

The Veil of Communism: An Analysis of Lifespan, GDP per Capita, Human Capital, and Agricultural Productivity in Eastern Europe

May 2012

Matei Dăian

Department of Economics
Stanford University
579 Serra Mall
Stanford, CA 94305
mdaian@stanford.edu

Under the direction of
Professor Kalina B. Manova

ABSTRACT

There is a clear economic difference between the more economically-developed Western Europe and their poorer counterparts in Eastern Europe and central Asia. But what caused this economic divergence? How big of a role did communism play? If communism is responsible, through what economic mechanisms did it manage to hinder growth? This paper will look at GDP/capita, growth in GDP/capita, human capital, labor to land ratio, ratio of unskilled to skilled workers, growth in lifespan, average expenditure per student and variations in these outcomes in order to determine a more specific impact of communism. This paper finds not only that communism had a huge negative impact on growth, but that even though communism was completely gone from Europe by 1991; it still impacts the growth of former communist countries. Moreover, there seem to be 2 blocks of countries within the communist bloc: non-Soviet Central and Eastern Europe and Soviet Eastern Europe and Central Asia and these two regions behave very differently.

Keywords: communism, economic growth, GDP per capita, human capital, labor to land ratio, ratio of unskilled to skilled workers, lifespan, expenditure per student

Acknowledgements: I thank Professor Kalina Manova for her guidance and support in the process of writing this honors thesis, Professor Peter Kao for his support and friendship, Professor Jay Bhattacharya for his advice, Professor Mark Tendall for his continued advice and support throughout my time at Stanford, and my family and friends for their encouragement.

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1. Introduction

In Romania there appeared some articles in the newspapers which presented theories according to which the true reason for which Romania's economy is not at Western European standards is not solely communism. According to those newspapers there is a deeper reason and that would be that there is something innately wrong with the Romanian economy, and that would be more difficult to change. How big was the effect of communism on the economies of Eastern European countries that were forced into the communist regime?

What is the impact of communism on development in these countries today? What are the exact mechanisms that affect development? These are the type of questions that this paper will attempt to answer. It was believed that there was going to be a smooth transition to democracy after the fall of communism, however, even today, after more than 20 years, the effects of communism can still be seen and there still is a large economic difference between Western and Eastern former communist Europe. Is the current economic difference between the Western world and Eastern Europe caused solely by communism, or is there a different reason for this economic difference? The most difficult part of this paper is that we do not know what would have happened to the economies of these Eastern European economies in the absence of communism. The Soviet Union and Eastern Europe were part of an economic system that was isolated from the rest of the world. Therefore, all the trade was done within the closed communist system. The economy was not allowed to evolve naturally following the demands of the market, but was centrally planned at Moscow for the entire communist regime.

From the existing literature analyzing growth, the main growth determinants seem to be the following factors: initial level of GDP/capita, human capital, labor to land ratio, trade openness, foreign direct investments, and taxation rates. Communism, as a political system, directly regulated the above mentioned factors, thus indirectly affecting growth in communist countries. Since money is not the only measure of a country's welfare, this paper also looks at changes in longevity during and after communism in order to gain a broader perspective of the larger effects of communism on life.

Some of the statements that will be made throughout this paper will be not be backed by statistical significance because of the small dataset. This thesis contains both quantitative and qualitative data. I am drawing evidence from related things without looking into the data myself.

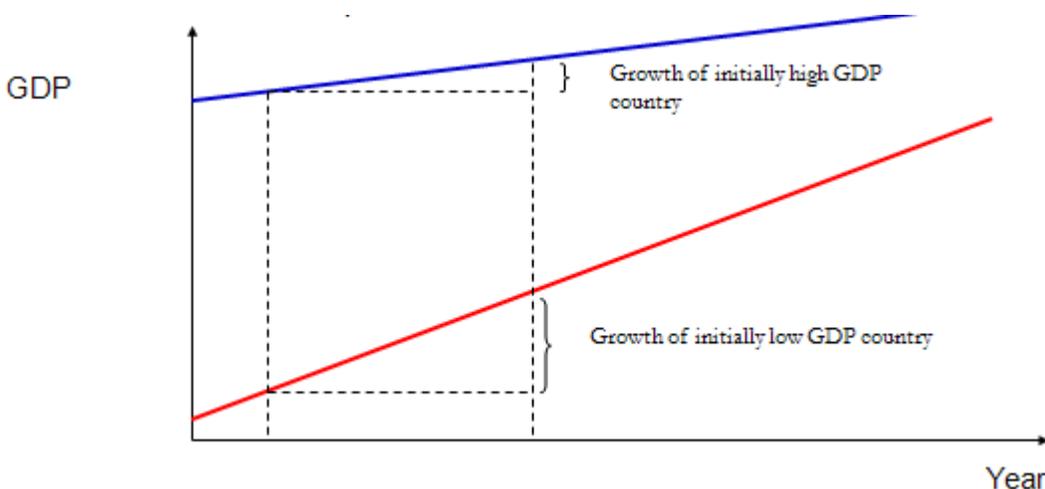
Democratic Europe grew more than communist Europe during the communist regime. Within communist Europe, at the end of communism, former Soviet Europe had higher absolute levels of income than non-Soviet former communist Europe. However, after the fall of communism, non-Soviet former communist Europe had a positive growth rate, as opposed to former Soviet Europe, which had a negative growth rate. These effects, especially the latter one, were so dramatic that former communist non-Soviet Europe clearly surpassed the income levels reported in the former Soviet Union within the first decade after the fall of communism.

The amount of foreign direct investment a country received does not seem to have had any significant impact on GDP evolution, longevity, or spending on education. The fact that a country was not a part of the Soviet Union, the fact that a country was democratic during the communist regime, and exports all seems to be positively correlated with growth, both during and after communism. Imports and taxes seem to have a negative effect on growth.

In terms of longevity, not having been part of the Soviet Union seems to have a positive effect on increase in lifespan. Exports and taxes seem to have a negative effect on lifespan. Imports have had a positive effect on lifespan, except for women after communism, when they had a negative effect. Being democratic during the time of the communist regime had a positive effect on lifespan during communism, but not after. After the fall of communism, countries that were part of the non-Soviet communist bloc tended to spend a larger portion of their GDP on education. Countries that relied more on imports tended to invest more in education, whereas exports and taxes had a negative effect on education spending.

2. Economic Mechanisms

Expect higher initial GDP level to have a *negative* effect on real GDP/capita growth – a poor country, *ceteris paribus*, tends to grow faster than a rich country.



Expect higher initial level of human capital to **positively** affect real GDP/capita growth – consistent with Solow growth model and more importantly endogenous growth models. An increase in investments as a share of GDP is expected to positively affect real GDP/capita growth – tests the Solow model and any other economic growth model. Investment is a key driver of growth. Those countries with high rates of population growth have lower growth rates – this finding is not robust to all models.

There are a number of papers that discuss the relationship between trade and GDP, the effect of trade ‘openness’ on GDP and finally the effect of trade on poverty and inequality. Look at Greenaway et al (2001), Irwin and Tervio (2000) and Dollar and Kraay (2004). The first 2 papers focus on the impact of international trade on growth/income of countries using samples of countries over a number of years. Dollar and Kraay (2004) focuses on the link between trade and poverty/income inequality.

The key concern though when estimating the link between *trade* and *growth* is the issue of endogeneity which prevents a correct estimate of the impact trade has on growth – i.e. “The positive correlation between trade and income could mean that countries with higher incomes engage in more trade rather than countries with more trade having more income” (Taken from Irwin and Tervio, 2000).

Greenaway et al (2001) focus on the issue of trade liberalization and its impact on GDP growth – so they are *not* looking at the impact of trade liberalization on poverty or income distribution or development. The reason for the paper is the inconclusive evidence from previous work – they argue that the reason for debate is (i) inappropriate methodology and (ii) how trade liberalization is measured. Previous research can be criticized for not using panel techniques that control for (i) country-specific effects, (ii) time-effects and (iii) an unobserved error effect that varies across *both* countries and years (time) which is assumed to be uncorrelated. The **Core** growth model is based on the empirical work of Levine and Renelt (1992) and theoretical developments by Romer (1990). The robust variables included in most **core** growth models are: (I) Investment, (II) Population Growth, (III) Initial Human Capital, and (IV) Initial GDP per Capita. Greenaway et al also add to this list of explanatory variables, (V) terms of trade variable and (VI) trade liberalization proxies.

In terms of trade openness, the reason increasing imports might be beneficial to a country is that foreign inputs might be better than domestic inputs. The reason increasing exports might be beneficial to a country is the creation of economies of scale that drive down production costs. International trade is the exchange of goods and services across national borders. In most countries, it represents a significant part of GDP. While international trade has been present throughout much of history (see Silk Road, Amber Road), its economic, social, and political importance have increased in recent centuries, mainly because of Industrialization, advanced transportation, globalization, multinational corporations, and outsourcing. In fact, it is probably the increasing prevalence of international trade that is usually meant by the term “globalization”.

Resource endowments play an important role in agricultural productivity growth. Induced innovations in technology are biased towards saving the limiting factor. In labor abundant & land scarce countries there have been technologic innovations to use the land more efficiently, such as biological innovations. In land abundant & labor scarce countries there have been technologic innovations to use labor more efficiently, such as mechanical innovations and adjustments in the land labor ratio. There are major differences in the resource endowments and the nature of technology in transition countries.

E. Borensztein, J. De Gregorio, and J-W. Lee tested the effect of foreign direct investment (FDI) on economic growth in a cross-country regression framework, utilizing data on

FDI flows from industrial countries to 69 developing countries over the last two decades. Their results suggest that FDI is an important vehicle for the transfer of technology, contributing relatively more to growth than domestic investment. However, the higher productivity of FDI holds only when the host country has a minimum threshold stock of human capital. Thus, FDI contributes to economic growth only when a sufficient absorptive capability of the advanced technologies is available in the host economy.

Foreign Direct Investment should stimulate productivity growth. The arrival of multinationals to a new country is usually associated with positive technological spillovers. They also trigger productivity and economic growth. FDI has grown dramatically as a major form of international capital transfer between 1980 and 1990. Over that decade, world flows of FDI—defined as cross-border expenditures to acquire or expand corporate control of productive assets—have approximately tripled. FDI has become a major form of net international borrowing for Japan and for the United States (the world's largest international lender and borrower, respectively). Direct investment has grown even more rapidly in the late 80s within Europe.

It is well known that tax rates are among the variables that influence the decisions made by consumers/workers and firms. Taxes enter many decisions, but the two most important are probably that they discourage work, since the lower the after-tax return from work, and they discourage saving and investment, since they lower after-tax returns. (A third is that taxes distort investment decisions by taxing different types of capital unequally.) We know that the countries that invest the most (measured as the ratio investments/income) also grow the fastest, on average, so maybe this is important (or maybe the causality goes the other way).

A lower tax rate on wage income should increase the labor supply. Given the labor demand function, this increase in labor supply will increase employment, reduce the pre-tax real wage and increase the post-tax real wage. Now turn to saving. We would expect lower taxes on interest and capital gains, as well as tax-sheltered saving plans, to make saving more attractive and lead to an increase in savings. In equilibrium, this will lower real rates of interest as more saving flows into capital markets, and raise investment. Over time this investment leads to higher capital, more productive labor, and higher output and wages.

While most economists would agree with the theoretical idea that lower taxes increase labor supply and savings, the crucial empirical question is whether the effects of cuts in tax rates on labor supply and savings are small or large. Most empirical evidence from a very large set of studies suggests that the effect on labor supply is probably small, except on relatively poor workers whose marginal tax rate can be quite high (then they work, they may lose welfare and medical benefits, so the “opportunity cost” of working can be high). This may be an important aspect of social policy, but probably does not have a large effect in the aggregate. In the graph, this would show up as a fairly steep labor supply curve, so that a shift up has little effect on employment. The effect on saving, though, is thought by some to be substantial but there is wide disagreement on this issue as well. There is some question as to how responsive saving is to tax incentives, but a number of economists, including Martin Feldstein of Harvard, think the effect is important.

3. Background

After the Allies won World War II, since the Soviet Union was on the Allies side, the Allies had to decide how they were going to split up Europe in terms of spreading the influence of the victorious countries. There were two sides at the negotiation table: the democratic Allies and the Soviet Union, a communist regime. After negotiations, Europe was split between Western Europe, which was democratic, and Eastern Europe, which was communist. The Soviet Union lost 27 million people and a significant part of their industry and infrastructure, both because of the Nazi Wehrmacht but also because of their own “scorched earth” policy which was meant to prevent Soviet assets from falling into Nazi hands as they advanced over 1,000 miles to within 15 miles of Moscow (Pearson 1998). After the war ended, Eastern European assets were physically transported and relocated to the Soviet Union (Pearson 1998). Between 1945 and 1953, the Soviets received a net transfer of resources from the rest of the Eastern Bloc under this policy roughly comparable to the net transfer from the United States to Western Europe in the Marshall Plan (Bideleux & Jeffries 2007). Romania and Hungary were some of the biggest sources of Eastern European industrial assets for the Soviet Union, because these two countries had been Axis countries during the war, and this policy was considered as punitive reparations (a principle accepted by Western powers) (Pearson 1998). However, in some cases, Red Army

officers abused this policy by viewing farms, villages, and even cities as being open for looting (Beavor 2002, Montgomery 1947, Knabe 2005). Other Eastern Bloc countries had to provide rolling stock, technology, industrial equipment, coal, and other resources to reconstruct the Soviet Union (Bideleux & Jeffries 2007). Therefore, in the first 8 years following World War II, this relocation of assets can be viewed as a massive investment in the infrastructure of the Soviet Union, and also as a massive disinvestment in infrastructure in non-Soviet communist countries. Communism was not only a form of government, but also an international political movement of the Soviet Union to control other countries, so the punitive reparations paid by Eastern European countries to the Soviet Union are an effect of communism. Also, Eastern European countries were forced by the Soviet Union to reject the Marshall Plan (Roberts 2000, McMahon 2003), which can be considered another economic effect of communism. However, because of the difficulty of quantifying the effects of these resource transfers on economic growth, I will not account for these transfers of resources in my regressions.

I will talk about infrastructure in the next paragraphs. The information I am providing is qualitative but not measured. In contrast with much private investment, investment in infrastructure can generate positive externalities throughout an economy, leading to social returns that exceed private returns. For regional infrastructure in transport and communication, one of their most important external effects is to increase market access by lowering trade costs. Broadly defined, trade costs include policy barriers (tariffs and nontariff barriers), transportation costs, local distribution costs, information costs, contract enforcement costs, and other costs associated with border related barriers, such as language and currency conversion. The tariff equivalent of trade costs can range from 30% to 105%, depending on the sector, according to estimates for imports by the United States (World Bank 2005). Based on 1990 bilateral trade data for 19 member countries of the Organization for Economic Co-operation and Development, Eaton and Kortum (2001) found that the tariff equivalent of trade costs ranged from 58% to 78%. Trade costs in developing countries are typically much higher due to weaker infrastructure and institutions (Zhai 2010).

Infrastructure affects economic development in terms of both intermediate and final products. With respect to intermediate products or goods, sound infrastructure facilitates the mobility of the means of production (labor, goods and finance), thus improving productivity and

reducing cost, which are key factors in competitiveness. Infrastructure also increases the flow of information, opening new opportunities and reducing asymmetries and other market imperfections. In terms of final products or goods, the consumption of infrastructure services improves easy access to energy for industries and domestic use; safe transportation; reliable communication; clean water and sanitation (Ababa 2005).

World War II left most of Europe in ruin in terms of infrastructure and not only. Some countries were probably affected more than others, but it is difficult to quantify the negative effect of the war on each individual economy, so I will not account for the war in my regressions. War has influenced economic history profoundly across time and space. Winners of wars have shaped economic institutions and trade patterns. Wars have influenced technological developments. Above all, recurring war has drained wealth, disrupted markets, and depressed economic growth. Wars are expensive (in money and other resources), destructive (of capital and human capital), and disruptive (of trade, resource availability, labor management). Large wars constitute severe shocks to the economies of participating countries. Notwithstanding some positive aspects of short-term stimulation and long-term destruction and rebuilding, war generally impedes economic development and undermines prosperity. Several specific economic effects of war recur across historical eras and locales: inflation, capital depletion, and positive economic effects (Goldstein 2003).

In April 1985, the general secretaries of the communist and workers' parties of the Soviet Union, Bulgaria, Czechoslovakia, the German Democratic Republic (East Germany), Hungary, Poland, and Romania gathered in Warsaw to sign a protocol extending the effective term of the 1955 Treaty on Friendship, Cooperation, and Mutual Assistance, which originally established the Soviet-led political-military alliance in Eastern Europe. Their action ensured that the Warsaw Pact, as it is commonly known, would have remained part of the international political and military landscape well into the future.

The Warsaw Pact alliance of the East European socialist states was the nominal counterweight to the North Atlantic Treaty Organization (NATO) on the European continent. Unlike NATO, founded in 1949, however, the Warsaw Pact did not have an independent organizational structure but functioned as part of the Soviet Ministry of Defense. In fact the Warsaw Pact had served as one of the Soviet Union's primary mechanisms for keeping its East

European allies under its political and military control. The Soviet Union has used the Warsaw Pact to erect a façade of collective decision making and action around the reality of its political domination and military intervention in the internal affairs of its allies. At the same time, the Soviet Union also has used the Warsaw Pact to develop East European socialist armies and harness them to its military strategy.

Since its inception, the Warsaw Pact had reflected the changing pattern of Soviet-East European relations and manifested problems that affect all alliances. The Warsaw Pact had evolved into something other than the mechanism of control the Soviet Union originally intended it to be, and it had become increasingly less dominated by the Soviet Union since the 1960s. The organizational structure of the Warsaw Pact had grown and had provided a forum for greater intra-alliance debate, bargaining, and conflict between the Soviet Union and its allies over the issues of national independence, policy autonomy, and East European participation in alliance decision making. While the Warsaw Pact retained its internal function in Soviet-East European relations, its non-Soviet members had also developed sufficient military capabilities to become useful adjuncts of Soviet power against NATO in Europe.

Beginning with Aschauer (1989a, 1989b, 1989c), there has been a resurgence in the debate about the productivity effects of infrastructure. This debate is reviewed in the World Bank's World Development Report (1994) which finds a large range of empirical results on the importance of infrastructure for economic growth, with estimates ranging from no effect, to rated of return in excess of 100% per annum. Gramlich (1994) surveys the empirical literature and emphasizes the difficulties of accurately pinning down the contributions of infrastructure to growth (Canning and Pedroni 1999).

A transition economy or transitional economy is an economy which is changing from a centrally planned economy to a free market (Feige 1994). There are a number of things that transition economies undergo, but here are the five most important ones: economic liberalization, privatization of government-owned enterprises and resources, the creation of a financial sector to facilitate macroeconomic stabilization (Feige 1991), the movement of private capital, and the changing and creating of institutions, particularly private enterprises. Economic liberalization means that market forces set prices rather than a central planning organization and trade barriers

are removed. The process has been applied in China, the former Soviet Union and Communist bloc countries of Europe, and many third world countries.

A study of the impact of industrialization on relative female survival using evidence from trade policies shows that trade policy serves as a proxy for industrialization (Chakraborty 2009). For example, countries with more of an industrial purpose had to export these manufactured goods to the rest of the system and were therefore more industrialized than countries with less industrial economic purposes, say agricultural countries. A study of industrialization and trade also showcases a relationship between trade orientation and the growth of total factor productivity (Nelson & Pack 1999). One Chinese government study in 2002 committed 60,000 errors in the collection of data over a five-month period (Baumohl 2007). This shows that data coming from communist regimes cannot be trusted.

Cultural factors, as measured by the two dimensions of values identified by Inglehart, explain 75% of the variation in the Perceived Corruption Index across non-communist countries. A strong 'survival' orientation contributes twice as much as a strong 'traditional' orientation to higher levels of corruption. When controlling for these cultural variables, communism and post-communism increase the levels of corruption even further, both directly and by contributing to heavier emphasis on survival values. Communism created structural incentives for engaging in corrupt behaviors, which became such a widespread fact of life that they became rooted in the culture of these societies – that is, the social norms and practices prevailing in communist societies. The transitions toward democracy and market economies have not yet erased this culture of corruption. In addition, the process of privatization itself has opened myriad opportunities for corruption. The effects are manifest in comparisons of corruption in noncommunist and (post-) communist countries in five cultural zones (Sandholtz & Taagepera 2005).

Some statistical analyses show that a cultural index, which reflects civil society strength, the proportion of Catholics and Protestants in the population and historical experience, has the strongest effect on growth, economic reform, macroeconomic stabilization policy and corruption. The former communist countries shared the same type of economic system before the collapse of communism. Communism rule in Eastern and Central Europe, Mongolia, and the former Soviet Union ended around the end of the 1980s and the beginning of the 1990s. Governments in these

countries abandoned communist policies and initiated economic reforms. The scopes of the reforms and decline of Gross Domestic Product (GDP) have varied significantly among post-communist countries. The economic reforms have been deeper and more comprehensive and economic decline less severe in Central European countries than in the former Soviet Republics, with the exception of the Baltic States (Katchanovski 2000).

The socialist order collapsed dramatically and there is current turmoil in the formerly communist world. All socialist societies had important common properties. Inherent attributes of socialism inevitably produced inefficiency because of the problems of the socialist system. The weak economic performance of socialist countries resulted from the system itself, not from the personalities of top leaders or mistakes made by leading organizations and planners. The political power structure and communist ideology also had a role in this weak economic performance. There are two types, or historical phases, of socialism. The “classical socialism” of Stalin, Mao, and their followers is totalitarian and brutally repressive, but its components fit together and make up a coherent edifice. Associated with names like Tito, Deng-Xiaoping, and Gorbachev, “reform socialism relaxes repression, but brings about a sharpening of inner contradictions and the eventual dissolution of the system.” (Kornai 1988)

The Council for Mutual Economic Assistance¹, 1949–1991, was an economic organization comprising the countries of the Eastern Bloc along with a number of communist states elsewhere in the world (Goodrich 2010). Each country within the Comecon had an economic purpose and was supposed to specialize in producing different goods and export them to the rest of the system, and import goods that other countries were meant to specialize in producing.

They used to work after 5 year plans, and these plans would have monthly economic targets that were supposed to be reached, regardless of the demand of the market and the cost effectiveness of producing the required goods. Also, prices were also fixed and there was no inflation. The Comecon was founded in 1949 by the Soviet Union, Bulgaria, Czechoslovakia, Hungary, Poland, and Romania. In December 1961, a council session approved the Basic Principles of the International Socialist Division of Labour, which talked of closer coordination

¹ Russian: Совет экономической взаимопомощи, *Sovet ekonomicheskoy vsaymopomoshchi*, С Э В, *SEV*, English abbreviation COMECON, CMEA, or CAME.

of plans and of "concentrating production of similar products in one or several socialist countries." In November 1962, Soviet Premier Nikita Khrushchev followed this up with a call for "a common single planning organ." This was resisted by Czechoslovakia, Hungary, and Poland, but most emphatically by increasingly nationalistic Romania, which strongly rejected the notion that they should specialize in agriculture. The system fell because it did not follow any market rules. Comecon represented a waste of resources; however, since it is very difficult to quantify this as economic losses to different communist countries, I will identify this more as a mechanism than as something to be used in the analysis. Part of the observed economic effects are also due to the war, however, since the war affected all the world, and it is difficult to measure quantitatively by how much was a country affected by war more than another country, we cannot include the effects of the war in our regressions.

Amplifying factors

World War II has truly changed the world as it had been known before then. Many millions of people died. Germany was one of the survivors of the war, but it was divided into four quadrants, which were under the control of the Allied Powers: the Soviet Union, France, the United Kingdom, and the United States. Many local, national, and continental phenomena took place as a result of World War II: the division of Germany, Korea, and later of Vietnam, the creation of Israel, the communist takeover of China and Eastern Europe, the birth of the United Kingdom's welfare state, and the redrawing of European borders. Also, many organizations were born because of the Second World War: the International Monetary Fund, the World Trade Organization, the World Bank, and the United Nations. This war was also a major source of technological innovation, with the jet engine, the electronic computer, and nuclear fission appearing during this period. In terms of world politics, the two most powerful victors: the Soviet Union and the United States imposed themselves as the superpowers.

At the end of the war, millions of refugees were homeless, the European economy had collapsed, and most of the European industrial infrastructure was destroyed. As a result of the new borders drawn by the victorious nations, large populations suddenly found themselves in hostile territory.

4. The Effect of Communism on Growth

4.1 Difference in Differences

In order to estimate the effects of communism on the economy, I will use the difference in differences (DID) (sometimes ‘Diff-in-Diffs’) technique. This is a mechanism used in literature, more specifically it is a nonexperimental technique used in econometrics that measures the effect of a treatment at a given period in time. It is often used to measure the change induced by a particular treatment or event, though may be subject to certain biases (mean reversion bias, etc.). In contrast to a within-subjects estimate of the treatment effect (that measures the difference in an outcome after and before treatment) or a between-subjects estimate of the treatment effect (that measures the difference in an outcome between the treatment and control groups), the DID estimator represents the difference between the pre-post, within-subjects differences of the treatment and control groups.

First, let us look at what seems to be the total impact of communism, excluding the actual economic mechanisms. I use the non-communist countries as a control group. A way to account for not knowing what would have happened in the absence of the treatment (communism) is seeing how these economies were evolving in the years prior to communism, what the trend was, find countries with a similar trend that did not become communist, and assume that the communist countries would have evolved similarly to these non-communist countries had communism not taken place. This means I would look at countries with similar economic characteristics that were not included in the treatment group. This way, we can assume that the inclusion in the treatment group was random (proximity to the Soviet Union) and the economic differences between the control and the treatment group are a direct consequence of communism. This is called the common trend assumption and it is an assumption that has to hold in order for the difference-in-difference model to yield unbiased results.

After running the difference-in-differences equation, I will use a panel estimation approach in order to identify the effects of communism on different economic variables and the effect of these economic variables on growth. I am assuming that a transitivity relationship exists in this case, such that because communism, through its regulations and policies, directly affects different economic outcomes that have a direct effect on growth, communism itself has an

indirect effect on growth. The left-hand side variables I will consider for different countries are: the level of GDP per capita, growth in GDP per capita, and increases in lifespan. The right-hand side variables I will regress the former on are: human capital measures, labor to land ratio, trade openness, foreign direct investments, taxes as a percentage of commercial profits, and distance from Moscow, the geopolitical center of the entire communist regime. The human capital measures that I am using are: average years of education as a percentage of the average years of education in the United States, average expenditure per student at a primary level as a percentage of the country's GDP, and the ratio of unskilled to skilled workers in a country. The more a country is open to trade, the more its imports and exports count as a percentage of that country's GDP. Therefore, I will measure a country's openness to trade by how much imports and exports constitute of that country's GDP, and I will look at these two measures separately, in order to determine if whether a country counts more on imports as opposed to exports for example has a significantly different effect on growth, or lifespan for that matter.

The basic premise of DID is to examine the effect of some sort of treatment by comparing the treatment group after treatment both to the treatment group before treatment and to some other control group. Naively, you might consider simply looking at the treatment group before and after treatment to try to deduce the effect of the treatment. However, a lot of other things were surely going on at exactly the same time as the treatment. DID uses a control group to subtract out other changes at the same time, assuming that these other changes were identical between the treatment and control groups. (The Achilles' heel of DID is when something else changes between the two groups at the same time as the treatment.) For it to be an accurate estimation, we must also assume that the composition of the two groups remains the same over the course of the treatment. Also we need to consider the possible serial correlation issues. In our case, the control group of non-communist countries considered is given by all Western European countries. Since the difference in differences method is performed over a longer period of time, other characteristics that are fixed over time will be controlled for. The identifying assumption of the difference in differences estimation is the common trend. Therefore, we assume that the countries from the treatment group would have evolved the same way as the countries from the control group, assuming these countries would have been assigned to the control group instead of the treatment group.

The difference-in-difference method will make use of the following equation:

$$D = (Y_{comm1989} - Y_{comm1938}) - (Y_{noncomm1989} - Y_{noncomm1938}), \text{ where}$$

D = difference-in-difference estimator

$Y_{comm1989}$ = average GDP/capita in former communist countries in 1989

$Y_{comm1938}$ = average GDP/capita in future communist countries in 1938

$Y_{noncomm1989}$ = average GDP/capita in non-communist countries in 1989

$Y_{noncomm1938}$ = average GDP/capita in non-communist countries in 1938

I consider the common trend assumption to be reasonable since some of the control and treatment group countries had almost identical economic growth patterns between 1870 and 1947, when communism was established. After that, there is an obvious discrepancy in their economic growth patterns, as measured by GDP per capita. I cannot use data coming from communist countries during the time in which they were communist (1947 – 1989) because it is completely unreliable. Therefore, for the communist countries, I will only use data before the establishment of the communist regime and after the fall of communism. The data limitation is quite difficult. If I had reliable data about the communist countries during the communist regime I could observe how the economies of Eastern Europe and of the Western world diverged and by how much in those years. I could also be able to identify what effect did different communist policies have on the economy and by how much did they harm or improve it. Considering the general trend, most communist policies were probably harmful to the economy.

The common trend assumption might not hold because we are talking about different countries with different economies. For example, the most important component of Romania's economy is the production of electric machinery and equipment, in Greece's case it is tourism, and in Portugal's case it is textiles. Maybe it just so happened that between 1938 and 1989 there was an increasing world-wide demand for tourism and textiles, but not so much for electric machinery and equipment. In this case, the variation of GDP per capita observed in the graphs would be completely explained by this variation in world demand for goods and communism would have no role in the evolution of communist countries' economies. Obviously this case is improbable, however a joint effect between an explanation like this and communism is plausible.

An interesting case is provided by the countries Romania, Greece, and Portugal which had similar economic growth trends between 1870 and 1938 (see graph). By doing a simple computation using the difference in differences equation specified in **3.1** and using only the countries Romania, Greece, and Portugal, we obtain a value of $D = - \$5,330.51^2$. Now we will run the same calculation using the entire control group mentioned in **3.1**, namely: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom; and considering the following communist countries as the treatment group: Czechoslovakia, Soviet Union, Hungary, Poland, Bulgaria, Yugoslavia, Romania, and Albania. After running this calculation, we obtain $D = - \$6,794.29$. Considering that the average GDP per capita in 1990 in former communist countries was \$6,457, given our set of assumptions, we can conclude that the communist countries of Eastern Europe could have been 2.05 times richer in 1990 than they actually were had they not gone through communism. This is a back-of-the-envelope calculation that does not control for anything else.

4.2 Panel Estimation Approach

In this section I will use a panel estimation approach for 43 European countries. I will use 6 observations for each country: growth in GDP per capita between 1947 and 1990, growth in GDP per capita between 1990 and 2003, growth in life expectancy at birth for males between 1960 and 1990, for females between 1960 and 1990, growth in life expectancy at birth for males between 1990 and 2009, for females between 1990 and 2009. The 43 countries I have chosen represent all European and Central Asian countries for which I found reliable data. These countries are: Albania, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Belarus, Bosnia, Kazakhstan, Kyrgyzstan, Macedonia, Russian Federation, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

² All the dollars used in this paper are 1990 International Dollars.

Here are the equations I am planning to write:

$$G_{1947-1990} = \text{intercept} + Dem$$

$$G_{1990-2003} = \text{intercept} + Dem$$

$$GM_{1960-1990} = \text{intercept} + Dem$$

$$GF_{1960-1990} = \text{intercept} + Dem$$

$$GM_{1990-2009} = \text{intercept} + Dem$$

$$GF_{1990-2009} = \text{intercept} + Dem$$

where:

G_{x-y} = growth in GDP per capita between the years x and y, $y > x$

GM_{x-y} = growth in life expectancy at birth in years for males between the years x and y,
 $y > x$

GF_{x-y} = growth in life expectancy at birth in years for females between the years x and y,
 $y > x$

$D = \rightarrow 1$ if a country was democratic during the communist regime, roughly between the
 years 1947 and 1990

$\rightarrow 0$ otherwise

After running these regressions, here are the results I obtained:

Table 1. Regression Results: Variables Regressed Against Growth in GDP per Capita, 1947-1990

	β
Democracy	1.04** (.46)
<i>Adjusted R²</i>	0.09

Standard errors are presented in parentheses

**Denotes statistical significance at the 5% level

Table 2. Regression Results: Variables Regressed Against Growth in GDP per Capita, 1990-2003

	β
Democracy	.36* (.17)
<i>Adjusted R²</i>	0.17

Standard errors are presented in parentheses

*Denotes statistical significance at the 10% level

Table 3. Regression Results: Variables Regressed Against Growth in Life Expectancy for Males, 1960-1990

	β
Democracy	1.27 (1.18)
<i>Adjusted R²</i>	0.004

Standard errors are presented in parentheses

No figures are significant at the 10% level

Table 4. Regression Results: Variables Regressed Against Growth in Life Expectancy for Females, 1960-1990

	β
Democracy	.65 (1.08)
<i>Adjusted R²</i>	-0.01

Standard errors are presented in parentheses

No figures are significant at the 10% level

Table 5. Regression Results: Variables Regressed Against Growth in Life Expectancy for Males, 1990-2009

	β
Democracy	-.64 (3.26)
<i>Adjusted R²</i>	-0.02

Standard errors are presented in parentheses

No figures are significant at the 10% level

Table 6. Regression Results: Variables Regressed Against Growth in Life Expectancy for Females, 1990-2009

	β
Democracy	-2.04 (3.47)
<i>Adjusted R²</i>	-0.02

Standard errors are presented in parentheses
No figures are significant at the 10% level

Note that for life expectancy I am starting with the year 1960 but for growth in GDP per capita I am starting with the year 1947. The reason I am skipping 13 years is because of lack of data. I am using data published by the World Bank for life span measures and they only have data for as early as 1960, but not before that. If the reader considers that the selection of start and end years for my regressions seems a little random, data availability is the most likely reason for which I am doing so.

After interpreting these results, the information conveyed is that communism had a negative effect both on the economic situation of communist countries, but also on the lifespan of people living in these countries. The increases in income and life expectancy were significantly higher in democratic countries than in communist countries, both during and after communism, proving the point that communism was followed by a difficult transition period which in some cases may have been more difficult than the communist period itself. The economic evolution of former communist countries between the years 1990 and 2003 is especially noteworthy, since on average they had a negative growth rate, as opposed to Western European countries, which continued to grow.

The effect of democracy on economic growth is statistically significant at the 5% level for growth between the years 1947-1990 and at the 10% level between the years 1990-2003. Democracy is not a statistically significant factor in predicting changes in life expectancy, before or after communism, for males or for females. These results tell us that countries that were democratic during the communist era had a cumulative increase in GDP/capita of more than 100% more than communist countries between the beginning of communism (1947) and the end of communism (1990). Also, countries that were democratic during the communist era continued to grow faster in the decade following communism, growing by a total average of 36.125% more

than former communist countries. This could potentially be a good indicator of the economic cost of transitioning from communism to democracy.

5. Why? Mechanisms

From the previous section, it is obvious that communism had a negative impact on the economic productivity in communist countries. But communism was just a political system. So what were the actual mechanisms that communism acted through? What were the specific policies and regulations employed by communism that caused this disastrous impact on communist countries? This section will attempt to answer these questions. Communism, by having a direct effect on growth determinants, has had an indirect effect on growth, assuming transitivity holds.

From the existing literature on growth, the factors that are generally agreed-upon to affect growth are: initial level of GDP per capita, human capital, labor to land ratio, trade openness, foreign direct investments, and taxes. Human capital can be measured in multiple ways. For the purpose of this paper, I will use three different measures of human capital: average years of education as a percentage of the average years of education in the United States, average expenditure per student at a primary level as a percentage of the country's GDP, and the ratio of unskilled to skilled workers in the workforce. In order to measure trade openness, I will look at imports and exports separately as a percentage of a country's GDP. The higher these values are, the more open a country is to trade, but whether a country is counting more on imports or exports can have a different effect on growth, as we will see later in this section. The tax rate I will use is the percentage of commercial profits paid to the government.

5.1 Exploring Growth Determinants

5.1.1 FDI during Transition

The transition economies have a small but rapidly increasing share of the total FDI stock. At the start of the transition (around 1990), the total inward stock of FDI in Central and Eastern Europe was less than one per cent of the world total. The small FDI stock was a result of the unfavorable economic environment for foreign MNEs. However, the growth rate of the FDI stock in Central and Eastern Europe between 1990 and 2003 was much higher than the global rate, and the transition economies increased their share of the total stock of FDI to around 3.5 per

cent in 2003. If the FDI stock would have been proportional to GDP, Central and Eastern Europe would have accounted for 2.4 per cent of the world stock in the year 2000, close to the actual figure of 2.5 per cent implying convergence toward more ‘normal’ levels of inward investment. To some extent the large increase in inward FDI to the transition economies is, therefore, explained by a very low initial level. The transition economies have been in a process of catching up due to an increasing share of total flows during the 1990s and the rising GDP share of inward FDI of GDP suggest that they are being integrated into the global economy.

Earlier studies of FDI inflows have pointed to the large variation in the amount of FDI that the transition economies attracted during the first years of the transition process. The data for FDI inflows presented in Appendix B suggest that these differences have continued during the second half of the 1990s. Consequently, there should now be substantial variation in the size of the inward stocks of FDI that the transition economies have managed to attract. Whether this is indeed the case can be answered by Table 2.2 and Table 2.3 which present cumulative inflows of FDI in total as well as per capita to the CEE group and the CIS group, respectively. The rightmost column presents data from the inward stock of FDI as a share of GDP. The countries have been ranked according to cumulative FDI inflows per capita.

Here I will run a panel regression that will have yearly GDP/capita growth between the years 1991 and 2003 in all European and Central Asian countries as the left-hand side variable. The right-hand side variables will be the cumulative yearly FDI inflows per capita in USD between the years 1991 and 2003, a binary variable which takes on the value 1 if a country was a Soviet republic and 0 otherwise, an interaction term between the two, and another binary variable which takes on the value 0 if a country was communist and 1 otherwise.

Here is the equation I am planning to write:

$$G_{x-(x+1)} = const + FDI_{x-(x+1)} + Dem + S + FDI_{x-(x+1)} * S$$

where:

$G_{x-(x+1)}$ = growth in GDP per capita between the years x and (x+1) in the considered countries

$FDI_{x-(x+1)}$ = cumulative foreign direct investment inflows per capita between the years x and $(x+1)$, expressed in United States Dollars

$S = 1$ for former Soviet Republic

0 otherwise

$Dem = 0$ for former communist country

1 otherwise

Here are the results of the panel regression:

Table 7. Panel Regression Results: Variables Regressed Against Yearly Growth in GDP per Capita, 1991-2003

	β
Foreign Direct Investment per Capita	.000002 (.000003)
Democracy	-.01 (.01)
Soviet	-.04*** (.01)
(FDI per Capita) * Soviet	.0003*** (.0001)
<i>Adjusted R²</i>	0.06

Standard errors are presented in parentheses

***Denotes statistical significance at the 1% level

This result tells us whether a country was part of the Soviet Union or not has a large effect on its growth after the end of the communist regime. This effect was so large that on average non-Soviet countries has a clear positive growth, whereas former communist countries' economies actually shrank significantly on average in the first 13 years following the fall of the Soviet Union, and implicitly of the communist regime. There seems to be a positive relationship between the amount of foreign direct investment received and growth, however this relationship is very weak. Also, foreign direct investment seemed to be more important in driving the growth of former Soviet countries as opposed to non-Soviet countries. \$1,000 received by every citizen of a former non-Soviet country in a given year would increase growth in GDP per capita in that

year by 0.2%, but it would increase growth in GDP per capita by 30.2% in a former Soviet Republic. So Foreign Direct Investment money seems to have a much larger positive effect in the former Soviet Union as opposed to anywhere else in Europe.

The Soviet variable and the interaction term (FDI per Capita) * Soviet are both statistically significant at the 1% level. According to the results of this regression, if every citizen of a country would receive \$10,000 more in foreign direct investment in a given year, a country would grow by 2% more in that year. If a country was Soviet, on average it grew by 4% per year less than countries that have not been part of the Soviet Union during the communist era. The Baltic countries provided an exception to this rule. They were some of the Eastern European countries that grew most during the transition period. Former democratic countries tended to grow by 1% less per year than former communist countries during transition.

Which are the most important source countries for the FDI flows to the transition economies? Can information about source countries provide indications of what determined the volume of FDI inflows? Data for the geographical origin of inward FDI are scattered but Table 2.4 presents data for the most important source countries of FDI for nine transition economies. For each transition economy, the two most important sources of FDI are in boldface.

In terms of where did FDI flows come from, on average 62.2% came from the EU-15 countries, while only 7.6% came from Central and Eastern Europe. However, there is a significant discrepancy between former Soviet republics and non-Soviet republics. Non-Soviet countries received on average 77.5% of their FDI flows from the EU-15 and only 1.6% from Central and Eastern Europe. This is a radically different situation from what has been going on with former Soviet republics, where on average only 51.9% of their FDI flows came from the EU-15 and 11.6% came from Central and Eastern Europe. The EU-15 was the main FDI source for former communist countries in general and non-Soviet Eastern European countries received significantly more FDI than former Soviet countries. Looking at FDI source, we see that non-Soviet Eastern Europe received a larger percentage of their total FDI from the EU-15, which accounts to a large part of the difference between total FDI received by non-Soviet and former Soviet countries.

One potential reason for which non-Soviet countries received more FDI than former Soviet countries could be that the transition to democracy was smoother in these countries. Indeed, if we use GDP/capita growth as a proxy for democratization, we can see that non-Soviet

Eastern Europe transitioned faster and more effectively to democracy. There are multiple reasons for which GDP/capita growth is a good proxy for democratization. Given that the communist regime was characterized by corruption and the Soviet one even more so, less corruption equals more economic productivity which is seen in the evolution of a country's GDP. Given that corruptions deters investors, especially foreign ones, the larger levels of FDI received by non-Soviet Eastern Europe could play the role of an instrumental variable for a corruption index. On the other hand, former Soviet countries received more FDI from Central and Eastern Europe, probably because of similarities of economic and policy landscapes in those transition years following the fall of communism. Another reason for which GDP/capita is a good proxy is that a political system is considered to work especially if the people of a country are prosperous. Of course there are exceptions to this rule, for example some Arab countries that are rich in oil but poor in human rights, but other than that this rule tends to hold. However, given the results of the regression I ran above, FDI does not seem to play a direct role in economic growth. It can though give us more insight into the particularities of each country, judging by the level of FDI per capita received.

5.1.2 Flat Tax in Eastern Europe

Advocates of the flat tax argue that the former communist states of Eastern Europe have benefited from the adoption of a flat tax. Most of these nations have experienced strong economic growth of 6% and higher in recent years, some of them, particularly the Baltic countries, experience exceptional GDP growth of around 10% yearly. Some argue that other factors, primarily the advent of capitalist economic systems and rapid market expansion after Soviet (communist) domination explain the rapid growth. Some argue that economic growth in these countries would likely have occurred regardless of the chosen tax system.

Whilst in some countries the introduction of a flat tax has coincided with strong increases in growth and tax revenue, some argue that there is no proven causal link between the two. Some argue that it is also possible that both are due to a third factor, such as new government that may institute other reforms along with the flat tax. Eastern Europe has for example greatly benefited from access to the European Union markets since the fall of the Iron Curtain.

Lithuania, which levies a flat tax rate of 24% (previously 27%) on its citizens, has experienced amongst the fastest growth in Europe. Advocates of the flat tax speak of this country's declining unemployment and rising standard of living. They also state that tax revenues have increased following the adoption of the flat tax, due to a subsequent decline in tax evasion and the Laffer curve effect. Others point out; however, that Lithuanian unemployment is falling at least partly as a result of mass emigration to Western Europe. The argument is that Lithuania's comparatively very low wages, on which a non-progressive flat tax is levied, combined with the possibility now to work legally in Western Europe since accession to the European Union, is forcing people to leave the country en masse. The Ministry of Labour estimated in 2004 that as many as 360,000 workers might have left the country by the end of that year, a prediction that is now thought to have been broadly accurate. The impact is already evident: in September 2004, the Lithuanian Trucking Association reported a shortage of 3,000-4,000 truck drivers. Large retail stores have also reported some difficulty in filling positions. However, the emigration trend has recently stopped as enormous real wage gains in Lithuania (presumably due to the shortage of workers) have caused a return of many migrants from Western Europe. In addition to that, it is clear that countries not levying a flat tax such as Poland also temporarily faced large waves of emigration after EU membership in 2004.

In Estonia, which has had a 26% (24% in 2005, 23% in 2006, 22% in 2007, 21% in 2008, 21% in 2009, 20% in 2010, 19% in 2011, 18% in 2012) flat tax rate since 1994, studies have shown that the significant increase in tax revenue experienced was caused partly by a disproportionately rising VAT revenue (Niedrige Steuer 2006). Moreover, Estonia and Slovakia have high social contributions, pegged to wage levels (Niedrige Steuer 2006). Both matters raise questions regarding the justice of the flat tax system, and thus its long-term political sustainability. The Estonian economist and former chairman of his country's parliamentary budget committee Olev Raju stated in September 2005 that "income disparities are raising and calls for a progressive system of taxation are getting louder – this could put an end to the flat tax after the next election" (Tenbrock 2005). However, this did not happen, since after the 2007 elections a right-wing coalition was formed which has stated its will to keep the flat tax in existence. However, critics argue that the tax rates these countries have are actually more progressive than flat (Kozluk 2006).

Hungary introduced a flat tax at 16% on 1 January 2011 (Ministry for National Economy 2010). The tax burden for typical workers in Central and Eastern Europe's "flat tax" countries is slightly higher (40.3% versus 40.2% of the total cost of employment) than that of the progressive systems elsewhere in the EU (L'Anglophone 2010). "Slovakia has a "flat tax" rate of 19%, but its employers pay a 35.2% contribution to social security (higher than the 34.8% in Belgium) and, in addition to the flat income tax, employees have 13.4% deducted for social security (also higher than the 13.07% in Belgium)," (L'Anglophone 2010) adding that a typical Slovak worker's Tax Freedom Day is a day later than a Finnish worker's.

Here I will run two regressions that will have growth in GDP/capita between 1990 and 2003 in different former communist countries as the left-hand side variable. The right-hand side variables will be total deductions from "real" gross salary in these countries, whether a country was democratic or not during the communist era, an interaction term between the two, cumulative FDI inflows per capita between the years 1989 and 2003 in US Dollars, and an interaction term between FDI and democracy.

Here is the equation I am planning to write:

$$G_{1990-2003} = \text{const} + T + Dem + T * Dem$$

$$G_{1990-2003} = \text{const} + T + Dem + FDI_{1989-2003} + FDI_{1989-2003} * Dem$$

where:

G_{x-y} = growth in GDP per capita between the years x and y in the considered countries,
 $y > x$

T = total deductions from "real" gross salary

FDI_{x-y} = cumulative foreign direct investment inflows per capita between the years x and y, expressed in United States Dollars, $y > x$

Dem = 1 if a country was democratic during the communist regime
 0 otherwise

Here are the results:

Table 8. Multiple Regression Results: Variables Regressed Against Growth in GDP per Capita, 1990-2003

	β	
	(1)	(2)
Tax	1.94 (1.81)	-.62 (.45)
Democracy	1.47* (.78)	.6** (.26)
Tax * Democracy	-2.62 (1.87)	
FDI ₁₉₈₉₋₂₀₀₃		.0001 (.0001)
FDI ₁₉₈₉₋₂₀₀₃ * Democracy		-.0001 (.0001)
<i>Adjusted R²</i>	0.24	0.22

Standard errors are presented in parentheses

*Denotes statistical significance at the 10% level

**Denotes statistical significance at the 5% level

This result tells us that taxes had a huge negative effect on growth in these countries between the years 1990 and 2003. Overall, the smaller the taxes, the more a country's economy grew in terms of GDP per capita between these years. Once again, there seems to be a positive relationship between FDI inflows and growth; however the relationship is very weak, and can therefore be neglected.

All the coefficients are statistically insignificant, except the democracy binary variable, which is significant at the 10% level in the first regression, and at the 5% level in the second regression. By doing some comparative statics, we learn from these regressions that countries that were democratic during the communist era grew cumulatively in terms of GDP per capita terms between 60.18% and 146.65% between the years 1990 and 2003, depending on what other variables we choose as right-hand side variables. Given that the democracy variable is more statistically significant in the second regression, we can conjecture that the true cost of transition was closer to the 60 percentage points as opposed to the 146 percentage points.

5.1.3 Other Growth Determinants

In this section I will see how growth in GDP per capita during and after communism is affected by the classic growth determinants to see if they hold in Europe and Central Asia. In order to achieve this, I will run regressions both during and after communism, to see if the role of these determinants changes during the transition that followed the fall of communism.

Here are the regressions I am planning to write for during the communist regime:

$$G_{1947-1990} = \text{const} + I_{1960-1990} + E_{1960-1990}$$

$$G_{1947-1990} = \text{const} + AYE_{1990}$$

$$G_{1998-2009} = \text{const} + I_{1998-2009} + E_{1998-2009} + AExp_{1998-2009}$$

where:

$I_{1960-1990}$ = average imports of goods and services (% of GDP) per year between 1960 and 1990

$E_{1960-1990}$ = average exports of goods and services (% of GDP) per year between 1960 and 1990

AYE_x = average number of years of education in a given country as a percentage of the average number of years of education in the United States in the year x

$AExp_{x-y}$ = average expenditure per student at a primary level as a percentage of GDP between the years x and y, $y > x$

I am writing the second equation because I only have data on the average years of education in 1990 as a percentage of the average years of education in the United States for 8 countries, but I have data on imports and exports for 39 countries. Here are the results I obtained:

Table 9. Multiple Regression Results: Variables Regressed Against Growth in GDP per Capita, 1947-1990

	β	
	(1)	(2)
Imports 1960-1990	-0.04 (.03)	
Exports 1960-1990	.06* (.03)	
Average years of education in 1990		-3.33 (8.97)
<i>Adjusted R²</i>	0.04	-0.14

Standard errors are presented in parentheses

*Denotes statistical significance at the 10% level

Table 10. Regression Results: Variables Regressed Against Growth in GDP per Capita, 1998-2009

	β
Imports 1998-2009	.07*** (.02)
Exports 1998-2009	-.05** (.02)
Average Expenditure per Student 1998-2009	-.07** (.03)
<i>Adjusted R²</i>	0.23

Standard errors are presented in parentheses

**Denotes statistical significance at the 5% level

***Denotes statistical significance at the 1% level

These results tell us that, at a first view, imports had a negative effect on growth during the communist regime, while exports had a positive effect. The average number of years of education seems to have a negative effect on growth, but the regression was only run on 8 countries, namely: Bulgaria, Czech Republic, Estonia, Hungary, Poland, Romania, Russian Federation, and Slovakia.

However, looking at the statistical significance of these variables, only the exports variable is statistically significant at the 10% level in the first regression, no other variables are statistically significant at the 10% level in the first 2 regressions. In the third regression all

variables are statistically significant: the imports variable is statistically significant at the 1% level, while the exports variable and average expenditure per student are statistically significant at the 5% level. Interpreting the results from the first regression tells us that if a country's exports between the years 1960 and 1990 increased by 1% as a share of its GDP, it would have grown by 6 cumulative percentage points more between the years 1947 and 1990. This relationship seems to change after communism. According to the results of the third regression, if a country's exports increased by 1% as a share of its GDP between the years 1998 and 2009, it would have grown by 5 cumulative percentage points less during the same time period. However, if imports increased by 1% instead, the country would have grown by 7% more.

If a country increased spending per student at a primary level by 1%, it would have grown by 7 cumulative percentage points less between the years 1998 and 2009. There could be three explanations for the latter result. The first one is that spending on education at a primary level is a long-term investment, with its benefits becoming visible after a longer period of time than solely 11 years. The second explanation is that countries who spend a larger percentage of their GDP on education at a primary level do so because they have lower levels of GDP, and they need to spend more in order to provide the minimum conditions necessary for an effective education system. They may spend a larger share of their GDP, but unless that share is large enough, they may still invest less in education in aggregate terms than richer countries. The money they spend on education could have been spent in a different sector, thus foregoing the potential benefits of investing in a different economic sector. The third explanation is that spending at a primary level does not affect human capital as much as spending on higher levels of education, which are arguably more important in the personal and professional development of people within a country.

I am planning to run a regression in order to study what happened to growth immediately after the fall of the communist regime:

$$G_{1990-2003} = \text{const} + I_{1991-2003} + E_{1991-2003} + AExp_{1998-2009} + T_{2005-2011} + FDI_{1989-2003}$$

Here are the results I obtained:

Table 11. Regression Results: Variables Regressed Against Growth in GDP per Capita, 1990-2003

	β
Imports 1991-2003	-.03*** (0.01)
Exports 1991-2003	.02*** (.01)
Average Expenditure per Student 1998-2009	-.02 (.01)
Tax 2005-2011	-.38 (.39)
FDI 1989-2003	0.00000004 (0.000005)
<i>Adjusted R²</i>	0.5

Standard errors are presented in parentheses

***Denotes statistical significance at the 1% level

From these results, we learn that countries that spent more per student at a primary level grew less in the period following the fall of the communist regime; however this effect is not statistically significant. Countries that paid higher taxes tended to grow less, but the result is not statistically significant either. Imports tended to discourage growth, and this result is statistically significant. Countries that export more tend to also grow more on average. Foreign direct investments seem to have a very small positive impact on growth.

Imports and exports are both statistically significant at the 1% level. None of the other coefficients are statistically significant at the 10% level. Interpreting these results, we reach the conclusions that if a country increased its imports by 1% of its GDP, it would have grown less by 3 cumulative percentage points between the years 1990 and 2003. Similarly, if a country increased its exports as a share of its GDP by 1%, it would have grown by 2 cumulative percentage points more between the same years.

5.2 Regression of Growth Determinants on Communism

In order to see the impact communism had on the standard growth determinants, I will run regressions of these growth determinants on whether a country was communist or not. I am doing this in order to identify the actual means through which communism impacted economic growth. The growth determinants I will regress on communism are: imports, exports, average expenditure per student, taxes, and FDI. I will regress some of these growth determinants using their after communism values also, in order to quantify the effects of the transition from communism to democracy. I cannot do so for all of them because of lack of reliable data. Here are the equations I am planning to write:

$$\text{Imports} = \text{const} + \text{Dem}$$

$$\text{Exports} = \text{const} + \text{Dem}$$

$$\text{AExp}_{1998-2009} = \text{const} + \text{Dem}$$

$$\text{T}_{2005-2011} = \text{const} + \text{Dem}$$

$$\text{FDI}_{1989-2003} = \text{const} + \text{Dem}$$

After running these regressions, here are the results I obtained:

Table 12. Regression Results: Variables Regressed Against Imports, 1960-1990

	β
Democracy	-11.33** (4.61)
<i>Adjusted R²</i>	0.12

Standard errors are presented in parentheses

**Denotes statistical significance at the 5% level

Table 13. Regression Results: Variables Regressed Against Imports, 1991-2010

	β
Democracy	-15.32*** (4.29)
<i>Adjusted R²</i>	0.21

Standard errors are presented in parentheses

***Denotes statistical significance at the 1% level

Table 14. Regression Results: Variables Regressed Against Exports, 1960-1990

	β
Democracy	-7.57 (4.95)
<i>Adjusted R²</i>	0.03

Standard errors are presented in parentheses

No figures are significant at the 10% level

Table 15. Regression Results: Variables Regressed Against Exports, 1991-2010

	β
Democracy	-3.3 (4.83)
<i>Adjusted R²</i>	-0.01

Standard errors are presented in parentheses

No figures are significant at the 10% level

Table 16. Regression Results: Variables Regressed Against Expenditure per Student, 1998-2009

	β
Democracy	-.61 (3.04)
<i>Adjusted R²</i>	-0.03

Standard errors are presented in parentheses

No figures are significant at the 10% level

Table 17. Regression Results: Variables Regressed Against Total Tax Rate (% of Commercial Profits), 2005-2011

	β
Democracy	-.004 (.06)
<i>Adjusted R²</i>	-0.02

Standard errors are presented in parentheses

No figures are significant at the 10% level

Table 18. Regression Results: Variables Regressed Against Foreign Direct Investment, 1989-2003

	β
Democracy	12990.92*** (2806.9)
<i>Adjusted R²</i>	0.33

Standard errors are presented in parentheses

***Denotes statistical significance at the 1% level

From these results we can infer that communist countries were actually trading more both before and after communism. They had higher levels of both imports and exports as a percentage of their GDP. Communist countries also tended to spend more per student at a primary level as a percentage of their GDP between the years 1998 and 2009. However, this might not necessarily mean that they spent more money per student, just a higher percentage of their GDP. It is likely that Western European countries still spent more per student in absolute terms. Democratic countries tended to have lower tax rates than former communist countries as a percentage of commercial profits. Although Eastern Europe opened up to foreign investments in 1989-1991, Western European countries received substantially more foreign direct investment than their former communist counterparts during the transition period following communism (1989-2003).

In the first regression, whether a country was democratic during the communist era is statistically significant at the 5% level. In the second regression the same variable is statistically significant at the 1% level. In the last regression, democracy is again significant at the 1% level. All the other variables are not statistically significant at the 10% level. These results tell us that democratic countries imported by 11.33% less as a proportion of their GDP between the years 1960 and 1990. This difference widened after the fall of communism, between the years 1991 and 2010, countries that were democratic during the communist regime imported by 15.32% less than former communist countries as a percentage of their GDP. Between the years 1989 and 2003, former and present democratic countries received on average \$12,990.92 per person cumulatively in foreign direct investment more than former communist countries.

6. Endogeneity & Reverse Causality

I have not talked much about one of the major assumptions of the OLS regression technique. One major assumption of the OLS regression is that the exogenous values are uncorrelated with the error terms. Note that this is impossible to confirm because we only have estimates of the error terms and if correlation exists, then these estimates will be incorrect.

What brings about this problem? Well, in general this problem is brought about by **omitted variable bias**. There is another variable which is correlated with both the exogenous and the endogenous variables so that after fitting the models above there is still a relationship with this other variable and the residuals.

The omitted variable bias is the major difficulty of observational data. It is a major problem because we are generally interested in whether the model above represents a causal relationship between the endogenous and the exogenous variable. A frequent interpretation of the models above is that if we could manipulate the exogenous variable by raising it one unit, the endogenous variable would increase by β_1 units. This is a causal argument.

Omitted variable bias is the most common illustration of what economists refer to as **endogeneity**. **Endogenous variables** are variables determined by other variables in the system, while **exogenous variables** are variables which can be considered external shocks to the system.

The other most important source of endogeneity is reverse causality. To truly be able to make a causal claim, we need a truly exogenous variable – that is, a variable which is not related to any of the other variables in the system, unobserved and observed. The problem with observational data is that there are an infinite number of unobserved variables which could render our observed relationship endogenous. This is the problem of **unobserved heterogeneity** in my sample.

Going back to the question of how does communism impact growth, we looked at the difference in the average growth rates between democratic and former communist country groups. But it would be dangerous to assume that such a difference reflected the “treatment” of communism, because the countries that remained democratic during the communist regime were also better-off economically before the instauration of the communist regime in Europe.

Even if all the important variables were observed, we would only completely control for them if we correctly specified the functional form of their relationship to growth. This problem

has led to much wailing and gnashing of teeth among economists. The traditional model (for all empirical methods, not just statistical) follows this basic format:

1. Make an argument about how and why things are as they are.
2. Show that the available empirical data are consistent with your argument.
3. Demonstrate that the available empirical data are inconsistent with counter-arguments for how and why things are as they are.

The key issue here is the last one. The focus is on a debate between real concrete stories not on some generalized debate that some unspecified counter-story could plausibly exist.

7. Mitigating/Amplifying Factors

Up until now, I have been comparing the performance of communist and non-communist countries. In this section, I am only looking at communist countries. The mitigating/amplifying factors are: distance from Moscow, whether a country was part of the Soviet Union or not, imports, exports, whether a country was democratic during the communist era or not, human capital, agricultural productivity, employment practices, war, and investment in human capital. Distance from Moscow can be both positive and negative. Given that Moscow was the economic and political center for the entire communist regime, perhaps countries that were closer to Moscow may have been able to trade more with the Soviet Union, and since trade volumes and growth are positively interrelated, this proximity to Moscow may have helped countries grow faster. On the other hand, countries that were further away from Moscow were subject to less stringent Soviet regulations and had more freedom in conducting their national and external policies. For example, economically, these countries could focus on their comparative advantages as opposed to following the production guidelines received from Moscow, which may not have always been optimal (and indeed they weren't, since the main reason for the fall of communism was the ineffective economic model).

The Soviet Union consisted of multiple republics which were ethnically-based administrative units subordinated directly to the Government of the Soviet Union. As a state, the Soviet Union was highly centralized. Communist countries that were not part of the Soviet Union during the communist regime had more freedom in conducting their internal and external policy, whereas Soviet Republics had no individual external policy, their external policy was represented by the external policy of the entire Soviet Union. The idea here is the same as above,

having more freedom internally and externally could be equivalent to a better economic outcome, but not always. Freedom does not have to be equivalent with economic prosperity.

Given the positive relationship between trade and economic prosperity, we would expect countries that traded more to have been more prosperous than countries that were less open to international trade. Countries that were democratic during the communist era definitely had a much larger economic growth rate than communist countries.

Human capital is the stock of competencies, knowledge, social and personal attributes, including creativity, embodied in the ability to perform labor so as to produce economic value. It is an aggregate economic view of the human being acting within economies, which is an attempt to capture the social, biological, cultural and psychological complexity as they interact in explicit and/or economic transactions.

Agricultural productivity is measured as the ratio of agricultural outputs to agricultural inputs. While individual products are usually measured by weight, their varying densities make measuring overall agricultural output difficult. Therefore, output is usually measured as the market value of final output, which excludes intermediate products such as corn feed used in the meat industry. This output value may be compared to many different types of inputs such as labor and land (yield). These are called partial measures of productivity. Agricultural productivity may also be measured by what is termed total factor productivity (TFP). This method of calculating agricultural productivity compares an index of agricultural inputs to an index of outputs. This measure of agricultural productivity was established to remedy the shortcomings of the partial measures of productivity. Changes in TFP are usually attributed to technological improvements. We would expect countries with a higher agricultural productivity to grow faster, since they need to spend less resources on agriculture and can therefore spend more resources on other industries.

Organizational social capital is defined as a resource reflecting the character of social relations within the organization. It is realized through members' levels of collective goal orientation and shared trust, which create value by facilitating successful collective action. Employment practices are primary mechanisms by which social capital is fostered or discouraged within organizations. Given the increased level of corruption and nepotism within the communist regime, we expect the employment practices in former communist countries to be

less merit-based than in democratic countries, which leads to a lower economic output, by impairing optimal labor allocation.

Although it is obvious that people acquire useful skills and knowledge, it is not obvious that these skills and knowledge are a form of capital, that this capital is in substantial part a product of deliberate investment, that it has grown in Western societies at a much faster rate than conventional (nonhuman) capital, and that its growth may well be the most distinctive feature of the economic system. It has been widely observed that increases in national output have been large compared with the increases of land, man-hours, and physical reproducible capital. Investment in human capital is probably the major explanation for this difference.

Much of what we call consumption constitutes investment in human capital. Direct expenditures on education, health, and internal migration to take advantage of better job opportunities are clear examples. Earnings foregone by mature students attending school and by workers acquiring on-the-job training are equally clear examples. Yet nowhere do these enter into national accounts. The use of leisure time to improve skills and knowledge is widespread and it too is unrecorded. In these and similar ways the *quality* of human effort can be greatly improved and its productivity enhanced. Such investment in human capital accounts for most of the impressive rise in the real earnings per worker. Economists have shied away from the explicit analysis of investment in human capital.

Assuming that \$1 invested in human capital in Germany yields the same return as \$1 invested in human capital in Romania, we would expect countries that invest more in human capital to have a faster economic growth in the future. However, if a country has historically invested more in the human capital of its people, then we would expect that country to have a faster economic growth now and in the future, *ceteris paribus*.

Once a war has ended, losing nations are sometimes required to pay war reparations to the victorious nations. In certain cases, land is ceded to the victorious nations. Typically speaking, war becomes very intertwined with the economy and many wars are partially or entirely based on economic reasons. In some cases war has stimulated a country's economy but in many cases warfare serves only to damage the economy of the countries involved. For example, Russia's involvement in World War I took such a toll on the Russian economy that it almost collapsed and greatly contributed to the start of the Russian Revolution of 1917. At the end of World War II, most countries of Eastern Europe were considered to have lost the war (one

exception being the Soviet Union). As a result, some of them lost land, but the countries that were Germany's allies had to pay war reparations to the Soviet Union that amounted to an equivalent of the Marshall plan that Western European countries received as aid from the United States. We would expect the countries that had to pay war reparations and that were not recipients of the Marshall plan to have a delayed economic growth as opposed to their Western European counterparts.

7.1 The Role of Distance to Moscow

Here I will run two regressions: the first one will have growth in GDP per capita terms and the second one will have income per capita in 1990 as the left-hand side variable. The equations will have distance from Moscow and a binary variable which takes the value 1 if a country was a member of the Soviet Union and 0 otherwise as the right-hand side variables. In order to calculate the distance, I will calculate the distance between the capital of the examined country and Moscow. Distance might play a different role for Soviet as opposed to non-Soviet countries. For example, one might imagine how the Soviet Union was interested in helping out economically (perhaps by shipping supplies and resources) its Soviet republics and it was easier for it to do so as long as these republics were closer to the economic center of the Soviet Union, i.e. Moscow. On average, Soviet republics were 233 kilometers closer to Moscow than non-Soviet republics (average distance of 1,842 km as opposed to 2,075 km). However, one might also wonder whether the Soviet Union had a negative economic effect on non-Soviet communist countries, and whether distance from Moscow impacted this effect in any way.

Another interesting aspect to look at is the effect of trade on growth in Eastern Europe. During the communist regime, there were 2 main types of trade occurring: trade within the Soviet Union and trade with other countries. Distance is usually negatively correlated with trade, but trade is positively correlated with growth. So countries closer to Moscow may have traded more with Russia and we would expect to see higher growth during communism when they had limited trade options outside the Soviet Block. This would presumably have changed after the fall of communism.

Here are the equations I am planning to write:

$$G_{1947-1990} = \text{const} + \text{Distance} + \text{Soviet}$$

$$Y_{1990} = \text{const} + \text{Distance} + \text{Soviet}$$

where:

Y_x = income per capita in the analyzed country in year x

G_{x-y} = growth in income per capita in the analyzed country between the years x and y

D = distance between the capital of the analyzed country and Moscow in kilometers

S = 1 for former Soviet Republic

0 otherwise

Here are the results after running the regression $G_{1947-1990} = \text{const} + \text{Distance} + \text{Soviet}$:

Table 19. Regression Results: Variables Regressed Against Growth in GDP per Capita, 1947-1990

	β
Distance	-.0005** (.0002)
Soviet	-.88* (.5)
<i>Adjusted R²</i>	0.15

Standard errors are presented in parentheses

*Denotes statistical significance at the 10% level

**Denotes statistical significance at the 5% level

This result tells us there is a negative relationship between growth during the communist regime and distance from Moscow for former communist countries/Soviet republics. The closer a country was situated to Moscow, the more it grew on average during the communist regime. This confirms the theory that, within the closed communist system, proximity to the economic center of the system, namely Moscow, was beneficial to a member country's economy. However, this relationship is very weak, so distance from Moscow was not one of the main factors driving growth during the communist regime.

Distance is statistically significant at the 5% level and whether a country was Soviet or not is statistically significant at the 10% level. A country whose capital was 100 kilometers closer to Moscow than another country's capital grew on average by 5 cumulative percentage

points more between 1947 and 1990. However, if a country was part of the Soviet Union, it grew on average by 88.49% less cumulatively between 1947 and 1990. So, given that a country was communist, there was a benefit in being a non-Soviet communist country close to Moscow. Soviet countries had an average growth of 82% less than their non-soviet counterparts.

Here are the results after running the regression $Y_{1990} = const + Distance + Soviet$ on all former communist Eastern European and Central Asian countries in the year 1990:

Table 20. Regression Results: Variables Regressed Against GDP per Capita in 1990

	β
Distance	-1.45*** (.36)
Soviet	450.91 (764.46)
<i>Adjusted R²</i>	0.36

Standard errors are presented in parentheses

***Denotes statistical significance at the 1% level

This result tells us that, at a first view, distance from Moscow is inversely related to economic performance: the closer you are to Moscow, the better off you are economically. Also, this result tells us that Soviet Republics were on average better off than non-Soviet Republics. Distance is statistically significant at the 1% level. Whether a country was Soviet or not is not statistically significant at the 10% level. A country whose capital was 100km closer to Moscow than another country's capital had a GDP per capita that was higher by \$145.01.

7.2 How much Human Capital does Eastern Europe have?

I compare the human capital endowment in some Eastern European countries. The educational attainment data suggests the time devoted to formal education in Eastern Europe be quite similar in all countries and equals roughly 70-80% of the USA. The amount of resources devoted to education does not equal human capital. If I include the rate of returns to education (the Mincerian method), that should reflect the cross-country differences in the efficiency and value of human capital (even though incorrectly), the estimated human capital stock reduces to about 50-60% of the USA.

The direct estimates of human capital by cost or income based methods lead to even larger differences: the per capita stock of human capital in Eastern Europe is 17-35% of the USA calculated at replacement costs (similarly to how physical capital stock is estimated). If I estimate human capital stock from the expected future earnings (as if it was an investment), the difference is even greater: Eastern Europe has about one-fifth to one-sixth of the human capital of the USA.

Which result should be trusted? All the reported measures tell us something important about human capital endowment in Eastern Europe, but each requires a different interpretation. The educational attainment can be seen as a proxy of the share of educated people in the society, which does not equal human capital, however. These estimates suggest rather an upper bound, a possible maximum value of human capital stock: if the institutions and the economy were as efficient in Eastern Europe as in the USA, the human capital endowment could reach 70-80% of the USA. Inefficiencies and structural differences, however, strongly affect how human capital is valued by the market. If I measure this by either replacement costs (Judson method) or by the expected lifetime earnings (Dagum and Slottje method) where these inefficiencies are already implicitly taken account of, the estimated human capital stock becomes much lower.

Here I will run a regression that will have the average years of education in 1990 as a percentage of the average years of education in the United States as the left-hand side variable and distance from Moscow to these countries as the right-hand side variable.

Here is the equation I am planning to write:

$$AYE_{1990} = \text{const} + \text{Distance}$$

Here are the results after running the regression $AYE_{1990} = \text{intercept} + D$ on some Eastern European countries, namely: Bulgaria, Czech Republic, Slovakia, Hungary, Poland, Romania, Estonia, and the Russian Federation:

Table 21. Regression Results: Variables Regressed Against Average Years of Education in 1990

	β
Distance	-.00005** (.00002)
<i>Adjusted R²</i>	0.58

Standard errors are presented in parentheses

**Denotes statistical significance at the 5% level

Distance as a variable is statistically significant at the 5% level. A country whose capital was 100km closer to Moscow than another country's capital had an average number of years of education that was 0.5% closer to the average number of years of education in the United States in 1990, given that all Eastern European countries averaged less years of education than the United States in 1990.

7.3 Agricultural Productivity

I use one set of productivity indicators to get a comprehensive picture: partial productivity: LABOR productivity. Resource endowments play an important role in agricultural productivity growth. Induced innovations in technology are biased towards saving the limiting factor. In the case of labor abundant and land scarce countries, technology innovations are geared towards using the land more efficiently. An example of such innovations is biological innovations. In land abundant and labor scarce countries, technology innovations are geared towards using labor more efficiently. Such innovations include mechanical innovations and an adjustment in the land labor ratio. There are major differences in the resource endowments and the nature of technology in transition countries.

Here I will run a regression that will have the labor/land ratio in 2008 of 24 different former communist countries as the left-hand side variable and distance from Moscow as the right-hand side variable.

Here is the equation I am planning to write:

$$LLR_{2008} = const + Distance$$

where:

LLR_x = the labor to land ratio in a given country in the year x

D = distance between the capital of the analyzed country and Moscow in kilometers

Here are the results after running the regression $LLR_{2008} = intercept + D$ on 24 former communist countries, namely: Mongolia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Azerbaijan, Georgia, Belarus, Moldova, Russia, Ukraine, Estonia, Latvia, Lithuania, Czech Republic, Hungary, Poland, Slovakia, Albania, Bulgaria, Romania, and Slovenia:

Table 22. Regression Results: Variables Regressed Against the Labor to Land Ratio in 2008

	β
Distance	-.000005 (.00002)
<i>Adjusted R²</i>	-0.04

Standard errors are presented in parentheses
No figures are significant at the 10% level

This result tells us that proximity to Moscow is usually correlated with a higher labor to land ratio, however this correlation is very weak. Truly, there is no significant relationship between the labor to land ratio of different former communist countries and their proximity to Moscow. Distance as a variable is not statistically significant at the 10% level.

7.4 Employment Practices

Here I will run a regression that will have the ratio of unskilled to skilled workers in 8 different South-Eastern European countries as the left-hand side variable and distance from Moscow as the right-hand side variable.

Here is the equation I am planning to write:

$$U/S_{2005} = const + Distance$$

where:

U/S_{2005} = ratio of unskilled to skilled workers in the considered countries in the year 2005

D = distance between the capital of the analyzed country and Moscow in kilometers

Here are the results after running the regression $U/S_{2005} = intercept + D$ on 8 former communist countries, namely: Bulgaria, Romania, Albania, Bosnia, Croatia, Macedonia, Serbia, and Montenegro:

Table 23. Regression Results: Variables Regressed Against the Ratio of Unskilled to Skilled Workers in 2005

	β
Distance	.0004 (.0002)
<i>Adjusted R²</i>	0.23

Standard errors are presented in parentheses

No figures are significant at the 10% level

This result tells us that proximity to Moscow is usually equivalent with a lower ratio of unskilled to skilled labor. So, there tends to be a larger proportion of skilled workers in countries that are closer Moscow. However, the relationship is very weak, so there really is no significant relationship between the ratio of unskilled to skilled workers in a country and its geographical position with respect to Moscow. Distance is not significant at the 10% level in predicting the ratio of unskilled to skilled workers in a country. However, if we were to assume the results of this regression hold, a country with its capital 100km closer to Moscow than another country's capital would have such a ratio of unskilled to skilled workers that would be smaller by 0.04 than the further away country.

7.5 What drives Growth in Europe?

In this section I will attempt to discover the main drivers of growth in Europe. Specifically, I will look into whether what drives growth in Europe differs between Western Europe, non-Soviet Eastern Europe and Soviet Eastern Europe. I will look into these effects both during and after communism, to see if anything significant changed in the years immediately after communism.

I will run a regression for two time periods, one between the years 1947 and 1990 (during communism) and one between the years 1991 and 2003 (right after the fall of communism). The regression will have growth in GDP per capita between the two years considered as the left-hand side variable. In the case of growth in GDP per capita during the communist regime, I will run a regression with growth as the depend variable on whether a country was democratic or communist, whether a country was part of the Soviet Union or not, imports and exports as a percentage of that country's GDP, and interaction terms. In the case of growth after the communist regime, I will also add foreign direct investment per capita and the average yearly total tax rate as a percentage of commercial profits.

Here are the equations I am planning to write:

$$G_{1947-1990} = const + I_{1960-1990} + I_{1960-1990} * Dem + E_{1960-1990} * Dem + Dem + S + I_{1960-1990} * S + E_{1960-1990} + E_{1960-1990} * S$$

$$G_{1990-2003} = const + I_{1991-2003} + I_{1991-2003} * Dem + E_{1991-2003} * Dem + FDI_{1989-2003} + FDI_{1989-2003} * Dem + T_{2005-2011}$$

where:

G_{x-y} = growth in GDP per capita between the years x and y in the considered countries,
 $y > x$

Dem = 1, if a country was democratic during the communist regime

0, otherwise

S = 1, if a country was part of the Soviet Union

0, otherwise

I_{x-y} = imports of goods and services as an average percentage of GDP between the years x and y

E_{x-y} = exports of goods and services as an average percentage of GDP between the years x and y

FDI_{x-y} = cumulative foreign direct investment net inflows per capita between the years x and y, expressed in United States Dollars, $y > x$

T_{x-y} = average total tax rate as a percentage of commercial profits between the years x and y, $y > x$

Here are the results:

Table 24. Regression Results: Variables Regressed Against the Growth in GDP per Capita, 1947-1990

	β
Imports 1960-1990	.01 (.03)
(Imports 1960-1990) * Democracy	.11 (.11)
(Exports 1960-1990) * Democracy	-.23** (.1)
Democracy	4.56*** (1.26)
Soviet	.4 (1.58)
(Imports 1960-1990) * Soviet	-.05 (.06)
Exports 1960-1990	.06** (.03)
(Exports 1960-1990) * Soviet	.03 (.05)
<i>Adjusted R²</i>	0.42

Standard errors are presented in parentheses

**Denotes statistical significance at the 5% level

***Denotes statistical significance at the 1% level

Table 25. Regression Results: Variables Regressed Against the Growth in GDP per Capita, 1990-2003

	β
Imports 1991-2003	-.01 (.01)
(Imports 1991-2003) * Democracy	-.01 (.01)
(Exports 1991-2003) * Democracy	.02** (.01)
FDI 1989-2003	-.0001 (.0001)
(FDI 1989-2003) * Democracy	-.0001 (.0001)
Taxes 2005-2011	-.35 (.46)
<i>Adjusted R²</i>	0.4

Standard errors are presented in parentheses

**Denotes statistical significance at the 5% level

The first result tells us that, during the communist regime, democratic countries grew more than communist countries. Moreover, Soviet countries grew more than soviet countries, this effect being separated from the previous effect. Countries that traded more tended to grow faster on average than other countries. Even though communism ended in theory, a post-communist period followed, where the countries that were communist previously had not embraced democracy completely just yet. The results are even more dramatic for former Soviet countries as opposed to former communist non-Soviet countries. After the fall of communism, countries that relied more on imports tended to grow less. Foreign direct investment does not seem to have played a significant role in the growth of different countries, but the amount of taxation did. Countries with higher tax rates tended to grow less than countries with lower tax rates.

In the first regression, democracy is significant at the 1% level, exports60-90 and the interaction term (exports60-90 * democracy) are significant at the 5% level. In the second regression, the interaction term (exports * democracy) is significant at the 5% level. No other

figures are significant at the 10% level. A democratic country grew by 455.99 cumulative percentage points in GDP per capita more than a communist country between the years 1947 and 1990. If a communist country could have increased exports by 1% more of their GDP, it would have grown 6.19 cumulative percentage points more in the same time period. However, if that country was democratic during the communist regime, increasing exports by 1% would have decreased their growth by 16.72%. After communism, if a democratic country would have increased their exports by 1% more of their GDP, they would have grown by 2.07 cumulative percentage points more during the period 1990-2003.

Given the positive relationship between human capital and economic growth, it can be inferred that countries that experienced higher growth rates also had both higher human capital levels and higher investment in human capital levels. These countries probably had a higher agricultural productivity also, as well as a more favorable ratio of skilled to unskilled workers.

7.6 What drives Longevity Increase in Europe?

Income is not the only parameter that describes the welfare of a country. Other potential parameters are health and human capital. Health can be measured by longevity, and human capital can be estimated using an education parameter. In this section, I will look at what factors drive an increase in longevity in Europe. I will look into longevity for males and for females, both during and after communism. I will run regressions using these endogenous variables and the same parameters as in the previous section.

Here are the equations I am planning to write:

$$GLM_{1960-1990} = const + Dem + Soviet + I_{1960-1990} + E_{1960-1990}$$

$$GLF_{1960-1990} = const + Dem + Soviet + I_{1960-1990} + E_{1960-1990}$$

$$GLM_{1990-2009} = const + Dem + Soviet + I_{1991-2010} + E_{1991-2010} + FDI_{1991-2010} + T_{2005-2011}$$

$$GLF_{1990-2009} = const + Dem + Soviet + I_{1991-2010} + E_{1991-2010} + FDI_{1991-2010} + T_{2005-2011}$$

where:

GLM_{x-y} = growth in males' lifespan between the years x and y, $y > x$

GLF_{x-y} = growth in females' lifespan between the years x and y, $y > x$

These regressions have been run on 44 European and Central Asian countries, namely: Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkmenistan, Ukraine, United Kingdom, and Uzbekistan. Here are the results:

Table 26. Regression Results: Variables Regressed Against the Growth in Males' Lifespan, 1960-1990

	β
Democracy	2.52** (1.21)
Soviet	-.31 (1.24)
Imports 1960-1990	.25*** (.06)
Exports 1960-1990	-.27*** (.06)
<i>Adjusted R²</i>	0.36

Standard errors are presented in parentheses

**Denotes statistical significance at the 5% level

***Denotes statistical significance at the 1% level

Table 27. Regression Results: Variables Regressed Against the Growth in Females' Lifespan, 1960-1990

	β
Democracy	.69 (1.01)
Soviet	-1.99* (1.03)
Imports 1960-1990	.2*** (.05)
Exports 1960-1990	-.23*** (.05)
<i>Adjusted R²</i>	0.39

Standard errors are presented in parentheses

*Denotes statistical significance at the 10% level

***Denotes statistical significance at the 1% level

Table 28. Regression Results: Variables Regressed Against the Growth in Males' Lifespan, 1990-2009

	β
Democracy	-5.5 (5.7)
Soviet	-6.11 (4.34)
Imports 1960-1990	.04 (.18)
Exports 1960-1990	-.2 (.17)
FDI 1991-2010	.0001 (.0001)
Taxes 2005-2011	-4.58 (9.98)
<i>Adjusted R²</i>	-0.01

Standard errors are presented in parentheses

No figures are significant at the 10% level

Table 29. Regression Results: Variables Regressed Against the Growth in Females' Lifespan, 1990-2009

	β
Democracy	-7.39 (6.17)
Soviet	-5.69 (4.7)
Imports 1960-1990	-.01 (.19)
Exports 1960-1990	-.17 (.19)
FDI 1991-2010	.0001 (.0002)
Taxes 2005-2011	-4 (10.79)
<i>Adjusted R²</i>	-0.03

Standard errors are presented in parentheses
No figures are significant at the 10% level

From the results of these equations, we learn that males in a specific country tended to live more, the more the country was more dependent on imports, in both time periods. Imports also tended to benefit females during the communist regime, but not after, when we notice a negative relationship between the amount of imports as a percentage of GDP and growth in females' lifespan. For both males and females, both during and after communism, exports have a negative effect on lifespan growth. The more a country exported, the less people's lifespan increased. People's lifespan increased more if a country was democratic during the communist regime. However, after the fall of communism, it was the former communist countries that experienced the largest increase in lifespan, meaning that the situation immediately improved after the fall of communism. Both during and after communism, the lifespan of people in non-soviet countries tended to increase faster than in soviet or former soviet countries. Foreign direct investment does not seem to have any effect on growth in lifespan and taxes have a clear negative effect on growth in lifespan. When a country has to pay less taxes to its state, its people live longer.

In the first regression, the democracy variable is statistically significant at the 5% level, and imports and exports are significant at the 1% level. In the second regression, the Soviet variable is statistically significant at the 10% level, and imports and exports are both significant at the 1% level. No other variables are significant at the 10% level. The lifespan of men living in democratic countries increased by 2.52 years more than the lifespan of men living in communist countries between the years 1960 and 1990. If, during the communist regime, a country increased its imports as a percentage of its GDP by 1%, the lifespan of males in that country would have increased by 0.25 years more between 1960 and 1990. On the other hand, if a country increased its exports by the same amount, the lifespan of males would have diminished by 0.27 years. The lifespan of women living in the Soviet Union increased by 1.99 years less than the lifespan of females living outside the Soviet Union between 1960 and 1990. If a country increased imports as a percentage of GDP by 1% in that period, the lifespan of females in the respective country would have increased by 0.2 years more. On the other hand, if exports were to rise by 1%, women would have lived 0.23 years less.

7.7 What drives Investment in Human Capital in Europe?

The other agreed upon measure of welfare is human capital. One of the ways human capital can be cultivated is through education. The quality of education is directly proportional with the amount of spending on education. However, different countries have different spending possibilities, according to their GDP. In order to account for this difference, I will look at spending as a percentage of GDP, as opposed to aggregate spending. In this section I will investigate what drives an increase in the average expenditure per student at a primary level as a percentage of GDP between the years 1998 and 2009.

Here is the equation I am planning to write:

$$AExp_{1998-2009} = const + Dem + Soviet + I_{1991-2010} + E_{1991-2010} + FDI_{1991-2010} + T_{2005-2011}$$

The regression has been run 34 European and Central Asian countries, namely: Albania, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Moldova,

Mongolia, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom. Here are the results:

Table 30. Regression Results: Variables Regressed Against the Average Expenditure per Student, 1998-2009

	β
Democracy	- .81 (5.87)
Soviet	-3.05 (4.77)
Imports 1991-2010	.16 (.28)
Exports 1991-2010	-.22 (.22)
FDI 1991-2010	.0001 (.0001)
Taxes 2005-2011	-11.21 (16.21)
<i>Adjusted R²</i>	-0.14

Standard errors are presented in parentheses
No figures are significant at the 10% level

This result tells us that former communist countries put more emphasis, at least at a formal level, on primary level education than developed countries. However, this might also mean that they simply must make a higher effort given their lower GDPs in order to provide an adequate education for their children, when compared to their Western European counterparts. Non-Soviet countries tend to spend more on primary education than former Soviet countries. Countries that import more and export less tend to spend more on primary education. Foreign direct investment does not seem to have any effect on expenditure per student at a primary level and taxes actually have a negative effect on primary education spending. The more a country taxes commercial profits, the less it seems to invest in primary education.

There are no statistically significant variables at the 10% level. Countries that were democratic during the communist era spent 0.81% of their GDP less than countries that were

communist per student at a primary level between the years 1998 and 2009. Countries that were part of the Soviet Union spent 3.05% less during the same time period. A 1% increase in imports as a percentage of GDP between the years 1991 and 2010 would have increased spending per student at a primary level by 0.16% as a percentage of GDP. Similarly, a 1% increase in exports would have decreased spending by 0.22%. A \$10,000 increase in FDI per capita between the years 1991 and 2010 would have increased spending by 0.67%. A 1% increase in the total tax rate as a percentage of commercial profits would have decreased spending per student at a primary level of education by 0.11%.

8. Conclusions

After the fall of the communist system, it may have been easier for a country like Czechoslovakia to transition to the market economy considering the preexisting industrial infrastructure, compared to a country like Bulgaria which had almost no industrial infrastructure and was producing agricultural goods at inefficiently high costs, mainly because of the lack of modern mechanized equipment. I conclude that communism had a large overall negative effect on Eastern Europe and that even now, more than 20 years after its fall, Eastern Europe is still fighting against the inertial self-projecting ghost of communism.

Democratic Europe grew more than communist Europe during the communist regime. Within communist Europe, at the end of communism, former Soviet Europe had higher absolute levels of income than non-Soviet former communist Europe. However, after the fall of communism, non-Soviet former communist Europe had a positive growth rate, as opposed to former Soviet Europe, which had a negative growth rate. These effects, especially the latter one, were so dramatic that former communist non-Soviet Europe clearly surpassed the income levels reported in the former Soviet Union within the first decade after the fall of communism. The amount of foreign direct investment a country received does not seem to have had any significant impact on GDP evolution, longevity, or spending on education. The fact that a country was not a part of the Soviet Union, the fact that a country was democratic during the communist regime, and exports all seems to be positively correlated with growth, both during and after communism. Imports and taxes seem to have a negative effect on growth. In terms of longevity, not having been part of the Soviet Union seems to have a positive effect on increase in lifespan. Exports and

taxes seem to have a negative effect on lifespan. Imports have had a positive effect on lifespan, except for women after communism, when they had a negative effect. Being democratic during the time of the communist regime had a positive effect on lifespan during communism, but not after. After the fall of communism, countries that were part of the non-Soviet communist bloc tended to spend a larger portion of their GDP on education. Countries that relied more on imports tended to invest more in education, whereas exports and taxes had a negative effect on education spending.

My findings raise a few questions that future work should address. The first question would be why doesn't foreign direct investment have any significant impact on any economic indicators? The second question would be why do imports have a negative effect on economic growth? What is the meaning behind the negative relationship between exports and longevity? What is the meaning behind the negative relationship between imports after communism and women's longevity? Why does non-Soviet Eastern Europe spend more on education as a percentage of GDP than former Soviet countries? What is the meaning behind the positive relationship between imports and education spending? Similarly, what is the meaning behind the negative relationship between exports and education spending? How about the negative relationship between taxes and education spending? These questions are meant to show that even though this paper has identified some interesting results, much work is still left to be done in order to identify the complete magnitude of the economic effects of communism.

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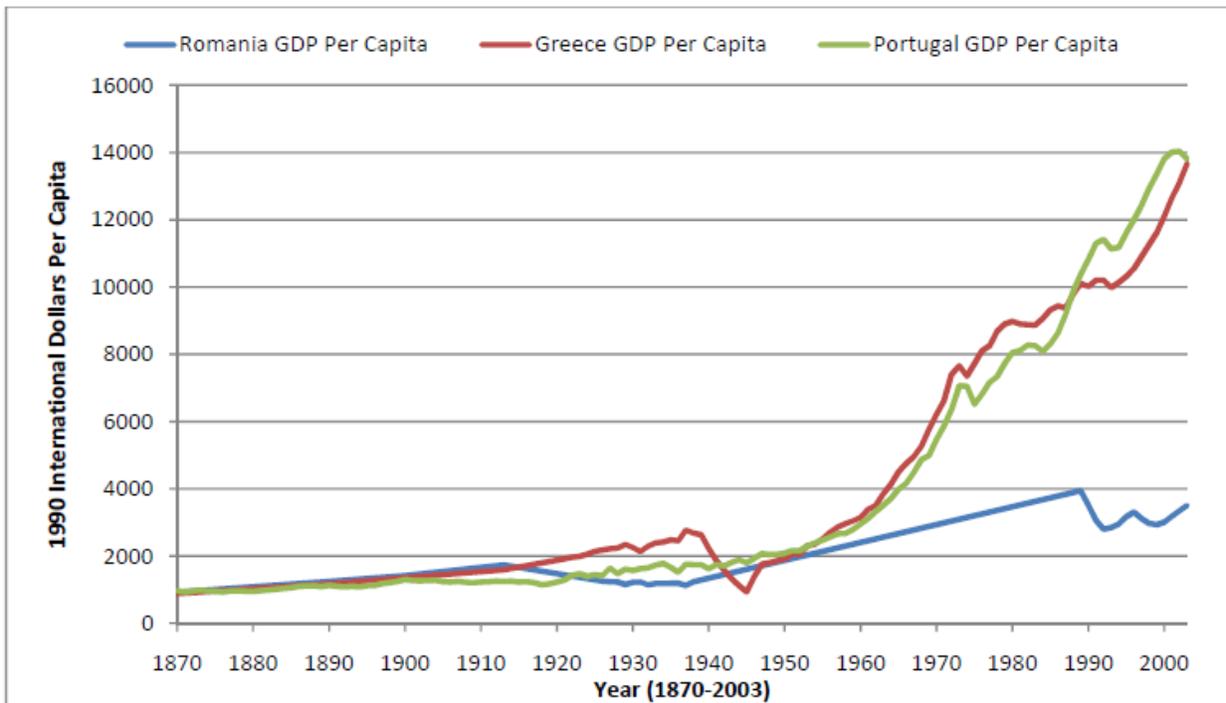
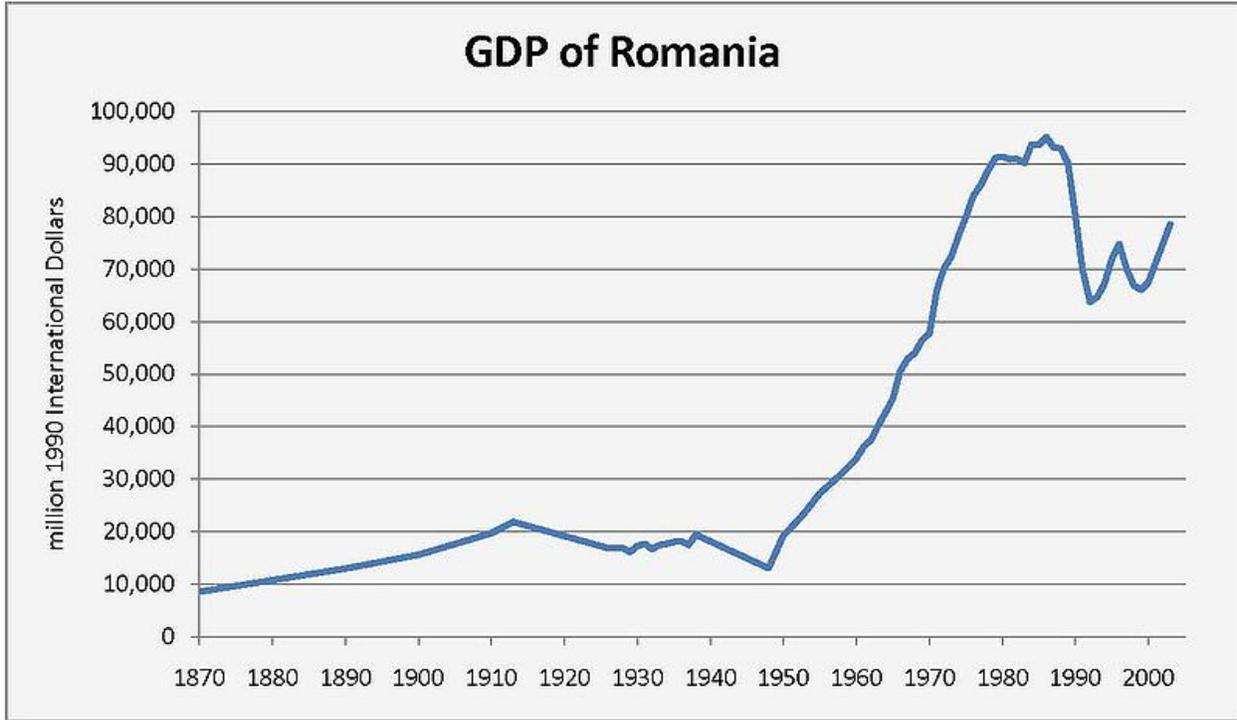
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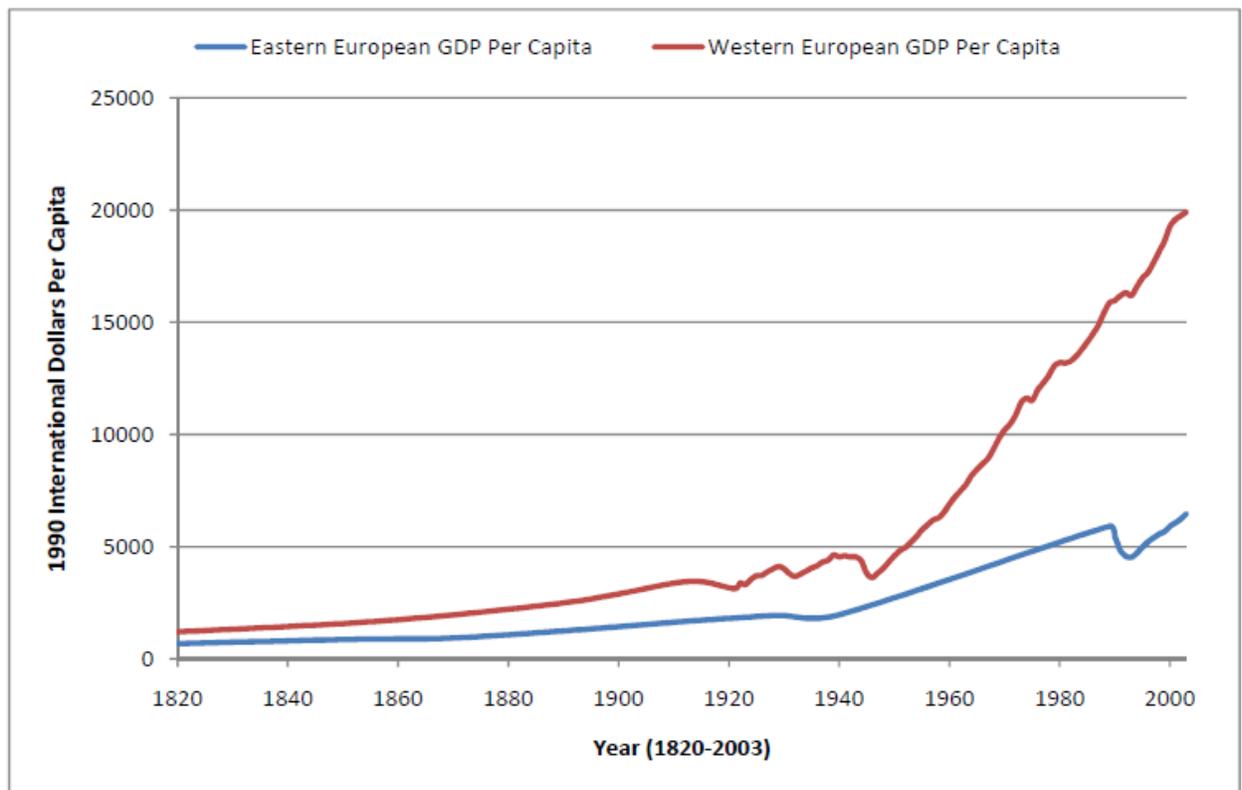
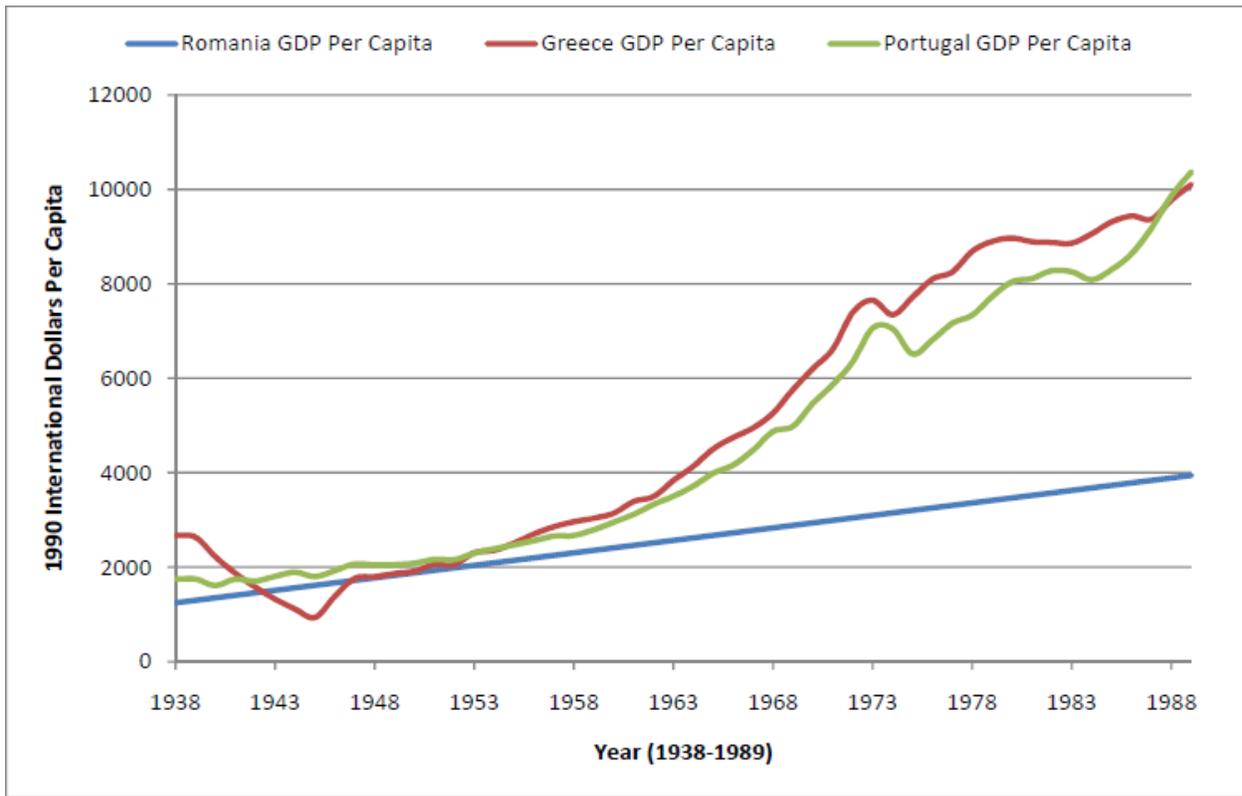
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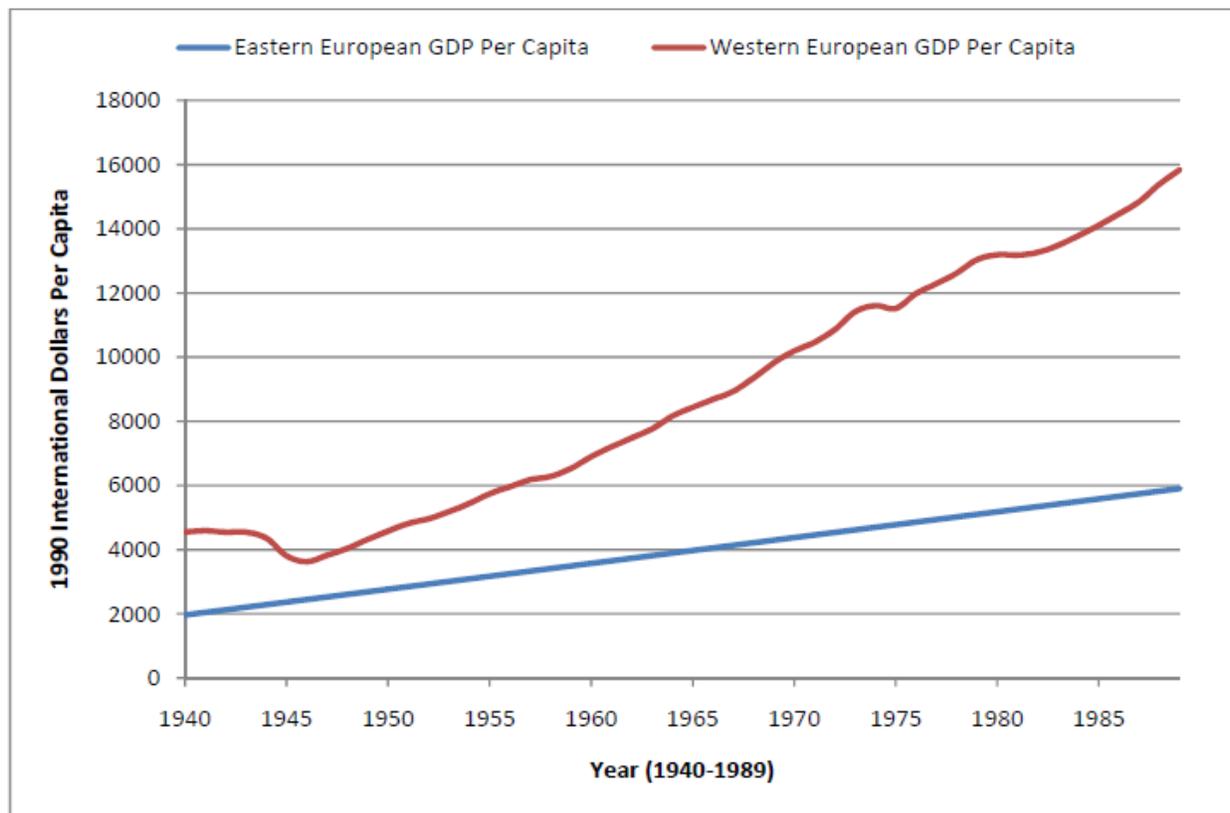
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Graphs and Tables







(Maddison 2007)

APPENDIX B Absolute FDI inflows**Table B.1 FDI inflows into CEE, millions of USD**

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003 ^a
Albania	20	45	65	89	97	42	45	51	143	204	135	178
Bulgaria	42	40	105	98	138	507	537	789	1 003	641	876	1 398
Croatia	13	102	110	109	486	347	835	1 420	1 085	1407	591	1 700
Czech Rep	983	563	749	2 526	1 276	1 275	3 591	6 234	4 943	5476	8 276	2 351
Estonia	80	156	212	199	111	130	574	222	324	342	153	743
Macedonia	0	0	24	12	12	18	118	32	176	439	77	94
Hungary	1 471	2 328	1 097	4 410	3 295	3 719	3 065	3 065	2 191	3 580	2 590	874
Latvia	..	50	279	245	379	515	303	331	401	170	374	328
Lithuania	..	30	31	72	152	328	921	478	375	439	715	142
Poland	284	580	1 846	3 617	4 445	4 863	6 049	7 239	9 234	5 802	3 901	3 839
Romania	73	87	341	417	415	1 267	2 079	1 025	1 051	1 154	1 080	1 528
Slovakia	100	107	236	194	199	84	374	701	2 058	1 460	4 007	549
Slovenia	113	111	129	161	167	303	221	59	71	371	1 748	-118
Total	3 179	4 199	5 224	12	11	13	18	21 646	23	21	24	13
				149	172	398	712		055	485	523	606

Source: EBRD (2004), Table A.2.8

Notes

“..” indicates that data is not available

Negative figures indicate disinvestment; foreign owned facilities have been closed down

a: Data for 2003 is an estimate.

Table 2.2 Inward FDI in the CEE economies

Country	Cumulative FDI inflows 1989-2003 per capita, USD	Cumulative FDI-inflows 1989-2003 (millions of USD)	FDI inward stock as share of GDP in 2003 (%)
Czech Rep	3 710 (1)	38 243 (2)	48.0 (4)
Hungary	3 364 (2)	33 641 (3)	51.8 (2)
Estonia	2 402 (3)	3 246 (11)	77.6 (1)
Slovakia	1 894 (4)	10 185 (5)	31.5 (6)
Croatia	1 857 (5)	8 204 (6)	49.6 (3)
Slovenia	1 647 (6)	3 277 (10)	15.6 (13)
Latvia	1 454 (7)	3 372 (9)	35.1 (5)
Poland	1 355 (8)	51 906 (1)	24.9 (9)
Lithuania	1 067 (9)	3 683 (8)	27.2 (8)
Bulgaria	795 (10)	6 235 (7)	29.1 (7)
Macedonia	501 (11)	1 002 (13)	22.1 (11)
Romania	486 (12)	10 536 (4)	23.4 (10)
Albania	352 (13)	1 114 (12)	18.1 (12)
Average	1 606	13 434	34.9

Source: EBRD (2004), Table A.2.8 and UNCTAD (2004) Annex Table B.6

Table 2.3 Inward FDI in the CIS economies

Country	Cumulative FDI inflows 1989-2003 per capita, USD	Cumulative FDI- inflows 1989-2003 (millions of USD)	FDI inward stock as share of GDP in 2003 (%)
Kazakhstan	1 094 (1)	15 730 (1)	60.1 (2)
Azerbaijan	873 (2)	7 214 (2)	117.7 (1)
Armenia	277 (3)	868 (10)	31.9 (4)
Georgia	272 (4)	1 257 (7)	26.3 (6)
Turkmenistan	269 (5)	1 613 (6)	16.8 (7)
Moldova	210 (6)	893 (9)	40.5 (3)
Belarus	200 (7)	1 979 (5)	10.8 (10)
Ukraine	128 (8)	6 213 (3)	14.1 (8)
Kyrgyzstan	85 (9)	413 (11)	28.6 (5)
Uzbekistan	35 (10)	917 (8)	10.6 (11)
Tajikistan	34 (11)	223 (12)	14.1 (8)
Russia	31 (12)	4 478 (4)	12.1 (9)
Average	292	3 483	32.0

Source: EBRD (2004), Table A.2.8 and UNCTAD (2004) Annex Table B.6

Table 2.4 Source countries of FDI to transition economies, per cent of total inward stock 2000

Country	Czech rep.	Estonia	Latvia	Lit.	Hungary	Poland	Armenia	Azerbaijan	Kazakhstan ^a
EU-15	84.1	83.4	50.4	64.4	80.3	68.2	47.2	28.7	37.3
<i>Austria</i>	11.1	0.3	0.5	0.7	12.2	1.5	0.0	0.0	<0.1
<i>France</i>	4.3	0.5	<0.1	1.1	6.5	19.2	19.8	5.0	1.9
<i>Finland</i>	0.6	29.9	6.2	6.0	1.6	0.8	0.0	0.0	<0.1
<i>Germany</i>	25.5	2.6	11.1	7.4	25.8	13.4	<0.1	1.5	1.3
<i>Netherlands</i>	30.1	2.4	2.8	1.1	22.5	8.6	<0.1	0.3	9.5
<i>Sweden</i>	1.4	39.8	12.6	17.3	0.9	4.3	0.0	0.0	<0.1
<i>United King.</i>	5.4	2.5	5.0	6.7	1.1	5.0	5.8	18.3	12.6
United States	6.5	4.6	9.4	9.8	8.2	14.7	10.1	30.4	40.9
Japan	0.5	0.1	0.0	<0.1	2.1	1.0	0.0	3.6	2.2
Central and Eastern Europe	1.5	1.5	18.1	11.2	0.8	2.5	27.0	7.5	4.3
Sum	92.6	89.6	77.9	85.4	91.4	86.4	84.3	70.2	84.7

Source: UNCTAD (2005)

Notes

a: Data for 2002.