

Encouraging Skill Development: Evidence from Public-Private Partnerships in Education in Russia's Regions¹

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Abstract:

How and when are governments able to encourage firms and schools to work together to develop workers' skills? Upgrading the quality of human capital in the workforce is widely seen as a key challenge faced by countries looking to escape the "middle income trap". Growing attention has been paid to public-private partnerships (PPP) between individual firms and schools as a powerful tool for meeting this challenge, but key facilitators of PPP thought crucial in existing studies – strong, independent employers' associations and labor unions – are often missing in such settings. To explore the emergence of PPP in skill development in the developing world, we draw on recent reform experiences in Russia's regions that have led to a surge in complex, costly forms of PPP despite historically anemic business associations and unions. We argue that variation in the administrative capacity of regional governments and their political accountability explains this surge. Strong administrative capacity reassures all parties that regional authorities can monitor their counterparties' compliance with agreements, while political accountability creates incentives for authorities to do so. We test our argument using original data on the existence and content of firm-school partnerships across all Russia's regions for 2013.

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Introduction

A key challenge faced by many governments in developing economies is escaping the middle income trap: protracted, stagnant growth common to countries emerging from low-levels of development (Doner and Schneider 2016). For many, the problem stems from a fundamental dilemma: wages and incomes are too high to compete with lower-cost, exporting countries but workers are not skilled enough to compete with those in advanced economies (Kharas and Kohli 2011). Emerging work on the political economy of development suggests that the most obvious solution – upgrading workers’ skill – is extremely challenging (Doner and Schneider 2016; Agenor and Canuto 2012), despite widespread understanding by firms that the lack of qualified labor is a significant obstacle to their development (ManpowerGroup 2016).

One solution that is gaining growing attention is to directly link firms and schools through public-private partnerships (PPP) that allow the former to tailor curricula to their own needs in exchange for material assistance and hiring guarantees (Hoffman and Schwartz 2015; Newman and Winston 2016). Such arrangements are institutionally challenging to set up, however, because of the difficulty of aligning the incentives of employers, schools, and governments. Existing research on successful PPP’s largely focuses on Coordinated Market Economies, emphasizing the central role of key actors – strong and independent business associations and labor unions – that are absent or weak in most developing countries (*see* Hall

and Soskice 2001, Thelen 2004, Busemeyer and Trampusch 2012; Busemeyer 2015). Thus we know little about how successful PPP can be forged in low- and middle-income settings.

What research exists suggests that PPP's for skill development pose multiple challenges. First, investments in human capital are costly and risky for firms, since trained employees can be easily poached by rivals. (Thelen 2004, Iversen and Soskice 2001, Acemoglu and Pischke 1998, Stevens 1996). Second, co-investments by firms with the state are problematic. Because the state is the final arbiter of contracts on its own territory, investors have little recourse in the event of disputes. Consequently, co-investments require strong, credible commitments that the state will abide by agreements (North and Weingast 1989, North et al. 2009). In much of the literature on TVET, the solution to these problems lies with the role of labor and business associations. The latter can monitor member firms to police poaching (*c.f.* Streeck 1992; Estevez-Abe et al. 2001) and use the threat of collective action to hold the state accountable (Finegold and Soskice 1988; Crouch et al. 1999). Labor unions perform similar functions for employees. Such associations tend to be weak in the developing world, however, limiting their value.

In this paper, we examine the paradoxical existence of meaningful, high-cost forms of TVET cooperation in Russia, where business associations and labor have traditionally been weak. Recently, in an attempt to promote more effective forms of skill development, the federal government devolved significant authority over the content and organization of TVET to regional governments (Remington 2017). Accordingly, in regions which firm-school cooperation has little educational content while in others it is characterized by shared responsibility over instruction and costly investments of time and money by firms. Meantime, variation in the strength of Russian business associations and labor unions has not been a significant source of

this variation (Remington and Marques in press). Thus, Russia is a useful case for exploring how middle-income countries can foster PPP in TVET, enhance human capital, and improve economic development in the absence of cohesive intermediary organizations such as business chamber, industry associations and labor unions.

In this paper, we treat the problem of encouraging firms and schools to engage in meaningful forms of PPP as a two-sided cooperation dilemma and attempt to understand the conditions under which both sides invest in costly (in terms of time or money) forms of partnership. We emphasize the role of government in encouraging investment in skill, arguing that two specific aspects of the cooperation dilemma enable the state to play an important role in resolving it. First, firms and schools depend on each other to take costly actions to implement agreements and must be reassured that their counter-parties will do so. Firms know that altering long established curricula, installing new equipment, and hiring or retraining instructors is time consuming and costly for schools. Similarly, school officials may be wary of exerting such efforts absent a belief that firms will be prevented from opportunistically renegeing on promised investments or hiring graduates after changes are made. We argue that both sides can be reassured if the state itself has strong administrative capacity, which we define as the ability of the state to monitor its agents and private actors and to achieve specific goals (Mann 1993; Hendrix 2010). Where the state has the capacity to effectively monitor firms and schools, as well as enforce contracts, it can help to ameliorate the fears of both sides (McNollGast 1987; Weingast and Moran 1983).

Second, however, firms must actually believe the state will exert pressure on school officials to honor agreements and vice-versa. Work on the political economy of investment has long emphasized that high levels of institutional constraints that give actors access to power

make the state accountable to those actors, even in non-democracies, and are key to investment (see North et al. 2009, Gehlbach and Keefer 2011). Where actors can hold the state accountable, it is more likely to be an unbiased defender of property rights and enforcer of contracts. For firms and schools, this can also ameliorate commitment problems and make meaningful co-investments in human capital more attractive.

To test our hypotheses, we take advantage of a unique dataset constructed using performance reports on PPP from 1654 Russian secondary vocational education facilities for the academic year 2013. We aggregate these reports to the regional level in order to identify the number of different forms of costly (in terms of time and material) practices present in a region in 2013, as well as the percentage of schools within regions that have adopted such practices. The former is a good, if imperfect, proxy for the *extent* to which regions have broadly encouraged adoption of meaningful co-investment practices among firm-school partners, while the latter is a reasonable proxy for *how widespread* these practices are within regions. Empirically, we focus on Russia due to the wide variation in TVET practices across its regions and their distribution. This variation is not well explained by existing work and it makes sub-national analysis of the Russian case attractive methodologically.⁵ Moreover, focusing on a single country ameliorates a wide range of potentially unobservable – legal regimes, social capital, historical legacies, or culture, etc. – that would complicate cross-national analysis.

To preview our findings, we find evidence that administrative capacity and political competition are strongly associated with both our measures of the extent to which costly PPP are present in regions and how common they are across regional schools. Recognizing the potential

⁵ This strategy has been used recently to test a wide range of outcomes of general interest to political economy, including inequality (Remington 2011) and economic growth (Libman 2012) to name a few.

for endogeneity, we introduce a new instrument for administrative capacity, which takes advantage of the strong links between soviet era industrial structure and contemporary administrative state capacity (Gehlbach 2008). Our strategy exploits the fact that the economic trauma of the Soviet collapse and the wholesale disruption of industrial relations and structures in the regions created an exogenous break between our instrument and contemporary vocational education. Although our political competition measure allows for no such instrument, we nonetheless find it to be robust to a number of plausible alternative explanations and controls. Although suggestive due to its cross-sectional nature, our findings nevertheless shed light on how states can encourage genuine PPP under conditions thought to be inhospitable to co-investment.

Theoretically, our work provides a novel explanation for how the state can encourage cooperative forms of human capital development. In doing so, it joins a growing body of work on the condition under which educational systems, whether vocational or academic, emerge and differentiate (*c.f.* Thelen 2004; Ansell and Lindvall 2013; Gift and Wibbels 2014; Busemeyer 2015) but focuses on conditions endemic to the developing world. Empirically, we explore our hypothesis – as well as a number of existing explanations – using statistical analysis of a novel dataset of PPP in Russia’s regions. This contrasts with previous work on TVET, which has primarily relied on qualitative approaches (*see* Hall and Soskice 2001, Culpepper 2000, Thelen 2004, Busemeyer and Trampusch 2012). We believe our new measures captures key characteristics – the nature of investments being made and their diffusion – of how TVET is organized. Substantively, our work suggests the conditions under which states can expect firms to engage in PPP in skill development, make costly investments, and thus help to produce the skilled workforce critical to economic development.

The next section briefly outlines the key problems of investment in TVET and our main argument. Sections one and two introduce the hypotheses, data, and research design. Section four presents our results. Section five describes a series of robustness checks (the results of these are available in the appendix) and section six concludes.

Literature and Hypotheses

The scholarly consensus is that TVET is characterized by fundamental commitment problems between individual firms and other actors arising from the unique challenges of human capital development. Firms fear that costly investments in training will disadvantage them vis-à-vis rivals willing to poach workers trained by others (Acemoglu and Pischke 1998) or lead to hold-up by unions (Estevez-Abe et al. 2001; Thelen 2004). They also fear expected returns may be sapped by the state via the process of incremental policy changes or poor protection of trade secrets (Hall and Thelen 2009; Culpepper 2000). More general work on the political economy of investment suggests that firms have much more to fear from the state, however. The state's final authority over contracts enable it to render investments unprofitable through opportunistic policy shifts (Frye 2010), inconsistent policy enforcement (Beazer 2012), or selective property rights protections (Gehlbach 2008). Absent institutional constraints, the rent-seeking motives of officials are likely to result in higher costs and risks for all forms of investment.

In this paper, we wish to draw attention to a more specific danger of PPP related to TVET: dealing with school officials. PPP requires firms to work hand-in-hand with school administrators and depend on them to train sufficiently qualified students. Work on bureaucratic accountability has long argued that absent disciplinary pressure from above, lower level officials can often take advantage of information asymmetries to carve out discretion and shirk their responsibilities (McNollGast 1987; Weingast and Moran 1983), with negative implications for

investment (Beazer 2012). For PPP in TVET, specifically, this danger can manifest itself in the unwillingness of school officials to exert efforts needed to properly train students. Evidence from Germany, among the most advanced countries in terms of TVET, suggests schools must constantly update their curricula, install new equipment, hire or retrain instructors, etc. (Andersen and Hassel 2013) to stay competitive and meet the needs of their PPP partners. If firms cannot ensure that their partners do this, their investments in PPP pay no dividends.

At the same time, schools also face commitment problems related to cooperating with firms. Human capital investment is characterized by a fundamental tension between investing in skills that are specific to a particular firm, sector, or industry, and those that are more generally portable across firms. While the former are generally more valuable to any given firm, the latter are crucial to the competitiveness of workers in the broader economy. For schools, cooperation with firms requires careful navigation of the benefits of cooperation versus the potential costs that come from allowing a partner to narrow education content. In the worst case, such cooperation may render students nearly unemployable outside the partner firm (Busemeyer 2015), nullifying the schools' gains (in terms of better student outcomes) from co-investment.

Work on TVET in Western Europe emphasizes the importance of business associations to solving commitment problems faced by both schools and firms (*see* Culpepper 2000; Busemeyer and Trampusch 2012; Busemeyer 2015). On the one hand, business associations render agreements among firms credible by providing information, monitoring compliance, and sanctioning members. On the other hand, associations render the state's commitments credible by providing the basis for mobilizing against adverse policy changes (Crouch et al. 1999). For PPP, associations are particularly valuable, as they can deploy resources to collate and verify firms' complaints about school partners and vice-versa. Should problems arise, associations can

then use the threat of collective action to sanction members or go directly to the state and pressure politicians. Thus, where associations are strong, the traditional literature would predict greater confidence by firms and schools in joint agreements, thus making costlier forms of PPP (in terms of time, material, and effort) more likely to appear and be widely adopted.

Absent associations, however, we argue that many of the functions they perform in creating credible commitment can potentially be handled by the state. A crucial, if underexplored, aspect of forging institutionally complex links between firms and schools in the existing literature on TVET is a state with strong administrative capacity. Formally, the concept of administrative capacity captures the extent to which the state can achieve specific goals and implement policy (Mann 1993). Central to its ability to do so in many contemporary arguments is its ability to effectively monitor the population, disseminate information through the bureaucracy, and sanction non-compliance with its wishes (Hendrix 2010). In existing work on TVET, the state's administrative capacity is crucial to its ability to independently assess the performance of TVET institutions, verify compliance with regulations, adjudicate disputes, and ultimately enforce tripartite agreements between itself, business, and labor (Streeck 1992; Culpepper 2000; Bussemeyer and Trampusch 2012). Although business associations and labor unions are considered to be responsible for investigating and disciplining their own members and calling attention to violations by others, their ability to do so is complemented by the state, which must ultimately verify their claims in adjudicating disputes.

This suggests that with strong administrative capacity, and its corresponding monitoring and enforcement apparatus, the state may be a substitute for the role of business associations and labor. For a state that can credibly commit to firms that it can police free-riding by other firms in the form of tax evasion, it seems plausible that it can provide reassurances that its monitoring

apparatus can also investigate and punish poaching, much as European business associations do. More importantly for PPP, however, stronger administrative capacity also provides firms with reassurance that the state has the necessary tools to ensure that local officials honor cooperative PPP agreements by producing qualified students. The willingness of firms to invest, therefore, hinges in part on their beliefs about the ability of the government to protect their investments. In a similar way, states with strong administrative capacity can also use their ability to monitor and potentially sanction firms in order to reassure schools that their partners will keep any commitments made. Thus, the state's ability to reassure both schools and firms that it can monitor agreements and sanction non-compliance by either side enables the state to step in to resolve coordination dilemmas. This potentially creates demand for TVET reform. At the same time, the government's enforcement capacity means that it can require school officials and firms to adopt or pursue PPP directly. Thus there is a supply side dynamic at play as well. Both are conducive to the usage of new, costly practices of PPP and to their spread within regions, suggesting:

H₁: In regions with higher administrative capacity, costly forms of PPP in VET are more likely to exist and are more likely to be used by a higher proportion of regional schools.

Having the state take the place of business associations in monitoring and sanctioning schools and firms may resolve commitment problems between firms and schools, but it does little to resolve fundamental commitment problems between these actors and the state itself. Although investments in TVET are not vulnerable to direct predation or expropriation, per se, they are still vulnerable to shifts in policy or the inability of the state to force school-level

officials' to comply with PPP (discussed above). Such vulnerabilities mean that PPP may be risky for firms, depressing costly co-investments. At the same time, school officials may worry that their time and effort in altering educational practices to suit the specific needs of firms may go unrewarded by their superiors in the state hierarchy, particularly if their firm partners do not follow through with promised investments or job guarantees.

Traditionally, work on the political economy of investment has highlighted the importance of institutions – human constraints on human interaction (North 1981) – as a means by which the state can make credible commitments to respecting firms' investment (Acemoglu et al. 2001; North et al. 2009). In this literature, institutions provide private actors with mechanisms that enable them to punish the state for breaking agreements and failing to defend property rights (North and Weingast 1989). Among the most important institutions in this literature are those that allow for direct political competition, which enable societal actors to replace politicians who abuse the power of the state. In doing so, they make politicians accountable to the public and align their incentives with respecting the rights of investors. Although traditionally conceived of as free, fair, and open elections, recent work has shown that electoral institutions can induce ersatz accountability even in settings where they are neither free nor fair by serving an important informational role that prevents fatal splits in the ruling elite (Magaloni 2006; Reuter 2017).

With respect to investments in skills, specifically, political competition is a potentially important factor in motivating the state to monitor compliance of both firms and schools with PPP obligations. As much of the literature on bureaucratic politics notes, the threat of electoral backlash is an important incentive to politicians to monitor and police local level officials and ensure that they are properly implementing policy (McCubbins and Schwartz 1984; Beazer 2012). Thus, we would expect political competition to strengthen firms' belief that the state will

intervene and sanction school officials that do not comply with PPP agreements. At the same time, political competition also enables schools to mobilize students and parents against politicians that allow firms to renege on promised investments, thus providing a mechanism to motivate the state to monitor and police firms' compliance with PPP. In both cases, access to tools for motivating state officials to prevent non-compliance with PPP should increase demand for costly forms of PPP, and lead to their spread. Consequently, we would expect:

H₂: In regions with greater political competition, costly forms of PPP in VET are more likely to exist and are more likely to be used by a higher proportion of regional schools.

Political competition is not the only incentive for the state to make credible commitments, however. Recent work suggests that legislatures, as institutions, are a valuable tool for creating credible commitments between leaders and ruling elites in autocratic and competitive authoritarian countries. Legislatures are valuable for ruling elites, because they both communicate the strength of various groups to the authorities and provide a forum for exchanging information (Gandhi 2008; Gehlbach and Keefer 2011). As a consequence, they decrease collective action costs and enable elites to credibly threaten autocratic leaders that do not respect property rights. In addition, access to the legislature also provides ruling elites access to spoils and policy benefits (Reuter and Turovsky 2014; Szakonyi 2018). Consequently, businesses and individual with direct access to legislatures should also be able to use them as powerful tools for directing the state to monitor and enforce their agreements. With respect to PPP, we therefore posit that the greater the representation of business people in regional legislatures, the easier it is for business interests to forge credible commitments with the state to

monitor and constrain schools. Again, we would expect this to increase demand for costly, meaningful forms of PPP by firms, making them more likely to arise and spread. We might also expect a supply-side dynamic. Legislatures with large proportions of firm owners may make PPP in TVET a priority, thus increasing pressure on schools to pursue it regardless of their preferences. Either way, this suggests:

H₃: In regions where business people make up a larger share of legislative institutions, costly forms of PPP in VET are more likely to exist and are more likely to be used by a higher proportion of regional schools.

Before concluding this section, it is important to point out that we believe that the two hypotheses we have proposed above should operate independently. States with a high degree of capacity may still be willing to serve as a credible commitment device between firms and schools even absent political competition or accountability, particularly if they have incentives to spur economic development. Similarly, pressure from firms and schools may force low-capacity states to use limited resources on PPP enforcement. Either way, we would not necessarily expect an interaction between these two variables.

Data and Empirical Strategy

In order to test the hypotheses laid out in the previous section, we take advantage of variation across Russia's regions in the nature of firm-school partnerships and how widespread they are. This variation stems from a decision in 2012 by the Russian federal government to devolve administrative responsibility for TVET to the regions. With this greater control over TVET also came additional costs that proved burdensome to regional budgets, however. One

solution has been to encourage PPP as a means of cost sharing with regional firms and decreasing schools' dependence on regional funds. Under this model, firms trade material investment in schools for greater control over the content and quality of instruction. Although the federal government continues to set nationwide standards (Federal State Educational Standards – *FGOSy*), schools can adjust up to 30% of their curricula to meet the specific needs of partner firms. Not all regions have adopted these sorts of arrangements, however.

To measure this regional variation, we take advantage of a unique dataset consisting of coded end-of-year performance reports from 1654 Russian secondary vocational education facilities for academic year 2013. We focus on secondary education, as it is the primary level of TVET for entry level positions in specialized, high-skill professions. The reports we use are mandated by the federal education ministry and must be publicly released, yielding data on all schools in the country.⁶ While the format and composition of reports vary, most include basic information on the institution, the quality and composition of the student body, its curricula, equipment and facilities, and educational outcomes. In addition, institutions are encouraged to include data and descriptions of their partnerships with firms and the terms of their PPP.

Using this data, we code the types of cooperation with firms reported by schools. These range from the traditional, Soviet era practice of sending students to firms temporarily to learn skills (*praktika*) to more costly forms, such as guaranteed work places for students after graduation.⁷ For our purposes, the theoretically most important forms are those that require repeated firm-school interaction or large material investments. Such forms require large

⁶ Overall, Russia has 2494 secondary vocational education facilities. Our data covers all of these schools except those in the in sectors (mainly music, culture and medicine) in which there are few private employers.

⁷ The full codebook for the original dataset is available from the authors' personal and institutional websites.

commitments, in time and treasure, and should be more likely to produce highly skilled graduates. Intensive investments in time under our scheme include the development of training standards and the design and evaluation of qualification exams. Such PPP not only requires firms to articulate specific needs, but also to develop curricula that meet these needs and pass regulatory muster. They also require constant work to keep content up-to-date and relevant.⁸ Materially costly forms of PPP include stipends to students, guaranteed jobs, and capital investments (in physical plants or equipment). All of these are potentially risky for firms, because returns depend on whether schools actually produce work-ready students. Schools face risks as well, because reforming curriculum, staffing, and training practices requires significant effort that may not be rewarded if firms renege on agreements.

Figure 1 shows the relative prevalence of these different forms of novel, high-cost PPP in our sample, summing the number of regions in which each practice is present. As the figure indicates, participation in setting standards and in overseeing qualification exams were the most common forms of high-cost partnerships in the sample, being present in 57 and 61 regions, respectively. The least widespread forms were wages for students and student stipends, which were present in 24 and 35 regions respectively. Overall, however, novel, costly PPPs were less common than traditional relationships like hold-over, soviet-era *praktika* (included in Figure 1 for comparison), in which students are sent for unsupervised, short periods to firms and have no guarantees that assignments will provide meaningful training or educational content.⁹

⁸ Interviews with firm representatives and school officials in the Kaluga (06/23/2016).

⁹ Russian sources distinguish between instructional practice (*uchebnaia praktika*) and production practice (*proizvodstvennaia praktika*). The former refers to actual on the job training, while the latter can refer to any work place experience, including menial assignments with no educational value. Our data do not allow us to distinguish

[Figure 1 here]

We also coded a number of forms of cooperation between firms and schools that require little time or money, such as participation in career fairs, short term field trips to firms, and unpaid internships. Not only are these forms low cost, but their value for skill development is dubious.

Our primary analysis makes use of two measures of TVET in the regions built from our dataset of firm-school relationships.¹⁰ The first is an index that attempts to capture the extent to which more complex, costly forms of PPP are used. This measure is simply the sum of the number of costly PPP practices (described above) present in *at least one* school in each region. Intuitively, more forms of complex PPP should be a reasonable proxy for regions' efforts to reform TVET and encourage deeper co-investment. As Figure 2 indicates, a plurality of regions (21.6%) feature no forms of costly PPPs, while between 2 and 5 different costly forms are present in the remainder. About 17% of regions take on the maximum value (7).

[Figure 2 about here]

Our second dependent variable of interest is the proportion of schools in each region that have adopted at least one of the costly practices described above. Straightforwardly, the higher the proportion of schools that have adopted at least one costly practice, the more common such practices should be in a region. Figure 3 illustrates the distribution of the variable and suggests that costly PPP practices are not very common. About 43% of regions have costly practices in at least 20% of their schools. Only in 13 regions does the percentage of schools using any of these costly practices exceed 50%, with the maximum being achieved in Khabarovsk krai (72%).

between these. The prevalence of *praktika* (see Figure 1) and anecdotal evidence suggests that most enterprises are not providing meaningful training in *praktika*. As a consequence, we treat it as low cost in the analysis below.

¹⁰ The regionally aggregated dataset used for the main analysis is Marques et al. 2019.

[Figure 3 about here]

In order to test our hypotheses, we use a similar set of main independent variables of interest and controls for both dependent variables. Because one is a count and the other a proportion, however, we are forced to make use of different econometric techniques for each. Since the number of costly PPP practices in TVET used is a count variable, we examine it using a Poisson model with robust sandwich standard errors.¹¹ For our measure of the proportion of schools in each region, we instead make use of a generalized linear regression with a binomial distribution and a logit link function or “fractionalized logit” (Papke and Wooldridge 1996).

Data for our independent variables primarily comes from the International Center for the Study of Institutions and Development’s Socio-Economic Database of Russia’s Regions, which is a compilation of data from official Russian government sources and published academic datasets. As our dataset of PPPs covers reports issued in 2013, we use the 2012 values of our variables unless otherwise indicated. Table A1 provides more detailed descriptions of the data.

Our first independent variable of interest is administrative capacity, which we predict is positively associated with greater frequency of costly practices within regions and with a greater frequency of regions adopting them (H_1). Because direct measures of administrative capacity are not available for Russian regions, we instead draw on a broad literature that argues that administrative capacity is related to the structure of tax receipts and the sources of state finance. This literature has long tied the development of strong states to the need to extract revenue from society to survive in a hostile world (Tilly 1975; Downing 1992; Thies 2004). Recent contributions have shown a strong relationship between access to easily exploited, hard to hide

¹¹ Despite Figure 2, diagnostic tests suggest that our data is not over-dispersed. Results are robust to using a Negative Binomial model, however.

sources of revenue – resource rents, large firms with immobile assets, etc. – and weak administrative capacity. This relationship arises because access to easy sources of revenue decreases incentives to make costly investments in a strong, professional bureaucracy capable the complex monitoring and auditing needed to tax more easily hidden sources (Gehlbach 2008; Hendrix 2010).

In Russia, resource rents formally accrue to the central government. For regions, therefore, the easiest source of revenue to exploit is annual transfers from the federal government, which are assigned to the regions and automatically transferred each year. These transfers have a strong equalizing component, with wealthier, more economically developed regions contributing funds that are then generally distributed to less developed regions.¹² Consequently, regions need not promote economic development to earn them and may be actively encouraged to neglect local infrastructure in order to continue to receive them. We therefore argue that greater dependence on federal transfers (i.e the larger the proportion of federal transfers to regional GRP) by regions suggests weaker administrative capacity.

To capture political competition (H_2), we use a simple measure of the vote margin between the first and second place parties in the 2011 federal legislative election. Competition among parties is associated with greater public scrutiny of the performance of regional government, so at the margin, regions with more robust political competition should feature greater accountability of the authorities to the public. Although at the national-level, Russia is a competitive authoritarian regime, there is nonetheless a great deal of variation in political competition across its regions that many previous studies have exploited.¹³ We argue that vote

¹² For a brief overview of the transfers system and its history, *see* Marques et al. 2016.

¹³ *See* McMann 2006; Reminton 2011; Panov and Ross 2013.

margins in federal elections therefore capture political competition, as it serves as a proxy for the extent to which the regional branches of Russia's dominant party, United Russia, are able to monopolize politics. Where the margin is lower, there is a more serious counterweight to United Russia and we would expect more political competition. Here, we focus on federal elections for methodological reasons related to our cross-sectional design. Federal elections were conducted in all regions simultaneously in 2011, whereas regional elections for the period prior to the 2013 academic year were staggered between 2008 and 2012. As a consequence, using regional elections could potentially capture changing national conditions (particularly the fallout and response to the 2008 financial crisis) in addition to political competition.

To capture access of business to policy-making institutions as a form of accountability (H₃), we make use of data on the business connections of sitting members of regional legislatures in the convocation prior to 2013.¹⁴ We aggregate this data to the regional level to construct the percentage of business people in the legislature, which should be positively correlated with the ability of businesses to pressure regional bureaucracies to enforce PPP agreements.¹⁵

In our main specifications, we also include a number of controls for regional characteristics that might drive the usage of larger numbers of costly forms of PPPs in TVET or make them more common. The baseline explanation for the emergence of meaningful PPP partnerships in existing work emphasizes the role of strong business associations and labor unions, which are able to form tripartite arrangements with the state to overcome coordination problems between actors. While there are no regional level measures of the strength of labor

¹⁴ This data was generously provided by David Szakonyi and was constructed using legislature's biographies and an official dataset of firm directors and owners. More details can be found in Szakonyi 2018.

¹⁵ We acknowledge, however, that business people have other means of access. We focus on legislatures both due to their theoretical importance in recent work and due to data limitations (*see* Gehlbach and Keefer 2011).

unions or business associations, we take as a proxy a measure of pluralism in Russia's regions developed from expert assessments (Petrov and Titkov 2013).¹⁶ Straightforwardly, the more pluralistic the region, the more likely it is to have strong business associations and labor unions.

Another set of explanations argues that more developed, industrialized regions should be more likely to use larger numbers of costly forms of PPP and for them to be more common. We control for these explanations using the log of regional GRP and the share of the secondary sector in total regional GRP. Another set of economic explanations emphasizes the nature of the labor market, including the pool of skilled labor, unemployment, population distribution, and poverty rate. We account for these using measures of the percentage of individuals with tertiary education in the workforce, the share of urban population, the level of employment, and the share of the population below the federal subsistence minimum. A final economic explanation highlights the presence of foreign firms, which may increase demand for skilled workers in a region. We account for this explanation using official data on foreign direct investment per capita, although the regional coverage for this variable is limited (N=75). Although we primarily rely on these controls in our main specifications for parsimony, we discuss additional tests using alternative controls that we used to check the robustness of our results below.

Results

Table 1 presents our main results. For ease of interpretation, the table reports either incidence rate ratios (for the number of costly practices) or log odds ratios (for percentage of schools adopting at least one costly practice). The former indicates the percentage change in the count variable for a unit change in a given explanatory variable. The latter indicates the increase

¹⁶ We make use of the value of this index for 2010, as it is the latest year for which data is available.

in probability a region will have at least one school that uses a costly TVET practice.¹⁷ In both cases, the value is derived by subtracting one from the reported co-efficient. Thus, numbers greater than one indicate a positive relationship and less than one a negative one.

[Table 1 here]

Model 1.1 introduces our first variable of interest: share of transfers in GRP. This variable has a negative relationship with number of costly TVET practices, as expected, and is significant at the 95% confidence level. Substantively, the effect is strong: a one percent increase in the percentage of federal transfers in regional GRP is associated with a 7.1% decrease in the expected number of costly forms of PPP used. Thus, as regional fiscal dependence on the federal center increases, and administrative capacity declines, fewer costly forms of TVET PPP are used.

Model 1.2 introduces our first measure of political competition, the vote margin for the dominant United Russia party in the most recent regional legislative election. The coefficient suggests a negative relationship between competition and number of costly TVET practices ($p < 0.1$), but the effect size is quite modest: a 0.7% decrease for each additional percentage point by which United Russia wins elections. Finally, Model 1.3 examines the relationship between the percentage of legislators who are businessmen and the number of costly types of PPP observed. The coefficient indicates a positive relationship and is significant at the 95% level, which suggests that greater representation of regional businesses in the legislature is correlated with more forms of costly public-private TVET partnership. For each percentage point increase in the number of business people in the regional legislature, one would expect about a 1.2% increase in the number of costly forms of TVET PPP. It is worth noting, however, that there is a strong

¹⁷ For this interpretation one assumes that the rate at which schools use practices is roughly equivalent to the probability a given school in a region participates, *see* Papke and Woolridge (1996).

potential for an ecological inference fallacy here. Greater business representation in regional legislatures may lead to the usage of costly forms of TVET cooperation due to the ability of businesses to more easily constrain the state and to take policy as credible. Alternatively, it may create credible commitments only for those firms represented in the legislature. Future micro-level work will need to disentangle this.

With respect to the economic control variables, the only consistent, robust predictors of usage of more costly forms of PPP across all specifications proved to be the level of employment, share of the workforce with tertiary education, and the share of the secondary sector in GRP. The share of educated workers and of the secondary sector are both positive predictors and have substantive effects in the 2-3% range. The level of employment is a negative predictor of costly PPP form usage at conventional levels and has a substantive effect in line with that of administrative capacity, ranging from 4.4 – 6% depending on the specification.

Turning to the percentage of schools that adopt at least one costly practice, Model 1.4 indicates that the share of federal transfers to regional GRP has a negative association ($P < 0.05$). The more dependent regions are on the federal center for fiscal resources, the weaker their administrative capacity and the less common are costly practices in PPP. Substantively, a 1% increase in dependence on the center translates to about a 7.7% decrease in the odds a given region will have at least one school using a costly TVET practice.

Moving to our measures of political competition and accountability, both the vote margin for United Russia (Model 1.6) and the share of businessmen in regional legislatures (Model 1.7) have the expected signs. As United Russia's vote margin increases – and political competition decreases – regions see a decline in the expected percentage of schools that adopt costly TVET practices. Although this variable is significant at the 5% level, it is substantively quite modest: a

2.3% decrease for each 1% increase in United Russia's vote margins. Similarly, as the number of businessmen in the legislature increases so does the expected percentage of schools adopting at least one costly TVET practice. This variable is not statistically significant, however.

Finally, with respect to our economic control variables, only the share of the secondary sector in regional GRP and the level of employment are consistently significant predictors of the dispersion of costly forms of PPP across a region's schools. The share of the secondary sector in regional GRP has a positive substantive effect (2.9 – 4.1% depending on the specification), while the level of employment again has a quite large, negative substantive effect (8 – 9.6%). Thus economic factors are also important to the spread of costly forms of PPP across regions' schools.

Robustness Checks

One of the major issues with our cross-sectional research design stems from the possibility of omitted variable bias, which may lead us to observe spurious correlations in our analysis. In order to verify the robustness of our results, we therefore conducted additional tests using a wide range of socio-economic controls. These results can be found in appendix tables A2 (for number of costly practices) and A3 (for share of schools adopting costly practices) of the supplementary materials. First, we included both of our measures of political accountability and the measure of administrative capacity in the same specification to check whether these channels operate distinctly. Results largely parallel those in Table 1. Administrative capacity remains a significant predictor of both the number of costly practices present regions and how common they are among schools, while the share of businessmen in regional legislatures continues to be

significant only for the former. The only major change is that our measure of political competition (measured electorally) ceases to be significant, casting doubt on its importance.¹⁸

Second, we also include a range of additional variables to check whether the composition and concentration of firms within regions or federal influence drive our results. To account for the composition of regional economies, we included measures of the aggregated shares of the primary and tertiary sectors in regional GRP, a Herfindahl index of industrial production constructed from disaggregated top-level sectors, regional shares of foreign firms, firms per capita, and regional shares of small firms.¹⁹ We also checked whether our results remain robust to variation in federal influence across the regions by directly controlling for the level of federal transfers and whether regions benefitted from a federal competition to spur TVET. Although the latter programs did not provide funding, winners received a great deal of acclaim and federal recognition for their proposals and subsequent efforts.²⁰ Our results remain robust to the inclusion of all of these variables and show little difference from those in Table 1.²¹

A more satisfying way of verifying the robustness of our results to endogeneity problems is through the use of an instrumental variable approach. Instrumental variables are difficult to find, because they must be correlated with the main explanatory variable of interest (relevance)

¹⁸ Results are presented in Model 1 of Tables A2 (for number of costly practices) and A3 (for share of schools adopting costly practices) of the supplementary material. Although we do not report them separately, we find that these results hold if we enter our main independent variables into the regression in pairs rather than all at once.

¹⁹ Details on these variables and their sources can be found in Table A1 of the supplementary appendix.

²⁰ For more on these competitions, *see* Remington 2017 and Remington and Marques in press.

²¹ Results are presented in Models 2 – 4 of Tables A2 (for number of costly practices) and A3 (for share of schools adopting costly practices) of the supplementary material. For parsimony, we report models with all of the variables discussed above included. Results also hold if they are entered in one at a time.

and only affect the dependent variable through their influence on the main explanatory variable (the exclusion restriction). As a consequence, we are only able to propose a plausible instrument for our measure of administrative capacity (the ratio of federal transfers in GRP). Specifically, we argue that in the Russian context a regional-level Herfindahl index of employment concentration in 1991 can serve as an instrument for the ratio of federal transfers in GRP.²²

The logic of our instrumentation strategy draws on recent work on state administrative capacity and tax regimes in the post-communist states, which highlights the link between economic conditions at the start of the transition from Communist planned economies to states' incentives to develop strong tax regimes and the capacity needed to enforce them (Easter 2002; Gehlbach 2008). This work begins from the premise that collecting taxes from individuals and small firms is administratively demanding, as such groups are numerous, tend to deal in cash, and leave less of an audit trail for the authorities.²³ Faced with revenue shortages in the early, post-transition period, states in the post-communist space needed to make decisions about how to structure their tax systems in order to meet urgent fiscal needs. Where industrial assets were heavily concentrated, the authorities could easily collect revenue from these large firms and had less of a need to develop the administrative capacity necessary to collect taxes from smaller business and individuals. Where industrial assets were dispersed, however, states had to meticulously develop the administrative capacity needed to tax smaller firms and individuals. Gehlbach (2008) argues (and empirically shows) that these choices created path dependency,

²² This measure is drawn from official Goskomstat (the Soviet statistical agency) industrial-registry data.

Goskomstat's definition of industry encompasses manufacturing, mining, electricity, and industrial services, which parallels Gehlbach's (2008). We thank John Earle, David Brown, and Scott Gehlbach for providing these data.

²³ For a review of recent empirical work backing this intuition, *see* Alm 2012.

resulting in permanent differences in the structure of taxation across countries and administrative capacity.

This variable intuitively links to the degree to which regions should depend on federal transfers, while also meeting the exclusion restriction. Controlling for modern day economic features in the first stage regression, it is highly unlikely that concentration of employment in 1991 would affect contemporary PPP in TVET practices directly given the massive economic and political upheavals associated with the collapse of the Soviet Union. Employment concentration in 1991 could also be associated with contemporary TVET indirectly, if employment concentration is associated with stronger Soviet era links between firms and schools that persist and shape contemporary PPP. Empirical work suggests this was not the case, though, as Soviet era TVET and firm-school relationships disintegrated under the strain of the transition. During this period, firms actively shed pre-existing relationships and abandoned partners in order to contain costs, which combined with massive budget deficits and corresponding funding cuts by the state to hollow out the Soviet era TVET system (Gimpel'son and Kapeliushnikov 2010). Because our dependent variables are count (number of costly forms used in a region) and ratio (share of schools that adopt at least one practice) data, we must use specialized estimators. We use a control-function estimator for a multiplicative-error instrumental variables poisson model with robust standard errors for our count data.²⁴ We use an instrumental variables fractional probit model with robust standard errors for our ratio data.²⁵ Results for both stages of these

²⁴ The model is intuitively similar to a standard two-stage model, but includes the residual from the first-stage, which accounts directly for unmeasured confounders. It is more appropriate for cases where there might be a non-linear effect of the instrumental variable on the main explanatory variable of interest, *see* Woolridge 2010.

²⁵ We estimate this using the `fracivp` package in Stata.

regressions are reported in Table A4 in the online appendix. Following standard practice, we include all variables in the second stage regressions in the first stage (Woolridge 2010).

Table A4 suggests that administrative capacity, measured by regional dependence on federal transfers, is indeed a strong and significant predictor ($P < .01$) of *both* the number of costly forms of PPP observed in regions (Model A4.1, Panel B) and the share of schools using at least one (Model A4.1, Panel B) in our instrumental variables specifications. This is in keeping with our administrative capacity hypothesis. Moreover, the first stage regressions (Model A4.1 and A4.2, Panel A) suggest that our instrument, employment concentration in industry in 1991, is a positive and statistically significant predictor ($P < .01$) of the ratio of transfers in GRP in both IV models, as required by our identification strategy.

These results should be interpreted cautiously, however. First, because our specifications are “just-identified” (i.e. have the same number of excluded and included instruments), we are unable to perform the standard Hansen over-identification test. Second, tests for the exogeneity of the endogenous variable narrowly reject the null hypothesis that the ratio of transfers in GRP is exogenous for both models ($p = .07$ in both cases). Finally, the F-statistic for the first stage models is about 18.09 for the IV poisson model, which exceeds the Stock Yogo critical value for weak instruments (Stock Yogo 2005), and somewhat lower for the IV fractionalized probit model. Taken together with the non-standard nature of our models, this suggests caution in interpreting the results. Nonetheless, this test does provide some evidence of the robustness of our main results to omitted variables and reverse causality concerns.

Finally, it could be that the relationships we have identified reflect a general willingness to adopt multi-faceted agreements rather than investment in costly forms of PPP, per se. This would cast doubt on the mechanisms we propose and our interpretations of our findings. To test

this proposition, Table A5 reproduces the analysis presented in Table 1, but uses alternative dependent variables as a placebo test. Both focus on forms of PPP that are not particularly costly to firms or are continuations of Soviet era practice. These variables focus on PPP involving participation in career fairs, field trips, unpaid internships, or Soviet style *praktika*. As Table A5 indicates, though, only our measure of political competition – United Russia’s margins of victory in the 2011 federal Duma elections – is significant at conventional levels and then only for our measure of the usage of costly practices. This suggests caution in attributing the usage of costly PPP practices to political competition. It also suggests, however, that our other independent variables of interest are indeed identifying a relationship between administrative capacity and (non-electoral) accountability and both usage of costly forms of co-investment by firms and regional governments in VET and the dispersion of these practices within regions. It is also consistent with our theoretical framework based on credible commitment problems, since such problems should not exist for PPP forms that require low-cost or no investment.

Conclusion

This paper has explored the paradoxical development of complex and costly forms of partnership between firms and schools in Russia’s regions, where many of the traditional predictors of the extent of such relationships are lacking. We argued that the focus of existing work on strong business associations and labor unions as solutions to coordination dilemmas among firms and schools obscures conditions under which the state can solve the problem on its own by providing credible commitments to both parties. We argued that that states with sufficient administrative capacity can credibly commit to firms and schools that it has the resources to make sure both sides honor PPP agreements. Similarly, political accountability can

also reassure both sides that the state has the proper incentives to actually enforce PPP agreements, again enabling the state to credibly commit.

Empirically, our analysis provides support for both sets of hypotheses. The stronger the administrative capacity of regional governments, as measured by their fiscal dependence on federal transfers the more likely that a large number of costly forms of VET PPP are observed and the higher the proportion of schools that practice them. Similarly, political accountability also appears to play a role, although subsequent robustness checks suggest it is business' access to legislative bodies that actually matters. Intriguingly, however, political accountability does little to explain how widespread costly forms of PPP are within regions.

Substantively, we believe this paper holds several lessons for understanding how public-private partnerships for skill development may form in settings where labor and employer intermediary associations are weak. In Russia, many regions were able to encourage the spread of public-private partnerships between firms and their schools and to do so in ways that involve costly co-investments. This suggests that in much of the developing world, where civil society is weak and markets underdeveloped, the formation of PPP in TVET is a viable strategy for escaping the “middle income trap”. The key to using this strategy is to further encourage development of administrative capacity and political accountability.

Second, our findings also suggest that there are conditions under which the state can take on the role of intermediary organizations between firms and schools. Work on the political economy of development has found that such intermediaries are critical to successful economic development, both for encouraging firm-school linkages to develop human capital and to broader cooperation between the public and private sectors (Doner and Schneider 2016). Specifically, our work points to the importance of the state's ability to hold local level officials and firms

accountable, as well as institutions that enable both to hold the state itself accountable. Moreover, our study joins a growing body of work indicating that such institutions need not be electoral: business access to legislative bodies may also serve as an accountability mechanism (Gehlbach and Keefer 2011).

Our results still leave open a number of important questions. First, the cross-sectional nature of the data does not allow us to make inferences about when such practices were adopted, only about their presence or absence. Therefore future work is needed to trace the pathways by which the state and firms come to engage in partnerships. Substantively, identifying these mechanisms may help us explain how PPP's in TVET can be fostered.. Theoretically, such exploration may also help explain why political accountability is associated with the general use of costly forms of PPP but not necessarily with how common they are among schools.

Second, this paper's primary measure of PPP practices in TVET focuses specifically on the investments made by firms, potentially masking variation in the organization of such arrangements and their governance. Such additional dimensions of variation are potentially critical for obtaining a more fine-grained understanding of how PPP's in TVET actually function. They may also have important implications for overall outcomes of PPP in TVET, particularly their ability to develop high quality skill, the longevity of such arrangements, and their adaptability to economic and technological shocks.

Finally, this paper largely considers macro-level use of costly TVET practices and how common they are at the regional level. As a consequence, it leaves unresolved questions about how and when micro-level characteristics of firms – their product market strategies, industry, relationships to authorities, etc. – condition their willingness to engage in costly forms of PPP. It is not clear whether school-specific characteristics make some schools much more likely to

successfully seek and accept opportunities to work directly with firms. Consequently, micro-level work that treats individual firms and schools as the unit of analysis is needed in order better understand the dynamics of PPP in TVET and shed further light on the conditions under which they emerge in the developing world.

Works Cited

- Acemoglu, D. and J. Pischke (1998). Why Do Firms Train? Theory and Evidence. *The Quarterly Journal of Economics* 113 (1): 79 – 119.
- Agénor, P-R. and O. Canuto (2012). “Middle-Income Growth Traps.” *Policy Research Working Paper* 6210. Washington, D.C.: World Bank.
- Alm, J. (2012). Measuring Explaining, and Controlling Tax Evasion: Lessons from Theory, Experiments, and Field Studies. *International Tax and Public Finance* 19 (1): 54 – 77.
- Anderson K. and A. Hassel (2013). Pathways of change in CMEs. Training regimes in Germany and the Netherlands. in Wren, A. (ed) *The political economy of the service transition*. Oxford: Oxford University Press, pp. 171 – 194.
- Beazer, Q. (2012). Bureaucratic Discretion, Business Investment, and Uncertainty. *The Journal of Politics* 74: 637 – 652.
- Busemeyer, M. (2015). *Skills and Inequality*. Cambridge: Cambridge University Press.
- Busemeyer, M. and C. Trampusch (2012). *The Political Economy of Collective Skill Formation*. New York: Oxford University Press.
- Crouch, C., D. Finegold and M. Sako (1999). *Are Skills the Answer? The Political Economy of Skill Creation in Advanced Industrial Countries*. New York: Oxford University Press.

- Culpepper, P. (2000) Can the State Create Cooperation?: Problems of Reforming the Labor Supply in France. *Journal of Public Policy* 20 (3): 223 – 245.
- Culpepper, P. D. and K. Thelen (2008). Institutions and Collective Actors in the Provision of Training: Historical and Cross-National Comparisons. in Mayer, K. U. and H. Solga(Eds.), *Skill Formation: Interdisciplinary and Cross-National Perspectives*. New York: Cambridge University Press.
- Doner, R. F. and B. R. Schneider (2016). The Middle-Income Trap: More Politics than Economics. *World Politics* 68 (4): 608 – 644.
- Downing, B. (1992). *Military Revolution and Political Change: Origins of Democracy and Autocracy in Early Modern Europe*. Princeton, NJ: Princeton University Press.
- Estevez-Abe, M., T. Iversen, and D. Soskice (2001). Social Protection and the Formation of Skills: A Reinterpretation of the Welfare State. in P. Hall and D, Soskice, eds. *Varieties of Capitalism*. New York: Oxford University Press.
- Finegold, D. and D. Soskice. The Failure of Training in Britain: Analysis and Prescription. *Oxford Review of Economic Policy* 1988; 4 (3): 21 – 53.
- Frye, T. (2010). *Building States and Markets After Communism: The Perils of Polarized Democracy*. New York: Cambridge University Press.
- Gandhi, J. (2008). *Political Institutions Under Dictatorship*. New York: Cambridge University Press.
- Gehlbach, S. (2008). *Representation Through Taxation: Revenue, Politics, and Development in Postcommunist States*. New York: Cambridge University Press.

- Gehlbach, S. and P. Keefer (2011). Investment without democracy: ruling-party institutionalization and credible commitment in autocracies. *Journal of Comparative Economics* 39: 123–139.
- Gimpel'son, V., R. Kapeliushnikov, and A. Lukyanova (2010). "Stuck Between Surplus and Shortage: Demand for Skills in the Russian Industry," *Labour* 24 (3): 311 – 332.
- Hall, P. and D. Soskice (2001). *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. New York: Oxford University Press.
- Hall, P. and K. Thelen (2009). Institutional change in varieties of capitalism. *Socio-Economic Review* 7 (1): 7 – 34.
- Hendrix, C. S. (2010). Measuring state capacity: Theoretical and empirical implications for the study of civil conflict. *Journal of Peace Research* 47 (3): 273 – 285.
- Hoffman, N. and R. Schwartz (2015). *Gold Standard: the Swiss Vocational Education and Training System*. Washington: National Center on Education and the Economy.
- Iversen, T. and D. Soskice (2001). Social protection and the formation of skills: a reinterpretation of the welfare state, in Hall, P. and D. Soskice, eds. *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. New York: Oxford University Press.
- Kharas, H. and H. Kohli (2011). What is the middle income trap, why do countries fall into it, and how can it be avoided? *Global Journal of Emerging Market Economies* 3 (3): 281 – 289.
- Libman, A. (2012). Democracy, Size of Bureaucracy, and Economic Growth: Evidence from Russia's Regions. *Empirical Economics* 43 (3): 1321 – 1352.

Magaloni, B. (2006). *Voting for Autocracy: Hegemonic Party Survival and its Demise in Mexico*. New York: Cambridge University Press.

Mann, M. (1993). *The Sources of Political Power: Volume 2, the Rise of Classes and Nation States 1760 – 1914*. New York: Cambridge University Press.

ManpowerGroup (2016). *2016-2017 Talent Shortage Survey*. Available at:

<http://www.manpowergroup.com/talent-shortage-201.6>, Accessed 15 August 2016

[Dataset] Marques II, I., T. Remington, and V. Bazavliuk (2019). Data for: Encouraging Skill Development: Evidence from Public-Private Partnerships in Education in Russia's Regions. Mendeley Data. Draft. Available at:

<https://data.mendeley.com/datasets/bpvyck4jym/draft?a=db91be6b-fa9d-4ff4-b77d-18774c0360d8>

McCubbins, M. and T. Schwartz (1984). Congressional Oversight Overlooked: Police Patrols Versus Fire Alarms. *American Journal of Political Science* 28 (1): 165 – 179.

McMann, Kelly. 2006. *Economic Autonomy and Democracy*. New York: Cambridge

Newman, K.S. and H. Winston (2016). *Reskilling America: Learning to Labor in the Twenty-First Century*. New York: Metropolitan Books.

North, D. (1981). *Structure and Change in Economic History*. New York: W.W. Norton.

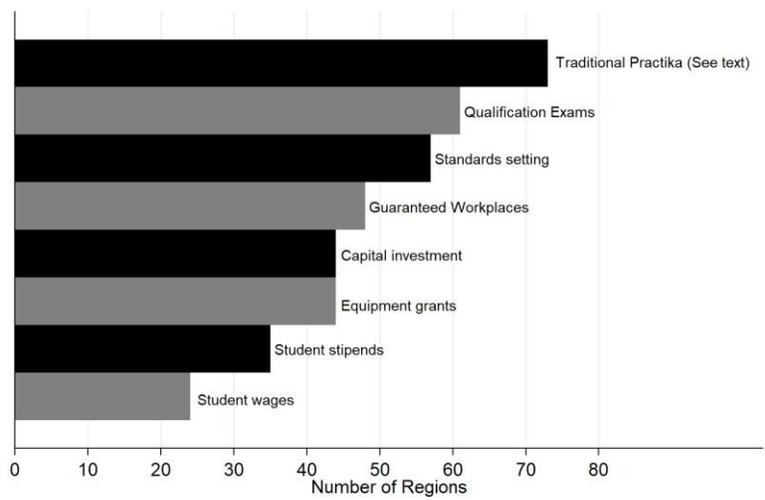
North, D. and B. Weingast (1989). Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England. *Journal of Economic History* 49: 803 – 832.

North, D., J. Wallis, and B. Weingast (2009). *Violence and Social Orders: A Conceptual Framework for Interpreting Recorded Human History*. Cambridge ; New York: Cambridge University Press.

- Panov, P. and C. Ross (2013). “Sub-National Elections in Russia: Variations in United Russia’s Domination of Regional Assemblies.” *Europe-Asia Studies* 65 (4): 737 – 752.
- Papke, L.E. and J.M. Wooldridge (1996). Econometric methods for fractional response variables with an application to 401(k) plan participation rates. *Journal of Applied Econometrics* 11: 619 – 632.
- Petrov, N. and A. Titkov (2013). “Ratings of Democracy by Moscow Carnegie Center: 10 Years in Service.” Moscow: Moscow Carnegie Center.
- Reuter, O. J. (2017). *The Origins of Dominant Parties*. Cambridge: Cambridge University Press.
- Reuter, O.J. and R. Turovsky (2014). Dominant Party Rule and Legislative Leadership in Authoritarian Regimes. *Party Politics* 20 (5): 663 – 674.
- Remington, T. F. (2017). Business-Government Cooperation in VET: A Russian Experiment with Dual Education. *Post-Soviet Affairs* 33 (4): 313–333.
- Remington, T. F. (2011). *The Politics of Inequality in Russia*. Cambridge: Cambridge University Press.
- Remington, T. F. and I. Marques II (2017). The Reform of Skill Formation in Russia: Regional Responses. *Europe-Asia Studies*, in press.
- Stock, J. H., and M. Yogo (2005). “Testing for Weak Instruments in Linear IV Regression.” In D. W. K. Andres and J. H. Stock (Eds.). *Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg*. New York: Cambridge University Press, 80–108.
- Streeck, W. (1992). *Social Institutions and Economic Performance: Studies of Industrial Relations in Advanced Capitalist Economies*. London: SAGE.
- Szakonyi, D. (2018). Businesspeople in Elected Office: Identifying Private Benefits from Firm-Level Returns. *American Political Science Review* 112 (2): 322 – 338.

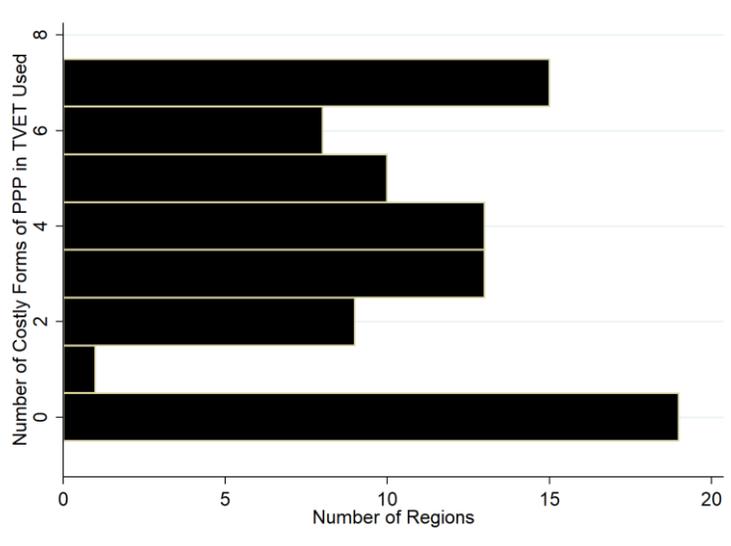
- Thelen, K. (2004). *How Institutions Evolve: The Political Economy of Skills in Germany, Britain, the United States, and Japan*. Cambridge: Cambridge University Press.
- Thies, Cameron G (2004) State building, interstate and intrastate rivalry: A study of post-colonial developing country extractive efforts, 1975–2000. *International Studies Quarterly* 48(1): 53–72.
- Tilly, C. (1975). Reflections on the history of European statemaking. in Tilly, C. and G. Ardant (Eds.). *The Formation of National States in Western Europe*. Princeton, NJ: Princeton University Press, pp. 3–83.
- Weingast, B. and M. Moran. Bureaucratic Discretion or Congressional Control? Regulatory Policymaking by the Federal Trade Commission. *Journal of Political Economy* 1983; 91: 765 – 800.
- Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.

Figure 1: Number of Regions Using Various Forms of PPP in TVET



Note: Traditional praktika are shown here in order to provide comparison with Soviet era forms that generally have lower skill content and have failed to promote skill development. Please see text for details.

Figure 2: Number of Costly Forms of PPP in TVET Used by Regions



Note: Costly forms of PPP in TVET are considered to be cases where firms participate in qualification exams, set standards for the school, provide guaranteed workplaces for graduates, make capital investments into schools, provide equipment (directly or via grants), pay students' stipends, or pay wages to students. See text for details.

Table 1: Usage of Costly Forms of PPP and Share of Schools using at Least One Costly Form in Russia's Regions

	(1)	(2)	(3)	(4)	(5)	(6)
	PPP Usage	PPP Usage	PPP Usage	Share of Schools	Share of Schools	Share of Schools
Log GRP (per capita)	0.754 (0.180)	1.146 (0.204)	1.119 (0.209)	0.734 (0.248)	1.142 (0.308)	1.146 (0.343)
FDI per capita	0.824 (0.098)	0.693* (0.145)	0.777 (0.128)	0.790 (0.145)	0.640 (0.200)	0.697 (0.255)
Share of Secondary Sector Sector in GRP	1.012 (0.008)	1.022*** (0.008)	1.025*** (0.008)	1.019 (0.016)	1.029** (0.015)	1.041*** (0.016)
Percentage of Employed College Degree Holders	1.030** (0.013)	1.023* (0.013)	1.030** (0.013)	1.046* (0.027)	1.039 (0.027)	1.053** (0.025)
Urban Population Percentage	1.600 (1.569)	2.871 (2.898)	4.810 (4.800)	3.789 (5.003)	5.304 (6.826)	9.732* (12.413)
Level of Employment	0.956* (0.025)	0.940*** (0.022)	0.946** (0.023)	0.920** (0.034)	0.904*** (0.033)	0.920** (0.034)
Share of Population Below Subsistence Minimum	0.997 (0.020)	0.957* (0.022)	0.972 (0.021)	0.975 (0.040)	0.923** (0.035)	0.945 (0.034)
Regional Pluralism Index	1.030 (0.086)	1.043 (0.103)	1.083 (0.098)	0.939 (0.113)	0.926 (0.125)	1.009 (0.127)
Share of Transfers in GRP	0.929** (0.031)			0.923** (0.030)		
UR Vote Margin in Most Recent Federal Election		0.993* (0.004)			0.987** (0.006)	
Percentage of Businessmen in Regional Legislature			1.012** (0.006)			1.015 (0.010)
Constant	905.238** (2,503.159)	9.556 (22.652)	1.571 (3.688)	847.021* (3,438.199)	11.351 (43.262)	0.234 (0.842)
Observations	74	75	74	74	75	74
Chi2	38.14	36.77	42.29	34.17	26.36	31.66
Log Likelihood	-145.8	-154.4	-151.1	-30.12	-31	-30.28
Pseudo-R2	0.147	0.106	0.117			
AIC				1.084	1.093	1.089

Models 1 - 4: Dependent variable is number of costly forms of PPP used

Models 5 - 8: Dependent variable is share of schools adopting at least one costly form of PPP

All models use robust standard errors. Incidence rates ratios or log-odds reported in lieu of coefficients. See text for interpretation.

*** p<0.01, ** p<0.05, * p<0.1

Supplementary Appendices for “Encouraging Skill Development: Evidence from Public-Private Partnerships in Education in Russia’s Regions”

Table of Contents

Appendix 1: Sources and Summary Statistics

Appendix 2: Additional Robustness Checks

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Appendix 1: Sources and Summary Statistics

As noted in the main text, the data file used in the analysis is available from the authors' institutional website. Descriptive statistics and original sources for all of the variables in the paper are presented in the table below.

Table A1: Sources and Summary Statistics

Variable Name	Original Source	N	mean	sd	min	max
Number of Costly PPP Practices Present in Region	Annual school reports. See main text for details.	88	3.56	2.45	0.00	7.00
Share of Schools Using at Least One Costly PPP Form	Annual school reports. See main text for details.	88	0.26	0.20	0.00	0.72
Number of Traditional and Low Cost PPP Practices Present in Regions	Annual school reports. See main text for details.	88	2.2	1.4	0	4
Log of Regional GRP per capita	Rosstat	83	12.50	0.67	11.26	15.12
Share of Secondary Sector in GRP	Rosstat	82	29.89	10.10	9.70	52.20
Percentage of Employed College Degree Holders	Rosstat	83	27.26	5.86	0.00	49.30
Share of Population Below Federal Subsistence Minimum	Rosstat	82	12.97	3.88	6.40	27.90
Regional Pluralism Index	Petrov and Titkov 2013	84	3.02	0.81	1.00	5.00
Share of Transfers in GRP	Rosstat, Russian Federal Treasury	81	10.34	11.52	0.73	70.62
Vote Margin, Federal Elections	Russian Federal Election Commission	83	28.65	22.47	1.89	99.30
Share of Businessmen Among Regional Deputies	Szakonyi 2016, 2018 Data provided by David Brown, John Earle, and Scott Gehlbach. Note that the index covers only manufacturing, mining, electricity, and industrial services.	83	39.88	14.68	3.70	71.43
Herfindahl Index of Heavy Regional Enterprises in 1991		79	0.05	0.04	0.01	0.29
Herfindahl Index of Sectoral Contributions to GRP	Rosstat, Author's calculations	82	0.15	0.07	0.1	0.52
Share of Primary Sector in GRP	Rosstat	82	17.93	15.10	0.10	71.9
Share of Tertiary Sector in GRP	Rosstat	82	52.18	11.85	18.40	80.00
FDI per Capita	EMISS Federal Data Portal, Rosstat	75	0.36	1.57	0.00	13.55
Urban Population Percentage	EMISS Federal Data Portal	81	0.70	0.13	0.29	1.00
Level of Employment	Rosstat	83	63.70	5.93	36.20	78.90
ASI Competition Winning Region	ASI website and Remington and Marques in press	84	0.15	0.36	0.00	1.00
Log of Federal Transfers	Russian Federal Treasury	81	23.88	0.64	22.04	25.74
Share of Small Firms in Total Firms	Rosstat	81	43.22	10.64	10.95	66.26
Share of Foreign Firms in Total Firms	Rosstat	79	0.48	0.44	0.01	2.50
Firms per 100 people	Rosstat	79	2.65	1.33	0.78	10.75

Appendix 2: Additional Robustness Checks

The Tables A2 and A3 present a series of additional robustness checks for our main findings using both the number of costly forms of PPP in each region (Table A2) and the share of schools using at least one costly form in each region (Table A3). These tests include both entering the main independent variables of interest into the regression simultaneously and in various permutations. They also include a host of additional control variables designed to check the robustness of our results to participation in federal programs aimed at improving Technical and Vocational Education and Training, absolute levels of federal transfers, and the economic structure of regions. Additional description and rationale for these specifications are provided in the main text.

Table A2: Additional Robustness Checks for Results on the Number of Costly Forms of PPP per Region

	(1) PPP Usage	(2) PPP Usage	(3) PPP Usage	(4) PPP Usage
Log GRP (per capita)	0.791 (0.188)	0.566 (0.198)	0.786 (0.274)	0.886 (0.324)
FDI per Capita	0.857 (0.090)	0.840 (0.098)	0.790 (0.120)	0.776 (0.155)
Percentage of Employed College Degree Holders	1.036*** (0.013)	1.010 (0.016)	1.001 (0.017)	1.006 (0.018)
Urban Population Percentage	2.075 (2.078)	2.206 (2.028)	4.558* (3.992)	6.231** (5.488)
Level of Employment	0.953* (0.026)	0.952* (0.026)	0.933*** (0.025)	0.941** (0.025)
Share of Population Below Subsistence Minimum	0.993 (0.022)	1.006 (0.024)	0.957 (0.026)	0.977 (0.025)
Regional Pluralism Index	1.039 (0.085)	0.954 (0.086)	0.976 (0.103)	1.011 (0.099)
Share of Secondary Sector Sector in GRP	1.014* (0.008)			
Share of Transfers in GRP	0.938** (0.030)	0.928** (0.030)		
UR Vote Margin in Most Recent Federal Election	0.998 (0.003)		0.992** (0.004)	
Percentage of Businessmen	1.009*			1.012**

in Regional Legislature	(0.005)			(0.006)
ASI Competition		1.083	1.008	1.099
Winning Region		(0.137)	(0.126)	(0.133)
Log of Federal Transfers		1.292**	1.464***	1.316**
		(0.152)	(0.195)	(0.166)
Herfindahl Index of		13.458*	3.467	4.270
Sectoral Contributions to GRP		(19.505)	(4.844)	(5.959)
Primary Sector Share of GRP		0.992	0.985*	0.981**
		(0.009)	(0.009)	(0.009)
Tertiary Sector Share of GRP		1.000	0.984**	0.986
		(0.009)	(0.008)	(0.009)
Share of Small Firms		1.009	1.014*	1.011
		(0.008)	(0.008)	(0.008)
Share of Foreign Firms		0.974	0.946	1.015
		(0.115)	(0.102)	(0.114)
Firms per 100 people		1.034	1.060	1.055
		(0.085)	(0.096)	(0.098)
Constant	266.363*	101.652	0.645	0.258
	(792.955)	(415.373)	(2.536)	(1.087)
Observations	73	71	71	70
Chi2	43.06	71.20	69.69	59.84
Log Likelihood	-142.8	-134.7	-139.9	-137.7
Pseudo-R2	0.156	0.181	0.150	0.154

All models use robust standard errors. Incidence rates ratios reported

in lieu of co-efficients. See main text for interpretation.

Robust standard error in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A3: Additional Robustness Checks for Results on the Share of Schools Using at Least One Costly Form of PPP per Region

	(1)	(2)	(3)	(4)
	Share of Schools	Share of Schools	Share of Schools	Share of Schools
Log GRP (per capita)	0.856 (0.297)	0.951 (0.556)	1.323 (0.733)	1.347 (0.776)
FDI per Capita	0.803 (0.141)	0.674 (0.227)	0.604 (0.243)	0.563 (0.259)
Percentage of Employed College Degree Holders	1.061** (0.026)	0.997 (0.028)	0.989 (0.029)	1.005 (0.027)
Urban Population Percentage	3.718 (4.450)	1.349 (1.776)	2.681 (3.620)	3.452 (4.339)
Level of Employment	0.913** (0.036)	0.916** (0.033)	0.895*** (0.037)	0.910** (0.034)
Share of Population Below Subsistence Minimum	0.955 (0.043)	0.976 (0.045)	0.921* (0.041)	0.946 (0.037)
Regional Pluralism Index	0.953 (0.118)	0.830 (0.103)	0.839 (0.119)	0.906 (0.116)
Share of Secondary Sector in GRP	1.027* (0.016)			
Share of Transfers in GRP	0.941* (0.032)	0.931** (0.030)		
UR Vote Margin in Most Recent Federal Election	0.993 (0.006)		0.989* (0.007)	
Percentage of Businessmen in Regional Legislature	1.011 (0.009)			1.015 (0.011)
ASI Competition		1.702* (0.487)	1.560 (0.448)	1.710* (0.482)
Winning Region		1.182 (0.213)	1.348 (0.269)	1.162 (0.196)
Log of Federal Transfers		1.825 (4.226)	0.627 (1.325)	0.773 (1.680)
Herfindahl Index of Sectoral Contributions to GRP		0.983 (0.018)	0.977 (0.016)	0.970* (0.016)
Primary Sector Share of GRP		1.011 (0.020)	0.995 (0.019)	0.987 (0.020)
Tertiary Sector Share of GRP		1.014 (0.012)	1.020* (0.012)	1.014 (0.011)
Share of Small Firms		0.856 (0.182)	0.825 (0.169)	0.929 (0.203)
Share of Foreign Firms		1.120 (0.150)	1.140 (0.169)	1.169 (0.168)
Firms per 100 people		3.997 (26.872)	0.034 (0.223)	0.069 (0.469)
Constant	80.067 (326.465)			
Observations	73	71	71	70
Chi2	39.46	66.93	68.76	66.65
Log Likelihood	-29.25	-28.01	-28.25	-27.63

AIC	1.130	1.268	1.275	1.275
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All models use robust standard errors. Log-odds reported in lieu of co-efficients.

See main text for interpretation.

Robust standard errors in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix 3: Instrumental Variables Regression

Table A4 presents the results of instrumental variables regressions, in which we instrument for the share of transfers in GRP (our proxy for administrative state capacity) with a herfindahl index of industrial employment from 1991. Our identification strategy draws on the well-studied link between the economic structure of Communist era economies and subsequent tax regimes. Where concentrated, heavy industry dominated Soviet-era production, post-soviet states did not invest heavily in creating strong, diverse tax regimes. This in turn led to weaker administrative capacity in these states (Easter 2002; Gehlbach 2008). We believe that this variable meets the exclusion restriction, because Soviet era relationships between schools and firms (and indeed the Soviet vocational education system broadly) were totally disrupted by the transition from the planned economy and the ensuing economic crisis (Gimpel'son and Kapeliushnikov 2010). We provide a more complete discussion of our estimation strategy, the rationale for our instrument, and our argument for how it meets the exclusion restriction in the main text.

Table A4: Instrumental Variables Estimation of Usage of Costly Forms of PPP and Share of Schools using at Least One Costly Form in Russia's Regions

	(1)	(2)
	PPP Usage	Share of Schools
Panel A: Second Stage		
Log GRP (per capita)	-1.482** (0.633)	-0.090*** (0.027)
FDI per capita	1.838** (0.837)	-0.512** (0.256)
Share of Secondary Sector	0.022 (0.017)	0.395 (0.357)
Sector in GRP		
Percentage of Employed	0.115*** (0.042)	0.004 (0.010)
College Degree Holders		
Urban Population Percentage	-0.236 (2.022)	0.043*** (0.017)
Level of Employment	-0.181* (0.103)	0.233 (0.901)
Share of Population Below	0.054 (0.045)	-0.043 (0.027)
Subsistence Minimum		

Regional Pluralism Index	-0.064 (0.155)	0.019 (0.026)
Share of Transfers in GRP	-0.226*** (0.084)	-0.088 (0.077)
Constant	28.841*** (10.672)	7.873** (3.095)
Panel B: First Stage		
Log GRP (per capita)	-8.095*** (1.881)	-8.095*** (1.894)
FDI per capita	4.932 (3.919)	4.932 (3.947)
Share of Secondary Sector Sector in GRP	-0.186*** (0.058)	-0.186*** (0.058)
Percentage of Employed College Degree Holders	0.337** (0.144)	0.337** (0.146)
Urban Population Percentage	-15.074** (7.061)	-15.074** (7.111)
Level of Employment	0.274 (0.273)	0.274 (0.275)
Share of Population Below Subsistence Minimum	0.637*** (0.202)	0.637*** (0.203)
Regional Pluralism Index	-0.014 (0.814)	-0.014 (0.820)
Herfindahl Index of Industrial Employment (1991)	74.399*** (25.296)	74.399*** (25.476)
Constant	87.200*** (24.565)	87.200*** (24.740)
First Stage Residual	0.100* (0.056)	
Observations	71	71

Models 1: Dependent variable is number of costly forms
of PPP Used.

Models 2: Dependent variable is percentage of schools
using at least one
costly form of PPP

Robust standard errors in
parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix 4: Placebo Test

Table A5 presents a placebo test that helps to validate our main argument. One potential problem with our main empirical strategy is that the findings may be driven by a general propensity to form partnerships in regions (of any kind) rather than the costly forms of investment (in terms of time and money) that are of theoretical interest. To test this, we perform a placebo test in which the dependent variable is the total number of forms of PPP used in a given region (regardless of how costly they are) and the share of schools using at least one form of PPP (of any type). We provide a fuller discussion of the strategy and the results of this test in the main text.

Table A5: Usage of Non-costly Forms of PPP and Share of Schools using at Least One Non-costly Form in Russia's Regions

	(1)	(2)	(3)	(4)	(5)	(6)
	PPP Usage	PPP Usage	PPP Usage	Share of Schools	Share of Schools	Share of Schools
Log GRP (per capita)	1.034 (0.188)	1.097 (0.180)	1.086 (0.174)	0.727 (0.351)	0.619 (0.273)	0.631 (0.269)
FDI per Capita	0.673 (0.179)	0.674 (0.168)	0.672 (0.170)	0.558 (0.415)	0.639 (0.434)	0.781 (0.580)
Share of Secondary Sector in GRP	1.016** (0.007)	1.016** (0.007)	1.019*** (0.007)	1.001 (0.014)	0.998 (0.014)	1.004 (0.014)
Percentage of Employed College Degree Holders	1.038*** (0.012)	1.039*** (0.011)	1.039*** (0.012)	1.009 (0.054)	1.018 (0.055)	1.039 (0.054)
Urban Population Percentage	7.701** (6.789)	6.820** (5.955)	9.946*** (8.363)	512.066*** (1,055.883)	349.728*** (757.252)	265.586*** (507.149)
Level of Employment	0.943*** (0.018)	0.934*** (0.016)	0.943*** (0.016)	0.943 (0.052)	0.950 (0.054)	0.954 (0.050)
Share of Population Below Subsistence Minimum	1.008 (0.019)	0.992 (0.016)	1.003 (0.016)	0.981 (0.044)	1.000 (0.044)	1.004 (0.043)
Regional Pluralism Index	0.959 (0.072)	0.931 (0.069)	0.967 (0.072)	0.723 (0.145)	0.714* (0.146)	0.748 (0.150)
Share of Transfers in GRP	0.989 (0.010)			1.024 (0.028)		
UR Vote Margin in Most Recent Federal Election		0.993*** (0.003)			1.000 (0.007)	
Percentage of Businessmen in Regional Legislature			1.005 (0.004)			1.013 (0.013)
Constant	4.215	5.557	1.313	142.490	749.730	108.772

	(8.512)	(10.867)	(2.512)	(900.532)	(4,427.854)	(612.425)
Observations	74	75	74	72	73	72
Chi2	44.24	50.99	36.94	14.26	14.13	21.98
Log Likelihood	-115.9	-116.7	-116	-32.66	-33.14	-32.59
Pseudo-R2	0.0882	0.0931	0.0885			
AIC				1.185	1.182	1.183

Models 1 - 4: Dependent variable is number of non-costly forms of PPP Used.

Models 5 - 8: Dependent variable is percentage of schools using at least one non-costly form of PPP.

All models use robust standard errors. Incidence rates ratios or log-odds reported in lieu of co-efficients.

See text for interpretation.

*** p<0.01, ** p<0.05, * p<0.1