

The Institutional Basis of Successful Economic Reform: Privatization Effectiveness and Regime Change After Ukraine's Orange Revolution

Scott Gehlbach

University of Wisconsin, Madison and CEFIR

E-mail: gehlbach@polisci.wisc.edu

John S. Earle

Upjohn Institute for Employment Research

and Central European University

Email: earle@upjohn.org

April 2010

Abstract

Why do similar economic reforms often produce dissimilar outcomes? We examine the impact of institutional environment on reform outcomes, exploiting a particular moment of institutional change: the 2004 Orange Revolution, which resulted in a dramatic shift in the balance of power among regions in Ukraine. Using a unique panel dataset of over 7,000 Ukrainian manufacturing enterprises, we estimate change at the regional level in the effect of privatization on firm performance. Our analysis finds a marked decrease after the Orange Revolution in the relative effectiveness of privatization in regions that opposed Viktor Yushchenko during the 2004 Ukrainian presidential election.

1 Introduction

One of the major lessons of recent economic liberalizations in developing and transition states is that similar reforms often produce dissimilar outcomes. In some countries, market-oriented reforms have dramatically increased prosperity and efficiency. In others, the results have been disappointing. A prominent example is the privatization of state-owned enterprises in the postcommunist world. In Eastern Europe, privatization has generally led to the expected efficiency gains; in the former Soviet Union, it has not.¹

The causes of this divergence are poorly understood. A leading hypothesis is that variation in the institutional environment is responsible for differences in reform outcomes, with market-oriented reforms more successful where property rights are secure, contracts are enforced, and the state provides a supportive regulatory environment. Testing this hypothesis, however, has proven difficult. Studies of reform outcomes are often difficult to compare across countries, and measures of institutions are inherently noisy. Even assuming no measurement problems, identifying the effect of those differences in a cross-country setting is complicated by unobserved variation in the macroeconomic environment, policy design, and other factors that might affect reform outcomes.

One solution to this problem is to exploit variation in institutions *within* a given country, where numerous potentially confounding factors can be held constant. We adopt this approach in this paper, using a unique panel dataset of over 7,000 Ukrainian manufacturing enterprises. Our research design takes advantage of a particular moment of institutional change: the 2004 Orange Revolution, which resulted in a dramatic shift of power away from an entrenched business elite. Critically, this business elite was centered in one part of the country, whereas Viktor Yushchenko, the victor in the Orange Revolution, had his political base in another. We thus identify the impact of institutional change on privatization effectiveness by exploiting a shock that affected two parts of the country in different ways.

The paper proceeds as follows. In Section 2, we describe the political context that motivates our research design. We discuss our data in Section 3 and empirical strategy in Section 4. Section 5 presents our results. Section 6 concludes.

2 Context

In late December 2004, following a tumultuous month of street protests and a do-over election, Viktor Yushchenko was declared the president-elect of Ukraine. The events of that period are popularly known as the Orange Revolution.

The seeds of the Orange Revolution were planted in 2002, when Yushchenko's Our Ukraine

¹See, for example, Megginson and Netter (2001), Djankov and Murrell (2002), and Guriev and Megginson (2007). Using data and estimation techniques similar to those in this paper, Brown, Earle and Telegdy (2006) find that privatization to domestic owners increased firm productivity by 15 percent in Romania, 8 percent in Hungary, and 2 percent in Ukraine, while decreasing productivity by 3 percent in Russia.

party won a plurality in national voting for the Rada, Ukraine’s parliament.² Yushchenko, who had briefly served as prime minister in the early 2000s, came within a whisker of forming a governing coalition with the Socialist Party and the Bloc of Yulia Tymoshenko, an oligarch-turned-populist who was one of Ukraine’s savviest political operators. (Tymoshenko’s party was known colloquially as BYuT, a not-so-subtle reference to her striking physical appearance). But heavy-haded tactics secured a majority for a government loyal to President Leonid Kuchma.

Since that time, a fevered contest for power had been waged between Yushchenko and Tymoshenko, on the one hand, and Kuchma and his appointed successor, Viktor Yanukovich, on the other. Fear of a Yushchenko victory would lead to his poisoning in September 2004 at the probable hands of Yanukovich’s political operatives, and subsequently to massive electoral fraud to secure Yanukovich’s victory in a runoff election on November 21. The popular unrest that followed, modeled to some extent on earlier “colored revolutions” in the post-communist region (Beissinger, 2007), ultimately led to the do-over election that catapulted Yushchenko to the presidency.³

During the latter years of his reign, Kuchma was supported by a narrow business elite drawn primarily from the eastern half of the country.⁴ Yanukovich represented one of these clans, the mining and steel interests based in the far eastern region of Donetsk. These eastern businessmen had profited from their close relationship with the state, and they spent generously to prevent Yushchenko’s victory: estimates of total campaign expenditures in 2004 exceed one percent of GDP (Åslund, 2006, p. 20).

The 2002 election had signaled that these businessmen from the east might lose the protection of those in power, and most of them were indeed expelled from the presidential court following Yushchenko’s victory in 2004. Yushchenko’s political base was in the historically Hapsburg west of the country (Clem and Craumer, 2005), and he owed nothing to the men who had financed the campaign against him. Power in Ukraine is exercised from the center, and Yushchenko used his control over gubernatorial appointments to replace every one of Ukraine’s 27 governors the year after the Orange Revolution.⁵ Tymoshenko was named to head a government that was notable for the absence of easterners, and a series of investigations was launched against eastern businessmen (Wilson, 2005, pp. 168–169).

Not least, a noisy campaign in favor of “reprivatization” (i.e., nationalization and subsequent privatization of previously privatized enterprises) targeted many of the eastern businessmen who had acquired assets under Kuchma on the cheap. The threat was credible, given the overwhelming majority of Ukrainians who were in favor of revising privatization (Åslund, 2009, pp. 206–207; see also Denisova et al., 2009). In the end, only two previously privatized enterprises were seized by authorities (Paskhaver and Verkhovodova, 2007), but the perceived

²Half the seats in 2002 were chosen by national proportional-representation voting, the other half in single-member districts.

³For an excellent summary of these events, see Wilson (2005).

⁴Viktor Medvedchuk, the head of Kuchma’s presidential administration, led a business group based in Kyiv, but this group had few production assets of the sort included in our dataset.

⁵Authors’ calculation based on news reports from the National News Agency of Ukraine. We use the term “governor” to refer to any head of regional administration.

threat to property rights has been blamed for the collapse in GDP growth that followed the Orange Revolution (Åslund, 2005).

In sum, the Orange Revolution entailed a dramatic shift of power away from the businessmen who controlled the private economy in the eastern half of the country, with arguably serious consequences for the perceived security of their property rights. The question of this paper is what this did to the relative performance of privatized firms in the east and west of Ukraine.

3 Data

As we discuss more fully in the following section, our research design employs a multilevel approach, with firms nested in 27 regions (*oblasti*) of Ukraine. We first estimate region-year privatization effects using firm-level data. We then estimate the differential effect of the Orange Revolution on these estimates of regional privatization effectiveness using data on voting in the 2004 Ukrainian presidential election and other regional characteristics. Here we discuss our firm-level and regional data in turn.

Our firm-level data are collected by the Ukrainian State Statistics Service (Derzhkomstat) and its Soviet-era predecessor. The primary source is industrial-enterprise registries, which include all industrial firms with more than 100 employees, plus those that are more than 25 percent owned by the state and/or by legal entities that are themselves included in the registry. Once firms enter the registries, they typically continue to report even if the original conditions for inclusion are no longer satisfied. The data thus correspond to the “old” sector of firms (and their successors) inherited from the Soviet system. We supplement the registry data with balance-sheet data and information from the State Property Committee and State Securities Commission.

The resulting database includes measures of *Output*, *Employment*, and *Capital stock*, as well as industry affiliation and regional location. With respect to ownership, we classify firms as *Domestic private* if the state holds less than 50 percent of the shares and domestic private shareholders own more than foreigners; the firm is classified as *Foreign private* if foreign shareholders own more than domestic private. The residual category is state ownership. We exclude non-manufacturing sectors and non-profit organizations from the sample. To focus on the effects of privatization with a relatively homogeneous comparison group, we also include only firms that are state-owned on entry into the database. Finally, we retain firm-years in the sample only when they contain complete information, which does not reduce the sample appreciably. The resulting sample of initially state-owned firms, some of which were then privatized, contains information on a panel of 7,664 enterprises, with 81,680 firm-year observations for 1989 and 1992–2007; data for 1990 and 1991 (before privatization was initiated) are not available.

In the second stage of our multilevel research design, we investigate the effect of Orange Revolution on privatization effectiveness in regions supportive of and opposed to Viktor Yushchenko, the eventual presidential-election winner. We use region-level data on the *Yushchenko vote* in the do-over runoff election of December 2004. As Figure 1 illustrates,

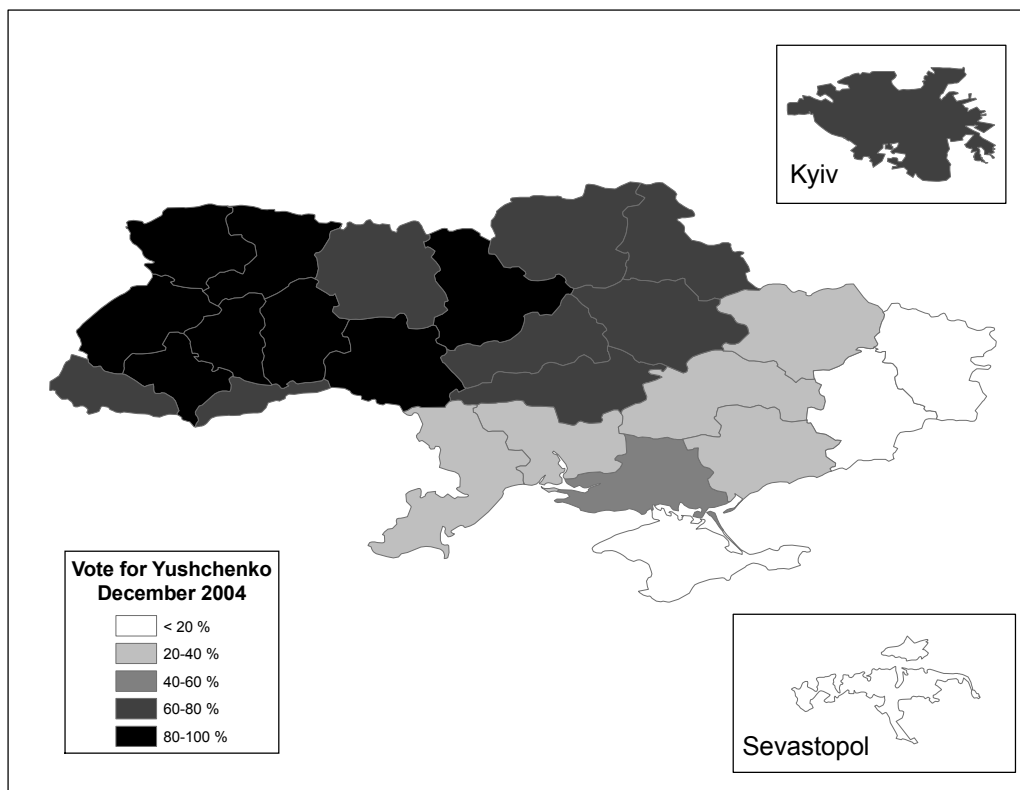


Figure 1: Voting in 2004 presidential election

there was a strong regional character to this vote, with Yushchenko doing better in the west than the east of the country. (The cities of Kyiv and Sevastopol are governed administratively as regions, and the data in this paper distinguish between these cities and the surrounding regions of Kyiv oblast and Crimea.)

Some of our equations also include various time-varying regional characteristics: *Industrial production growth*; *Unemployment*, using the International Labour Organization methodology; *Foreign direct investment*; and *Population*. All of the latter variables are drawn from annual statistical yearbooks and the *Regions of Ukraine* publications of the Ukrainian State Statistics Service. Finally, in some exercises we also use data on the *Our Ukraine vote* and *BYuT [Bloc of Yulia Tymoshenko] vote* in the 2002 parliamentary elections. All vote shares are recorded as proportions.

As we discuss below, one potential concern with our research design is that the 2004 election results may be endogenous to the effectiveness of privatization at the regional level. To address this concern, we exploit a striking feature of the 2004 elections: the strong correlation between vote outcome and the ethnic and linguistic character of the region. Regions with large shares of self-identified Russians (*Russian ethnicity*) and Russian speakers (*Russian language*) were overwhelmingly less likely to vote for Yushchenko in 2004. Notably, this pattern was not so evident in earlier presidential elections, when machine politics tended to

overwhelm cultural identification with one candidate or another.⁶ Moreover, the data source for these variables is the 2001 Ukrainian Census, well prior to the Orange Revolution, thus avoiding concerns that events during the Orange Revolution may have changed ethnic self-identification. After controlling for the sectoral composition of regions, which may depend on the timing of their incorporation into the Russian Empire or the Soviet Union, there is thus little reason to think that ethnicity or language use should be correlated with privatization effectiveness other than through the effects of the Orange Revolution. To a partial extent, we can check this assumption by exploiting overidentification tests when both Russian ethnicity and Russian language interacted with a dummy for the years following the Orange Revolution are used as instruments.

4 Empirical strategy

Our general research design follows the multilevel approach in Brown, Earle and Gehlbach (2009), which builds on the analysis of firm-level data in Brown, Earle and Telegdy (2006, 2009). As in Brown, Earle and Gehlbach (2009), we first use panel data on manufacturing enterprises to estimate the effect of privatization on firm performance at the regional level, following which we regress those estimates on various regional characteristics to identify institutional determinants of privatization effectiveness. Relative to a one-step “random coefficient” model, which is asymptotically equivalent (e.g., Beck, 2005), this two-step approach economizes on computation, given the very large number of firm-year observations in our data and numerous region-level specifications that we employ. Our method differs from Brown, Earle and Gehlbach (2009) primarily in the source of institutional variation that we exploit. Brown, Earle and Gehlbach (2009) focus on cross-sectional variation in Russia, taking advantage of plausibly exogenous differences across Russian regions in the size of public administrations. In contrast, we exploit changes in the institutional environment over time as well as across space in Ukraine; thus, we estimate *time-varying* regional privatization effects.

The fundamental issue in identifying the effect of privatization on firm performance is that firms are not randomly selected for privatization. Absent an experimental or quasi-experimental setting, any analysis of privatization effects therefore requires detailed panel data with a large number of privatized and state-owned firms within industries and a long time series of observations on each firm before and after the privatization process. Our data meet these criteria. We exploit these data to control for selection bias in the privatization process, using program-evaluation techniques that correct not only for the possibility that firms selected for privatization may have different performance on average than firms remaining state-owned, but also that they may exhibit different performance growth. As Brown, Earle and Telegdy (2006) show, once these two idiosyncratic factors are taken into account,

⁶The emergence of this ethnic and linguistic divide seems to have more to do with underlying cultural predispositions than attitudes toward Russia *per se*; see, for example, Tucker (2007). Darden and Grzymala-Busse (2006) and Darden (2010) trace these predispositions to the introduction of national identities in the communist and precommunist periods.

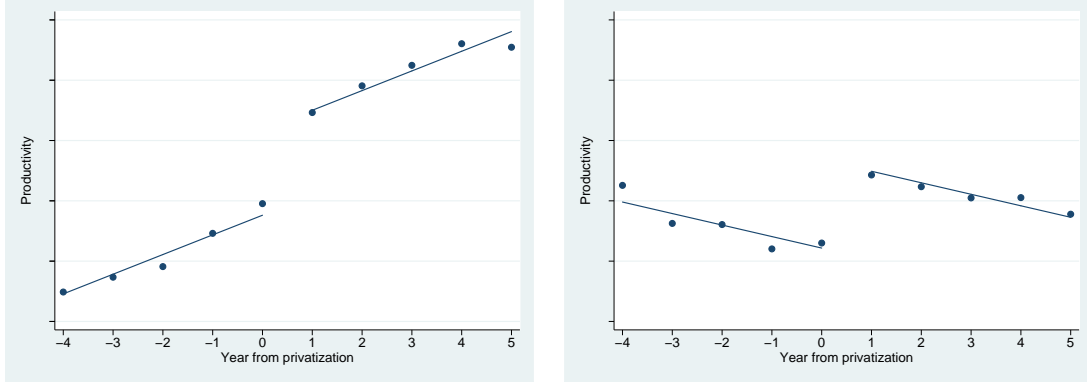


Figure 2: Two firms with similar privatization effects when controlling for firm fixed effects and firm-specific trends

there is no statistically significant difference in the behavior of preprivatization productivity across privatized and state-owned firms.

In particular, we employ a specification containing both a firm fixed effect (FE) and a firm-specific trend (FT), also known as a “random-growth” model, to estimate privatization effects. Figure 2 illustrates the approach: the inclusion of fixed effects and trends results in an apples-to-apples comparison, such that the estimated effect of privatization is approximately the same for the two firms depicted in the figure. In addition, we include a full set of industry-year effects to control for time-varying industry characteristics and shocks that may be correlated with both ownership and performance. Our estimates are therefore based on deviations resulting from privatization from the performance trend for each individual firm, controlling for industry-year shocks.

Our performance measure is multifactor productivity, the quantitative outcome most closely tied to economic welfare. The first-stage estimating equation is

$$x_{jt} = \mathbf{f}(k_{jt}, l_{jt}) + \mathbf{Y}\gamma + \mathbf{w}_t\alpha_j + F_{jt}\phi + D_{jt}\mathbf{Y}\vartheta + D_{jt}\mathbf{M}\delta + \eta_{jt}, \quad (1)$$

where j indexes firms and t indexes T periods. The variable x_{jt} is output; \mathbf{f} is a $1 \times J$ vector of industry-specific production functions, where J is the number of sectors, k_{jt} is capital stock, and l_{jt} is employment; \mathbf{Y} is a $1 \times JT$ vector of industry-year interaction dummies, and γ is the associated $JT \times 1$ vector of coefficients; \mathbf{w}_t is a vector of aggregate time variables, and α_j is the vector of associated individual-specific slopes; and F_{jt} is an indicator of whether the firm was foreign-owned at the end of year $t - 1$, with ϕ the associated coefficient. The variable D_{jt} is an indicator for domestic private ownership, \mathbf{Y} is the same $1 \times JT$ vector of industry-year interaction dummies, and ϑ is the associated $J \times 1$ vector of coefficients. The vector \mathbf{M} is a $1 \times RT$ vector of region-year interaction dummies, where R is the number of regions, and δ is the $RT \times 1$ vector of coefficients of interest: the time-varying region-level productivity effect of domestic privatization. Finally, η_{jt} is an idiosyncratic error.

Given the very small number of foreign-privatized firms in our data set, we do not attempt to estimate a separate foreign-privatization effect for each region, but assume an effect ϕ that is constant across regions. In fact, as discussed above, Brown, Earle and Telegdy (2006)

find uniformly positive and large effects of foreign privatization across the countries in their study, in contrast to the quite different effects of domestic privatization that are our focus. For conciseness, in what follows we often refer simply to estimated privatization effects, omitting the qualifier “domestic.”

These region-year privatization effects (the parameter vector δ) control for variation in industrial composition across regions and over time through the interactions between domestic private ownership and industry-year dummies ($D_{jt}\mathbf{Y}$). In addition, we permit production functions to vary across industries (the vector \mathbf{f}), and as discussed above we include a full set of industry-year effects (the vector \mathbf{Y}).⁷

Our method of controlling for selection bias is embodied in the specification of \mathbf{w}_t . The FE&FT model with firm fixed effects and firm-specific trends (the “random growth” model) has $\mathbf{w}_t \equiv (1, t)$, so that $\alpha_j \equiv (\alpha_{1j}, \alpha_{2j})$, where α_{1j} is a fixed unobserved effect and α_{2j} is the specific trend for firm j . In practice, the FE&FT model is estimated in two steps, the first detrending all variables for each firm separately and the second estimating the model on the detrended data.

In the second stage of our two-stage procedure, we wish to estimate the following model:

$$\delta_{rt} = \mathbf{Z}_{rt}\mu + \theta_t + \mathbf{w}_t\zeta_r + u_{rt}, \quad (2)$$

where δ_{rt} is the productivity effect of domestic privatization for region r at time t ; \mathbf{Z}_{rt} is a vector of time-varying regional characteristics, with μ the associated vector of coefficients; θ_t is a year-specific effect; \mathbf{w}_t is a vector of time variables, as in the previous equation, with ζ_r the associated vector of coefficients; and u_{rt} is an idiosyncratic error.

In most of our analysis, the vector \mathbf{Z}_{rt} includes the interaction of an indicator for the years after the Orange Revolution and the vote for Yushchenko in the final round of the 2004 presidential election. In other words, we compare the impact of the Orange Revolution on privatization effectiveness in regions that supported Yushchenko and those that did not.

As in the firm-level analysis, we define $\mathbf{w}_t \equiv (1, t)$, so that we allow for both region fixed effects and region-specific trends. As Figure 3 illustrates, trends in privatization effectiveness differ sharply across regions before the Orange Revolution, even after controlling for year fixed effects. In Sumy, for example, privatization effectiveness trends sharply downward before the Orange Revolution, whereas in Odesa the trend is clearly positive. If these trends are correlated with vote for Yushchenko in 2004, then models with fixed effects only would produce biased estimates of the impact of the Orange Revolution on privatization effectiveness. Our empirical strategy corrects for these differences by estimating a separate linear trend for each region.

In practice, we do not observe δ_{rt} directly, but instead have an estimate $\hat{\delta}_{rt} = \delta_{rt} + v_{rt}$ from

⁷We follow Brown, Earle and Telegdy (2006) in reporting results for $J = 10$, trading off the benefits of disaggregation of sectors and number of observations within individual sectors. Brown, Earle and Telegdy (2006) also show that the estimated effects of privatization are little affected by alternative assumptions on the form of the production function (e.g., Cobb-Douglas, trans-log) or estimation method (e.g., OLS regression, factor cost shares, or the Olley and Pakes (1996) semi-parametric approach).

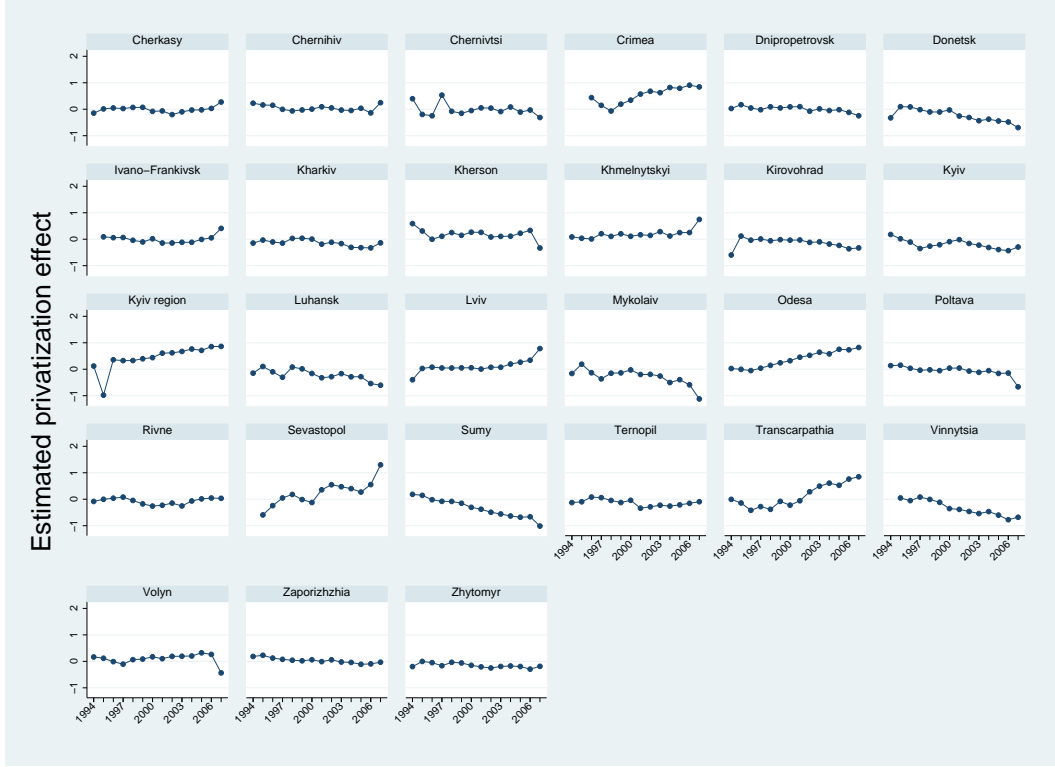


Figure 3: Trends in privatization effectiveness, controlling for year fixed effects

estimation of Equation 2. Our estimating equation for the second stage is therefore

$$\hat{\delta}_{rt} = \mathbf{Z}_{rt}\boldsymbol{\mu} + \theta_t + \mathbf{w}_t\zeta_r + (u_{rt} + v_{rt}) = \mathbf{Z}_{rt}\boldsymbol{\mu} + \theta_t + \mathbf{w}_t\zeta_r + \varepsilon_{rt}, \quad (3)$$

where we define $\varepsilon_{rt} \equiv u_{rt} + v_{rt}$. Estimation of Equation 3 poses a minor complication, in that the precision of first-stage estimates of δ_{rt} will generally be greater in region-year cells with more firm-year observations, implying that ε_{rt} will have smaller variance in such region-years. In principle, we could correct for this second-stage heteroskedasticity by employing a feasible generalized least squares (FGLS) estimator of the sort suggested by Hanushek (1974), though this would be somewhat cumbersome given the panel structure of our second stage. In practice, OLS estimates of Equation 3 are consistent, and working with similar data Brown, Earle and Gehlbach (2009) find no substantial differences between OLS and FGLS estimates. We therefore estimate Equation 3 by OLS, calculating heteroskedasticity-robust standard errors that allow for correlation of error terms across years within regions (i.e., we “cluster by region”).

A more serious econometric concern is that the election outcome in 2004 may be endogenous to regional privatization effectiveness. As we discuss above, we therefore also estimate Equation 3 by two-stage least squares, using the interaction of an Orange Revolution indicator and Russian ethnicity and language, respectively, as instruments for the Orange Revolution \times Yushchenko vote interaction.

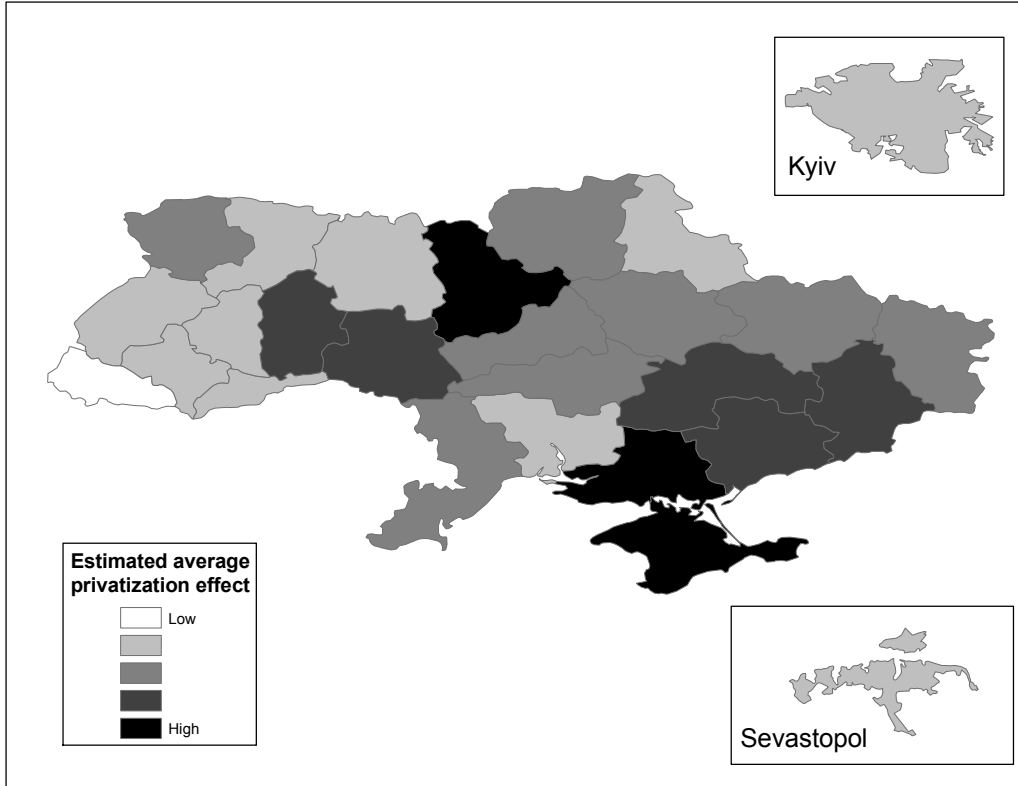


Figure 4: Average effect of privatization on firm productivity, by region

5 Results

5.1 Estimation

As a preliminary step, we estimate the average regional impact of privatization to domestic owners on multifactor productivity, using the following variant of Equation 1:

$$x_{jt} = \mathbf{f}(k_{jt}, l_{jt}) + \mathbf{Y}\gamma + \mathbf{w}_t\alpha_j + F_{jt}\phi + D_{jt}\mathbf{I}\vartheta + D_{jt}\mathbf{O}\delta + \eta_{jt},$$

where \mathbf{I} is a $1 \times J$ vector of industry dummies, \mathbf{O} is a $1 \times R$ vector of region dummies, and δ is a vector of average regional privatization effects. Figure 4 illustrates the estimated regional effects. In general, privatization has a more positive impact on firm productivity in the eastern regions of Ukraine. Variation in these estimated effects is quite large, ranging from a 40-percent reduction in firm productivity in Transcarpathia to a 27-percent increase in Crimea. These cross-regional differences are comparable to those documented for Russia in Brown, Earle and Gehlbach (2009).

Our focus in this paper is on variation over time in regional privatization effectiveness, not on the average effect. The primary question is whether the relative performance of privatized firms was affected by the regime change that followed the Orange Revolution in 2004. To estimate this effect, we take advantage of the strong geographic character of the

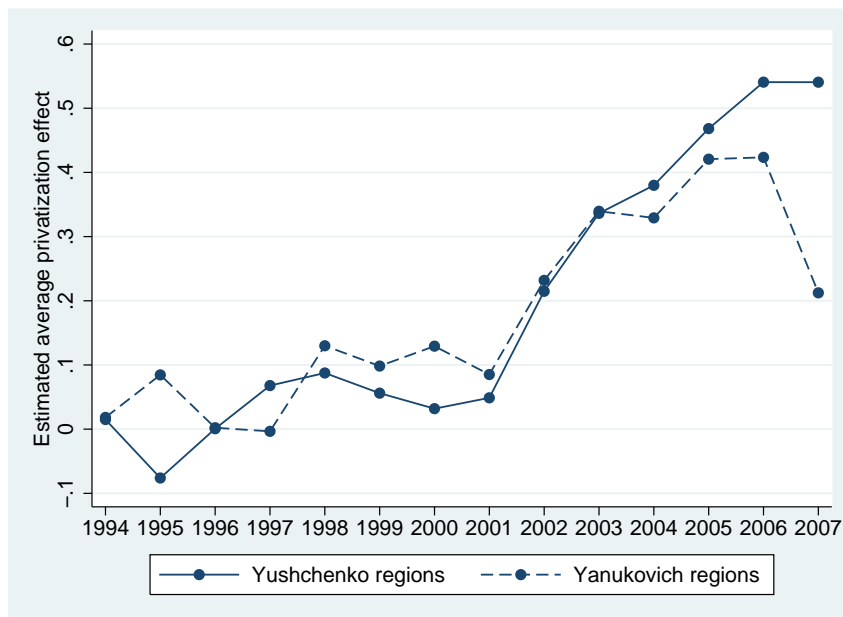


Figure 5: Average effect of privatization on firm productivity, by year

Orange Revolution: as discussed above, many of the actions subsequently taken by President Yushchenko were directed against business elites in the eastern regions where Yushchenko did poorly in the 2004 presidential election, and his government was composed almost entirely of individuals from other parts of the country. Our hypothesis is therefore that the performance of privatized firms in pro-Yanukovich regions decreased after the Orange Revolution, relative to that in pro-Yushchenko regions.

Figure 5 presents a rough comparison of trends in privatization performance in regions where Yushchenko and Yanukovich did relatively well in the December 2004 (do-over) runoff election.⁸ In both parts of the country, privatization has little impact on firm performance through 2001. The sharp acceleration after that date may be a consequence of the extensive economic reforms carried out during Yushchenko’s 17-month stint as prime minister in 2000 and 2001. There is little obvious difference in the trajectories of Yushchenko and Yanukovich regions before the Orange Revolution, but trends diverge after Yushchenko’s election as president. By 2007, privatization to domestic owners is estimated to have a 33-percentage-point greater impact on firm productivity in Yushchenko regions than in Yanukovich regions, a difference that is statistically significant ($p=0.009$).

To formally test the hypothesis of a differential impact of the Orange Revolution on regional privatization effectiveness, we turn to the empirical strategy outlined in the previous section. As discussed there, we estimate a model with region and year fixed effects and region-specific trends. Our determinant of interest is the interaction of an Orange Revolution indicator, 0 through 2004 and 1 thereafter, and the vote for Yushchenko in the December runoff election. (The “direct effects” are subsumed by the region and year fixed effects.)

⁸Yushchenko received at least two-thirds of the vote in the 14 regions (out of 27 total) defined here as “Yushchenko regions.”

Table 1 presents these estimates of the impact of the Orange Revolution on privatization effectiveness. Column (1) reports results for an unbalanced panel of estimated privatization effects from our firm-level regression, representing 27 regions for the 1994–2007 period. (Privatization effects cannot be estimated in regions with no privatized firms, and privatization did not begin in some regions until after 1994.) The estimated effect of the Orange Revolution \times Yushchenko vote interaction is large and statistically significant at the 0.01 level.⁹ To put this in perspective, Yushchenko’s vote share in the December election ranged from 0.04 in Donetsk to 0.96 in Ternopil. The Orange Revolution is therefore estimated to have resulted in a decrease in privatization effectiveness of 24 percentage points in the most anti-Yushchenko region, relative to the most pro-Yushchenko region.

The estimate in column (1) controls for many potential sources of variation across firms, time, and regions. To begin with, regional privatization effects are based on deviations resulting from privatization from the productivity trend for each individual firm, controlling for industry-year shocks. Thus, for example, privatization would have the same impact on two firms—one in a sector experiencing rapid technological improvement, the other burdened with excess employment—if it increased productivity two percent above a positive trend in the first case and two percent above a negative trend in the second. Moreover, these estimates control for differences across regions in industrial structure, as our first-stage model (Equation 1) allows for sector-specific privatization effects that vary over time: any difference between Donetsk and Ternopil is due to factors other than the presence of a large mining sector in the first region but not the second. The inclusion of year fixed effects in the second-stage equation controls for common shocks to privatization effectiveness such as changes in macroeconomic policy, and the presence of region fixed effects controls for time-invariant characteristics such as urbanization and geographic location that may impact privatization performance. Finally, the inclusion of region-specific trends allows for the possibility that the effect of regional characteristics may change over time. For example, product and input markets may be generally deeper in urbanized regions, but that relationship may have accelerated as the economic transition progressed.

Nonetheless, there may be time-variant regional characteristics that are correlated with the Orange Revolution effect that are not captured by region-specific trends. As a robustness check, we therefore include the vector of (possibly endogenous) controls described in Section 3: industrial production growth, unemployment, log FDI, and log population. Missing data for some variables reduce coverage to the period 1996–2007. We also drop Sevastopol from these regressions, as data are provided inconsistently for this region.

Column (2) of Table 1 reproduces the specification in column (1) on this restricted sample; the estimate is very similar. Column (3) presents results with the vector of covariates. None of the controls has an estimated effect that is significantly different from zero, and the estimated effect of the Orange Revolution \times Yushchenko vote interaction is again very similar to that in column (1). We conclude that the baseline specification with fixed effects and region-specific trends captures the underlying relationship.

⁹In a model with fixed effects only, the estimated effect of the Orange Revolution \times Yushchenko vote interaction is insignificant but positive, with an estimated coefficient of 0.089 (SE = 0.253).

Table 1: The Orange Revolution and privatization effectiveness

	Full Sample		Restricted Sample		Full Sample	
	(1)	(2)	(3)	(4)	(5)	
Orange Revolution × Yushchenko vote	0.257*** (0.082)	0.265** (0.106)	0.248** (0.113)	0.404* (0.233)	0.245*** (0.083)	
Industrial production growth			−0.165 (0.114)			
Unemployment			−1.196 (0.814)			
Log FDI			0.002 (0.028)			
Log population			2.184 (3.089)			
Orange Revolution × western region				0.114 (0.091)		
Orange Revolution × southern region				0.150 (0.145)		
Orange Revolution × eastern region				0.169 (0.144)		
Orange Revolution × western border					0.069 (0.083)	
Orange Revolution × eastern border					0.039 (0.048)	
Year fixed effects	Yes	Yes	Yes	Yes	Yes	
Region fixed effects	Yes	Yes	Yes	Yes	Yes	
Region-specific trends	Yes	Yes	Yes	Yes	Yes	
Observations	373	312	312	373	373	
Regions	27	26	26	27	27	

Notes: Dependent variable is estimated regional privatization effect from firm-level FE&FT regression. In parentheses, heteroskedasticity-robust standard errors corrected to allow for clustering across observations within regions. Significance levels: *** = 0.01, ** = 0.05, * = 0.10.

The results in columns (1)–(3) support the hypothesis that Yushchenko used his presidential power to alter business-state relations after the Orange Revolution, with the business environment for privatized firms worsening in regions that opposed his election, relative to those that supported it. An alternative explanation for these results is that privatized firms in particular regions benefited or suffered from Yushchenko’s efforts to realign Ukraine with the West, a policy that came at the expense of relations with Russia. In principle, the shifting geopolitical environment could have disproportionately affected firms with actual or potential trade ties to the European Union and Russia. (Changing relations with the European Union and Russia may also have affected particular *sectors*, but those effects would be captured by the sector-specific privatization effects estimated in Equation 1.)

The specifications in Columns (4) and (5) of Table 3 explore this possibility by including interactions of the Orange Revolution dummy with various dummies for geographic location. Column (4) divides Ukraine into four macro-regions, following the typology in Clem and Craumer (2005). Column (5) interacts the Orange Revolution dummy with indicators equal to one if the region borders Poland, Slovakia, Hungary, or Romania (Romania joined the European Union in 2007, but accession talks were well under way by the time of the Orange Revolution) or Russia, respectively. None of these interactions has a statistically significant effect, and the Orange Revolution \times Yushchenko vote effect is large and significant in both regression.

As a further robustness check, we verified that the results in Table 1 are not driven by outliers, dropping regions one at a time from the sample. The estimated coefficient on the interaction of the Orange Revolution dummy and Yushchenko vote in the specification of Column (1) never drops below 0.22 in any of these 27 regressions, and the associated p -value is always below 0.02.

5.2 Identification

As discussed above, one potential concern with these results is that the 2004 election outcome may be endogenous to regional privatization effectiveness. To address this issue, we consider two excluded instruments: an interaction between the Orange Revolution dummy and the proportion of the regional population with self-declared Russian ethnicity, and an interaction between the Orange Revolution dummy and the proportion of the regional population speaking Russian as a native language.

Table 2 reports the results of these instrumental-variables regressions. Both instruments are strongly correlated with the Orange Revolution \times Yushchenko vote interaction—Yushchenko did better in regions with few Russians—but the relationships are somewhat distinct. Indeed, self-declared Russian ethnicity is positively correlated with vote for Yushchenko, after controlling for Russian language. The Hansen J -statistic, which allows for a test of overidentification in the presence of heteroskedasticity, comfortably supports the exclusion of these instruments. The estimated effect of the Orange Revolution \times Yushchenko vote interaction is substantively large in all regressions, though typically somewhat smaller than in the analogous specification in Table 1, and it is statistically significant in four out of five specifications. Column (4) is the outlier: examination of the first-stage coefficients reveals that the macro-region dummies capture regional variation in self-declared Russian ethnicity, having controlled for Russian language use.

As an additional exercise, we consider the dynamics of the Orange Revolution effect. If this effect is causal, then pro- and anti-Yushchenko regions should diverge after the Orange Revolution, not before, though there is the possibility of anticipatory effects just prior to the event. We can check this by estimating a dynamic specification of Equation 3, where we interact dummy variables for the years before and after the Orange Revolution with vote for Yushchenko in the 2004 presidential election. Formally, index event time by τ , with $\tau = 0$ corresponding to 2004, the year of the Orange Revolution. We report results from a

Table 2: Instrumental-variables regressions

	Full Sample		Restricted Sample		Full Sample	
	(1)	(2)	(3)	(4)	(5)	
Orange Revolution × Yushchenko vote	0.222** (0.083)	0.209** (0.099)	0.185* (0.104)	0.197 (0.294)	0.209** (0.086)	
Industrial production growth			-0.167 (0.115)			
Unemployment			-1.234 (0.820)			
Log FDI			0.002 (0.028)			
Log population			2.001 (3.000)			
Orange Revolution × western region				0.139 (0.095)		
Orange Revolution × southern region				0.045 (0.201)		
Orange Revolution × eastern region				0.052 (0.166)		
Orange Revolution × western border					0.075 (0.085)	
Orange Revolution × eastern border					0.031 (0.046)	
Russian ethnicity (first stage)	1.126*** (0.144)	0.921*** (0.213)	0.883*** (0.212)	-0.042 (0.130)	1.353*** (0.154)	
Russian language (first stage)	-1.766*** (0.094)	-1.665*** (0.126)	-1.664*** (0.125)	-0.423*** (0.105)	-1.921*** (0.104)	
Hansen overidentification statistic <i>p</i> -value, Hansen statistic	0.064 0.800	0.054 0.817	0.128 0.721	0.181 0.670	0.006 0.938	
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Region-specific trends	Yes	Yes	Yes	Yes	Yes	Yes
Observations	373	312	312	373	373	
Regions	27	26	26	27	27	

Notes: Dependent variable is estimated regional privatization effect from firm-level FE&FT regression. In parentheses, heteroskedasticity-robust standard errors corrected to allow for clustering across observations within regions. Significance levels: *** = 0.01, ** = 0.05, * = 0.10.

specification that includes interactions for $\tau = -5, -4, \dots, 2, 3$, thus treating years before 1999 as the base category, though our results are qualitatively similar with different event windows.

Figure 6 depicts the dynamics of the Orange Revolution effect. Although the individual

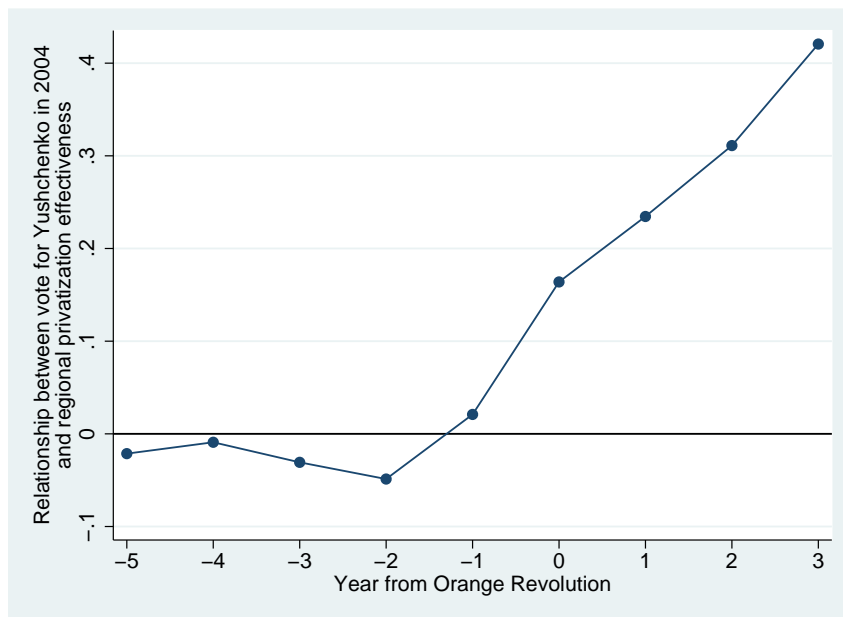


Figure 6: Dynamics of estimated Orange Revolution effect

coefficients are imprecisely estimated, the pattern is striking. The profile is flat through $t = -2$, suggesting no relationship between vote for Yushchenko and privatization effectiveness before 2003. There is a small uptick at $t = -1$, and a substantial increase at $t = 0$, which corresponds to the year of the Orange Revolution. This movement is consistent with changes in firm behavior in anticipation of a possible regime change. In fact, from 2002 there was a growing sense that the group around President Kuchma could be swept from power. Anders Åslund writes, “The possibility of a regime change in the presidential elections of 2004 had been intensely discussed ever since the parliamentary elections in March 2002” (Åslund, 2006, p. 26). Moreover, the popular belief that Yushchenko could win increased dramatically over the course of the election campaign and subsequent events in 2004 (Kuzio, 2006). Firms may therefore have begun to adjust to a possible change in the business environment, expecting a shift in presidential favor to the western regions of the country. Finally, following the Orange Revolution, pro- and anti-Yushchenko regions increasingly diverge, with the effect reaching its maximum at $\tau = 3$, the last year in the data.

5.3 Interpretation

What accounts for the strong correlation between the Yushchenko vote in the 2004 presidential election and the post-Orange Revolution trends in privatization effectiveness? The contextual discussion provided above suggests that Yushchenko himself was interested in realigning the relationship between government and business in various parts of the country, and that he had the means to do so through his control of gubernatorial appointments, among other presidential powers. Moreover, the dynamic effects discussed earlier suggest that firm owners and managers may have anticipated a sea change in the business environment in the period just prior to the collapse of the Kuchma regime, with privatized firms in

Table 3: Disaggregation of Orange Revolution effect

	(1)	(2)
Orange Revolution × Our Ukraine vote	0.677*** (0.190)	
Orange Revolution × BYuT vote	-1.152 (0.758)	
Orange Revolution × Yushchenko vote		0.491*** (0.122)
Orange Revolution × swing vote		-0.572** (0.221)
Year fixed effects	Yes	Yes
Region fixed effects	Yes	Yes
Region-specific trends	Yes	Yes
Observations	373	373
Regions	27	27

Notes: Dependent variable is estimated regional privatization effect from firm-level FE&FT regression. In parentheses, heteroskedasticity-robust standard errors corrected to allow for clustering across observations within regions. Significance levels: *** = 0.01, ** = 0.05, * = 0.10.

anti-Yushchenko regions expecting a (relative) deterioration in business-state relations.

We can explore Yushchenko’s personal role by distinguishing more carefully between regions that were consistently pro-Yushchenko, and those that gravitated to him after the 2002 parliamentary elections when Yulia Tymoshenko decided not to run for president. Although Tymoshenko was Yushchenko’s partner in the Orange Revolution, her participation in the government was not ensured until January 2005, when she was named prime minister.¹⁰ Moreover, Tymoshenko held the premiership for only seven months, and in any event the power to appoint governors rests with the president, not the prime minister. To the extent that politicians reward their core supporters rather than “swing voters,” we might therefore expect any divergence in privatization performance to more heavily impact regions that were consistently supportive of Yushchenko, rather than those that switched their support from Tymoshenko to Yushchenko after 2002.

The specification in column (1) of Table 3 unpacks the Orange Revolution effect by interacting the vote for Yushchenko’s and Tymoshenko’s respective parties in 2002 with the same Orange Revolution dummy used in Tables 1 and 2. The Orange Revolution effect is entirely driven by variation in support for Yushchenko’s Our Ukraine. The estimated coefficient on the Orange Revolution × BYuT [Bloc of Yulia Tymoshenko] vote interaction is in fact negative, though statistically insignificant. Thus, the (relative) performance of privatized firms

¹⁰An agreement signed between the two parties in July 2004 granted Tymoshenko Yushchenko’s support for the premiership, but this secret protocol was not revealed until after the Orange Revolution, when it was leaked to the press (Wilson, 2005, pp. 159–160).

increased in regions that were consistently supportive of Viktor Yushchenko, not those where individuals joined the Orange coalition closer to the 2004 presidential election.

Column (2) reports results from a similar specification that includes the interaction of the Orange Revolution dummy and Yushchenko vote, plus the interaction of the Orange Revolution dummy and the “swing” in Yushchenko’s vote from 2002 to 2004, defined as the Yushchenko vote in the December 2004 election minus the Our Ukraine vote in the 2002 parliamentary elections. The estimated coefficient on the latter term is negative and statistically significant, implying that there is more divergence in privatization performance after the Orange Revolution in regions populated by Yushchenko’s core supporters.

6 Conclusion

The Orange Revolution shifted the geographic balance of power in Ukraine. A change in the business environment accompanied that shift, as the effect of privatization on firm productivity declined in regions that had opposed Viktor Yushchenko, winner of the 2004 presidential election, relative to those that had supported him. Our results suggest that privatization performance improved most (in relative terms) in regions that constituted Yushchenko’s core political base, not those whose residents joined his coalition late in the game. Analysis of the dynamics of the relationship, and instrumental-variables regressions that exploit the strong correlation between regional voting in 2004 and the ethnic and linguistic character of the region, suggest that the effect is causal.

Our work provides some of the first direct evidence that changes in the institutional environment can affect reform outcomes. Roughly speaking, the impact of the Orange Revolution is similar in magnitude to the large differences in privatization performance observed across postcommunist countries. The results in this paper are thus consistent with the hypothesis that institutional differences drive cross-national variation in reform outcomes. Fully generalizable results, however, await future research.

References

- Åslund, Anders. 2005. “The Economic Policy of Ukraine after the Orange Revolution.” *Eurasian Geography and Economics* 46(5):327–353.
- Åslund, Anders. 2006. The Ancien Régime: Kuchma and the Oligarchs. In *Revolution in Orange: The Origins of Ukraine’s Democratic Breakthrough*, ed. Anders Åslund and Michael McFaul. Washington, DC: Carnegie Endowment for International Peace.
- Åslund, Anders. 2009. *How Ukraine Became a Market Economy and Democracy*. Washington, DC: Peterson Institute for International Economics.
- Beck, Nathaniel. 2005. “Multilevel Analyses of Comparative Data: A Comment.” *Political Analysis* 13(4):457–458.

- Beissinger, Mark R. 2007. "Structure and Example in Modular Political Phenomena: The Diffusion of Bulldozer/Rose/Orange/Tulip Revolutions." *Perspectives on Politics* 5(1):259–276.
- Brown, J. David, John S. Earle and Álmos Telegdy. 2006. "The Productivity Effects of Privatization: Longitudinal Estimates from Hungary, Romania, Russia, and Ukraine." *Journal of Political Economy* 114(1):61–99.
- Brown, J. David, John S. Earle and Álmos Telegdy. 2009. "Employment and Wage Effects of Privatisation: Evidence from Hungary, Romania, Russia, and Ukraine." *Economic Journal* forthcoming.
- Brown, J. David, John S. Earle and Scott Gehlbach. 2009. "Helping Hand or Grabbing Hand? State Bureaucracy and Privatization Effectiveness." *American Political Science Review* 103(2):264–283.
- Clem, Ralph S. and Peter R. Craumer. 2005. "Shades of Orange: The Electoral Geography of Ukraines 2004 Presidential Elections." *Eurasian Geography and Economics* 46(5):364–385.
- Darden, Keith. 2010. "Resisting Occupation." Mimeo, Yale University.
- Darden, Keith and Anna Grzymala-Busse. 2006. "The Great Divide: Pre-communist Schooling and Post-communist Trajectories." Paper presented at the Duke Workshop on Post-Communist Political Economy and Domestic Politics.
- Denisova, Irina, Markus Eller, Timothy Frye and Ekaterina V. Zhuravskaya. 2009. "Who Wants to Revise Privatization? The Complementarity of Market Skills and Institutions." *American Political Science Review* 103(2):284–304.
- Djankov, Simeon and Peter Murrell. 2002. "Enterprise Restructuring in Transition: A Quantitative Survey." *Journal of Economic Literature* 40(3):739–792.
- Guriev, Sergei and William L. Megginson. 2007. Privatization: What Have We Learned? In *Beyond Transition. Proceedings of the 18th ABCDE*, ed. Francois Bourguignon and Boris Pleskovic. Washington, DC: World Bank.
- Hanushek, Eric A. 1974. "Efficient Estimators for Regressing Regression Coefficients." *The American Statistician* 28(2):66–67.
- Kuzio, Taras. 2006. Everyday Ukrainians and the Orange Revolution. In *Revolution in Orange: The Origins of Ukraine's Democratic Breakthrough*, ed. Anders Åslund and Michael McFaul. Washington, DC: Carnegie Endowment for International Peace.
- Megginson, William L. and Jeffrey M. Netter. 2001. "From State to Market: A Survey of Empirical Studies on Privatization." *Journal of Economic Literature* 39(2):321–389.
- Olley, G. Steven and Ariel Pakes. 1996. "The Dynamics of Productivity in the Telecommunications Equipment Industry." *Econometrica* 64(6):1263–1297.

- Paskhaver, Aleksandr and Lidiia Verkhovodova. 2007. "Privatization Before and After the Orange Revolution." *Problems of Economic Transition* 50(3):5–40.
- Tucker, Joshua. A. 2007. "Enough! Electoral Fraud, Collective Action Problems, and Post-Communist Colored Revolutions." *Perspectives on Politics* 5(3):537–553.
- Wilson, Andrew. 2005. *Ukraine's Orange Revolution*. New Haven, CT: Yale University Press.