Government-sponsored labour-market training and output growth - cyclical, structural and globalization influences

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Abstract

Empirical work on the effects of government-sponsored labour-market training programs (LTPs) has been largely focused on the unemployment-exit and employment-entry probabilities of program participants using micro-level data. This paper seeks to add to the current literature by providing broad cross-country evidence on whether or not additional public-sector resources allocated to LTPs contributes to raising output growth and per-capita incomes. Using data from OECD countries during 1989-2009 and GMM estimation, we find evidence suggesting that on average labour-market training programs are growth-enhancing. The positive growth-effect of LTP-spending is found to be stronger the more favourable are business-cycle conditions, the larger is the magnitude of structural shocks at country level and the greater is the scale of opening-up of markets at the global level.

1. Introduction

Government-sponsored labour-market training programs (LTPs) are extensively used in many countries, either as part of an overall strategy for improving the functioning of the labour market or as a tool to increase workers' employability and enhance social cohesion (Kluve *et al.*,2007; Bonoli, 2010; Duell & Vogler-Ludwig, 2012; Brown & Koettl, 2015). The proportion of public funds assigned to such programs has increased in most countries since 2001, following the widespread switch from passive to active measures as a means of intervening in labour markets. Today, LTP expenditures are the largest component of active labour-market spending in the OECD area, accounting for about one-third of the total ALMP budget. Training programs are also the most widely used labour-market instrument in the euro zone area, and, although cross-national differences still exist, the majority of euro zone member states have expanded training policies since 2004, with some of them currently showing LTP-budgets that amount to over 40% of total active labour-market spending (European Commission, 2005; OECD, 2015). Moreover, there is growing interest in labour-market training by developing and transition countries, as governments in these economies are increasingly looking for policy strategies that are capable of enhancing labour-market flexibility while at the same time reducing poverty (Betcherman *et al.*, 2004; Auer *et al.*, 2008; Kuddo, 2009; Spevacek, 2009).

With training being increasingly used as a key labour-market instrument, a large body of literature has emerged during the last few years examining the labour-market impact of particular programs and the extent to which they benefit participants. Based on micro-level data, much of this literature finds positive effects of LTPs on the job-finding probabilities of participating workers over the medium term, with a number of studies also suggesting favourable effects on total measured employment (Fitzenberger *et al.*, 2008; Cueto & Mato, 2009; Arellano, 2010; Card *et al.*, 2010; Rodriguez-Planas & Jacob, 2010; Lechner & Wunsch, 2011; Blache, 2011). However, while these findings are clearly of great importance in suggesting that, from a microeconomic perspective, programs achieve their intended effect, a related and equally important question remains unanswered. To what extent does public spending on training contribute to economic growth and per-capita incomes at the aggregate level? Systematic cross-country evidence on this issue is lacking. Yet, evaluating the effects of programs in terms of countries' growth prospects has become an issue of particular relevance following the global economic crisis of 2008-2009, which, in addition to deteriorating labour-market outcomes,

has been accompanied by poor growth-performance and constrained government-budgets in many economies which have increased the opportunity cost of LTP-policy (OECD, 2013; Braconie *et al.*, 2014).

Public spending on labour-market training can have both positive and negative repercussions on economic growth. Training programs can be expected to be growth-enhancing through improved human capital, by creating incentives for the workforce to invest in knowledge and by helping workers upgrade their skills in periods of structural change. Growth-enhancing effects may also arise from increased labour supply, to the extent that programs improve employability among disadvantaged workers and make it easier for inactive groups of the population to gain access to the labour force. Further positive effects on growth may arise from learning spillovers, as better skills acquired via training can facilitate the production of new ideas and/or lead to innovative entrepreneurial behaviour. On the other hand, training policy is expensive and increased LTP-expenditures can adversely affect growth by crowding-out other more productive types of government spending. Negative growth effects can also result from the impact of programs on workers' wage-setting behaviour, by reducing the welfare loss from becoming or remaining unemployed, or from their impact on job-seekers' average search effort, by distorting incentives to search for jobs. At the same time, the growth effect of training measures may not be independent of the existing economic context. For example, the opportunity cost of allocating additional public funds to LTPs is likely to be larger in periods of falling economic activity relative to trend, when the strain on resources is already sizable. The labour-supply gain is also likely to vary with the business cycle, as inactive workers may not choose to participate in programs when expected earnings are falling. On the other hand, training programs can be expected to be particularly useful in times of rapidly changing economic structures, when discrepancies between skill demand and supply are likely to be quite pronounced. The scale of economic globalization may also play a role, as the opening-up of markets increases a country's need to have a workforce with up-to-date skills to help improve competitiveness. And whether or not the positive effects on economic growth from LTP-policies can offset any negative side-effects is theoretically unclear.

This paper seeks to add to the current literature by providing broad cross-country evidence on the relationship between public spending on labour-market training and per-capita output growth and exploring potential non-linearities. We use data from OECD countries during 1989-2009, while we deal with the issue of potential endogeneities. Our results suggest that government-sponsored labour-market training public programs are on average growth-enhancing. This holds after controlling for other labour-market influences on growth rates that operate through productivity or wages, including proxies for workers' human-capital not related to programs, bargaining strength and reservation wages. At the same time, we find differences in the growth-training relationship stemming from business-cycle influences, extent of country-specific structural shocks, and scale of economic globalization. In particular, the growth effect of LTPs is found to change over the cycle, with our results suggesting that, other things equal, expenditures on training programs yield a larger-than-average return in terms of additional output growth during periods of favourable economic conditions. The extent of cross-industry structural shocks also matters. We find a sizable growth gain from additional LTP-spending in situations of fast changing industrial structures, and this holds even during economic downturns. At the same time, economic globalization plays a role, with our estimates showing that the growth gain from program-spending is larger the more globalized are domestic markets in individual economies. Overall, our results indicate that, depending on the existing economic context, an increase by 1 standard deviation in LTP-spending per labour-force member as percent of per-capita GDP can raise (per-capita) output-growth by between 0.004 and 0.01 percentage points.

The rest of the paper is structured as follows. Section 2.1 discusses some key links between labour-market training and economic growth, while Section 2.2 discusses the empirical methodology. Section 3 presents the estimation results. Section 4 follows with concluding comments.

2. Economic growth and labour-market training

2.1 Key links between growth and training programs

Spending on labour-market training can have an impact on per-capita output growth through a number of channels. Training programs can be expected to be growth-enhancing through workers' average productivity, by encouraging learning and the build up of skills and by increasing the adaptability of the labour force to structural change. Positive growth effects may also result indirectly, through improved efficiency, to the extent that the build-up of skills can facilitate innovation and speed up the pace of technological change. Further growth-enhancing effects can arise from greater labour-force participation, as programs improve the employability prospects of disadvantaged groups of the population and facilitate the re-entry into the labour market of discouraged workers. At the same time, by encouraging job-seekers to adjust their skills according to the employers' needs, LTP-policy can speed up the flow into employment, thus raising growth through an increased job-finding rate. By making workers more productive, programs can further serve as an instrument to raise labour demand at a given wage, and thus increase employment and output-growth over the medium term. Increased employment and growth may also result indirectly through lower wages, to the extent that, by raising the employability of the labour force, training programs are likely to intensify job competition in the economy and weaken the bargaining position of insiders.

On the other hand, training programs can lead to lock-in effects (Van Ours, 2004; Røed & Raaum, 2006; Rosholm & Skipper, 2009). Actual program participation leaves less time available for active job search, while the prospect of program participation, by making unemployment less frightening, may distort incentives for search in general, leading all job-seekers to reduce their search effort. This can adversely affect per-capita output growth through increased equilibrium unemployment. Negative effects on growth may also result from the impact of programs on workers' reservation wages. Indeed, the prospect of program participation, by reducing the welfare difference between having and not having a job, can lead to a fall in workers' perceived opportunity cost of remaining unemployed. This will tend to raise equilibrium wages, leading to reduced labour demand and job creation and thus lower measured employment and output growth. Counteracting factors through labour demand and job creation can also operate via other channels (Calmfors *et al.*, 2002; Dahlberg & Forslund, 2005; Crépon *et al.*, 2013; Brown & Koettl, 2015). For example, program participation may signal low productivity to employers, making them reluctant to hire workers involved in LTPs. In the case of on-the-job training, a crowding-out effect may also arise, as employers could simply replace regular workers by less-expensive program participants, with no net gain in terms of measured employment and thus economic growth.

Moreover, negative effects on per-capita output growth can result from the resource cost of implementing training policies. Training is the most expensive type of active labour-market policy, and increased expenditures on programs can adversely affect growth by requiring extra taxes or reducing the resources available for other more productive public-sector uses. And even if one ignores the opportunity cost of allocating additional public funds to LTP-policy, training programs could still fail to be sufficiently growth-enhancing because of poorly performing institutions that prevent the efficient use of the corresponding LTP-resources.

At the same time, the growth impact of training-spending may not be independent of cyclical influences. For example, the opportunity cost of allocating additional public funds to labour-market training can be expected to be higher during downturns, when the strain on public-sector resources is already sizable. The incentive of the population to join the labour force and improve employability by participating in programs is also likely to be weaker, the lower are expected earnings and thus the more unfavourable is the current economic context. One would further expect the lock-in effect of programs to vary with the business cycle. Negative lock-in effects of programs are likely to be more pronounced during periods of unfavourable economic conditions relative to trend, when job-finding rates are anyway low and the return to search is small, something consistent with the evidence in e.g. Bloemen (2005), Krueger & Mueller (2011) and DeLoach & Kurt (2013), which suggests that search effort is pro-cyclical.

On the other hand, business-cycle fluctuations may coincide with periods of country-specific structural shocks that create discrepancies between skill demand and supply. In such cases, more

spending on LTPs may still be growth-enhancing even if the prevailing macroeconomic context is not sufficiently favourable, to the extent that programs can help workers adjust their skills to the requirements of expanding industries and prevent a rise in structural unemployment. Skill discrepancies could also arise indirectly, due to economic globalization, through the opening-up of domestic markets to foreign competition. Indeed, by affecting national economies differently, the process of economic globalization may require a reorganization of production in individual countries and a reallocation of labour resources across the different sectors to help maintain competitiveness. In such cases, by making it easier for workers to upgrade their skills and adjust to the resulting changes in labour-demand patterns, an expansion of training policy could still yield a return in terms of additional output-growth even if the existing macroeconomic context is not sufficiently favourable relative to trend.

To what extent do the favourable effects of LTP-spending on output-growth outweigh the adverse side-effects? Is the growth-training relationship positive or negative on average at the aggregate level? To what extent the growth impact of pubic spending on training is different, depending on the prevailing economic conditions? What is the best timing for expanding training programs in terms of output growth? This paper seeks to provide evidence on these issues. To our knowledge, broad cross-country empirical evidence on the relationship between LTP-expenditures and per-capita output growth is lacking. Despite much discussion on the extent to which active labour-market policies in general have different effects over the cycle, empirical work on whether LTP- impacts are business-cycle dependent is also scant. Few micro-level studies exist, focusing on how cyclical fluctuations in aggregate unemployment or other relevant indicator affect the job-entry probabilities of program participants, and the results are mixed (Raaum *et al.*, 2002; Røed & Raaum, 2006; Staghøj *et al.*, 2007; Lechner & Wunsch, 2009; McVicar & Podivinsky, 2010; Forslund *et al.*, 2011; Nordlund, 2011). For example, while the evidence reported in Røed & Raaum (2006), Staghøj *et al.* (2007) and McVicar & Podivinsky (2010) suggests that program-outcomes are less positive when aggregate unemployment is higher or business-cycle conditions are unfavourable, the results found in Lechner & Wunsch (2009) and Forslund *et al.* (2011) indicate that program effects are more positive when unemployment is higher. Moreover, even among micro-level studies focusing on the labour-market impact of training programs, empirical evidence on whether or not LTP effects are influenced by the extent of structural change is extremely limited. In an attempt to determine who is losing jobs, only Forslund *et al.* (2011) classifies employment-changes in industry as structural or cyclical depending on the extent to which overall employment also changes before and after a turning point. Potential influences arising from the opening-up of markets at the global level are also in general neglected.

2.2. Empirical specification and data

To test for the existence of an average growth-training relationship we use a baseline model of the form:

$$\begin{aligned} d\ln(gdp)_{j,t} = \delta_o + \delta_1 \ln(gdp)_{j,t-1} + \delta_2 (sav)_{j,t} + \delta_3 (ter)_{j,t} + \\ + \delta_4 (bar)_{j,t} + \delta_5 (dur)_{j,t} + \delta_{lmt} (lmt)_{j,t} + \mu_j + \varepsilon_{j,t} \end{aligned} \quad (1)$$

where the $\delta'_i s$ are unknown parameters to be estimated, μ_j represents country-fixed effects and $\varepsilon_{j,t}$ is a residual term. The dependent variable, $d\ln(gdp)_{j,t}$ is real per-capita output-growth, while $\ln(gdp)_{j,t-1}$, the lagged value of (the logarithm of) real per-capita GDP, will enter the regression with a negative coefficient δ_1, if conditional convergence applies. $(sav)_{j,t}$ represents the savings rate, measured as the share of (gross) fixed-capital formation in GDP, and we expect $\delta_2 > 0$.

The $(lmt)_{j,t}$ variable is our proxy for LTP-intensity, measured as expenditures on training programs per labour-force member as percent of per-capita GDP. $(ter)_{j,t}$, $(bar)_{j,t}$ and $(dur)_{j,t}$ are proxies for other labour-market influences on output growth, operating through productivity and/or wages. Thus $(ter)_{j,t}$ is used to capture labour-

productivity improvements resulting from human capital acquired from sources other than LTPs, with this variable measured as the ratio of (gross) tertiary enrolment to the population of the corresponding age group and δ_3 expected to be positive. $(bar)_{j,t}$ measures the extent to which, based on national legislation, bargaining agreements relating to wages are extended to non-participating workers and/or firms, and it is used as a proxy for exogenous influences on workers' bargaining strength regardless of LTP-policy. To the extent that, other things equal, a rise in workers' bargaining power, by increasing equilibrium wages, is likely to lead to reduced job-creation incentives independently of LTPs, causing a fall in growth via lower measured employment, we expect $\delta_4 < 0$. $(dur)_{j,t}$ measures unemployment-duration, and it is used as a proxy for reservation wages. Whether or not labour-market-training policies are implemented, higher unemployment duration reduces the present-discounted value of workers' perceived unemployment-compensation opportunities and thus leads to reduced reservation wages. With reservation wages and job-creation incentives being negatively related, and with job creation and output growth being positively related, we expect $\delta_5 > 0$. Series for $(bar)_{j,t}$ are obtained from Visser (2013) (*AIAS* database), and higher values (0 to 5) reflect increased bargaining power of workers. Data on $(dur)_{j,t}$ are from the OECD (*Incidence of Unemployment by Duration*) and measure the proportion of unemployed workers for one year or more relative to total unemployment. Data on $(ter)_{j,t}$ are obtained from the World Bank (*World Development Indicators*). Data on the savings variable $(sav)_{j,t}$ are also obtained from the World Bank (*World Development Indicators*), while cross-country series for $(lmt)_{j,t}$ are constructed using OECD data (*Labour Market database* and *Employment Outlook)*. The output-growth rate, $d\ln(gdp)_{j,t}$, is measured as the annual percentage change of real GDP per capita (US$, constant prices, constant exchange rates, 2005 = base year), with the corresponding GDP series obtained from the OECD (*Main Economic Indicators*). Time dummies are introduced in all specifications to control for common developments, like worldwide improvements in technology or monetary-policy changes, which might have taken place during the period under consideration.

To test for influences on the growth-training relationship arising from the state of the business cycle, the size of structural shocks and the scale of economic globalization, we estimate (2a)-(2c), where $(down)_{j,t}$, $(lvar)_{j,t}$ and $(lglo)_{j,t}$ are defined as dummies:

$$d\ln(gdp)_{j,t} = \delta_o + \delta_1 \ln(gdp)_{j,t-1} + \delta_2 (sav)_{j,t} + \delta_3 (ter)_{j,t} + \delta_4 (bar)_{j,t} + \\ + \delta_5 (dur)_{j,t} + \delta_{lmt} (lmt)_{j,t} + \delta_{lmt*donn} (lmt*down)_{j,t} + \mu_j + \varepsilon_{j,t}$$

(2a)

$$d\ln(gdp)_{j,t} = \delta_o + \delta_1 \ln(gdp)_{j,t-1} + \delta_2 (sav)_{j,t} + \delta_3 (ter)_{j,t} + \delta_4 (bar)_{j,t} + \\ + \delta_5 (dur)_{j,t} + \delta_{lmt} (lmt)_{j,t} + \delta_{lmt*lvar} (lmt*lvar)_{j,t} + \mu_j + \varepsilon_{j,t}$$

(2b)

$$d\ln(gdp)_{j,t} = \delta_o + \delta_1 \ln(gdp)_{j,t-1} + \delta_2 (sav)_{j,t} + \delta_3 (ter)_{j,t} + \delta_4 (bar)_{j,t} + \\ + \delta_5 (dur)_{j,t} + \delta_{lmt} (lmt)_{j,t} + \delta_{lmt*lglo} (lmt*lglo)_{j,t} + \mu_j + \varepsilon_{j,t}$$

(2c)

Starting from (2a), the $(lmt)_{j,t}$ variable can be expected to enter the regression with a significantly positive coefficient if the macroeconomic environment is favourable enough to eliminate the likelihood of a large resource-cost effect from additional expenditures on training programs, of a small labour-supply gain and of a sizable negative lock-in effect, so that the productivity- and job-matching benefits from LTP-policy are not fully offset. On the other hand, training expenditures may enter the regression with a non-positive coefficient if economic conditions are not sufficiently favourable relative to trend, so as to generate a large labour-

supply gain from more programs and guarantee that the resource cost of increasing program-spending, as well as any adverse lock-in effect or wage-increasing effects, are small. Accordingly, in (2a), to test for cyclical influences, we let $(down)_{j,t}$ be equal to 1 during periods of declining economic activity relative to trend, representing the case of a switch to a more unfavourable macroeconomic environment, and equal to zero otherwise, with the coefficient sum $\delta_{lmt} + \delta_{lmt*down}$ capturing the output-growth effect from increased LTP-spending during downturns and the coefficient on $(lmt)_{j,t}$, i.e. δ_{lmt}, capturing the corresponding effect during upturns. Statistical significance of $\delta_{lmt*down}$ would provide evidence of a different response of per-capita output growth to more LTP-spending depending on the phase of the business cycle, while no rejection of the hypothesis $|\delta_{lmt}| > |\delta_{lmt} + \delta_{lmt*down}|$ would indicate a smaller growth-effect of training programs during downturns. To construct $(down)_{j,t}$ we use the cyclical component of GDP, $(cyc)_{j,t}$, obtained by applying a Hodrick-Prescott filter to real-GDP series, and we let $(down)_{j,t}$ be equal to 1 if the *i,j* observation for (cyc) is negative and equal to zero otherwise.

Country-specific structural shocks are proxied by a measure of employment variability across manufacturing industries, given that such shocks can be expected to be associated with a reallocation of labour resources across the different industrial branches. Series for cross-industry employment-variability are constructed by applying a Pooled Panel-ARCH model to employment-growth data from 23 manufacturing industries at the ISIC-2 level. Industry-employment data are obtained from the OECD's *STAN* database, and estimation results are shown in Table 2. Fitted values from the estimated conditional-variance equation in this table are then recovered and the (annual) conditional employment-growth variability per country, $(var)_{j,t}$, is computed as the average value of the 23 manufacturing industries. To test, in (2b), for influences stemming from country-specific structural shocks, we let $(lvar)_{j,t}$ take the value of 1 when the *j, t* observation for (var) is below the sample's median, reflecting the case of small-scale restructuring that leads to limited reallocation of labour resources between industries, and the value of zero otherwise.

On the other hand, to test for influences on the output-growth impact of training-spending stemming from differences in the extent to which national markets are exposed to foreign competition, we include in (2c) the interaction term $(lmt * lglo)_{j,t}$. $(glo)_{j,t}$ is an economic-globalization index, obtained from the *KOF database* (Dreher *et al.*, 2008), and a higher value implies greater exposure of national markets to foreign competition. We thus let $(lglo)_{j,t}$ in (2c) take the value of one when the *j, t* observation for this index is below the sample's median, representing the case of limited globalization of national markets, and the value of zero otherwise.

Accordingly, in (2b), the growth effect of government-sponsored labour-market training in situations of small-scale structural shocks is captured by the coefficient sum $\delta_{lmt} + \delta_{lmt*lvar}$, while the corresponding effect in situations of extensive structural change is captured by the coefficient δ_{lmt}. Similarly, in (2c), the case of limited globalization of national markets is captured by the coefficient sum $\delta_{lmt} + \delta_{lmt*lglo}$, while the case of large-scale globalization is captured by the coefficient on $(lmt)_{j,t}$, i.e. δ_{lmt}. To the extent that labour-market training helps workers adjust their skills according to the employers' needs, LTP-policy is likely to yield a larger return in terms of additional per-capita output growth if substantial cross-industry restructuring is taking place in an economy, requiring large-scale reallocation of labour resources from declining to expanding industrial branches. LTP-policy is also likely to have a relatively larger growth-enhancing effect if extensive globalization of markets is taking place, since, in such a case, the need for an economy to have a workforce with up-to-date skills to help improve competitiveness will tend to be more urgent. Thus, in (2b)-(2c), statistical significance of the coefficients $\delta_{lmt*lvar}$ and $\delta_{lmt*lglo}$ would provide evidence of a different response of output growth to training-spending

depending, respectively, on the magnitude of cross-industry structural shocks and the pace of economic globalization. No rejection of the hypothesis $|\delta_{lmt}| > |\delta_{lmt} + \delta_{lmt*lvar}|$, $|\delta_{lmt}| > |\delta_{lmt} + \delta_{lmt*lglo}|$ would further indicate that the output-growth impact of additional LTP expenditures is positively related to the extent of structural adjustment, resulting either directly as a response to country-specific cross-industry shocks, or indirectly as the economy's response to the opening-up of markets at the global level.

Additionally to (2a)-(2c), we also examine cyclical and structural influences jointly, so as to investigate their interplay on output-growth, by estimating (3a)-(3b):

$$d\ln(gdp)_{j,t} = \delta_o + \delta_1 \ln(gdp)_{j,t-1} + \delta_2 (sav)_{j,t} + \delta_3 (ter)_{j,t} + \delta_4 (bar)_{j,t} + \delta_5 (dur)_{j,t} + \delta_{lmt} (lmt)_{j,t} + \delta_{lmt*uplvar} (lmt*uplvar)_{j,t} + \delta_{amt*downhvar} (lmt*downhvar)_{j,t} + \delta_{lmt*uphvar} (lmt*uphvar)_{j,t} + \mu_j + \varepsilon_{j,t} \quad (3a)$$

$$d\ln(gdp)_{j,t} = \delta_o + \delta_1 \ln(gdp)_{j,t-1} + \delta_2 (sav)_{j,t} + \delta_3 (ter)_{j,t} + \delta_4 (bar)_{j,t} + \delta_5 (dur)_{j,t} + \delta_{lmt} (lmt)_{j,t} + \delta_{lmt*uplglo} (lmt*uplglo)_{j,t} + \delta_{lmt*downhglo} (lmt*downhglo)_{j,t} + \delta_{amt*uphglo} (lmt*uphglo)_{j,t} + \mu_j + \varepsilon_{j,t} \quad (3b)$$

where $(up)_{i,t} = (1 - down_{i,t})$ corresponds to an economic upturn, $(hvar)_{j,t} = (1 - lvar_{i,t})$ reflects extensive cross-industry employment-variability, and $(hglo)_{j,t} = (1 - lglo_{j,t})$ indicates large-scale economic globalization. The composite interaction terms allow us to test for a joint effect of upward/downward movements in economic activity relative to trend in conjunction with large/small country-specific structural shocks or extensive/limited opening-up of markets at the global level, and are defined as:

$$(uphvar)_{j,t} = \begin{cases} 1 \text{ if } (up)_{j,t} \cap (hvar)_{j,t} & \text{(alongside an upturn, large-scale country-specific structural shocks are occuring)} \\ 0 \text{ otherwise} \end{cases}$$

$$(uplvar)_{j,t} = \begin{cases} 1 \text{ if } (up)_{j,t} \cap (lvar)_{j,t} & \text{(alongside an upturn, small-scale country-specific structural shocks are occuring)} \\ 0 \text{ otherwise} \end{cases}$$

$$(downhvar)_{j,t} = \begin{cases} 1 \text{ if } (down)_{j,t} \cap (hvar)_{j,t} & \text{(alongside a downturn, large-scale country-specific structural shocks are occuring)} \\ 0 \text{ otherwise} \end{cases}$$

$$(uphglo)_{j,t} = \begin{cases} 1 \text{ if } (up)_{j,t} \cap (hglo)_{j,t} & \text{(alongside an upturn, large-scale opening-up of markets at the global level is occuring)} \\ 0 \text{ otherwise} \end{cases}$$

(3c)

$$(uplglo)_{j,t} = \begin{cases} 1 \text{ if } (up)_{j,t} \cap (lglo)_{j,t} & \text{(alongside an upturn, small-scale opening-up of markets at the global level is occuring)} \\ 0 \text{ otherwise} \end{cases}$$

$$(downhglo)_{j,t} = \begin{cases} 1 \text{ if } (down)_{j,t} \cap (hglo)_{j,t} & \text{(alongside a downturn, large-scale opening-up of markets at the global level is occuring)} \\ 0 \text{ otherwise} \end{cases}$$

Given these dummy-definitions, in the context of (3a), a situation where alongside a downturn there is limited inter-industry restructuring is captured by the coefficient on $(lmt)_{j,t}$. Similarly, in (3b), a situation where alongside an economic downturn there is limited globalization of markets is captured by the coefficient on $(lmt)_{j,t}$.

Descriptive statistics for the variables are reported in Table 1. Estimation is carried out by applying the system-GMM technique (Arellano & Bover, 1995; Blundell & Bond, 1998). This technique is extensively used in panel-data growth studies to control for endogeneity bias arising from the possibility that one or more of the explanatory variables in the growth regressions are not be strictly exogenous. Actual estimation is based on lagged levels and lagged first-differences of right-hand-side variables, which ensures that the estimates reflect causation running from these variables to the dependent variable and not vice versa, while the unobserved individual-country characteristics are eliminated. The statistical adequacy of the model is established when the generated residuals do not exhibit second-order autocorrelation, a property checked by the m_2 statistic, and when the over-identifying restrictions are not rejected, a condition checked by applying the Sargan test. For potentially endogenous variables, valid lags (i.e. not correlated with the current error term), are lags 2 or more. Since a large number of instruments can over fit endogenous variables and bias the coefficient estimates, we use only lags 2 to 4 to keep the number of instruments manageable. At the same time, given that most of the explanatory variables in (1)-(3), including the LTP-policy proxy (lmt), may not be strictly exogenous to output-growth developments, all right-hand-side variables, except the time dummies, have been treated as potentially endogenous and have been accordingly instrumented. As we deal with an unbalanced panel with gaps, we further resort to using a forward orthogonal transformation instead of first-differencing (see e.g. Arellano & Bover, 1995). By this transformation, instead of the previous observation, the average of all available future observations is subtracted from the current value of a variable. This transformation can be computed even in the presence of gaps in a panel, thus minimizing data loss, while lagged observations of a variable are valid as instruments since they do not enter the transformation formula.

3. Estimation results

Results are presented in Tables 3-4. All regressions satisfy the insignificance of second-order autocorrelation in the residuals, while the Sargan test of over-identifying restrictions suggests that the model is well specified. At the same time, there is a positive and statistically significant output-growth effect from higher saving, consistent with the findings of other studies, while the coefficient on lagged per-capita GDP is significantly negative, indicating conditional convergence for the set of countries and time-period under consideration.

As far as LTP-policy is concerned, the results in column (1) of Table 3 suggest that on average government-sponsored training programs have growth-enhancing effects. The (lmt) variable enters with a significantly positive sign. The corresponding coefficient implies that increasing the amount of training expenditures per labour-force member as percent of per-capita GDP by 1 standard deviation raises per-capita output-growth by 0.0054 percentage point. This modest, but statistically significant, growth-enhancing effect of LTPs is obtained after taking into account other potential labour-market influences on growth rates operating through wages or productivity, namely proxies for workers' bargaining strength, reservation wages and higher-education human capital, the coefficients of which have the expected signs and are all statistically significant at conventional levels.

On the other hand, the estimates in columns (2)-(4) of Table 3 indicate cyclical, structural and globalization influences on the growth-training relationship. Starting with column (2), the growth effect of LTP-policy during economic upturns is reflected in the coefficient on (lmt), which is significantly positive and implies an output-growth gain of 0.0087 percentage point from an increase by 1 standard deviation in training-spending per labour-force member as percent of per capita GDP. But the interaction term $(lmt*down)$

enters the regression with a negative sign, implying that more LTPs during downturns may not yield a net return in terms of additional growth. Indeed, for the country-sample and time-period considered, we cannot reject the hypothesis $\delta_{lmt} + \delta_{lmt*down} = 0$, i.e. no significant output-growth gain from expanding training programs at times of unfavourable economic conditions relative to trend. Several factors can be responsible for this result: (i) more severe strain on public-sector resources during economic downturns, and thus a larger opportunity cost of allocating extra funds to labour-market training; (ii) a smaller labour-supply gain from LTPs when the macroeconomic context is unfavourable relative to trend and expected earning are falling, due to no strong incentive on the part of the population to enter the labour-force and enhance employability by participating in programs; (iii) a larger lock-in effect of programs in bad times, given that participating-workers' perceived probability of obtaining a job-offer through more intensive job-search can be expected to fall when the overall macroeconomic conditions are deteriorating; and, (iv) a lower probability of skill shortages in periods of deteriorating economic conditions and slack labour markets, and thus a smaller return in terms of additional output-growth from updating workers' skills through training.

Turning to the role of cross-industry restructuring at country level and of opening-up of markets at international level, in columns (3) and (4) of Table 3 the interaction terms $(lmt * lvar)$ and $(lmt * lglo)$ are statistically significant and enter negatively, suggesting impacts on the growth-training relationship resulting from the magnitude of country-specific industry shocks and from the pace of economic globalization. In particular, from the coefficient on (lmt) in column (3), it follows that, in situations of large-scale country-specific structural shocks, the output-growth differential from an increase by 1 standard deviation in training-spending per labour-force member relative to per-capita GDP can be up to 0.0084 percentage point. In a situation of small-scale cross-industry structural shocks, captured by the coefficient sum $\delta_{lmt} + \delta_{lmt*lvar}$, the corresponding differential is smaller in magnitude, amounting to 0.0058 percentage points. As far as economic globalization is concerned, in column (4), the growth effect of LTP-policy in cases of higher-than-average globalization of markers, captured by the coefficient on (lmt), is positive and statistically significant, leading to a growth-training elasticity (evaluated at the sample's mean) of 0.0043. In cases of limited globalization of markets, captured by the coefficient sum $\delta_{lmt} + \delta_{lmt*lglo}$, the growth-LTP elasticity is 0.0018 and statistically insignificant at conventional levels. These results are not difficult to explain. First, large-scale structural shocks at country-level are more likely, compared to small-scale shocks, to be associated with significant skill discrepancies, and this in turn implies a larger output-growth gain from adjusting workers' skills to the employers' needs through training. Second, by providing workers a tool to upgrade their skills, training programs can in general help an economy to remain competitive at the international level, and this can be expected to be particularly important for economic growth during periods of large-scale globalization of markets.

Interactions between different influences are examined in Table 4. This table includes in the set of regressors the composite dummies defined in (3c), and a summary of the results obtained is presented in Tables 5(a)-5(b). Starting from column (1), where cyclical effects are examined jointly with country-specific structural shocks, all interaction terms are significant at 1% or 5%, indicating that both such sources of influences are valid when they are considered together. In terms of magnitude, during upturns and sizable cross-industry reallocation of labour resources at country-level (captured by the coefficient sum $\delta_{lmt} + \delta_{lmt*uphvar}$), the output-growth-gain associated with an increase in LTP-intensity by one standard deviation attains its highest value (= 0.010), with statistical significance from Table 5(a) at 1%. A somewhat lower, but, from Table 5(a), still highly significant growth-enhancing effect (= 0.0078), is obtained in cases of a favourable macroeconomic environment relative to trend and limited cross-industry restructuring (coefficient sum $\delta_{lmt} + \delta_{lmt*uplvar}$). On the other hand, when the macroeconomic context is deteriorating and at the same time limited cross-industry reallocation of labour resources is taking place, the output-

growth gain from additional spending on programs is weak, reflected in the coefficient on (lmt), i.e. δ_{lmt} .This coefficient, while positive, is small in size and statistically insignificant at conventional levels. However, the coefficient estimates in column (1) of Table 4 imply that, even when the macroeconomic context is unfavourable relative to trend, there can still be a return in terms of additional output-growth from expanding programs if substantial restructuring is taking place in an economy that requires large-scale cross-industry reallocation of labour resources in individual countries. The effect in this case of LTP-policy is captured by the coefficient sum $\delta_{lmt} + \delta_{lmt*downhvar}$. From Table 5(a), $\delta_{lmt} + \delta_{lmt*downhvar}$ is significantly positive, implying an output-growth gain of 0.0063 percentage point from increasing by 1 standard deviation training-expenditures per labour-force member as percent of per-capita GDP.

In column (2) of Table 4 the largest output-growth gain from program-spending is obtained in situations where, alongside an improving domestic macroeconomic context, there is large-scale globalization of domestic markets, requiring individual economies to have workers with up-to-date skills to help improve competitiveness. This is reflected in the coefficient sum $\delta_{lmt} + \delta_{lmt*uphglo}$. From Table 5(b), $\delta_{lmt} + \delta_{lmt*uphglo}$ is significantly positive and large in size, implying an output-growth gain of 0.0089 percentage point from raising training-intensity by 1 standard deviation. In cases of a deteriorating macroeconomic context relative to trend and limited globalization of domestic markets, LTP-spending fails to yield a return in terms of additional output growth, with the coefficient estimate for δ_{lmt} suggesting a negative growth-training relationship. However, the coefficient sum $\delta_{lmt} + \delta_{lmt*downhglo}$ is significantly positive, implying that training programs can still be growth-enhancing if alongside an unfavourable domestic macroeconomic context there is large-scale opening-up of domestic markets. The estimated coefficients indicate in this case a growth-training elasticity (evaluated at the sample's mean) of 0.0031. This elasticity is about thirty-percent larger than the corresponding elasticity in column (2) of Table 3, where no account is taken of the extent of globalization of markets, and only marginally insignificant (Table (5(b)).

What policy conclusions can be derived from the results in Tables 3-5? Firstly, for the country-sample and time period considered, government-sponsored training programs are found to have been on average growth-increasing. This provides support for the view that allocating more public funds to labour-market training is worthwhile at the aggregate level, even when programs do not contribute much to a net increase in the total number of jobs in the short run. Secondly, the overall economic context is a key factor to consider when deciding on the timing of program expansion. Other things equal, increasing spending on labour-market training when the macroeconomic context is deteriorating relative to trend may not achieve much in terms of per-capita output growth. Yet, even when the domestic macroeconomic context is not sufficiently favourable, there is a case for more LTP-spending if, either extensive cross-industry restructuring is taking place in an economy, requiring workers to adapt their skills to the needs of expanding industries, or large-scale opening-up of markets is occurring at the global level, requiring national economies to have a workforce with up-to-date skills to maintain or improve competitiveness.

4. Discussion and conclusions

Government-sponsored labour-market training has been strongly recommended by the OECD and explicitly promoted by the European Commission through the *European Employment Strategy* since 2001. Currently, LTP expenditures are the largest component of total active labour-market spending in many economies, accounting for about 30% of the overall ALMP-budget in OECD countries and for about 35% in euro zone countries. And while there is an extensive empirical literature assessing from a microeconomic perspective the impact of LTPs on labour-market outcomes, broad cross-country empirical evidence on the extent to which public spending on labour-market training contributes to economic growth and per-capita incomes at the aggregate level is lacking.

Based on data from OECD countries during 1989-2009, our estimates suggest that government-sponsored training programs are on average growth-enhancing. On the other hand, our results indicate differences in the growth impact of programs, with increased spending on LTPs leading to a greater or smaller return in terms of additional per-capita output growth depending on business-cycle conditions, on the extent of cross-industry restructuring at the country-level and on the scale of opening-up of markets at the global level. During economic upturns the growth-training relationship is strongly positive but during downturns the growth effect of additional LTP-spending is found to be weak. This result points to the importance of taking into account the existing macroeconomic context when considering whether or not to expand training policy. Increasing expenditures on training programs in bad times, when macroeconomic conditions are unfavourable relative to trend, may achieve little in terms of additional per-capita output-growth as the direct positive growth effects can be counterbalanced by negative indirect side-effects.

Nevertheless, cyclical fluctuations may coincide with periods of country-specific structural shocks. In such cases government-sponsored training programs can still be growth-enhancing, even if the domestic macroeconomic context is not sufficiently favourable, by reducing skill mismatch and preventing a rise in structural unemployment. Indeed, in situations of fast changing economic structures, we find a significant growth-enhancing effect from increased expenditures on LTPs even during downturns. At the same time, our results indicate that the growth gain from labour-market training is larger the greater is the pace of economic globalization. This result has a straightforward intuitive explanation: globalization increases a country's need to remain economically competitive, and this makes more urgent the need to have a labour force with up-to-date skills in order to maintain economic growth. Given the recent trend towards greater globalization of national markets, this result suggests that the importance of LTP policy for economic growth is likely to increase in the years to come.

The analysis in the paper can be extended in several ways. For example, one could examine sub-categories of training programs and/or split the country-sample in groups (e.g. EU vs. other OECD countries) in order to assess potential cross-group differences in the way output-growth responds to LTP-policy. One could also extend the analysis to other types of active labour-market policies or examine the role of complementarities between training and other labour-market institutions or policies. At the same time, as a robustness control, different proxies for cyclical, structural and globalization influences could be used. These extensions are among our plans for further research.

References

Arellano, A. (2010), "Do training programmes get the unemployed back to work? A look at the Spanish experience", *Revista de Economía Aplicada*, 18, pp. 39-65.

Arellano, M. and Bover, O. (1995), "Another look at the instrumental variable estimation of error-component models", *Journal of Econometrics*, 68, pp. 29-45.

Auer, P., Efendioglu, U. and Leschke, J. (2008), *Active labour market polices around the world – Coping with the consequences of globalization,* International Labour Office (ILO), Geneva.

Ballot, G., Fakhfakh, F. and Taymaz E. (2006), "Who benefits from training and R&D, the firm or the workers?", *British Journal of Industrial Relations*, 44, pp. 473-495.

Barrett, A. and O'Connell, P. J. (2001), "Does training generally work? The returns to in-company training", *Industrial & Labor Relations Review,* 54, pp. 647-662.

Bergemann, A., Fitzenberger, B. and Speckesser, S. (2009), "Evaluating the dynamic employment effects of training programs in East Germany using conditional difference-in-differences", *Journal of Applied Econometrics*, 24, pp. 797-823.

Betcherman, G., Olivas, K. and Dar, A. (2004), "Impacts of active labour market programs: new evidence from evaluations with particular attention to developing and transition countries", Social Protection Discussion Paper No. 0402, World Bank.

Biewen, M., Fitzenberger, B., Osikominu,A. and Waller, M. (2007), "Which program for whom? Evidence on the comparative effectiveness of public sponsored training programs in Germany", ZEW Discussion Paper 07-042.

Blache, G. (2011), "Active labour market policies in Denmark: a comparative analysis of post-program effects", CES Working Paper No. 2011.71, University of Paris 1 Panthéon-Sorbonne, Centre d'Economie de la Sorbonne.

Bloemen, H. (2005), "Job-search intensity and labour-market transition: an empirical analysis", *Journal of Human Resources*, 40, pp. 231-269.

Blundell, R. and Bond, S. (1998), "Initial conditions and moment restrictions in dynamic panel data models", *Journal of Econometrics*, 87, pp. 115-43.

Bollerslev, T. (1986), "Generalized autoregressive conditional heteroscedasticity', *Journal of Econometrics*, 31, pp. 307-327.

Bonoli, G. (2010), "The political economy of active labour market policy", *Politics & Society*, 38, pp. 435-457

Boothby, D., Dufour, A. and Tang, J. (2010), "Technology adoption, training, and productivity performance", *Research Policy,* 39, pp. 650-661.

Braconie, H, Nicoletti, N. and Westmore, B. (2014), *Policy challenges for the next 50 years,* OECD Economic Policy Papers, OECD Paris.

Brown, A. and Koettl, J. (2015), "Active labour market programs: employment gains or fiscal drain?", *IZA Journal of Labour Economics*, 4, pp. 12-34.

Calmfors, L., Forslund, A. and Hemström, M. (2002), "Does active labour market policy work? Lessons from Swedish experiences", *Sweedish Economic Policy Review*, 8, pp. 61-131

Card, D., Kluve, J. and Weber, A. (2010), "Active labour-market policies evaluations: a meta-analysis", *Economic Journal*, 120, pp. 452-477.

Cermeño, R. and Grier, K.B. (2006), "Conditional heteroscedasticity and cross-sectional dependence in panel data: an empirical study of inflation uncertainty in the G7 countries", In Baltagi, B.H. (ed.) *Panel Data Econometrics,* North-Holland.

Conti, G. (2005), "Training, productivity and wages in Italy", *Labour Economics*, 12, pp. 557-576.

Crépon, B., Duflo, E., Gurgand, M., Rathelot, R. and Zamora, P. (2013), "Do labour market policies have displacement effects? Evidence from a clustered randomized experiment", *Quarterly Journal of Economics*, 128, pp. 531-580.

Cueto, B. and Mato, F. J. (2009), "A non-experimental evaluation of training programmes: regional evidence for Spain", *Annals of Regional Science*, 43, pp. 415-433.

Dahlberg, M. and Forslund, A. (2005), "Direct displacement effects of labour market programmes", *Scandinavian Journal of Economics*, 107, pp. 475-494.

Dearden, L., Reed, H. and Van Reenen, J. (2006), "The impact of training on productivity and wages: evidence from British panel data", *Oxford Bulletin of Economics and Statistics,* 68, pp. 397-421.

DeLoach, S. B. and Kurt, M. (2013), "Discouraging workers: estimating the impacts of macroeconomic shocks on the search intensity of the unemployed", *Journal of Labour Research*, 34, pp. 433-454.

Dieckhoff, M. (2007), "Does it work? Effect of continuing training on labour market outcomes: a comparative study of Germany, Denmark and the United Kingdom", *European Sociological Review*, 23, pp. 295-308.

Dreher, A., Gaston, N., and Martens, P. (2008). *Measuring globalization-gauging its consequences,* Springer, New York

Duell, N. and Vogler-Ludwig, K. (2012), *Can active labour market programmes reduce long-term unemployment?* Mutual-Learning Program for Employment and Social Solidarity, European Commission.

Engle, R. (1982), "Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation", *Econometrica,* 50, pp. 987-1007.

European Commission (2005), *A Study on the effectiveness of ALMPs,* Final Report, European Commission.

Fitzenberger, B., Osikominu, A. and Völter, R. (2008),"Get training or wait? Long-run employment effects of training programs for the unemployed in West Germany", *Annales d'Economie et de Statistique*, 34, pp. 321-355.

Forslund, A, Fredriksson, P. and Vikström, J. (2011), "What active labour market policy works best in a recession?" , *Nordic Economic Policy Review* , 1, pp. 71–102.

Jespersen, S.T., Munch, J. R. and Skipper, L. (2008), "Costs and benefits of Danish active labour market programs", *Labour Economics*, 15, pp. 859-884.

Kluve, J. (2010), "The effectiveness of European active labour market policies", *Labour Economics*, 17, pp. 904-918.

Kluve J. (ed.) (2007). *Active labour market policies in Europe: performance and perspectives*, Springer, New York.

Konings, J. and Vanormelingen, S. (2015), "The impact of training on productivity and wages: firm-level evidence", *Review of Economics and Statistics* , 97, pp. 485-497.

Krueger, A. B. and Mueller, A. (2011), "Job search, emotional well-being, and job finding in periods of mass unemployment", *Brookings Papers on Economic Activity*, 1, pp.1-81.

Kuddo, A. (2009), "Employment services and active labour market programs in Eastern & Central Asian countries", Social Protection & Labour Discussion Paper 0918, World Bank.

Lechner, M., Miquel, R. and Wunsch, C. (2011), "Long-run effects of public-sector sponsored training in West Germany", *Journal of the European Economic Association*, 9, pp.742-784.

Lechner, M. and Wunsch, C. (2009), "Are training programs more effective when unemployment is high?", *Labour Economics* , 27, pp. 653-692.

McVicar, D. and Podivinsky, J.M. (2010), "Are active labour market programs least effective when are most needed? Melbourne Institute Working Paper 16/10, University of Melbourne.

Nordlund, M. (2011), "What works best when? The role of active labour market policy programmes in different business cycles", *International Journal of Social Welfare*, 20, pp. 43-54..

OECD (2005), *Labour market programs and activation strategies: evaluating the impacts,* OECD Employment Outlook.

OECD (2012), *Activating job-seekers: how Australia does it,* OECD Employment Outlook.

OECD (2013), *Activating job seekers,* OECD Employment Outlook.

OECD (2015), *Activation policies for more inclusive labour markets,* OECD Employment Outlook.

Osikominu, A. (2013), "Quick job entry or long-term human capital development? The dynamic effects of alternative training schemes", *Review of Economic Studies*, 80, pp. 313-342.

Raaum, O., Torp, H. and Zhang, T. (2002), "Business cycles and the impact of labour market programs", Memorandum 14/2002, Department of Economics, University of Oslo.

Rodriguez-Planas, N. and Jacob, B. (2010), "Evaluating active labour market programs in Romania", *Empirical Economics*, 38, pp. 65-84.

Røed, K. and Raaum, O. (2006), "Do labour market programmes speed up the return to work?" *Oxford Bulletin of Economics and Statistics*, 68, pp. 541-568.

Rosholm, M. and Skipper, L. (2009), "Is labour market training a curse for the Unemployed? Evidence from a social experiment", *Journal of Applied Econometrics*, 24, pp. 338-365.

Sianesi, B. (2004), "An evaluation of the Swedish system of active labour market programs in the 1990s", *Review of Economics and Statistics*, 86, pp. 133-155.

Spevacek,A.M. (2009), "Effectiveness of active labour market programs: a review of programs in Central and Eastern Europe and the Commonwealth of Independent States", KSC Research Paper 05/2009.

Staghøj, J., Svarer, M. and Rosholm, M. (2007), "A statistical programme assignment", IZA Discussion Paper 3165.

Van Ours, J.C. (2004), "The locking-in effect of subsidized jobs", *Journal of Comparative Economics*, 32, pp. 37–52.

Visser, J. (2013), *ICTWSS: Database on institutional characteristics of trade unions, wage setting, state intervention and social pacts* (Version 4), Amsterdam Institute for Advanced Labour Studies (AIAS), University of Amsterdam.

Wunsch, C. and Lechner, M. (2008),"What did all the money do? On the general ineffectiveness of recent West German labour-market programmes", *Kyklos,* 61, pp. 134-174.

Variable	Obs.	Mean	Std. Dev.	Min	Max
$dln(gdp)_{j,t}$	375	0.018	0.026	-0.094	0.097
$ln(gdp)_{j,t}$	375	10.182	0.541	8.411	11.125
$(sav)_{j,t}$	375	0.219	0.037	0.141	0.338
$(ter)_{j,t}$	375	0.571	0.178	0.147	1.039
$(dur)_{j,t}$	375	0.323	0.165	0.005	0.754
$(bar)_{j,t}$	375	1.371	1.245	0.000	3.000
$(lmt)_{j,t}$	375	0.005	0.004	0.000	0.019
$(cyc)_{j,t}$	375	0.000	0.023	-0.071	0.081
$(var)_{j,t}$	293	0.012	0.031	0.002	0.368
$(glo)_{j,t}$	375	0.753	0.128	0.432	0.968

Notes: *Country-sample*: Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, United Kingdom, United States. *Time-period*: 1989-2009.

Table 1 Descriptive statistics

Regressor[b]	Estimates
Mean Equation	
Constant	-0.007*** (-13.86)
$(emp)_{j,t-1}$	0.278*** (49.03)
$(emp)_{j,t-2}$	0.249*** (52.42)
Conditional Variance Equation	
Constant	0.002*** (156.75)
ARCH(1)	0.543*** (37.23)
ARCH(2)	0.311*** (25.32)
Log-likelihood	7795
Observations	6222

Notes: [(a)] The percentage change of the number of employees for manufacturing industries. [(b)] The terms $(emp)_{j,t-1}$ and $(emp)_{j,t-2}$ represent the first and second-order lags of the dependent variable. Numbers in parentheses denote z-scores. Triple asterisks denote statistical significance at the one percent level.

Table 2 Pooled Panel ARCH model for cross-industry employment growth [a]

Regressor	(1)	(2)	(3)	(4)
$ln(gdp)_{j,t-1}$	-0.013** (-2.02)	-0.013* (-1.96)	-0.011* (-1.76)	-0.013** (-2.04)
$(sav)_{j,t}$	0.320*** (5.22)	0.288*** (4.70)	0.284*** (4.10)	0.296*** (5.18)
$(ter)_{j,t}$	0.038* (1.69)	0.035* (1.65)	0.062** (2.29)	0.038* (1.83)

$(dur)_{j,t}$	0.098*** (5.39)	0.106*** (5.49)	0.073*** (3.35)	0.093*** (5.00)
$(bar)_{j,t}$	-0.007*** (-3.44)	-0.008*** (-3.61)	-0.007** (-2.18)	-0.006*** (-2.71)
$(lmt)_{j,t}$	1.338* (1.84)	2.175** (2.34)	2.112*** (2.99)	1.545** (2.04)
$(lmt*down)_{j,t}$		-1.416*** (-2.83)		
$(lmt*lvar)_{j,t}$			-0.672** (-2.03)	
$(lmt*lglo)_{j,t}$				-1.319* (-1.86)
Observations	375	375	293	375
m_1 [p-value]	-1.82 [0.06]	-2.11 [0.03]	-2.30 [0.02]	-1.83 [0.06]
m_2 [p-value]	-1.18 [0.23]	-0.53 [0.59]	0.66 [0.50]	-1.09 [0.27]
Sargan [p-value]	190.40 [0.47]	174.48 [0.83]	156.08 [0.81]	201.25 [0.34]
$H_0 : \delta_{lmt} + \delta_{lmt*down} = 0$		1.09 [0.29]		
$H_0 : \delta_{lmt} + \delta_{lmt*lvar} = 0$			7.26 [0.00]	
$H_0 : \delta_{lmt} + \delta_{lmt*lglo} = 0$				0.07 [0.79]

Notes: Numbers in parentheses denote z-scores, m_1 and m_2 are residual first and second order serial correlation tests, while Sargan stands for the over-identifying restrictions test. Single, double, and triple asterisks denote statistical significance at the ten percent, five percent, and one percent level respectively. All models allow for robust standard errors. Time dummies are included.

Table 3 Government-sponsored labour-market training and output growth

Regressor	(1)	(2)
$ln(gdp)_{j,t-1}$	-0.015** (-2.30)	-0.014** (-2.20)
$(sav)_{j,t}$	0.219*** (3.26)	0.262*** (4.56)
$(ter)_{j,t}$	0.050** (2.07)	0.038* (1.95)
$(dur)_{j,t}$	0.068*** (3.20)	0.099*** (5.14)
$(bar)_{j,t}$	-0.006* (-1.74)	-0.007*** (-2.94)
$(lmt)_{j,t}$	0.599 (0.96)	-0.464 (-0.52)
$(lmt*uplvar)_{j,t}$	1.346*** (2.67)	
$(lmt*downhvar)_{j,t}$	0.967** (1.98)	
$(lmt*uphvar)_{j,t}$	1.940*** (3.22)	
$(lmt*uplglo)_{j,t}$		2.016*** (3.09)
$(lmt*downhglo)_{j,t}$		1.562** (2.37)
$(lmt*uphglo)_{j,t}$		2.684*** (3.05)
Observations	293	375
m_1 [p-value]	-2.51 [0.01]	-2.09 [0.03]
m_2 [p-value]	1.14 [0.25]	-0.59 [0.55]
Sargan [p-value]	166.71 [0.76]	187.60 [0.75]

Notes: see Table 3.

Table 4 Government-sponsored labour-market training and output growth: interactions between different sources of asymmetries

Case	Hypothesis Testing	Coefficients
Downturn & Small-Scale Labour Reallocation	$H_0 : \delta_{lmt} = 0$	0.599 (0.33)
Upturn & Small-Scale Labour Reallocation	$H_0 : \delta_{lmt} + \delta_{lmt*uplvar} = 0$	1.945*** (0.00)
Downturn & Large-Scale Labour Reallocation	$H_0 : \delta_{lmt} + \delta_{lmt*downhvar} = 0$	1.566*** (0.00)

Upturn & Large-Scale Labour Reallocation	$H_0 : \delta_{lmt} + \delta_{lmt*uphvar} = 0$	2.539*** (0.00)

Notes: Numbers in parentheses denote p-values, while triple asterisks denote statistical significance at the one percent level. The composite coefficients are based on column (1) of Table 4.

Table 5(a). Interactions between cyclical influences and structural shocks at country level

Case	Hypothesis Testing	Coefficients
Downturn & Small-Scale Globalization	$H_0 : \delta_{lmt} = 0$	-0.464 (0.60)
Upturn & Small-Scale Globalization	$H_0 : \delta_{lmt} + \delta_{lmt*uplglo} = 0$	1.552* (0.09)
Downturn & Large-Scale Globalization	$H_0 : \delta_{lmt} + \delta_{lmt*downhglo} = 0$	1.098 (0.12)
Upturn & Large-Scale Globalization	$H_0 : \delta_{lmt} + \delta_{lmt*uphglo} = 0$	2.220** (0.02)

Notes: see Table 5(a)

Table 5(b). Interactions between cyclical influences and scale of economic globalization