CENTRE FOR EUROPEAN POLICY STUDIES

CEPS WORKING DOCUMENT NO. 197

DECEMBER 2003

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ISBN 92-9079-473-9
Available for free downloading from the CEPS website (http://www.ceps.be)

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Abstract

Anglo-Saxon countries have been successful in the 1990s concerning labour market performance compared to the former role models of Germany and Japan. This reversal in relative economic performance might be related to idiosyncracies in financial markets, with bank-based financial markets as in Germany and Japan being possibly inferior to stock-market based financial markets in turbulent times and when approaching the economic frontier. A cleavage is related to venture capital markets which are flourishing in Anglo-Saxon but not in German-type financial markets. Venture capital is crucial for financing structural change, new firms and innovations and therefore possibly also nowadays for employment growth.

Keywords: Labour markets, venture capital, unemployment, new economy, panel data analysis

JEL classification: E22, E24, E44, G24, G32

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1. Introduction

In spite of the recent cyclical downturn, there is a growing sense that the United States has been steaming ahead again in terms of economic development compared to most OECD countries but especially compared to Germany and Japan, which not long ago, namely in the 1980s, were considered to be successful economic role models. The catch-up process of these two countries vis-à-vis the US does not only seem to be have stopped, but the gap appears to have begun to widen again. This is largely the result of a poor economic performance in the 1990s, especially in Japan, but also in reunified Germany with considerably lower growth rates of per capita GDP and of total factor productivity and a far less impressive labour market performance featuring lower and at times even negative employment growth and rising instead of falling NAIRUs. The US appears to be better able to cope with the economic challenges posed to OECD countries in recent years which can be traced back inter alia to globalisation and to labour-saving technical progress.

The prime challenge to advanced economies is presented by the radical and rapid process of structural change, that is, the ongoing move from largely standardised products of the industrial sector to the service sector, but also to the fledgling areas of the new economy, such as biotechnology, information and internet technology, computers or the media. This structural change is also reflected in a changing composition of labour demand, with the demand for highly qualified and versatile labour rising relative to the demand for low-skilled workers who can perform relatively few tasks. A second important challenge is due to the greater volatility and microeconomic turbulence of the economic environment that favours countries with a more flexible set of institutions in order to be able to respond quickly to shocks and to new economic opportunities. All this conveys the impression that this may be the dawn of a new era of creative destruction with greater risks, but also potentially greater returns for innovative entrepreneurs, since the viability of firms increasingly depends on innovative rather than on imitative activities. Countries with a rigid set of institutions that tend to stifle innovative entrepreneurship are therefore likely to fall behind in terms of economic development as reflected in growth of GDP per capita and of employment.[1]

A third and by now well-known challenge for Japan is solving the ongoing banking crisis. Interestingly, indicators are mounting nowadays that Germany may have also stumbled into a major banking crisis in 2003 with record rates of bankruptcies of firms and of banks having to write off large amounts of bad loans. Back in the 1980s, both countries were heralded for their

[1] See Heckman (2002).

bank-based financial markets which had the same legal roots in the German law tradition[2] and which supposedly gave them an institutional advantage due to stronger protection of creditor rights, more patient financial markets, potentially larger investment volumes and closer relationships between banks and large industrial companies for example. All these factors allegedly enable experienced managers to pursue a longer time horizon in their more discretionary and more large-scale investment policy supposedly to the long-term benefit not only of the firm's share- and stakeholders but also for the country concerned.

Such a positive assessment of bank-based financial markets in countries that are not at the frontier of economic development was actually not restricted to the 1980s, but was already emphasised by Gerschenkron (1962) in his well-known volume *Economic Backwardness in Historical Perspective*. The key notion here is the following: Bank-based financial markets are insider-oriented systems which value the experience of managers more than stock-market-based financial markets do and provide greater protection from short-run market pressures. Furthermore, experienced managers can realise greater investment volumes and are better at adopting already-existing technologies in large quantities. Finally, these two factors are the more important for the economic progress of a country, the further away it is from the world frontier of economic development and were therefore potentially beneficial for Germany and Japan in the post-war period.

In contrast, when approaching the frontier it becomes more important for a country to innovate itself and thus to select the right managers and firms for undertaking promising innovations and new ventures as well as to have a smooth matching process between firms and financiers. Anglo-Saxon type stock-market-based financial markets with fully developed venture capital markets tend to be superior in these types of selection and matching activities, inter alia because they give less shelter to entrenched managers who might not be innovative anymore, thus being more open to the entry of outsider entrepreneurs with new ideas. Concerning the optimal institutional setting in financial markets for long-run growth of per capita GDP and of employment, this suggests that there may be a trade-off between experience on the one hand and selection as well as matching on the other hand. The optimal position might depend on the economic environment as well as on the distance of a specific country to the frontier of economic development. More turbulent times with rapid and radical structural change, along with a closer position to the frontier of economic development both appear to favour the Anglo-Saxon-type institutional setting in financial markets with highly developed venture capital markets.[3]

The poor performance of Germany, particularly in terms of rising unemployment is usually blamed on its rigid labour market and its generous welfare state.[4] However, it might in addition be the case for both, Germany and Japan, that the insider-oriented bank-based institutional setting of their financial markets is no longer an asset but rather a burden for realising further economic progress and for improving labour market performance. The comparative institutional advantage concerning financial markets might have shifted over the last decade not only to the US but to Anglo-Saxon countries in general, which feature stock-market based financial markets with a stronger protection of shareholder rights and more developed venture capital markets.[5] It is noteworthy in this respect that not only the US but

[2] See La Porta et al. (1998).

[3] See Acemoglu et al. (2002), Hellmann & Puri (2000) and Kortum & Lerner (1998).

[4] See e.g. Siebert (1997) and Berthold & Fehn (2002).

[5] See La Porta et al. (1998), Hubbard (1998) and Botazzi & Da Rin (2002).

also other Anglo-Saxon countries even within Europe, such as the UK and Ireland, have fared particularly well in the 1990s and into the new millennium in terms of growth of per capita GDP and of employment. They have both recently surpassed Germany in terms of their per capita GDP and have had a much better labour market performance. A secular deterioration in relative economic performance of the former champions Germany and Japan seems to have occurred that might at least be partially related to their peculiar bank-based insider-oriented institutional setting on financial markets which is not conducive to developing fully-fledged venture capital markets.

Anglo-Saxon financial markets are characterised by highly developed stock markets and markets for initial public offerings, which are in turn essential for flourishing venture capital markets. Venture capital has in recent years played a key role especially in Anglo-Saxon countries in financing structural change, innovations and new firms. These factors are again essential for understanding employment performances over the last decade. Venture capital is a hybrid system between arm's length and relationship-based financing with venture capitalists not only mitigating financing constraints but potentially adding value via their sector-specific business knowledge. Due to their experience and expertise, they can increase the survival rate of young firms in the particularly treacherous seed and start-up phase of a new firm's economic life cycle. Hence, venture capitalists are not just financiers but they perform important additional activities that unspecialised commercial banks are unable to perform such as monitoring and giving helpful business advice to fledgling firms.[6]

The contractual arrangement between the innovative entrepreneur and the venture capitalist often depends on the ability of the venture capitalist to replace the entrepreneur and run the innovative project in case the entrepreneur himself turns out to be incapable or unwilling to do a good job. In sum, highly developed and well-functioning venture capital markets might be a key element in the Anglo-Saxon institutional setting in financial markets, which contributed in the 1990s and into the new millennium to producing a better labour market performance in comparison to countries that rely largely on bank financing and on internal financing in large established firms. The German attempt to mimic the Anglo-Saxon financial market model at least partially via establishing the "Neuer Markt" for initial public offerings of young high-tech firms, which have typically been financed by venture capitalists, has recently failed spectacularly. If venture capital financing turns out to be empirically important for improving labour market performance, public policy must therefore step up efforts to reform financial market institutions so that a viable and flourishing venture capital market develops in order to contribute not only directly via hard-nosed and politically controversial structural reforms of the labour market and of the welfare state to improving labour market performance, but also indirectly via the institutional setting in financial markets.

The rest of the paper is organised as follows. Section 2 briefly presents a highly stylised macroeconomic model that depicts the negative employment effects of matching frictions on both the labour and the financial market. This is done under the heuristic assumption that a fully developed venture capital market reduces matching frictions in the financial market. Section 3 is the core of the paper as it presents new panel data empirical evidence for the OECD countries concerning the relationship between venture capital investment and employment performance at the macro level. Section 4 offers policy conclusions.

[6] See Botazzi & Da Rin (2001) and Fehn (2002).

2. Matching Problems and Labour Market Tightness

The lack of a well-functioning venture capital market represents a type of financial market imperfection. There exists a number of ways to model the spill-over effect of incomplete financial markets on labour market performance. One such approach would be to consider appropriation problems in labour as well as in financial markets that lower the quasi-equilibrium employment rate.[7] A second possibility is the assumption that malfunctioning venture capital markets raise start-up costs for new firms due to greater difficulties in obtaining finance, which in turn leads to less entrepreneurship, a lower equilibrium number of firms and a lower degree of competition in the goods market. All these effects taken together result in a long-run equilibrium that features lower labour market tightness as measured by the ratio of the vacancy rate to the unemployment rate and a lower quasi-equilibrium rate of employment. Hence, if underdeveloped venture capital markets raise start-up costs for new firms, labour market performance unequivocally deteriorates in the long run.[8]

A third approach consists of combining matching problems in labour and financial markets in a macro-model assuming that a well-functioning venture capital market is conducive to reducing matching problems between firms and financiers, thus increasing labour market tightness and raising the quasi-equilibrium rate of employment. The essential building blocks of such a model are presented below.[9] There are three types of actors in the model: Entrepreneurs with innovative ideas, financiers with capital, and workers. One individual of each group is necessary for setting up a firm. There are symmetric matching problems in the labour and the financial markets. Firms and banks have difficulty in finding each other just as workers and firms do. In order to produce, however, entrepreneurs need both a worker and a financier so that both matching problems need to be resolved before any production can start. Starting with the labour market, entrepreneurs need to expend search costs γ per period to recruit and hire a worker. A simple constant returns to scale matching function $h(U,V)$ is assumed with two inputs, the number of unemployed U and of vacancies V, which are offered by all firms in the economy producing a flow of job matches:[10]

$$\frac{h(U,V)}{V} = h(\theta^{-1},1) \equiv q(\theta). \qquad (1)$$

A tighter labour market, that is, a higher value of $\theta \equiv V/U$, lowers the probability q that a firm finds a suitable worker: $q'(\theta) < 0$.

Hence, in order to find a worker, a firm needs to obtain finance and to look for a financier or bank. It is assumed that there are symmetric matching problems also in the financial market. There are F firms and B banks and each of these F firms has to spend c search costs per period to look for a bank. The flow of financial contracts is given by the matching function $m(B,F)$. The difficulty of firms to find a suitable bank is represented by the ratio $\phi = F/B$. The inverse ϕ^{-1} is therefore a measure for the liquidity of the financial market. The probability that a firm encounters a suitable bank is defined as follows:

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[7] See Caballero & Hammour (1999).

[8] See Pissarides (2001) and Blanchard & Giavazzi (2001).

[9] This material is entirely based on the pioneering work of Wasmer & Weil (2000) and merely serves to lay a theoretical foundation for our own empirical analysis.

[10] The matching function h is assumed to have the properties of a standard production function: $h_U > 0, h_V > 0, h_{UU} < 0, h_{VV} < 0$.

$$\frac{m(B,F)}{F} = m(\phi^{-1},1) \equiv p(\phi)\,, \tag{2}$$

with the probability that a bank finds a firm being:

$$\frac{m(B,F)}{B} = m(1,\phi) \equiv \phi\, p(\phi)\,. \tag{3}$$

The first probability depends negatively and the second one positively on financial market tightness ϕ.

The life of a firm can be separated into four consecutive periods of stochastic length:

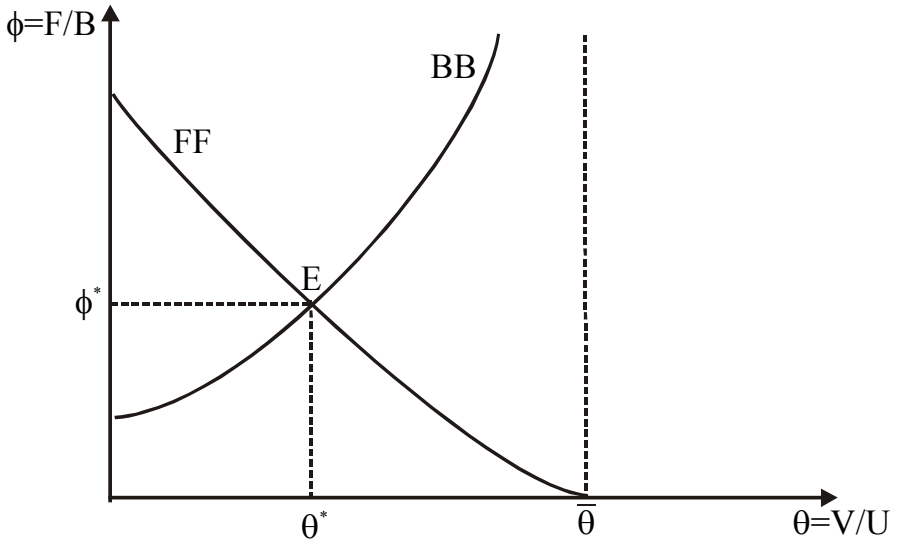
- Fundraising. Potential entrepreneurs with ideas look in period 0 for banks to set up a firm expending a non-pecuniary flow search cost *c*. Conversely, banks search for suitable firms paying a flow search cost *k.* The probability of a match and thus that a firm moves on to the recruitment phase is given by $p(\phi)$.
- Recruitment. Firms look in period 1 for workers expending a flow search cost γ that is financed by the bank met in the fundraising phase. The probability that a firm finds a suitable worker is given by $q(\theta)$.
- Production. Firms produce in period 2 with the aid of the worker hired in the recruitment phase that yields a flow revenue *y*. These cash flows are used to pay workers a given wage ω and banks the ex ante agreed-upon price for capital ρ per period in the production phase.
- Destruction. Firms stop their productive activities with an exogenously given probability *s* and transit into period 3 in which they are dissolved.

The financial contract between the firm and the bank has two components: the bank provides the firm during the recruitment phase 1 with γ money units per time period and the firm pays to the bank ρ monetary units per time period during the production phase 2. Total payments in both directions are therefore stochastic and the financial contract resembles a profit-sharing or venture capital contract because the size of the payments from the firm to the bank during the production phase depends on profits and is not fixed. It is assumed that the firm and the bank divide the production surplus according to a Nash bargaining solution and that there is free entry of firms and banks into the goods and into the financial market, respectively. Hence, there are no unused profit opportunities and expected search costs for banks and firms must equal expected profits in case of a successfully concluded contract.

This implies that the value of a matched bank is lower and that one of a matched firm is higher in a less liquid financial market with a higher ϕ, that is, a high equilibrium number of firms relative to banks. Banks have to search less and firms more under such circumstances with many firms relative to banks. The equilibrium tightness of the financial market rises with greater search costs for firms *k*, whereas it depends negatively on search costs *c* for banks. A higher relative bargaining power of banks relative to firms exerts a negative impact on the equilibrium tightness of the financial market, whereas labour market tightness θ, that is, the equilibrium vacancy rate relative to the unemployment rate, does not affect the equilibrium in the financial market.

The graphic solution of the model in a diagram with labour and financial market tightness on the horizontal and vertical axis respectively is straightforward and highly intuitive.[11] Let BB and FF be the entry or zero profit condition for banks and firms respectively. The entry condition for banks or financiers BB must have a positive slope because a higher number of firms relative to banks increases the profit opportunities for banks. In order for the zero profit condition to be fulfilled, this must be balanced by a higher vacancy rate relative to the unemployment rate which reduces profit opportunities for firms and via the profit-sharing contract also for banks. In contrast, the entry condition for firms must have a negative slope because a tighter labour market, that is, a greater vacancy rate relative to the unemployment rate, reduces profit opportunities for firms and must thus be counterbalanced by a more liquid financial market, that is, a smaller number of firms relative to banks in order for the zero profit condition to hold. Total equilibrium is given by the intersection of both curves at the point E with equilibrium financial market tightness being ϕ^* and equilibrium labour market tightness being θ^*.

Figure 1. Total equilibrium



Source: Wasmer & Weil (2000, p. 16).

Higher search costs for banks would shift the BB curve to the north-west without affecting the FF curve thus worsening labour market performance and reducing the liquidity on the financial market. Lower search costs for firms for finding a suitable bank would turn the FF curve clockwise around the given intersection point with the x-axis thus improving labour market performance and reducing the liquidity in the financial market. Higher profits of firms, due for example to structural reforms of the labour market, would shift both curves to the east thus greatly improving labour market performance, but leaving the liquidity of the financial market in the end unchanged.

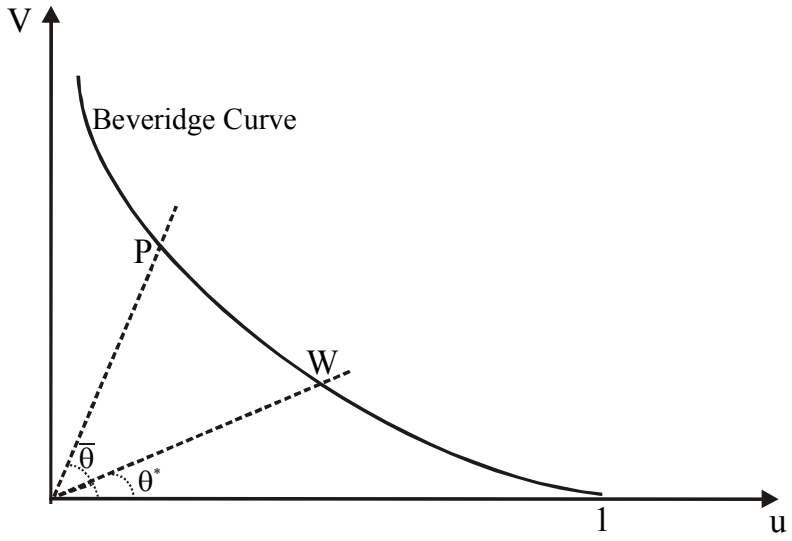
The financial market would work perfectly well if neither banks nor firms had to incur search costs in the financial market, that is, for $k = 0$ and $c = 0$. The transition probability for firms

[11] For the formal solution, see Wasmer & Weil (2000).

in the recruitment phase $p(\phi)$ would then be equal to one. There would be no financial market restriction in this case and the equilibrium tightness of the financial market would then be $\phi^* = 0$. This corresponds with an equilibrium labour market tightness $\bar{\theta}$ which is unequivocally greater than with the financial market restriction: $\theta^* < \bar{\theta}$. Hence, the equilibrium vacancy rate relative to the unemployment rate is reduced by adding financial market frictions to labour market imperfections. Theory therefore predicts unequivocally that a malfunctioning financial or venture capital market with greater matching frictions reduces the quasi-equilibrium employment rate and output, whereas it raises the quasi-equilibrium unemployment rate. Thus, there should be a positive relationship between labour market performance and the development of the venture capital market, as measured by venture capital investments relative to GDP for example.

This result can be directly transferred to the well-known Beveridge curve representation with the unemployment rate and the vacancy rate on the horizontal and vertical axis respectively. The distance of the Beveridge curve from the origin corresponds positively with matching problems on the labour market so that the locus of the Beveridge curve is given if labour market frictions are held constant. Adding financial market imperfections to labour market frictions is equivalent to moving southeast along a given Beveridge curve toward less vacancies and a higher unemployment rate from a point such as P to a point such as W.

Figure 2. Beveridge curve and incomplete financial market



Source: Wasmer & Weil (2000, p. 18).

Due to $\theta^* < \bar{\theta}$, the ray through the origin with financial market imperfections has a smaller slope than the one with a perfect financial market, thus yielding clearly a higher quasi-equilibrium unemployment rate under the assumption of unchanged matching frictions on the labour market and thus with a given locus of the Beveridge curve. Hence, if a well-functioning venture capital market is indeed conducive to reducing matching frictions on the financial market, the model clearly predicts that a highly developed venture capital market should be correlated with better labour market performance across countries and over time.

3. Empirical Estimation

3.1 Model and Estimation Procedure

In this section we estimate the impact of variables measuring venture capital investment on employment growth based on the assumption that a well-functioning venture capital market is mainly conducive to job creation in new and innovative firms and in integrating young people quickly into the regular labour market. It might thus accelerate the process of structural change because venture capital investment is unlikely to be of much help in preserving jobs in old and declining industries which are at risk of disappearing. Hence, venture capital investment can be expected to have a more significant effect on employment growth than on official unemployment rates.

The model is estimated using panel data on a sample of 20 OECD countries over the period 1986-99.[12] The data and its sources are described in Table 1.

Table 1. Description of the labour market and capital market variables

Macroeconomic time series	
Total employment (EMP)	Civilian or (if not available) total economy employment (employees and self employed). Source: OECD Main Economic Indicators.
Real gross domestic product (GDP)	Source: OECD Main Economic Indicators
Institutional labour market variables	
Benefit replacement ratio (RR1)	Average replacement rate over the first year of an unemployment spell. Source: Blanchard & Wolfers (1999, pp. 11 ff. and data appendix). Three realisations per country (for 1986-89, 1990-94 and 1995-99). Indicator displays more variability than RRATE.
Benefit duration (BENEFIT)	Duration of unemployment benefits (years, 4 years meaning indefinite). Sources: Layard & Nickell (1997, pp. 11 ff.) and complementary data delivered by S. Nickell.
Union coordination index (UNCORD)	Union coordination in wage bargaining. Index with 3 = high, 2 = middle, 1 = low. Sources: Layard & Nickell (1997, Table 3) and complementary data delivered by S. Nickell.
Union coverage index (UNION)	Index, 3 = over 70% covered, 2 = 25-70% covered, 3 = under 25% covered. Source: Layard & Nickell (1997, Table 3) and complementary data delivered by S. Nickell.
Employment protection index (EMPRO)	Country ranking with 20 as the most strictly regulated. Sources: Layard & Nickell (1997, p. 6, Table 2) and complementary data delivered by S. Nickell.
Tax wedge (WEDGE))	Total tax wedge (in %). Sum of the payroll tax rate, the income tax rate and the consumption tax rate. Average rates derived from national income and tax data. Sources: Layard & Nickell (1997, p. 4, Table 1) and complementary data delivered by S. Nickell.
Venture capital investment time series	
Venture capital investment (VC)	Seed, startup and expansion (both government and private sector funded) as per mil of average GDP. Sources: Own calculations based on Asian Venture Capital Journal (2000), Baygan & Freudenberg (2000), European Venture Capital Association (2000), National Venture Capital Association (2000), Jeng & Wells (2000).

[12] The 20 countries being: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Canada, United States, Japan, Australia and New Zealand.

Early stage venture capital investment (INVEARLY)	Seed and startup (both government and private sector funded) as per mil of average GDP. Sources: Own calculations based on Asian Venture Capital Journal (2000), Baygan & Freudenberg (2000), European Venture Capital Association (2000), National Venture Capital Association (2000), Jeng & Wells (2000)
Institutional capital market variables	
Creditor rights (CREDITRIGHT)	Index of the legal system's protection of creditors in case of a firm's liquidation or reorganisation. Range: 0 to 4, 4 is the highest level of creditor protection. Source: La Porta et al. (1998), p. 1136, Table 4.

We begin our analysis with the following equation:

$$\ln EMP_{it} = \alpha VC_{it} + \beta \ln GDP_{it} + \delta_j X_{jit} + \varepsilon_{it}, \quad (4)$$

where *EMP* is an index of employment for country *i* in period *t*, VC_{it} is our measure of venture capital for country *i* in period *t*, *GDP* is the level of real gross domestic product for country *i* in period *t*, included as a cyclical control variable following Wasmer and Weil (2000) and X_{jit} is a vector of *j* additional variables used to control for key institutional variables.

The above model is a standard static panel model. In the case of labour market variables as in many other economic situations, there are reasons to believe that such a model may be dynamically mis-specified. As such, we specify a second estimating equation:

$$\ln EMP_{it} = \gamma \ln EMP_{t-1} + \alpha VC_{it} + \beta \ln GDP_{it} + \delta_j X_{jit} + \varepsilon_{it}, \quad (5)$$

where EMP_{t-1} are lags of the dependent variable. This has the appeal that it models employment in a dynamic context, which allows venture capital to have both a short-run and a long-run impact.

Dynamic panel models such as that in equation 5 are characterised by the presence of a lagged dependent variable, which creates a number of econometric issues. The major problem that arises when introducing a lagged dependent variable as an explanatory variable is that the error term and the lagged dependent variable are correlated, with the lagged dependent variable being correlated with the individual specific effects that are subsumed into the error term. This implies that standard estimators are biased, and as such an alternative method of estimating such models is required.

A now standard procedure to provide consistent estimates is to adopt an instrumental variable procedure, which instruments the lagged dependent variable. Although a number of candidates are possible, the Arellano and Bond (1991) approach is adopted as this will generate the most efficient estimates. The validity of this approach requires a lack of second-order serial correlation in the dynamic specification, so tests for this are presented with the results. Overall instrument validity is also examined using a Sargan test[13] of over-identifying restrictions. The null hypothesis of the Sargan test is of the exogeneity of the instrument set.

We consider a similar specification for both the static and dynamic model. Given the above discussion, therefore, the final estimating equations we employ are:

$$D \ln EMP_{it} = \alpha DVC_{it} + \beta DGDP_{it} + \delta_j X_{jit} + D\varepsilon_{it}, \quad (6)$$

[13] Following Sargan (1958).

and

$$D\ln EMP_{it} = \gamma D\ln EMP_{t-1} + \alpha DVC_{it} + \beta D\ln GDP_{it} + \delta_j X_{jit} + D\varepsilon_{it}, \qquad (7)$$

where *D* refers to the first difference of the variable in question. By taking first differences from most of our variables, we consider a consistent specification in both the dynamic and static models. We estimate therefore the impact on the (approximate) growth of employment of the change in venture capital,[14] the change in GDP and of additional labour market institution variables. One thing to note from these equations, however, is that the additional variables accounting for institutional variables are included in levels rather than differences; these are included in levels since they show little variation across time.

We sequentially use two measures of venture capital, these being either the change in venture capital (*DVC*) or the change in early stage venture capital (*DINVEARLY*). *DVC* is defined as the seed, start-up and expansion (both government and private sector funded) as per million of average GDP, while *DINVEARLY* is used to account for early stage venture capital only, and is defined as the seed and start-up (both government and private sector funded) as per million of average GDP. There is good reason to believe that these variables measuring venture capital may be endogenous. This is not only valid with respect to the labour market variables but also to another independent variable, namely real GDP, which is used as a cyclical control variable in our context. Hence, in the case of a significant coefficient of venture capital, one could argue that the demand for finance has been strong and the supply of venture capital supply has been stimulated in those countries that have been innovative and able to create jobs (strong employment growth) and where the macroeconomic climate has been favourable and macroeconomic policy has been supportive.[15] In this case, both employment and venture capital investment may then be driven by a third factor. Estimated coefficients of venture capital might then be biased, although we will show later on in section 3.2 that the correlation coefficient between the change in VC investment and the change in real GDP is surprisingly low. Hence, to account for the problem of endogeneity of the venture capital variable and thus for possible reverse causality we instrument the venture capital variables, employing the second lag of the venture capital variables as instruments.

The additional variables in the model are included to control for key institutional characteristics. Firstly, we include variables to control for various institutional labour market variables. As such, we include a measure of the benefit replacement ratio (*RR1*), a measure of the duration of unemployment benefits (*Benefit*), a measure of employment protection (*Empro*), the tax wedge (*Wedge*), the union coverage index (*Union*) and a measure of the centralisation of wage bargaining (*Uncord*). It is expected that these will adequately control for factors that contribute towards labour market rigidities, which include high firing costs, strong unions and generous employment benefits. Secondly, we include a variable to account for the presence of institutional capital markets, by including an index of the legal system's protection of creditors in case of a firm's liquidation or re-organisation (*CreditRight*). This variable reflects the legal position of creditors vis-à-vis firms in case of financial distress.

[14] We also included in various specifications the change in the log of venture capital. This resulted in positive coefficients, but the results were not as strong, in that the coefficients were not always significant. Similarly, we also included in various specifications GDP growth (i.e. the change in the log of GDP) as opposed to simply the change in GDP. This didn't affect the results a great deal, although in a small number of cases GDP growth was not significant where the change in GDP was. These results are available on request.

[15] Given that labour market institutions are often badly measured, an alternative view would be that venture capital may capture their effects.

With respect to the sign on the coefficients of these additional variables included in our regressions, we expect the following marginal coefficients for the employment equations.[16] We expect *RR1*, *Benefit*, *Empro, Wedge* and *Union* to be negative, while the coefficients on *Uncord* and *CreditRight* are expected to exert a positive impact on employment growth. At the same time we expect that the coefficients on the changes in the two venture capital variables (*DVC* and *DINVEARLY*) would be positive so that more venture capital investment would raise employment growth.

3.2 Results

We began our formal empirical analysis with tests of the non-stationarity of the variables under consideration. The test we applied was the widely used panel data unit root test by Levin and Lin (2002).[17] This test represents a direct extension of the univariate ADF test setting to panel data. The results by Levin and Lin indicate that panel data are particularly useful for distinguishing between unit roots and highly persistent stationarity in macroeconomic data and that their unit root test for panel data is appropriate in panels of moderate size (between 10 and 250 cross-sections) as encountered in our study.

Tables 2a and 2b display the results of applying this unit root test to our set of variables. Table 2a refers to tests on the levels of the variables and Table 2b to tests applied to the first differences. As usual, we difference the variables until they are stationary. Hence, we will follow a consistent approach in our estimations and only use a set of stationary variables.

Table 2a. Panel ADF-test statistics for levels of variables

Variable	*t-value (no lagged differences)*	*t-value (one lagged difference)*	*t-value (two lagged differences)*
	I) ADF-test statistic (no constant, no trend)		
lnEMP	+7.48	+3.45	+3.41
GDP	+17.82	+6.86	+6.05
VC	-2.22**	+2.47	+3.46
INVEARLY	-1.55*	-0.48	+5.68
	II) ADF-test statistic (common constant, no trend)		
lnEMP	-3.91***	-4.93***	-4.99***
GDP	0.35	-1.18	-0.65
VC	-4.22***	+0.02	+1.08
INVEARLY	-3.06***	-2.19**	+4.09
	III) ADF-test statistic (common constant and trend)		
lnEMP	-5.03***	-6.21***	-6.49***
GDP	-3.27***	-5.14***	-5.68***
VC	+0.23	+0.44	+1.12
INVEARLY	+3.61	+3.83	+4.84
	IV) ADF-test statistic (individual-specific constant and trend)		
lnEMP	-2.33	-5.65	-5.08
GDP	-0.81	-3.55	-3.39
VC	-1.24	-0.78	+0.54
INVEARLY	+2.27	+2.68	-4.37

[16] See, for example, Blanchard & Wolfers (1999), and Layard & Nickell (1997).

[17] This test was augmented by Levin & Lin (1993) and critically surveyed by Higgins & Zakrajsek (1999).

Notes: The t-value is the realisation of the usual ADF-test statistic; */**/*** denotes significance of the lagged endogenous variable; the sample range is 1986-99 with adjustments if necessary due to the lag structure.

Ad I) Test equations correspond to model 1 in Levin and Lin (1992). The relevant critical values are -1.39/-1.76/ -2.45 (Levin & Lin, 1992, Table 1, p. 45) (for N=20 cross-sections and t=10 periods).

Ad II) Test equations correspond to model 2 in Levin and Lin (1992). The relevant critical values are -1.57/ -1.94/-2.64 (Levin & Lin, 1992, Table 2, p. 46) (for N=20 cross-sections and t=10 periods).

Ad III) Test equations correspond to model 3 in Levin and Lin (1992). The relevant critical values are -1.75/ -2.13/-2.85 (Levin & Lin, 1992, Table 3, p. 47) (for N=20 cross-sections and t=10 periods).

Ad IV) Test equations correspond to model 5 in Levin and Lin (1992). The relevant critical values are -6.82/ -7.06/-7.51 (Levin & Lin, 1992, Table 5, p. 49) (for N=20 cross-sections and t=10 periods).

Table 2b. Panel ADF-test statistics for first differences of variables

Variable	*t-value (no lagged differences)*	*t-value (one lagged difference)*	*t-value (two lagged differences)*
	I) ADF-test statistic (no constant, no trend)		
DlnEMP	-6.96***	-6.98***	-6.37***
DGDP	-5.37***	-4.45***	-3.38***
DVC	-17.32***	-6.88***	-3.68***
DINVEARLY	-14.11***	-12.68***	-3.36***
	II) ADF-test statistic (common constant, no trend)		
DlnEMP	-7.93***	-7.95***	-7.32***
DGDP	-9.27***	-7.88***	-6.71***
DVC	-18.04***	-7.75***	-4.67***
DINVEARLY	-14.50***	-13.64***	-4.32***
	III) ADF-test statistic (common constant and trend)		
DlnEMP	-8.06***	-8.10***	-7.60***
DGDP	-9.44***	-8.28***	-7.27***
DVC	-11.67***	-6.30***	-3.48***
DINVEARLY	-8.79***	-5.33***	-0.56
	IV) ADF-test statistic (individual-specific constant and trend)		
DlnEMP	-8.52***	-9.10***	-9.08***
DGDP	-10.39***	-9.87***	-9.44***
DVC	-11.73***	-6.48	-3.74
DINVEARLY	-9.51***	-6.48	-1.55

Note: The t-value is the realisation of the usual ADF-test statistic; */**/*** denotes significance of the lagged endogenous variable; the sample range is 1986-99 with adjustments if necessary due to the lag structure.

Ad I) Test equations correspond to model 1 in Levin and Lin (1992). The relevant critical values are -1.39/-1.76/ -2.45 (Levin & Lin, 1992, Table 1, p. 45) (for N=20 cross-sections and t=10 periods).

Ad II) Test equations correspond to model 2 in Levin and Lin (1992). The relevant critical values are -1.57/ -1.94/-2.64 (Levin & Lin, 1992, Table 2, p. 46) (for N=20 cross-sections and t=10 periods).

Ad III) Test equations correspond to model 3 in Levin and Lin (1992). The relevant critical values are -1.75/ -2.13/-2.85 (Levin & Lin, 1992, Table 3, p. 47) (for N=20 cross-sections and t=10 periods).

Ad IV) Test equations correspond to model 5 in Levin and Lin (1992). The relevant critical values are -6.82/ -7.06/-7.51 (Levin & Lin, 1992), Table 5, p. 49) (for N=20 cross-sections and t=10 periods).

The unit root tests reveal not only evidence of non-stationary behaviour of the venture capital investment variables, but also identify a kind of explosive evolvement of venture capital investment. The latter can be considered as a well-known stylised fact especially of the late 1990s. It is indicated by high positive empirical realisations of the ADF-test statistics in Table

2a. Overall, the test results for the levels reveal that the null-hypothesis of non-stationarity has to be accepted for most of the variables under consideration. The evidence is borderline in only a few specifications of the test equations. However, the ADF-tests for the first differenced variables deliver overwhelming evidence of stationarity. Non-stationarity cannot be rejected in only 5 out of 48 cases. These exceptions are most probably due to the rather high critical values of the test statistics and the relatively small sample size. The latter is of course dominated by the exceptionally explosive behaviour of the venture capital series in the non-Anglo-Saxon countries over the very last years.

Based on our theoretical arguments, we conjecture that controlling for the key institutional variables on the labour and the capital market, the presence of venture capital improves labour-market performance in a cross-country panel analysis. To test for a significant relationship between venture capital and labour-market performance, we undertake estimations in differences and for early stage as well as for total venture capital investment. The models were estimated using the package Dynamic Panel Data 98 for GAUSS, details of which are provided by Arellano and Bond (1998). The following tables display the results from estimating equations 3 and 4. The tables report the coefficients along with heteroscedastic consistent t-ratios. The validity of the dynamic models depends upon a lack of second order serial correlation and the validity of the instrument set, tested for with the Sargan test. Results of these tests are reported in the tables.

Table 3. Total venture capital investment and employment growth

DlnEMP	1	2	3	4	5	6
DlnEMP-1				0.51	0.41	0.43
				(9.08)***	(5.81)***	(6.02)***
DVC	0.03	0.03	0.03	0.009	0.008	0.006
	(1.95)**	(1.75)*	(0.94)	(3.37)***	(2.6)***	(1.87)*
DGDP		0.005	0.005		0.005	0.006
		(1.41)**	(1.64)*		(6.39)***	(5.1)***
RR1			-0.0009			0.0001
			(-0.7)			(0.51)
Benefit			0.003			-0.0002
			(0.32)			(-0.11)
Uncord			0.03			0.005
			(1.14)			(0.79)
Empro			0.002			0.001
			(0.46)			(2.03)**
Wedge			-0.0001			-0.0001
			(-0.11)			(-0.23)
Credit Right			-0.01			0.003
			(-0.67)			(1.11)
Union			-0.03			-0.02
			(-0.61)			(-1.53)
Constant	0.005	-0.006	0.07	0.003	-0.007	0.002
	(1.44)	(-0.83)	(0.71)	(2.98)***	(-4.26)***	(0.13)
Wald Test	3.79*	8.24**	14.24	139.8***	118.2***	298.3***
Sargan Test	0.45 (df = 10)	6.92 (df = 9)	0.94 (df=2)	96.5**	79.62 (df=74)	56.8 (df=67)
	(p = 0.45)	(p = 0.65)	(p = 0.63)	(df=75)	(p = 0.31)	(p = 0.81)
				(p = 0.048)		
1st Order Correlation	2.46**	2.04**	1.4	0.66	-1.05	0.11
2nd Order Correlation	2.09**	1.61	1.13	-0.3	-0.38	1.05

Note: All models are estimated using robust standard errors. Values in parentheses are t-statistics. ***, **, * indicate significance at the 1, 5 and 10 percent levels respectively. For the Sargan test, we report the test statistic alongside the number of degrees of freedom (df) and the p-value. The instruments used in the static model are the lags of the change in venture capital, while in the dynamic model we have the lags of the change in venture capital and the lags of the lagged dependent variable as instruments.

Table 4. Early stage venture capital investment and employment growth

DlnEMP	1	2	3	4	5	6
DlnEMP-1				0.51	0.41	0.41
				(11.04)***	(5.16)***	(4.73)***
DINVEARLY	0.01	0.04	-0.02	0.02	0.02	0.01
	(0.59)	(1.91*)	(-0.27)	(2.44)**	(1.92)*	(1.51)
DGDP		0.007	0.01		0.005	0.006
		(3.44)***	(1.46)		(7.69)***	(5.87)***
RR1			-0.0008			0.00004
			(-0.48)			(0.2)
Benefit			0.007			0.0002
			(0.54)			(0.1)
Uncord			-0.01			0.006
			(-0.63)			(0.83)
Empro			-0.001			0.001
			(-0.36)			(1.82)*
Wedge			0.002			-0.00003
			(0.78)			(-0.12)
Credit Right			-0.00002			0.005
			(-0.0008)			(1.05)
Union			-0.01			-0.02
			(-0.21)			(-1.67)*
Constant	0.008	-0.01	-0.03	0.003	-0.007	0.004
	(3.28)***	(-1.9)*	(-0.21)	(3.02)***	(-3.67)***	(0.18)
Wald Test	0.35	11.91***	33.74***	232.08***	87.4***	264.47***
Sargan Test	16.21* (df=10) (p = 0.09)	13.26 (df=9) (p = 0.15)	1.1 (df=2) = 1.2 (p 0.58)	100.08** (df=75) (p = 0.03)	84.68 (df=74) (p = 0.19)	51.83 (df=67) (p = 0.91)
1st Order Correlation	2.61***	1.78*	1.35	0.68	-0.97	0.94
2nd Order Correlation	2.15**	0.66	1.21	-1.06	-0.65	1.25

Note: All models are estimated using robust standard errors. Values in parentheses are t-statistics. ***, **, * indicate significance at the 1, 5 and 10 percent levels respectively. For the Sargan test, we report the test statistic alongside the number of degrees of freedom (df) and the p-value. The instruments used in the static model are the lags of the change in venture capital, while in the dynamic model we have the lags of the change in venture capital and the lags of the lagged dependent variable as instruments.

To start with, note that the Sargan test for the validity of the instruments tends to be insignificant and that the test of second order serial correlation is insignificant in the dynamic model, suggesting that the models are well specified. If we begin by examining the coefficients on the additional variables included in the model, we see that the coefficient on the change in GDP is positive as expected, and tends to be significant in both tables and in both the static and dynamic specification. Hence, the well-known prior that GDP growth is one important determinant of employment growth is corroborated by our estimations.

The coefficients on the institutional variables included in the models tend to be very small and in only three cases are they significant. Employment protection is significant in both dynamic specifications but with an unexpected positive sign. However, the impact of employment protection on labour market performance is highly disputed in theory so that our expectations

were only borderline in this case. The union coverage index is significant and negative as expected in the dynamic case of Table 4. These weak results on the institutional variables are likely to reflect a number of concerns with the data on these institutional variables. Firstly, we may expect a great deal of multi-collinearity between these variables and the results are indicative of such a problem, characterised by insignificant coefficients and coefficients that are not of the expected sign. Table 5 reports the correlation matrix and we can see from this that the correlations between a number of the institutional variables are reasonably high. This is in clear contrast to the empirical realisations of the correlation coefficient between the change in VC investment and real GDP growth. They are surprisingly low (0.1 for both DVC and DINVEARLY).

Secondly, the lack of consistent and significant results on these additional variables may reflect the fact that they show very little variation over time. These data have been used to explain labour market performance in cross-section and panel data studies using averages over time and have been found to be significant.[18] Given that our data has a significant time-series dimension to it, we would expect that the coefficients on these variables would not be as significant as in a cross-section regression for example, where only the cross-country and not the time-series variation would be important. Although these problems are likely to be important, it needs to be kept in mind that these are not the variables of primary interest in this paper and that they are included largely as a test of robustness on the variable of interest here, namely venture capital.

Finally, we can concentrate on the variables representing venture capital. Table 3 examines the impact of the change in venture capital on the growth of employment. The coefficients on *DVC* are always positive as expected, and they are also significant at least at the 10 percent level in five out of the six cases depicted. The dynamic results tend to be more supportive of a significant impact of *DVC* on the growth of employment, in the sense that the coefficients tend to be significant at higher levels of significance. At the same time, the coefficients in the static model tend to be larger in absolute value.

Table 4 replaces *DVC* with *DINVEARLY*, in order to examine the impact of early stage venture capital investment on employment growth. The coefficients on *DINVEARLY* are not quite as supportive of an impact of early stage venture capital investment on employment growth possibly reflecting the fact that expansion investment which is not included here affects job creation most directly. Although the coefficient is positive as expected in five out of six cases, it is now significant in only half of the cases. Once again, the results are more supportive in the dynamic case, with more significant coefficients being found, which indicates once again that the employment effects of venture capital investment are part of a dynamic process.

A potential caveat raised in section 3.1 was that the estimated coefficients of venture capital might be biased due to a reverse causality between real GDP growth and the change in VC investment. A short inspection of the correlation coefficients between the change in both definitions of VC investments and real GDP growth listed in Table 5 reveals that the empirical realisations of the former are in fact surprisingly low. Hence, although we accounted for the theoretical problem of endogeneity of the venture capital variable and thus for possible reverse causality a priori by instrumenting the venture capital variables, this problem does actually not seem to be a problem in our sample.

[18] See, for example, Nickell (1997) and Layard & Nickell (1997).

Table 5. Correlation matrix

	DEMP	DlnEMP	DGDP	DlnGDP	DInvearly	DlnInvearly	DVC	DlnVC	RR1	Benefit	Uncord	Empro	Wedge	Credit	Union
DEMP	1														
DlnEMP	0.99	1													
DGDP	0.52	0.51	1												
DlnGDP	0.47	0.47	0.98	1											
DInvearly	0.15	0.14	0.1	0.05	1										
DlnInvearly	0.10	0.1	0.09	0.07	0.5	1									
DVC	0.16	0.16	0.1	0.07	0.77	0.34	1								
DlnVC	0.1	0.1	0.13	0.13	0.33	0.51	0.62	1							
RR1	-0.07	-0.07	-0.06	-0.05	-0.006	-0.007	-0.005	-0.04	1						
Benefit	0.14	0.14	0.17	0.18	-0.08	0.03	-0.07	-0.04	-0.2	1					
Uncord	-0.17	-0.17	-0.05	-0.05	-0.12	0.01	-0.08	0.02	0.35	-0.02	1				
Empro	-0.13	-0.14	0.03	0.05	-0.12	-0.008	-0.1	0.01	0.11	0.18	0.37	1			
Wedge	-0.26	-0.16	-0.13	-0.12	-0.001	0.04	0.01	0.02	0.35	-0.12	0.51	0.45	1		
Credit	-0.03	-0.03	-0.06	-0.05	-0.11	-0.02	-0.05	0.01	-0.3	0.34	0.51	0.05	-0.004	1	
Union	-0.07	-0.08	0.12	0.13	-0.16	-0.02	-0.14	-0.01	0.34	0.37	0.63	0.7	0.43	0.1	1

Note: This correlation matrix includes some variables not contained in the final specifications. However, they were used by us in additional robustness estimations that were not included in Tables 3 and 4 due to their lower goodness-of-fit.

3.3 Long-Run Effects

Based on our dynamic results, it is possible to estimate the long-run contribution of venture capital to employment growth, using the formula $\sum\beta_i/(1-\sum\alpha_i)$, where β_i are the coefficients on the venture capital variables and α_i are the coefficients on the lagged employment growth variable. The long-run effect of venture capital for the results displayed in Tables 3-4 is reported in Table 6.

Table 6. Long run impact of venture capital investment on employment growth

	Column 4	Column 5	Column 6
Table 3 (DVC)	0.018	0.014	0.011
Table 4 (DINVEARLY)	0.041	0.03	0.017

Note: The table contains the estimated long-run coefficients of the respective VC variable implied by the estimation results listed in Tables 3 and 4.

To understand what these results imply we can use an example. If we take the value 0.018 from the upper left cell of Table 6, this tells us that a one unit increase in venture capital (i.e. *DVC* = 1) will increase employment growth by 1.8 percentage points. Taking the example of Germany, which had an average change in VC investment over the period studied of DVC = 0.15 units and in early VC investment of DINVEARLY= 0.04 units, we can calculate that a one standard deviation increase in the change in DVC (accidentally exactly equal to 1.00) would have increased employment growth by around 1.8 percentage points according to the value 1.8.[19] Moreover, the value of 0.041 in the lower left cell of Table 6 would imply that a one standard deviation increase in *DINVEARLY* (equal to 0.25) would have raised employment growth by around 1 percentage point. We can conduct similar exercises for the remaining entries in Table 6. Doing so suggests that an increase in *DVC* by one standard deviation would increase employment growth by between 1.1 and 1.4% (last two entries in the first row). Similarly an increase in *DINVEARLY* by one standard deviation would increase the change in employment by between 0.43 and 0.75% (last two entries in the second row). It should be noted that these figures are strikingly similar for *DV*C and *DINVEARLY*. One note of caution in interpreting these figures is that we are using at most 13 years of data to try and infer the long-run impact of venture capital on employment growth. This might be inadequate, but at least the interval of a 1.0 to a 1.8% employment growth effect of venture capital that is identified here may be used as a rough guide.

The non-negligible size of these effects must be attributed to our conjecture that venture capital investment is different from standard types of investment because it is directed especially to new and innovative firms. If projects that are funded via venture capital turn out to be successful, they therefore tend to have particularly large returns on investment and they also tend to have particularly large multiplier effects on output and employment, e.g. by prodding technological advancements or by generating a market for a new innovative product. The total real effect of successful venture capital investment is therefore not at all restricted to the firm directly concerned but spill-over and trickle-down effects to other firms also matter.

[19] The high empirical realisation of the standard deviation is due to the explosive development of the venture capital investment time series. The latter became obvious already in the panel unit root tests by the high positive numbers of the ADF-test statistics for the levels of these variables (see Tables 2a and 2b).

4. Conclusions

Many economists argue that labour market rigidities and generous welfare states are at the core of persistently low job creation in continental Europe compared to most Anglo-Saxon countries and especially compared to the US in the 1990s. It is important to note, however, that job creation might in addition depend on markets that are complementary to the labour market and whose malfunctioning might also constitute a bottleneck for job creation. Such a bottleneck might be the possibility for young and innovative firms to obtain finance for their highly risky projects. Hence, by leaving out capital market variables, past empirical results might have overstated the impact and significance of some of the labour market variables. The ability of a country to encourage and sustain technological innovation by entrepreneurial firms is after all one of the main sources of economic and employment growth.

Economic intuition suggests that venture capitalists have to play a key role in this respect because they have often been able to provide promising companies with adequate risk financing, this especially being the case in the US. Economists have so far paid relatively little attention to the possibility of a virtuous circle between entrepreneurial dynamism, innovative start-ups, a dynamic venture capital industry and job creation.

It has recently been argued that it is a challenging empirical problem to demonstrate a causal relationship between the presence of venture capital investment and innovation or job growth.[20] This paper delivers pioneering empirical evidence of such a link at the macroeconomic level. We are able to show that venture capital is able to significantly raise employment growth and job creation. We conjecture that venture capital is mainly conducive to job creation in new and innovative firms and that it facilitates the process of structural change towards the new economy. This is of little help, however, in reintegrating the long-term unemployed into the regular labour market where appropriate reforms of the welfare state and of labour market institutions have to play the key role.

The results obtained are particularly important considering the fact that direct policies to combat unemployment, for example, by deregulating the labour market or by trimming welfare state activities, are notoriously difficult to implement in the political decision process, so that indirect alternative routes such as via fostering the venture capital market and thus entrepreneurial dynamism are urgently called for in continental Europe.

Nevertheless, these results should not be misinterpreted as a justification for government subsidies to the venture capital industry or for government-run venture capital activities. Rather, the government should provide an institutional framework that is favourable to the development of a flourishing private venture capital industry and entrepreneurial dynamism. There exists a number of possible ways of doing so. First, the pension system could be capitalized to a greater extent and pension funds could be allowed to invest part of their assets in venture capital firms. Based on the US example, this should further spur the development of the venture capital market in continental Europe.[21] Second, a well-functioning market for initial public offerings such as NSDAQ needs to be created as an exit route for venture capitalists. This is especially important since European attempts at doing so such as the "Neuer Markt" have recently failed spectacularly. Trust and transparency are clearly key issues in recreating such an exit market so that there is especially a need for strong and unequivocal corporate governance and accounting rules.

[20] See Gompers & Lerner (2001, p. 164).

[21] See Jeng & Wells (2000).

However, it is also important to keep in mind in this respect that it is not at all only the supply of venture capital that might restrict the total volume of venture capital investment, but possibly also the lack of suitable entrepreneurs with innovative ideas as well as the lack of incentives to undertake risky ventures and to disclose innovative ideas to possible financiers. With respect to the last point, a third possible policy to foster venture capital markets is therefore the implementation of stronger patent rights along the lines found in the US. This might be conducive to fostering venture capital markets because innovative entrepreneurs might then be less afraid to disclose their ideas to a venture capitalist for fear that they would be taken advantage of.

Fourth, the education system, especially at university level, along with an elaborate institutional framework for transforming innovative ideas into new business ventures would be the primary levers to address such a scarcity of able human resources. Fifth, the tax system should provide adequate incentives for entrepreneurs to take risks rather than having the government participate only via highly progressive taxes in the upside of ventures. A highly progressive tax system, high taxation of capital gains, taxes on assets of firms along with strict limitations on rolling over losses, which are almost inevitable in the start-up phase of new ventures, into future periods are important factors stifling entrepreneurial dynamism and venture capital investments.

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CENTRE FOR EUROPEAN POLICY STUDIES

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GOALS

- To achieve high standards of academic excellence and maintain unqualified independence.
- To provide a forum for discussion among all stakeholders in the European policy process.
- To build collaborative networks of researchers, policy-makers and business across the whole of Europe.
- To disseminate our findings and views through a regular flow of publications and public events.

ASSETS AND ACHIEVEMENTS

- Complete independence to set its own priorities and freedom from any outside influence.
- Authoritative research by an international staff with a demonstrated capability to analyse policy questions and anticipate trends well before they become topics of general public discussion.
- Formation of seven different research networks, comprising some 140 research institutes from throughout Europe and beyond, to complement and consolidate our research expertise and to greatly extend our reach in a wide range of areas from agricultural and security policy to climate change, JHA and economic analysis.
- An extensive network of external collaborators, including some 35 senior associates with extensive working experience in EU affairs.

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CEPS is a place where creative and authoritative specialists reflect and comment on the problems and opportunities facing Europe today. This is evidenced by the depth and originality of its publications and the talent and prescience of its expanding research staff. The CEPS research programme is organised under two major headings:

Economic Policy

Macroeconomic Policy
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Agricultural Policy

Politics, Institutions and Security

The Future of Europe
Justice and Home Affairs
The Wider Europe
- South East Europe
- Caucasus & Black Sea
- EU-Russian/Ukraine Relations
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