

### Privatization/Liberalization and Growth: Evidence from a Natural Experiment of European Economies in Transition

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#### **Chander Kant\***

#### Abstract

We examine the relationship between privatization/liberalization and growth using comparable pre-1991 data also. For transition countries with such data, Bulgaria, Hungary, Poland, and Romania or BHPR countries, a regime change to market economy increased their catching-up-to-the-US rate from 1.66% to 2.25%, while TFP's contribution to output is almost the same in the two periods. Reforms did not impose any short run costs on these countries while the CIS countries fell-behind so sharply that they have still not recovered their 1991 relative income level. The greatly different post-1990 growth in short/long term cannot be explained by differing emphasis on external or price liberalization or privatization - the emphasis was not different. While TFP is behind growth of both, physical (human) capital is the additional factor in Baltic and ex-Czechoslovakian (ex-Yugoslavian) countries. Negative contribution of human capital is the sole reason underlying falling-behind of the CIS countries since 1991. Based on catching-up/fallingbehind during the longest period for which we have reliable and comparable data, CIS countries have no prospect of ever equaling US or German income, BHPR countries will reach income equality with the US (Germany) in 90 (108) years; Baltic and ex-Czechoslovakia countries in 67 (91) years, and ex-Yugoslavia countries in 101 (203) years.

**JEL Codes**: 010, 047

Key Words: Command economy and market economy; "old" ex-socialist countries and "new" ex-socialist countries; three groups of "new" ex-socialist countries; factors behind differing post-socialist growth/catching-up; time for full convergence

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#### Privatization/liberalization and growth: evidence from a natural experiment of European economies in transition

#### **1. Introduction**

Economists have recognized that Solow (1956) and Swan (1956) model's physical capital, labor in efficiency units, and technology are "proximate" factors for growth that depend on "fundamentals" like institutions, colonial heritage, religious or legal traditions, culture.<sup>1</sup> North's (1990) contribution emphasizing the role of institutions in growth is seminal. He defined them as "rules of the game... or... humanly devised constraints . . . that structure incentives in human exchange, whether political, social, or economic." Rules of the game 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 (2010) highlight four state variables now at the center of growth theory - ideas, institutions, population, and human capital. They model three of them and specifically refrain from modeling institutions. Fuchs-Schundeln and Hassan (2016), defining institutions more precisely (following Acemoglu, 2009), separate them from social structure, and 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 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 culture essentially means civic capital that overcomes free rider problem. It is not feasible for one to conduct controlled experiments for any of the three at the level of countries. That leaves natural

<sup>&</sup>lt;sup>1</sup>See, Rodrik (2003), Acemoglu et al. (2005). See, also Kant (2016) for additional references.

experiments as the best means of drawing the causal relationships for all three.

As noted by Acemoglu et al. (2005), privatization of ownership and liberalization of markets in ex-socialist countries provides a natural setting for an empirical analysis of their effects. Different theoretical models predict a positive relationship of privatization/liberalization with growth. In general equilibrium framework, Gylfason (1998) employing a two-sector full employment and Hansen (1997) with an imperfect competition model, predict that privatization and market (instead of administered) prices either acts like removing a price distortion through price reform/ trade liberalization or enhances micro-economic efficiency through a broad distribution of ownership rights. These conclusions are supported by empirical studies by Plane (1997) for 35 developing market economies over the 1988-92 and Berkowitz and DeJong (2003) for post-Soviet Russia; but not by Bennett et al. (2007) for 26 transition economies for 1990–2003. Zinnes et al. (2001) find privatization boosted growth in 25 transition economies in 1990s only when accompanied by hard budget constraints and deep institutional reforms. On the speed of privatization, Bennett et al. (2007) report mass privatization led to greater post-privatization growth boost than gradual privatization while Gouret (2007) does not.

Using the 1995-2008 levels of Heritage Foundation's index of economic freedom (IEE) for most of the post-socialist countries, Piatek et. al (2013) find IEE, but not political freedom, Granger causes faster growth.<sup>2</sup> Estrin et al. (2009), identifying privatization by private sector's share in GDP from EBRD's Transition Reports, 1998-2007, and summarizing empirical studies, find privatization has a positive effect on growth – especially when accompanied by complementary

<sup>&</sup>lt;sup>2</sup>They find more than half of the CIS countries were not politically free, and had decreasing political rights over this period.

reforms – but whether mass privatization (often largely to insiders) has a stronger effect is not clear. The expected vast improvement from poor performance during the centrally planned period has not occurred partly due to sharp recession immediately following the launch of privatization.

Performing a meta-analysis of 60 empirical studies published from 1996-2013 of the first generation structural reforms in 26 transition economies, Babecky and Havranek (2014) find the reforms had substantial costs to growth in the short-run but more positive effects in the long-run, especially when they were focused on removing trade and capital account controls. Dell'Anno and Villa (2013) construct a broad index of institutional change for 1990-2008 from EBRD's transition (or reform) indicators for 27 Central and Eastern Europe and Commonwealth of Independent States (CIS) transition economies. They show that higher speed of reforms Granger causes growth (measured as an average for 27 countries) but not vice-versa. Eicher and Schreiber (2010) exploit the relatively large changes during transition, and construct a structural policy index by summing up EBRD's relevant liberalization indices from 1991-2001 for 26 transition countries. They find large short-term effects of structural policy on growth using a panel with fixed effects; or, alternatively, using "independence," (how politically free a country

was in 1988) as instrument for economic institutions.

As far as I can tell, none of these studies have examined growth effects of regime change from a command economy to a market economy by using data for both the post-1990 to the pre-1991 periods. Longer-term (i.e., pre-1991) comparable data is available for countries that that have been separate countries since the Second World War. This data is eminently suitable to use as a natural experiment for a comparative study of growth effects of the two regimes: Command vs. Market. For the other ex-socialist countries that emerged or re-emerged as independent new countries in 1991/1993, pre1991 data is not available in any comprehensive way that is comparable to post-1990 data. Nevertheless, we use the longest post1990 data, that is available to examine the open questions of mechanism of markets leading to economic success, if any, whether grouping of the ex-socialist economies' by their antecedents reveals additional insights, and their lessons for long term growth for developing countries. See, Estrin et al. (2009), and Dell'Anno and Villa (2013).

We analyze the above questions empirically using data for countries in Central and Eastern Europe and the former Soviet Union preceding (if available) as well as following transition to a market-economy in 1991.<sup>3</sup> We analyze the effects of moving to a market economy for countries that have existed as separate countries since at least the Second World War in Section 2. The effects of a regime change from a command to a market economy for countries who attained separate statehood for the first time in 1991/1993 is analyzed in Section 3. Section 4 concludes.

#### 2. "Old" ex-socialist countries under different regimes/antecedents

Two indices have been used to identify privatization and economic reforms in the literature on transition: Heritage Foundation's index of economic freedom and EBRD's transition (or reform) indicators. We prefer the latter since it is available from 1989 (as opposed to 1995 for the former). EBRD rates the following indicators on a scale of 1 (little progress or lowest level) to 4.33 (attainment of advanced industrial economy standards): Large-scale privatization, small-scale

<sup>&</sup>lt;sup>3</sup>We call Central and Eastern Europe and the former Soviet Union together as Eurasia. Albania, Bulgaria, Hungary, Poland, and Romania have existed as separate countries since at least the Second World War while the splitting of Czechoslovakia into its two parts, the break-up of the former U.S.S.R. into its constituent republics, and the dissolution of the former Yugoslavia led to emergence or re-emergence of many independent countries in 1991/1993.

privatization, governance and enterprise restructuring, price liberalization, trade and foreign exchange system, and competition policy. For the "old" ex-socialist countries for which we have relevant data, called BHPR (Bulgaria, Hungary, Poland, and Romania) countries hereinafter, sum of these indicators rose from the lowest level (6 to 8.7) in 1989 to almost the maximum level by 2004-2006.<sup>4</sup> Although we do not have comparable data, it is reasonable to assume these countries were at the same level of privatization/ liberalization (i.e., little) in the pre-1991 period as they were in 1989-1990.

We use the PWT data for income (and other variables) since it goes back the farthest. RGDP in its versions starting with 8.0 (the next generation, see, Feenstra et al. (2015)), permit real GDP comparisons across countries as well as over time; and we use its most recent version 9.0 (available at <u>http://www.rug.nl/ggdc/productivity/pwt)</u> that gives data to 2014.<sup>5</sup> It is available for Romania since 1960 and for Bulgaria, Hungary, and Poland since 1970. For these countries it provides a natural experiment to analyze long-term performance under two different regimes: socialism and market economy.

Figure 1 shows the three-year moving average (to smooth out short-run fluctuations) of PPP PCY index with base-years 1961 for Romania (and the US) and 1971 for the other three countries. US income grew at an average of 2% between 1961 to 2013, was the least volatile, and

<sup>&</sup>lt;sup>4</sup>Hungary reached its almost maximum level (maximum minus 1) in 1998.

<sup>&</sup>lt;sup>5</sup>Ver. 9.0 uses PPPs from the international comparison project (ICP) 2011 that removes some of the distortions of ICP 2005 used in PWT 8.0/8.1 (e.g., inclusion in ICP 2005 of many products typical in the consumption baskets of high-income countries that are high-priced luxury items in low-income countries). See, World Bank (2013, 2014) and Inklaar and Rao (2017).

exhibited no sharp change in or around 1990. Income ratios are frequently used in growth and transition studies. For example, Peron and Rey (2012) use time series analysis to examine the distribution of Indian Ocean Zone (IOZ) countries' incomes ratio to the IOZ average, and to the world mean income, Cuberes and Jerzmanowski (2009) examine growth reversals using real output per worker relative to the US, Fuchs-Schundeln (2008) use German Reunification as a natural experiment to study its effect on East-West Germany saving-ratio, income-ratio, and wealth ratio, and Jones and Olken (2008) find growth "miracles" and "failures, defined as growth relative to the US, are ubiquitous at ten-year periods. Nevertheless, none of these studies either use a catch-up index or explanatory variables also as ratios.

Following Kant (2018), the catch-up index, that is based on income rations, is defined as follows. Let  $y_{J0}$  and  $y_{US0}$  represent Country J's per-capita RGDP for the base year and the US per-capita RGDP for Country J's base year, and  $R_{J0}$  Country J's base per capita RGDP ratio. We assume US is the richer country, for all time periods under study. Then,

$$R_{\rm J0} = (y_{\rm J0}/y_{\rm US0}) < 1. \tag{1}$$

For each subsequent year, similar ratios of a country's annual per-capita RGDP to that of the US are computed. The catch-up index for Country J for year t is the ratio of its per capita RGDP ratio for year t to its base per capita RGDP ratio. Let  $I_{Jt}$  represent this index. Then,

$$I_{\rm Jt} = (R_{\rm Jt}/R_{\rm J0}) \tag{2}$$

 $I_{\rm Jt}$  is the index of income ratios. By converting all income ratios to the same base, the catch-up index helps us identify the breaks/turning points, and compare/combine different countries' experience. It is depicted for the four countries with respect to the US for all available

years in Figure 2.<sup>6</sup> Its increase shows relative convergence (that is not sufficient for absolute convergence, i.e., for income gap to decrease), while its decrease shows both relative and absolute divergence (since, relative divergence is sufficient for absolute divergence). All BHPR countries exhibit both catching-up (relative convergence, RC) and falling back (relative divergence, RD).<sup>7</sup> Nevertheless, 1991 marks a break-point/change in the previous trend (confirmed by cusum-of-squares test) for all four countries: Bulgaria from RC to RD, and Poland from no RC/RD to RC, and the other two countries from RD to its end. Thus, start of the market economy period in 1990/1991 marks the end of absolute income divergence for three out of four Eastern Europe exsocialist countries for which data are available for the earlier period also.

Table 1, computes the average (geometric mean) catching-up rate for the BHPR countries separately for the two periods.<sup>8</sup> The catching-up rate for the post-1991 period is more than one-

<sup>6</sup>Post-transition convergence of East European and CIS countries is often examined to Germany. We use the US as the anchor country since we consider pre-transition period also.

<sup>7</sup>Although Romania's index dominates Figure 2, it experiences falling behind from 1983 to 1999 and recovers its 1983 relative income only in 2006. Similarly, Bulgaria falls behind from its peak relative income in 1988 to a level below the 1971 level by 1998 and has still not re-attained the 1988 level. That is, it fails to catch-up for 25 years. Romania, and Bulgaria fail to catch-up for 23 years (1983-2006), and 25 years (1988-2013), respectively. Similarly, Poland shows no catching-up for 20 years (1971- 1991) and Hungary for 13 years (1981-1994). Catching-up of none of these countries is consistent and steady.

<sup>8</sup>Appendix Table 1 gives their performance over the longest period for which we have comparable and reliable data.

half point higher. The catching-up growth in the post-socialist period is higher and (as seen in Figure 2), the falling behind is less frequent. Nevertheless, the evidence of BHPR countries does not support the conclusion of Estrin et al. (2009) that centrally planned economies had poor economic performance in the pre-transition and were just waiting for privatization and market economy to burst into rapid growth. Eicher and Schreiber (2010), using a panel for 1991-2001 of 26 ex-socialist countries, find a mere 10% change in quality of structural policies (measured by EBRD's TIs) raises annual growth by 2.7%. We find the whole-scale adoption of structural change from command to market economy by BHPR countries increased annual growth rate by only 0.5 points.

Based on Solow (1957), comparative standards of living have been explained either in levels or in their growth. The former decomposes cross-section differences in output per worker levels into differences in physical capital-labor ratios, quality of human capital, and productivity. See, Caselli (2005) and Feenstra et al. (2015). The latter explains growth in output per worker by growth in the right hand side variables. The regressions are run for about 100 or more countries, and the results averaged across countries and across each decade. See, Jorgenson and Vu (2010).

Our interest is in explaining changes in the catch-up index and income ratios overtime. Let kl represent physical capital per unit of employed labor, hc average human capital (that is based on years of schooling and Mincerian returns to education), and A the efficiency with which the factors are used, i.e., TFP.<sup>9</sup> Letting per capita income approximate output per worker, ignoring the time sub-scripts, and using the neo-classical production function, e.g., as given in Caselli

<sup>&</sup>lt;sup>9</sup>PWT 9.0 and 8.0 call their human capital measure an "index." See, Feenstra et al. (2015), Inklaar and Timmer (2013) and PWT 9.0. We prefer the nomenclature "human capital measure"

(2005), for Country J,

$$y_{J} = A_{J} k l_{J} {}^{\alpha} h c_{J} {}^{I - \alpha}$$
(3)

Then, Country J's income ratio to the US is,

$$(y_J/y_{US}) = (A_J/A_{US}) (kl_J/kl_{US})^{\alpha} (hc_J/hc_{US})^{1-\alpha}$$
(4)

(4) tells us Country J's income ratio depends on ratios of the two TFPs, the two capitallabor ratios and the two average human capital. As noted above, Peron and Rey (2012), Cuberes and Jerzmanowski (2009), Jones and Olken (2008), and Fuchs-Schundeln (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.

We estimate (4) (rather than use the catch-up index on the left hand-side and express the right hand-side ratios as indices). We also do not take three-year moving-average values thereby obtaining data for 1960/1970 and 2014 as well. The estimable version of (4) is:

$$(y_J/y_{US})_t = \mu + \beta_1 (A_J/A_{US})_t + \beta_2 (kl_J/kl_{US})_t + \beta_3 (hc_J/hc_{US})_t + \varepsilon_t$$
(5)

We undertake panel estimation of (5); separately for 1960/1970 to 1991 and 1991 to 2014. These data are available in PWT 9.0 for these periods for BHPR countries. We take annual data rather than that averaged over five or ten non-overlapping years since the latter throws away too much information. See, Attanasio et al. (2000). In panel estimation, following Kennedy (2008), we first test the null that the intercepts are equal. If this null is accepted, pooled OLS estimation is used. If it is rejected, we apply the Hausman test to test if the random effects model is unbiased. If this null is not rejected, we used the random effects model; if this null is rejected,

or "average human capital" since the values are not expressed as a ratio to a base year's values. Further, the TFP numbers each year in PWT 8.0/9.0 are relative to the US.

we use the fixed effects model.

Table 2 presents panel estimation results for income ratios for the two periods for BHPR countries. The panel for the first period is unbalanced; that for the second period fully balanced. Based on the above considerations, both panels are estimated by pooled OLS since they do not reject Breusch-Pagan Lagrange multiplier test of equal intercepts. All pooled OLS estimates are equal to the corresponding random-effect estimates for both the periods. All the coefficients are significant at 1% level. Surprisingly, TFP's contribution to catching-up is almost the same for the two time periods. Estrin et al. (2009) find the effect of privatization of state-owned enterprises on efficiency and TFP is mostly positive in Central Europe. We do not find privatization-boosted TFP contributed more to income in BHPR countries after privatization than it did before privatization.

Contribution of physical capital to income in the second period is about 40% lower. The said decline is more than made up by human capital. Its contribution is almost four times what it was in the socialist period. It entirely explains the higher catching-up by BHPR countries in the post-socialist period. It appears the human capital intensive part of these economies got a boost by privatization/liberalization.

#### 3. "New" ex-socialist countries

This section analyzes the catching-up experience of ex-socialist entities that came into being or re-emerged as separate independent countries in 1991/1993 by splitting of Czechoslovakia into its two parts, the break-up of the former U.S.S.R. into its constituent republics, and the dissolution of the former Yugoslavia; and limit ourselves to countries for which data on explanatory variables are available.

Table 3 presents catching-up results for "new" ex-socialist countries in three panels: Panel

10

A for Baltic countries and the Czech Republic and Slovakia; Panel B for ex- Yugoslavia countries, Croatia, Serbia, and Slovenia; and Panel C for CIS countries, Armenia, Kazakhstan, Kyrgyz Republic, Moldova, Russian Federation, Tajikistan and Ukraine. The "new" ex-socialist countries have experienced significantly worse economic performance than "old" ex-socialist (BHPR) countries over the same period. The three groups of "new" ex-Socialist countries have caughtup/fallen-behind the US at 1.46%, 1.18%, and -1.46% rate, respectively - versus 2.25% catchingup for the "old" socialist countries. Megginson (2005) found that mass privatization did not yield the expected positive results. We find the results varied greatly among the groups of ex-socialist countries and by individual countries.<sup>10</sup>

<sup>10</sup>For individual countries, Dell'Anno and Villa (2013) find positive growth rates over 1990-2009 for all ex-socialist countries except Kyrgyz Republic, Moldova, Serbia, Tajikistan and Ukraine. We find incomes of Moldova, Serbia, and Ukraine instead grew annually at about .6%, 3.5% and .6%, respectively, from 1991-2013 - because US income grew at 2%. Vintrova (2009) finds that the Slovak income reached 84% of the Czech's by 2007. We find the Slovak relative and absolute convergence with the Czech continued after 2007 too - by 2013, its income was 90% of the Czech income. by enterprises. Yet, he does not explain why these factors had no effect on BHPR countries and such strong effect in CIS countries (that they have still not recovered from the initial fall). In contrast to the finding of Babecky and Havranek (2014), reforms neither imposed substantial short run costs in all ex-socialist countries nor had strong positive long run effects in all countries. This has happened even though all four groups of ex-socialist countries had almost the same trajectory of transition to a market economy. See, Figure 4.

Figure 5 depicts the transition indicator (TI) for only the liberalization of trade and foreign exchange system for the four groups of ex-socialist countries - they are far closer to each other than the aggregate TI (shown in Figure 4). Yet, in contrast to the conclusions of Babecky and Havranek (2014) and Nannicini and Billmeier (2010) (that reforms focused on external liberalization were more beneficial and making the transition without opening up to trade considerably hampers growth) almost equal focus on external liberalization/opening up to trade did not benefit the four groups of countries equally whether in the short or the long-run.

On the other hand, Berkowitz and DeJong (2003) explain the enormous regional differences in economic growth rates in post-Soviet Russia by regional differences in price liberalization policies and large-scale privatization. Figure 6 depicts the average of price liberalization and large-scale privatization transition indicators for four groups of ex-socialist countries. The countries did not differ enormously by the extent of their price liberalization and large-scale privatization. Yet, they differed greatly in their growth and catching-up rates. This suggests is that markets cannot be given a completely free-reign but countries/markets need to be "governed" by wise politicians and technocrats or constrained by proper institutions to ensure a positive outcome. See, Wade (1990).

The above results may be compared to existing results in the literature. Piatek et. al (2013)

find causality from economic freedom to economic growth with one year lag using Heritage Foundation's index of economic freedom (IEE) for the former. They divide the post-socialist countries (25) in different groups, use IEE for 1995-2008, country fixed effects panel regression that uses a time trend instead of a constant, and lagged dependent variable on the RHS. We use EBRD's transition indicators (that are available since 1989) as indicators of privatization and the introduction of market economy and the next generation PWT 9.0 data (that goes up to 2014). We find the post-socialist performance is not uniformly positive. Assuming all ex-socialist countries in Eurasia were catching-up to the US before 1991 at 1.66% annual rate, only BHPR countries show a slightly better post-socialist economic performance (at about one-half point higher). Post-socialist Baltic and ex-Czechoslovakia countries catch-up to the US at almost the same rate, ex-Yugoslavia countries at a lower rate, and CIS countries fall behind the US, both relatively and absolutely.

Table 5 presents panel estimation results for the other groups of ex-socialist countries. All panels are strongly balanced; with 25 observations for each country. The ex-Yugoslavian countries panel is estimated by pooled OLS since it does not reject Breusch-Pagan Lagrange multiplier test of equal intercepts; as before, the pooled OLS estimates are equal to the corresponding random-effect estimates. The Baltic and ex-Czechoslovakian and CIS countries panels reject Breusch-Pagan Lagrange multiplier test of equal intercepts as well as the Hausman test of unbiased random effects. They are estimated by the fixed effects model. All the catching-up of the Baltic and ex-Czechoslovakian countries is explained by physical capital and TFP - since the coefficient on human capital is negative. Negative contribution of human capital is the only reason that explains the falling-behind of the CIS countries. On the other hand, only human capital and TFP explain the catching-up of ex-Yugoslavian countries - since the coefficient on physical

capital is not significant. TFP's contribution to catching-up is about three times in Baltic and ex-Czechoslovakian countries than it is in ex-Yugoslavian countries. Still, the catching-up rate of Baltic and ex-Czechoslovakian countries is not much higher. The greatly higher contribution of TFP mostly goes to mitigate the negative effects on catching-up of human capital there and the very strong effects of human capital in ex-Yugoslavian countries.

The above results may be contrasted to those by Dombi (2013). He finds the main source of economic growth for ten Central Eastern European (CEE) post-socialist countries between 1995 and 2007 to be physical capital followed by TFP; and that of human capital to be marginal. We, on the other hand, do not find physical capital played any role in ex- Yugoslavian countries while the role of human capital there was strong. On the other hand, Prochniak (2011) finds human capital was a very important determinant of growth for 1993-2009 in the 10 Central and Eastern European (CEE) countries, and Nath (2009) reports physical capital to be an important for growth for 13 transition economies in this region from 1991 to 2005.<sup>11</sup>

Doucouliagos and Ulubasoglu (2006) and Calvo and Sanchez-Robles (2003) find privatization/market economy/economic freedom spur economic growth by boosting domestic and foreign investment. Our results generally support these conclusions. For each group of countries, the effect of physical capital on catching-up growth is positive, and is statistically significant in three out of four cases. Nevertheless, for CIS countries, this positive effect is not successful in preventing their falling behind in the post-socialist period.

Rather than catching-up to the US, we now examine the within group income convergence

<sup>&</sup>lt;sup>11</sup>Countries used by Prochniak (2011) are Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

of the ex-socialist countries from 1991-2013. Table 3 shows that although the within group dispersion of absolute incomes (measured by COV = SD/average) has decreased for i) BHPR, ii) Baltic and ex-Czechoslovakia, and iii) ex-Yugoslavia countries by 41%, 46%, and 14%, respectively, from 1991 to 2013, it has about doubled for CIS countries. For all these countries considered together, divergence of their absolute incomes has increased three fold from 1991 to 2013. See, Table 4. These results may be contrasted from that of Mazurek (2012) who found strong convergence.

We also calculate and report in Tables 1 and 3 the time it will it take for ex-socialist countries to reach income equality with the US. Based on the past catching-up for the longest period for which we have reliable and comparable data, Appendix Table 1 and Table 3 project BHPR countries will reach income equality with the US in 90 years; Baltic and ex-Czechoslovakia countries in 67 years, ex-Yugoslavia countries in 101 years, and CIS countries have no prospect for ever reaching income equality with the US. These results are to be taken with caution since the time for income quality with the benchmark country depends both on the period used for projecting into the future and the benchmark country considered. Although Kant (2018) finds that of the 28 countries in South Asia and Sub-Saharan Africa that caught-up to the US from 1992 to 2013, 21 fell behind over a longer period; and the longer period catching-up rate of most of them are one-fifth to about one-half of the 1992-2013 rate; the Eurasian ex-socialist countries longer period performance could be better.<sup>12</sup> On the other hand, if a different benchmark country, e.g.

<sup>&</sup>lt;sup>12</sup> Comparing Appendix Table 1 to Table 1, BHPR countries' longer term catching-up is slower - over 1961/1971 to 2013, it is at 1.95% rate versus the 2.25% rate for 1991-2013; and for two out of four countries the longer period catching-up rate is one-half to three-fourths of the 1991-

Germany, is used, the catching-up rate would be lower since Germany's income grew at .74% faster rate than the US during 1991-2013 (due to slow recovery from the 2008-2009 Great Recession in the US). Then, time for full convergence with Germany would rise to 108 years for BHPR countries; 91 years for Baltic and ex-Czechoslovakia countries, and 203 years for ex-Yugoslavia countries (despite lower German income as compared to the US).

#### 4. Conclusions

We use a natural experiment to examine the growth effects of regime change from command to market economy using the ex-socialist countries in Eurasia. As far as I can tell, none of the empirical studies of this question have used data for both the post-1990 to the pre-1991 periods. We use the comparable pre-1991 data also; as well as the longest post-1990 data that are available, and use the catch-up index and income ratio in our analysis. We group these countries into four: a) countries that have existed as separate countries since at least the Second World War, called BHPR (Bulgaria, Hungary, Poland, and Romania), or "old" ex-socialist countries, and three groups of "new" ex-socialist countries b) Baltic and ex-Czechoslovakia countries, c) ex-Yugoslavia countries, and d) CIS.

Estrin et al. (2009)'s conclude centrally planned economies had poor economic performance in the pre-transition, and were expected to vastly improve it post-transition; and privatization mostly affected TFP positively, implying the enhanced TFP boosted growth. Our

<sup>2013</sup> rate. Further, all experienced no catching-up for periods ranging from 13 to 25 years. This happened even though all these countries are upper middle income (two) or high income (two) as compared to South Asian and Sub-Saharan African countries where virtually all are lower income or lower middle income.

analysis shows BHPR countries were catching up to the US at 1.66% rate in the centrally planned period. In the market economy period, the catching up increased by about 0.5 points (to 2.25%) while TFP's contribution to output was almost the same in the two periods. Considering only the post-transition period, the "new" ex-socialist countries have done worse than "old" ex-socialist countries. Babecky and Havranek (2014) find reforms imposed substantial short run costs but had strong positive long run effects. We find reforms did not impose any short run costs on BHPR countries while CIS countries fell-behind so sharply that they have still not recovered their 1991 income level relative to the US. We find all four groups of ex-socialist countries had almost the same trajectory of overall transition to a market economy. Contrary to Babecky and Havranek (2014), Nannicini and Billmeier (2010) and Berkowitz and DeJong (2003), the greatly different growth/catching-up in short/long term cannot be explained by differing emphasis on external or price liberalization or privatization - the emphasis was not different. Panel estimation shows while TFP is behind the growth/catching-up of both, in Baltic and ex-Czechoslovakian countries the additional factor is physical capital while in ex-Yugoslavian countries it is human capital. On the other hand, negative contribution of human capital is the only reason that explains the fallingbehind of the CIS countries. These results are different from those by Dombi (2013), Prochniak (2011), and Nath (2009); although the periods considered and countries included by these authors' varies.

We also examine within group convergence and years for full convergence to the US and Germany. Dispersion of absolute incomes has decreased in i) BHPR, ii) Baltic and ex-Czechoslovakia, and iii) ex-Yugoslavia countries, has almost doubled in CIS countries; and has trebled for all these countries as a group from 1991-2013. Based on catching-up/falling-behind during the longest period for which we have reliable and comparable data, CIS countries have no

prospect of ever equaling US or German income, BHPR countries will reach income equality with the US (Germany) in 90 (108) years; Baltic and ex-Czechoslovakia countries in 67 (91) years, and ex-Yugoslavia countries in 101 (203) years.

We now note some of the implications of this paper and suggestions for further research. The weaker growth effects of transition in "new" ex-socialist countries might be due to the burden of governance as a sovereign country for the first time and undertaking regime change while grappling simultaneously with costs and burdens of separate statehood. Standard scale effects (increasing returns in the provision of public goods and non-rivalrous technology) raise the administrative costs both in the main unit in the former united country/empire (e.g., Russia in the U.S.S.R. and Serbia in Yugoslavia) as well as in the new units that are spun off.

Second, de jure introduction of a market economy is not de facto introduction in view of ingrained habits and customs of people. Fuchs-Schundeln and Hassan (2015) identify three aspects of fundamental causes of growth: institutions, social structure, and culture. Even if institutions change, old social structure, and culture may persist. For example, Alesina and Fuchs-Schundeln (2007) and Okulicz-Kozaryn (2014) find that after 45 years under communism, exsocialist countries' residents were favorably disposed to redistribution by the state (and, if anything, increased their preference for redistribution) and were not ready for unbridled market economy and competition.

Third, political integration does not mean economic integration. Nitsch and Wolf (2009) find that although administrative barriers to trade between East and West Germany were rapidly eliminated with the fall of the Berlin Wall, the intra-German trade pattern has persisted along the former East-West border. The persistence of old trade patterns and economic relationships among CIS countries is likely to be greater.

Lastly, even though its growth effects may be mixed, as noted by Shleifer and Vishny (1994), massive privatization may have been necessary to root out the command economic system based on communist ideology. It may also have been necessary to root out tentacles of the communist party reaching almost all sections of the society, and to eliminate the fear of the secret police, arbitrary detention and may be execution. But, giving free reins to animal spirits of capitalism is no guarantee of honest new production and innovation. Animal spirits can also be used as freedom for predation, diversion, and rent accumulation. Prevention of diversion and pocketing of gains from investments and technology by bureaucrats, politicians, insiders, controlled shareholders, and lawyers/judges is essential.

#### References

Acemoglu, D. (2009). Introduction to Modern Economic Growth. Princeton University Press.

Acemoglu, D., Johnson, S., and Robinson, J.A. 2005. Institutions as the Fundamental Cause of Long-Run Economic Growth. In: Agion, P., Durlauf, S. (Eds.), Handbook of Economic Growth. North Holland, Amsterdam, pp. 385–472.

Alesina, A. and N. Fuchs-Schundeln (2007). Good Bye Lenin (or Not?): The Effect of Communism on People. American Economic Review 97 (4), 1507{1528.

Attanasio, O. P., L. Picci, and A.E. Scorcu (2000. Saving, growth, and investment: A Macroeconomic Analysis using a panel of countries. *Review of Economics and Statistics* 82, 182-211.

Babecky, J. and T. Havranek (2014). Structural Reforms and Growth in Transition: A Meta-analysis. *Economics of Transition*, 22(1), 2014, pp. 13-42.

Bengoa, M. and Sanchez-Robles, B., 2003. Foreign direct investment, economic freedom and growth: new evidence from Latin-America. European journal of political economy, 19 (3), 529–545.

Bennett, J., S. Estrin, and G. Urga, 2007. Methods of Privatization and Economic Growth in Transition Economies. Economics of Transition, 15(4): 661–83.

Berkowitz, D., and DeJong, D. N. 2003. Policy Reform and Growth in Post-Soviet Russia. European Economic Review, 47(2): 337–52.

Caselli, F. (2005). Accounting for cross---country income differences in Phillipe, A. and S. N. Durlauf (eds.) Handbook of Economic Growth, Volume 1A, Elsevier: 679---741.

20

Cuberes, D. and M. Jerzmanowski (2009). 'Democracy, Diversification and Growth Reversals', *Economic Journal*, 119(540), 1270-1302.

Doucouliagos, C. and Ulubasoglu, M.A., 2006. Economic freedom and economic growth: does specification make a difference? European journal of political economy, 22 (1), 60–81.

Dombi, A., 2013. The Sources of Economic Growth and Relative Backwardness in the Central Eastern European Countries between 1995 and 2007. *Post-Communist Economies* 25(4), 425-47.

Eicher, T.S. and Schreiber, T., 2010. Structural Policies and Growth: Time Series Evidence from a Natural Experiment. Journal of Development Economics, 91(1), 169-79.

Estrin, S., J. Hanousek, E. Kocenda, and J. Svejnar (2009). The Effects of Privatization and Ownership in Transition Economies. Journal of Economic Literature, 47(3), September 2009, 699-728.

European Bank for Reconstruction and Development. Transition Reports 1998-2007, London: European Bank for Reconstruction and Development and available at http://www.ebrd.com/downloads/research/economics/macrodata/tic.xls

Feenstra, R.C., R. Inklaar, and M.P. Timmer (2015). 'The Next Generation of the Penn World Table,' American Economic Review, 105(10), 3150-82.

Fuchs-Schundeln, N. (2008). The Response of Household Saving to the Large Shock of German Reunification. American Economic Review 98 (5), 1798-1828.

Fuchs-Schundeln, N. and T. Hassan (2015). Natural Experiments in Macroeconomics. C.E.P.R. Discussion Papers, CEPR Discussion Papers: 10628, 2015 and NBER Working Papers: 21228.

21

Gouret, F., 2007. Privatization and Output Behavior during the Transition: Methods Matter! Journal of Comparative Economics, 35(1): 3–34.

Guiso, L., P. Sapeinza, and L. Zingales (2011). Civic Capital as the Missing Link, Chapter in Civic Capital as the Missing Link, pp. 417{480. Elsevier.

Gylfason, T., 1998. Privatization, Efficiency and Economic Growth. Centre for Economic Policy Research Discussion Paper 1844.

Hansen, C.W., and Longstrup, L. 2015. The Rise in Life Expectancy and Economic Growth in the 20th Century. Economic Journal, 125(584), 838-52.

Hansen, N.A., 1997. Privatization, Technology Choice and Aggregate Outcomes. Journal of Public Economics, 64(3): 425–42.

Heritage Foundation, Index of economic freedom. Methodology, [online]. Available from: http://www.heritage.org/index/book/methodology,

Inklaar, R. and D.S. P. Rao (2017). 'Cross-Country Income Levels Over Time: Did The Developing World Suddenly Become Much Richer?', *American Economic Journal: Macroeconomics*, 9(1), 265-90.

Inklaar, R. and M.P. Timmer (2013). Capital, labor and TFP in PWT 8.0. Groningen Growth and Development Centre, University of Groningen.

Jorgenson, D. W. and K. M. Vu (2010). Potential Growth of the World Economy. Journal of Policy Modeling 32(5): 615---631.

Jones, B.F., and A. Olken (2008). 'The Anatomy of Start-Stop Growth', *Review of Economics and Statistics*, 90(3), 582-587.

Jones, C., and Romer, P.M., 2012. New Kaldor Facts: Ideas, Institutions, Population, and Human Capital. *American Economic Journal: Macroeconomics* 2, 224-245. Kant, C., 2016. "Are Institutions in Developing Countries Malleable," *Journal of Policy Modeling* 38(2), 272–289.

Kant, C., 2018. Income Convergence and the Catch-Up Index. Forthcoming in North American Journal of Economics and Finance

Kaufmann, D., Kraay, A., and Zoido-Lobatón, P., (1999a and 1999b). "Aggregating Governance Indicators;" and "Governance Matters." World Bank Policy Research Working Paper Nos. 2195 and 2196, Washington, D.C.

Kaufmann, D., Kraay, A., and Mastruzzi, M. 2004. Governance Matters III: Governance Indicators for 1996, 1998, 2000, and 2002. *World Bank Economic Review*, Vol. 18, Issue 2, pp. 253–87.

Kennedy, P. (2008). A guide to econometrics, 6<sup>th</sup> Ed., Blackwell.

Mazurek, J., 2012. The Evaluation of an Economic Distance among Countries: A Novel Approach. *Prague Economic Papers* 21(3), 277-90.

Megginson, William L. 2005. The Financial Economics of Privatization. Oxford and New York: Oxford University Press

Nath, H., 2009. Trade, Foreign Direct Investment, and Growth: Evidence from Transition Economies. *Comparative Economic Studies* 51(1), 20-50.

Nannicini, T. and Billmeier, A., 2011. Economies in Transition: How Important Is Trade Openness for Growth? *Oxford Bulletin of Economics and Statistics* 73(3), 287-314.

Nitsch, V. and Wolf, N., 2009. Tear Down this Wall : On the Persistence of Borders in Trade. University of Warwick, Department of Economics, The Warwick Economics Research Paper Series (TWERPS).

North, D.C., 1990. Institutions, Institutional Change, and Economic Performance. Cambridge University Press, Cambridge.

Nunn, N., 2014. "Historical Development" in Handbook of Economic Growth, Vol. 2A, Eds. S. Durlauf and P. Aghion. Amsterdam: Elsevier B.V.

Okulicz-Kozaryn, A. (2014). Winners and Losers in Transition: Preferences for

Redistribution and Nostalgia for Communism in Eastern Europe. Kyklos 67(3), 447-61.

Peron,O. and S. Rey (2012). 'Trade and Convergence of Per Capita Income in the Indian Ocean Zone, 1950-2008', *Annals of Regional Science*, 49, 657-683.

Piatek, D., K. Szarzec, and M. Pilc, (2013). Economic Freedom, Democracy and Economic Growth: A Causal Investigation in Transition Countries. Post-Communist Economies, 25(3), September 2013, 267-88.

Plane, P., 1997. Privatization and Economic Growth: An Empirical Investigation from a Sample of Developing Market Economies. Applied Economics, 29(2): 161–78.

Prochniak, M., 2011. Determinants of Economic Growth in Central and Eastern Europe: The Global Crisis Perspective. *Post-Communist Economies* 23(4), 449-68.

PWT 9.0 (2015). Human capital in PWT 9.0.

Rodrik, D., (Ed.), 2003. In Search of Prosperity: Analytic Narratives on Economic Growth.

Princeton University Press, Princeton, N.J.

Roland, G. (2000). Transition and Economics: Politics, Markets and Firms. Cambridge, MA: MIT Press.

Shleifer, A. and R.W. Vishny, 1994. Politicians and Firms. *Quarterly Journal of Economics*, 109(4): 995–1025.

Solow, R. M. (1956). A contribution to the theory of economic growth. The Quarterly

Journal of Economics 70 (1), 65{94.

Swan, T. W. (1956). Economic growth and capital accumulation. *Economic Record* 32 (2), 334-361.

Vintrova, R., 2009. Lessons from the Czech and Slovak Economies Split. *Prague Economic Papers* 18(1), 3-25

Wade, R., 1990. Governing the Market. Princeton: Princeton University Press.

World Bank, 2014. 2011 International Comparison Program. World Bank. Washington, D.C.

World Bank, 2013. Measuring the Real Size of the World Economy: The Framework, Methodology, and Results of the International Comparison Program (ICP). World Bank. Washington, D.C.

World Bank. World Development Indicators. World Bank. Washington, D.C.

Zinnes, C., Yair E., and Sachs, J.. 2001. The Gains from Privatization in Transition Economies: Is 'Change of Ownership' Enough? IMF Staff Papers, 48: 146–70.

Table 1: Catch-up index for BHPR countries								
Country	Base	No. of	Catch-Up	Index	Y-Equality	US/Countr	y PPP PCY	
	Year	Yrs.	FinalYear	Gr. Rate	w. US Years	Base Year	FinalYear	
			A) 196	51/1971	to 1991			
Bulgaria	1971	20	158.6	2.33	69	4.9	3.1	
Hungary	1971	20	138.5	1.64	88	4.2	3.0	
Poland	1971	20	97.2	-0.14		4.4	4.5	
Romania	1961	30	201.3	2.36	105	11.7	5.8	
GeoMean		22.1	144	1.66	106	5.7	3.9	
SD						3.61	1.32	
SD/GM						63.4	33.5	
B) 1991 to 2013								
Bulgaria	1991	22	101.8	0.08	1395	3.1	3.1	
Hungary	1991	22	143.9	1.67	66	3.0	2.1	
Poland	1991	22	213.2	3.50	44	4.5	2.1	
Romania	1991	22	226.8	3.79	47	5.8	2.6	
GeoMean		22	163.1	2.25	62	3.9	2.4	
SD						1.32	0.5	
SD/GM						33.5	19.6	

Notes: BHPR stands for Bulgaria, Hungary, Poland, and Romania. Data from which the above results are derived is from PWT 9.0. See, Kant (2018) for the equation to derive years for full convergence.

Table 2: Gro	owth factors for BHPR c	ountries			
	Panel Estimation				
	1960/1970-1991	1991-2014			
K/L ratio	0.5935*	0.3710*			
.,	(0.0487)	(0.0292)			
Human canital	0 2812*	1 1622*			
	(0.1061)	(0.1847)			
TEP	0.2503*	0.2395*			
	(0.0165)	(0.0216)			
No. of obs	98	96			
Panel	Unbalanced	Balanced			
Estimation method	Random effects	Random effects			
	or pooled OLS	or pooled OLS			
Adi Pica	0 0057	0 0004			
Auj. n-sy	0.9057	0.6964			

# Notes: See above. The numbers in parenthesis are the standard errors of the estimated coefficients in the row directly above. \* indicates significance at 1% level. The estimation results with pooled OLS are identical to using randm effects GLS model. The R-sq for both the pooled OLS and random-effects GLS estimation is .9086 for the first period and .9016 for the second.

Country	Catch-U	p Index	Y-Equality	US/Country PPP PCY	
	Ind.2013	Gr. Rate	w. US Years	1991	2013
	A) Baltic a	and Ex-Cz	echoslovakia	countries	
Czech Republic	111.0	0.48	135	1.9	1.7
Estonia	175.0	2.58	47	3.3	1.9
Latvia	115.0	0.64	150	2.6	2.3
Lithuania	161.5	2.20	52	3.1	1.9
Slovakia	136.2	1.41	65	2.5	1.9
GeoMean	137.5	1.46	67	2.6	1.9
SD				0.5	0.2
SD/GM				20.9	11.3
	B)	Ex-Yugo	slavia countr	ies	
Croatia	128.0	1.13	101	3.1	2.4
Serbia	139.8	1.53	111	5.4	3.9
Slovenia	121.0	0.87	86	2.1	1.7
GeoMean	129.4	1.18	101	3.3	2.5
SD				1.7	1.1
SD/GM				51.7	44.7
		C) CIS	countries		
Armenia	125.1	1.02	201	7.7	6.1
Kazakhstan	142.9	1.64	72	3.2	2.3
Kyrgyz Republic	33.9	-4.80		5.3	15.7
Moldova	73.1	-1.41		8.2	11.2
Russian Federation	88.8	-0.54		1.9	2.2
Tajikistan	35.8	-4.56		6.7	18.8
Ukraine	73.6	-1.38		3.6	4.9
GeoMean	72.3	-1.46		4.7	6.5
SD				2.4	6.6
SD/GM				51.6	101.3

Table 3: Catch-up index for new or reemergent independent countries

Notes: See above. The base year for all countries is 1991 and the number of years is 22.

Table 4: Abs. Diverg. In Eurasia's ex-socialist countries, 1991-2013							
Average/Dispersion	Catch-Up Index		Y-Equality	US/Country PPP PCY			
	Ind.2013	Gr. Rate	w. US Years	1991	2013		
GM	111.4	1.01	264	3.7	3.3		
SD				1.9	5.1		
SD/GM				52.1	153.7		

Notes: See above.

	Baltic & Ex-Czechoslovakia	Ex-Yuguslavia	CIS
K/L Ratio	0.3409*	0.0974	0.1140*
	(0.0257)	(.0832)	(.0423)
Human Capital	-0.2101***	1.6363*	1895**
	(0.1190)	(0.2610)	(0.0825)
TFP	0.8252*	0.2828*	0.4344*
	(0.0525)	(0.0720)	(0.0154)
No. of obs.	125	75	175
Method	Fixed effects	Pooled OLS or RE	Fixed effects
R-sq	0.8554 (within)	0.8362	0.8313 (within)
Adj. R-sq	NA	0.8293	NA

## Table 5: Growth factors for "new" ex-socialist countriesPanel Estimation

Notes: See above. \*\* and \*\*\* indicate significance at 5% and 10% level, respectively. All the panels are stongly balanced.













Appendix Table 1: Catch-up index for BHPR countries, 1961-1971 to 2013							
Country	ountry Base No. of		Catch-U	o Index	Y-Equality	US/Country PPP PCY	
	Year	Yrs.	FinalYear	Gr. Rate	w. US Years	Base Year	FinalYear
Dulgaria	1071	45	161 4	1 1 -	120	4.0	2.1
Bulgaria	19/1	42	161.4	1.15	139	4.9	3.1
Hungary	19/1	42	199.3	1.66	87	4.2	2.1
Poland	1971	42	207.3	1.75	85	4.4	2.1
Romania	1961	52	456.5	2.96	84	11.7	2.6
GeoMean		44.3	234.9	1.95	90	5.7	2.4
SD						3.61	0.5
SD/GM						63.4	19.9

Notes: BHPR stands for Bulgaria, Hungary, Poland, and Romania. Data from which the above results are derived is from PWT 9.0. See, Kant (2018) for the equation to derive years for full convergence.