

Globalization and Labor Force Participation

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Abstract

This study finds evidence that globalization depresses labor force participation via social spending and tax policy. We estimate a panel Vector Auto Regression model on data over the period of 1980~2012 from the 26 OECD countries. Social spending has increased, consistent with the compensation hypothesis, while labor income taxes have risen relative to capital income taxes, consistent with tax competition hypothesis. As a result, one can see the reduction of labor force participation. Social safety nets and tax policies need to be streamlined upon globalization.

JEL Classification: H87, F15, F66

Keywords: Fiscal policy, Globalization, Labor force participation, Tax competition, Compensation hypothesis, Panel VAR

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I. Introduction

We uncover the effects of globalization on both tax policy and transfers, i.e., social spending programs, and how changes in their interaction result in depressing labor force participation. Two prominent hypotheses in this area are the tax competition and compensation hypotheses. The tax competition hypothesis states that, when capital becomes internationally mobile, governments strategically cut capital income tax rates to attract neighbors' capital and expand the tax base. Low capital income tax rates reduce tax revenue, causing under-provision of public goods and a welfare crisis. In fact, welfare crises have not occurred. Instead, social expenditures have increased over time in most OECD countries. This observation has led to the compensation hypothesis, according to which governments raise social spending to guard workers against income volatility associated with globalization.

If tax competition causes governments to raise labor taxes in lieu of capital taxes, labor force participation will be reduced. Likewise, high social spending may discourage labor force participation. Our results show support for both channels, however we find that the evidence for the second channel is stronger and more consistent. Moreover, we find evidence that tax competition works through feedback effects by causing governments to finance higher social spending through increases in labor taxes relative to capital taxes.

Empirical studies have investigated the tax competition and compensation hypotheses in separate models. This study extends the research by allowing the possibility of feedback effects between tax policy and social spending. We employ a Panel Vector Auto Regression (PVAR) approach and impose weak exogeneity conditions. We assume our measure of globalization is weakly exogenous. To further investigate the role of globalization we estimate the model on subsamples of data that differ in degree of openness. We split the sample three ways: into EU and non-EU members, into countries with relatively weak and strong capital controls, and into pre-1992 and post-1992 periods. The subsample results support that more open economies experience greater variability in income/output, increases in social spending and a heavier reliance on labor taxes relative to capital income tax for financing social spending.

In Section 2 we review the literature and set out hypotheses. Sections 3 and 4 describe data collection and model construction. Section 5 reports the empirical results of the baseline model and subsample models. Section 6 offers our conclusions.

II. Background

The Zodrow and Mieszkowski (1986) model and its extensions (Bucovetsky 1991, Bucovetsky and Wilson 1991) predict a capital tax race to the bottom and a social spending contraction as a result of globalization. Razin and Sadka (1995) and Eichner and Upmann (2012) also show that optimal capital tax rates are zero in open economies. However, empirical evidence is conflicting on whether globalization has in fact reduced capital taxes. Some authors (Quinn 1997, Swank 1998, Garrett and Mitchell 2001, Dreher 2006) found no associated reduction, whereas others did find reductions (Rodrik 1997, Winner 2005, Bretschger and Hettich 2005, Devereux *et al.* 2008). Evidence that globalization is associated with increased labor taxes is stronger (Bretschger and Hettich 2005, Winner 2005, Adam and Kammas 2007, Onaran *et al.* 2011)¹. The fact that labor tax increases lead to lower labor force participation rates is well established (see Blundell *et al.* 1998, Prescott 2004, Davis and Henerkson 2004, Simula and Trannoy 2010).

Despite the prediction of reduced social spending by the tax competition hypothesis, social spending has increased in most OECD countries (Cameron 1978, Hicks and Swank 1992). Swank and Steinmo (2002) contend that structural unemployment, generated by globalization, raises social spending. Adam and Kammas (2007) suggest that social spending has increased to compensate for income volatility caused by globalization. In either case, increased social spending may create work disincentives that further reduce labor force participation. Based on this literature, we test three hypotheses:

Tax Competition Hypothesis: An increase in openness reduces the capital-to-labor tax ratio and this reduction lowers the labor force participation rate.

¹An exception is Swank and Steinmo (2002)

Compensation Hypothesis: An increase in openness increases social spending which lowers the labor force participation rate.

Interaction Hypothesis: Increases in social spending increase the labor tax which leads to a lower labor force participation rate.

We use impulse responses from PVAR estimation to determine the validity of these hypotheses over the period of 1980~2012.

III. Data Collection

Variables include a measure of globalization (*open*), average effective capital-to-labor income tax ratio (*tkl*), share of social transfers and benefits to GDP (*social*), the output gap (*ygap*), and the labor force participation rate (*lfpr*). Data for 26 OECD countries from 1980 to 2012 was collected².

Globalization is measured by Dreher's (2006) KOF economic index. This index includes both qualitative and quantitative aspects. These are 'Actual flows' (trade, foreign direct investment, foreign portfolio investment, and income payments to foreign nationals) and 'Restrictions' (mean tariff rates, taxes on trade, and an index of capital controls). Average effective tax rates measure the capital-to-labor income tax ratio (*tkl*) (Mendoza *et al.* 1994, Carey and Rabesona 2002). We employ the methodology of Carey and Rabesona (2002) to construct the tax ratio. The ratio of social transfers and benefits to GDP (*social*) measures social spending³. The output gap variable measures income. The output gap (*ygap*) is calculated as the deviation of real gross domestic product (RGDP) from its trend. The residuals are extracted by detrending the series using Hodrick and Prescott (HP) filtering. The labor force participation rate (*lfpr*) is the ratio of labor force to working age population.

The presence of a unit root is tested by the Im-Pesaran-Shin (IPS) panel unit root test. In order to decide whether the residual contains a time trend or

²8 countries (Chile, Estonia, Hungary, Iceland, Israel, Luxemburg, Mexico, and Turkey) from 34 OECD countries are dropped because the data for effective tax rates are not available.

³We experimented with subcategories of social expenditures to check robustness of results. Two subcategories: unemployment and old age pension expenditures, showed similar and strong results whereas results with health care, disability and family expenditures were weaker. These are available from the authors upon request.

not, the test is replicated with an inclusion of a time trend. At the five percent confidence level, *ygap* and *tkl* are stationary in level, while *open*, *social*, and *lfpr* are difference stationary of order one⁴. The *open*, *social*, and *lfpr* variables are first differenced, so these variables are now in terms of changes.

Below is a table with summary statistics. Sources are listed in Appendix A3.

Table 1. Summary statistics of main variables

(26 OECD countries, 1980–2012)

Variable	Obs	Mean	Std. Dev	Min	Max
<i>Open</i>	769	71.1004	14.4854	23.88	96.83
Δ <i>open</i>	743	.6881	1.9063	-5.95	19.4
<i>ygap</i>	804	.0000	.0684	-.4457	.5181
<i>tkl</i>	652	.8422	.3874	.0138	2.6690
<i>social</i>	604	24.9739	6.9431	4.2885	41.9896
Δ <i>social</i>	578	.1641	1.0269	-4.4434	5.7937
<i>lfpr</i>	762	71.5668	6.4954	56.1767	84.1474
Δ <i>lfpr</i>	736	.1863	.6110	-2.0085	3.2299

(Note) (i) The *open* is KOF economics integration index ranging from 0 to 100.

The *ygap* is deviation of Real Gross Domestic Product (RGDP) from its trend.

The *tkl* is average effective capital-to-labor tax ratio.

The *social* is social transfers and benefits as a share of Gross Domestic Product (GDP).

The *lfpr* is the share of labor force as a share of working age population.

(ii) Values are rounded at 5th decimal point.

IV. Model Construction

We employ a PVAR technique to allow the possibility of feedback effects between tax policy and social spending. A reduced-form PVAR of the first order is⁵:

⁴The choice of lag length is one, guided by Akaike Information Criterion (AIC) and the test statistics are found to be insensitive up to an inclusion of maximum length of three. We also performed the test proposed by Westerlund (2008). The Westerlund test provides four statistics; G_a , G , P_a , and P , and . The test statistics of the four variables in level are found to be insignificant at one percent confidence level. We failed to reject the null hypothesis of no cointegration.

⁵The time fixed effect is suppressed by demeaning the series.

$$\begin{aligned}
 Y_{it} &= \Phi Y_{it-1} + A_i + u_{i,t}, \quad u_{i,t} \sim iid(0, \Sigma) \\
 Y_{it} &= (open, ygap, tkl, social, lfpr)
 \end{aligned}
 \tag{1}$$

The A_i is a vector of country fixed effects, Φ is a matrix of coefficients of five endogenous variables, and $u_{i,t}$ is a vector of residuals that are independent and identically distributed. Employing a lagged dependent variable as an instrument suffers from biasness and inconsistency because the fixed effect is correlated to the instrument. That is:

$$E[y_{it-1}a_i] \neq 0, \text{ therefore } E[y_{it-1}v_{i,t}] \neq 0 \quad \text{where } v_{i,t} = \varepsilon_{i,t} + \alpha_i \tag{2}$$

To eliminate the fixed effect, either first differencing or forward mean differencing could be used⁶. Forward mean differencing, i.e., the Helmert procedure, is used here (Arellano and Bover 1995, Love and Zicchino 2006, Boubtane *et al.* 2012). The transformation process is:

$$\check{y}_{it} = \frac{(y_{it} - \bar{y}_{it})}{\sqrt{\frac{T_i - t_i + 1}{T_i - t_i}}}, \quad \bar{y}_{it} = \sum_{s=t+1}^T \frac{y_{i,s}}{T - s}
 \tag{3}$$

Here, \bar{y}_{it} is the forward mean of the y_{it} at time t and \check{y}_{it} is the transformed variable. Through this transformation, the fixed effect is eliminated and the instrument satisfies the orthogonal condition:

$$E[y_{it-1}\check{\varepsilon}_{i,t}] = 0 \quad \text{and} \quad E[\check{y}_{it}y_{it-1}] \neq 0 \tag{4}$$

Estimation is performed by system GMM (Blundell and Bond 1998, Arellano and Bover 1995). In matrix form, the system GMM is:

$$\begin{pmatrix} \check{y}_{i,t} \\ y_{i,t} \end{pmatrix} = \phi \begin{pmatrix} \check{y}_{i,t-1} \\ y_{i,t-1} \end{pmatrix} + \varphi \begin{pmatrix} \check{x}_{i,t-1} \\ x_{i,t-1} \end{pmatrix} + \begin{pmatrix} \check{\varepsilon}_{i,t} \\ \varepsilon_{i,t} \end{pmatrix}
 \tag{5}$$

The coefficient matrix Φ is estimated by the two-stage, or instrumental variable (IV), GMM.

⁶Bond *et al.* (2001) argue in favor of the latter to avoid throwing away information embedded in levels and avoid magnifying the gap in an unbalanced panel data.

The structural form of the model is:

$$B_0 Y_{it} = B(L) Y_{it} + A'_i + e_{i,t} \quad (6)$$

This is recovered from an estimation of the reduced form (1). Thus, $\Phi(L) = B_0^{-1} B(L)$, $A'_i = B_0^{-1} A_i$, $u_{i,t} = B_0^{-1} e_{i,t}$. We use Choleski decomposition to identify the B_0 matrix. In our baseline model we use the order: open, output gap, tax ratio, social spending, and labor force participation rate. We also obtain results when the order of output gap, tax ratio and social spending is switched⁷. The weak exogeneity condition is imposed on the open variable reflects the hypothesis that globalization has impacted the behavior of the tax ratio (tax competition) and social spending (compensation hypothesis), hence labor force participation. We regard the assumption as reasonable given the political nature of trade treaties and financial liberalization policies, whereas it is much less likely that the other variables are weakly exogenous *vis-a-vis* the open variable⁸.

V. Empirical Results

A. Baseline model estimation

A subset of the impulse response functions (IRFs) results appear in Figure 1. A positive standard deviation shock is given at period zero and ninety percent confidence intervals are generated by one thousand replications of Monte Carlo simulation⁹.

The first set of panels of Figure 1 presents responses to a positive shock from a change in openness. The capital-to-labor tax ratio initially drops from the shock, the response of the tax ratio becomes insignificant shortly thereafter, providing only suggestive evidence of tax competition. The response of the social spending variable is to drop immediately and then, with a delay of two periods, rise above the initial level and stay nearly constant.

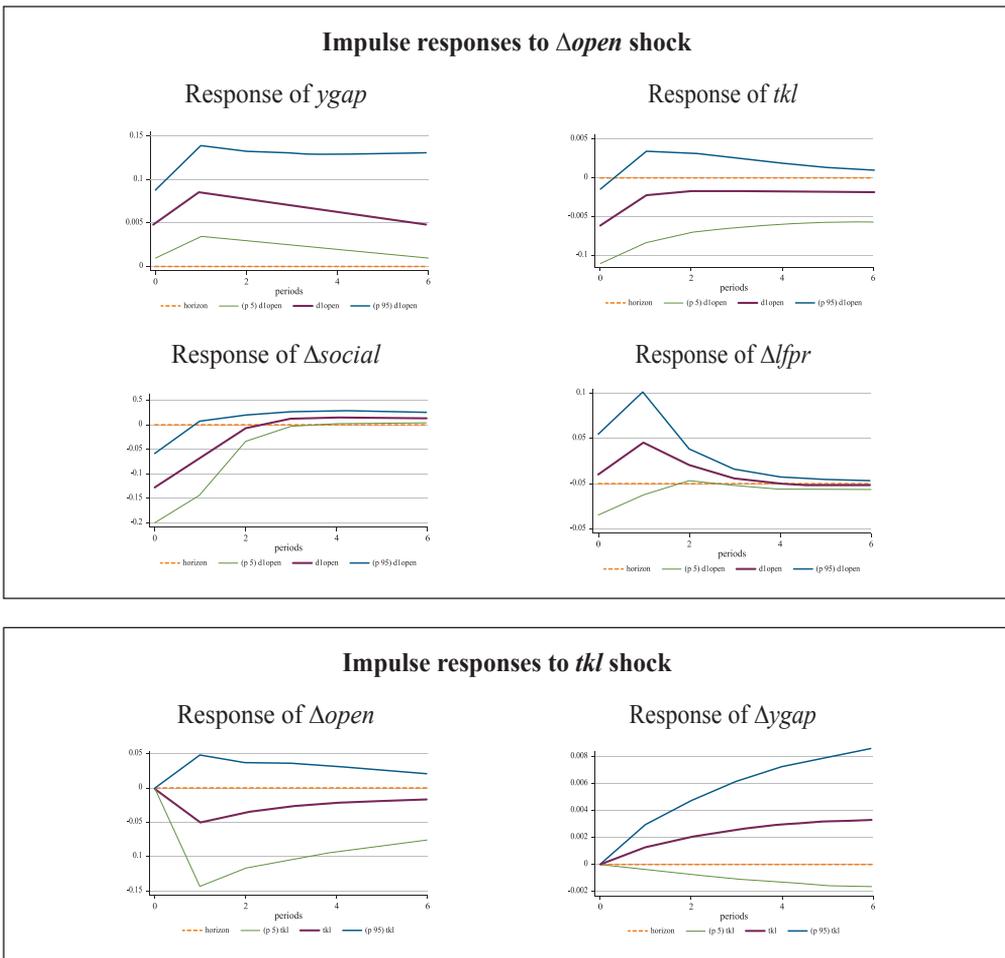
⁷Results are provided in Appendix A, Figure A.5.

⁸Our assumption also has empirical support from the results of Kim *et al.* (2018): p.2797.

⁹We modified a program code provided by Love and Zicchino (2006).

We interpret this as stronger evidence for the compensation hypothesis than that for the tax competition hypothesis. In the third set of panels of Figure 1, in response to a positive shock from social spending, the capital-to-labor tax ratio drops, that is, the labor tax rises relative to the capital tax. It support the conjecture that openness leads to higher social spending financed by changes in labor taxes relative to capital taxes. As expected, a decrease in the tax ratio and an increase in social spending have negative impacts on the labor force participation variable.

Figure 1. Baseline model



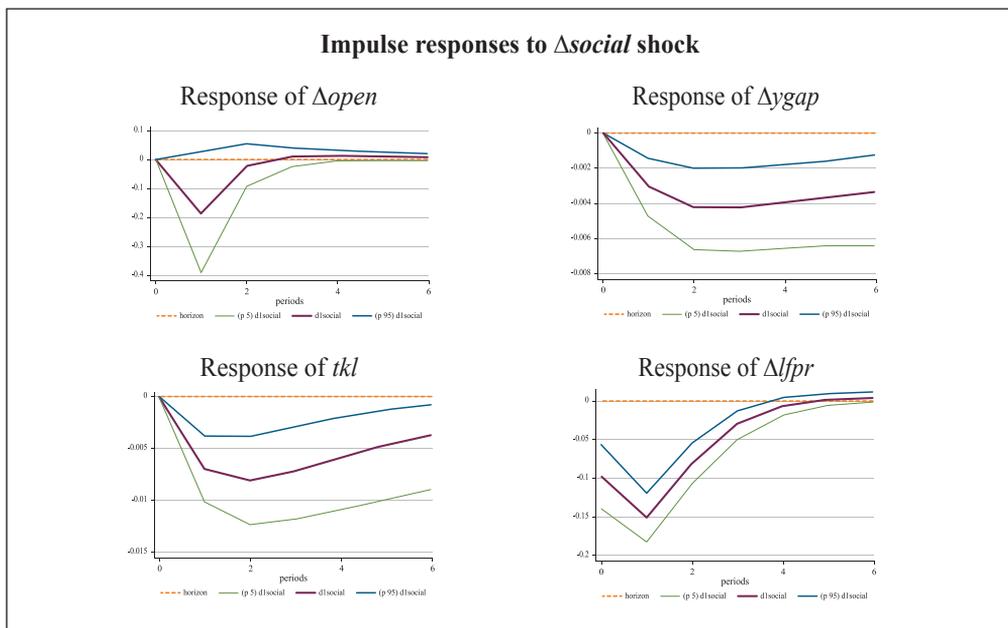
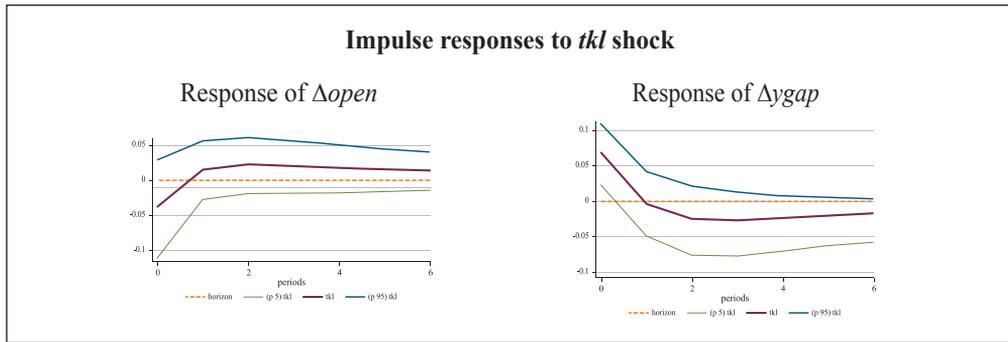


Table 2 reports variance decompositions 10 periods ahead. Variation in the openness, output gap and tax variables are mostly explained by own variation in the long run - 98.1 percent, 94.8 and 95.9 respectively. The shocks on these three variables vanish relatively fast. Variation in the social spending variable is explained, approximately 87.7 percent, by its own, 8.2 percent by the output gap, and 2.2 percent by the openness variable. Variation in the labor force participation rate variable is explained 85.2 percent by its own, 10.8 percent by the social expenditure change, and 2.1 percent by the capital-to-labor tax ratio.

To summarize, a positive shock in openness has a stronger effect on social spending than on the tax ratio, thus supporting the compensation hypothesis

that globalization raises social spending. Moreover, the impacts of social spending directly on labor force participation and indirectly on the tax ratio suggest that the impact of globalization on the labor market comes more through this channel rather than through changes in tax policy.

Possibly these results are driven by the subset of EU members. To analyze this further, we estimate the model on two subsamples: EU members and non-EU members.

Table 2. Variance decomposition in 10 periods ahead

Variable	$\Delta open$	$ygap$	tkl	$\Delta social$	$\Delta lfpr$
$\Delta open$	.9812	.0026	.0013	.0081	.0067
$ygap$	.0331	.9480	.0070	.0100	.0019
tkl	.0054	.0129	.9586	.0198	.0033
$\Delta social$	.0228	.0820	.0043	.8770	.0139
$\Delta lfpr$	.0075	.0101	.0210	.1085	.8529

- (Note) (i) Variations in row variables are explained by column variables. Values rounded at 5th decimal point
(ii) The *open* is KOF economics integration index ranging from 0 to 100.
The *ygap* is deviation of Real Gross Domestic Product (RGDP) from its trend.
The *tkl* is average effective capital-to-labor tax ratio.
The *social* is social transfers and benefits as a share of Gross Domestic Product (GDP).
The *lfpr* is the share of labor force as a share of working age population.
(iii) Values rounded at 5th decimal point

B. EU versus Non-EU subsamples

EU members differ from non-EU members in the degree of openness, which is about 10 points higher than the nonmembers. Because they are more politically integrated than nonmembers, when facing injurious competition, they are more likely to harmonize their tax systems. Additionally, EU members have high levels of social spending (see Table 3). These facts suggest that evidence of tax competition might be less visible in the EU subsample and evidence of the compensation hypothesis stronger.

A subset of IRFs of the subsamples are reported in Figure 2. As expected, the response of the tax ratio variable to a positive shock from the openness

variable shows no evidence of tax competition in the EU subsample whereas there is slightly stronger evidence for tax competition in the non-EU sample. However, there is a distinct difference in the responses of the social spending variable to a shock in openness. Whereas the response of the non-EU subsample is insignificant, the response of the EU subsample resembles the response in the baseline model. The evidence supporting the compensation hypothesis is stronger in the EU subsample than in the baseline model two periods after the shock.

In neither subsample does a positive shock to the tax ratio (a drop in labor tax) change social spending, but the labor force participation variable significantly increases in the EU subsample, though not significantly in the non-EU subsample. A positive shock to the change in social expenditures permanently lowers the tax ratio, that is, raises the relative tax on labor. This effect is significant over the entire 10 year horizon in the EU subsample but vanishes over time in the non-EU subsample. Moreover, in both groups, an increase in social spending has a negative effect on the labor force participation variable.

Table 3. Summary statistics for EU and Non-EU

Variable	EU			Non-EU		
	Obs	Mean	Std. Dev	Min	Mean	Std. Dev
<i>Open</i>	521	74.1399	13.2344	248	64.7140	14.9413
$\Delta open$	503	.7640	1.9052	240	.5290	1.9026
<i>ygap</i>	540	.0000	.0275	264	.0000	.1128
<i>tkl</i>	426	.6791	.2887	226	1.1497	.3626
$\Delta social$	419	28.0581	4.5164	185	17.9885	6.3970
<i>social</i>	401	.1772	1.095	177	.1344	.8551
<i>lfpr</i>	498	70.6471	6.0394	264	73.3016	6.9663
$\Delta lfpr$	480	.1752	.6257	256	.2070	.5831

(Note) (i) EU members are AUT, BEL, CZE, DEN, ESP, FIN, FRA, GER, GRC, IRL, ITA, NLD, POL, PRT, SVK, SVN, SWE, and GBR. Non EU members are AUS, CAN, JAP, KOR, NZL, NOR, CHE, and USA.

(ii) The *open* is KOF economics integration index ranging from 0 to 100.

The *ygap* is deviation of Real Gross Domestic Product (RGDP) from its trend.

The *tkl* is average effective capital-to-labor tax ratio.

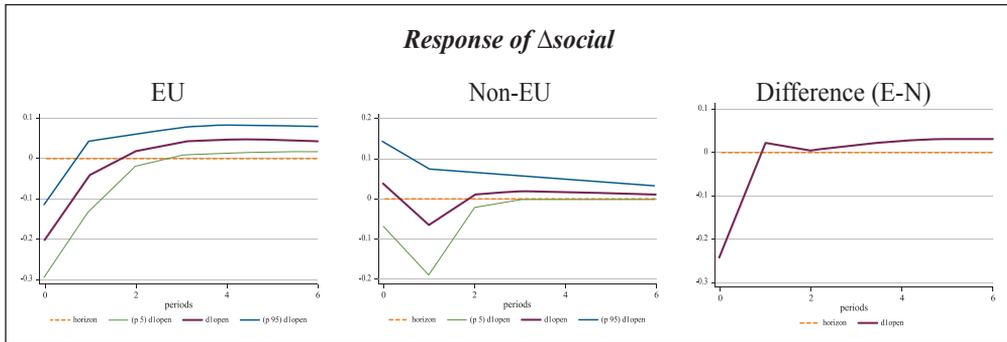
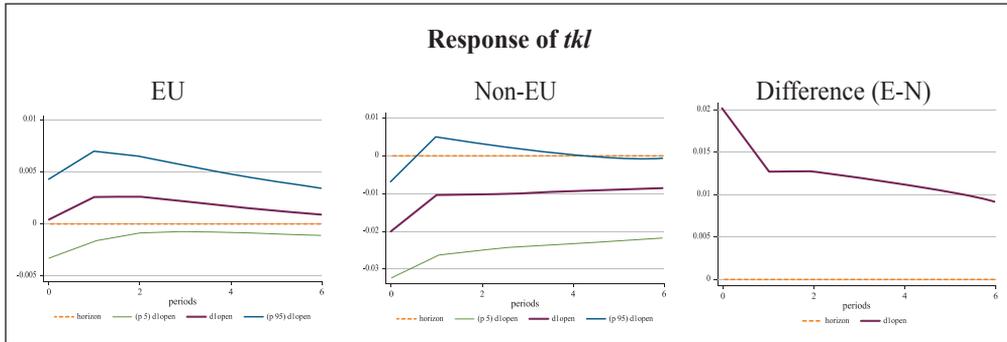
The *social* is social transfers and benefits as a share of Gross Domestic Product (GDP).

The *lfpr* is the share of labor force as a share of working age population.

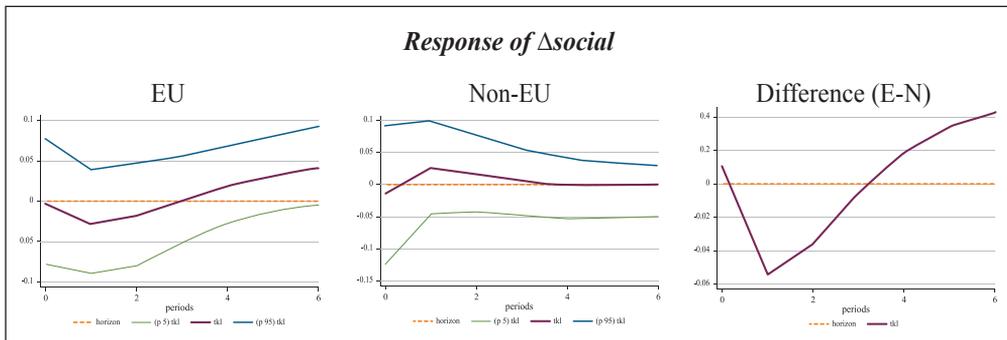
(iii) Values rounded at 5th decimal point

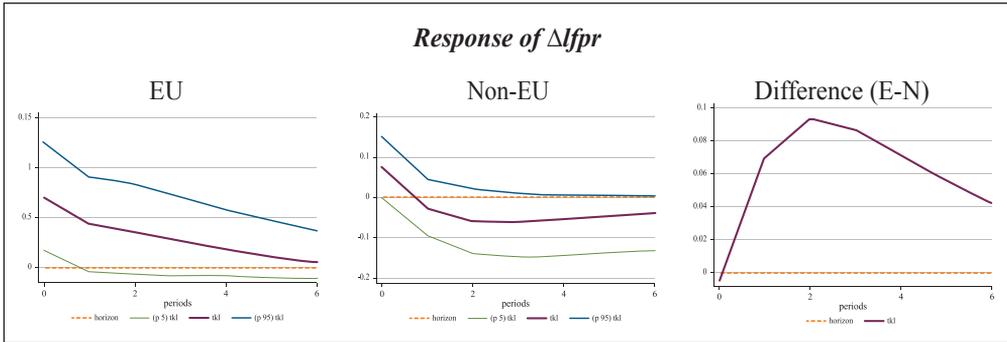
Figure 2. EU and Non-EU

A. Impulse responses to *open* shock

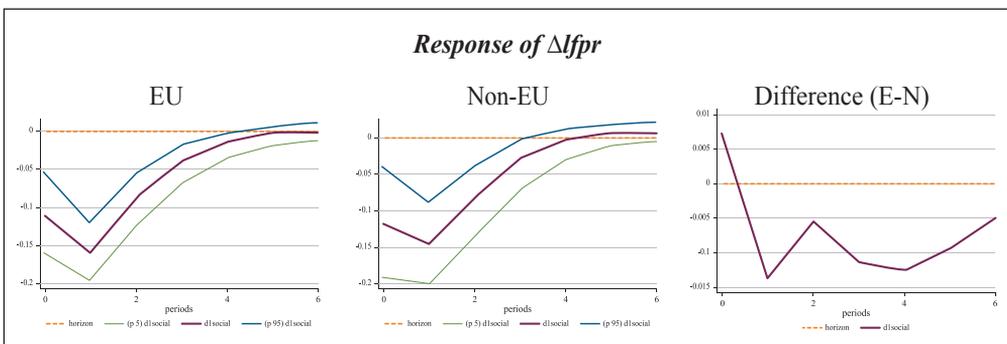
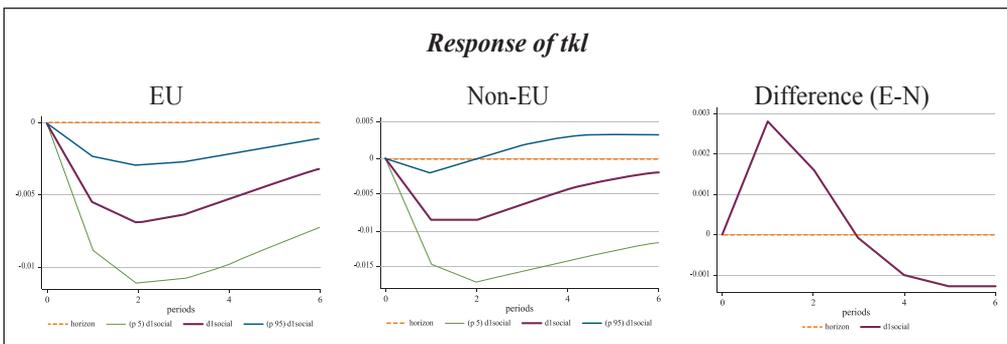


B. Impulse responses to Δtkl shock





C. Impulse responses to $\Delta social$ shock



The most noticeable difference in the variance decompositions in Table 4 is in the variations of the social spending variable. Only 58.5 percent of the variation is explained by own variation in the EU subsample whereas it is 85.2 percent for the non-EU subsample and 87.7 percent for the baseline model. The output gap still explains about 36.2 percent of the variations in the social spending variable after 10 periods.

These results support the idea that, within the EU, the impact of globalization is greater on social spending than on tax competition. However, through feedback effects, the financing burden of higher social spending raises the relative tax on labor. Both relatively higher labor taxes and higher social expenditures have negative impacts on changes in labor participation.

Table 4. Variance decompositon in 10 periods ahead: EU vs. Non-EU

EU	<i>$\Delta open$</i>	<i>ygap</i>	<i>tkl</i>	<i>$\Delta social$</i>	<i>$\Delta lfpr$</i>
<i>$\Delta open$</i>	.9364	.0355	.0053	.0063	.0164
<i>ygap</i>	.0317	.8997	.0373	.0311	.0001
<i>tkl</i>	.0063	.0502	.8955	.0474	.0006
<i>$\Delta social$</i>	.0401	.3625	.0082	.5853	.0040
<i>$\Delta lfpr$</i>	.0068	.0426	.0247	.1207	.8053
Non-EU	<i>$\Delta open$</i>	<i>ygap</i>	<i>tkl</i>	<i>$\Delta social$</i>	<i>$\Delta lfpr$</i>
<i>$\Delta open$</i>	.9668	.0035	.0070	.0222	.0005
<i>ygap</i>	.0612	.9090	.0031	.0192	.0075
<i>tkl</i>	.0375	.0204	.9208	.0074	.0140
<i>$\Delta social$</i>	.0104	.1079	.0018	.8525	.0274
<i>$\Delta lfpr$</i>	.0220	.0155	.0619	.1199	.7808

- (Note) (i) Variations in row variables are explained by column variables. Values rounded at 5th decimal point
(ii) The *open* is KOF economics integration index ranging from 0 to 100.
The *ygap* is deviation of Real Gross Domestic Product (RGDP) from its trend.
The *tkl* is average effective capital-to-labor tax ratio.
The *social* is social transfers and benefits as a share of Gross Domestic Product (GDP).
The *lfpr* is the share of labor force as a share of working age population.
(iii) Values rounded at 5th decimal point

C. Capital controls: strong *versus* weak

Are capital controls effective in buffering an economy against income volatility thus reducing the need for compensation? Do they insulate an economy from tax competition? We use an index, KAOPEN, developed by Chinn and Ito (2008) to divide the sample by intensity of capital restrictions¹⁰.

¹⁰The index is based on the 1) presence of multiple change rates, 2) restriction on capital account, 3) restriction on current account, and

After averaging the data from 1996 to 2011, the sample was split in half using a median value of the averages (see Table A5 in the appendix)¹¹. The strong control countries are Portugal, Sweden, Spain, Japan, Norway, Belgium, Greece, Czech Rep, Australia, Slovenia, Slovak Rep, Korea, and Poland. The weak control countries are Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, New Zealand, Switzerland, United Kingdom, and the United States. Table 5 provides summary statistics of two subsamples.

Table 5. Summary statistics for strong control and weak control

Variable	Strong Control			Weak Control		
	Obs	Mean	Std. Dev	Min	Mean	Std. Dev
<i>Open</i>	366	66.9165	16.1223	403	74.8996	11.5953
$\Delta open$	353	.8445	2.1821	390	.5465	1.6064
<i>ygap</i>	395	.0000	.0406	409	.0000	.0873
<i>tkl</i>	284	.8422	.4816	368	.8423	.2957
<i>social</i>	261	23.0269	7.7958	343	26.4554	5.8051
$\Delta social$	248	.1483	1.0327	330	.1760	1.0239
<i>lfpr</i>	355	70.5049	5.9222	407	72.4929	6.8304
$\Delta lfpr$	342	.2008	.6561	394	.1736	.5695

(Note) (i) Strong countries are AUS, BEL, CZE, ESP, GRC, JAP, KOR, NOR, POL, PRT, SVK, SVN, and SWE. Weak countries are AUT, CAN, DEN, FRA, FIN, GER, ITL, ITA, NLD, NZL, CHE, GBR and USA.

(ii) The *open* is KOF economics integration index ranging from 0 to 100.

The *ygap* is deviation of Real Gross Domestic Product (RGDP) from its trend.

The *tkl* is average effective capital-to-labor tax ratio.

The *social* is social transfers and benefits as a share of Gross Domestic Product (GDP).

The *lfpr* is the share of labor force as a share of working age population.

(iii) Values rounded at 5th decimal point

Figure 3 reports a subset of the group comparison results. As can be seen

⁴ requirement of surrender of export proceeds. The variables are reported in the IMF's annual report on *Exchange Arrangement and Exchange Restrictions* (AREAER)

¹¹ Since countries are members of OECD, hence, highly developed, deviations of one from another are not significantly different. Potentially, large clustering around the median value can result in biasness when splitting the groups.

from the first line of the set, an increase in openness has no influence or weak influence on the output gap in the strong control group but a significant positive impact on the weak control group. Evidence of tax competition is only observed in the strong control group, suggesting that strong capital controls are not effective at avoiding tax competition. In the strong control group, no evidence of the compensation hypothesis is detected, however the social spending variable initially drops then permanently rises in the weak control group.

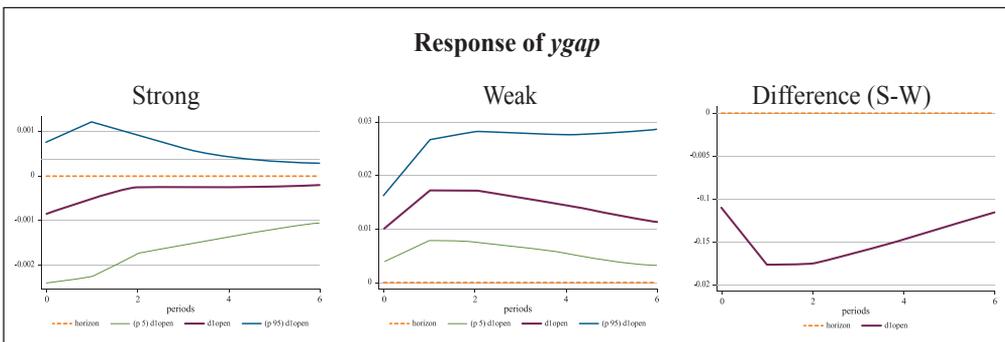
A positive output gap shock raises labor force participation in the strong capital control countries, whereas weak capital control countries show a relatively weak positive response after a year, which becomes negative in the long run.

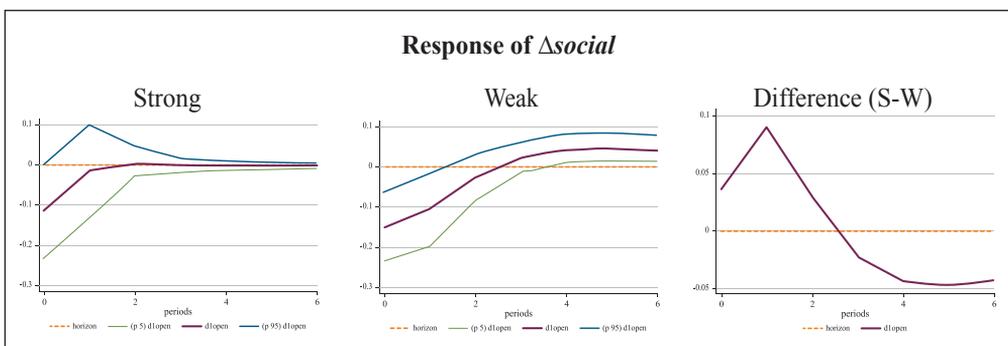
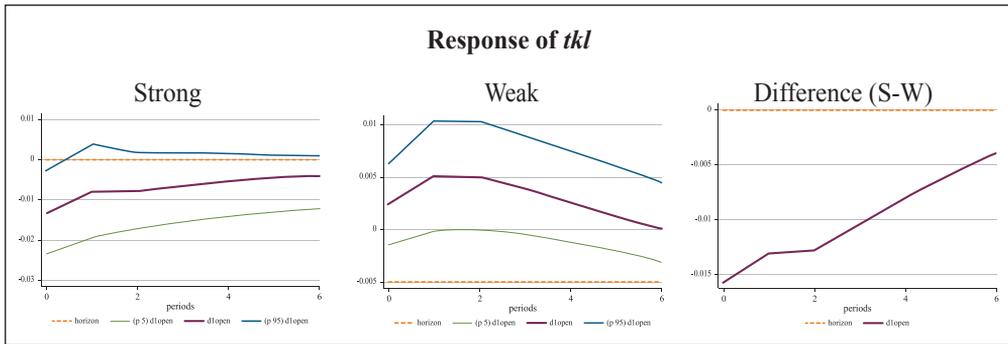
A positive shock in the tax ratio, i.e., drop in labor tax rate, has different responses in social spending and labor force participation between groups. There is an immediate positive impact on labor force participation in the strong control group. In the weak control group there is an increase in social spending but a year's delay in the response of labor force participation.

In both groups, a positive shock to social spending variable raises the labor tax burden. While the burden vanishes relatively quickly in the strong control group, it is long-lasting in the weak control group. A positive shock in social spending has a stronger negative impact on labor force participation in the weak control group than the strong control group.

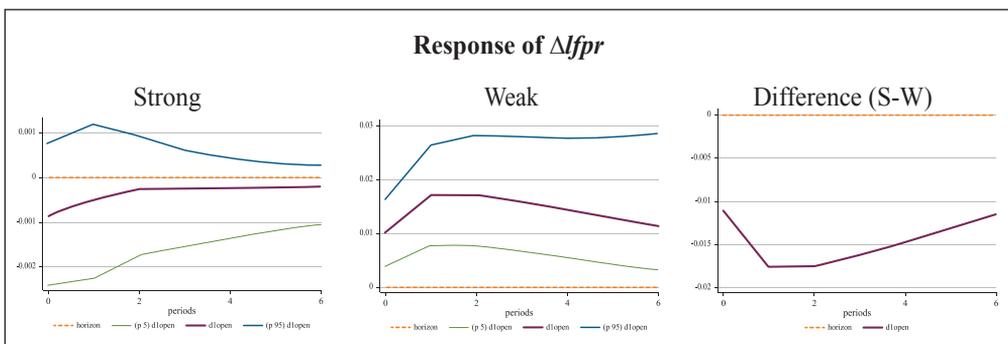
Figure 3. Strong and weak control

A. Impulse responses to $\Delta open$ shock

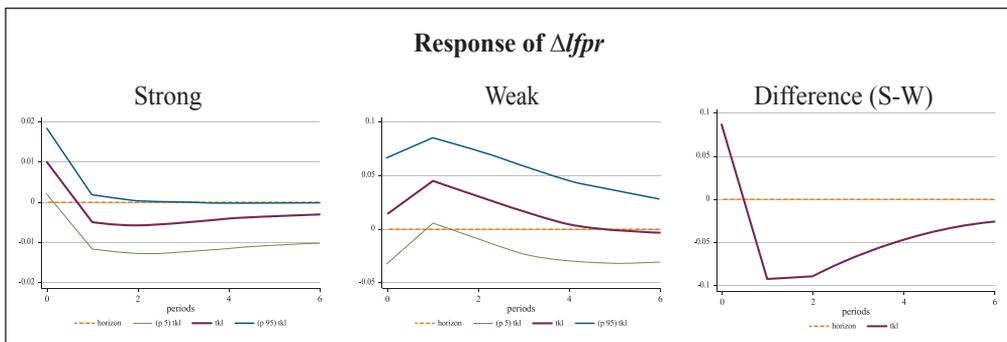
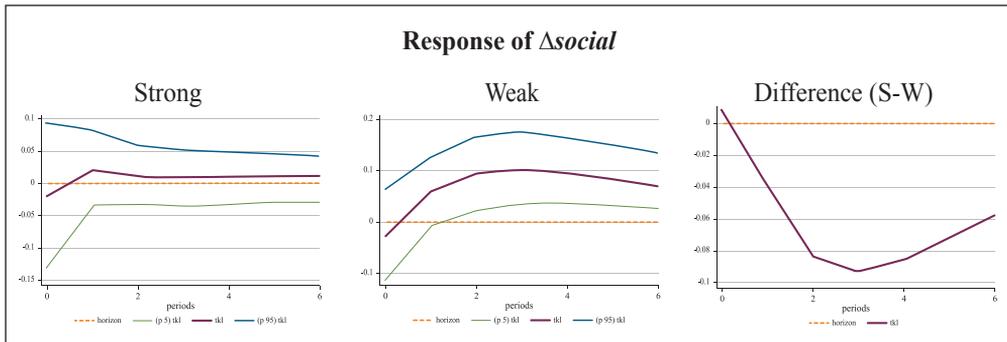




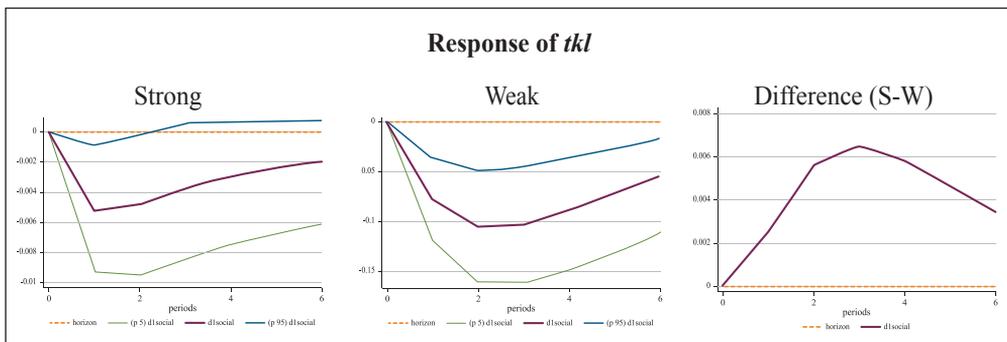
B. Impulse responses to $ygap$ shock



C. Impulse responses to tkl shock



D. Impulse responses to $\Delta social$ shock



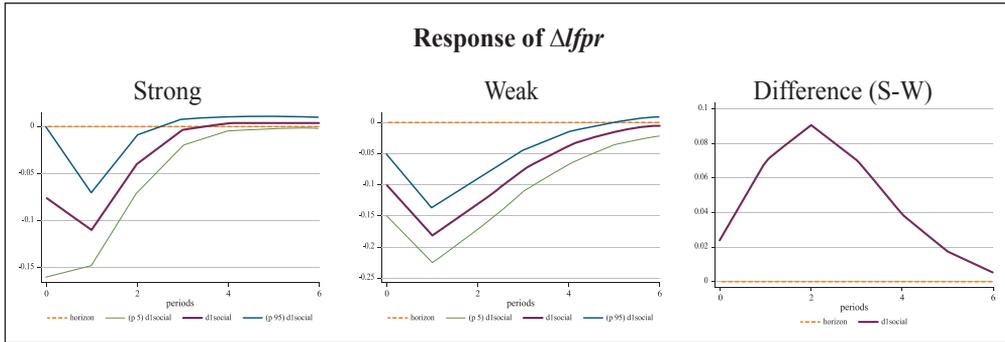


Table 6 shows differences in the variance decompositions for the tax ratio and social spending variables between groups. More of the variation in the tax ratio is explained by the output gap and social expenditure variables in the weak control group. Likewise, more of the variation in social spending is explained by the output gap, tax ratio and openness variables in the weak control group.

Table 6. Variance decompositon in 10 periods ahead: strong vs. weak

Strong	$\Delta open$	$ygap$	tkl	$\Delta social$	$\Delta lfpr$
$\Delta open$	.9761	.0024	.0059	.0153	.0004
$ygap$	.0033	.9364	.0418	.0128	.0057
tkl	.0189	.0022	.9666	.0038	.0085
$\Delta social$	.0146	.1134	.0020	.8568	.0132
$\Delta lfpr$	.0209	.0457	.0517	.0438	.8380
Weak	$\Delta open$	$ygap$	tkl	$\Delta social$	$\Delta lfpr$
$\Delta open$	.9566	.0097	.0040	.0024	.0273
$ygap$	.0960	.8832	.0050	.0092	.0067
tkl	.0158	.0660	.8333	.0845	.0005
$\Delta social$	.0419	.0954	.0507	.8011	.0110
$\Delta lfpr$	.0079	.0288	.0109	.2067	.7457

(Note) (i) Variations in row variables are explained by column variables.

(ii) The *open* is KOF economics integration index ranging from 0 to 100.

The *ygap* is deviation of Real Gross Domestic Product (RGDP) from its trend.

The *tkl* is average effective capital-to-labor tax ratio.

The *social* is social transfers and benefits as a share of Gross Domestic Product (GDP).

The *lpr* is the share of labor force as a share of working age population.

(iii) Values rounded at 5th decimal point

In summary, countries with weaker capital controls show significant increases in social spending as a result of an increase in openness, and less willingness to raise capital taxes relative to labor taxes as a result of positive shocks to changes in social spending. Positive shocks to social spending have a stronger negative impact on labor participation in countries with weak capital controls. Moreover, while changes in openness have stronger impacts on the output gap in countries with weaker controls, positive output gap shocks seem to have fainter positive impacts on labor force participation in these economies, and even a long run negative effect. The one riddle in this set of results is that increases in the tax ratio (increase in capital tax and/or drop in labor tax) are associated with positive changes in social spending in countries with weak capital controls.

D. Pre-1992 versus post-1992

The pre-1992 and post-1992 periods are before and after the greatest wave of globalization. The early 90s and late 80s are characterized by the formation of the EU, the dissolution of Soviet Union and the emergence of new market-based economies. These developments lowered international uncertainty, increased information flow, and accelerated capital flow across borders. How were the responses of social spending and tax policy changed? We expect the output gap to be positively affected by increases in openness. We also expect to see larger responses of social spending and tax ratios to changes in openness as governments adapt to globalization. We follow Rademacher (2013) who employs 1992 as a structural break point. From Table 7, it can be seen that openness index is about 12 points higher.

Table 7. Summary statistics for pre-1992 and post-1992

Variable	Pre-1992			Post-1992		
	Obs	Mean	Std. Dev	Min	Mean	Std. Dev
<i>Open</i>	277	63.3883	14.0395	492	75.4419	12.8438
$\Delta open$	253	.9305	1.5018	490	.5629	2.0750
<i>ygap</i>	266	.0011	.0519	538	.0000	.0753
<i>tkl</i>	209	.9590	.4625	443	.7871	.3330
<i>social</i>	108	22.6076	8.5071	496	25.4891	6.4493
$\Delta social$	93	.2950	.9372	485	.1390	1.0423
<i>lfpr</i>	230	69.7318	6.7842	532	72.3600	6.2070
$\Delta lfpr$	210	.1710	.6675	526	.1924	.5875

(Note) (i) The *open* is KOF economics integration index ranging from 0 to 100.

The *ygap* is deviation of Real Gross Domestic Product (RGDP) from its trend.

The *tkl* is average effective capital-to-labor tax ratio.

The *social* is social transfers and benefits as a share of Gross Domestic Product (GDP).

The *lfpr* is the share of labor force as a share of working age population.

(ii) Values rounded at 5th decimal point

Figure 4 reports a subset of the IRFs of two groups. In the first set of the panels of Figure 4, a positive shock to openness significantly and positively impacts the output gap in the post-1992 period whereas no significant relationship is detected in the pre-1992 period. In the second line of the set, the tax ratio drops in response to the openness shock in the post-1992 period, providing clearer evidence of tax competition. As in the baseline model, the social spending variable rises above the initial level after two periods in the post-1992 period, though here it is not significant.

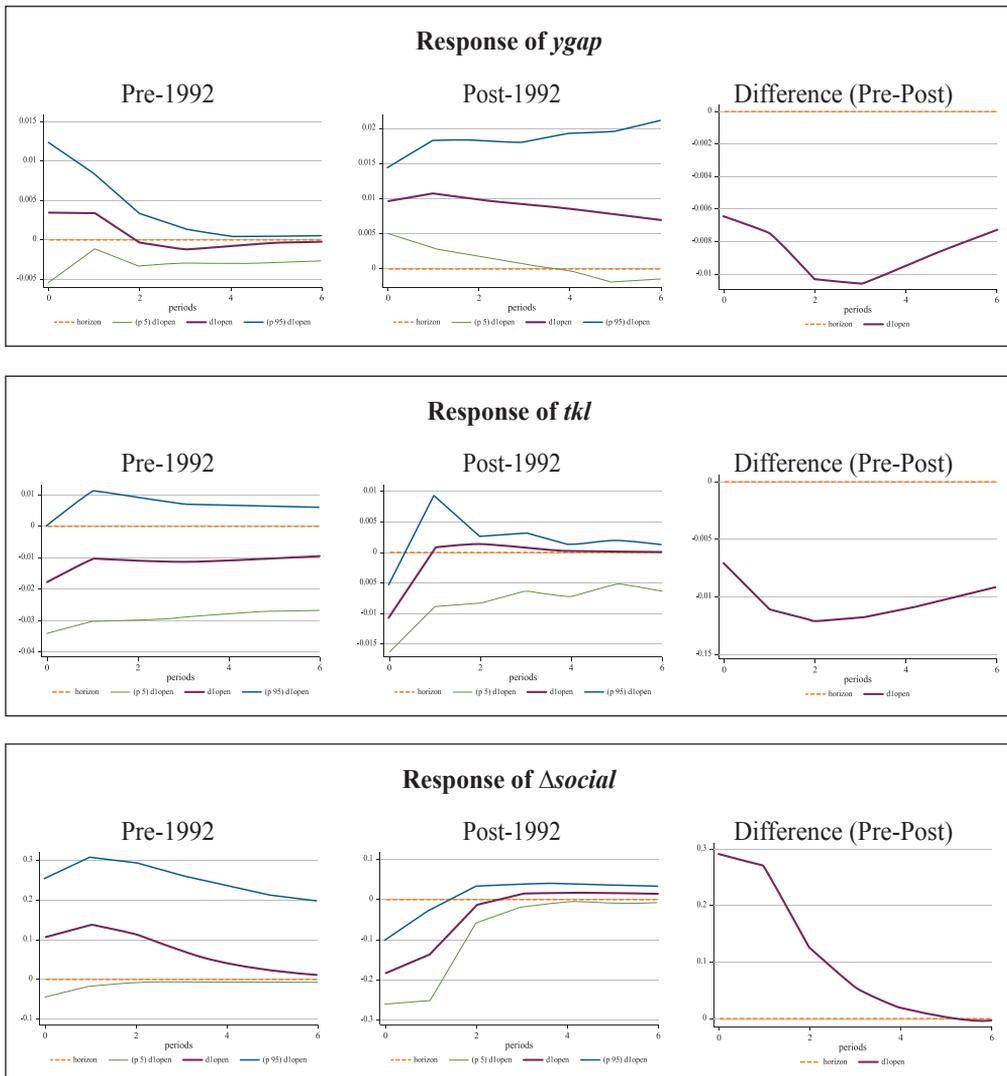
A positive shock in the tax ratio (high capital tax/low labor tax) increases social spending in the pre-1992 period, however the sign reverses in the post-1992. An increase in the relative tax ratio results in an initial positive response in labor force participation in the post-1992 period but not in the pre-1992 period.

Changes in social spending have no significant impact on the tax ratio in the pre-1992 period, but a negative and significant response is detected in the post-1992 period. The first line of the third set of panels indicate that there

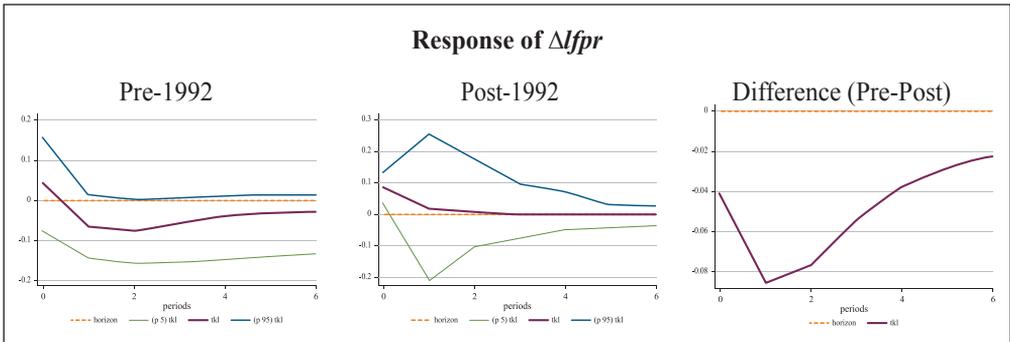
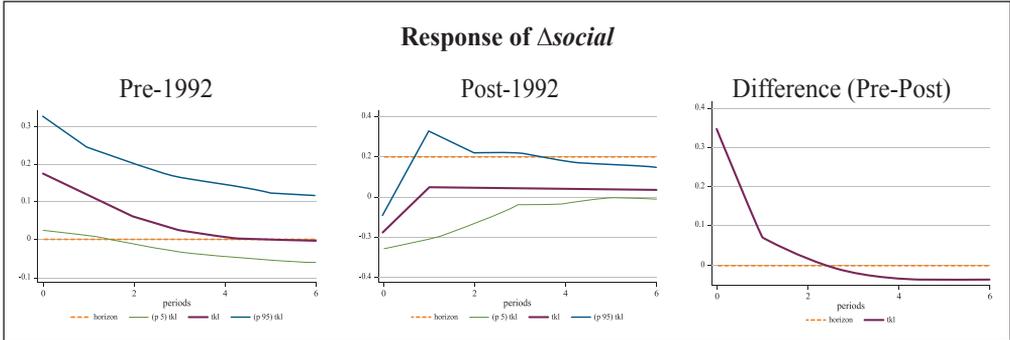
has an increase in the relative tax burden on labor. Taken with first line of second set of panel, a negative interaction between social spending changes and tax ratio is observed in the post-1992 period. Positive changes in social spending raise the labor tax and vice versa. Through their interaction, the participation in the labor market is reduced.

Figure 4. Pre-1992 and post-1992

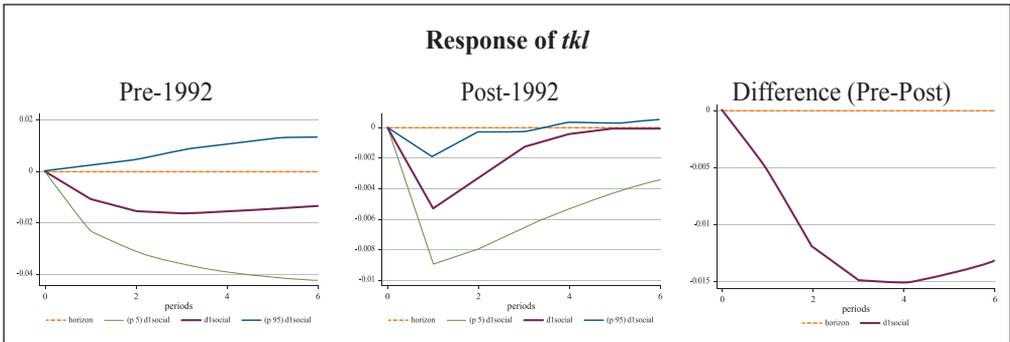
A. Impulse responses to $\Delta open$ shock



B. Impulse responses to *tkl* shock



C. Impulse responses to $\Delta social$ shock



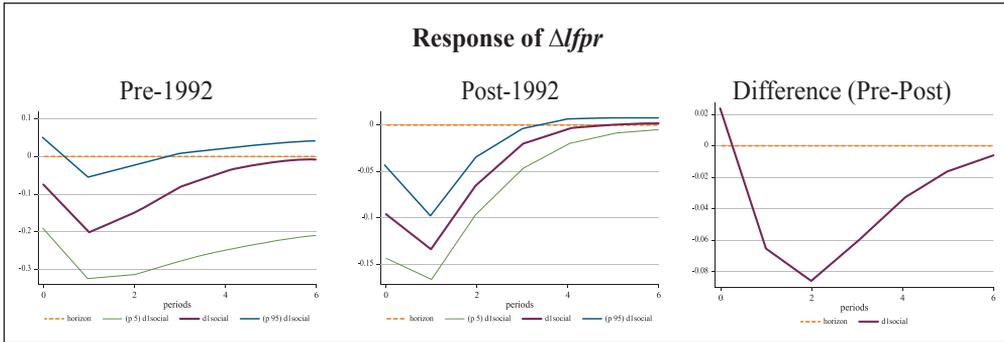


Table 8 reports variance decompositions. The variance of the output gap that is contributed by its own shock drops from 92.9 to 71.3 percent due to increased influence from the openness variable (from 1.1 to 4.5 percent) and tax ratio variable (from 0.8 to 22.3 percent) and there is an increase in the persistence of social spending in the post-1992 period.

Table 8. Variance decomposition in 10 periods ahead: pre-1992 vs. post-1992

EU	$\Delta open$	$ygap$	tkl	$\Delta social$	$\Delta lfpr$
<i>open</i>	.9414	.0002	.0194	.0066	.0323
<i>ygap</i>	.0115	.9299	.0084	.0499	.0003
<i>tkl</i>	.0318	.0070	.9003	.0447	.0162
<i>social</i>	.0448	.0685	.0435	.8430	.0002
<i>lfpr</i>	.0096	.0172	.0401	.1542	.7790
Non-EU	$\Delta open$	$ygap$	tkl	$\Delta social$	$\Delta lfpr$
<i>open</i>	.9431	.0085	.0280	.0139	.0065
<i>ygap</i>	.0459	.7137	.2237	.0123	.0044
<i>tkl</i>	.0292	.0332	.9237	.0102	.0038
<i>social</i>	.0568	.0564	.0467	.8232	.0169
<i>lfpr</i>	.0125	.0088	.0222	.0914	.8652

(Note) (i) Variations in row variables are explained by column variables.

(ii) The *open* is KOF economics integration index ranging from 0 to 100.

The *ygap* is deviation of Real Gross Domestic Product (RGDP) from its trend.

The *tkl* is average effective capital-to-labor tax ratio.

The *social* is social transfers and benefits as a share of Gross Domestic Product (GDP).

The *lfr* is the share of labor force as a share of working age population.
(iii) Values rounded at 5th decimal point

Shocks to openness have stronger positive impacts on the output gap variable in the more open post-1992 period. There is also evidence that openness plays a role in decreasing the tax ratio in the post-1992 period. Openness decreases social spending initially but there is some indication that it increases later. This is consistent with the results of the previous subsection on weak and strong capital controls. There is also evidence that countries reduce the relative tax ratio (raise labor taxes relative to capital taxes) in response to positive changes in social spending in the more open post-1992 period.

V. Conclusion

International economic integration has had a profound impact on the workings of national economies, including labor markets. This study uses a PVAR approach that imposes weak exogeneity conditions to gain insight on these effects. Additional insights were gained by estimating the model on subsamples of data that differed by extent of economic integration.

Hypotheses from two prominent models, the tax competition model and the compensation model, are tested. We test whether openness causes countries to raise labor taxes rather than capital taxes, leading to lower labor participation, consequently the need for higher social spending. We also test whether countries seek to shield their populations from income volatility by increasing social spending, which leads to relatively higher labor tax burdens.

Our results support for both channels. However, the evidence for the second channel, i.e., increases in openness directly affect changes in social spending (compensation hypothesis), is stronger and more consistent across samples. Tax competition appears to have worked in an indirect way by causing governments to raise labor taxes relative to capital taxes to finance higher social spending. Both results negatively affect labor force participation in the domestic economy.

Output gap shocks tend to cause greater changes in social spending and higher labor taxes in open economies, which leads to less labor force participation. These labor market effects of globalization via tax and transfer

policies illustrate that the challenging fiscal reforms are necessary.

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Appendix

Table A1: Statistics for IPS panel unit root test

Level	Without Trend			With Trend		
	<i>t</i> -statistic	<i>P</i> -value	AIC (max)	<i>t</i> -statistic	<i>P</i> -value	AIC (max)
<i>Open</i>	-1.1736	.1203	.77(3)	4.8329	1	.73(3)
<i>ygap</i>	-6.1719	.0000***	1.35(3)	-1.7731	.0381**	1.15(3)
<i>tkl</i>	-2.9261	.0017***	.88(3)	-3.0277	.0012***	.46(3)
<i>social</i>	-.7484	.2271	.81(3)	-1.1884	.1173	.69(2)
<i>lfpr</i>	1.0716	.8580	1.12(3)	-.2122	.4160	1.42(3)
First Diff.	<i>t</i> -statistic	<i>P</i> -value	AIC (max)	<i>t</i> -statistic	<i>P</i> -value	AIC (max)
Δ <i>open</i>	-14.4274	.0000***	.58(3)	-14.8706	.0000***	.5(3)
Δ <i>social</i>	-12.0756	.0000***	.27(3)	-10.5909	.0000***	.38(1)
Δ <i>lfpr</i>	-10.8326	.0000***	.62(3)	-9.8156	.0000***	.73(3)

(Note) H0: All panels contain unit root. H1: Some panels are stationary. *** 1%, **5%, *10%

Table A2: Statistics for Westerlund panel cointegration test

Statistics	Z-value	<i>P</i> -value	Statistics	Z-value	<i>P</i> -value
G_a	6.154	1	P_a	3.501	1
G_t	4.499	1	P_t	2.175	.985

Table A3: Source of data

Variables	Description	Source
<i>tkl</i>	Effective capital labor tax ratio	OECD revenue statistics, STAN, National Accounts, Carey and Rabesona (2002)
<i>social</i>	Social benefits and transfers in percentage of GDP	OECD National Accounts
<i>lfpr</i>	Labor force participation rate	OECD Economic Outlook
<i>open</i>	KOF economics index	Swiss federal institution of technology, Zrich
<i>ygap</i>	RGDP detrended by HP filtering	OECD Economic Outlook

Table A4: Country list and subsample classification for the 26 OECD countries

Country	EU	Strong Capital Controls
Australia		
Austria	○	○
Belgium	○	○
Canada		
Czech, Rep.	○	○
Denmark	○	
Finland	○	
France	○	
Germany	○	
Greece	○	○
Ireland	○	
Italy	○	
Japan		○
Korea, Rep.		○
Netherlands	○	
New Zealand		
Norway		○
Poland	○	○
Portugal	○	○
Slovak, Rep.	○	○
Slovenia	○	○
Spain	○	○
Sweden	○	○
Switzerland		
United Kingdom	○	
United States		
	18	13

Table A5: Average index of capital control indicators during 1996~2011

Weak	Average Index	Strong	Average index
AUT	2.439	PRT	2.422
CAN	2.439	SWE	2.422
DEN	2.439	ESP	2.389
FRA	2.439	JAP	2.373
FIN	2.439	NOR	2.340
GER	2.439	BEL	2.191
IRL	2.439	GRC	1.878
ITA	2.439	CZE	1.559
NLD	2.439	AUS	1.285
NZL	2.439	SVN	1.158
CHE	2.439	SVK	-.063
GBR	2.439	KOR	-.212
USA	2.439	POL	-.398
Average	2.439	Average	1.488