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Business-government cooperation in VET: a Russian experiment with dual education

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ABSTRACT
Upgrading skill formation has become an increasingly urgent task for societies facing the challenges of rapid technological change and globalization. However, reform of systems of vocational education and training (VET) poses severe challenges for aligning the interests of schools, firms, households, and governments, even in societies with relatively efficient markets for labor and education. Where market institutions are poorly developed, these challenges are particularly acute, resulting in endemic mismatches between the supply and demand of skill. Currently governments in many countries, including the United States, Russia, and China, are seeking to adopt elements of the German dual education model. The Russian federal government has undertaken several initiatives designed to upgrade VET by encouraging closer cooperation of vocational schools and firms at the regional level, including the adoption of dual education programs. This paper focuses on one such project: a 2013 pilot program administered by the Russian Agency for Strategic Initiatives, to foster the development of new models of dual education. The paper compares the 13 pilot regions with regions that submitted proposals but were not selected and with all other regions along multiple economic, social, demographic, and institutional dimensions. The findings suggest hypotheses about the conditions that enabled the pilot regions to take advantage of federal policies encouraging the adoption of dual education. More generally, the paper sheds light on institutional solutions to collective action dilemmas in skill formation in transitional and developing societies.

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Russian Federation; vocational education and training (VET); skill formation; coordinated and liberal market economies; collective dilemmas

VET systems in comparative perspective

Upgrading skill formation has become an increasingly urgent task for societies facing the challenges of rapid technological change and globalization. Everywhere policy-makers are seeking ways to strengthen the linkages among employers, workers, and educational institutions. A large body of scholarly literature has illuminated the diverse ways countries have sought to meet these challenges (Finegold and Soskice 1988; Martin 2000; Crouch, Finegold, and Sako 2001; Busemeyer and Trampusch 2012; Eichhorst et al. 2012; Martin and Swank 2012; Pilz 2012; OECD 2013). This literature demonstrates wide variation in national models for combining national and local government intervention, public-private partnerships, and market-based provision of skill. In some societies, privately financed skill provision plays a larger role; in others, financing by government and business structures predominates. The problem of coordinating the demand for skill with the supply of skill is far more acute to the extent

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that neither market institutions nor organizational mechanisms work efficiently to convey information to market actors about the demand for skill and align the interests of participants in the labor market. Poorly performing market and organizational institutions waste human and physical resources, as some kinds of skill are overproduced and others go underprovided. Substantial static and dynamic economic inefficiency results.

One influential theoretical tradition classifies different modal forms of regulating labor markets in advanced capitalist societies (Streeck 1992; Hall and Soskice 2001; Thelen et al. 2004). However, thus far there has been less scholarly attention to the reform of skill formation in countries undergoing the transition from state-planned to market economies. Such countries – including Eastern Europe and the former Soviet Union as well as China and Vietnam – are adapting inherited state-administered vocational education and training (VET) institutions to the new conditions of market relations. Taking Russia as a case, this paper explores the emergence of new patterns of collaboration among firms, schools, and government in skill provision in a transitional state. It addresses the question of the conditions under which firms shoulder some of the financial and curricular responsibility for skill formation in partnership with vocational schools. More broadly, it addresses the problem of solving the cooperation dilemmas inherent in upgrading skill formation.

To situate the Russian case, it helps to identify the two ideal types of labor market organization identified in the varieties of capitalism literature. In "liberal market economies," skill in the labor market is largely a private good. Relations among workers and firms, firms with one another, and firms and government tend to be transactional and individualistic. Investment risk and reward is privatized, whether it be the calculation individuals make about the potential return on investment in skill, or firms' calculations about the expected return on investment in capital and technology. Government provides general education while more specific skill acquisition is financed by individuals or is shared between individuals and firms; firms tend to confine training to the provision of non-portable skills that are less likely to benefit rivals. Fear of poaching restricts the amount of training that firms are willing to provide. To the extent that usable skill is underprovided, therefore, the positive externalities associated with skill – that is, the benefits to society of higher productivity that are not captured entirely by the wage premium to individuals – are lost. Consequently, there is a risk that, in the aggregate, an economy may be trapped in a low-skill equilibrium (Finegold and Soskice 1988; Crouch, Finegold, and Sako 2001).[1]

"Coordinated market economies" feature more direct collaboration among government, labor and employers to expand the pool of skilled labor available to firms. This in turn helps expand the positive benefits of skill for society at large. Labor unions cooperate with employer associations to minimize wage competition in favor of collective efforts to train workers for branches of industry. Government encourages and enforces such cooperation, whereas in liberal market economies, government restricts cooperation among firms out of the fear of anti-competitive collusion. Government also helps to ensure that the costs and benefits of investment in training are shared between capital and labor. For example, in some coordinated market economies, government requires that firms belong to trade and industry councils. These councils directly supervise skill formation, ensuring uniform standards in content and method of instruction across vocational schools and apprenticeship programs. Such cooperation among firms, labor, and government is much less prevalent in liberal market economies where transactions in the markets for labor and education tend to be one-off. Coordinated market economies tend to foster long-term relationships among social partners. In both liberal and coordinated market economies, cooperation dilemmas arise in skill formation: can a firm count on a school to provide it with graduates with adequate skill and can a school or a student count on the firm to provide a job commensurate with the training? If a school designs a curriculum for a particular type of occupation, will there be a demand for its graduates? The risk and reward associated with skill formation are borne largely by private market agents in the liberal market economy, and shared by market agents in the coordinated market economy. Long-term relationships in the latter reduce reciprocal fears of shirking and defection from cooperative agreements.

An important dimension of cross-national variation is the degree to which firms in the same industry join forces to foster institutions that provide training. In what the literature terms "collectivist" systems,

employer associations cooperate with labor unions to invest in industry-wide training. Where labor markets are tight, firms tie their own hands to avoid competing for labor by raising wages and benefits, instead offering non-wage inducements to recruit and retain labor. Government typically provides social protection such as active labor market policies and generous old-age retirement benefits that spare firms from taking on additional financial burdens. Workers in return enjoy certain assurances that their training makes them employable regardless of the conditions of individual firms, and the relatively greater security they enjoy offsets the wage increases they might otherwise realize. Collectivist institutions of skill formation overcome the collective action problem inherent in allocating the cost and benefit of training across firms and individual workers. They enable both small and large firms to benefit from the existence of a pool of skill to which all contribute and from which all draw.[2]

Where firms meet their needs for skilled labor through their own individual efforts, with minimal cooperation through employer associations, their strategies are often characterized as "segmentalist." That is, to deter poaching of trained workers by rival firms, they employ firm-specific means of recruiting and retaining labor. These may include competing for high-quality labor by offering better wages and providing career ladders and other benefits. Their training tends to be tailored specifically to the firm. They may develop their own in-house training facilities, contract with private training providers, or reduce the level of skill required in the production process. At the extreme end in this direction are firms in the "gig" economy, which consider employees to be independent contractors and provide effectively no training. More common is the use of licensing requirements, whereby governments restrict entry to a trade to those who have obtained a license on the basis of training and examination. In the United States, state-regulated occupational licensing requirements affect about 18% of the workforce (Kleiner 2000). In most cases, workers themselves must pay for the required training.

VET is often called upon to solve both social and economic goals. The social role of VET is reflected in the fact that training for manual vocations in many societies is a path taken by youth for whom academic tracks are not well suited. Governments also often treat VET as a means to ease reentry to employment for laid-off workers. This goal can conflict with the longer term economic objective of upgrading the technological competitiveness of firms and industries since skill upgrading is a critical complement to technical modernization (Crouch, Finegold, and Sako 2001).

Therefore, policy-makers face tradeoffs between the economic and social functions of VET. In practice, many systems of skill formation become bifurcated between lower- and higher-skill segments. Governments may assign greater priority to fighting unemployment by providing basic types of training to facilitate quick reentry into the workforce or to ensuring a steady supply of labor for existing firms than reorganizing VET around future needs of the economy.[3] A system of skill formation that links R&D to training, encouraging regular feedback between innovation and practice, is likely to be more successful at imparting what Streeck calls "polyvalent skills." These include the ability to adapt and expand an existing base of skill to successively more demanding tasks (Streeck 1992).[4]

In turn, successful systems that reward continuous learning on the part of individual employees generate positive externalities for their employers. Streeck characterizes the German system as one of "applied research conducted by research institutes and associations close to industrial users linking up with widely available shopfloor-generated worker skills vested in long-term commitments to quasi-professional occupational identities, and governed by consensus-building institutions like co-determination" (Streeck 1997, 250). The result, in the optimal case, is regular feedback between the shop floor and the R&D process, resulting in continous learning and upgrading of productive technology. For example, at the VW Academy in Chattanooga, Tennessee, in the United States, where Volkswagen has a major assembly plant and an adjacent training facility, trainees from the Academy sometimes troubleshoot and solve problems originating on the production line, providing direct feedback from the training facility to the plant.[5]

Today local governments in many countries, including the United States, Russia, and China, are seeking to adopt elements of the German dual education model (Skills Initiative 2015). In this system, training for industrial trades is a shared responsibility of firms and schools. Trainees divide their time roughly equally between classroom and on-the-job training. As trainees, they receive a lower wage than

regular workers, but are guaranteed secure, well-paid jobs at the firm upon successful completion of the program and receipt of a certificate. Industry associations and labor unions set specific standards for occupational qualifications and the content and methodology of instruction. Schools are government financed but firms provide much of the training equipment, curriculum, and certification of graduates. The master-instructors at the firms are also specially trained and certified.

The system of dual education is widespread in Germany and German-speaking countries (Austria and Switzerland), and elements of it are widely used in some other European countries, such as Denmark and Sweden (Pilz 2007). The variation in the details of the system found in various countries is not relevant for the purpose of this paper. Crucial to the system's effectiveness, however, is close collaboration of industry, labor, schools, and government. The supply of well-qualified workers is treated as a public good, and the costs of providing it are shared among the social partners and government, as are the benefits of higher productivity and job security. Collectivist elements in the form of employer association and trade union participation reduce the financial strain for any given firm and limit competition among firms and between labor and capital. In Germany's case, several specific historical factors have tended to uphold the system over time: the importance of the concept of the "calling" (*Beruf*), understood not merely as an occupation, but as a social identity; the public consensus around the value of social partnership between labor and capital following World War II; the continuing vitality of the stratum of small and medium-sized enterprises that produce skill-intensive inputs for large industrial firms; the cohesion of the peak associations for labor and capital; and the strong export orientation of Germany's economy that exerted pressure on industry to remain competitive through technological upgrading of production rather than low-cost mass production. These elements are not readily transferable to other national settings. Moreover, even in Germany, the scale of the apprenticeship system is shrinking, as fewer firms representing fewer branches are participating. The number of low-wage, part-time jobs (sometimes called "mini-jobs") is growing (Thelen 2014).

Most national systems of skill formation do not fall neatly into the "liberal" and "coordinated" market economy categories. Even fewer can boast the close collaboration between industry and VET characteristic of the German-speaking countries. Few countries feature cohesive labor and employer associations, and still fewer have efficient labor markets that can respond relatively quickly to changes in labor demand by shifting the incentives for workers and firms to guide the supply and composition of skills provided by general and vocational educational institutions. In most, state-funded vocational schools struggle to offer training of sufficient quality to meet firms' demand for skilled labor, while firms are reluctant to assume the cost of overhauling VET systems themselves.

States undergoing a transition from a planned economy face a particular set of constraints in this respect: they enter the market economy with a legacy of an extensive government-run system of vocational educational institutions created to serve the needs of planned programs of rapid industrialization. The planned industrialization drives in the Soviet Union and Mao-era China demanded the rapid transformation of poorly educated rural populations into an industrial work force possessing at least rudimentary occupational skills, as well as a smaller cadre of technical specialists trained narrowly for specific occupations. In these countries, only a relatively small number of people attended institutions of general higher learning. Under the conditions of the market economy, the VET systems are now undergoing significant change. Models such as that of the German-style "dual education" are attracting considerable attention. For example, in 2015 the Russian government issued a directive listing several targets for industrial upgrading: it promised to identify the 50 most needed and most promising technology-intensive jobs of the future by October 2015; to raise from 10% in 2016 to 50% in 2020 the number of vocational schools using dual education; to increase the number of vocational schools training students for the top 50 most important technologically intensive jobs from 15% in 2016 to 50% in 2020; and so on.[6] This directive formalized instructions contained in President Putin's message to parliament the previous December, when Putin demanded that by 2020, a majority of vocational education institutions should provide training for the jobs that correspond to world technical standards. However, adaptation of German-style dual education methods poses severe institutional difficulty because it requires intense cooperation among employers, schools, and government (including

educational ministries controlling curricular standards). Adopting dual education systems is an excellent case of the problem of forging institutional solutions to cooperation dilemmas. We will examine this through a study of the Agency for Strategic Initiatives (ASI) pilot program in Russia.

The next section provides a brief overview of the Soviet and post-Soviet VET system, while a third section analyzes the Russian ASI experiment in greater detail. A fourth offers some conclusions.

VET and economic transition

Prior to their collapse, communist regimes used their economic planning systems to match the demand for skill with the supply of it through a state-financed and -administered system of VET that produced skills roughly in the assortment and quantities called for by the economic plan (Matthews 1982; Saar, Unt, and Kogan 2008; Eichhorst et al. 2012). In the USSR, creation of basic primary-level vocational schools accompanied the crash industrialization drive of the 1930s. These were intended to give a largely peasant population rudimentary general education and basic industrial skills. The primary vocational schools added two years of training to eight years of basic general education. Later, specialized secondary institutions opened as well. These added a vocational component of four years to eight years of basic general education, enabling an individual to graduate with a secondary degree. Specialized and polytechnical institutes offered tertiary specialist degrees as well. All schools were state funded and state controlled. The central government set strict curricular standards that matched skill formation to the output targets of the planned economy.

While Soviet firms had some leeway to make use of discretionary wages and bonuses to retain labor, the government imposed limits on the base wages that firms could offer workers through a standardized wage scale that specified particular wage levels for particular occupations, seniority, and location.[7] Firms therefore found other ways besides wages to recruit and retain labor. One way was through the paternalistic social responsibilities that firms routinely assumed in the Soviet era. Firms sponsored schools, recreational facilities, and many other services for their communities, some of which they used to foster labor attachment among workers, who could not change jobs without risking their company benefits. Firms also cultivated close ties to primary and secondary vocational schools in their territories, offering students practical training opportunities, and providing in-kind assistance to the schools to recruit early. Many vocational schools had a close relationship with a single enterprise and concentrated on training workers for it, with the enterprise providing the school with various in-kind services (this relationship was termed *sheftstvo*). At the firm, a common pattern was to designate long-term, experienced older workers as mentors (*nastavniki*) for trainees and newly hired workers.[8] These practices allowed firms to identify and recruit workers, familiarize future employees with the skill demands of the firm, and ease the transition from school to employment. It was common for firms to organize tours for school children and to visit local schools in order to acquaint elementary and middle school students with the firm. Such close relations between firms, schools, and communities combined an element of Soviet-style corporate social responsibility with more immediate benefits to the firms in the form of a stream of qualified workers. To this day, Russian firms regard work force development as a high priority for corporate social responsibility.[9]

Thus notwithstanding the extensive system of state-run vocational education, firms devoted substantial effort to controlling their internal labor forces by providing in-house, firm-specific training, fostering loyalty to the firm, and rewarding good performance with bonuses and other forms of incentive pay. In this Soviet version of segmentalism, firms rarely cooperated directly with each other to meet their labor market needs. They instead relied on direct relationships with workers and schools to train and retain skilled workers. This pattern helps explain the paradox of overstaffing at the firm level amidst a general shortage of skilled labor throughout the Soviet period.

Throughout the Soviet industrial era, a system of nationally administered job assignment (*raspredenelie*) was employed to allocate labor to jobs. The system sought to match particular skill profiles to jobs calling for that specialization. Moreover, the household residence registration system (the *propiska* – equivalent of the Chinese *hukou* system) strongly restricted geographic mobility for labor. Moreover,

the absence of a market for housing meant that workers found it extremely difficult to move from one city to another in search of better jobs. Therefore, although a labor market existed to some degree, administrative mechanisms such as the job assignment system, the household residence registration system, and the lack of a free market in housing severely limited it.

The collapse of the Soviet regime brought massive dislocation to the economy and society, not least in the system of vocational education. The collapse of much industrial production in the 1990s, followed by the economic recovery in the 2000s and the pressure of market competition to upgrade production technologies in industry, imposed heavy pressures on the vocational education system. During the economic crisis of the 1990s, spending by the state and by firms on support for vocational schools dropped sharply. The Soviet-era practice whereby firms acted as sponsors of vocational institutions disappeared in many places as laws dictating firms' social responsibilities were removed from the books. Similar trends were observed in all the former socialist countries as they embarked on their transitions to market-oriented economies (Saar, Unt, and Kogan 2008). In Russia, primary and secondary vocational schools scrambled to survive. Many turned themselves into "lycees" and "colleges," and forged new partnerships with firms or began charging tuition. Many went bankrupt. Others created programs aimed at new, popular skill profiles, often in the retail commerce or service sector.

Under the Soviet system, all educational institutions had been state financed and state run. The state limited the number of spaces in tertiary educational institutions but encouraged all students to complete a secondary degree either in a general or vocationally specialized secondary school. This explains why the share of the populace with secondary degrees was comparatively high whereas the share with tertiary degrees was low relative to the advanced capitalist economies. This structure remained in place well after the transition, even as the number of tertiary institutions grew through the formation of new private schools. By 2010, about 40% of the adult population had general or specialized secondary degrees and over 20% had tertiary degrees. As of 2011, Russia ranked fourth in the world (after Korea, Japan, and Canada) in the share of 25–34 year-olds with tertiary education (OECD 2013, 26). The share of the workforce with no more than a secondary degree plummeted from 47 to 24%

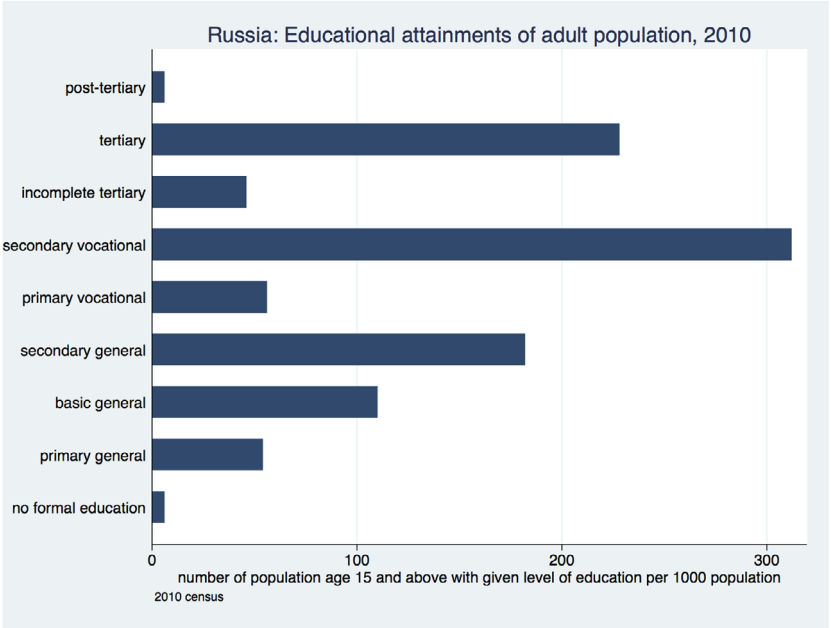

Figure 1. Russia: educational attainments of adult population, 2010.

over the 1995–2010 period) (WB/HSE 2013, 15). Figure 1 indicates the current distribution of the adult population by educational level.

The end of the old state job assignment system, and of the command economy generally, substantially liberalized labor markets and further contributed to the problems faced by the vocational education system. Individuals had far more choice over their educational and occupational careers than in previous times. The perceived prestige of tertiary education, and falling prestige of primary-level vocational education, helped to stimulate declines in enrollments in primary-level vocational education in the 1990s and 2000s, and a steep increase in enrollments in tertiary institutions. Enrollments in secondary-level vocational institutions held steady in this period, as Figure 2 indicates. As one would expect, the numbers and types of educational institutions also changed rapidly during the transition in response to economic pressure and liberalization (Figure 3).

By 2012, when a major new federal law on education was enacted, the government had concluded that primary vocational schools were no longer viable. Secondary vocational institutions were to absorb the remaining primary schools and to offer two types of programs, one for skilled workers that added three to five years to eight years of basic general education, the other adding two to three years to full general secondary education. Tertiary vocational education was reformed as well: henceforth a baccalaureate would take 4 years, a specialty 5–5.5 years, a masters' degree 1–2 years (beyond the baccalaureate), and (after 2013) post-tertiary degrees were to be added. Most importantly, financial and administrative responsibility for VET was formally assigned to the regional governments.

The decline in the number of schools has been accompanied by relatively low levels of financing for professional education, which exacerbates the challenges faced by the system. Overall state spending on education as a percentage of GDP is comparable with international standards, as demonstrated by Table 1.

With respect to non-state spending, however, Russia lags well behind other developed countries. Overall education spending as a share of GDP is 6.3% on average in the OECD, and over 7% for some developed countries, but it is under 5% for Russia (OECD 2013, 182). Spending on *vocational* education as a share of this total is particularly low – around 1% of total spending – with the bulk concentrated at the tertiary level (Indikatory 2014). Finally, in contrast to many countries, Russia's state finances the

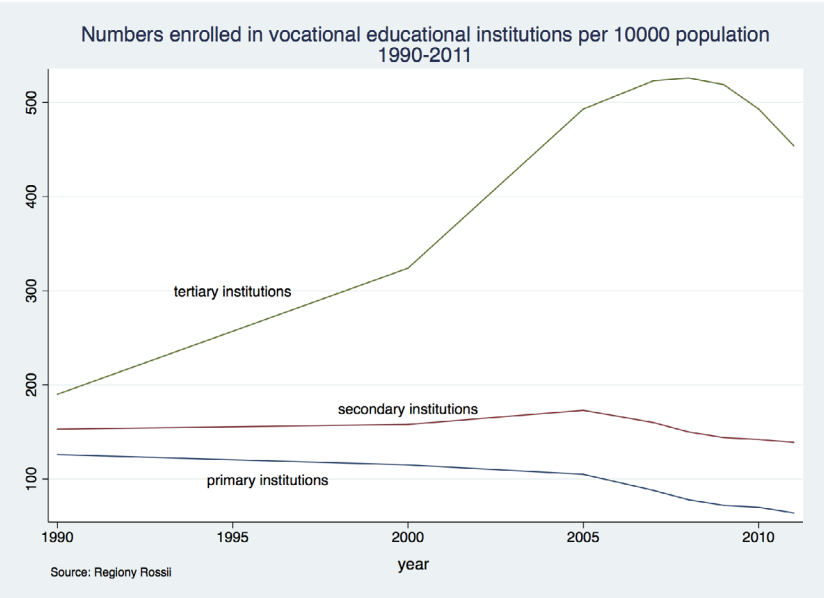

Figure 2. Russia: numbers enrolled in vocational educational institutions per 1000 population, 1990–2011.

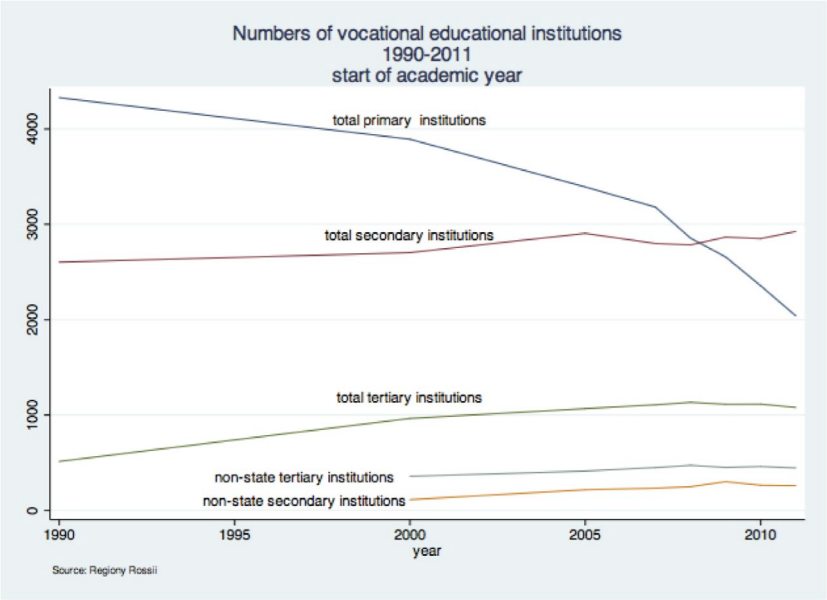

Figure 3. Russia: numbers of vocational educational institutions, 1990–2001.

Table 1. Annual spending per pupil by educational institutions for all educational services, relative to GDP per capita (2010), selected countries.

Country	Percent
Slovenia	34
US	33
Poland	32
Estonia	30
Japan	30
OECD average	28
EU 21 average	28
Russia	**26**
Hungary	26
Israel	25
Brazil	24
Argentina	23
Mexico	20

Source: OECD (2013, 177).

majority of the spending on vocational education (over 80% for secondary vocational schooling, 60% for tertiary). What non-state spending there is on higher vocational education comes mainly from individual households rather than firms. Firms account for only about 12% of the total spending on higher vocational education (Obrazovanie 2014). By contrast, in Germany, firms fund 80% of the expenses on vocational education (Sistemnyi proekt 2014, 6).

This heavy state component to spending translates into a market for vocational education in Russia that remains state dominated. The number of graduates of non-state secondary vocational education institution has leveled off at about 6.5% of all graduates of specialized secondary vocational schools. For these students, over 80% of the funding for tuition comes from individual households and less than 10% from firms. Of the remaining students in state-financed secondary vocational schools, only about 30% are fully privately financed, as opposed to receiving some government funds. At the higher educational level, much more of the funding comes from individuals: about half the students in state

higher educational institutions pay some type of tuition.[10] These figures suggest that for the population, the growth in household outlays for education has been enormous: on a per capita basis, private educational spending has risen over 11 times, from 137 rubles to 1616 between 2000 and 2011. Very little of these tuition revenues are going to private, proprietary vocational schools; the vast majority of vocational schools are funded and administered by regional governments, with tuition revenue from private tuition-paying students comprising a significant portion of their budgets. A challenge for the government, therefore, is to reduce the financial burden for the state and individual households for training, and to increase outlays by firms.

The shrinkage in the number of vocational schools and the fall in the scale of funding are only problematic under conditions of a genuine skill shortage. Otherwise, these phenomena could represent a shift toward a more efficient match between the demand for and supply of skill. However, as the economy recovered in the early and mid-2000s, and firms once again began hiring, workers with skill and experience were in short supply. The aging of the work force was one reason for the deficit, as firms found that there were far too few skilled workers in their 30s, 40s, and 50s to replace the old cadre of skilled workers who received their training and experience in the Soviet era and had reached retirement age. By the mid-2000s, firm surveys found that managers considered the shortage of skilled labor to be one of the top three obstacles to firm performance (along with high taxes and unpredictable regulations).[11] Business associations echoed the complaint. A 2012 survey of 6000 businesses conducted for the All-Russian Non-Governmental Organization of Small and Medium-Sized Businesses (OPORA), found that two-thirds of its members considered the insufficiency of personnel a serious problem. High taxes and difficult access to finance followed (OPORA 2012). Similarly, a survey of member firms by the Russian Union of Industrialists and Entrepreneurs found that 64% of firms considered the shortage of skilled labor to be one of the most severe problems confronting them (RSPP 2014, 30–31). A PWC survey in Russia found that 85% of CEOs were concerned or extremely concerned about the shortage of skilled labor and considered it a threat to economic and political stability (PWC 2014, 15). This was somewhat higher than the figures for other BRICS countries or the US (71 and 70%, respectively). A survey by the Institute of Economic Forecasting of the Russian Academy of Sciences in late 2012 of 169 enterprises in 55 regions found that over 88% of respondents said that their enterprise was short of skilled labor (Russian Academy of Crafts 2015).

The inability of firms to find qualified labor reflects the mismatch between the types of skills supplied by the Russian vocational education system (and higher education) and those demanded by employers. Indeed, one of the most disturbing features of the Russian educational system is its low social return. As a recent study conducted by the World Bank in cooperation with the Higher School of Economics observes, Russian labor productivity is less than half the average level of OECD countries (WB/HSE 2013, 7). Much of this productivity gap can be explained by lack of skills. A 2008 report by the Russian government cites a typical example: one machine-building factory manager noted that many of his customers were ordering old-fashioned machine tools rather than the far more efficient numerically controlled ones, because they lacked trained specialists able to work on the more advanced equipment (Mirkin 2008). Thus lack of skill induces the perpetuation of inefficient production technologies.

The head of the personnel department of a large energy holding company in Vladivostok observed:

> Graduates of technical schools often have to undergo a lengthy period of additional training, and often have to be completely retrained to meet the needs of the company. Firms sign contracts with higher educational institutions to do that in order to save time. We have agreements with several schools for this purpose. Above all, the firms in our holding need engineers and workers. We have fewer young specialists than pension-age specialists. As a result, we have a serious problem with technical specialists – our firms have hardly any professionals of intermediate age. (Ardal'yanova 2015, 10)

Given the need to retrain employees anyway, his firm placed little value on the vocational education system. This experience is not unique. Many firms express dissatisfaction with the quality of vocational institution graduates. A survey by the country's main business association (the Russian Union of Industrialists and Entrepreneurs, or RSPP) found that only 16% of firms considered graduates' skills adequate or more adequate than not; the rest were more dissatisfied or could not give a definite answer

(RSPP 2013, 10). Another survey of firms found that nearly three quarters rated the quality of graduates of vocational higher educational institutions as no higher than 3 on a scale of 1 (lowest) to 5 (highest) (Strategiya 2013, 280).

Contributing to the skill mismatch problem is the aversion on the part of young people to entering blue-collar occupations. This trend stems from a combination of the rapid rise in the wage premium to higher education in the 1990s and early 2000s and the low status of manual labor, which resulted in a boom in higher educational enrollments during the transition (Abankina et al. 2011; Andrushchak and Prudnikova 2011; WB/HSE 2013). Whereas in 1990, only about 25% of youth entered higher educational institutions, by 2008, almost 70% of graduates of general secondary educational institutions continued on for a tertiary degree (Andrushchak and Prudnikova 2011, 3; Strategiya 2013, 284).

The surge of enrollments in higher education had multiple consequences. One was a negative selection effect for the quality of students in secondary and primary vocational schools, as gifted pupils pursued more high prestige placements (Strategiya 2013, 280). Another was a lowering of educational quality in many higher educational establishments as schools attempted to attract newly interested students and deal with the mass influx. Finally, and perhaps most importantly, the surge also lent itself to a large expansion of education in fields for which occupational demand was relatively low, such as management, economics, and law (Mirkin 2008). Consequently, the problem for many firms was not a low level of human capital, but a low level of human capital *with relevant skills*.

The disjuncture in the labor market caused by a surge in pupils seeking degrees related to skills employers do not value is reflected in the wage returns to higher education. As studies of the wage premium to education showed, the return on investment in higher education began falling in the latter half of the 2000s. In some fields that were previously most popular – education, economics, law, and management – the wage premium to education turned negative, whereas in specialties tied to manufacturing, transportation, communications, and health care, the premium remained positive (Andrushchak and Prudnikova 2011, 30–31). In engineering, where the demand for tertiary education is relatively low, the return on investment remains high (Carnoy et al. 2012).

Given the combination of these factors, it is therefore little wonder that firms express dissatisfaction with the quality and quantity of relevant vocational institution graduates. If firms are unwilling (or unable) to train workers themselves, though, why do they not attempt to modify the existing VET system in order to derive better outputs? The 2013 World Bank–Higher School of Economics report sheds light on this puzzle, arguing that incentives of schools and employers were misaligned. Neither the vocational educational institutions – particularly those at the tertiary level – nor the enterprises had sufficient incentive to invest in the types of skill required by industry. On the one hand, firms feared that provision of general and higher order skills would be wasted investment due to the high turnover problem and the likelihood of poaching. On the other, higher educational establishments were evaluated on the basis of the number of diplomas they produced, not the skill qualifications or match to industry needs of their graduates (WB/HSE 2013, 11). Students, for their part, seemed to either highly value professional prestige or to be inadequately informed about returns on investment for blue-collar specialists, thus causing them to flock to white-collar programs that teach low-demand skills. Firms' unwillingness to send strong signals by investing in their employees' education and the uncertain quality of schools made flight into white-collar work, if not rational, then certainly understandable. This dynamic has all the makings of a classic collective action dilemma: all would be better if there were a more effective system for matching the demand and supply of skill on the labor market. But for no one side is there sufficient incentive to assume the disproportionate initial cost and risk of investing in a major overhaul of vocational education.

A crucial institutional legacy of the planned economy in Russia is the relative weakness of industrial associations and labor unions as mechanisms for labor market regulation. The Federation of Independent Trade Unions of Russia (FITUR) is the successor organization of the former All-Union Central Council of Trade Unions, which was the sole legal organization for labor. Today, although other trade union organizations exist legally, the FITUR remains the dominant organized representative of labor in dealing with government and employers. The FITUR participates in formal consultations over

wages and work conditions under the auspices of the Tripartite Commission.[12] But by all accounts, the FITUR has a distinctly subordinate voice in setting social policy. Moreover, the tripartite commissions play almost no role in shaping VET.

In contrast, business associations in Russia are active and influential. The most prominent – the Russian Union of Industrialists and Entrepreneurs (RUIE), OPORA, the Trade-Industrial Chamber, and Delovaya Rossiya, have been active in shaping policy on VET. For example, RUIE has worked on developing new occupational skill standards for incorporation into the curricula of schools. RSPP also lobbies to reform the tax code to give firms tax deductions for training expenses. In many regions, business associations regularly consult with government officials about regional economic development. It is striking, however, that in almost no regions does a regional business association play the lead role in supervising VET.

This institutional legacy, in which neither trade unions nor business associations participate actively in linking the demand and supply of skill, implies that any coordination of VET reform will be brokered by government. Since 2012, however, administrative and financial responsibility for VET has been assigned to the regional level. Therefore federal-level state agencies and employer associations that desire to improve the effectiveness of VET must work through regional governments. Federal agencies have pursued several initiatives to stimulate reform of VET. These include federal programs launched in 2006 and 2011 to encourage the creation of regional training centers and of new programs for vocational training. Because of the decentralization of control over VET, however, the key to the success of federal initiatives lies in the willingness on the part of regional goverments and firms to take advantage of them. A close examination of one recent federal program sheds light on the conditions under which regional governments have responded to a federal initiative to create viable public-private partnerships using the dual education system.

The ASI pilot program

In Russia, as in many countries, multiple state bodies have a stake in vocational education. In Russia's case these include the Education Ministry, the Labor Ministry, and the Ministry of Trade and Industry, as well as their regional branches. The Health, Transportation, and Agriculture ministries also all run their own branch system of vocational schools. The Defense Ministry has a large role in advocating for better VET. To help coordinate their interest in VET reform, the ASI – an ad hoc government body created by Vladimir Putin (then serving as prime minister) in 2011 to promote the development of entrepreneurship in Russia – has taken the lead in promoting new models of VET (Freinkman and Yakovlev 2014).

Because direct administrative responsibility for VET has been delegated to the regions, the federal government's controls are largely indirect. To be sure, the federal government sets the standards for the curriculum that governs the accreditation of all educational institutions (the Federal State Educational Standards, or FGOS). However, in contrast to many policy areas where the federal government has direct hierarchical control over regions, in order to induce closer cooperation between schools and employers, the federal government must resort to indirect measures, such as holding competitions for reform plans meeting the federal government's objectives. The Education Ministry has been holding such competitions each year, beginning with the launch of the federal target program on education in 2006 and continuing in different forms since then. About one billion rubles are awarded to regional governments annually on the basis of a combination of need- and merit-based criteria.[13]

In 2013 the ASI announced a competition to select regions to participate in a project designed specifically to encourage the adoption of models of dual education, whereby firms and schools would collaborate in designing and implementing a curriculum based on classroom instruction at the school complemented by in-house training provided by designated master-instructors at firms. The model was to be loosely based on German-style apprenticeship training. The goal was to encourage regions to foster partnerships between firms and schools under which firms would bear a significant share of the cost of training. ASI stipulated that the project was to give particular priority to high-technology industries. Other criteria for selecting pilot regions included the requirement that firms contribute a

substantial share of the funding, that the project would result in creating new jobs, and that it showed a probability of attracting further investment to the region.[14] The federal government would provide no funding; all funding was to come from the regional government and the participating firms. The ASI rather offered administrative and methodological support from the federal level, including from the Ministry of Education, the Ministry of Labor, the Ministry of Trade and Industry, the World Bank, and the Russian-German Foreign Trade Chamber.[15] A crucial element of the ASI's role has been to ensure coordination among the federal ministries and large state-owned enterprises (SOEs) that are involved in the project.[16]

In some respects, adapting dual education to Russian circumstances has been a matter of reviving traditional Soviet practices, such as *nastavnichestvo* and *sheftstvo*. In other respects, however, the post-Soviet environment poses new challenges. One is the decentralization of responsibility for VET to the regions. Another is that under market conditions, firms and governments must invest real budget resources into it, however much in-kind spending is involved. Firms must now calculate the cost/benefit ratio of training, whereas in the Soviet system, cost, like profit, was a purely nominal consideration.

The ASI competition itself was held in November and December 2013, but it was preceded by several months of preparatory work by the ASI and its partners. In January 2014 ASI selected the first 10 regions for participation in the project, adding another 3 regions in 2015 from among the original applicant pool. Altogether 23 regions applied; 10 regions were not chosen, and another 60 (or 62 if the new Crimean regions are included) did not apply.

The contest encouraged regions to submit long-term plans for closer collaboration of firms and schools in meeting firms' needs for qualified labor by adopting dual education programs requiring long-term contracts between particular enterprises and particular schools. The firms would pay for upgrading training facilities, financing stipends for trainees, giving trainees on-site instruction, certifying that graduates of training programs possessed the necessary qualifications, and providing jobs to the graduates at the enterprises. The proposals required evidence that the regional government and firms were both contributing materially and that the schools were responding to the firms' requirements for training tailored to the firms' needs. In some cases, the agreements called for the widespread adoption of bilateral contracts between individual firms and individual schools, but in some cases, the proposals called for the creation of entirely new training facilities (usually on the premises of an existing specialized secondary vocational school or a technical college or university). In the most ambitious plans, the regional government proposed a "cluster" model of development, where a geographic location would concentrate production, training, and R&D serving a particular branch. Planned industrial clusters have become an increasingly popular vehicle for planned industrial upgrading by Russian regions. It is natural that their plans would combine training with infrastructure improvement and closer links between production and R&D. Each region's proposal was scored and ranked on a five-point scale (as in Russian schools, 5 was the highest score, 1 the lowest). Kaluga's proposal received the highest score, 4.8; Kalmykia's the lowest, 1.[17]

Why did some regions seek to participate and others not? Why were some regions able to construct better proposals than others? There is no uniform pattern, but three factors appear to stand out. For some regions, the prospect of foreign investment was a catalyst (this was the case in Kaluga Oblast', for example, where the prospect of a major investment by Volkswagen in a new greenfield production facility was the impetus for the government's initiative).[18] In other cases, President Putin's drive to expand and upgrade military production spurred defense plants in particular regions to meet the technical demands of the military in order to win procurement contracts (such was the case in Nizhnii Novgorod). In still others, regional political leaders sought to make VET reform a signature achievement of their tenure and to gain national prominence as leaders in this area. Although Russian governors are promoted to higher positions only rarely, they can be removed by the president for poor performance (Reuter and Robertson 2012; Rochlitz et al. 2015). Therefore, some governors seek ways to demonstrate clear policy achievements. Given the high priority assigned by the federal government to improving the quality of technical education, participation in the ASI pilot program allowed governors to benefit politically from showcasing their regions.

In general, regions seek new economic bases of economic development, and regard closer cooperation of firms and schools as a means to make local enterprises more competitive on the Russian and world markets (Tatarstan, Samara, and Yaroslavl' are examples). In one region, Perm', the major local business association had already begun encouraging the use of dual education and had taken the initiative in coordinating the involvement of firms, schools, and government. In most regions in Russia, however, a government body, often a special council answering to the governor, serves as the coordinator. The ASI website indicates that regardless of the particular organizational plan chosen, there needs to be a designed body coordinating the activity of firms, schools, and government.

Nearly all regional leaders face the pressure of an aging and shrinking work force. Therefore those regional leaders focused on regional economic development must raise the skill level of production, since "replacing workers with machines" means that workers must possess the knowledge to use the new technologies. Moreover, intense fiscal pressure on regions drives them to seek new sources of financing for VET. However, nearly all regions face similar pressures, but only some have demonstrated the will and capacity to forge new partnerships between firms, schools, and governments. Therefore the impetus for participation in the ASI competition appears to reflect some combination of the three factors mentioned above: the motivations and skills of their governors, a push by an outside investor, and pressure from the defense industry for higher skill labor.

It is important to remember that the ASI offered no funding to the pilot regions, although it did provide extensive administrative support. Other federal programs did provide some funding in some cases; for example, as part of the large-scale military modernization effort, the defense industry provided funds to the Education Ministry to upgrade training. A press release from the government of Belgorod in 2013 indicated that its planned overhaul of vocational education over the 2011–2015 period would require 680 million rubles of regional budget spending, another 57 million from large firms, and "several million" rubles per year from the federal government (Belgorodskoi 2013). The fact that the ASI program provided no funding raises an important question: why did regional governments not undertake the reform on their own? I will argue that regional governments used participation in the federal pilot program as leverage to enforce agreements to cooperate in VET on the part of firms and schools. This implies that the federal initiative was important because it solved a commitment problem for regional governments, enabling them to ensure that firms and schools would meet their obligations. This effect, however, was conditional on a region's ability to take advantage of the federal program to induce firms to enter partnerships with schools. Therefore, from the standpoint of the ASI, it was a demonstrated commitment and capacity to implementing the program – rather than need – that determined which regions were chosen.

As noted above, only 23 regions applied for federal funding under the program, and only 13 were chosen. Below I explore the similarities and differences among the regions that applied and won, those that applied but failed, and the rest, to determine what characteristics best predict a region's decision to a apply and its success in being selected for the pilot project.

To analyze the ways in which the winning 13 regions do and do not differ from the unsuccessful regions and the remaining group, I identified four categories of variables that might differ systematically across the three sets of regions: demographic; economic; social; and political. I used both descriptive statistics and ANOVA tests. To simplify the presentation of the results, I show the median value for each variable for each category of region, as well as the results of an ANOVA test to determine whether the differences among the groups in mean values are statistically likely to be due to chance.[19] To do this, I report the p value for the test. A p value lower than 0.05 indicates a greater than 95% chance that the differences in the distribution of values across the three groups are not purely random. I have highlighted in boldface those p values that indicate that the differences are systematic, not random. Table 2 displays the results.

I tested many more variables than these 13, but only present these as the most representative for each type of factor. For the most part, the pilot regions are not distinctive in their economic structures, suggesting that it was not any one particular characteristic of their regional economy that motivated their governments to enter the federal contest. Although the median level of gross regional output per

Table 2. Comparison of pilot regions ($N = 13$), unsuccessful applicant regions ($N = 10$), and all others ($N = 60$).

	Category of region			
	Pilots	Unsuccessful applicants	Others	Anova test
	Median (std. dev.)	Median (std. dev)	Median (std. dev.)	Prob > *F*
Population				
Population, thous., 2011	2631 (1720.29)	1059.5 (1066.64)	1111 (1748.58)	**0.059**
Urbanization, pct., 2011	76.1 (6.68)	65 (8.66)	69.7 (14.63)	0.117
Economy				
GRP per cap, adjusted, 2012[a]	48.25 (10.98)	32.67 (13.27)	34.55 (51.36)	0.687
Mean income, adjusted, 2014[b]	3.27 (0.52)	2.67 (0.52)	2.78 (0.63)	**0.01**
Secondary industry as share of total output, 2012	35 (5.85)	34.7 (12.49)	27.8 (10.5)	**0.03**
HHI Index, 2012[c]	0.425 (0.05)	0.423 (0.03)	0.432 (0.07)	0.58
Foreign trade as pct. of total output, 2011	0.316 (0.31)	0.1615 (0.40)	0.178 (0.31)	0.63
Foreign-owned firms as pct. of total, 2014	0.003 (0.003)	0.002 (0.003)	0.0035 (0.009)	0.66
Society				
Poverty rate, 2011	12.5 (3.17)	16.1 (0.15)	15 (4.1)	**0.005**
Unemployment rate, 2014	4.2 (1.15)	15 (2.21)	5.65 (4.56)	0.167
Governance				
State administration as share of value-added of region, 2012	5.2 (1.45)	7.85 (3.72)	7.4 (4.57)	**0.06**
Federal subsidies as share of budget, 2013	0.15 (0.10)	0.26 (0.15)	0.26 (0.20)	**0.04**
Regional democracy score, 2010[d]	36 (5.99)	27 (4.17)	30 (5.67)	**0.006**

Source: Regiony Rossii, *Sotsial'no-Ekonomicheskie Pokazateli* (various years).
[a]Expressed as a multiple of the regional subsistence minimum in given year.
[b]Expressed as a multiple of the regional subsistence minimum in given year.
[c]The Hirschman-Herfindahl Index measures the concentration or dispersion of economic production across the primary, secondary, and tertiary sectors. A value of 1 would mean that the entire economy was concentrated in one sector; a value of 0 would mean that no one branch dominates.
[d]The measure used for governance is the "democracy" index constructed by a team of experts at the Carnegie Moscow Center under the direction of Nikolai Petrov. The components of the index are as follows: (1) regional political structure (real balance of power among elites, whether elites elected, independence of judiciary, observance of citizens' rights); (2) openness of political life; (3) level of fairness and freedom of elections; (4) political pluralism (stable parties, coalitions, during and after elections); (5) independence of media; (6) level of corruption; (7) economic liberalization (privatization, respect for property rights); (8) civil society (NGOs, public participation in political life); (9) quality, turnover of elites (how orderly is change of leadership, effectiveness of mechanisms for harmonizing interests); (10) local self-government (presence of elected local government, how active and effective is local government). The governance index is an additive index of these 10 measures. For more information, see http://www.socpol.ru/atlas/indexes/index_democr.shtml.

capita is higher among the winners of the contest, the difference is not statistically significant due to the wide range of variation in the residual group ("others"). There is some tendency for the applicants, both the successful and unsuccessful ones, to be more industrialized (higher secondary industry shares). However, they are not more exposed to foreign investment or trade. They do tend to have higher mean personal incomes (expressed as a multiple of the regional subsistence minimum). They also have a lower poverty rate (this is statistically significant) and a somewhat lower unemployment rate, although the latter difference lies outside the boundaries of conventional levels of statistical significance.

With respect to population size and urbanization, the pilot regions tend to be larger in population on average than the other two groups. They are also somewhat more urbanized, although, again, the latter difference is not within the usual limits of statistical significance.

Note that the unsuccessful applicants differ from the other two groups in several respects: they tend to be poorer and to have higher poverty rates, lower gross regional output per capita, and much higher unemployment. They also have considerably lower scores on the three measures of governance. Let us examine these measures more closely.

The three measures of governance show the clearest pattern of difference across the three groups of regions. The first of the governance measures is the share of the economy going to state administration. The argument is that regions that devote a higher share of their economy to government are

making less efficient use of resources than other regions, treating government either as a means of social welfare, or spending more on government activity than other regions. The pilot regions are significantly lower in this respect than are the other regions. A second indicator of quality of government also reflects the efficiency of government spending. Russian regions vary enormously in the degree to which they depend on the federal government to subsidize their budgets (the median value is 25% across all regions of the country, but in some regions, the share of federal transfers is only 3%, while in others it is as high as 85%). Both the government administrative share in the economy measure and the federal subsidy share measure are strongly related to a region's income and poverty rate (and, in the case of the federal subsidy measure, to unemployment as well). However, both are also strongly associated with the third measure, the "democracy index." Adding the latter measure to a multivariate model of the correlates of government administrative spending and federal subsidies considerably strengthens the association, even after controlling for poverty, income, and unemployment. Thus there is a political component that helps to explain variation in the degree to which regions devote resources to the regional government bureaucracy and depend on federal subsidies for their spending.

What is the democracy indicator, and what does it actually measure? Although it was designed to measure the level of "democratic-ness," its multifaceted nature allows other interpretations.[20] In previous work, I have interpreted the index as reflecting both the dispersion of power among regional power centers and their capacity to cooperate on matters of common interest (Remington 2011). That is, the measure captures both the relative dispersion of power across multiple sectors as well as the capacity to act cohesively. The measure is therefore a reasonably good indicator for the quality of regional governance identified by Kathryn Stoner-Weiss as elite consensus or integration, the capacity for collective action. This quality, she argued, enabled some regional governments to cope with crisis more effectively and to be more responsive to public demands in the early 1990s (Stoner-Weiss 1997). Similarly, Peter Evans characterized the capacity for effective policy-making and policy implementation achieved through a combination of executive coherence and close coordination with relevant elites as "embedded autonomy" (Evans 1995). Particularly in a society with a weak civil society, low levels of trust among the population, and ubiquitous failures of coordination in the political sphere, the strength of "elite social capital" can compensate for other institutional weaknesses.

This argument helps explain how a regional government in Russia might solve the commitment problems inherent in reforming VET. Successful adoption of models of firm-school cooperation that rest on more than one-time transactions, and instead require both firms and schools to invest sizable resources in new programs of instruction, or even entire new training facilities, depend on solving classic commitment problems: how to ensure that the parties to an institutional agreement will honor their commitment? Solutions to problems of this type have been widely analyzed in the "new institutionalism" literature (North and Weingast 1989; North 1990, 1993). Standard approaches highlight the importance of monitoring and mutually agreed upon external enforcement of agreements. In the Russian case, government – not employer and labor associations – plays the role of monitor and enforcer. But in many cases, it is also the broker of the agreement in the first place. With few exceptions, regional press reports suggest that government acts as the initiator of bilateral and multilateral contracts involving firms and schools. A common pattern is the "tri-partite agreement" – i.e. an agreement among the regional government, one or more schools, and one or more firms.

This helps to explain the pattern of response to the ASI's invitation to compete for federal assistance in adopting new dual education VET institutions. The funds provided by the federal government under the program were relatively modest. The prospect of federal funding may have helped to motivate some regional governments to submit proposals, but, as the data show, it was the regions that were poorer in resources on average and lower in governance quality whose proposals failed. Perhaps their leaders were hoping for the funding more than the administrative support.

This evidence makes it reasonable to conclude that the regions that applied successfully were not motivated by the prospect of obtaining federal funds so much as by the opportunity to use the modest funding from the federal government as leverage to induce larger commitments by firms and schools to new cooperative relationships. This enabled the successful regions to accomplish regional tasks: to

make the region more attractive for federal procurement contracts (especially in the defense industry) and for foreign investment. The federal program gives the governor more power to press local schools and firms to forge new relationships. In short, the governor's ability to deploy the federal funds and attention improves his ability to induce and enforce the commitments to joint projects on the part of firms and schools. If this supposition is correct, then the application for participation in the federal program allowed the regional government to deploy its existing governance capacity for the achievement of a new set of developmental goals. Federal involvement brought federal monitoring of the regional government's efforts, and in turn enabled both the federal and regional governments to monitor the efforts of the firms and schools.

The ASI's role is crucial. ASI is both the coordinating mechanism for federal involvement – helping overcome the interjurisdictional rivalries among the education, labor, and industrial ministries over control of VET – but also worked closely with the pilot regions as they implemented their projects. Through 2015 and 2016 the ASI has been analyzing the experience of the regional initiatives in order to propose revisions to the federal educational curriculum standards that apply to vocational schools (generally in the direction of allowing more hours to be spent in on-the-job training) and to assess whether and how to disseminate the dual education model to all regions once the initial trial period has ended.[21]

From the standpoint of the federal government, the ASI program created incentives for relatively high capacity regions to mobilize their efforts around a comprehensive plan to attract business investment in VET reform. The federal government hoped their successes would serve as models for other regions. From the standpoint of regional governments, however, forging deep and lasting partnerships between firms, schools, and government poses serious commitment problems. Participation in the federal contest was one way of resolving those problems: federal monitoring helped to enforce the commitment to cooperation on the part of the regional partners. In turn, by participating in the federally initiated pilot program, regions were in a better position to attract outside investment. Consider the following comment made by one of the Russian officials in charge of the dual education program. In remarks at a conference in Berlin in February 2015, he made explicit that the implicit guarantee of the federal authorities was the critical factor in inducing business participation[22]:

> The value of our experiment lies in the fact that its realization is supported by the top leaders of the winning regions and is under the constant supervision of the ASI and three federal ministries: the Ministry of Economic Development, the Ministry of Education and Science, and the Ministry of Labor. Such attention to the course of the adoption of elements of the dual system of education allows us to hope that winning regions will raise their investment attractiveness for foreign enterprises, and already now we are accepting proposals for participation in our experiment from foreign colleagues, for example Südzucker AG, a large German producer, which is planning its development on Russian territory.

The incentive for regions to enter the contest therefore lay less in the material stimulus offered by the federal government than in the signal to firms sent by the success of the proposal. Federal attention helped to ensure that all sides would fulfill their commitments to reform.

To be sure, it is too soon to assess the effectiveness of the ASI program. Early indications are that the reforms have had modest impact. A number of individual firms have forged new partnerships with individual schools. Collectivist institutions are much rarer. In the case of Kaluga, for example, the dual education system only operates for Volkswagen: the other foreign auto firms participating in the agreement with the local automotive technology school pulled out following the 2009 recession.[23] Similarly, in other regions, large firms have opened new instructional facilities on their premises complementing the curriculum of partner schools. The fact that participants frequently comment that dual education is merely the reinvention of the older Soviet forms of partnership between individual firms and schools suggests that the push for dual education has not produced a large-scale shift to multifirm cooperation in skill provision. Rather, these programs probably upgrade skill provision for large single firms rather than creating deeper regional pools of skill serving multiple firms.

Conclusions

To the extent that skill formation is indeed a public good, that is, a private good providing positive social externalities, then it is subject to the same problem of underprovision as for other public goods in a market-driven economy. In a successful liberal market economy, some conditions help to alleviate the potential shortage of skill: a robust flow of information about the potential benefits of investment in skill by workers and firms; functioning institutions to enforce contractual obligations on the part of employers and employees; and incentives to induce investment in new skill as the technological demands of the economy change. In societies where these conditions are lacking, however, and in particular in societies where production technologies are changing rapidly, market arrangements are likely to yield high inefficiency. As a result, a significant gap between the array of skills that firms need and those that workers possess and schools produce may result in a "low-skill equilibrium" (Crouch, Finegold, and Sako 2001, 22).

This paper has argued that such a low-skill equilibrium arises from cooperation failures. Each side – individual workers, firms, schools, and government – would be better off if they could commit themselves to long-term joint investment in skill formation. However, no one side is motivated to bear the lion's share of the cost. Commitment problems can be overcome by institutions that monitor and enforce the agreement. Firms are more willing to contribute their resources to training programs outside the firm to the extent that they are confident they will benefit. In turn, schools are more willing to transform their curriculum if they are confident that they will benefit by improving the placement of their graduates and increasing their attractiveness to potential trainees. In the post-Soviet environment, underperforming schools face the danger of being shut down. Long-term contractual relations with employers therefore help to guarantee their survival. For their part, workers benefit from knowing that the training they receive will be valued in the labor market, improving employability and job security. And government benefits from the higher productivity and efficiency achieved for the local economy.

The ASI pilot program considered here illuminates the conditions under which local governments in a transitional economy can stimulate the formation of comprehensive partnerships between firms and schools in the provision of VET. Because coordinating the joint investments by firms and schools in new curricula and traineeships poses a cooperation dilemma, institutional mechanisms to reduce transaction costs and enforce agreements are required. In the post-planned economy environment, neither industrial associations nor trade unions are equipped to supply such solutions. Where institutional solutions are found, therefore, they tend to be provided by government actors. The pilot program run by ASI generated an additional layer of institutional enforcement to such agreements in the form of the central government's interest in promoting new dual education programs. Federal attention rather than funding was a crucial condition of success of this initiative. Federal involvement encouraged regional governors to assume responsibility for the success of the program and encouraged firms to upgrade productive technologies. Firms knew that federal monitoring deterred regional governments from reneging on their commitments to investing in the reform of VET, and in turn, the firms' involvement made government and schools willing partners in the endeavor.

At the same time, this study suggests that a regional government's ability to forge new mechanisms of partnership between firms and schools depends on its existing stock of institutional capacity. A more effective government and a more cohesive regional elite tend to allow regional governments to solve collective action problems of the kind posed by VET reform.

Notes

1. Crouch, Finegold, and Sako point out that from the standpoint of society, the collective sum of skill in the work force has the characteristic of a public good that is non-excludable but is rivalrous (2001, 25). Such a good is technically a "common pool resource." That is, users cannot be prevented from consuming it, but overuse will deplete the supply. Thus users are rivals.
2. This is a simplified description of patterns described in Swenson (2002), Thelen (2001, 71–104), Iversen and Soskice (2001), Iversen and Stephens (2008), and Culpepper (2000).

3. Crouch, Finegold, and Sako (2001, 158–179) discusses Great Britain.
4. Polyvalent skills, in Streeck's view, are not only the "key" to acquiring more skill (hence the term *Schluesselqualifikationen*), but also imply attitudinal and behavioral skills such as diligence, attention to detail, and willingness to take responsibility in group settings.
5. Personal observation and interviews at VW Academy, a joint project of Chattanooga State Community College and the Volkswagen Group of America (2 May 2016).
6. Government directive (*razporyazhenie*), RF 349-r. March 3, 2015 (from Pravitel'stvo. Razporyazheniya, No. 349, 2015; http://dlib.eastview.com/browse/doc/43309898).
7. Discussions of compensation under the Soviet system may be found in Clarke (1996), Gimpelson and Kapeliushnikov (2011), and Remington (2011).
8. *Nastavniki* (mentors or master trainers) were senior, experienced workers who were assigned to take young workers under their wing and help them adapt to the environment of the firm. The institution was called *nastavnichestvo*.
9. Poussenkova and Nikitina (2016, 7) surveyed MBA students at three technical institutes serving the oil and gas industry, asking students to check which of a list of activities they thought were included in the concept of "Corporate Social Responsibility (CSR)." The three most commonly cited were "protecting the health of the company's employees,""training and development of the company's employees," and "promoting job creation and small business development in the regions of operations." After that followed "environmentally sound activities" and "support of sports in the regions of operations."
10. Some students finance their training through the *tselevoi nabor* (target recruitment) system. Under this system, certain students are selected by a regional government or a firm to receive training. A firm, or the regional government on behalf of the firm, pays the tuition fees. Upon successful completion of the course of study, graduates automatically receive jobs at the sponsoring firm.
11. These surveys, known as the "Business Environment and Economic Competitiveness Surveys," were conducted by the Ministry of Economic Development, the Higher School of Economics, and the Levada Center in 2005 and 2009.
12. Formally, the Tripartite Commission for the Regulation of Social-Labor Relations. Besides the FITUR, the government and the main employer associations are the other partners. The tripartite commission was created in 1992 to establish a framework of "social partnership" between business and labor. Subnational branches of the Tripartite Commission exist in nearly every region and major city. Russian and foreign experts agree that, for the most part, the work of the tripartite commissions is largely formal. See Ashwin and Clarke (2003) and Clarke (1999, 2007).
13. Interview with A.A. Klimov, Deputy Minister of Education, 1 August 2016.
14. See the website http://asi.ru/staffing/dualeducation/.
15. The World Bank was involved only as a consultant.
16. Interview with a senior ASI executive in Moscow, 24 June 2016.
17. The scores may be found on the ASI website: http://asi.ru/staffing/dualeducation/docs/table.pdf.
18. Evidence about the reform of VET in particular regions is drawn from local press sources and websites. For more information, see Remington and Marques (2014).
19. Note that the figures represent the median region in each category for each variable and the standard deviation of the range of values for the regions in that category. I report the median rather than mean in order to reduce the effect of extreme values. The ANOVA test, however, is based on a comparison of means and distributions for each of the three categories of regions.
20. Note that the components of the index are closely correlated. Cronbach's alpha is 0.8986. Therefore, the measure is highly reliable.
21. See http://asi.ru/staffing/dualeducation/.
22. See http://www.asi.ru/news/16618.
23. Personal observation and interviews at the Automotive Technology Instructional Center, Kaluga, Russia, 23 June 2016.

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