EU Accession, Institutions, and Human Capital

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Abstract

We use the experience of Central/East European and former Soviet Union ex-socialist countries to show the role of macro, meso and micro institutions in catch up/fall behind growth. Greater experience of state-level government fosters growth; the extent of socialist entrenchment/years under socialism hurts it; and joining the EU boosts it. The higher than OECD level of human capital at transition is not sufficient to overcome the self-serving behavior of old socialist elite/new opaque business networks that emerge to exploit the complex/uncertain environment upon communism's collapse. Accepting and implementing the European Union rules, regulations, and norms upon joining it permits building of transparent networks and lifts growth. Human capital is the most important factor for growth, not TFP. Suggesting dichotomy between institutions and human capital is misleading. Skilled/educated labor needs the right institutions to create value it is capable of - institutions' effect on growth is channeled through human capital.

Keywords: relative and absolute convergence; growth factors; initial institutional conditions; opaque versus transparent business networks, "old" vs. "new" ex-socialist countries

JEL Classifications: I25, J24, L14, O43, P27

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1. Introduction

North (1981) defines institutions as "a set of rules, compliance procedures, and moral and ethical behavioral norms designed to constrain the behavior of individuals in the interests of maximizing the wealth or utility of principals" (p. 201-202). Rules may either be codified in written laws, regulations, and instructions or they may be cultural traits, unwritten conventions, and practices. Nunn (2014). If so, institutions overlap with cultural and legal traditions.

Jones and Romer (2012) refrain from modeling institutions; although they model other three of their four state variables, namely ideas, population, and human capital, they highlight as central to growth theory. Using institutional variables from World Bank's Doing Business database, Kant (2016) shows institutional quality is higher with a greater FDI presence in developing (but not in developed) countries Fuchs-Schundeln and Hassan (2016), defining institutions more precisely, separate them from i) social structure, and ii) culture. Institutions are "the broad set of rules, regulations, laws, and policies that affect economic incentives and thus the incentives to invest in technology, physical capital, and human capital" while i) social structure is the network of friendships, family ties, and socioeconomic stratification (e.g., the class structure) that affects spread of information and ability to enforce contracts; and ii) culture essentially means civic capital that overcomes free rider problem.

Glaeser, La Porta, Lopez-de-Silanes & Shleifer (2004) and Beck and Laeven (2006) analyze the role of initial institutional conditions/levels for growth. The former take institutions to mean constraints on the executive and argue they are less important than human capital accumulation for growth; the latter show the 1996 (initial) value of institutional development measure given by Kaufman, Kraay, and Mastruzzi (2004) in 24 ex-socialist countries was

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adversely affected by years under socialism. We examine the institutions and growth relationship by studying the experience of ex-socialist countries of Central/East Europe and Former Soviet Union by assembling them in groups based on either their initial institutional conditions or their post-transition institutional aspirations.

Bockstette, Chanda, and Putterman (2002) show for 94 countries from 1960 to 1995, countries with greater experience of state-level government have higher levels of political stability and growth rates. Of the Central/East European and Former Soviet Union ex-socialist countries, Bulgaria, Hungary, Poland, and Romania have been sovereign countries since the Second World War. These are called "old" ex-socialist countries in this paper and denoted as BHPR. The non-BHPR countries, called "new" ex-socialist countries here, can be grouped either by i) the initial or ex-ante institutional factor of years under socialism and whether emerged from a civil war, or ii) by the ex post institutional factor of whether they aspired to join, and then joined, the EU (as opposed to forming into CIS and turning away from the EU).[1]

Of the institutional antecedents and aspirations stated above, we focus on EU accession. i.e., whether joining the EU and adopting its norms and standards boosts growth. Horridge and

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[1]Hungary, Poland, Bulgaria and Romania also joined the EU, the first two on May 1, 2004 and the other two on January 1, 2007. However, we show below the growth experience of these "old" ex-socialist countries was different from that of "new" ex-socialist countries (the Czech Republic, Estonia, Latvia, Lithuania, Slovakia, and Slovenia) all of whom joined the EU on May 1, 2004. Denizer (1997) also observes that areas that became separate countries in 1991 faced additional tasks of i) creating national economies out of a highly integrated Union and ii) developing administrative capacity to function as a sovereign nation.

Rokicki (2018) simulate per-capita income growth within Visegrad countries by four regional dynamic computable general equilibrium (CGE) models.[2] Their base scenario includes the effect of EU accession; their counterfactual analysis is without accession. Comparing the two scenarios, they find regional per-capita income between 2000 and 2013 would have grown at a slower pace in all regions of the Visegrad countries without EU membership. The primary reason is that they would have missed out of EU's structural policies. Using a macroeconomic production function accounting for institutional reform, Piazolo (1999) argues Central and Eastern Europe economies can enhance their growth through EU-based institutional change. On the other hand, simulating debt dynamics of eight Central and Eastern Europe countries that joined the EU in 2004 Hallett and Lewis (2007) expect Maastricht debt and deficit criteria will constrain their catch-up growth.

van Ees and Bachmann (2006), emphasize the consequences for economic growth of organization of exchange in transparent as opposed to opaque business networks. The transition economies no longer have the centrally planned economy structure of networks in which economic transactions take place. Still, old opaque socio-economic systems find little reason to give way to a more value-creating economic activity; and new opaque networks emerge to take advantage of high degree of complexity and uncertainty.[3] The challenge of transition is to build new trust-based institutions/exchange networks in a situation of weak legislative structures and lack of effective

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[2]They select these countries due to data limitations and because each of these countries had several regions at the NUTS-2 level.

[3]Kowalewski and Rybinski (2011) similarly believe powerful interest groups can alter their legal and economic environment to be more self-serving when financial, legal, and political institutions are weak; Beck and Laeven (2006) hold the socialist elite remained an entrenched

market regulation and property right enforcement rules. They suggest the 2004/2007 enlargement of the EU is likely to build transparent Eastern-Western firm networks and developing favorably reliable macro- and meso-institutional frameworks. Bohle (2018) comparing growth regimes of Visegrad and Baltic countries, discusses how the EU exported its rules, regulations, and norms to Central and East European countries as they sought its membership.

We find support for results by Bockstette et al. (2002) that the extent of prior experience of state-level government fosters growth; and by Beck and Laeven (2006) that the number of years under socialism hurts growth. We show ex-socialist countries (whether "old" or "new") that joined the EU boosted their growth after accession.[4]   These countries had higher level of human capital at transition than in OECD. Their reasonably educated and healthy labor was not sufficient to overcome the dilution of institutional constraints at all levels following the collapse of communism.   It required their acceptance and implementation of the European Union rules, regulations, and norms in all details to enable skilled labor to create value/output it was capable of. Institutions' effect on growth was channeled through human capital. Suggesting dichotomy between human capital and institutions or giving the former more importance (see, Glaeser et al. 2006) may be misleading. Analyzing factors for income and growth, we find human capital to be

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interest group in the initial phase of transition; and Johnson et al. (2000) show that to build a new economic structure, trust within a network of enterprises is an important element

[4]Bluffstone et al. (2003) estimate that approximating its environmental protection legislation with fifteen environmental directives of the EU will cost Lithuania roughly 3.5% of its GDP in 2015. They do not consider the subsidy Lithuania receives from EU's Cohesion and Structural funds.

the dominant factor, not TFP – in accordance with the importance Lucas (1988) and Erosa et al. (2010) give to it.

The paper is organized as follows. Section 2 below delineates the model and specifications used in the paper. Section 3 examines the effects of EU accession for countries that have existed as separate countries since at least the Second World War; Section 4 for "new" ex-socialist countries grouped by years under socialism at transition and whether aspiring to join, and then joining, the EU post-transition. Section 5 contains concluding observations.

2. Model and Specification

2.1 The Catch-up Index, R-Convergence, Divergence[5]

Income ratios/incomes relative to another country are frequently used in growth and transition studies. For example, Cuberes and Jerzmanowski (2009) examine growth reversals using real output per worker relative to the US; Fuchs-Schundeln (2008) use German Reunification as a quasi-natural experiment to study its effect on East-West Germany saving-ratio, income-ratio, and wealth ratio; Jones and Olken (2008) finding of ubiquitous growth "miracles" and "failures at ten-year periods defines growth as relative to the US; and Svejnar (2002) compares Soviet bloc's growth to a corresponding group of market economies. We use income normalized to a bench-mark country's income; that country is chosen whose income is the least volatile. That makes the data of interest more granular. Generally, a large country is taken as the bench-mark country. Taking its income as the numeraire removes/dilutes the effects of world or region-wide factors on a country's income.

Let y_{J0} and y_{Jt}, represent Country J's per-capita income for the base year and year t, y_{BM0}

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[5]See Kant (2019) for more detailed derivation of results stated in this sub-section.

and y_{BMt} the bench-mark country's per-capita income for Country J's base year and year t, and R_{J0} and R_{Jt} Country J's base and year t per capita income ratio vis a vis the benchmark country. Then, the catch-up index I_{Jt} for Country J for year t is,

$$I_{Jt} = (R_{Jt}/ R_{J0}) \tag{1}$$

By expressing all countries' relative incomes/income ratios to the same base (100), the catch-up index permits ready comparison of trends and dynamics of different countries' income. An increase (decrease) in the index (or in the income ratio) indicates Country J's income rises more than (less than) that of the bench-mark country. Said increase is called relative convergence, r-convergence, in this paper, and is not sufficient (although necessary) for absolute convergence, i.e., for income gap, $\Delta_{Jt} = (y_{BMt} - y_{Jt}) > 0$, to decrease. On the other hand, a decrease in the index is called divergence in this paper - both relative and absolute - since relative divergence is sufficient for absolute divergence.

We can show that:

$$r_I = r_J - r_{BM.} \tag{2}$$

and

$$n = \log (1/R_{J,0}) / \log (1 + r_I) \tag{3}.$$

where r_I is the catch-up (or the fall-behind, if negative) rate and r_J and r_{BM} are the country growth rates; and n is the number of years since the base year for Country J's income to become equal to the frontier's. This (absolute) income equality is called full convergence here.

2.2 Difference-in-Differences

Three econometric methods have been used to empirically study institutions - instrumental variables, regression discontinuity, and difference-in-differences (DID). They are design-based estimators at the heart of credibility revolution in empirical economics. Of these, the last is

probably the most widely used. See, Angrist and Pischke (2010).[6] The specification of the estimating equation of a DID model is:

$$Y_{it} = \alpha_i + \beta \ Treat \times Post_t + \gamma_t + \varepsilon_{it} \qquad\qquad (4)$$

where Y_{it} is the outcome in, say, country i in year t; *Treat* indicates country i's treatment status in the year of treatment, i.e., *Treat* = 1 if country i is a treatment country and = 0 if it is a not; *Post_t* indicates the post-treatment period, i.e., *Post_t* = 1 $\forall$ $t \geq$ treatment year and = 0 otherwise; β gives the effect of treatment, α_i and γ_t indicate time-invariant country effects (either pre-fixed or randomly determined) and time effects, respectively, and ε_{it} is the error term. As noted by Persson and Tabellini (2008), this estimation allows for any correlation between the treatment dummy and time-invariant country features since the outcome effects of the latter are captured by $\alpha_{i,}$.

To mimic random assignment, DID design uses time trend of untreated group as the "counterfactual." [7] It thereby permits i) both pretreatment difference between the two groups and ii) factors other than the treatment that affect the outcome in both; comparing the outcome in the treatment group before and after the treatment with the corresponding change in the non-treatment group during the same period. The treatment is joining the EU versus the counter-factual of no

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[6]For the use of DID to study macroeconomic relationships, see, e.g., Rodrik and Wacziarg (2005) and Papaioannou and Siourounis (2008).

[7]To make the counterfactual assumption more credible, DID literature often attempts to increase the similarity between treated and control countries by including a vector of covariates, X_{it}, such as initial per capita income and continental location (Africa, Asia, Europe, the Americas) indicators etc. We dispense with such specification because in our DID analysis both groups of countries belong to EU25 where income levels are not very divergent.

change in the EU membership status.[8]

2.3 Growth Factors

Let *kl* represent physical capital per unit of employed labor, *hc* average human capital (that is, quality of labor or average educational attainment) in a country, and *A* the efficiency with which physical capital and human capital are used, i.e., TFP. Using the neo-classical production function as given in Caselli (2005), the left-hand side then would be output per unit of employed labor. Let per capita income approximate output per worker and ignore the time sub-scripts. Then for Country J,

$$y_J = A_J \, kl_J{}^{\alpha} \, hc_J{}^{1-\alpha} \tag{5}$$

Our interest is in explaining changes in relative incomes/income ratios overtime. Using (5), Country J's income ratio to the bench-mark country is,

$$(y_J/y_{BM}) = (A_J/A_{BM}) \, (kl_J/kl_{BM})^{\alpha} \, (hc_J/hc_{BM})^{1-\alpha} \tag{6}$$

(6) tells us Country J's income ratio depends on ratios of the two TFPs, the two capital-labor ratios and the two levels of average human capital.[9]

The estimable version of (6) is:

$$(y_J/y_{BM})_t = \mu + \beta_1 \, (A_J/A_{BM})_t + \beta_2 \, (kl_J/kl_{BM})_t + \beta_3 \, (hc_J/hc_{BM})_t + \varepsilon_t \tag{7}$$

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[8]We also use directly compute exponential growth rates as non-econometrically indicating the effect of EU accession for this sample.

[9]As noted above, Cuberes and Jerzmanowski (2009) and Jones and Olken (2008) use income relative to the US as the dependent variable; but do not take explanatory variables as relative to the corresponding US/a bench mark country's numbers in their econometric investigation.

where each variable is taken in logs.

3. "Old" Ex-Socialist Countries

3.1 Data[10]

We use Penn World Tables (PWT) data for income (and other variables) since it goes back the farthest for the maximum number of countries possible. Starting with version 8.0 (the new generation), PWT gives two versions of real GDP: CGDP that uses prices that are constant across countries but depend on the *current year*; and RGDP that uses prices that are constant across countries and are also *constant over time*. We use RGDP variables for income (that are well suited for comparisons across countries and over time - Feenstra, et al. (2015)); and PWT version, 9.0 (available at http://www.rug.nl/ggdc/productivity/pwt). It gives data to 2014 and goes back to 1950 for the US, EU15 countries and many countries in rest of the world. For most ex-socialist countries, it gives data since 1990.[11]

The other variables used from PWT 9.0 are population, number of employed persons, human capital measure based primarily on average years of schooling from Barro and Lee (2013) and an assumed rate of returns to education based on Mincerian equation estimates around the world[12], capital stock at current PPPs, and TFP level at current PPPs (USA = 1). We use the period

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[10]What we say about data applies to both this and the next section.

[11]it gives data for Romania since 1960, for Bulgaria, Hungary, and Poland since 1970.

[12]The main problem in developing the "human capital measure" (a nomenclature we prefer over calling it "human capital index" - as in PWT 9.0/8.0 - since the values are not expressed as a ratio to a base year's values usually required for an index) is constructing data on average years of schooling. Inklaar and Timmer (2013) explain that PWT 9.0 uses average years of schooling data for 95 countries primarily from Barro and Lee (2013) – who build these numbers at five-year

since 1990 and EU15 (or "old EU") except Germany (EU15XG), as the control/comparator countries for DID estimation of the effects of EU accession by "new EU" or EU-10 (the ex-socialist countries that joined the EU in 2004/2007) countries. World Bank classifies most of the EU10 some EU15 countries as upper-middle-income for the period in question. *See*, World Development Indicators, various issues. Following Campos and Coricelli (2002), that countries at similar level of development/per-capita income should be used as comparators, "counterfactual" from EU15 would be most applicable. Germany is excluded since data is for unified Germany; that separately for the erstwhile East Germany are not available in PWT 9.0. For the same reason, we cannot use Germany as the bench-mark county for income catch-up or convergence and use the US instead.[13] That is, we compare catch-up to the US of ex-socialist countries compared to similar catch-up of EU15XG countries.

3.2 Estimation, DID for EU Accession and Growth Factors, BHPR

We now estimate equation (4) for BHPR by panel estimation keeping in mind the following. Persson and Tabellini (2008) point out that DID estimation requires that heterogeneity in the effects of treatment should not be systematically related to the heterogeneity in (either the timing or the extent of) treatment itself. As discussed in Kennedy (2008), the random effects estimator considers both "within" and "between" variation and is more efficient. Nevertheless, it

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intervals from 1950 to 2010 for 146 countries – and for 55 countries primarily from Cohen and Leker (2014) and Cohen and Soto (2007) – who provide these numbers at ten-year intervals, 1960-2020 for 95 countries.

[13]Kutan and Yigit (2007) also do not use Germany as the benchmark country in their analysis for similar reasons.

suffers from possible bias. Using Hausman test to test the null that random effect estimator is unbiased does not reject the null for panels in this paper, and we use the said estimator.[14]

EU membership of BHPR (and other ex-socialist countries that joined the EU) did not occur endogenously due to economic variables internal to BHPR. They became members only after adopting/agreeing to adopt EU rules, regulations, and norms as well as agreeing to being subject to EU's (newly created) monitoring and surveillance mechanisms. In addition to broad fields like democratization, minority and human rights, regulatory convergence or administrative capacity building, the EU sought to reinforce "the applicant states' capacity to maintain the rule of law, uphold economic freedom, prevent discriminatory practices, foster domestic competitiveness and implement European rules and policies," e.g. environmental policies. *See*, Bohle (2018) and Appendix 1. The DID method is appropriate to estimate the effects of EU accession BHPR achieved after agreeing to such externally imposed conditions.

DID estimation for the period 1991-2014 (results stated in column 1 of Table 1) for BHPR show the EU accession dummy has a substantial positive magnitude and is statistically significant at 1% level. As noted above, EU accession comes after many years of country-EU inter-action with the latter requiring adherence to its norms and standards in all details and judging whether the candidate country had satisfied its concerns. Further, many changes made may not have immediate effect on income. Thus, we re-estimate equation (4) for alternative periods by deleting the overlapping middle years. First, we delete observations for all 18 countries for 2001 to 2006. This deletes non-EU accession years of 2001 to 2003 for Hungary/Poland and 2001 to 2006 for

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[14]Both fixed-effects and random-effects estimators have time-invariant country effects – in the former, they are parametrically fixed, in the latter they are randomly determined.

Bulgaria/Romania, and EU accession years of 2004 to 2006 for Hungary/Poland and none for Bulgaria/Romania. Then, we delete observations for 2000 and 2007 also. The results are stated in columns 2 and 3 of Table 1's panel C. Each succeeding greater separation of post-accession versus pre-accession periods shows increased positive effect on incomes of BHPR countries' accession to the EU. In Table 2, we compare post-accession to pre-accession average exponential growth rates difference for BHPR countries versus similar difference for EU15XG. Three-year moving averages of catch-up index is used for all 18 countries to both smooth out short-run fluctuations and to minimize the effects of initial and final year values. It shows a substantial positive effect (a 3.43 points higher growth rate) of BHPR joining the EU.[15]

<Insert Tables 1 and 2 here>

Now, we examine whether the relative importance of growth factors for BHPR are different for the post-EU accession period from those in their pre-accession period by undertaking panel estimations of (7) for the two periods. Results are presented in Table 3[16] Human capital is not statistically significant in the pre-EU accession period; all other coefficients in the two periods are significant at 1% level. TFP's contribution to income is about 70% higher post-EU accession and that of physical capital is less than one-half. The main reason for income growth boost post-EU accession is the high and statistically significant (at 1% level) contribution of human capital.[17]

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[15]Individual country growth rates are given in Appendix 2.

[16]The growth factor results for SBCS countries reported therein are discussed below.

[17]Kutan and Yigit (2007) find both improved productivity and physical capital accumulation explain higher post-accession growth of last five members that joined the EU15, namely, Spain, Portugal, Austria, Finland, and Sweden. For BHPR, it is human capital, not either physical capital or productivity, that primarily explains EU accession's impact on growth.

<Insert Table 3 here>

4. "New" ex-socialist countries

4.1 Estimation, DID for EU Accession, SBCS

Limiting ourselves to countries for which explanatory variables data are available, we divide the "new" ex-socialist countries into three groups. These are: a) joined the EU (on May 1, 2004), Slovenia, the Baltic countries, the Czech Republic and Slovakia, called hereinafter as SBCS countries - they were under the socialist system for about five decades; b) emerged from the ruins of internecine war for many years, ex-Yugoslavia countries Croatia and Serbia - they were under the socialist system for about four decades; and c) formed into CIS (thereby distancing them from the EU), ex-Soviet Union countries, Armenia, Kazakhstan, Kyrgyz Republic, Moldova, Russian Federation, Tajikistan and Ukraine - they were under the socialist system for about seven decades).[18] DID analysis can be performed for only EU accession (for SBCS), and we do it first.

Results for estimating (4) for 1991-2014 for EU15XG (control) and SBCS (treatment = joining the EU on May 1, 2004) countries are presented in Table 4. The results show the coefficient on the DID EU accession dummy, has a substantial positive magnitude, and is statistically significant at 1% level. Again, each succeeding greater separation of post-accession versus pre-accession periods shows increased positive effect on incomes of SBCS countries joining the EU, and comparing post-accession to pre-accession average exponential growth rates difference for SBCS countries versus similar difference for EU15XG shows a substantial positive effect (a 2.30

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[18]Beck and Laeven (2006) use number of years a country has been socialist as proxy for their entrenchment of the socialist elite institutional variable and its power to affect the transition.

points higher growth rate, see Table 2) of SBCS countries joining the EU.[19]

<Insert Table 4 here>

Both the i) high catch-up of BHPR countries and ii) all positive catch -up of SBCS countries since 1990 are entirely explained by the spurt in growth after they joined the EU. All these ten countries had introduced not just trade and foreign exchange system openness but all economic confounders (namely large and small-scale privatization, governance and enterprise restructuring, price liberalization, and pro-competition policy) and political confounders (like democracy) in the early 1990s.[20] Collapse of socialism led them to rapidly deepen their integration with the EU and the world economy. By 1994 (i.e., at least ten years before EU accession) all BHPR and SBCS

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[19]Table 2 supports Martin and Sanz's (2003) expectation that EU accession is likely to significantly contribute towards convergence of per capita income levels of Central and East European countries to that of "old" EU.

[20]EBRD has rated all the transition (or reform) economic indicators for all ex-socialist countries for the period since 1989. Its description and what a country must do to progress from the lowest level or little progress (1.00) to the maximum (attainment of advanced industrial economy standards or 4.33) score – where the scores are not cardinal and it is increasingly difficult to achieve a higher score, see Raiser et al. (2001) - in each, is available at

https://www.ebrd.com/cs/Satellite?c=Content&cid=1395237866249&pagename=EBRD%2FContent%2FContentLayout. The BHPR and SBCS countries had attained the maximum score for all indicators by late 1990s. Appendix 3 gives the description of the external sector (trade and foreign exchange system) indicator, downloaded from the above website on June 7, 2019. EBRD gives

countries had already reached the next-to-the maximum 4.00 value of trade and foreign exchange system openness indicator and reached the maximum value of 4.33 in different years from 1994 to 2001 (see, Figure 1) and all except for Slovakia had set up national FDI promotion strategies (see, Bohle (2018)). What changed in and around 2004 was not a spurt in openness that year; it was institutional changes these countries adopted/agreed-to in the process of joining the EU.[21]

<Insert Figure 1 here>

While highlighting that quality of institutions is even more important in civil law countries that all CEEC countries are, Kowalewski and Rybinski (2011) complain they i) had to follow the EU's environmental policies, e.g., CO_2 policy that USA and BRICs do not, and ii) report they (with the exception of Estonia) had to pass an avalanche of new laws/regulations and create new bureaucratic processes pre-accession that burdened the state. These and Maastricht debt and deficit criteria burdens must be counter-balanced by development funds the new member states received from the EU.[22]

4.2 Post-1990 Growth

Table 5 presents average growth/catch-up experience of all three groups of "new" ex-socialist, as well as BHPR, countries for the 1991-2013 period. The "new" ex-socialist countries

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the maximum 4.33 value on it to transition countries that remove most tariff barriers and achieve membership in WTO.

[21]We discuss in Appendix 1 some of the changes these countries adopted/agreed to adopt in the few years before or after they joined the EU.

[22]These funds were as high as 4% of GDP. *See*, Kowalewski and Rybinski (2011) and Bohle (2018).

have performed significantly worse (catching-up/falling-behind the US at 1.36%, 1.33%, and -1.46 % rate) than the BHPR ("old" ex-socialist) countries (catching-up at 2.25%) over the same period; confirming results by Bockstette et al. (2002) that the extent of prior experience of state-level government fosters growth. Among the "new" ex-socialist countries, countries with the longest period under socialism/greatest socialist entrenchment (CIS countries) have done the worst confirming Beck and Laeven (2006) finding that the number of years under socialism hurts growth.[23] We also show (in the next sub-section) that examining growth factors separately by countries grouped by institutional factors is illuminating.

<Insert Table 5 here>

Figure 2 shows the dynamics of the average (GM) catch-up index for the four groups of ex-socialist countries for the 1991-2013 period.[24]   Roland (2000) finds no transition country avoided a serious and major output fall at the beginning of transition. We find the BHPR's income did not fall - it kept growing at almost the US rate right from the beginning of transition for about

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[23]Examining "new" ex-socialist countries' growth for the 1991-2003 period, and regressing growth rates on years under socialism give similar results. Croatia and Serbia almost do as well as SBCS countries because their period under socialism is slightly smaller (four versus five decades) and because growth generally accelerates after civil war; *see*, Collier (1999).

[24]Individual country growth rates are presented in Appendix 4. We find that, in contrast to Svejnar (2002), i) Balkan and Baltic countries, Romania, Estonia, Lithuania, Latvia, and Bulgaria, on average have performed better than the Central European countries, Poland, Hungary, Slovakia, Slovenia, and the Czech Republic, in the post-1990 period, indicating that geography-related initial

ten years - and then grew faster. Initial institutional conditions and post-transition aspirations matter. Croatia and Serbia recover their initial level of income relative to the US (that undoubtedly fell due to their internecine war from 1991) within approximately three years of that war's end (in December 1993). SBCS start recovery and catch -up after just about two years of falling-behind. CIS is the only group of countries that continue to fall-behind sharply for about ten years and their income relative to the US was about 30% lower in 2013 than what it was in 1991. Roland (2000) explains the initial fall to credit crunch, snapping of network externalities and freedom to engage in monopoly behavior by enterprises. Yet, he does not explain why these factors had no effect on BHPR countries and such strong effect in CIS countries (that their income gap from the US is much higher in 2013 than it was in 1991 - since relative divergence is sufficient for absolute divergence).

<Insert Figure 2 here>

4.3 Growth Factors, "New" Ex-socialist countries

Table 6 presents growth factors estimation results for Croatia & Serbia and CIS countries for 1991-2014. For both the groups, human capital does not have a statistically significant effect; the other two factors do. It is the strongly positive and statistically significant (at 1% level) effect of physical capital and TFP that explains the catch-up of the CS countries. For the CIS group, all three factors are statistically significant with the contribution of TFP slightly higher and that of physical capital is substantially weaker while the negative contribution of human capital is more significant. The only reason for their falling back is the negative contribution of human capital

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conditions have not held the former group back; and ii) Slovenia and BHPR countries (other than Bulgaria) did not have a larger relative income gap with advanced economies in 2001 than in 1990.

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that more than negates the positive contribution of the other two factors.

<Insert Table 6 here>

Discussing now the post-EU accession and pre-accession growth factors for SBCS countries presented in Table 3, all coefficients in the two periods are significant at 1% level. TFP's and physical capital's contribution to income are higher post-EU accession. Nevertheless, the primary reason for sharp income growth boost post-EU accession is the change in human capital's sign from a negative value to a positive high value. Now both improved productivity and physical capital explain higher post-accession growth.[25] Nevertheless, still it is human capital that primarily explains the impact of EU accession of ex-socialist countries on their growth.

The above analysis shows adopting/not-adopting EU's "broad set of rules, regulations, laws, and policies that affect economic incentives" makes human capital the most important factor explaining both i) higher catch-up of BHPR, ii) all positive catch-up of SBCS, iii) and falling-behind of CIS countries since comparable data are available for all these countries. This result is consistent with Marin (2010) who, with a detailed survey of German and Austrian investment projects in Eastern Europe in 2010, finds these countries relocated their skilled jobs to cheaper East European locations. East European labor did not acquire job skills on EU accession – it was reasonably educated at transition. These countries' human capital indicators, e.g., average years of schooling, were better at transition than in OECD (and did not go down in the 1990s). [26] *See*, Barro and Lee (2001). Labor with the same skills they had for decades created more value with

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[25]Kutan and Yigit (2007) also get a similar result for last five members that joined EU15.

[26]Campos and Coricelli (2002) highlight Central and East European countries' pre-transition human capital development by suggesting just comparing their per-capita income to EU-

18

the right institutions – institutions' effect on growth was channeled through human capital.

Glaeser, La Porta, Lopez-de-Silanes & Shleifer (2004) find "initial levels of constraints on the executive [that they identify as good institutions] do not predict subsequent economic growth, whereas initial levels of human capital continue to be strong predictors." Identification of institutions as constraints on the head of the state (e.g., whether unconstrained dictator or not) or even as government in general is narrow. In addition to "a set of rules, compliance procedures," institutions are also "moral and ethical behavioral norms" that "constrain the behavior of individuals." North (1981), p. 201-202. That is, institutions include meso- or micro- institutions. Collapse of communism meant dilution of constraints at all levels (state, city, enterprise/ organization, and individual) and emergence of opaque business networks. It required externally imposed constraints by the EU to replace these opaque by transparent networks to enable human capital to create value/output it was capable of.

Table 7 presents results from panel estimation of growth factors of EU-15XG countries for 1991-2014 and reproduces them for BHPR and SBCS countries since their accession to the EU (from Table 3). For all three groups of countries, TFP is not the most important factor; human capital is. This is in accordance with the importance Lucas (1988) and Erosa et al. (2010), give to human capital. Erosa et al. (2010) build a model of heterogeneous individuals to quantify the relative effects of TFP and human capital in explaining cross-country income differences. They find human capital amplifies the effect of TFP differences about four-fold. To explain rich country's PPP income that is 20 times a poor country's, TFP needs to be five times when human

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15 at transition ignores the efforts these countries devoted to improving education and health during socialism

capital can vary between countries but 18 times when it is the same. We find human capital is always more significant than TFP in explaining income.

<Insert Table 7 here>

Fernald et al. (2017) and Hanushek et al. (2017) adopt growth accounting framework like what we use. Fully accounting for the cyclical effects that should have implied faster recovery, Fernald et al. (2017) report it is the slower growth of TFP (and decline in labor force participation rate) that account for slower recovery in the US since the Great Recession. They do not find human capital played any role in it. On the other hand, Hanushek et al. (2017) while finding results to be insensitive to differences in price levels across states (available since 2008), show differences in human capital account for 20 to 30% of differences in per-capita GDP of states within the US. We find a far greater role of human capital in situations when institutions change.

5. Conclusions

We use the experience of Central/East European and former Soviet Union ex-socialist countries to show the role of macro, meso and micro institutions, and of human capital, in catch up/fall behind growth. We assemble these countries in groups based either on their initial institutional conditions or on their post-transition institutional aspirations. The initial institutional conditions are i) extent of prior experience of state-level government and ii) the number of years under socialism. We find support for results by Bockstette et al. (2002) that the extent of prior experience of state-level government fosters growth; and by Beck and Laeven (2006) that the number of years under socialism hurts growth.

The post-transition institutional aspiration is to join the EU (as opposed to forming into CIS and turning away from it). The Central/East European and former Soviet Union ex-socialist countries had higher level of human capital at transition than in OECD. The collapse of

communism meant dilution of institutional constraints at all levels (state, city, enterprise/ organization, and individual). Their reasonably educated and healthy labor was not sufficient to overcome the self-serving behavior of old entrenched socialist elite or of the new opaque business networks that emerged to take advantage of the post-1990 complex and uncertain environment. Income gap of most of the "new" socialist countries from the US widened post-1990.

Adopting/not-adopting EU's "broad set of rules, regulations, laws, and policies that affect economic incentives" in all details makes human capital (not TFP) the most important factor explaining higher catch-up or all catch-up (in fact, changing falling-behind - in both relative and absolute income - to catch -up as for SBCS) or falling behind of ex-socialist countries since comparable data are available for them. Labor, either individually or in organizations, with the same skills they had for decades created more value with the right institutions – institutions' effect on growth was channeled through human capital.

Suggesting dichotomy between human capital and narrowly defined institutions or giving the former more importance (see, Glaeser et al. 2006) may be misleading. Institutions are important and critical for growth in middle- or high-income countries of Europe also. Both in EU15XG and the ex-socialist countries that joined the EU in 2004/2007, TFP is not the most important factor; human capital is - in accordance with the importance Lucas (1988) and Erosa et al. (2010), give to it. Fernald et al. (2017) ascribe slower post-Great Recession recovery in the US to slower growth of TFP and Hanushek et al. (2017) find human capital accounts for 20 to 30% of differences in per-capita GDP of states within the US. We find a greater role of human capital on growth than either of these studies as we analyze its role when institutions differ.

Data Availability Statement: Data used in this study is available as follows:

EBRD's Transition indicators (1989-2014) by country:

Available at

https://www.ebrd.com/what-we-do/economic-research-and-data/data/forecasts-macro-data-transition-indicators.html

Income and growth factors (1990-2014) by country from Penn World Tables.

Available at

http://www.rug.nl/ggdc/productivity/pwt

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Figure 1: Trade & FE TI 1990-2014; BHPR and SBCS Countries

Bulgaria — Hungary — Poland — Romania — Czech Republic — Estonia — Latvia — Lithuania — Slovak Republic — Slovenia
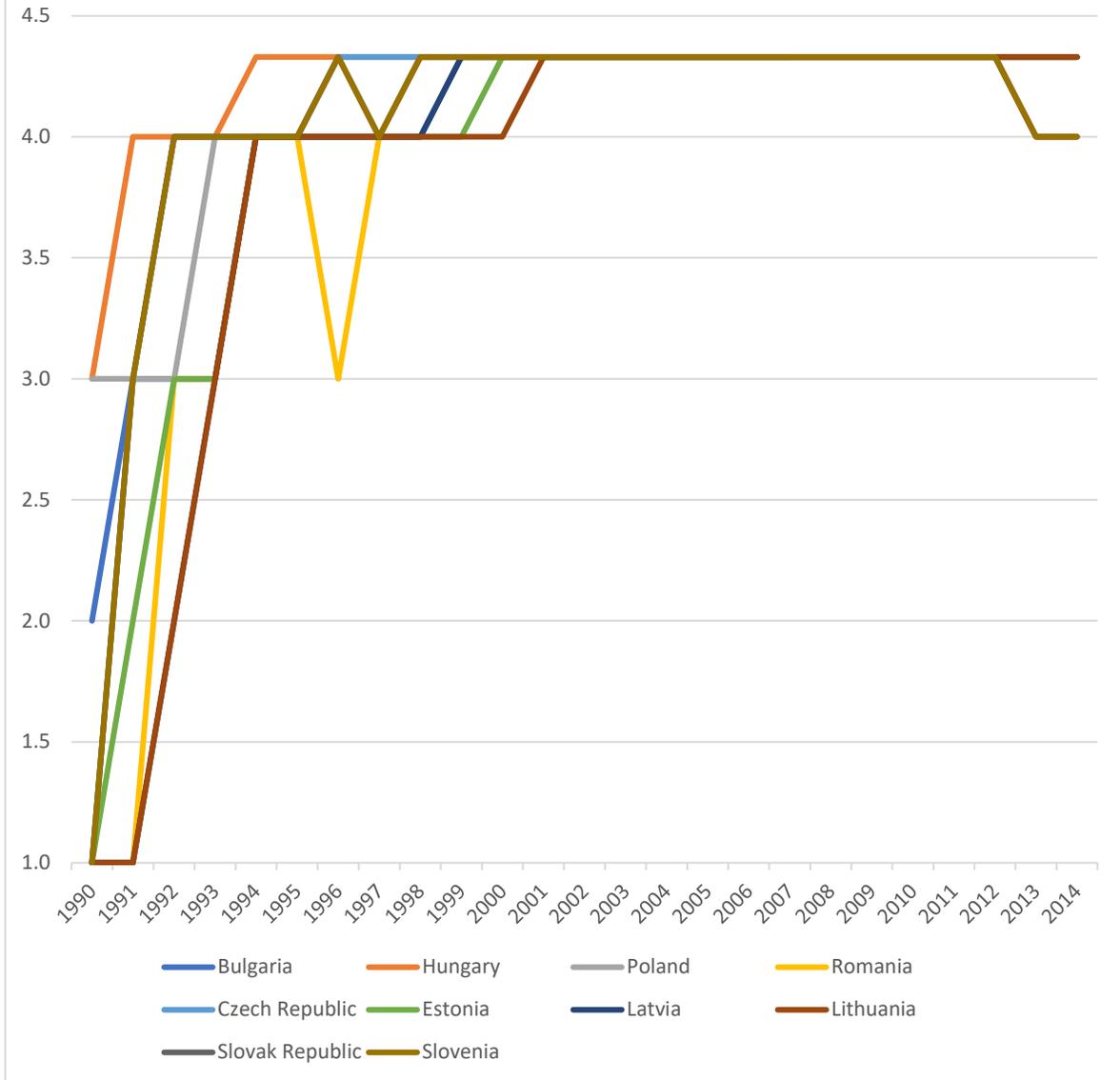
Figure 2: Catch-up Index 1991-2013
Four Groups of Ex-Socialist Countries

BHPR — SBCS — Cro&Ser — CIS
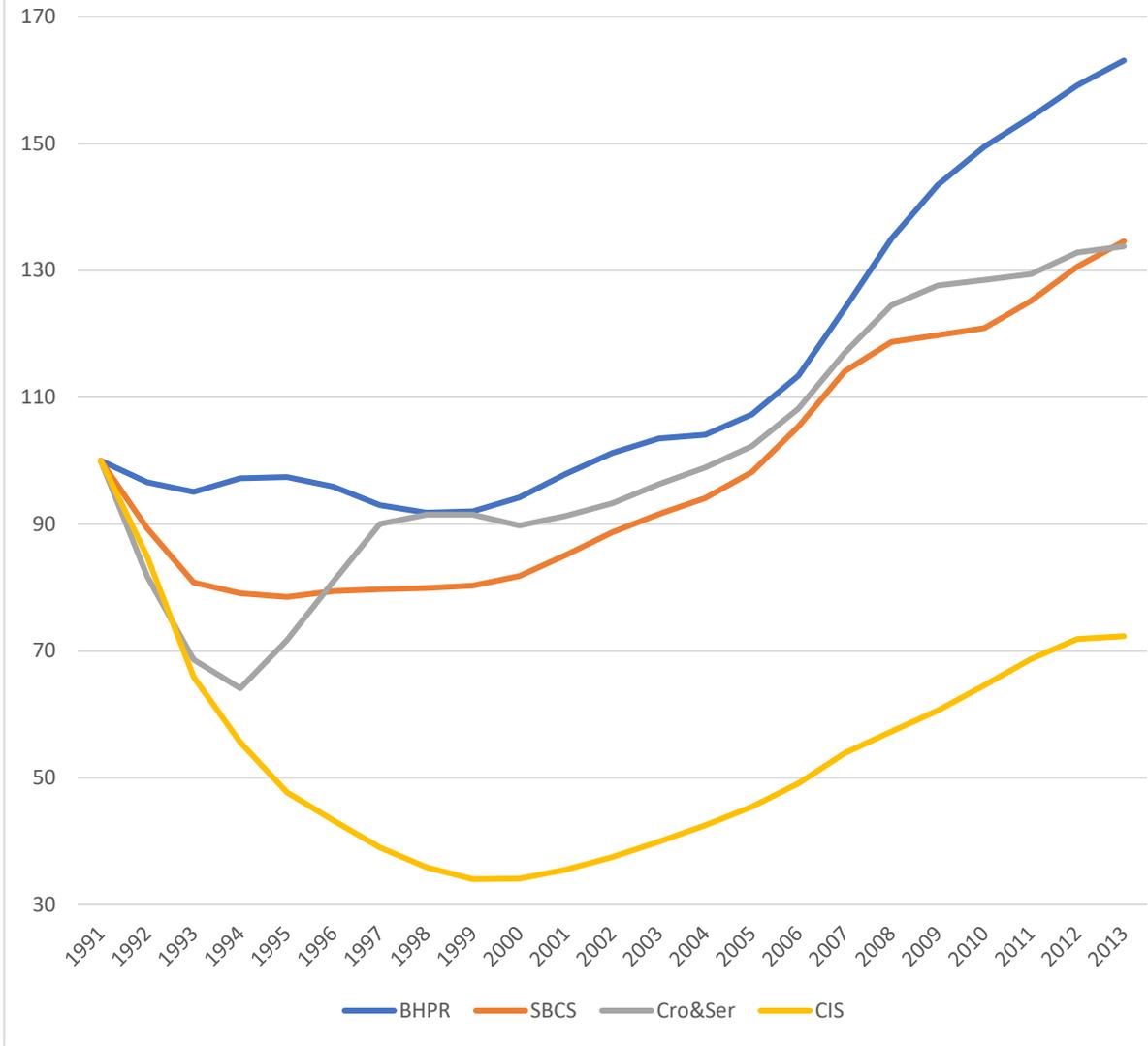
Table 1: DID estimation of Effect on income of EU Accession with BHPR as the treatment group and EU15XG as the control group

Period	1991-2014	1991-2000, 2007-2014	1991-1999, 2008-2014
EUAcc× Postt	0.1116[a]	0.1285[a]	0.1365[a]
	(0.0153)	(0.0193)	(0.0213)
Constant	0.6541[a]	0.6542[a]	0.6523[a]
	(0.0543)	(0.0535)	(0.0534)
No. of obs.	432	324	288
R-sq	0.0921	0.1011	0.0929

Notes: BHPR stands for Bulgaria, Hungary, Poland, and Romania and EU15XG for EU15 countries except Germany. Hungry and Poland joined the EU on May 1, 2004 and Bulgaria and Romania on January 1, 2007. The numbers in parenthesis are the standard errors of the estimated coefficients in the row directly above. [a] and [b] indicate significance at 1% and 5% levels, respectively. All panels are strongly balanced and are estimated by the random effects estimator. Annual data is used. First column gives results with EU accession for Hungary/Poland from 2004 and for Bulgaria/Romania from 2007. its next column deletes obs. for all 18 countries for 2001 to 2006, deleting non-EU accession years of 2001 to 2003 for Hungary/Poland and 2001 to 2006 for Bulgaria/Romania and and EU accession years of 2004 to 2006 for Hungary/Poland and none for Bulgaria/Romania. Its last column deletes observations for 2000 and2007 also. These columns show that each succeeding greater separation of post-accession versus pre-accession periods increases positive effect on incomes of BHPR countries' integration with the EU's institutions.

Tab. 2: Average Exponential Gorwth Rates, EU Accession

	2004-2013 Catch-Up Index		1991-2003 Catch-Up Index		
	2013	**Gr. Rate**	**2003**	**Gr. Rate**	**Difference**
BHPR	137.7	4.45	111.7	0.83	3.62
SBCS	117	1.76	91.6	-0.73	2.49
EU15XG	110.5	1.12	111.7	0.93	0.19
BHPR-EU15XG					3.43
SBCS-EU15XG					2.30

Notes: See above. SBCS stands for Slovenia, the Baltic countries, the Czech Republic and Slovakia. The above results are derved from PWT 9.0 data and are for catch-up (PCY relative to US) index. The average is geometric mean. 3-year MA data are used

Tab 3: Growth Factors For EU Accession Countries

	BHPR		SBCS	
	1991-2003	2004-2014	1991-2003	2004-2014
K/L Ratio	0.5996[a]	0.2653[a]	0.2159a	0.2955[a]
	(0.0251)	(0.0352)	(0.0534)	(0.0268)
Human Capital	0.0045	1.5087[a]	-0.4985[a]	0.7510[a]
	(0.1730)	(0.2529)	(0.1186)	(0.2293)
TFP	0.2378[a]	0.4008[a]	0.5603[a]	0.6735[a]
	(0.0132)	(0.0580)	(0.0515)	(0.1146)
No. of Obs.	58	38	78	66
R-sq	0.9436	0.9513	0.4426	0.7882

Notes: As above. The BHPR panels are unbalanced, the SBCS strongly balanced.

**Tab 4: DID estimation of Effect on income of EU Accesion with SBCS
as the treatment group and EU15XG as the control group**

Period	1991-2014	1991-2002, 2005-2014	1991-2001, 2006-2014	1991-2000, 2007-2014
EUAcc× Postt	0.1229[a]	0.1336[a]	0.1450[a]	0.1545[a]
	(0.0121)	(0.0129)	(0.0140)	(0.0153)
Constant	0.6414[a]	0.6414[a]	0.6415[a]	0.6410[a]
	(0.0478)	(0.0481)	(0.0484)	(0.0487)
No. of obs.	480	440	400	360
R-sq	0.0761	0.0690	0.0613	0.0543

Notes: See above. All panels are strongly balanced. All periods are estimated by the random effects estimator. The second column deletes obs. for all 20 countries for 2003 and 2004, the next for 2002 to 2005, and the last from 2001 to 2006. These columns show that each succeeding greater separation of post-accession versus pre-accession periods increases positive effect on incomes of SBCS countries' integration with the EU's institutions.

Tab. 5: Average Exp. Growth Rates
Four Groups of Ex-Soc. Countries
Catch-Up Index

	2013	Gr. Rate
BHPR countries	163.1	2.25
SBCS countries	134.6	1.36
Croatia and Serbia	133.8	1.33
CIS countries	72.3	-1.46

Notes: See above. Catch-up index is the index of PCY relative to the US income. The base year for all countries is 1991. Three year MA data are used.

Tab 6: Growth Factors For CS & CIS Countries

	Crotia & Serbia	CIS countries
K/L Ratio	0.3669[a]	0.1626a
	(.1286)	(.0402)
Human Capital	-0.1884	-0.0966
	(0.4125)	(0.0854)
TFP	0.3390[a]	0.4426[a]
	(0.0619)	(0.0165)
No. of Obs.	48	168
R-sq	0.8100	0.8349

Notes: See above. Both panels are stongly balanced. The estimaton period for both panels is 1991-2014.

Table 7: Growth Factors For "New" And "Old" EU Countries

	BHPR 2004-2014	SBCS 2004-2014	"Old" EU 1991-2014
K/L Ratio	0.2653[a]	0.2955[a]	0.0732[a]
	(0.0352)	(0.0268)	(0.0228)
Human Capital	1.5087[a]	0.7510[a]	2.748[a]
	(0.2529)	(0.2293)	(0.1940)
TFP	0.4008[a]	0.6735[a]	0.1640[a]
	(0.0580)	(0.1146)	(0.0409)
No. of obs.	38	66	336
R-sq	0.9513	0.7882	0.1552

Notes: See above. BHPR and SBCS panels are unbalanced while "old" EU
panel is stongly balanced. "Old EU" stands for EU-15 countries except Germany.