when *de facto* indicator of capital mobility is considered. In line with the theory, this suggests that high capital mobility amplifies the impact on the domestic unemployment rate of domestic shocks in total factor productivity. Finally, in accordance with the predictions of Azariadis and Pissarides' model, there is no evidence of any direct effect of capital mobility on the equilibrium unemployment rate.

In the next specification, we test whether the effect of capital mobility on both persistence and responsiveness of unemployment to TFP shocks is stronger for small countries as predicted by the Azariadis and Pissarides model.. Table 3 presents these results.

[TABLE 3 AROUND HERE]

The results are consistent with those for the whole sample and the coefficients are significant at conventional levels. In particular, capital mobility is found to significantly reduce the persistence of unemployment and increase the responsiveness to productivity shocks in both small and large countries. The effect of capital mobility on unemployment persistence is not statically different across the two groups of countries, while larger international capital flows have a stronger impact on the responsiveness of unemployment to productivity

[24] The t-statistic and p-value of the null hypotesis $H_0 : \sum_{j=1}^{p} \theta'_j \geqslant 0$ and $\sum_{j=1}^{p} \gamma'_j \geqslant 0$ are reported on the lower panel of Table 2.

shocks in small countries.

To sum up, the evidence in Tables 2 and 3 suggests that, in economies characterized by larger mobility of international capital, idiosyncratic productive shocks have a stronger, though less lasting, effect on unemployment. Consequently these economies experience amplified fluctuations in unemployment, though the adjustments to the equilibrium are faster. Estimates also suggest that this mechanism is weaker in large economies than in small ones.

4.3 The unemployment response to temporary productivity shocks iith high and low capital mobility

In the previous section we found that international capital mobility affects unemployment dynamics by increasing the impact of productivity shocks on the unemployment and reducing its persistence.

By using the parameters from column 4 in Table 2 and column 1 and 2 in Table 3, we first simulate the response of unemployment to a (negative) one-standard deviation TFP shock and the adjustment dynamics towards the equilibrium in two scenario: (a) a baseline economy with low international capital mobility (closed economy) and (b) international capital flows (open economy). The overall impact of capital mobility on the response of unemployment to the shock is a combination of the initial response of unemployment and the mean lag reflecting the adjustment paths towards the equilibrium.[25]

The exercise is carried on for the *de jure* indicator of capital mobility, using the coefficients estimated in the previous section for the whole sample (equation **??**) and then for large and small countries separately (equation 5 for small countries and 6 for large ones

[25] The mean lag is defined as the time taken to adjust halfway to equilibrium. Using our spefication, the mean lag is calculated as

$$ML = \frac{\gamma_1}{\gamma_1 + \gamma_2} + \frac{\theta_1 + 2\theta_2}{1 - \theta_1 - \theta_2}$$

where the parameters γ and θ depend on the extent of capital mobility across countries.

).[26] In order to quantify the effect of capital mobility on unemployment persistence and responsiveness in a closed and open economy benchmark, we use the average value of the capital mobility indicator in our sample in the period of low capital mobility (before 1985) and high capital mobility (after 1985) as reported in Table 1.[27]

We then make use of the following three equations in the simulations:

$$\begin{aligned} u_{it} &= (1.191 + 0.051{\times}\overline{KA})u_{t-1} - (0.322 + 0.086{\times}\overline{KA})u_{t-2} \\ &\quad -(0.006 + 0.042{\times}\overline{KA})tfp\_sh_t - (0.090 + 0.002{\times}\overline{KA})tfp\_sh_{t-1} \\ &\quad +Const_2 \end{aligned} \tag{4}$$

$$\begin{aligned} u_{it} &= (1.081 + 0.111{\times}\overline{KA})u_{t-1} - (0.222 + 0.150{\times}\overline{KA})u_{t-2} \\ &\quad -(0.004 + 0.041{\times}\overline{KA})tfp\_sh_t - (0.098 + 0.019{\times}\overline{KA})tfp\_sh_{t-1} \\ &\quad +Const_1 \end{aligned} \tag{5}$$

$$\begin{aligned} u_{it} &= (1.490 - 0.090{\times}\overline{KA})u_{t-1} - (0.597 + 0.039{\times}\overline{KA})u_{t-2} \\ &\quad -(0.019 + 0.049{\times}\overline{KA})tfp\_sh_t - (0.055 - 0.009{\times}\overline{KA})tfp\_sh_{t-1} \\ &\quad +Const_3 \end{aligned} \tag{6}$$

with $\overline{KA} = 0.607$ (*closed conomy*); $\overline{KA} = 1.925$ (*open economy*); $Const$ is a constant, e.g. all variables not varied in the simulations.

Figure 2 shows graphically the adjustment dynamics of the unemployment rate after

[26] Qualitativly simalar results are obtained using the *de facto* indicator. Results are available from the author upon request.

[27] For the *de iure* index $KAopen$ the two values are $min = 0.087$ (Portugal) and $max = 2.456$ (Switzerland, the United States and Canada).

a one-standard deviation temporary TFP shock in the two scenarios (open economy and closed economy).

[FIGURE 2 AROUND HERE]

The adjustment path of the unemployment rate to the equilibrium is qualitatively the same in the three graphs. The initial response of unemployment to the shock is larger in presence of lager capital mobility and the speed of the recovery process is higher due to a lower unemployment persistence. In Table 4 we report the effect of the shock at the peak in the two scenario (column 1) and the persistence of the effect measured as the mean-lag (column 2).

[TABLE 4 AROUND HERE]

At the peak, the response effect of unemployment is14pp higher in the open economy than in the closed economy scenario. This difference accounts for almost the 24 percent of the standard deviation of the cyclical unemployment rate in our sample.[28] Moreover, the adjustment to the pre-shock level of unemployment is faster in the economy with capital mobility because of the lower degree of persistence. This results in an estimated mean lag which is on average 45 percent shorter in the open economy than in the closed economy, moving from around 46 months to 25 months.

In accordance with the results discussed in the previous section, the differences in the unemployment dynamics in the two scenarios are more accentuated when we consider the small countries model. In the simulation for small countries, the impact of the productivity shock is almost doubled in the open economy, and the mean lag is reduced by more of 52%.[29]

[28] The impact coefficient of the productivity shock is on avarage 58 percent higher in the open economy than in the closed economy.

[29] The estimated mean lag decreases from 4.08 time-periods (about 49 months) in the closed economy to 1.93 time-periods (about 23 months) in the open economy.

4.4 The unemployment volatility with high and low capital mobility: A Montecarlo simulation excercise

From the previous section we found evidence that higher international capital mobility is associated with a lower persistence of unemployment over time and higher responsiveness of unemployment to productivity shocks. Therefore, the overall effect on volatility is less clear cut depending on which effect prevails. In the next exercise we want to simulate the overall unemployment variance in the two scenario describe above to assess whether the increased international capital mobility observed in the data has contributed to higher variance in the unemployment rate.

Given the emprical specification as in 1, the following benchmark statistics can be calculated across all countries and over the whole period:

$$E(u_0) = E\left[\frac{\sum_{j=0}^{q}(\gamma_j + \gamma_j' KA_{it-1})tfp\_sh_{it-j} + \boldsymbol{\alpha}'\mathbf{z}_{it} + \varepsilon_{it}}{1 - \sum_{j=1}^{p}(\theta_j + \theta_j' KA_{it-1})}\right]$$

$$sd(u_0) = \left[E\left[\left(\frac{\sum_{j=0}^{q}(\gamma_j + \gamma_j' KA_{it-1})tfp\_sh_{it-j} + \boldsymbol{\alpha}'\mathbf{z}_{it} + \varepsilon_{it}}{1 - \sum_{j=1}^{p}(\theta_j + \theta_j' KA_{it-1})}\right)^2\right] - [E(u_0)]^2\right]^{1/2}$$

The first equation corresponds to the predicted average of the steadystate unemployment, and the second one is the standard deviation. Using the observed values of the indicator of capital mobility in the closed economy and open economy, we obtain the difference in the volatility of unemployment in the two scenarios. The above calculation relies on a set of parameters' estimates drawn from the estimation of the non-linear model of Table 2 Column 4. To account for the uncertainty surrounding these estimates and to provide confidence intervals, we bootstrap each coefficients by drawing from its estimated asymptotic distribution.

The results are reported in Table 4, column 3. The increase in capital mobility significantly affects the equilibrium unemployment volatility, which implies that, in the economy with larger capital mobility, the increase in the responsivness of unemployment to productivity shocks dominates the reduction in the persistence. The average standard deviation with international capital mobility exceeds the one without capital mobility by about 6% for the overall sample, thought such difference rises to almost 13% when we consider the small countries sample, where the impact of capital mobility on unemployment volatility is expected to be stronger.This result accounts for more than one quarter of the observed increase in the unemployment volatility in the small countries sample over the period.

5 Conclusions

In this paper we presented empirical evidence for the OECD countries to show that increased international capital mobility has contributed to higher variance in the unemployment rate. Our findings confirm that unemployment in countries characterized by larger penetration of international capital is more responsive to idiosyncratic shocks and consequently these countries experience amplified fluctuations in employment. The time it takes for equilibrium to be restored, however, is shorter with international capital mobility.

We used our empirical model to simulate the response of the unemployment rate to a one-standard error temporary TFP shock. The results suggest that for the period 1986-2001 the simulated unemployment volatility in the economy with positive international capital mobility is on average 16 percent higher than in the economy with no capital mobility.

We then used the model's estimates to illustrate the extent to which capital mobility can account for the higher unemployment volatility occurred in many OECD countries since mid 80s. The model predicts that an increase of international capital flows of the same magnitude of that observed in the data after 1985 accounts for 9-13 percent of the (simulated) increase of unemployment volatility. This suggests a significant role played by international flows of capital in explaining the rise in unemployment fluctuations.

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Table 1. Capital mobility and unemployment volatility

	KAopen	FDI in	FDI out	FDI sum	sd_un
			Overall sample		
			1970-2003		
sample mean (1)	1.346	0.084	0.092	0.185	0.010
			1970-1985		
sample mean (2)	0.607	0.032	0.031	0.063	0.009
			1986-2003		
sample mean (3)	1.925	0.126	0.138	0.268	0.013
sample mean ratio (3)/(2)	3.173	3.982	4.411	4.269	1.431
			Small countries [(1)]		
			1970-2003		
sample mean (1)	1.225	0.103	0.105	0.213	0.011
			1970-1985		
sample mean (2)	0.376	0.034	0.032	0.066	0.008
			1986-2003		
sample mean (3)	1.832	0.158	0.157	0.322	0.013
sample mean ratio (3)/(2)	4.879	4.691	4.893	4.911	1.542
			Large countries [(2)]		
			1970-2003		
sample mean (1)	1.395	0.057	0.077	0.142	0.009
			1970-1985		
sample mean (2)	0.705	0.030	0.030	0.061	0.009
			1986-2003		
sample mean (3)	2.008	0.079	0.116	0.195	0.012
sample mean ratio (3)/(2)	2.846	2.612	3.818	3.215	1.342

Note: [(1)] Australia , Austria, Belgium, Denmark, Finland, Ireland, Netherlands, New Zealand, Norway, Portugal, Sweden, Switzerland; [(2)] Canada, France, Germany, Italy, Japan, Spain, United Kingdom, United States.

Table 2. Capital mobility, unemployment persistence and responsiveness

	De jure indicator				*De facto* indicator			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
unt-1	1.268	1.216	1.276	1.191	1.320	1.360	1.318	1.366
	(24.38)***	(16.31)***	(25.00)***	(16.58)***	(27.96)***	(26.23)***	(27.98)***	(24.04)***
un(t-2)	-0.442	-0.348	-0.438	-0.322	-0.527	-0.552	-0.525	-0.557
	(8.35)***	(4.52)***	(8.23)***	(4.34)***	(11.70)***	(10.79)***	(11.70)***	(10.10)***
un(t-1) × KA		0.017		0.051		-0.331		-0.368
		(0.50)		(1.47)		(3.18)***		(2.23)**
un(t-2) × KA		-0.061		-0.086		0.222		0.257
		(1.70)*		(2.45)**		(1.86)*		(1.67)*
tfp_sh	-0.031	-0.026	-0.012	-0.006	-0.042	-0.043	-0.035	-0.045
	(1.64)	(1.39)	(0.70)	(0.38)	(2.54)**	(2.66)***	(2.01)**	(2.47)**
tfp_sh(t-1)	-0.098	-0.095	-0.090	-0.090	-0.090	-0.090	-0.091	-0.086
	(6.19)***	(6.06)***	(6.00)***	(6.01)***	(5.84)***	(5.79)***	(5.07)***	(4.57)***
tfp_sh × KA			-0.042	-0.042			-0.069	0.006
			(4.86)***	(4.69)***			(1.53)	(0.12)
tfp_sh(t-1) × KA			-0.010	-0.002			0.004	-0.060
			(1.21)	(0.31)			(0.05)	(1.73)*
KA	0.001	0.004	0.001	0.003	-0.001	0.004	-0.002	0.004
	(1.08)	(1.18)	(1.07)	(1.46)	(0.72)	(0.70)	(1.09)	(0.73)
Persistence coefficient:								
$\sum_{j=1}^{2}\hat{\theta}_j + \hat{\theta}'_j \times \overline{KA}$	0.826	0.809	0.838	0.822	0.793	0.788	0.793	0.789
	(31.39)***	(31.86)***	(33.24)***	(33.89)***	(32.22)***	(33.22)***	(33.08)***	(32.23)***
Responsiveness coefficient:								
$\sum_{j=1}^{2}\hat{\gamma}_j + \hat{\gamma}'_j \times \overline{KA}$	-0. 129	-0.121	-0.172	-0.155	-0.132	-0.133	-0.138	-0.141
	(5.21)***	(4.95)***	(5.22)***	(7.03)***	(6.10)***	(6.19)***	(6.03)***	(6.52)**
F-tests (p-values) –Null: no effect on persistence								
$H_0:\ \theta'_1 = 0, \theta'_2 = 0$	-	0.000	-	0.000	-	0.021	-	0.015
$H_0: \sum_{j=1}^{2}\theta'_j \geq 0$	-	0.000	-	0.000	-	0.001	-	0.031
F-tests (p-values)- Null: no effect on responsiveness								
$H_0:\ \gamma'_1 = 0, \gamma'_2 = 0$	-	-	0.000	0.000	-	-	0.089	0.092
$H_0: \sum_{j=1}^{2}\gamma'_j \geq 0$	-	-	0.000	0.000	-	-	0.251	0.083
Serial Correlation								
(p-values)	0.12	0.17	0.16	0.20	0.22	0.24	0.18	0.19
R-squared	0.87	0.87	0.89	0.90	0.88	0.88	0.89	0.89
Observations	569	569	569	569	544	544	544	544
Countries	20	20	20	20	20	20	20	20

Note: . ***,**, * significance at 1, 5 10 percent respectively. Robust t-statistics in parenthesis. Serial Correlation is an LM test distributed N(0,1) under the null (H0: no autocorrelation). All the specifications include country dummies, year dummies and country specific trends. Other controls in the regressions are: Union density (union), benefit duration (bd) benefit replacement ratio (brr), tax wedge (tw), real interest rate (rint), import shock (imppr_sh), price shock (pr_sh). See Table 4A in Appendix 2 for the complete set of results.

Table 3. Capital mobility, unemployment persistence and responsiveness: small vs. large countries

	De jure indicator			*De facto* indicator		
	(1)	(2)	(3)	(1)	(2)	(3)
	small	large	Δ small vs. large	small	large	Δ small vs. large
un(t-1)	1.081	1.490	-0.409	1.35	1.225	0.125
	(12.90)***	(17.07)***	(3.61)***	(118.13)***	(12.94)***	(1.06)
un(t-2)	-0.222	-0.597	0.375	-0.6	-0.414	-0.186
	(2.644)***	(6.99)***	(3.61)***	(8.449)***	(4.86)***	(1.06)
un(t-1) × kopen	0.111	-0.090	0.201	-0.371	0.609	-0.980
	(2.689)***	(2.05)**	(3.45)***	(2.022)**	(1.00)	(1.55)
un(t-2) × kopen	-0.150	0.039	-0.189	0.266	-0.859	1.125
	(3.645)***	(0.92)	(3.11)***	(2.029)**	(1.68)*	(2.27)**
tfp_sh	-0.004	-0.019	0.015	-0.03	-0.002	-0.028
	(0.22)	(0.47)	(0.38)	(1.65)*	(0.05)	(0.68)
tfp_sh(t-1)	-0.098	-0.055	-0.043	-0.084	-0.051	-0.033
	(5.80)***	(2.11)**	(1.51)	(4.13)***	(1.48)	(0.86)
tfp_sh × kaopen	-0.041	-0.049	0.008	-0.789	-0.448	-0.338
	(3.52)***	(2.67)***	(0.62)	(2.52)**	(3.01)***	(3.03)***
tfp_sh(t-1) × kaopen	-0.019	0.009	-0.028	-0.202	-0.200	-0.402
	(1.689)*	(0.76)	(1.73)*	(1.02)	(0.83)	(0.79)
Effect on persistence						
$\sum_{j=1}^{2}\theta'_j$	-0.039	-0.051	0.012	-0.105	-0.251	0.145
	(1.71)*	(3.81)***	(1.35)	(1.66)*	(1.67)**	(1.21)
Effect on responsiveness						
$\sum_{j=1}^{2}\gamma'_j$	-0.060	-0.040	-0.020	-0.991	-0.648	-0.343
	(3.95)***	(1.67)*	(1.67)*	(1.72)*	(2.78)***	(2.67)***

Note: . ***,**, * significance at 1, 5 10 percent respectively. Robust t-statistics in parenthesis. All the specifications include country dummies, year dummies and country specific trends. Other controls in the regressions are: Union density (union), benefit duration (bd) benefit replacement ratio (brr), tax wedge (tw), real interest rate (rint), import shock (imppr_sh), price shock (pr_sh). See Table 5A in Appendix 2 for the complete set of results.

Table 4: Simulation results: responsiveness, persistence and volatility with low and high international capital mobility.

	Impact (Max Peak)	Persistence (Mean Lag)	Volatility (Stand. Dev.)
	(1)	(2)	(3)
		Overall Sample	
Open economy	0.0059	1.88	0.021
Closed economy	0.0033	4.35	0.019
Diff%	78.79	-56.78	11.12
		Small Countries	
Open economy	0.0073	1.66	0.021
Closed economy	0.0038	4.67	0.016
Diff%	90.76	-64.43	24.83
		Large Countries	
Open economy	0.0049	1.47	0.020
Closed economy	0.0033	2.96	0.019
Diff%	50.77	-50.18	8.45

Note: The differences in the impacts (column 1) and in the mean lags (column 2) are calculated using the results from the simulation exercise describe in paragraph 3. Volatility (column 3) is calculated using the Montecarlo simulation as described in paragraph XXX. All the differences between the two scenarios are significant at 5% and more.

Figure 1. Cross country correlation between unemployment volatility and capital mobility

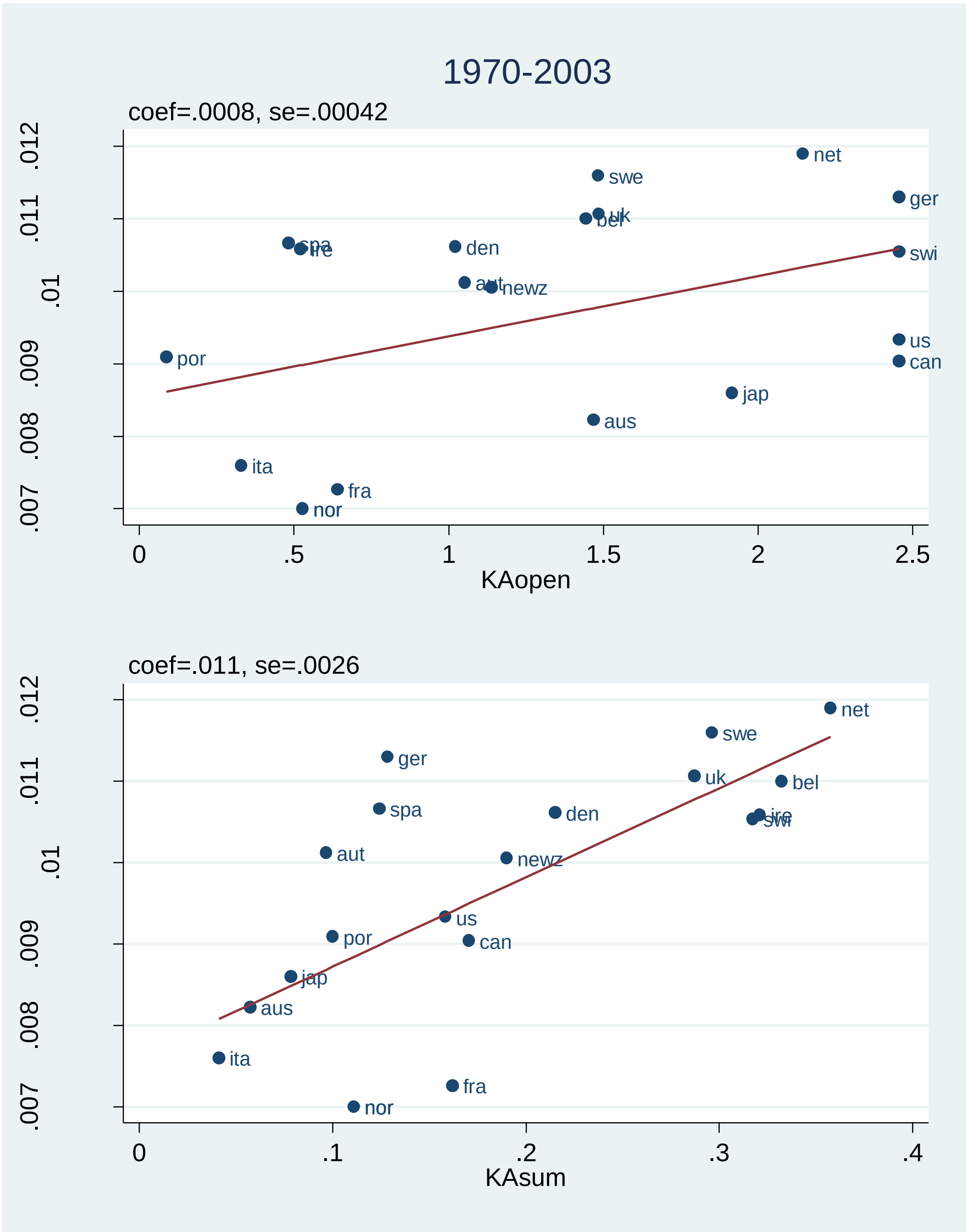
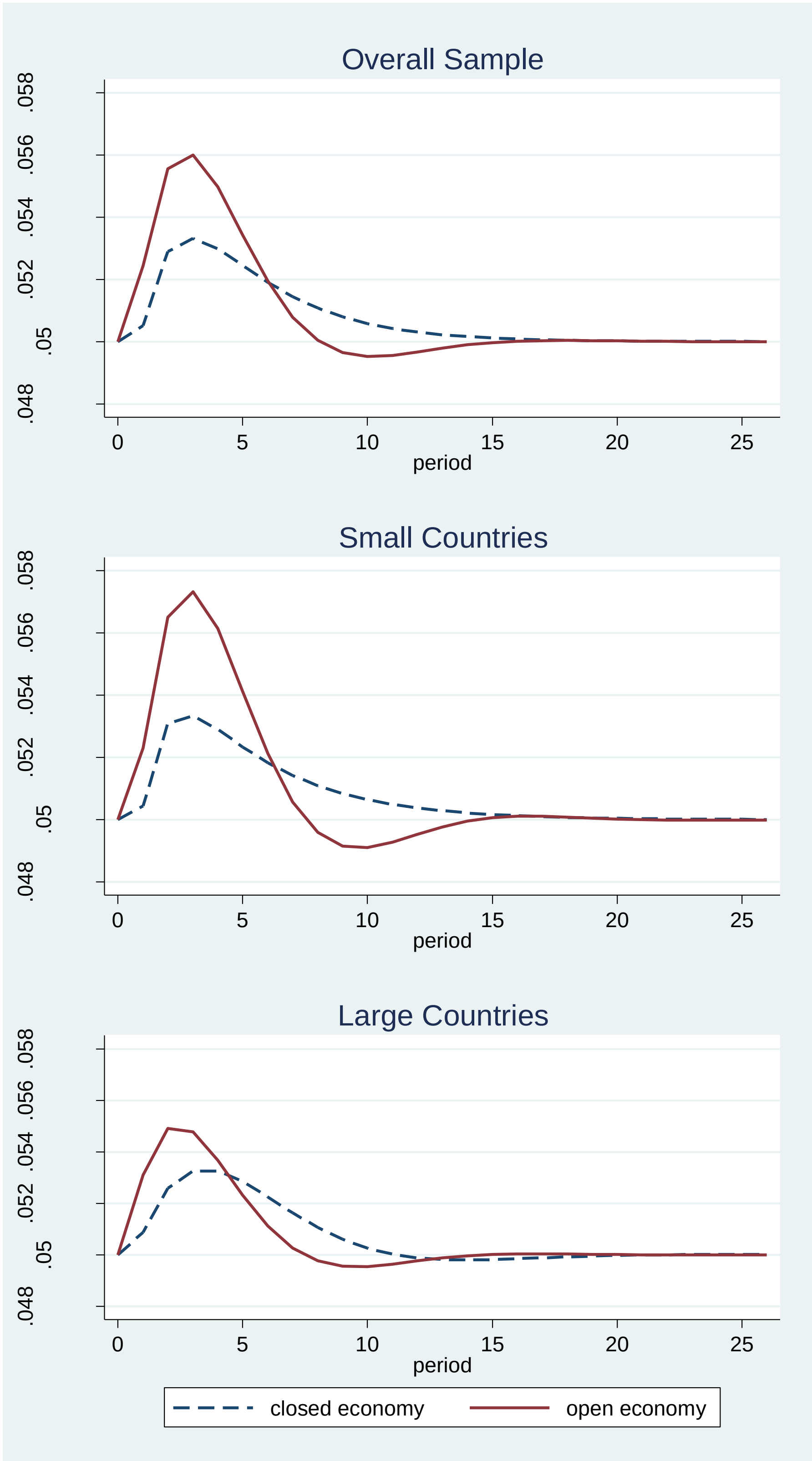


Figure 2. Simulation



A Appendix 1

A.1 Data appendix

A.1.1 Sample composition

The countries in the sample are:

Australia	Finland	Japan	Spain
Austria	France	Netherlands	Sweden
Belgium	Germany	Norway	Switzerland
Canada	Ireland	New Zealand	United Kingdom
Denmark	Italy	Portugal	United States

A.1.2 Data definitions and sources

u Unemployment rate (*source*: OECD, Labour Force Statistics).

sd_un Unemployment rate volatility. This is calculated as the standard deviation of the cyclical component of the unemployment rate. We detrended the data using the Hodrick-Prescott filter, setting the smoothing parameter λ equal to 100 as suggested for annual data (Hodrick and Prescott, 1997).

FDIin Foreign direct investment inflows (*source*: International Financial Statistics, IMF) normalized to nominal domestic investment (*source*: OECD National Accounts).

FDIout Foreign direct investment outflows (*source*: International Financial Statistics, IMF) normalized to nominal domestic investment (*source*: OECD National Accounts).

FDIsum Sum of foreign direct investment inflows and outflows: $FDIsum = FDIin + FDIout$.

w Real labour cost: $w = \left(\frac{WSSE}{def_{GDP}}\right)/(L - L_{self})$, where WSSE is the compensation of employees at current price and national currencies (*source*: OECD Economic Outlook), def_{GDP} is the GDP deflator, base year 1990 (*source*: OECD National Accounts), L is total employment and L_{self} is the total number of self- employed ECD National Accounts)

K Real capital stock. The calculation of the capital stock is made according to the Perpetual Inventory Method: $K = (1-\delta)K_{-1} + \left(\frac{I^n}{def_{INV}}\right)_{-1}$, where I^n is the gross fixed capital formation at current prices and national currencies (*source*: OECD National Accounts) and def_{INV} is the gross fixed capital formation price index, base year 1990 (*source*: OECD National Accounts) and the depreciation rate, δ, is assumed constant and equal to 8 percent, which is consistent with OECD estimates (Machin and Van Reenen, 1998). Initial capital stock is calculated as: $K_0 = \frac{I_0}{g+\delta}$, where g is the average annual growth of investment expenditure and I_0 is investment expenditure in the first year for which data is available.

tfp_sh TFP shock. This is computed as the deviation of the Solow residual from its (Hodrick-Prescott) trend (Nickell *et al.* 2001). The Solow residual is calculated using the following formula: $dlnA = \frac{1}{1-\overline{\alpha}}[d\ln Y - \overline{\alpha} d\ln K - (1-\overline{\alpha}) d\ln L]$, where Y is gross domestic output at constant price and national currencies (*source*: OECD National Accounts), K is capital stock as defined above, L is total employment (*source*: OECD Economic Outlook), $(1-\overline{\alpha})$ is a smoothed share of labour following the procedure described in Harrigan (1997). Labor share is defined as $(1-\alpha) = \frac{wL}{Y}$.

p Consumer price index , base year 1990 (OECD, Main Economic Indicators).

pr_sh Price shock. This is computed as the change in inflation: $pr\_sh = \Delta^2 p$ (see Nickell et al, 2006)

imp_sh Import price shock. This is measured by proportional changes in real import prices weighted by the trade share (Nickell *et al.* 2001): $imp\_sh = \frac{M}{Y_n} \Delta \ln \left(\frac{P_M}{P_Y} \right)$ where M (*source*: OECD Outlook) and Y_n (*source*: OECD National Accounts) are imports and GDP at current prices, P_M (*source*: OECD Outlook) and P_Y (*source*: OECD National Accounts) are the import price deflator and the GDP deflator (*source*: OECD National Accounts) both with 1995 as base year .

rint Real long term interest rate deflated by the 3-year expected inflation rate: $r = i - E(d\ln p_{+1})$, where i is the long term nominal interest rate (*source*: OECD Economic Outlook). $E(d\ln p_{+1})$ are fitted values from the regression $d\ln p = \gamma_1 d\ln p_{-1} + \gamma_2 d\ln p_{-2} + \gamma_3 d\ln p_{-3} + \nu$, where $d\ln p$ is the inflation rate based on the consumer price index p (*source*: OECD National Accounts) and the coefficients on the right side are restricted to sum to one, indicating inflation neutrality in the long run (see Cristini, 1999).

union Trade union density, defined as the percentage of employees who are union members (*source:* Bassanini and Duval, 2006)

tw Labour tax wedge, calculated as the sum of the employment tax rate, the direct tax rate and the indirect tax rate (*source:* Bassanini and Duval, 2006)

br Average benefit replacement ratio, defined as the ratio of unemployment benefits to wages for a number of representative types (*source:* Bassanini and Duval, 2006)

bd Benefit duration, calculated as the ratio of average to initial unemployment benefit replacement rate (*source:* Bassanini and Duval, 2006)

Table 1A. FDI flows, unemployment and investment volatility: 1970-2003

	kaopen	FDIin	FDIout	FDIsum	sd_un
			Small countries		
Australia	1.468	0.034	0.023	0.057	0.008
Austria	1.053	0.067	0.029	0.097	0.010
Belgium	1.443	0.178	0.154	0.332	0.011
Denmark	1.021	0.106	0.109	0.215	0.011
Finland	1.364	0.052	0.107	0.158	0.023
Ireland	0.520	0.166	0.107	0.321	0.011
Netherlands	2.145	0.138	0.220	0.358	0.012
New Zealand	1.137	0.147	0.043	0.190	0.010
Norway	0.527	0.048	0.055	0.105	0.008
Portugal	0.087	0.063	0.037	0.110	0.007
Sweden	1.483	0.139	0.157	0.296	0.012
Switzerland	2.456	0.095	0.223	0.317	0.011
Mean	*1.225*	*0.103*	*0.105*	*0.213*	*0.011*
			Large countries		
Canada	2.456	0.090	0.080	0.171	0.009
France	0.641	0.058	0.104	0.162	0.007
Germany	2.456	0.034	0.055	0.128	0.011
Italy	0.329	0.018	0.023	0.041	0.008
Japan	1.916	0.002	0.021	0.078	0.009
Spain	0.482	0.071	0.053	0.124	0.011
United Kingdom	1.484	0.124	0.200	0.287	0.011
United States	2.456	0.042	0.043	0.158	0.009
Mean	*1.395*	*0.057*	*0.077*	*0.142*	*0.009*
Sample mean	*1.346*	*0.084*	*0.092*	*0.185*	*0.010*

Table 2A. FDI flows, unemployment and investment volatility: 1970-1985

	kaopen	FDIin	FDIout	FDIsum	sd_un
			Small countries		
Australia	0.935	0.015	0.006	0.021	0.008
Austria	0.021	0.046	0.013	0.059	0.009
Belgium	1.063	0.062	0.019	0.081	0.010
Denmark	-0.106	0.007	0.013	0.020	0.010
Finland	1.364	0.005	0.012	0.017	0.010
Ireland	-0.455	0.054	0.021	0.072	0.011
Netherlands	1.585	0.052	0.131	0.183	0.014
New Zealand	-0.297	0.077	0.018	0.096	0.006
Norway	0.048	0.020	0.022	0.042	0.004
Portugal	-1.159	0.020	0.001	0.022	0.009
Sweden	1.132	0.009	0.040	0.048	0.011
Switzerland	-	0.038	0.088	0.126	0.002
Mean	*0.376*	*0.034*	*0.032*	*0.066*	*0.009*
			Large countries		
Canada	2.456	0.069	0.042	0.111	0.011
France	-0.362	0.018	0.019	0.037	0.005
Germany	2.456	0.010	0.023	0.033	0.011
Italy	-1.025	0.012	0.010	0.022	0.006
Japan	1.391	0.001	0.012	0.012	0.009
Spain	-0.370	0.035	0.006	0.041	0.011
United Kingdom	0.392	0.067	0.102	0.168	0.013
United States	2.456	0.016	0.027	0.043	0.009
Mean	*0.705*	*0.030*	*0.030*	*0.061*	*0.009*
Sample mean	*0.607*	*0.032*	*0.031*	*0.063*	*0.009*

Table 3A. FDI flows, unemployment and investment volatility: 1986-2003

	kaopen	FDIin	FDIout	FDIsum	sd_un
			Small countries		
Australia	1.941	0.053	0.041	0.093	0.008
Austria	1.970	0.090	0.047	0.137	0.011
Belgium	1.823	0.270	0.260	0.529	0.013
Denmark	2.024	0.162	0.162	0.324	0.012
Finland	1.364	0.105	0.225	0.329	0.030
Ireland	1.386	0.250	0.107	0.437	0.013
Netherlands	2.456	0.224	0.308	0.532	0.009
New Zealand	2.412	0.208	0.064	0.272	0.013
Norway	1.165	0.073	0.085	0.158	0.008
Portugal	1.195	0.093	0.061	0.154	0.012
Sweden	1.794	0.269	0.275	0.544	0.016
Switzerland	2.456	0.105	0.248	0.353	0.011
Mean	*1.832*	*0.158*	*0.157*	*0.322*	*0.013*
			Large countries		
Canada	2.456	0.112	0.118	0.230	0.011
France	1.533	0.085	0.163	0.248	0.009
Germany	2.456	0.056	0.085	0.141	0.012
Italy	1.533	0.024	0.036	0.061	0.009
Japan	2.382	0.002	0.026	0.029	0.009
Spain	1.239	0.095	0.085	0.181	0.021
United Kingdom	2.456	0.181	0.299	0.480	0.015
United States	2.456	0.068	0.060	0.127	0.009
Mean	*2.008*	*0.079*	*0.116*	*0.195*	*0.012*
Sample mean	*1.925*	*0.126*	*0.138*	*0.268*	*0.013*

Table 4A: Summery statistics 1970-2003

country	un	union	bd	brr	tw	rint	pr_sh	imp_sh	tfp_sh
Australia	0.0695	0.4381	1.0175	0.2376	0.1413	0.0383	-0.0006	0.0011	0.0001
	0.0218	*0.0744*	*0.0067*	*0.0289*	*0.0468*	*0.0483*	*0.0210*	*0.0101*	*0.0308*
Austria	0.0346	0.4733	0.6980	0.2790	0.3832	0.0387	-0.0014	-0.0063	0.0000
	0.0170	*0.0582*	*0.1447*	*0.0359*	*0.0420*	*0.0133*	*0.0111*	*0.0112*	*0.0185*
Belgium	0.0742	0.5191	0.7818	0.4271	0.4232	0.0434	-0.0011	0.0002	0.0004
	0.0269	*0.0218*	*0.0109*	*0.0290*	*0.0408*	*0.0282*	*0.0169*	*0.0301*	*0.0201*
Canada	0.0862	0.3576	0.2556	0.2830	0.2262	0.0436	-0.0008	-0.0010	-0.0003
	0.0177	*0.0170*	*0.0862*	*0.0149*	*0.0674*	*0.0335*	*0.0201*	*0.0083*	*0.0197*
Denmark	0.0584	0.7477	0.7663	0.5411	0.3987	0.0591	-0.0016	-0.0016	0.0001
	0.0209	*0.0475*	*0.1740*	*0.1044*	*0.0579*	*0.0266*	*0.0165*	*0.0117*	*0.0240*
Finland	0.0729	0.7199	0.6219	0.3286	0.3779	0.0285	-0.0014	-0.0002	0.0007
	0.0445	*0.0611*	*0.0869*	*0.0692*	*0.0657*	*0.0404*	*0.0284*	*0.0135*	*0.0331*
France	0.0837	0.1461	0.3759	0.3255	0.3775	0.0414	-0.0016	-0.0010	-0.0003
	0.0301	*0.0483*	*0.1321*	*0.0565*	*0.0613*	*0.0269*	*0.0113*	*0.0096*	*0.0137*
Germany	0.0607	0.3185	0.6323	0.2875	0.3696	0.0417	-0.0019	-0.0002	0.0003
	0.0242	*0.0344*	*0.0698*	*0.0110*	*0.0277*	*0.0113*	*0.0103*	*0.0102*	*0.0217*
Ireland	0.1109	0.5162	0.5293	0.2723	0.2412	0.0307	-0.0016	-0.0030	0.0004
	0.0420	*0.0580*	*0.1669*	*0.0406*	*0.0459*	*0.0328*	*0.0386*	*0.0294*	*0.0295*
Italy	0.0888	0.4300	0.0347	0.0692	0.3830	0.0238	-0.0014	-0.0005	0.0006
	0.0201	*0.0433*	*0.0793*	*0.0837*	*0.0928*	*0.0442*	*0.0254*	*0.0132*	*0.0224*
Japan	0.0265	0.2601	0.0000	0.1059	0.2281	0.0260	-0.0021	-0.0005	0.0003
	0.0095	*0.0312*	*0.0000*	*0.0166*	*0.0662*	*0.0275*	*0.0305*	*0.0064*	*0.0205*
Netherlands	0.0606	0.2693	0.5828	0.4995	0.4370	0.0424	0.0003	-0.0047	0.0017
	0.0263	*0.0469*	*0.1170*	*0.0258*	*0.0399*	*0.0247*	*0.0113*	*0.0273*	*0.0146*
New Zealand	0.0465	0.3312	1.0267	0.2950	0.2150	0.0227	-0.0030	-0.0002	-0.0002
	0.0310	*0.0825*	*0.0156*	*0.0187*	*0.0348*	*0.0443*	*0.0378*	*0.0120*	*0.0332*
Norway	0.0322	0.5469	0.4987	0.3079	0.3254	0.0342	-0.0015	-0.0037	-0.0001
	0.0148	*0.0196*	*0.0667*	*0.1205*	*0.0628*	*0.0360*	*0.0431*	*0.0089*	*0.0228*
Portugal	0.0613	0.4644	0.2331	0.2295	0.2422	0.0316	0.0000	-0.0030	0.0000
	0.0205	*0.1412*	*0.2309*	*0.1612*	*0.0696*	*0.0506*	*0.0337*	*0.0156*	*0.0523*
Spain	0.1212	0.1272	0.1881	0.2796	0.2779	0.0236	-0.0012	-0.0018	0.0005
	0.0572	*0.0369*	*0.1154*	*0.0645*	*0.0631*	*0.0474*	*0.0208*	*0.0091*	*0.0155*
Sweden	0.0373	0.8203	0.0423	0.2504	0.4212	0.0362	-0.0016	-0.0010	0.0004
	0.0230	*0.0548*	*0.0166*	*0.0577*	*0.0733*	*0.0279*	*0.0202*	*0.0128*	*0.0199*
Switzerland	0.0338	0.2185	0.2944	0.3595	0.4127	0.0285	0.0010	-0.0007	0.0026
	0.0140	*0.0153*	*0.0362*	*0.0680*	*0.0274*	*0.0066*	*0.0063*	*0.0132*	*0.0154*
united kingdom	0.0720	0.4651	0.7048	0.2031	0.2622	0.0282	-0.0023	-0.0030	-0.0001
	0.0288	*0.0847*	*0.1531*	*0.0312*	*0.0225*	*0.0335*	*0.0353*	*0.0154*	*0.0237*
united states	0.0635	0.1899	0.1838	0.1283	0.2158	0.0390	-0.0008	-0.0007	-0.0003
	0.0145	*0.0457*	*0.0251*	*0.0134*	*0.0348*	*0.0236*	*0.0125*	*0.0050*	*0.0204*
Sample mean	0.0661	0.4279	0.4788	0.2802	0.3130	0.0353	-0.0013	-0.0016	0.0002
Sample Std. Dev.	*0.0252*	*0.0511*	*0.0867*	*0.0526*	*0.0521*	*0.0314*	*0.0226*	*0.0136*	*0.0236*

Note: Mean and *standard deviation*

Table 5A. Capital mobility, unemployment persistence and responsiveness

	De jure indicator				*De facto* indicator			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
unt-1	1.268	1.216	1.276	1.191	1.320	1.360	1.318	1.366
	(24.38)***	(16.31)***	(25.00)***	(16.58)***	(27.96)***	(26.23)***	(27.98)***	(24.04)***
un(t-2)	-0.442	-0.348	-0.438	-0.322	-0.527	-0.552	-0.525	-0.557
	(8.35)***	(4.52)***	(8.23)***	(4.34)***	(11.70)***	(10.79)***	(11.70)***	(10.10)***
un(t-1) × KA		0.017		0.051		-0.331		-0.368
		(0.50)		(1.47)		(3.18)***		(2.23)**
un(t-2) × KA		-0.061		-0.086		0.222		0.257
		(1.70)*		(2.45)**		(1.86)*		(1.67)*
tfp_sh	-0.031	-0.026	-0.012	-0.006	-0.042	-0.043	-0.035	-0.045
	(1.64)	(1.39)	(0.70)	(0.38)	(2.54)**	(2.66)***	(2.01)**	(2.47)**
tfp_sh(t-1)	-0.098	-0.095	-0.090	-0.090	-0.090	-0.090	-0.091	-0.086
	(6.19)***	(6.06)***	(6.00)***	(6.01)***	(5.84)***	(5.79)***	(5.07)***	(4.57)***
tfp_sh × KA			-0.042	-0.042			-0.069	0.006
			(4.86)***	(4.69)***			(1.53)	(0.12)
tfp_sh(t-1) × KA			-0.010	-0.002			0.004	-0.060
			(1.21)	(0.31)			(0.05)	(1.73)*
KA	0.001	0.004	0.001	0.003	-0.001	0.004	-0.002	0.004
	(1.08)	(1.18)	(1.07)	(1.46)	(0.72)	(0.70)	(1.09)	(0.73)
union	0.038	0.033	0.038	0.033	0.038	0.040	0.039	0.040
	(3.04)***	(2.77)***	(3.19)***	(2.86)***	(3.12)***	(3.22)***	(3.16)***	(3.22)***
bd	-0.004	-0.004	-0.004	-0.004	0.007	0.008	0.007	0.008
	(0.55)	(0.68)	(0.55)	(0.66)	(1.50)	(1.72)*	(1.54)	(1.73)*
brrr	0.021	0.023	0.020	0.021	0.000	-0.002	-0.000	-0.002
	(1.53)	(1.75)*	(1.49)	(1.66)*	(0.00)	(0.22)	(0.01)	(0.23)
tw	0.019	0.015	0.019	0.016	0.025	0.028	0.026	0.028
	(1.09)	(0.92)	(1.11)	(0.99)	(1.87)*	(2.04)**	(1.92)*	(2.05)**
rint	0.046	0.039	0.050	0.041	0.043	0.041	0.042	0.041
	(2.02)**	(1.76)*	(2.26)**	(1.87)*	(2.18)**	(2.08)**	(2.15)**	(2.10)**
imppr_sh	-0.008	0.001	-0.001	0.007	0.005	0.011	0.012	0.010
	(0.25)	(0.03)	(0.03)	(0.24)	(0.19)	(0.43)	(0.45)	(0.37)
pr_sh	0.021	0.025	0.028	0.029	0.005	0.002	0.004	0.002
	(1.02)	(1.18)	(1.41)	(1.50)	(0.35)	(0.16)	(0.28)	(0.17)
Persistence coefficient								
$\sum_{j=1}^{2}\hat{\theta}_j + \hat{\theta}'_j \times \overline{KA}$	0.826	0.809	0.838	0.822	0.793	0.788	0.793	0.789
	(31.39)***	(31.86)***	(33.24)***	(33.89)***	(32.22)***	(33.22)***	(33.08)***	(32.23)***
Responsiveness coefficient								
$\sum_{j=1}^{2}\hat{\gamma}_j + \hat{\gamma}'_j \times \overline{KA}$	-0. 129	-0.121	-0.172	-0.155	-0.132	-0.133	-0.138	-0.141
	(5.21)***	(4.95)***	(5.22)***	(7.03)***	(6.10)***	(6.19)***	(6.03)***	(6.52)**
F-tests (p-values) - persistence								
$H_0:\ \theta'_1 = 0, \theta'_2 = 0$	-	0.000	-	0.000	-	0.021	-	0.015
$\sum_{j=1}^{2}\theta'_j \geq 0$	-	0.000		0.000	-	0.001	-	0.031
F-tests (p-values)- responsiveness								
$H_0:\ \gamma'_1 = 0, \gamma'_2 = 0$	-	-	0.000	0.000	-	-	0.089	0.092
$\sum_{j=1}^{2}\gamma'_j \geq 0$			0.000	0.000			0.251	0.063
Serial Correlation (p-values)	0.12	0.17	0.16	0.20	0.22	0.24	0.18	0.19
R-squared	0.87	0.87	0.89	0.90	0.88	0.88	0.89	0.89
Observations	569	569	569	569	544	544	544	544
Countries	20	20	20	20	20	20	20	20

Note: all the specifications include country dummies, year dummies and country specific trends. ***,**, * significance at 1, 5 10 percent respectively. Robust standard errors are in parenthesis.

Table 6A. Capital mobility, unemployment persistence and responsiveness: small vs. large countries

	De iure	*De facto*
	(1)	(2)
un(t-1)	1.490	1.225
	(17.07)***	(12.94)***
un(t-2)	-0.597	-0.414
	(6.99)***	(4.86)***
un(t-1) × small	-0.409	0.125
	(3.61)***	(1.06)
un(t-2) × small	0.375	-0.186
	(3.35)***	(1.70)*
un(t-1) × KA	-0.090	0.609
	(2.05)**	(1.00)
un(t-2) × KA	0.039	-0.859
	(0.92)	(1.68)*
un(t-1) × KA × small	0.201	-0.980
	(3.45)***	(1.55)
un(t-2) × KA × small	-0.189	1.125
	(3.11)***	(2.27)**
tfp_sh	-0.019	-0.002
	(0.47)	(0.05)
tfp_sh(t-1)	-0.055	-0.051
	(2.11)**	(1.48)
tfp_sh × small	0 .015	-0.028
	(0.38)	(0.68)
tfp_sh(t-1) × small	-0.043	-0.033
	(1.51)	(0.86)
tfp_sh × KA	-0.049	-0.448
	(2.67)***	(3.01)***
tfp_sh(t-1) × KA	0.009	-0.200
	(0.76)	(0.83)
tfp_sh × KA × small	0.008	-0.338
	(0.62)	(3.03)***
tfp_sh(t-1) × KA × small	-0.028	0.402
	(1.73)*	(0.79)
KA	0.006	-0.002
	(3.84)***	(0.12)
KA*small	-0.004	-0.005
	(2.09)**	(0.35)
union	0.041	0.044
	(3.32)***	(3.48)***
bd	-0.003	0.009
	(0.55)	(1.95)*
brrr	0.018	-0.009
	(1.39)	(0.89)
tw	0.009	0.037
	(0.54)	(2.57)**
rint	0.042	0.055
	(1.93)*	(2.89)***
imppr_sh	-0.007	0.002
	(0.25)	(0.08)
pr_sh	0.027	0.004
	(1.50)	(0.32)
Serial Correlation (p-values)	0.38	0.39
R-squared	0.89	0.88
Observations	569	544
Countries	20	20
small	12	12
large	8	8

Note: all the specifications include country dummies, year dummies and country specific trends. ***,**, * significance at 1, 5 10 percent respectively. Robust standard errors are in parenthesis.