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Foreign Investment and Income Inequality
The Natural Experiment of Central and Eastern Europe

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Abstract
How does foreign direct investment (FDI) affect income inequality? We bring evidence from the natural experiment of Central and Eastern Europe (CEE) to bear on a hotly debated topic. We begin by outlining the literature on the effect of FDI on income inequality, and the serious critiques offered by Firebaugh that raised doubt on previous research. We then discuss the ways in which CEE countries provide a natural experiment with which to contribute to this debate. We estimate a series of fixed effects regression models that relate income inequality to foreign investment and a baseline internal development model. We find that foreign investment has a robust positive effect on income inequality, net of unmeasured heterogeneity across cases, the internal development model, additional controls, and the critiques offered by Firebaugh. Further, we show that the effect is observable over the short term, no matter how FDI is measured. We conclude by directing attention to CEE countries as a historically unique opportunity to gauge the effect of exposure to the world economy on many development outcomes.

Key words: Central and Eastern Europe • development • foreign direct investment • inequality • post-socialist transition

INTRODUCTION

One foundational orienting question for the social sciences has been the source of various forms of inequality (e.g. Alderson and Nielsen, 1999; Mahutga, 2006; Milanovic, 2005; Morris and Western, 1999; Nielsen, 1994). One of the standard approaches to the explanation of cross-national variation in income inequality is offered by the foreign investment dependence (PEN) – the percentage of a national economy owned by foreign actors – literature, which suggests that a high level of foreign ownership in a domestic economy increases the level of inequality for the country as a whole (e.g. Beer and Boswell, 2002; Bornschier and Ballmer-Cao, 1979;

Bornscheir et al., 1978). Indeed, the purported impact of PEN is not limited to inequality trends, but also affects many development outcomes, such as economic growth and urbanization (Bornscheir and Chase-Dunn, 1985; Dixon and Boswell, 1996; Evans and Timberlake, 1980; Kentor, 1998, 2001). Further, a large and growing body of literature finds that PEN affects an economy's impact on the environment by generating higher pollution rates (Jorgenson, 2006a, 2006b; Jorgenson and Kick, 2006; Kentor and Grimes, 2006).

However, the literature finding deleterious PEN effects was subject to a serious critique by Firebaugh (1992). This was followed by a fairly convincing rebuttal (Dixon and Boswell, 1996), and subsequent findings that tended to support the inequality increasing effects of penetration across a rather heterogeneous sample of countries (Alderson and Nielsen, 1999). Nevertheless, the debate about the developmental effects of PEN is far from settled. In particular, there continues to be some debate over whether or not it 'makes sense' to conceptualize the effects of foreign direct investment as the delayed consequences of the historical penetration of a national economy that leads to long-term 'disarticularion', or rather that the effects of FDI can only truly be assessed over the short term – and studies taking the latter view tend to contradict the hypotheses of the PEN literature (e.g. de Soysa and Oneal, 1999, cf. Dixon and Boswell, 1996; Kentor, 1998).

We argue that the recent experience of post-socialist transition countries from Central and Eastern Europe (CEE) provides a natural experiment with which to assess the effect of foreign investment dependence on income inequality. These countries had almost zero foreign investment prior to the fall of the communist regimes, after which they increasingly opened up to foreign investment to varying degrees (Bandelj, 2008). Thus, this case provides a window through which to view changes in the distribution of income as economies that were isolated from Western political and economic practices, fairly advanced in terms of their industrial infrastructure and egalitarian in terms of their political orientation, become exposed to foreign investment.

This article begins by outlining the debate on the effect of inequality from the dependency/world-systems perspective and the subsequent critique offered by Firebaugh (1992). We then discuss the various ways in which CEE provides a natural experiment with which to assess the role FDI plays in income inequality, and discuss the mechanisms through which FDI likely impacts income inequality in CEE. We continue by discussing control variables that should be included in order to isolate the effect of FDI on inequality: a) the internal development model (Alderson and Nielsen, 1999; Nielsen, 1994), and b) additional factors proposed by the literature: rising unemployment, the retrenchment of government spending and the relative level of privatization. We then estimate a series of fixed effects models that control for unmeasured time-invariant unit-specific heterogeneity. We find that PEN significantly increases income inequality, net of the internal development model, the critiques suggested by Firebaugh (1992),

and other potential suspects. Further, we show that both yearly inflow and accumulated stock have substantively identical effects, indicating that the effect of FDI in these CEE cases is significant over the fairly short term. We conclude by suggesting that transition countries will continue to provide an important research site allowing researchers to assess the effect of FDI and globalization on inequality, as well as other outcomes over the course of these countries' long-term change.

FOREIGN INVESTMENT AND INCOME INEQUALITY

Those approaching the problem of development from the world-systems/dependency perspectives suggest that PEN has deleterious consequences for host economies. In particular, PEN contorts the composition of a nation's forces of production to rely on low wage and unskilled labor to produce goods at low levels of technological sophistication. This creates few opportunities for beneficial 'spill-over' effects such as research and development activities, industrial services or differentiation (Bornschier and Ballmer-Cao, 1979; Bornschier and Chase-Dunn, 1985; Galtung, 1971; Hirschman, 1945). Furthermore, heavy dependence on foreign capital promotes an uneven distribution of capital intensity across sectors and geographical regions in the receiver economy. This concentrates income in (typically more productive) outward oriented sectors, increasing overall income inequality (Frank, 1967; Stack, 1980). In addition, PEN constrains the development of bureaucratic skills necessary for a highly functioning business sector. This increases inequality because it delimits the production of human capital within the receiver economy (Bornschier and Ballmer-Cao, 1979; Bornschier and Chase-Dunn, 1985; Evans and Timberlake, 1980).

Scholars also argue that foreign capital penetration encourages inequality by influencing the distributive capacity of nation-states. Increases in global capital flows tend to produce a 'race to the bottom' in which governments in developing nations seek to attract foreign investment by implementing policies that lower the bargaining power of labor, eliminate provisions that encourage full employment and wage enhancement, such as job training and local purchasing requirements, and thus remove institutional constraints on rising income inequality (Beer and Boswell, 2002; DeMartino, 1998; McMichael, 1996; Ranney, 1998). In sum, the dependency and world-systems perspectives suggest that PEN is associated with higher levels of inequality.

While many studies in the world systems/dependency literature report the deleterious effect of PEN on economic growth and income equality (Alderson and Nielsen, 1999; Bornschier and Ballmer-Cao, 1979; Bornschier and Chase-Dunn, 1985; Bornschier et al., 1978; Dixon and Boswell, 1996; Evans and Timberlake, 1980; Kentor, 1998; Tsai 1995), early studies were subject to a major critique by Firebaugh (1992). In the context of economic growth, PEN researches estimated models that contained both FDI flow (the yearly inflow) and FDI stock (the cumulated inflow) in the same equation, and interpreted a positive coefficient

on the former as a short-term beneficial effect, and a negative coefficient on the latter as a long-term deleterious one. Firebaugh countered that the negative sign on the stock variable could also be interpreted as a beneficial effect of the foreign investment rate: the faster the yearly inflow of foreign investment, the faster the economic growth. This argument stems from the fact that the foreign investment rate is calculated as the ratio of flow/stock, so that including both flow and stock as separate regressors is equivalent to estimating the effect of the numerator while holding the denominator constant in the case of flow, and vice versa in the case of stock. Thus, 'a negative effect of foreign investment stock in such a model would indicate a positive effect of the foreign investment rate on growth because, keeping flow constant, the larger the stock the smaller the rate' (Alderson and Nielsen, 1999: 612). Firebaugh concludes by arguing that the correct interpretation for the findings from PEN studies is that the foreign investment rate (the ratio of flow/stock) benefits developing countries, but that it doesn't benefit them as much as domestic investment.

We should note that Firebaugh's main critique was directed at interpretations of the effects of foreign investment on economic growth rather than on income inequality. Nevertheless, Firebaugh (1992) argues that the logic holds in the context of 'non-economic' outcomes (pp. 123–4), and as Alderson and Nielsen (1999) emphasized, studies measuring the effect of investment dependence on inequality should also avoid misinterpretation due to denominator effects. We follow previous analyses (Alderson and Nielsen, 1999; Dixon and Boswell, 1996) and use a variety of model specifications to avoid misinterpreting any results for foreign capital penetration.

FOREIGN INVESTMENT AND TRANSITION FROM SOCIALISM: THE NATURAL EXPERIMENT OF CENTRAL AND EASTERN EUROPE

Post-socialist countries in Central and Eastern Europe present a natural experiment with which to study the effects of FDI on inequality because private foreign investment was practically non-existent prior to the collapse of communist regimes, after which the barriers to liberalization were lifted (Bandelj, 2008). It is important to acknowledge that some intra-regional investment activities occurred within the Council of Mutual Economic Assistance (CMEA), the economic organization of communist states that existed from 1949 to 1991 – the so-called COMECON countries (which included the Soviet Union and its satellite states) – forming 'a handful of joint enterprises' and 'joint investment projects' (McMillan, 1987: 4). However, such efforts did not involve direct equity investment of one COMECON state into another, and thus, as McMillan specifies, would not qualify as FDI proper. Moreover, de facto liberalization started before 1989 in Hungary, Poland and former Yugoslavia. Consistent with their socialist reform efforts, these countries put in place laws that allowed formation of joint ventures with foreign firms after 1985. By 1988 these states legalized full foreign ownership of firms as did the Baltic states of Estonia, Latvia and

Lithuania, as part of perestroika in the Soviet Union. Nevertheless, as Table 1 shows, practical consequences of de facto liberalization are evident only by 1989 when FDI flows started to penetrate Central and Eastern Europe. Thus, CEE presents a historically unique opportunity to assess the effects of foreign investment on inequality in a context where it did not exist previously.

Table 1 Foreign direct investment trends in CEE

	FDI inflows ($ billion) [a]		average FDI stock as % GDP [b]	
	CEE	**World**	**CEE**	**World**
1970	0	13	0	–
1980	0	55	0	5
1985	0	58	0	7
1986	0	87	0	7
1987	0	140	0	7
1988	0	165	0	7
1989	<1	193	<1	8
1990	<1	208	2	8
1991	2	161	2	8
1992	3	169	5	8
1993	4	228	7	9
1994	4	259	9	9
1995	10	341	9	9
1996	8	393	10	10
1997	10	488	15	12
1998	17	701	18	14
1999	18	1092	22	16
2000	20	1397	26	18
2001	20	826	30	20

[a] Cumulative FDI inflows in a particular year.
[b] Average for the region/world.
[c] CEE: Central and Eastern Europe includes Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.
Source: UNCTAD (2006).

Two other factors set the CEE case apart from the typical peripheral economy and make it a natural experiment to assess the effect of FDI on income inequality: a comparatively high level of industrialization, and initially low level of inequality. First, the world-systems perspective was developed to explain the influence of the global economy on former colonies. These colonies were incorporated into the world-system as producers of agriculture and natural resource goods for advanced industrial countries. Thus, the effect of FDI on these countries worked itself out over the long term by delimiting the spread of industrialization in these countries, and 'disarticulating' the industry that did develop (Dixon and Boswell, 1996). Hence, the colonies remained underdeveloped, with little industrial infrastructure until the later part of the 20th century. On the other hand, one of the core missions of the communist regimes was heavy industrialization with a goal to surpass the productivity of capitalist states, and a high level of energy was spent building up the productive capacity of these countries (Kornai, 1992; Rona-Tas, 1997). As a result, CEE countries were more industrially advanced than a prototypical underdeveloped country upon the collapse of the communist regimes and onset of economic liberalization and global integration. Thus, while the effect of foreign capital penetration manifested in a long-term 'disarticulation' of stereotypical peripheral economies, the effects of foreign investment in the CEE case represent the consequences of immediate and rapid penetration of a relatively advanced economy by foreign capital.

Second, prior to 1989 CEE countries embodied the socialist creed 'from each according to his ability, to each according to his need' to varying degrees (Marx, 1875). While analyses show that the actual socialist systems could not erase inequalities (Szelenyi, 1978), scholars agree that social inequality during socialism was substantially lower than social inequality in other systems at comparable levels of industrial development (Boswell and Chase-Dunn, 2000; Heyns, 2005). After 1989, CEE countries embarked on market reform, more or less quickly abandoning state-socialist ideals and replacing them with neoliberal policy scripts (Bockman and Eyal, 2002). Thus, the socialist policies of full employment and basic needs provision – universal education, health care, subsidized housing and cultural goods – became exposed to the anti-state interventionism logic of neoliberal thinking. Part and parcel of this process was the opening up of CEE countries to FDI.

We argue that foreign direct investment has significantly contributed to the rise in income inequality in Central and Eastern Europe. Given the unique economic and social history of CEE countries, the mechanism through which FDI increases inequality relate to short-term – but rapid – changes to the political economy. In particular, we posit three possible mechanisms. First, we argue that FDI is likely to increase income inequality through fostering one of two possible types of dualism between the foreign and domestic sectors. In the first type of dualism, foreign firms pay less than their domestic counterparts, which leads to income inequality between labor in the foreign and the domestic sectors. This line of reasoning is largely consistent with the body of literature on the growth consequences of FDI

penetration, which suggests that, at the very least, foreign capital is *less productive* than domestic capital (Firebaugh, 1992; cf. Dixon and Boswell, 1996).

In the second type, sector dualism could arise if the foreign sector, while smaller than the domestic sector, actually pays higher wages relative to the domestic sector. There is growing evidence suggesting just this scenario in countries outside Central and Eastern Europe (Aitken et al., 1996; ILO, 1998; Moran, 2002). Exactly why this is tends to be open to debate, and a major culprit might be that foreign firms tend to be more capital intensive and operate on a larger scale than domestic firms (Aitken et al., 1996; cf. Lipsey and Sjoholm, 2001), which increases the demand for skilled labor relative to unskilled, causing divergence between the two (Feenstra and Hanson, 1997). There is also mounting evidence that companies who privatized with foreign capital in Central and Eastern Europe are, on average, more productive than those privatized by purely domestic capital (e.g. Smith et al., 1997; for review, see Megginson and Netter, 2001). Indeed, this type of sector dualism may bear a striking resemblance to some of the early dependency hypotheses concerning the relationship between foreign capital penetration and income inequality (i.e. Frank, 1967; Stack, 1980). Given the findings from other geographical locations, organizational level studies in CEE and its similarity to the early dependency hypotheses, we suggest that FDI likely increases income inequality through higher wages in the foreign sector vis-à-vis the domestic sector in Central and Eastern Europe.

Apart from creating dualism between the foreign and domestic sectors, FDI could also contribute to rising inequality by increasing wage inequality between management and labor within the foreign sector. Indeed, FDI in post-socialist Europe is concentrated considerably in trade, business activities and financial services (UNCTAD, 2006). High wages in these sectors reflects the premium to skilled managerial personnel that comprise the growing segment of high wage employment (King, 2001). Foreign capital may or may not depress labor wages, but the premiums paid to management in foreign owned firms contribute to inequality of wage distribution *within* the foreign sector (Milanovic, 1999). In sum, we suggest that FDI could increases inequality by fostering a dualism between the foreign and domestic sectors with higher wages accruing to the smaller foreign sector, and by exacerbating pay inequities between management and labor *within* the foreign sector.

THE BASELINE INTERNAL DEVELOPMENT MODEL

In addition to the potentially spurious 'denominator effects' outlined by Firebaugh, there are other factors that need to be taken into account when evaluating the effect of foreign investment on inequality. Foreign investment instruments represent the type of connectivity a country has with the world economy, capturing the effects of the *external* environment on domestic outcomes. However, a venerable research tradition in both sociology and economics has found that *internal* factors matter for inequality levels within a given

society. Following Kuznets (1953, 1955), Nielsen outlined the internal development model, which specifies the factors that drive the inverted-U relationship between economic development and inequality (Nielsen, 1994). Three major processes are important: the size of the agricultural sector and sector dualism, the demographic transition, and the spread of education.

Size of the Agricultural Sector and Sector Dualism

To explain the inverted-U curve, Kuznets focused on the differences between agricultural and non-agricultural sectors in the course of development. At an early development stage, most of the labor force is in agriculture. With development, an increasing proportion of the labor force shifts to the higher-income industrial sectors, and in high stages of development, the agricultural sector will be very small. According to Kuznets, differences between households in agriculture are relatively weak, so inequality in the agricultural sector is typically low. Therefore, societies with large agricultural sectors should show lower overall inequality.

In addition to within-sector inequality, Kuznets also paid attention to sector dualism, which refers to the inequality arising from the difference in average income between agricultural and non-agricultural sectors (Nielsen, 1994). Sector dualism is calculated as p – L where p is the share of GDP in agriculture and L is the percent of the labor force in agriculture. Thus, we include measures of the percent of labor in agriculture and sector dualism to control for the effects of the employment structure in our cases.

The Demographic Transition

According to Kuznets, the inverted-U shaped trend also rests on the demographic transition. Specifically, increases in population growth in developing countries create an influx of young workers into the labor market, which increases the supply of young and rather unskilled labor. This tends to drive wages down, and increase inequality between the working poor and other strata. Empirical analyses following Kuznets substantiated the positive relationship between population growth and inequality (Ahluwalia, 1976; Alderson and Nielsen, 1999; Bollen and Jackman, 1985; Simpson, 1990).

The conjecture that population growth widens the income gap by depressing the relative position of the low-income strata provides a straightforward labor market explanation of the effect of demographic transition. Adopting a broader perspective, Nielsen (1994) argues that the negative effect of the demographic transition on inequality is also based on sociocultural mechanisms. For Nielsen, population growth is also 'a proxy for the heterogeneity, and resulting inequality, generated by many other processes of uneven diffusion of industrial technology in a traditional social system which stems from the uneven diffusion of modern technology throughout the population' (p. 662). To capture the combined effect of the broader sociocultural transformations related to industrialization,

Nielsen coined a term 'generalized sociocultural dualism, to distinguish these effects from strictly economic (sector) dualism as associated with labor force movements away from agriculture' (p. 664). Hence, we include a standard measure of the rate of population growth to control for both the demographic and sociocultural transformations (Alderson and Nielsen, 1999).

The Spread of Education

The spread of education is an integral part of the internal development model. Education increases the overall level of human capital in the labor force, which contributes to a rising skill levels. Higher average skill levels reduce the skilled wage premium, lowering overall inequality (Alderson and Nielsen, 1999; Gottschalk and Smeeding, 1997; Lecaillon et al., 1984; Nielsen, 1994; Simpson, 1990; Tinbergen, 1975; Williamson, 1991).

Consistent with their focus on social equality, socialist authorities made several provisions to equalize access to education (Ganzeboom and Nieuwbeerta, 1999; Kreidl, 2004). Although these efforts were often imperfect (Gerber and Hout, 1995), they led to relatively high secondary school enrollments in socialist Europe (Boswell and Chase-Dunn, 2000; Ganzeboom and Nieuwbeerta, 1999; Heyns, 2005). Hence, it is questionable whether differences in enrollment levels will significantly contribute to the explanation of the income inequality differences within and across these countries after the collapse of communist regimes. Nevertheless, based on previous research, we control for educational enrollment rates.

Additional Controls: Size of Private Sector, Government Spending, and Unemployment

We argued that FDI is part and parcel of liberalization that CEE countries have experienced after the collapse of communist regimes. This liberalization has been also characterized by the rise of the private sector, retrenchment of social welfare spending, and rises in unemployment (e.g. Emigh and Szelényi, 2001; Megginson and Netter, 2001). All of these effects could contribute to the rising inequality in Central and Eastern Europe. Hence, after we address the spurious regression issues raised by Firebaugh (1992), we assess the effects of FDI net of these factors.

DATA AND METHODS

Sample

We use longitudinal data on ten Central and East European post-socialist countries that are now European Union member states: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. These countries represent a set of the most comparable post-socialist cases because of their common membership in the European Union and the similar political and economic changes that acquiring such membership implies. Specifically, these countries are comparable in terms of the progress in democratization

and privatization. Moreover, they have similarly advanced industrial structure and relatively low natural resource endowments. These characteristics all have consequences for the type of FDI that these countries attract, and therefore the mechanisms that underlie the FDI and inequality link. Because of longitudinal data limitations we could not include other cases, but believe that our findings apply to other transition countries that have made progress with democratization and where FDI concentrates the tertiary sector rather than in the primary sector (as is the case of oil-related FDI in Kazakhstan, for instance).

The time period covered is from 1990 to 2001. Our dataset has an unbalanced panel structure, with varying numbers of observations over time for different countries. (See Appendix A for the list of country/year observations.) This is a commonly used strategy in inequality studies and necessitates the estimation of models that account for unmeasured country specific heterogeneity (Halaby, 2004). To present models that allow for comparison across different specifications, we use a consistent sample with 91 observations.

Pooled Cross-sectional Time Series Analysis

To investigate the determinants of inequality across countries and overtime, we need to pool the individual countries' time series. Our pooled cross-section of time series allows us to control for heterogeneity bias arising from time invariant unit specific effects. One standard econometric approach for dealing with this problem is to estimate a random effects (RE) or a fixed effects (FE) regression model (Amemiya, 1985; for applications, see Alderson and Nielsen, 1999; Gustafsson and Johansson, 1999). We report least-squares dummy variable FE estimates for three reasons. First, choosing between random and fixed effects models hinges on the critical question of whether or not the unmeasured unit effects are uncorrelated with the regressors, and the FE estimator is unbiased even when the unit effects are correlated. Hausman tests were mixed with respect to the validity of the RE assumption, which lead us to opt for the more conservative fixed-effects approach, though the RE models were substantively identical when the Hausman test suggested the assumption of uncorrelated unit effects was valid. Second, the major advantage of the RE models vis-à-vis FE is that of efficiency, but given the small N large T structure to our data, there is little reason to favor the RE estimator on efficiency grounds because the efficiency of the random and fixed effects estimators converges as T approaches infinity (Halaby, 2004; Wooldridge, 2002).[1]

We also note that these data trend strongly over time, suggesting the potential for serially correlated errors. Thus, in order to achieve stationarity, we estimate and adjust for a first-order autoregressive (AR1) process following Prais and Winsten (1954). Finally, the multiple observations in our sample warrant further specifications to account for the within cluster error correlations. Thus, we use panel corrected robust standard errors (PCSE) to assess significance (Beck and

Katz, 1995). In sum, the estimates shown below provide Prais-Winsten coefficients with Panel Corrected Standard Errors. Given the relatively small sample size, we consider any coefficient significant where $p < .10$. We analyzed the data using Stata 9.1. Diagnostics revealed no outliers or influential cases, and we ran all the models with a consistent sample of 91 observations that remained after deleting cases with missing data. Tables 3 and 4 report the results of the analysis.

Dependent Variable

The dependent variable in this analysis is the Gini index for each country/year observation. Its detailed description is provided in Table 2. The Gini coefficient is the most common measure of dispersion used to assess inequality in an income. Values of the Gini coefficient range between 0 and 1, where a low Gini coefficient indicates less inequality and a high Gini coefficient indicates more inequality. The data come from the TRANSMONEE dataset on Central and Eastern Europe and refer mainly to household earnings. TRANSMONEE dataset is the largest East European dataset with Gini indices across countries and over time, and collects Gini estimates calculated on both household earnings and household income. We draw primarily from the earnings estimates because they allowed the highest number of country-year observations, and were more consistent with estimates from other sources with well-defined reliability (Galbraith and Kum, 2005).[2]

Independent Variables

The independent variables include three measures of foreign investment, a measure of domestic investment, five measures derived from the internal development control model, a time trend, along with three other contending explanations for the upswing in inequality – the unemployment rate, government expenditure and the size of the private sector. All of the independent variables are lagged one year to preclude simultaneity bias, and the FDI variables were logged to reduce skew. The list of all the independent variables used in the analysis with descriptive statistics is included in Table 2. Appendix A includes a description of their sources. Correlation coefficients are provided in Appendix B.

RESULTS

Model 1 introduces the baseline internal development model. With the exception of the natural rate of population increase, all of the coefficients are in the expected direction, but only secondary education, the natural rate of population increase and sector dualism are significant. The significantly negative effect of population increase may reflect the specificity of the CEE case. In the course of development, influxes of young and relatively unskilled cohorts to the labor market may lead to higher inequality (because they depress the relative position of these working poor) but our findings indicate that population growth in post-socialism is related to lower inequality. This unanticipated finding required some

additional examinations of the demographic trends in our data. In fact, the great majority of the country/year observations in our dataset show negative population growth. For most of the period from 1990 to 2001, all countries but Poland experienced population decline. Hence, in our case the effect of demographic transition on inequality should be interpreted as an effect of population *decline* on inequality. Kuznets did not stipulate about population decline but our data show that these relationships may not be symmetrical. That is, while influxes of young and unskilled workers into the labor market (due to population growth in the early stages of development) may increase inequality, the reverse process, that is, the aging and contraction of the active labor force, does not decrease inequality. The power of this effect is not robust across our models, and thus we suggest that future research should test this proposition more directly.

Model 2 introduces foreign capital penetration into the equation. As expected, the effect of foreign capital penetration is both positive and significant. However, given that the correlation between flow and stock is .883, we would also expect to observe a positive effect of the flow of FDI as a ratio of GDP. Thus, as Model 3 shows, the ratio of FDI flow/GDP also has a positive effect on inequality. Importantly, the significance of the time trend falls away with the inclusion of either flow or stock as predictors of inequality, suggesting that the rapid inflow of foreign investment explains a large proportion of the increase in inequality observed in our cases over time. Despite the robust positive effect of the flow and stock of FDI as a ratio of GDP, we introduce further specifications to fully control for the serious critique offered by Firebaugh (1992). Model 4 includes both flow and stock in the same model. If the dataset is beset with denominator effects, we should expect to see a negative effect on the flow variable, and a positive effect on the stock variable (Alderson and Nielsen, 1999). However, the signs on both coefficients are positive, though neither is significant. This model and the high bivariate correlation between flow and stock suggest that they do not have an independent effect, but rather capture the same underlying socio-economic process: the rapid penetration of these economies by foreign investment.

However, we still need to control for two possibilities outlined by Firebaugh. First, Models 2 and 3 estimate the effect of the ratio of foreign investment (either flow or stock) to GDP without controlling for the *rate* of foreign investment. However, Firebaugh (1992) contends that such models 'have no defensible interpretation' absent controls for the investment rate (p. 124). Thus, Model 5 follows Alderson and Nielsen (1999) and Dixon and Boswell (1996) by introducing the FDI rate (FDI flow/FDI stock) variable along with foreign stock to control for denominator effects. As Model 5 shows, the penetration covariate is significant while the foreign investment rate covariate is positive but insignificant.

The second critique Firebaugh (1996) offers is a 'differential equalization' critique: finding a positive effect of foreign capital penetration may simply indicate its effect on inequality *relative* to domestic investment. Specifically, Firebaugh points out that a positive effect could mean that 1) both

Table 2 Variables used in the analysis of income inequality in post-socialist countries

Variable	Description	Mean (SD)
Dependent variable		
Gini Index	Gini coefficients expressed in percentage terms, measuring the dispersion of income between the richest and the poorest. Data are primarily derived from household earnings, interpolated from group data for monthly earnings, with bonuses, for full-time employees as reported by employers.	.312 (.051)
Internal development		
Secondary education	Total upper secondary education enrolment Upper secondary education: offers educational programs which require the completion of basic education for admission or a combination of education and vocational and technical experience. This is measured as the ratio of enrolled students to the age relevant population (15–18), in percent.	78.596 (11.537)
Population increase	Birth rate minus death rate, per thousand population; excludes changes due to migration.	21.910 (2.613)
Sector dualism	This measure captures the average difference in income between the agricultural and non-agricultural sectors of the economy. It is measured as the absolute value of the difference between the percentage of the labor force in agriculture, and the proportion of GDP in agriculture.	.091 (.075)
Percent of labor force in agriculture	This is the percentage of the labor force that works in the agricultural sector. (In order to reduce colinearity we orthogonalize % labor force in agriculture and sector dualism using a modified Gram-Schmidt procedure [Draper and Smith, 1981]. This is equivalent to regressing % labor force in agriculture on sector dualism, and using the unstandardized residuals in place of the original labor force variable.)	.182 (.104)
Economic development	Gross Domestic Product Per Capita ($ thousand), logged for skew with a base 10 log transformation.	3.498 (0.258)
Foreign investment		
Penetration	The extent to which a national economy is dominated by foreign ownership as a result of accumulated FDI over time (FDI stock). Measured as the ratio of foreign capital stock to GDP, and logged for skew with a base 10 log transformation.	2.026 (1.552)
Flow	The size of yearly FDI inflow into the host economy. Measured as the ratio of FDI inflows to GDP, and logged for skew with a base 10 log transformation.	21.708 (.555)
Rate	The rate at which foreign investment enters a country. Measured as the ratio of the flow of foreign investment to foreign investment stock, and logged for skew with a base 10 log transformation.	1.407 (.315)

(Continued)

Table 2 (Continued)

Variable	Description	Mean (SD)
Domestic investment	Domestic investment consists of additional outlays to the economy's fixed assets, plus net changes in inventory levels. Fixed assets include land improvements (fences, ditches, drains, etc.); plant, machinery and equipment purchases; and the construction of roads, railways, schools, offices, hospitals, private residential dwellings, commercial and industrial buildings, etc. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales and 'work in progress'. Net acquisitions of valuables are also considered capital formation.	23.514 (5.924)
Privatization	Percent of GDP accounted for by private sector, logged for skew with a base 10 log transformation.	3.948 (.458)
Government expenditure	Government expenditure as % of GDP includes salaries of public servants, purchase of weapons for the military, any investment expenditure by a government into public goods and transfer payments, such as social security or unemployment benefits.	42.62 (7.35)
Unemployment rate	This comprises all persons above a specific age who, during a specified brief time-reference period, have been without work (that is, not in paid employment or self-employment), are available for work, and are seeking work (that is, have taken specific steps in the specified period to seek paid employment or self-employment). This concept differs from registered unemployment, which refers to the segment of the labor force registered at labor offices as unemployed.	10.76 (4.29)
Time	A time trend, where 1990 = 1.	8.37 (3.265)

domestic capital and PEN boost inequality, but PEN boosts it more; 2) PEN boosts inequality while domestic capital decreases it; 3) both reduce inequality, but PEN reduces it less. In order to control for Firebaugh's 'differential equalization' critique, Model 6 introduces the domestic investment rate directly into the equation. Our findings are most consistent with Firebaugh's second potentiality. As shown in Model 6, foreign investment boosts inequality while the sign on domestic investment is negative but insignificant and the coefficient on the foreign investment rate is unaffected.

In addition to the models presented in Table 3, we also estimated the effect of four other processes that may have contributed to the models: the unemployment rate, the ratio of government expenditure to GDP, the size of the private sector and a second-order GDP quadratic. First, unemployment could be a contending story explaining the upswing in inequality experienced in CEE countries as firms downsize through the course of liberalization. Second, the ratio of government expenditure to GDP proxies for the retrenchment of egalitarian social policy, which accounted for the comparatively low levels of inequality in CEE prior

Table 3 Unstandardized coefficients from fixed effects regression of income inequality on foreign investment and internal development model in Central and Eastern Europe, 1990–2001

	1	2	3	4	5	6
Foreign investment						
'Penetration'	–	0.013**	–	.008	.015**	.015**
		(.006)		(.006)	(.006)	(.007)
'Flow'	–	–	0.028**	.017	–	–
			(.014)	(.015)		
'Rate'	–	–	–	–	.018	.018
					(.016)	(.018)
Domestic investment						
Domestic investment rate	–	–	–	–	–	−.0009
						(.0007)
Internal development model						
Secondary education	−.001**	−0.0007	−.0007**	−.0006	−.0006	−.0005
	(.0005)	(.0005)	(.0003)	(.0004)	(.0004)	(.0004)
Natural rate of population increase	−.006**	−0.002	−.003	−.002	−.002	−.001
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Sector dualism	0.384*	0.326*	.301	.296	.291	.292
	(.223)	(.197)	(.234)	(.217)	(.222)	(.230)
Percent of labor force in agriculture	−0.038	–0.023	–.076	–0.052	–.055	–.055
	(.124)	(.115)	(.125)	(.127)	(.130)	(.140)
Time	0.004**	−0.0004	.0007	−.0008	−.0007	.0001
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Constant	.343***	.346***	.417***	.390***	.322***	.329***
	(.082)	(.069)	(.094)	(.098)	(.051)	(.059)
R^2	.801	.822	.830	.833	.833	.828
ρ	−.062	−.077	−.093	−.091	−.092	−.075

Notes: $N = 91$ in all models. * $p < .10$; ** $p < .05$; *** $p < .01$ (two-tailed tests). Numbers in parentheses are panel corrected standard errors. First-order autocorrelation (AR1) coefficients are represented by ρ.

Table 4 Unstandardized coefficients from fixed effects regression of income inequality on foreign investment, internal development and additional controls

	7	8	9	10	11
Foreign investment					
'Penetration'	.016***	.014**	.017***	.016***	.017***
	(.006)	(.007)	(.006)	(.005)	(.005)
'Rate'	.018	.020	.016	.018	.019
	(.018)	(.018)	(.017)	(.018)	(.017)
Domestic investment					
Domestic investment rate	−.001	−.001**	−.001	−.001	−.001
	(.001)	(.0005)	(.001)	(.001)	(.001)
Baseline development model					
Secondary education	−.0007**	−0005	−.0005	−.0005	−.0007**
	(.0002)	(.0004)	(.0004)	(.0004)	(.0003)
Natural rate of population increase	−.001	−.002	−.002	−.002	−.002
	(.002)	(.002)	(.002)	(.002)	(.002)
Sector dualism	.259	.293	.279	.315	.254
	(.200)	(.230)	(.238)	(.252)	(.235)
Percent of labor force in agriculture	−.079	−.082	−.052	−.038	−.107
	(.134)	(.127)	(.140)	(.141)	(.108)
Time	.0003	.0001	.0003	−.001	−.0002
	(.003)	(.002)	(.003)	(.003)	(.003)
Additional controls					
GDP per capita (log)	–	–	–	.017	.013
				(.033)	(.033)
GDP per capita (log) squared	–	–	–	−.002	−.003
				(.013)	(.019)
Size of the private sector (Private/GDP)	–	–	−.008	–	−.007
			(.014)		(.223)
Government expenditure/GDP	–	−.001	–	–	−.0007
		(.001)			(.0006)
Unemployment rate	−.001	–	–	–	−.001
	(.001)				(.002)
Constant	.365***	.320***	.357***	.292***	.466***
	(.067)	(.046)	(.087)	(.054)	(.093)
R^2	.836	.832	.830	.831	.850
ρ	−.092	−.083	−.079	−.080	−.114

Notes: $N = 91$ in all models. *$p < .10$; **$p < .05$; ***$p < .01$ (two-tailed tests). Numbers in parentheses are panel corrected standard errors. First-order autocorrelation (AR1) coefficients are represented by ρ.

to the transition. Thus, it could be that the retrenchment of government social provision explains the upswing in inequality rather than foreign direct investment. Third, it could be that variation in the level of privatization explains the rise in inequality rather than the extent to which the political economy is penetrated by foreign investment. Finally, a large part of the Kuznets model of inequality is the inverted U relationship between development and inequality. Thus, including the quadratic term controls for this potentiality.

Model 7 introduces the unemployment rate, which is neither properly signed nor significant. Model 8 introduces the ratio of government expenditure to GDP, which is correctly signed but insignificant. Model 9 includes the size of the private sector along with the FDI model, which is neither correctly signed nor significant. Model 10 introduces the development quadratic into the equation, which is correctly signed but insignificant. Model 11 includes the full model with all of the additional controls. Importantly, PEN not only remained significant in models that included these measures, but actually increased in size and in relation to its standard error, suggesting that FDI plays an inequality increasing role apart from any relationship to these additional controls.

DISCUSSION AND CONCLUSION

This article contributes to the debate on the effect of foreign investment on income inequality by exploiting the natural experiment of post-socialist transition in CEE. The fact that FDI was virtually non-existent prior to 1989 affords the opportunity to assess the impact of rapid FDI inflow on inequality by comparing states that are comparable in many respects but have varying levels of inflow and inequality increases. Our conservative fixed effects models show that foreign capital penetration had a significantly positive effect on inequality net of unmeasured time-invariant unit specific heterogeneity, the internal development model, several additional controls and the various critiques of PEN research offered in the literature. Furthermore, the effect of PEN – the ratio of stock to GDP – was neither different nor independent from the flow variable – the ratio of flow to GDP. Rather, they both generated the same effect on inequality, and neither produced an independent effect net of the other. Thus, in a context where FDI moves from non-existent to rapidly flowing, both flow and stock capture the same extent to which the economies in CEE are penetrated by foreign capital.

We also note that the effects of the internal development model attenuated and were not significant predictors of income inequality upon the inclusion of the FDI covariates. We suggest three potential reasons for this. The likely first reason is the specificity of the CEE case. It may be that the internal development model applies more thoroughly to stereotypical less developed countries that do not have a unique communist history and level of industrialization that came with it. (However, others have found that the internal development model adds explanatory value to homogenous samples that include only industrially advanced countries, i.e. Alderson and Nielson, 2002.) Second, to our knowledge

none of the previous studies utilizing the internal development model controlled for time-invariant, unit-specific heterogeneity as completely as do our fixed effect models. Thus, one possibility is that the weak significance of the internal development covariates in our models reflects the correlation between these domestic variables and the time-invariant unit-specific heterogeneity that often plagues cross-national analyses. Still another possibility is that the cross-sectional variation on the internal development model outweighs the temporal variation. We found evidence of this in the random effects models we estimated, though some suggest that high cross-sectional variation relative to temporal variation and correlated unit effects are two sides of the same coin (Halaby, 2004). Third, and what we suggest as the most likely reason, is the importance of exposure to foreign investment as an explanation for inequality levels in CEE countries. Indeed, the internal development model is premised on long-term structural changes within a given economy, whereas both FDI and inequality underwent fairly rapid changes in CEE. Thus, it is likely the case that FDI is simply a powerful explanatory variable for rises in income inequality after communism that represents rising inequality both within the foreign sector as well as between the foreign and domestic sectors, but concede that internal development processes likely remain a powerful model for income inequality *in general*.

In sum, we find that foreign capital penetration has a robust positive effect on inequality net of the theoretically relevant controls from the internal development model, the various critiques offered by Firebaugh and additional controls. Further, the effects manifest themselves over the short term, which provides unique evidence to bear on the relationship. While further research with organizational level data is needed to further strengthen our arguments, based on the findings of this study and the support of previous research (Aitken et al., 1996; Feenstra and Hanson, 1997; King, 2001; Megginson and Netter, 2001; Milanovic, 1999; Moran, 2002) we propose that FDI increases inequality in CEE by inducing inequality between management and labor within the foreign sector, and by contributing to dualism between the foreign and domestic sectors, where foreign firms pay higher wages relative to domestic firms. Not only does this provide unique evidence with respect to the CEE case, but it also brings unique evidence to bear on the inequality inducing effects of FDI more generally by showing that FDI has a positive effect on inequality even in the very short term (see de Soysa and Oneal, 1999, in the context of economic growth).

Finally, we encourage scholars engaging in development research to give more attention to the CEE case. Much economic thinking on the question of within country inequality assumes a natural progression from low to high inequality and back again as countries move through development stages (see Korzeniewicz and Moran, 2005). However, the CEE cases should be located on the declining slope of the inverted U curve because of their high level of industrialization compared to their stereotypical peripheral counterparts, yet they demonstrate rising income inequality. Some may counter that their level of inequality was 'unnatural' prior to

transition, and is naturally adjusting to the market. Yet, their rising inequality is not so different from that experienced by many other Western developed countries over the course of the globalization period (e.g. Alderson and Nielsen, 2002; Morris and Western, 1999). Continuing to watch these post-socialist countries in the following decades may give insight onto the long-term consequences of FDI. While much of the economics literature on FDI posits a beneficial effect of FDI for host countries because of the expected spill-over effects, there is also evidence that FDI may not produce spill-over absent institutional controls to ensure it (Aitken et al., 1996). This is a very important issue in the context of the inequality upswing experienced in this CEE case because the causal mechanisms upon which our argument stands – higher wages in the foreign sector and wage inequality between management and labor within the foreign sector – will continue to operate if and only if there is not a significant amount of spill-over from the foreign to the domestic sectors and from the managerial classes to labor. Thus, inequality could remain a long-term feature of countries that increasingly rely upon FDI unless they couple this reliance with institutional measures that can ensure that FDI leads to technology transfer and other types of spill-overs to the domestic sector. Indeed, CEE transition countries will provide a historically unique laboratory for understanding whether or not FDI productivity does spill over, and for identifying the mechanisms that either encourage or constrain the process.

The coming decades are likely to provide a continually fruitful opportunity to gauge the effect of globalization on inequality and other development outcomes as transition countries continue to undergo the changes that come with rapid exposure to the world economy. Fruitful comparisons are likely to be made between transition countries and developed Western countries – the global North, where both simultaneously experienced comparatively low levels of inequality and relatively high levels of industrialization throughout the immediate post-war world order, yet showed demonstrable upswings in income inequality over the last decades of the 20th century. Indeed, there are two crucial differences between CEE countries and the North that seem to have led to the same inequality upswing: Capitalist versus Communist development prior to the late 20th century, and strikingly different roles in the process of economic globalization. While most agree that economic globalization – the rise in FDI and less formal kinds of production network formation – has been initiated and driven by the North's role as a net *outsourcer*, most research on CEE countries finds that they partake in these new global formations by integrating into relationships as 'junior partners' to firms in Northern countries, or in other words as net *outsourcees* (Bair, 2005; Czaban and Henderson, 2003; van Tulder and Ruigrok, 1998).[3] If there is indeed a universal inequality trajectory, we need to understand how two important differences between these two cases – their social histories (capitalist versus communist development) and integration with the rest of the world during globalization – generated comparable upswings in income inequality. Such comparisons will likely provide clues as to whether or not there is anything natural about levels of income inequality.

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Appendix A Sample and data sources

Countries included:
Country/year observations:

- Bulgaria (1990–2001)
- Czech Republic (1990–3, 1996–2001)
- Estonia (1993, 1995–2001)
- Hungary (1990, 1992–4, 1996–2001)
- Latvia (1992–2001)
- Lithuania (1997–2001)
- Poland (1990–2001)
- Romania (1991–2001)
- Slovakia (1996–2001)
- Slovenia (1993–2001)

Dependent variable

Gini Coefficient
Source: TRANSMONEE 2003 Database, UNICEF IRC, Florence.

Internal development model

Secondary school enrollment
Source: TRANSMONEE 2003 Database, UNICEF IRC, Florence.

Natural rate of population increase
Source: TRANSMONEE 2003 Database, UNICEF IRC, Florence.

Share employed in agriculture
Source: World Development Indicators online database: [http://devdata.worldbank.org/dataonline].

Share of agriculture in GDP (for sector dualism measure)
Share of Agriculture in GDP *Source:* EBRD Transition Report, 1999 and 2003.

GPD per capita
Source: World Development Indicators online database: [http://devdata.worldbank.org/dataonline].

Liberalization

Private sector share in GDP
Source: EBRD Transition Report, 1999 and 2003.

Government expenditure
Source: World Development Indicators online database: [http://devdata.worldbank.org/dataonline].

Unemployment
Source: EBRD Transition Report, 1999 and 2003.

Foreign investment
Foreign capital stock/GDP (log)
Source: EBRD Transition Report, 1999 and 2003.

Foreign direct investment inflow
Source: EBRD Transition Report, 1999 and 2003.

Foreign investment rate
Source: EBRD Transition Report, 1999 and 2003.

Gross Domestic Product source: World Development Indicators online database: [http://devdata.worldbank.org/dataonline].

Domestic investment

Domestic investment rate [Gross Domestic Capital Outlay/Gross Value Added]
Domestic Capital Outlay source: EBRD Transition Report, 1999 and 2003.
Gross Value Added source: World Development Indicators online database:
[http://devdata.worldbank.org/dataonline].

Appendix B Correlation coefficients for variables included in analyses

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Gini													
2	Penetration	.402												
3	Flow	.429	.883											
4	Rate	−.090	−.588	−.144										
5	Domestic investment	−.182	.510	.417	−.349									
6	GDP per capita	−321	.311	.059	−567	.567								
7	Private sector size	.349	.871	.746	−.556	.434	.178							
8	Unemployment rate	.276	.330	.216	−.350	−.229	−.026	.402						
9	Government expenditure	−.521	− 261	−295	.019	−015	.374	−.325	−.032					
10	Secondary education	−.346	.131	−.115	−.494	.189	.590	.218	.269	.467				
11	Population increase	−483	−.394	−.507	−.061	.013	.341	−.223	.058	.299	.478			
12	Dualism	.263	−.117	−.134	.030	−.381	−.398	.030	.191	−.253	.073	.290		
13	% labor force in agriculture	.110	−.469	−241	.585	−.555	−.708	−.391	−.183	−.288	−.563	−.279	.857	
14	Year	.427	.838	.723	−.535	.418	.171	.827	.390	−.375	.187	−.270	.076	−.346

Notes: approximate p values, $p < .10$ when $r \geq .173$; $p < .05$ when $r \geq .205$; $p < .01$ when $r \geq .269$.

NOTES

1 One more fairly common argument made in favor of the RE model in the sociological inequality literature has been that the RE model preserves between case variation that is eliminated with the FE model. However, eliminating between case variation is the very strength of the FE model because it is what allows for unbiased estimates in the presence of correlated unit effects (Halaby, 2004).

2 Previous research pools inequality estimates from various sources that measure inequality at the household and individual levels, and on income and earnings. To assuage concerns for bias, others have estimated a series of dummy variables to control for these differences, which had significant effects (e.g. Alderson and Nielson, 1999; Lee, 2005). In order to make sure that the income based Gini estimates we included did not impact our findings, we estimated models with a dummy variable for income. Findings were identical with and without dummy variables for the income based Gini coefficients we interpolated, and the dummy variables were smaller than their own standard errors even in models without any additional covariates. These estimates are available upon request.

3 Indeed, while much of the economic rationale for the inequality upswing in the global North has been placed squarely on the shoulders of greater competition between Northern and Southern labor and labor saving technological change (see Feenstra, 1998 for a review), the natural expectation would be for the reverse trend in the global south as both jobs and older technologies diffuse thereto.

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