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Abstract:
This study provides evidence that more generous unemployment insurance system is associated with faster growth of productivity. The results are consistent with the theory that higher social insurance allows workers to search for more suited jobs and as a result, the worker-job match is more productive (e.g. Acemoglu and Shimer (1999)). This study also discusses reasons why the observed relationship is unlikely to be explained by the fact that richer countries provide more generous unemployment insurance. Our results extend the previous literature on generosity of unemployment insurance and quality of post-unemployment worker-job match by studying the effect on aggregate productivity.

Keywords: Unemployment Insurance, TFP Growth, Generosity of Unemployment Insurance, Productivity
JEL: J65, O43

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Introduction

The importance of social insurance has been a heavily discussed topic among scholars for a long time. Moreover, the issue is increasingly of public interest as some European countries are currently considering the introduction of basic income projects or have been experimenting with unconditional basic income. Some economists view social insurance, and in particular, unemployment insurance, not only as a measure of social policy, but also as a way to improve worker-job matching. In fact, some have been arguing that more generous unemployment benefits provide workers with freedom to wait and search for a better job match, which may increase productivity, and on the aggregate level, even the output of the economy. For example, one of the first attempts to highlight a positive effect of unemployment insurance on economic performance was made by Acemoglu and Shimer (1999). The authors constructed a general equilibrium model and showed that for risk averse consumers, the existence of unemployment benefits is a necessary condition for the maximized output of the economy. In particular, they argued, the presence of unemployment benefits encourages workers to search for more productive job with higher wage.

Similar results were obtained by Marimon and Zilibotti (1999), who strove to explain differences in European and U.S. labor markets. Specifically, they created an equilibrium search-matching model and calibrated it as: (i) a typical economy of a European country with unemployment benefits; and (ii) a U.S.-type laissez faire economy with no unemployment insurance. Then they studied the impact of a technological shock (which emphasized the importance of the match between talents and vacancies) on the individual economies and concluded that the European type of economy with unemployment benefits reached a higher growth rate. In their article, Acemoglu and Shimer (2000) presented a simple static model which captures and formally expresses the notion that higher unemployment insurance allows workers to search for more productive jobs. Moreover, they also presented a more complex dynamic model that revealed that under a specific calibration, productivity gain caused by unemployment insurance outweighs the loss of output caused by higher unemployment.

While the theoretical results are well-developed, the literature addressing empirical evidence of the existence of a positive effect of more generous unemployment insurance on economic performance is narrow. In fact, to the best of our knowledge, there has

been almost no empirical research devoted to this topic. Several articles travelled some way down this path and studied whether greater unemployment insurance generosity leads to better worker-job matching. Most of the researchers measure the job match quality by: (i) a wage in an post-unemployment job; or (ii) duration (tenure) of that job. Studies using the former method provide ambiguous results. While few authors in the 1970s found evidence of a positive impact of generosity of unemployment benefits on post-unemployment wage (Ehrenberg and Oaxaca (1976); Burgess and Kingston (1976); Holen (1977)), some more recent studies failed to find a strong (if any) relation (Blau and Robins (1986); Addison and Blackburn (2000)). Literature which have used the duration of the post-unemployment job as a measure for the job match quality also provide mixed evidence. In particular, Centeno and Novo (2006) employed the NLSY79 data-set and used tenure[1] of a job after the unemployed period as a proxy for the quality of match, and showed that more generous unemployment insurance shifted the distribution of post-unemployment job duration to the right and thus increased, as the authors claimed, the quality of the match. Moreover, the impact seemed to be unequal across educational levels, with the highest effect on the least educated. Likewise, Tatsiramos (2009) studied European countries and found evidence suggesting that more generous unemployment insurance tends to lead to a more stable post-unemployment job. In contrast, Van Ours and Vodopivec (2008) took advantage of a natural experiment in Slovenia[2] and studied the impact of a change of unemployment insurance law on job match quality and found no detectable results.

The better worker-job match can be understood as an increase in worker's productivity, which at the aggregate level leads to a rise in total factor productivity. Using unbalanced panel data for 16 developed countries, and studying the within variation (fixed effects model), we find that more generous unemployment insurance is associated with faster TFP growth. In order to suppresses the fundamental differences across countries, we focus on within countries variation. Moreover, variation within one country is also more consistent with the economic mechanism. An increase in generosity of unemployment insurance is more likely to ensure better match in that particular country than to attract foreign workers with higher productivity. While workers may migrate because of a better job, they are unlikely to migrate because of the generosity of unemployment insurance, especially as foreigners are not generally entitled for unemployment bene-

[1] They also conducted exercise using wages as proxy.

[2] In 1998, there was a reform which reduced a potential duration of unemployment for most of the workers.

fits. The results seem to be robust against several specifications and used variables. We also show that this relationship cannot be simply explained by the fact that richer countries provide more generous social system. Our results are an important step towards an understanding of the effect of generosity of unemployment insurance system on productivity, which is a necessary condition for the fundamental question. Can the productivity gain outweigh the loss due to a rise in unemployment; if so, under what conditions?

The remainder of the study is organized as follows. Next section introduces data used in the empirical analysis. Furthermore, we discuss other alternative interpretation of the data. After a brief section about methodology, the results and sensitivity analysis are presented. Finally, we add some concluding remarks.

Data

One of the most challenging parts of the analysis is to measure the generosity of unemployment insurance, which is widely known as a multi-dimentional variable. Different rules for eligibility, duration, the actual level of payments, waiting period, etc. make the comparison among countries and in time nearly impossible. Additionally, even if the systems were set equally, the economic conditions, and informal labor market institutions prevent a decent comparative analysis. Pallage et al. (2013) pointed out this problem "...[w]hile duration of benefits is shorter in the United States than in most European countries, it may not imply that UI[3] programs in the United States are less generous since the duration of unemployment is also shorter" (p.2).

As a result, a respectable comparison of the generosity of all social programs (not only unemployment insurance) is a difficult task and requires consideration of several aspects going beyond the main characteristics of social benefits. The economic literature studying methods of measuring the generosity of social programs has been rather poor and tended to use weak proxy variables. One of the most heavily used proxy variables for generosity is a share of GDP spent on the labor market, or directly on unemployment benefits. Such a measure has several flaws and may not lead to credible results. For instance, when studying the evolution of the generosity of unemployment insurance in European countries in the last few decades, the proxy fails to count for population

[3]Unemployment insurance

growth and an unemployment increase which during this period occurred in Europe. Likewise, when comparing different countries, the figures are affected by various taxation policies as the tax burden levied on unemployment benefits differs. However, although the share of the GDP spent on social programs is far from being flawless, it is likely to provide useful insight.

When proposing a better measure, Scruggs (2006) focused on replacement rate and coverage rate which, as he argued, are the most important features of unemployment insurance. To extend Scruggs' rather simple approach, Pallage et al. (2013) created a model consisting of two comparable economies which vary only in complexity of unemployment insurance. In the simple model, unemployment benefits are provided for everyone from the first day of the unemployment period, and with no-time effect. The more sophisticated model captures more aspects e.g., the unemployment duration, the unemployment rate, the unemployment insurance duration, the actual level of unemployment benefits, taxes, and also different sources of financial support provided by the government. By comparing household's utilities between both models, the authors estimated a one-dimension measure of the unemployment insurance which provides the same level of utility as the multidimensional structure of the policies. However, when performing a regression of the model's output on variables that are believed to affect the generosity, although the authors acknowledged omitting non-linear relations and other potential flaws, only three variables (unemployment benefits, unemployment duration, and wait time) appeared significant.

To conduct our analysis, we make use of a data-set, CWED 2 (Scruggs et al., 2014b). This dataset provides systematic data on institutional features of social insurance programs for roughly 30 developed countries since 1970. Specifically, the main variable of interest to us is *Uegen* - Unemployment Generosity Index is available for 22 countries; this particular index along with two more indexes provided in the database are based on Esping Andersen's decommodification index (Esping-Andersen, 1990). The Unemployment Generosity Index, as proposed by Scruggs et al. (2014b), is a weighted average of z-scores, where the most important part is the replacement rate z-score. In particular,

the core[4] of the uegen index looks as follows

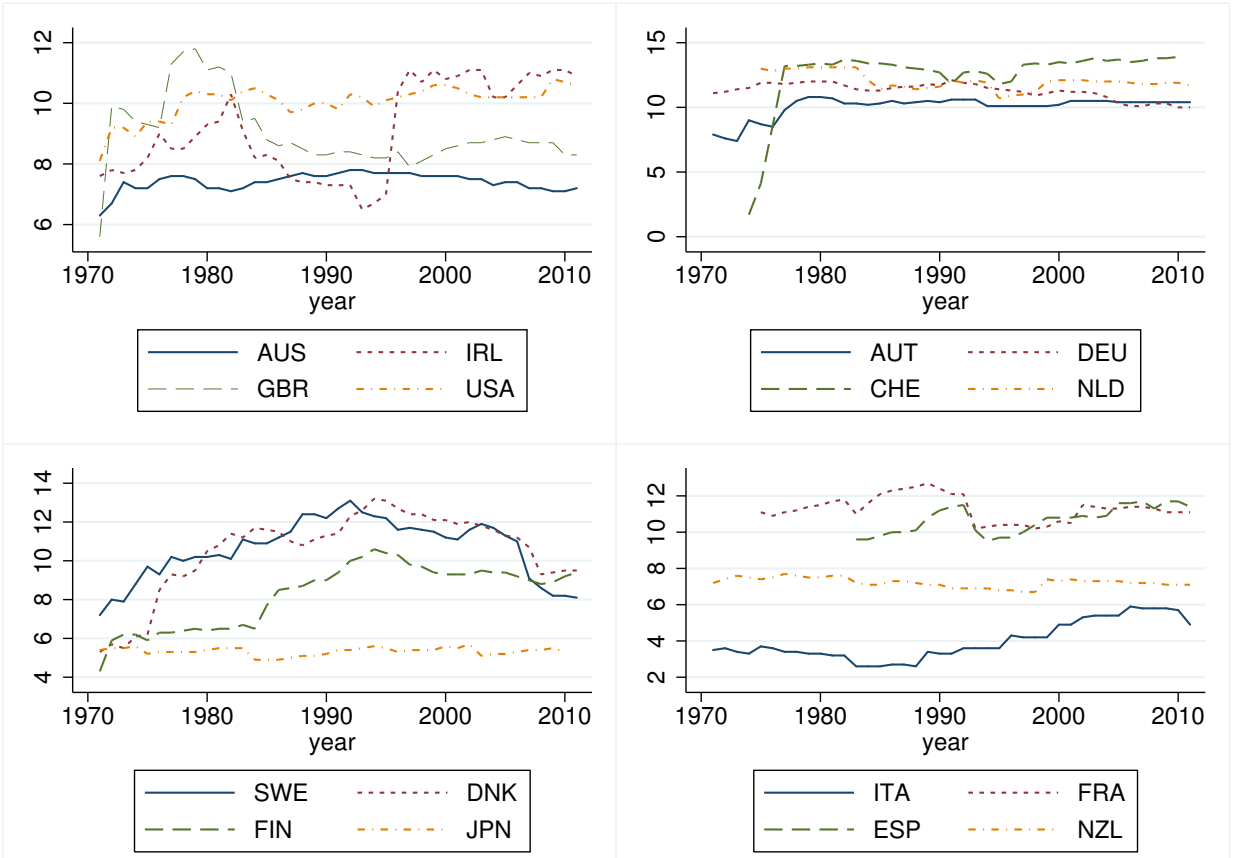
$$\begin{aligned} Uegen_{nt} =& 2 * Z(replacement\_rate_{nt}) + Z(\log(duration\_weeks_{nt})) + \\ & Z(\log(qualification\_weeks_{nt})) + Z(waiting\_days_{nt}) + 12.5, \end{aligned} \tag{1}$$

where Z() indicates the z-score. The authors also added a constant of 12.5 to normalize the value. In addition, the core of the index (i.e. Equation 1) is multiplied by insurance coverage, so it represents Scruggs' notion of the importance of the replacement rate and the insurance coverage rate. When analyzing the robustness of the results, we also employ the share of the GDP spent on social programs.

Figure 1 depicts several time series of evolution of all 16 countries[5] used in this study. Specifically, the top left graph shows Anglo-Saxon countries. While the U.S. and Australia have exhibited rather flat pattern, Ireland and the Great Britain have experienced decent variation in the generosity. This source of variation is principal for our empirical exercise. Note, that the overall level of generosity in Anglo-Saxon countries is lower than in Nordic countries and Western European countries such as Germany, Switzerland, Austria, and the Netherlands. Prior to 1980, Switzerland witnessed surprisingly low level of generosity. Nevertheless, since 1980 Switch unemployment insurance belongs among the most generous. The two remaining graphs show two outliers. First, there has been very low unemployment insurance generosity in Japan since 1970. The only less generous country in our sample is Italy, especially until the 1990. Overall, the level of variation within countries is relatively high. Consequently, results based on within variation seem credible. For more details, please refer to (Scruggs et al., 2014a).

[4]The core means that to obtain the overall index, the number must be further adjusted.
[5]The selection of 16 countries is determined by data availability.

Figure 1: Generosity of Unemployment Insurance



Source: Author using data from (Scruggs et al., 2014b)

The core of the analysis is based on the growth of total factor productivity literature. In particular, we follow Gehringer et al. (2013),Isaksson (2007), and Loko and Diouf (2009) and use variables which are widely believed to be related to TFP growth. Loko and Diouf (2009) provided well-arranged summary of the standard approach to the TFP growth analysis. According to them, the most widely agreed variables affecting TFP in the literature are those related to a knowledge spillover e.g., trade openness and FDI. The higher the international contact is, the more likely new technology is adopted. This leads to faster growth of TFP. The next group of covariates is a sectoral composition of (the growth of) an output. In particular, many have argued that economies with a higher value-added share of high-productivity growth sectors have higher aggregate productivity growth. An institutional framework of an economy may have an impact on TFP. A more freely thinking and acting society is more likely to innovate. Finally, Loko and Diouf (2009) discussed the importance of labor quality. Essentially, this study extends the last group of arguments (labor quality) by adding a generosity of unemployment insurance which is supposed to improve the quality of match and thus the productivity as well. Moreover, Loko and Diouf (2009) also anticipated that a higher female labor participation rate should have a positive effect on the growth of TFP; however, they, at the same time, admitted that empirical results offer rather mixed evidence. In addition to the groups of covariates discussed above, Isaksson (2007) highlighted the positive effect of knowledge; patents, R&D, and information and communication technology (ICT). Furthermore, we include rate of unemployment that captures properties of the labor market conditions.

The list of explanatory variables employed in our analysis is presented in Table 2. To control for the initial effect of economic development, we include *GDPPwe* provided by OECD, which measures how efficiently labor input is combined with other factors and used in a production process. Percentage change (growth) of *GDPPwe* serves as an alternative measure of productivity growth in a sensitivity analysis. Variable called *TradeOpeness* is calculated as the sum of export and import as a ratio of GDP in a particular year. We further use $InwardFDIShareGdp$ that represents the total level of direct investment at the end a year. Both measures of value added in agriculture and financial sector is a contribution of a particular sector to the total value added. In both cases, we focus on percentage year-to-year change of this contribution. Finally, to capture changes in investment structure, we control for ICT investment. This variable is defined as the acquisition of equipment and computer software that is used in production for more

than one year. This indicator is measured as a share of of total non-residential gross fixed capital formation.

Our data-set contains unbalanced panel data for 16 developed countries spanning from 1991 up to 2010. However, due to data limitation, not all variables for all countries and/or all time periods are at our disposal.

Variable	Description	Source
Uegen	Index of Unemployment Generosity	CWED 2
TFPGrowth	Growth of (Multifactoral) Total Factor Productivity	OECD
GDPPwe	GDP per Worked Hours	OECD
GDPPCReal	Real GDP *per capita* (Constant 2005 USD)	World Bank
FemaleEmployment	Employment Rates: Women	OECD
TradeOpeness	Sum of Export and Import Measured as a Share of GDP	OECD & World Bank
InwardFDIShareGdp	Inward FDI Stock (USD) Divided by Nominal GDP	OECD & Own Calculation
ValueAddedAg	Value Added in Agriculture, Forestry, and Fishing Contribution to VA Growth (percentage)	OECD
GDPNominal	Nominal GDP (USD)	World Bank
IctInvestment	Investment into IT, Communication, and Software (Percentage of all Investment)	OECD
ValueAddedFinGr	Value Added in Financial Sector Growth (Change) of Contribution to VA Growth (Percentage)	OECD
UnempRate	Number of Unemployed People as a Percentage of the Labour Force	OECD
PubExpUb	Share of GDP Spent on Unemployment Benefits	OECD
LabProdG	Labor productivity growth (growth of *GDPPwe*)	OECD

Table 2: Dataset

Methodology

Having a panel data allows us to choose what source of variations one prefer to study. Given the problem specifications and the underlying economic mechanism, it is likely that the level of generosity affects the worker-job match and subsequently productivity within a country rather than across countries. Consequently, one inclines to within variation. Furthermore, as a supporting evidence Hausman test of misspecification also sides with fixed effects model, as the null hypothesis of random and fixed effects models providing the same coefficients was rejected.

The formalized fixed effects model studying the effect of the generosity of unemployment insurance on the TFP growth appears as follows.

$$TFPGrowth_{i,t} = \alpha_i + \mathbf{X}_{i,t}\beta + Uegen_{i,t}\delta + \sum_{j=1}^{J} \phi_j \mathbb{1}[t \in j] + \varepsilon_{i,t}, \tag{2}$$

where α_i captures individual heterogeneity for country i, $\mathbf{X}_{i,t}$ contains all control variables used, and $Uegen_{i,t}$ is a variable of our interest; and $\mathbb{1}$ is an indicator function which returns 1 if period t is a subset of time periods j, otherwise returns 0; and $\varepsilon_{i,t}$ stand for the idiosyncratic errors, which change across time as well as across countries. Although the fixed effect allows $\mathbb{E}[\alpha_i|\mathbf{x}_i]$ to be any function of $\mathbf{x}_i$, in order for the estimator be consistent we make two more assumptions. Considering the individual unobserved effect as a random variable, the first assumption can be viewed as a zero conditional mean of error term for each time period t:

$$\mathbb{E}[\varepsilon_{i,t}|\mathbf{x}_i, \alpha_i] = 0.$$

The second requirement is the standard rank assumption on the matrix of time varying explanatory variables. Under these two assumptions, the fixed effect estimator is consistent. Unless indicated otherwise, we bootstrap clustered standard errors.

There are a few reasons why the zero conditional mean assumption may not hold. First, the typical problem is a systematic measurement error. This problem is severe for most of the empirical studies. In this case, we benefit from having two different measurements of generosity of unemployment insurance: (i) Unemployment Generosity Index; and (ii)

Share of GDP spent on unemployment benefits. It is possible to mitigate the seriousness of measurement error problem by using the second measure as a robustness check of the results. The second typical source of bias is omitting some of the key variable that is correlated with both TFP growth and generosity of unemployment insurance. To eliminate the potential bias, we enlarge the typical productivity growth regression by the unemployment rate as a informative variable about the labor market conditions. Not controlling for unemployment rate may lead to inaccurate coefficients.

It is possible that the average pattern of TFP growth might have changed in time, regardless of country. For example, due to higher usage of modern technology it may tend to increase rapidly. More impotantly, time trend may be correlated with both TFP growth and generosity of unemployment insurance. To capture this effect we extend the model with time dummies. An advantage of time dummies compared to a linear trend is that they do not impose a structure on the effect between two particular years. While the linear trend, can capture only monotonic pattern, dummies provide more variability in trend. Using dummies, however, also brings a disadvantage of losing degrees of freedom.

Results

The model pinned down by Equation 2 serves as a benchmark. Table 3 shows the results. The first column shows results of regressing TFP growth on Index of Unemployment Generosity while controlling for other covariates. Note, the first column does not control for a time effect. That is difference with respect to the second column, which includes year dummies. As a result, the estimated effect of generosity of unemployment insurance declines. The time effect explains an increasing common trend between Uegen and TFP growth. In both regressions, however; the coefficient is positive and statistically significant. More generous unemployment insurance is associated with higher TFP growth.

All of the models use 191 observations for 16 countries with, on average, approximately 12 time periods per country. To understand the magnitude of the effect, the coefficient associated with *Uegen* can be seen (ceteris paribus) as follows. If the US have had the generosity level of 2005 already in 1970, their TFP growth in 1970 would be roughly 1.6

	TFPGrowth	TFPGrowth	TFPGrowth
Uegen	1.05***	.877***	1.07***
	(.361)	(.267)	(.353)
UnempRate	.25***	.223*	.241***
	(.073)	(.114)	(.082)
ValueAddedFinGrowth	.303***	.212***	.303***
	(.036)	(.03)	(.043)
IctInvestment	.049	.054	.042
	(.048)	(.053)	(.061)
TradeOpenness	.015	.026	.018
	(.025)	(.019)	(.02)
InwardFDIShareGDP	2.1e+06*	1.1e+06	2.0e+06*
	(1.2e+06)	(2.0e+06)	(1.1e+06)
ValueAddedAg	.591***	.596**	.569***
	(.215)	(.276)	(.218)
GDPPwe	-9.1e-03	-9.2e-03	.02
	(.025)	(.074)	(.04)
FemaleEmployment	.044	.058	.049
	(.085)	(.11)	(.081)
Late90			-.135
			(.6)
Early00			-.241
			(.739)
Late00			-.676
			(.934)
Constant	-17.4***	-17.9***	-18.6***
	(4.65)	(5.77)	(5.72)
YearEffects	No	Yes	No
Observations	191	191	191
R^2	0.478	0.608	0.483
Adjusted R^2	0.403	0.493	0.398
F			

Bootstrapped clustered standard errors in parentheses.

* p < 0.1, ** p < 0.05, *** p < 0.01.

Table 3: Results

percentage points higher.

Sensitivity analysis

In order to deliver more robust results, we conduct 6 more exercises with different specifications. For the sake of clarity, we distinguish two groups of sensitivity analyses: (i) related to specifications of the model; and (ii) using different variables (proxies) for studied phenomena.

The model is potentially dynamic; saying that growth of productivity in a given country is affected by growth in the same country in the previous year. To check this option, we include the growth of the previous year among the explanatory variables. However, this, under the presence of fixed effects, cannot be estimated consistently by OLS. Hence we employ a procedure proposed by Arellano and Bond (1991), where they derived a consistent generalized method of moments estimator. One may also argue that the idiosyncratic error suffers from auto-correlation. Therefore, we run the model with a lagged value of individual error terms. Finally, we average observations for 5 years into one observation. For instance, for the growth of TFP we obtain an average of 5 years growth. This dramatically reduces the number of observations, but the resulting model suppresses the effect of business cycles. Table 4 presents the results.

The first column shows results when the lagged value of the dependent variable is included. The fact that the lagged value is insignificant leads to rejecting the dynamic model and preferring the static model. The middle column displays output from the model where error terms are assumed to follow the AR(1) process. What the table fails to show, is the value of modified Bhargava et al. Durbin-Watson statistics, which is 1.67. Unfortunately, no standard statistical software has implemented critical values and to the best of our knowledge, the only published critical values are those in (Bhargava et al., 1982). The authors stated values for circumstances (number of time periods and individuals) which are not comparable with ours. Therefore, we can say nothing about the significance of the lagged value of error term; however, comparing the results with other models, the results do not seem to differ significantly. As a result, we conclude that there is no significant problem caused by potential auto-correlation. Finally, the last column provides results for 5-years average observations. Note that there are only

	TFPGrowth	TFPGrowth	TFPGrowth(5Years)
L.TFPGrowth	-.112		
	(.085)		
Uegen(5Years)	1.11***	1.01***	.753**
	(.202)	(.219)	(.304)
UnempRate(5Years)	.252***	.232***	.117
	(.064)	(.07)	(.104)
ValueAddedFinGrowth(5Years)	.325***	.305***	.164**
	(.039)	(.041)	(.064)
IctInvestment(5Years)	.06	.076	.033
	(.054)	(.059)	(.061)
TradeOpenness(5Years)	.023	.013	.032
	(.018)	(.018)	(0.021)
InwardFDIShareGDP(5Years)	1.8e+06*	2.1e+06**	8.7e+05
	(9.2e+05)	(1.0e+06)	(1.1e+06)
ValueAddedAg(5Years)	.519**	.467*	.928**
	(.235)	(.253)	(.34)
GDPPwe(5Years)	-.018	2.8e-03	-.04
	(.029)	(.03)	(0.027)
FemaleEmployment(5Years)	.032	-.014	0.089
	(.08)	(.081)	(0.067)
Constant	-17.4***	-14.6***	-15.6***
	(4.17)	(4.1)	(4.14)
Observations	166	175	48
R^2			0.771
Adjusted R^2		0.387	0.716
F		14.7	16.1

Bootstrapped clustered standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Sensitivity Analysis I

48 observations - roughly 25% of the initial data-set. Furthermore, compared to previous models, this model is able to explain more of the total within variation of the TFP growth, as R^2 equals to 0.77. For all the models in Table 4 holds that generosity of unemployment insurance is positive, significant and of a similar magnitude as the benchmark model with and without time effects, respectively.

To dissipate potential concerns about the variables used, we analyze three models which check the robustness of our results against a different choice of variables. In particular, we substitute *TFPGrowth* by *LabProdG*, which measures the growth of GDP per worked hour; and *Uegen* by the share of GDP spent on unemployment benefits *PubExpUb*. Table 5 presents results for three models. These results show all possible combinations of *TFPGrowth* and *PubExpUb* as the dependent variables and *Uegen* and *LabProdG* as variables of the main interest on the right-hand side.

The first model in Table 5 shows that alternative measures of unemployment generosity affect the main results only negligible. The relationship between generosity of unemployment insurance and TFP growth remain positive and significant at the 10% significant level. The middle column displays that regressing growth of labor productivity instead of TFP growth on Uegen yields the same qualitative results. There is a positive relationship of a similar magnitude as the benchmark model. Finally, the last column represents regression of growth of labor productivity on public expenditure spend on unemployment benefits. It further suggests that the relationship is robust against different specification of the variables.

Potential Endogeneity

When studying a relationship between the productivity and generosity of unemployment insurance one tempts to expect that more productive and richer countries can afford to provide more generous social system including higher unemployment insurance. To dissipate similar concerns and show that the data provides different (and more interesting) story our empirical exercise consists three important features.

First, our focus was on the growth of TFP productivity and not the overall level. Fig-

	TFPGrowth	LabProdG	LabProdG
PubExpUb	1.01*		1.21*
	(.52)		(.632)
UnempRate	.121	.304***	.183
	(.1)	(.064)	(.123)
ValueAddedFinGrowth	.227***	.159***	.176***
	(.034)	(.034)	(.044)
IctInvestment	.073	.084	.106
	(.056)	(.076)	(.066)
TradeOpenness	.013	.019	2.1e-03
	(.013)	(.014)	(.018)
InwardFDIShareGDP	1.1e+06	1.5e+06	1.5e+06
	(1.5e+06)	(9.7e+05)	(1.5e+06)
ValueAddedAg	.595***	.51**	.511**
	(.163)	(.212)	(.227)
GDPPwe	-.097*	-.036	-.145**
	(.047)	(.052)	(.063)
FemaleEmployment	.074	.158**	.181**
	(.061)	(.062)	(.077)
Uegen		1.09***	
		(.235)	
Constant	-8.62**	-23.6***	-12.2**
	(3.65)	(4.14)	(4.41)
YearEffects	Yes	Yes	Yes
Observations	191	191	191
R^2	0.571	0.477	0.423
Adjusted R^2	0.497	0.387	0.323
F	.	.	.

Bootstrapped clustered standard errors in parentheses.

* p $<$ 0.1, ** p $<$ 0.05, *** p $<$ 0.01.

Table 5: Sensitivity Analysis II

ure 2 shows that our specification changed the source of variation studied. The countries studied do not exhibit positive relationship between 20 years average TFP growth and the average real GDP per capita. If any trend can be inferred then there is a slightly negative correlation. Second, in our regression specification, we explicitly control for GDP per worked hours i.e., for a level of productivity. Finally, the most robust reason is the source of variation. Running the fixed effect model and therefore employing the time variation between generosity of unemployment benefits and TFP growth within a country, makes sure that the estimated dependence is not caused by richer countries providing more generous unemployment insurance system.

Nevertheless, the results are based on observable data and not on a random experiment and as policies and their parameters (e.g., eligibility) do not appear randomly in countries, it is impossible to decisively reject the potential endogeneity. Potential scenario that may explain our results and, at the same time, violate the theoretical argument in literature is a situation when government reforms unemployment insurance system and at the same time other policy (e.g., taxation or investment subsidy) that increases the productivity. It seems unlikely, however, that the analogous coincidence happens across the sample of countries. In fact, the data are consistent with more interesting story predicting that more generous unemployment insurance improves the productivity growth.

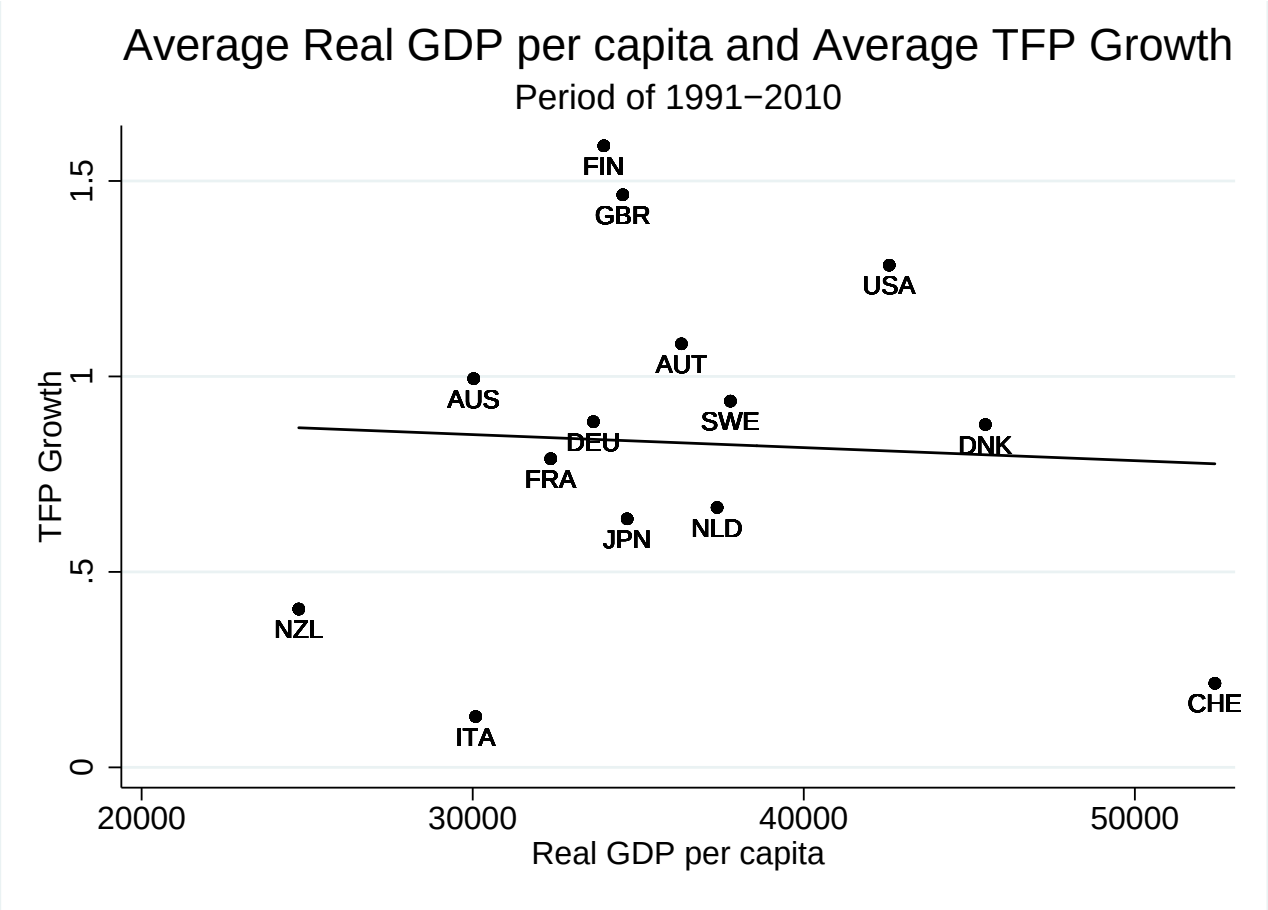


Figure 2: GDP per capita and TFP Growth

Source: Author.

Overall, the empirical study shows that in the developed countries, more generous unemployment insurance is associated with higher growth of productivity. In particular, it seems that for a given country an increase of unemployment insurance generosity by 1 point in the index results, on average, in an increase of productivity growth by 0.8 - 1.1 percentage points. This conclusion appears to be robust against different specifications. Note that it does not necessary imply higher economic growth, as more generous unemployment insurance is likely to cause a higher unemployment rate which may outweigh the positive productivity gain.

Concluding Remarks

This study continues in research conducted by Acemoglu and Shimer (1999), Acemoglu and Shimer (2000), and Marimon and Zilibotti (1999). Their theoretical models suggest that more generous unemployment insurance may have a positive effect on productivity and economic performance. Using within countries source of variation, we provide missing empirical evidence. An increase in unemployment generosity by 1 index point is estimated to be associated with faster TFP growth by 0.8 - 1.1 percentage points. The use of fixed effects model allows us to study the within variation and suppress the effect of undesirable long-term cross units' differences including the development of the economies. The evidence is consistent with the argumentation that more generous unemployment insurance provides better outside option and workers within a given country can search for more productive job. It says nothing about comparison of productive workers and unemployment insurance between two countries. The other contribution is an extension of previous studies of Van Ours and Vodopivec (2008) and Centeno and Novo (2006) on the potential effect of more generous unemployment insurance on a better quality match in the post-unemployment job, by shifting the focus to the resulting productivity gain.

The study provides robust conclusions in terms of variables and specifications applied. The unsolved limitation is a lack of less developed countries. Since the interaction between unemployment insurance and other institutions is likely connected with the level of development of the economy, studying developing countries is a promising research question. For example, would the more generous unemployment insurance be also associated with higher productivity growth in countries with traditionally strong shadow

sectors? Do less developed countries prefer to increase productivity at the cost of higher unemployment? Ultimately, the fundamental question is whether the productivity gain can overweight the loss resulting from higher unemployment and under what conditions. This also reminds for future research.

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