# Delegation to workers across countries and industries : social capital and coordination needs matter

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Yoko Asuyama*

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**Keywords:** Coordination, Decentralization, Delegation, PIAAC, Social Capital, Trust

**JEL classification:** L22, L23, Z13

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# Delegation to Workers across Countries and Industries: Social Capital and Coordination Needs Matter*

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The degree of delegating authority to non-managerial and non-supervisory workers substantially varies across countries and industries. By examining worker-level data from 14 countries, I empirically explain this variation by region-specific social capital that proxies workers' degree of self-centeredness and the industry-specific need for coordination. The empirical results of this study confirm the theoretical predictions by Alonso *et al*. (2008) for the first time: the negative association between coordination needs and decentralization is mitigated in regions with lower self-centeredness of workers. In particular, when self-centeredness of workers (respectively, need for coordination) is very low, the degree of delegation is always high regardless of the level of the need for coordination (self-centeredness of workers). Positive associations between delegation and its benefits, including job satisfaction, wages (proxy for higher productivity), and skill upgrading of workers, are also found. These results imply that people's degree of self-centeredness affects a country's economic development patterns by changing the degree of decentralization and its benefits.

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## 1. Introduction

Decentralization, that is, delegation of decision-making from higher to lower organizational levels, is beneficial for firms in many ways.[1] Theoretically, these benefits include better adaptation to the business environment owing to more efficient use of local knowledge (Holmström 1984; Dessein 2002; Hart and Moore 2005; Dessin and Santos 2006; Alonso *et al*. 2008), speedier decision-making because of more efficient information processing (Radner 1993; Bolton and Dewatripont 1994), and an increase in job satisfaction/motivation and effort of workers to whom authority is delegated (Aghion and Tirole 1997; Zábojník 2002). Empirically, Fehr *et al*. (2013) have confirmed the last motivation-enhancing effect of delegation in a laboratory experiment. Appelbaum *et al*. (2000, Chapter 9) also find a positive association between delegation to non-managerial employees and employee job satisfaction.

Despite these benefits, firms do not always pursue decentralization, and the degree of delegation varies substantially across locations and industries. For example, Figures 1.1 and 1.2 display the variation across countries and industries, respectively, in the degree of discretion that the average non-managerial and non-supervisory worker can choose or change their way of work.[2] The degree of decentralization in this aspect ranges from Russia's 2.41 to Finland's 3.80, where the degree is measured on a 5-point scale: 1 = not at all (choose/change the way of own work); 2 = very little; 3 = to some extent; 4 = to a high extent; 5 = to a very high extent (Figure 1.1). Regional variations are much greater: the corresponding average scores range from 1.72 in Altai Krai, Russia, to 4.05 in Bremen, Germany. As Figure 1.2 shows, the corresponding scores also vary across industries, ranging from 2.57 in textile-related manufacturing to 3.75 in computer-related services.

[1] For the summary on the benefits and costs of delegation, see Colombo and Delmastro (2008, Chapter 2), Bloom and Van Reenen (2011, section 5.4.2), and Gibbons *et al*. (2012).

[2] This aspect is one of the seven elements of delegation examined in this paper's empirical analysis. Similar variations are observed when examining other elements.

What explains these variations in the actual degree of decentralization? One important reason is that decentralization is not pursued in countries/regions or industries in which the expected costs of delegation are relatively large. Theoretically, such costs mainly include (i) loss of control (Holmström 1984; Aghion and Tirole 1997; Dessein 2002; Alonso *et al*. 2008) and (ii) difficulty in coordination (Bolton and Dewatripont 1994; Hart and More 2005; Dessin and Santos 2006; Alonso *et al*. 2008). First, delegation generally results in difficulty in monitoring agents' behaviors. As the interests of the principal (firm) and the agent (worker) increasingly misalign, the possibility of workers' rent-seeking behaviors, which are harmful for firm profit, increases. Second, when coordinating worker behaviors is important for firm profit, decentralization is costly because adaptation to local conditions is prioritized over coordination under decentralization.

This paper focuses mainly on these two costs of decentralization as determinants of its implementation.[3] First, the size of expected cost owing to rent-seeking behaviors is measured by region-specific social capital that proxies self-centeredness of workers. Second, the magnitude of cost owing to difficulty in coordination is measured by industry-specific coordination needs. Based on the theoretical framework by Alonso *et al*. (2008), I empirically examine the effect of these two cost measures on the degree of delegation to non-managerial and non-supervisory workers utilizing worker-level data from 14 countries. The following theory-consistent results are obtained: First, the degree of decentralization is lower when its costs are higher (i.e., when industry's need for coordination is higher or when region's average self-centeredness of workers is higher). Second, the negative association between coordination needs and decentralization is mitigated in regions with lower

[3] Other factors that affect the degree of decentralization by changing the benefits and costs of delegation, such as worker skill, use of information and communication technology (ICT), firm size, and the competitiveness of product market, are controlled for in the empirical analysis.

self-centeredness of workers. Third, in industries with very low coordination needs, the degree of decentralization is high and does not depend on the level of self-centeredness of workers. Similarly, in regions where self-centeredness of workers is very low, the degree of delegation is always high, regardless of the industry's coordination needs. As mentioned below, the second and third findings are empirically new. These results are robust to alternative indices of decentralization, an industry's coordination needs, and self-centeredness of workers. The possibility of endogeneity bias is minimized because the region-specific and industry-specific cost measures used in this paper are likely to be exogenous to individual firms. In addition, the endogeneity test results indicate that the social capital variable (proxy for worker self-centeredness) can be treated as exogenous.

The lower-level self-centeredness of workers is considered to raise firm profit through more information sharing (i.e., less inefficiencies caused by imperfect information) and better coordination among workers, and less biased decision making of each worker from the firm's perspective. These are exactly the main channels through which social capital improves efficiency of the group (Durlauf and Fafchamps 2005: 1652−1658).[4] When self-centeredness of workers is very low, decentralization is chosen because it yields higher profit than centralization even when coordination is extremely important. When coordination is important, each worker recognizes it and thus coordinates well by exchanging better-quality information, which raises firm profit under decentralization. By contrast, the quality of communication becomes worse under centralization with an increase in coordination needs (see Section 2 for more detail).

This study contributes to the literature in three main ways. First, to the author's knowledge, this study is the first to test the theoretical predictions of Alonso *et al*.

[4] As Durlauf and Fafchamps (2005: 1644) summarize, previous studies generally regard social capital as something that "generates positive externalities for members of a group" through "shared trust, norms, and values" that "arise from informal forms of organizations based on social networks and associations."

(2008) empirically. Past empirical studies find a negative association between coordination needs and the degree of decentralization (Colombo and Delmastro 2004; McElheran 2014; Meagher and Wait 2014). However, Alonso *et al*. (2008) theoretically shows that even when coordination is extremely important, decentralization is optimal if the degree of misalignment of interests between principal and agent are sufficiently small. Such interaction effects of coordination needs and the misalignment of interests are empirically examined in this paper for the first time.

Second, this study also contributes to the growing literature on the effect of culture (or social capital) on economic activities (Guiso *et al*. 2006, 2011; Durlauf and Fafchamps 2005; Fernández 2011; Alesina and Giuliano 2015). In particular, this paper is closely related to Bloom *et al*. (2012), Appelbaum *et al*. (2000, Chapter 9), and Cingano and Pinnotti (2016). By examining firm data in the United States (US), Europe, and Asia, Bloom *et al*. (2012) empirically show that firms headquartered in high-trust regions delegate more authorities to plant managers and that higher levels of bilateral trust between the country of headquarter and that of subsidiary increases decentralization. Appelbaum *et al*. (2000, Chapter 9) also find a positive association between delegation to non-managerial employees ("greater opportunity to participate") and their trust to managers in three manufacturing industries in the US. However, both papers do not examine the effect of coordination needs nor social capital measures other than trust. By contrast, the current paper shows that the effect of trust on decentralization depends on the importance of coordination. In fact, trust does not matter for decentralization when coordination needs are very low. The results in this paper also indicate that "trust" may be interpreted as the degree of self-centeredness of workers because alternative social capital variables (participation in volunteer activities and attitude on wealth accumulation) are also found to be significant determinants of decentralization. These remarks also apply to Cingano and Pinnotti (2016) who examine industry-level data across Italian regions and European countries. They find that higher

regional- (or country-) level trust is associated with a larger share of value-added and export in delegation-intensive industries. They treat the industry's degree of decentralization as exogenous, while I assume and empirically show that the degree of decentralization is determined by social capital (e.g., trust) and coordination needs.

The third contribution of this study is its data characteristics. The data in the current paper cover both manufacturing and service industries across 14 countries in Europe (including Russia and Eastern Europe) and Asia. By contrast, the coverage of most studies that examine the determinants of decentralization are limited, especially in terms of the country coverage, although a few exceptions exist; for example, Bloom *et al*. (2012) cover manufacturing firms in 12 countries in US, Europe, and Asia.[5] Another uniqueness of the current study is the use of worker-level data. Previous studies on the determinants of decentralization generally use firm or establishment level dataset (Colombo and Delmastro 2004; Bloom *et al*. 2012; McElheran 2014; Meagher and Wait 2014; studies cited in the Tables 2.2a in Colombo and Delmastro 2008). By examining worker-level data, this paper is able to examine the effects of individual characteristics on the degree of decentralization.[6]

The rest of this paper is organized as follows: Section 2 briefly explains the model by Alonso *et al*. (2008) regarding firm decentralization/centralization choice. Section 3 presents the empirical strategy. Section 4 describes the data. The estimation results on the benefits and determinants of decentralization are reported, respectively, in Sections 5 and 6 and Section 7 concludes.

[5] Graham *et al*. (2015) also cover European and Asian CFOs, although their main empirical analysis is based on US CEOs.

[6] Graham *et al*. (2015) examine the effect of CEO's characteristics (and a few characteristics of managers) on the degree of decentralization. However, the examined characteristics are limited. In addition, they do not examine delegation to lower-level workers.

## 2. A Model Explaining the Decentralization/Centralization Choice

Alonso *et al*. (2008) build a model that explains how the two major costs of decentralization (loss of control and coordination failure) influence the firm's decision-making patterns, that is, decentralized or centralized decision making. Their model considers an organization with two divisions and one headquarter, and examines how the decision rights are allocated between a headquarter manager and two division managers. I directly apply their model to my empirical setting simply by changing the "two division managers" in their model to "two non-managerial and non-supervisory workers." Delegation to the lowest-rank workers in the organization is examined, primarily because my data on decentralization are mainly concerned with narrow-scope decisions related to the person's daily business operations (see Section 4.2.1). By contrast, empirical studies that examine the degree of delegation to managers usually analyze more wide-scope strategic decisions, such as those on mergers and acquisition, capital investment, hiring and dismissal of employees, introduction of new product, technology, and work organization (Colombo and Delmastro 2004; Bloom *et al*. 2012; Meagher and Wait 2014; Graham *et al*. 2015).

I briefly explain the model of Alonso *et al*. (2008) with slight notational changes. Consider a hypothetical firm consisting of a headquarter (HQ) manager and two workers $i \in \{1,2\}$. There are two decisions, $d_1$ and $d_2$, which are related to the tasks of workers 1 and 2, respectively. These decisions are made by either the HQ manager in the case of centralization or by each worker in the case of decentralization. Decision rights are allocated to maximize the sum of expected profits generated by workers 1 and 2, $\mathrm{E}[\pi_1 + \pi_2]$. Profits of worker *i* ($\pi_i$) are defined as follows:

$$\pi_i = K_i - (d_i - \theta_i)^2 - \delta(d_i - d_j)^2 \quad \forall\, i \in \{1,2\},$$

where $K_i$ is the maximum profits realizable, $\theta_i$ is the local conditions each worker faces, $d_j$ is the decision on other task (if $i$ = 1, then $j$ = 2, or vice versa). $\theta_i$ is privately observed by worker *i*, but its distribution is common knowledge. $d_i = \theta_i$

means perfect adaptation to the local condition and $d_i = d_j$ means perfect coordination between decisions 1 and 2. Each worker's profits are increasing in both adaptation and coordination, but there is a trade-off between them. The parameter $\delta \in [0, \infty)$ captures the relative importance of coordination for the profits.

Each worker strategically sends messages $m_i$ to the HQ manager under centralization (vertical communication), or to the other worker under decentralization (horizontal communication), to influence decision making in her favor. These communications take the form of "cheap-talk." Under centralization, the HQ manager chooses the optimal decisions $d_1$ and $d_2$ to maximize the expected overall profits given the messages received $\mathrm{E}[\pi_1 + \pi_2 \mid m]$, where $m \equiv (m_1, m_2)$. Under decentralization, each worker chooses the optimal decision $d_i$ that maximizes $\mathrm{E}[\lambda\pi_{\mathrm{i}} + (1-\lambda)\pi_{\mathrm{j}} \mid \theta_{\mathrm{i}}, m]$. The key here is the presence of $\lambda \in [1/2, 1]$, which is the weight each worker gives to her own profits. This parameter $\lambda$ (called "own-division bias" in Alonso *et al*. [2008]) captures the degree of misaligned interests between the HQ and each worker. In the current paper, I call this $\lambda$ the degree of workers' self-centeredness.

Under the above setting, Alonso *et al*. (2008) show the following: (i) when coordination need $\delta$ and self-centeredness of workers $\lambda$ are both sufficiently large, both $\delta$ and $\lambda$ are negatively correlated with decentralization; (ii) when $\delta$ is sufficiently small, decentralization is optimal regardless of $\lambda$; and (iii) when $\lambda$ is sufficiently small, decentralization is optimal, regardless of $\delta$ (see Proposition 5, Figure 6, and Section VI of Alonso *et al*. [2008]). As mentioned in the Introduction, previous literature predicts the negative associations of both $\delta$ and $\lambda$ with the degree of decentralization. A particularly novel finding of their model is (iii), which shows that even when the need for coordination is extremely high, decentralization outperforms centralization when the self-centeredness of workers is sufficiently low.

This (iii) occurs because an increased need for coordination improves the

quality of communication under decentralization, but worsens that under centralization. Under decentralization, each worker recognizes the importance of coordination for her own profit and thus, exchanges more precise information with each other, which results in better coordination and greater firm profit. By contrast, under centralization, each worker anticipates that the HQ manager would give too much weight to coordination and thus, over-reports her state to induce a decision better adapted to her local conditions. Less precise information on local conditions results in poor adaptation and a reduction in firm profit. Through this mechanism, the expected profit under decentralization becomes larger than that under centralization, when the degree of self-centeredness of workers ($\lambda$) is sufficiently small. When $\lambda$ is large (and $\delta$ is also sufficiently large), centralization outperforms decentralization. This is because larger $\lambda$ leads to less precise communication and more biased decision making under decentralization.[7] Put differently, lower self-centeredness of workers (small $\lambda$) increases efficiency through better coordination by improving the quality of information and through decisions more closely aligned with the firm's interests.

## 3. Empirical Strategy

Based on the model in the previous section, I empirically examine whether workers' self-centeredness and need for coordination actually influence the degree of decentralization. In particular, I primarily estimate the following equation:

$$Decent_{ijr} = \alpha + \beta_1 IndCoord_{jc} + \beta_2 SocK_r + \beta_3 IndCoord_{jc} * SocK_r + \gamma_1 X_{ijr} + \gamma_2 Z_{jc} + F_j + F_c + \varepsilon_{ijr}, \quad (3.1)$$

[7] An increase in $\lambda$ leads to lower qualities of both vertical and horizontal communication. However, since each worker's interest is more closely aligned with the HQ manager than the other worker who is biased toward own profit, the negative effect of $\lambda$ on the communication quality is smaller under centralization.

where subscripts *i*, *j*, *r*, and *c* denote worker (non-managerial and non-supervisory worker), industry, region, and country, respectively. $Decent_{ijr}$ stands for the degree of delegation to the worker. $IndCoord_{jc}$ represents the degree of coordination needs of industry *j* in country *c*. $SocK_r$ is the region-specific social capital that proxies the degree of self-centeredness of the average worker in the region. A higher value of $SocK_r$ means *lower* self-centeredness of workers. $X_{ijr}$ is a vector of worker (and workplace) characteristics that may influence the degree of delegation, including gender, age and its square (or years of work experience and its square, and years of tenure at the current employer and its square), years of education, literacy and numeracy skills (proficiency scores), health status, immigrant-related dummies (whether born abroad and the native language is foreign), occupation dummies, skills used at work (reading, writing, numeracy, and information and communication technology [ICT]), dummies for fulltime work and indefinite employment contract, size of the workplace, and public and non-profit organization sector dummies. $Z_{jc}$ denotes a vector of industry characteristics such as export and import ratios that represent the degree of market competition of the industry. $F_j$ and $F_c$ denote industry and country dummies. $\varepsilon_{ijr}$ is the error term. In some specifications, region dummies ($F_r$) are controlled for instead of $F_c$ and, in that case, $\beta_2$ is not identified. I also experiment with $IndCoord_j$ (instead of $IndCoord_{jc}$), which does not vary across countries, resulting in an inability to identify $\beta_1$. A more detailed description of variables appears in the next section and in Appendix Table A1.

All the estimations in this paper use the "*repest*" command in Stata (Avvisati and Keslair 2016), which is specially designed for the PIAAC and other datasets with complex survey designs. The *repest* command uses sampling weight to obtain a point estimate that represents the population, and standard errors are estimated using jackknife replicate weights. The command also deals with plausible values such as

literacy and numeracy proficiency scores.[8] I modify the original sampling weight that weighs countries according to their population size to the one that gives equal weight to (all survey participants in) each country.[9]

The model in the previous section leads to the following four predictions:

(i) $\beta_1 < 0$, that is, a higher need for coordination (*IndCoord*) is associated with a lower degree of decentralization (delegation to workers) in general.

(ii) $\beta_2 > 0$, that is, lower self-centeredness (i.e., higher *SocK*) is associated with a higher degree of decentralization in general.

(iii) $\beta_3 > 0$, that is, as the degree of self-centeredness decreases (i.e., as the *SocK* increases), the negative association between *IndCoord* and decentralization weakens.

(iv) In particular, when *IndCoord* is very low, the degree of decentralization is always high, regardless of *SocK*. Similarly, when *SocK* is very high (i.e., the degree of self-centeredness is very low), the degree of decentralization is always high, regardless of *IndCoord*.

# 4. Data

## 4.1 Main Data Sources and Sample Used

Individual-level data on the degree of decentralization and worker characteristics are taken from the Public Use Files (PUF) of the Programme for the International Assessment of Adult Competencies (PIAAC), conducted by the

[8] The number of replications is 80 without plausible values. When plausible values are used, the average estimator across 10 plausible values is reported and the imputation error is additionally added when estimating standard errors. For more details, see Avvisati and Keslair (2016) and Mohadjer *et al*. (2013).

[9] This treatment is appropriate when examining the effect of social capital because the variation in social capital is especially large between countries. If too much (little) weight is given to countries with large (small) populations, then the interesting variation in social capital is substantially lost.

Organisation for Economic Co-operation and Development (OECD) in 2011–2012.[10] During this period, PIAAC surveyed approximately 166,000 adults aged 16−65 years from 24 countries (OECD 2015b). PIAAC directly assesses adult skills in literacy, numeracy, and problem solving using ICT, surveys various skills used at work and home, and collects various background information, including demographic and job characteristics. Among 22 countries, for which the PUF are available, 14 countries that contain detailed (2-digit level based on ISIC Rev. 4) industry codes for worker's jobs and information on geographical regions are primarily analyzed in the regression analysis.[11] The number of regions in these countries amounts to at most 142 regions.[12]

Industry-level data on $IndCoord_{jc}$ and $Z_{jc}$ are constructed from the 2011 input−output table of each country taken from the OECD Input−Output Database (2015 edition) (OECD 2015a). As will be mentioned in the next subsection, an alternative $IndCoord_{j}$ is also constructed from the IPUMS American Community Survey (ACS) 2008−2012 5-year sample (Ruggles *et al*. 2015). Region-level social capital data is constructed from PIAAC as well as the World Values Survey and European Values Study data for the period 1989−2011 (WVS-EVS; World Values Survey Association 2015; European Values Study Foundation 2011). The following subsection details the data for industry's coordination needs and social capital.

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[10] I use the PUF for Round-1 countries released in March 2015. In addition, as for the German data, the German PIAAC Scientific Use File (Rammstedt *et al*. 2015), which contains more detailed variables, is used as a supplement.

[11] The 14 countries are Czech Republic, Denmark, France, Germany, Ireland, Japan, South Korea, Netherlands, Poland, Russia (excluding Moscow municipal area), Slovak Republic, Spain, Sweden, United Kingdom (UK, England, and Northern Ireland only). The remaining 8 countries (Austria, Canada, Estonia, Finland, Belgium [Flanders only], Italy, Norway, and the US) do not contain information on geographical regions, and the first four of them do not contain 2-digit level industry codes.

[12] Based on the sample in the column (1) of Table 6.1, when using *Trust1_piaac*. The corresponding number of regions is 103, when using *Trust1_wvs*. The unit of region is the OECD's Territorial level 2 (TL2), when using *SocK* constructed from PIAAC data. When *SocK* is constructed from WVS-EVS, some TL2 regions are aggregated to be matched with WVS-EVS's region codes.

To analyze the delegation to non-managerial and non-supervisory workers working at the lowest level of the firm's hierarchy, I restrict the sample to employees i) who are in paid employment (excluding self-employed), ii) whose occupation is *neither* armed forces, legislators, senior officials and managers, professionals, *nor* skilled agricultural and fishery workers;[13] and iii) who have no employees to supervise or manage, either directly or indirectly.

### 4.2 Construction of Key Variables

#### 4.2.1 *Decent*: Decentralization

I construct two decentralization indices. The first index, *Decent1*, is constructed from the four PIAAC questions that ask to what extent (based on the 5-point scale) the respondent can choose or change (i) the sequence of her tasks, (ii) how she does her work, (iii) the speed or rate of her work, and (iv) her working hours.[14] These four items are used by the PIAAC to construct the variable called TASKDISC and indicates the degree of task discretion. The second index, *Decent2*, is constructed from these four questions plus three additional PIAAC questions, that is, the 5-point scale frequencies of (v) planning the respondent's own activities, (vi) organizing her own time, and (vii) confronting complex problems that take at least 30 minutes to find a good solution.[15]

Because scaling may vary across questions, the answer to each question is first standardized to have zero mean and one standard deviation. Then, *Decent1* and *Decent2*

[13] That is, sample workers are restricted to those of the following occupation categories: technicians and associate professionals; clerks; service workers and shop and market sales workers; craft and related trades workers; plant and machine operators and assemblers; and elementary occupations.

[14] The answer to each question takes the value of 1 (not at all), 2 (very little), 3 (to some extent), 4 (to a high extent), or 5 (to a very high extent).

[15] The answers to those questions take the value of 1(never), 2 (less than once a month), 3 (less than once a week but at least once a month), 4 (at least once a week but not every day), or 5 (every day).

are constructed as the unweighted average across the corresponding four or seven standardized answers. This procedure is similar to that employed by Bloom and Van Reenen (2007), who constructed an aggregate management practice score from 18 five-point scale questions.[16] As shown in Appendix Table A2, all seven questions are positively correlated with one another and the aggregate indices, *Decent1* and *Decent2*, are highly positively correlated (the correlation coefficient is 0.894).

Figures 4.1 and 4.2 arrange country and industry, respectively, in descending order of *Decent1*.[17] In both decentralization indices, Northern European countries, Japan, and Austria tend to delegate larger authority to lower level workers, whereas Russia, the Slovak Republic, Italy, France, Spain, Ireland, and South Korea tend to delegate less authority. The US, UK, and Canada lie in the middle. In terms of industry, the degree of delegation tends to be higher in many service industries (e.g., real estate, computer services, finance, and renting of machinery) and lower in many manufacturing (e.g., textile and apparel, rubber and plastic, food, beverages and tobacco) and agriculture, hunting, forestry, and fishing industries.

### 4.2.2 *IndCoord*: Coordination Needs of Industries

I assume that an industry's need for coordination is higher when the industry has longer production chains, that is, it requires greater amounts of intermediate inputs or longer sequences of production stages to produce a final product.[18] For example, to produce a perfect-quality car and earn high-level profits, coordination between and within various divisions (research and development, design, marketing and sales,

[16] Similar aggregation technique is used in Bresnahan *et al*. (2002) who construct a decentralization measure of workplace.
[17] As Appendix Figures A1 and A2 show, similar tendencies are observed in terms of *Decent2*.
[18] As for firm-specific measures, existing studies use measures such as the size of inter-plant transfers within a firm (McElheran 2014), the number of other workplaces producing the same product (Meagher and Wait 2014), and dummies for a multi-plant firm and being a subcontractor (Colombo and Delmastro 2004).

material and parts procurement, and multiple plants) is essential. Each auto part needs to be of good quality and fit with other parts, and cost-effective (by utilizing economies of scale) at the same time. As suggested by the O-ring theory by Kremer (1993), the malfunction probability of a final product increases with the number of parts used. Thus, coordination becomes more important for the profit of firms using greater amounts of intermediate inputs. By contrast, in apparel manufacturing or financial service industries, less intermediate inputs or production stages are required, and thus, coordination activities are less intense and less important.

More precisely, as the primary measure for the industry's coordination needs ($IndCoord1_{jc}$), I use the column sum of the Leontief inverse coefficient of industry *j* in country *c* in 2011.[19] This index is used in Asuyama (2012, 2015) as a measure for the industry's length of production chains and in Fally (2012) as "the number of production stages embodied in each product." The data are taken from an input–output table, which is in the form of a 34 industry*34 industry matrix, for each country, constructed by the OECD (OECD 2015a). This $IndCoord1_{jc}$ measures the dollar amount of intermediate inputs that are directly or indirectly required to produce one dollar's worth of industry *j*'s output.

I also use an alternative measure $IndCoord2_j$, which is the industry-specific skill substitutability (or complementarity) index used in Bombardini *et al*. (2012). As they mention, higher skill complementarity means that poor performance at one task reduces the output more significantly and that teamwork is important. Thus, coordination is more crucial for profit in industries with higher skill complementarity. As $IndCoord2_j$, the ranking of industries, based on residual wage dispersion

[19] $IndCoord1_{jc} = \sum_k leon_{kjc}$, where $leon_{kjc}$ is the (*k*, *j*)th entry of the Leontief inverse coefficient matrix, *L*. $L = (I - A)^{-1}$, where *I* is the identity matrix and *A* is the input coefficient matrix whose (*k*, *j*)th entry is $a_{kj}$, which is the amount of input sourced from industry *k* directly used to produce one dollar's worth of industry *j*'s output.

(measured in terms of standard deviation), which is computed from the IPUMS American Community Survey (ACS) 2008−2012 5-year sample, is used following Bombardini *et al*. (2012).[20] Higher residual wage dispersion (i.e., lower residual wage dispersion ranking) stands for lower complementarity and thus lower need for coordination of the industry. As Bombardini *et al*. (2012) explain, marginal product of, and thus wage return to, unobserved skill is higher in industries with lower skill complementarity. Thus, the residual wage dispersion after purging the effect of individual characteristics (such as education, age, gender, and race) becomes greater as the industry's skill complementarity becomes lower. More details on the construction of $IndCoord2_j$ are provided in Appendix A.

$IndCoord2_j$ has an advantage over $IndCoord1_{jc}$ in that more detailed industry classifications are available (71 industries compared with 34 industries in the case of $IndCoord1_{jc}$ ).[21] The disadvantage of $IndCoord2_j$ is that it loses cross-country variation. Figure 4.3 plots $IndCoord1_{jc}$ and $IndCoord2_j$ constructed based on the same 34 industries as $IndCoord1_{jc}$. This shows that both indices are highly positively correlated (the correlation coefficient is 0.548 and significant at 1% level), reinforcing the validity of using both indices as the measure for industry's coordination needs.

Table 4.1 arranges 34 industries in ascending order of $IndCoord1_{jc}$ averaged across countries. It also reports the 34-industry-based $IndCoord2_j$.[22] This reveals that manufacturing industries are characterized by a greater need for coordination compared with service industries. In terms of $IndCoord2_j$, several service industries (e.g., post

[20] Similar to Bombardini *et al*. (2012), I also experiment with the 95-5 interpercentile range (instead of standard deviation) as the wage dispersion measure, and obtain similar estimation results because both measures are highly correlated.

[21] Seventy-one industries are created by matching the 2-digit ISIC Rev. 4 industry code in PIAAC and the INDNAICS code in ACS.

[22] $IndCoord2_j$ based on 71-industry classification is reported in Appendix Table A3.

and telecommunications; electricity, gas and water supply; education; transport and storage; and computer-related services) record a higher need for coordination than manufacturing industries (e.g., other manufacturing; pulp and paper; food, beverage and tobacco; textile, apparel and leather; and computer, electronic, and optical equipment).

Higher coordination needs in many manufacturing industries compared with service industries are consistent with intuition, considering the nature of producing a manufactured good, which generally requires more sequential production stages. For example, a delay in parts production in the previous stages results in more idling time (lower productivity) of workers in the later production stages. Thus, coordination between sequential production stages is essential. By contrast, in case of services, such as selling a financial product, the sales talk of each worker is usually not sequential, but rather simultaneous and does not affect the productivity of other workers in general, although certain processes (e.g., R&D and marketing before selling products) are sequential, similar to manufacturing.

### 4.2.3 *SocK*: Social Capital Standing for Workers' Self-Centeredness

Table 4.2 lists the social capital variables used in the regression analysis. They are constructed from either PIAAC or the World Values Survey and European Values Study data (WVS-EVS). All social capital values are region-average figures for non-managerial workers.[23] The use of WVS-EVS data can mitigate a possible simultaneity bias arising from constructing both *Decent* and *SocK* from the same PIAAC data. WVS-EVS is an international survey whose main focus is to collect people's various values/attitudes toward family, work, gender, religion, politics, society,

[23] When using PIAAC, samples are non-managerial and non-supervisory workers who are working at the lowest level of the firm's hierarchy and thus the same as the regression sample. When using WVS-EVS, samples are based on workers, not self-employed, and having an occupation of either non-manual office worker, foreman and supervisor, or manual worker. For both PIAAC and WVS-EVS data, regions that have less than 30 observations to calculate the region-average social capital are excluded from the sample.

and so on. Similarly to Bloom *et al*. (2012), I combine multiple survey waves (between 1989 and 2011) and calculate a simple average *SocK* for each region over all available years to increase the sample size.[24] This strategy is reasonable given the long-lasting nature of people's values (Bisin and Verdier 2011).

I use six social capital variables (Table 4.2): three trust-related variables (T*rust1_piaac*, *Trust1_wvs*, *Trust2_piaac*);[25] two altruism-related variables, which are measured by the participation in voluntary work (*Vol_piaac*, *Vol_wvs*); and attitude on wealth accumulation (*Wealth_wvs*). These variables are chosen because they are considered to serve as proxies for the level of self-centeredness of the average worker in the region and also because they cover a sufficient number of countries and observations to calculate the region-level figure. Note that higher social capital means lower self-centeredness.

Similar to the argument by Bloom *et al*. (2012), trust (in particular, T*rust1_piaac*, *Trust1_wvs*) captures the belief of workers in the region that other workers do not do "wrong" actions (e.g., rent-seeking behaviors). Then, higher level of trust indicates the lower possibility of rent-seeking behaviors, i.e., the more aligned interests between the HQ and workers (= lower $\lambda$ in the model in Section 2).

Alternative reasoning is possible in particular for *Trust2_piaac.* Consider a society in which people think that if they are not careful, others will take advantage of them. In such a society, it is likely that workers become self-centered; that is, put less weight on others' performances (large $\lambda$). This is because caring about others'

[24] To reduce the difference in timing of measuring social capital across regions, the first-wave surveys (1981−1984) are excluded. In addition, since data on decentralization was collected in 2011−2012, part of the sixth-wave surveys (2010−2014) that were conducted before 2012 is also excluded.

[25] *Trust1_wvs* is the most popular trust variable used in literature that examines the effect of trust on economic outcome (Bloom *et al*. 2012; Algan and Cahuc 2014; Cingano and Pinotti 2016). WVS-EVS also contains a similar question as *Trust2_piaac*, which is not used because of limited country-coverage.

performances leads to more communication, but it is believed that the shared information is likely to be exploited by others and harms the worker.

It is rather straightforward that the level of altruism (measured by the degree of voluntary activities) proxies the degree of self-centeredness. The more altruistic workers are, the more they care about others' activities and are eager to help others to perform better.

Finally, *Wealth_wvs* measures how workers place their views on a 10-point scale ranging from 1 (people can only get rich at the expense of others) to 10 (wealth can grow, so there's enough for everyone). The lower *Wealth_wvs*, the more difficult it is for the workers to care about others' performance, which is believed to result in higher rewards to others at their own expense. For this reason, *Wealth_wvs* is considered to proxy the degree of self-centeredness of workers.

Appendix Table A4 displays the correlations among the six social capital variables. All pairwise correlations are positive. The three trust-related variables are highly and positively correlated. Next, Table 4.3 arranges countries in ascending order of the average level of each social capital variable. It shows that former communist countries and France tend to score low, while Northern European countries and Canada tend to score high.

Finally, summary statistics of all the dependent and independent variables based on regression samples are reported in the Appendix Table A1.

## 5. Results I: Benefits of Decentralization

Before examining the effects of an industry's need for coordination and workers' self-centeredness on decentralization, this section briefly examines whether some of the benefits of decentralization mentioned in the Introduction are actually observed in PIAAC data. Using the non-managerial and non-supervisory workers'

sample taken from PIAAC, a variable representing the potential benefit of decentralization (*Benefit*) is regressed on the degree of decentralization (*Decent*) and other control variables, similar to those in equation (3.1).[26]

As mentioned in the Introduction, greater decentralization is expected to accompany productivity improvement owing to the increased job satisfaction/motivation of workers. This benefit is captured by worker's job satisfaction (*Satisfied*) and hourly wage (*Wage*). I assume that a worker's hourly wages proxy their productivity after controlling for region-specific wage-setting institutions by region dummies. Through a laboratory experiment, Bartling *et al*. (2012) find that offering higher discretion to a worker results in higher productivity and profits, provided she receives higher wages. Then, the expected positive association between wages and delegation may not be causal, but is likely to indicate higher productivity.

Delegation to workers is also expected to increase the demand for skills because the return to delegation is higher when workers have higher ability to manage their delegated tasks (Bloom and Van Reenen 2011: 1755). Then, decentralized firms would provide more training to their workers (*Train*), bear a larger amount of its costs (*Train_wh*, *Train_cost*), and demand more educated and experienced workers (*Edu_demand*, *Edu_higherD*, *Exp_demand*). Skill upgrading of workers also may not be necessarily causal, but a complement to decentralization in the sense that simultaneously introducing both would be profitable to firms.

The details and summary statistics of the eight *Benefit* variables are displayed in Table 5.1. Table 5.2 reports the estimated coefficients of *Decent* obtained in the *Benefit* regressions. The estimation method depends on the type of *Benefit* variables: least squares for *Wage*, probit for *Train*, and ordered probit for other *Benefit* variables. The degree of decentralization to workers are positively and statistically significantly

[26] As for the control variables, see the notes of Table 5.2.

associated with all the *Benefit* variables, except *Train_cost*, even after controlling for various individual characteristics including multiple dimensions of skills (e.g., education, age [or experience and tenure], literacy and numeracy proficiency scores) and dummies for industry and country (or region in *Wage* regression).[27] The obtained results are consistent with the hypothesis that more delegation to non-managerial and non-supervisory workers leads to (or is a complement to) higher job satisfaction and wages that proxy higher productivity, and skill upgrading through training and hiring.

## 6. Results II: Determinants of Decentralization

### 6.1 Need for Coordination and Self-centeredness: Baseline Results

Despite the benefits of decentralization, delegation to workers would be limited if the costs of delegation (misaligned interests owing to self-centeredness of workers and coordination failure) is sufficiently large. Thus, this section examines the effects of the self-centeredness of workers and industry's need for coordination on the degree of delegation to workers.

First, Figure 6.1 plots *Decent1* and *IndCoord1* (both of which are weighted averages of country×industry cell) by the level of country-average *Trust1_piaac*. The left and right plots are based on (nine) countries with low and high average *Trust1_piaac*, respectively. The similar plots based on other *SocK* variables are displayed in the Appendix Figure A3. As expected, regardless of the *SocK* variables, the degree of delegation is negatively associated with both self-centeredness of workers and industry's need for coordination. Although not displayed, a similar tendency is observed for *Decent2*.

[27] The positive associations of job satisfaction and wages with delegation to non-managerial workers are consistent with Appelbaum *et al*. (2000) who find similar correlations by using worker survey data in three US manufacturing industries.

Figure 6.1 does not control for the effects of individual, workplace, industry, or location characteristics on decentralization. As a next step, Table 6.1 reports the estimation results for equation (3.1) in the case of using *IndCoord1*, which controls for these various characteristics. It only reports the estimated coefficients on *IndCoord1*, *SocK*, and *IndCoord1*SocK*. All specifications control for industry dummies. Columns (1)−(3) control for country dummies and column (4) controls for region dummies, and thus, the coefficient on region-specific *SocK* is not identified. As for the difference in other control variables and their estimated coefficients, see the notes of Table 6.1 and Table 6.2.

Table 6.1 shows that, regardless of *SocK* and *Decent* variables and specifications, the coefficient on *IndCoord1* is always significantly negative, indicating that a greater need for coordination is associated with less delegation to workers. The coefficient on *SocK* tends to be positive in column (1). However, it turns out to be either insignificant or negative after adding the interaction term *IndCoord1*SocK* (columns 2−4). The coefficient on *IndCoord1*SocK* is always significantly positive, implying that, as the degree of self-centeredness decreases (i.e., as the *SocK* increases), the negative impact of the need for coordination on decentralization is mitigated. The size of coefficients is similar regardless of whether country or region dummies are controlled for and whether *Decent1* or *Decent2* is used as the dependent variable.

These results are mostly consistent with the predictions presented in Section 3. At first sight, the insignificant or negative coefficients on *SocK* in columns (2)−(4) seem at odds. However, the minimum value for *IndCoord1* is not zero, but one. Furthermore, the null hypothesis, $\hat{\beta}_2 + \hat{\beta}_3 = 0$ (where $\hat{\beta}_2$ and $\hat{\beta}_3$ are coefficients of *SocK* and *IndCoord1*SocK*, respectively) is not rejected, even at a 10% significance level, except in one case (column (3) when using *Decent2* and *Trust2_piaac*). Consequently, the estimation results are actually consistent with all predictions (i)−(iv) in Section 3, as

Figure 6.2 illustrates.[28] Using the estimated coefficients in column (3) of Table 6.1, Figure 6.2 plots predicted *Decent1* ($\widehat{Decent}1$) and *IndCoord1*, separately by the minimum, mean, and maximum values of *SocK* in the regression sample. $\widehat{Decent}1$ is predicted based solely on *IndCoord1* and *SocK* (= $\hat{\beta}_1 IndCoord1 + \hat{\beta}_2 SocK + \hat{\beta}_3 IndCoord1 * SocK$). Similar pictures are observed when plotting predicted values of *Decent2*. These graphs generally confirm the predictions: (i) higher need for coordination is negatively associated with decentralization in general; (ii) lower self-centeredness (i.e., higher *SocK*) is positively associated with decentralization in general; (iii) the negative association between coordination needs and decentralization is mitigated as the level of self-centeredness becomes lower; and (iv) when coordination needs are very low, the degree of decentralization is almost the same, regardless of the level of self-centeredness. Note that if we set $\hat{\beta}_2 + \hat{\beta}_3 = 0$, then all three lines start from the same level of *Decent1* when *IndCoord1* = 1.0. Furthermore, when the level of self-centeredness is very low, the degree of delegation does not depend on the coordination needs. This can be seen from the nearly flat graph line of *Decent1* when the maximum *SocK* is used, except the case using *Vol_piaac*.

### 6.2 Other Determinants of Decentralization

Table 6.2 reports the estimation results for columns (3) and (4) in Table 6.1 including other control variables and using *Decent1* as the dependent variable. As mentioned in the Introduction, assessing the associations between individual characteristics and delegation is one of the unique features of this paper.

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[28] When *IndCoord1* is one (very low) and $\hat{\beta}_2 + \hat{\beta}_3 = 0$, the degree of decentralization is not associated with the level of *SocK* as expected in prediction (iv). However, as *IndCoord1* becomes higher, the coefficient on *SocK*, that is, $(\hat{\beta}_2 + \hat{\beta}_3 IndCoord1)$, departs from zero and becomes larger. In other words, *SocK* is positively associated with decentralization when *IndCoord1* is not very low.

Individual (and partly workplace) characteristics that are positively and significantly associated with the degree of delegation are: years of experience, years of education, health status, frequency of skill use in the workplace in terms of ICT, reading, writing, and numeracy skills, having an indefinite employment contract, and working in a non-profit organization (compared with a private organization). By contrast, being a female, born abroad, speaking a foreign native language, working as either a clerk, service/sales worker, craft worker, or operator/assembler (compared with elementary occupation), working fulltime (i.e., working more than 30 hours per week), working in a larger-size establishment, in a workplace that belongs to a larger firm, in the public sector, are negatively associated with delegation. Similar tendencies are found when using *Decent2* (Appendix Table A5). In the case of *Decent2*, however, age, tenure, and numeracy skills are also positively associated with the degree of delegation in most specifications while the coefficients on craft occupation and fulltime dummy are not statistically significant.

Positive associations between worker's skill (education, experience, tenure, numeracy skill, and frequency of skill use) and decentralization are consistent with firm- or establishment-level studies, such as Bloom *et al.* (2012) and Bresnahan *et al*. (2002). The positive coefficient on ICT skill use in the workplace is also consistent with findings in previous studies (Bresnahan *et al*. 2002; Colombo and Delmastro 2004; McElheran 2014).

Compared with these results, more delegation to workers with elementary occupations, and less delegation to those working fulltime, belonging to a larger establishment or firm initially seems surprising. However, it is less surprising if workers with elementary occupations enjoy greater autonomy over their own work, given that these occupations include cleaners; laborers in mining, construction, manufacturing, and transport; street vendors; and so on. It is also natural that part-time workers have more flexibility over working hours and the way they work. Finally, as for the

establishment/firm size, most studies find that it is positively associated with decentralization (Colombo and Delmastro 2004; Bloom *et al*. 2012; Graham *et al*. 2015; Cingano and Pinotti 2016), although a few studies find an insignificant or negative association (McElheran 2014; Meagher and Wait 2014). The current paper differs from these past studies in that I examine the delegation to workers at the lowest level of organization, whereas past studies mostly examine delegation to managers. The number of hierarchic levels between HQ and managers is almost identical, regardless of organization size, whereas that between HQ and workers at the lowest level increases with organization size. Thus, it is natural that, in a smaller organization, where the number of hierarchic levels is also smaller, the lowest-level workers are required to share greater authority.

As for the industry characteristics, working in industries with higher export ratios is negatively associated with delegation, whereas the coefficient on import ratio is mostly insignificant (Table 6.2, Appendix Table A5).[29] These results are different from several empirical studies that find positive association between product market competition and decentralization (Bloom *et al*. 2010; Guadalupe and Wulf 2010; Meagher and Wait 2014), although the results on the effect of import competition are mixed in these studies too. From a theoretical point of view, negative association between competition and decentralization is possible (Alonso *et al*. 2015): Competition could favor centralization if the principal has better knowledge about *other* markets (e.g., global markets) than the agent and thus holds an advantage in *coordinating adaptation* to multiple markets (Alonso *et al*. 2015).

### 6.3 Additional Results on Need for Coordination and Self-centeredness

I also estimate equation (3.1) using the 71-industry-based *IndCoord2* instead of

[29] It should be noted that the effects of industry characteristics that are common across countries are absorbed by the industry dummies.

the 34-industry based *IndCoord1*. The estimation results are reported in Table 6.3. The column numbers (2−4) indicate that the specification is the same as the corresponding column number in Table 6.1, except that the *IndCoord2* coefficient is unidentified and that export and import ratios of the industry are not controlled, owing to data unavailability. *IndCoord2* is industry-specific and common across countries, and thus, industry dummies absorb its effect. The results are mostly similar to those when using *IndCoord1*. The coefficient of *SocK* is mostly insignificant and that of *IndCoord2*SocK* is always significantly positive.

The analysis so far mitigates the possible endogeneity bias by controlling for various individual and workplace characteristics, including multiple ability-related measures and industry-specific and country/region-specific factors. It is also reasonable to consider the industry-level need for coordination (in particular, *IndCoord2*, which is taken from US data) exogenous for the firm's HQ that chooses the optimal degree of delegation. Region-level social capital (in particular, the one taken from the different source [WVS-EVS]), which is likely to be slow changing, is also considered almost exogenous for the firm. However, reverse causality from decentralization to social capital might still be possible. For example, Appelbaum *et al*. (2000, Chapter 9) argue that workers' greater opportunity to participate in decision making leads to their higher trust of managers.

To deal with such potential reverse causality, *SocK* is instrumented with the country-specific ethnic segregation index (*Segregation*) constructed by Alesina and Zhuravskaya (2011).[30] Alesina and Zhuravskaya (2011) find that more segregated

[30] More precisely, *SocK* is instrumented with [1-*Segregation*] to generate positive association between *SocK* and *Segregation*, because *Segregation* ranges from 0 to 1 and becomes larger when the country is more segregated. Alesina and Zhuravskaya (2011) also construct linguistic and religious segregation indices, but these are not used due to their limited country coverage. It should be noted that, among countries included in the estimation sample in Tables 6.1−6.3, ethnic segregation index is not available for Poland.

countries, where ethnic groups live more spatially separately, have lower levels of trust. Then, the decentralization measure is regressed on *IndCoord2*SocK*, industry and region dummies, and other control variables (Control 1' or Control 3' in Table 6.3) by the two-stage least squares (2SLS) method. The results are reported in Table 6.4. Note that, owing to the inclusion of industry and region dummies, $\hat{\beta}_1$ and $\hat{\beta}_2$ are not identified. First, the instrument (*IndCoord2*[1-Segregation]*) is strongly correlated with *IndCoord2*SocK* in all specifications, except when using *Trust1_piaac* as *SocK*. This is shown by the *F* statistic in the first stage regression, which is substantially larger than 10 (the rule of thumb by Staiger and Stock [1997]) or 16.38 (Stock and Yogo [2005]'s critical values with the 10% maximal size of Wald test) in all specifications except the *Trust1_piaac* case. Next, the results of the endogeneity test show that the null hypothesis that *SocK* is exogenous is not rejected in all specifications at 5% (or 1% in most cases) significance level. These results indicate that the results obtained in Tables 6.1, 6.2, and 6.3 are robust.

## 7. Conclusion

Despite the various benefits of delegation to workers, the actual degree of delegation substantially varies across countries/regions and industries. As an important reason for such variation, this paper focuses on the differences in two types of delegation costs: (1) region-specific social capital that proxies workers' degree of self-centeredness and (2) industry-specific need for coordination. Based on the theoretical framework by Alonso *et al*. (2008), I have empirically examined the effect of these two cost measures on the degree of delegation to non-managerial and non-supervisory workers utilizing worker-level PIAAC data from 14 countries.

The empirical results of this study have confirmed the theoretical predictions by Alonso *et al*. (2008) for the first time: The negative association between coordination

needs and decentralization is mitigated in regions with lower self-centeredness of workers. In particular, when self-centeredness of workers (respectively, coordination need) is very low, the degree of delegation is very high and generally does not depend on the level of coordination needs (self-centeredness of workers). These results are robust to alternative indices for delegation, an industry's coordination needs, and self-centeredness of workers. The possibility of endogeneity bias is minimized by controlling for various individual and workplace characteristics, and industry and country/region dummies, by constructing social capital and coordination needs indices from other sources, and by conducting endogeneity tests for social capital variables.

I also have found that delegation is positively associated with its potential benefits, such as higher job satisfaction, higher wages (proxy for higher productivity), more training, and increased demand for skills. These benefits are beneficial not only for firms, but also for the welfare of workers and a country's economic development. The identified positive associations are consistent with the theoretical predictions that delegation brings such effects. My empirical results are not necessarily causal and may partly reflect the complementarities among decentralization and these "benefits." However, even in the complementary case, it is highly likely that social capital and coordination needs affect firms' joint decisions on the levels of delegation, wages, and skill upgrading.

This study has important implications for the economic development patterns of regions or countries. As summarized above, this study has shown that the degree of delegation to workers becomes high in regions in which workers' self-centeredness is low, even when the industry's coordination needs are extremely high. These industries requiring greater coordination are those that need to combine greater amounts of intermediate inputs (or require a greater number of production stages) and substantially suffer from a poor performance in production processes. Many manufacturing industries, in particular, transport equipment, basic metals, and various machinery manufacturing,

fall into this type. These tendencies are generally observed, regardless of country.[31] Then, the results of this paper imply that non-managerial and non-supervisory workers in these manufacturing industries are delegated more authority, are more satisfied, receive higher wages and more training, and achieve higher productivity in regions/countries in which self-centeredness of workers is lower. Thus, by changing the level of delegation and its "benefits," social capital representing self-centeredness may affect not only economic growth, but also the comparative advantage of regions or countries. In addition, higher wages and higher skill demand for non-managerial and non-supervisory positions may lead to less inequality in terms of both income and skill.

These possible links between social capital, delegation, and comparative advantage and inequalities of regions/countries are interesting areas for future empirical investigation. Examining whether greater delegation in the case of very low self-centeredness and very high coordination needs are actually due to improved horizontal communication and coordination among workers as modeled by Alonso *et al*. (2008) is also left for future research, as data for horizontal and vertical communication were not available for this study.

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[31] The level of coordination needs for each industry is highly correlated among various countries: The unweighted average of pairwise correlation coefficients among *IndCoord1* over 18 countries is 0.834.

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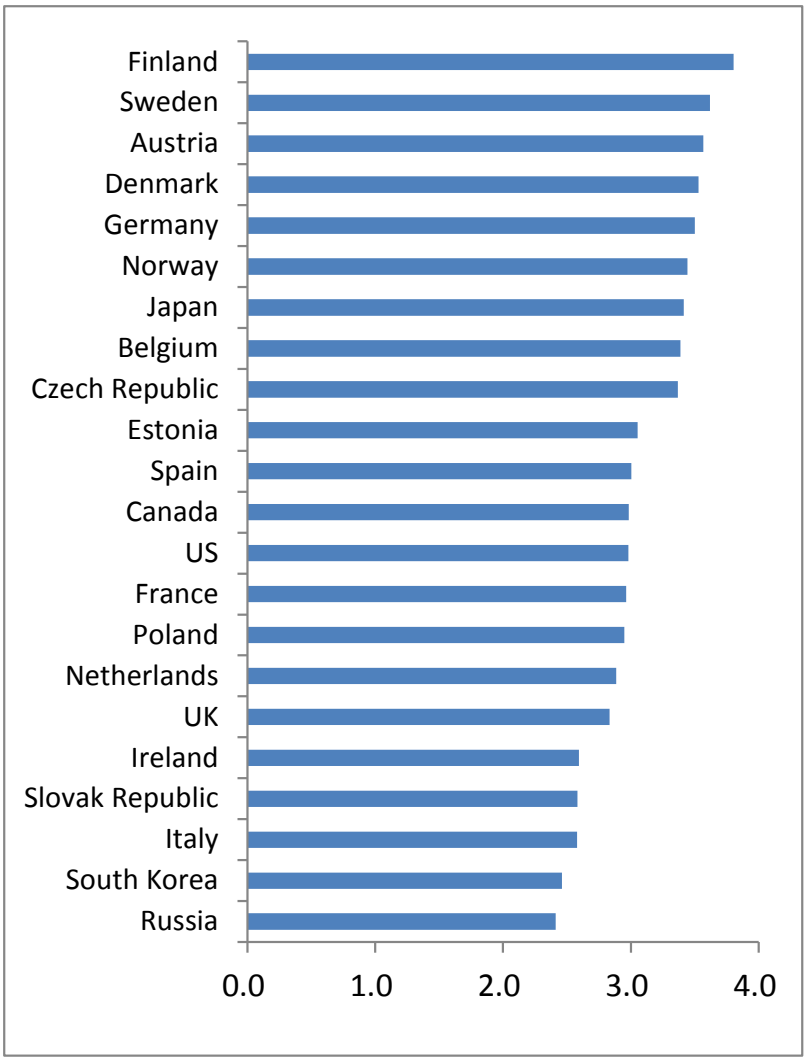
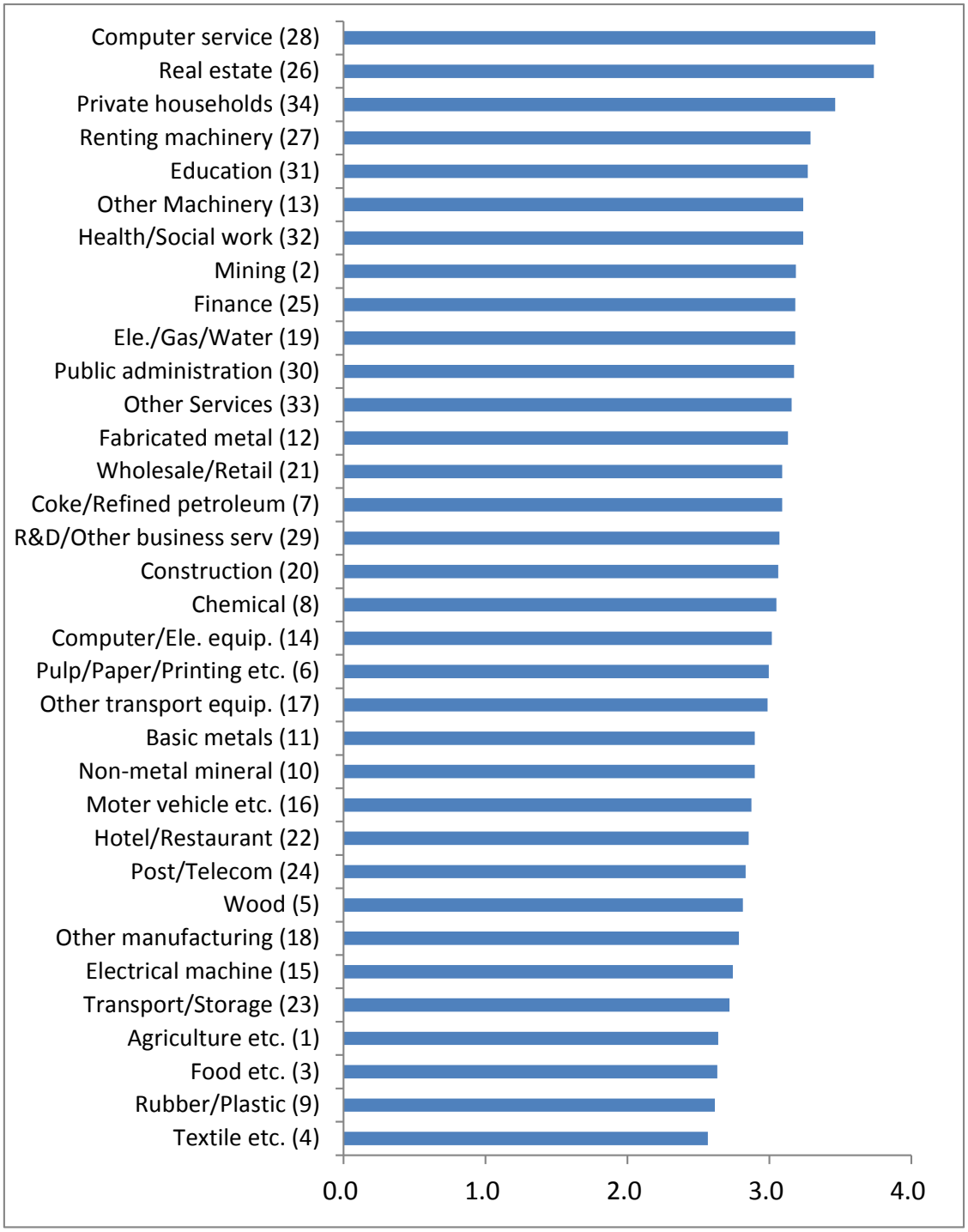
Figure 1.1. Average Scores for Countries' Degree of Worker Discretion on the Way of Work



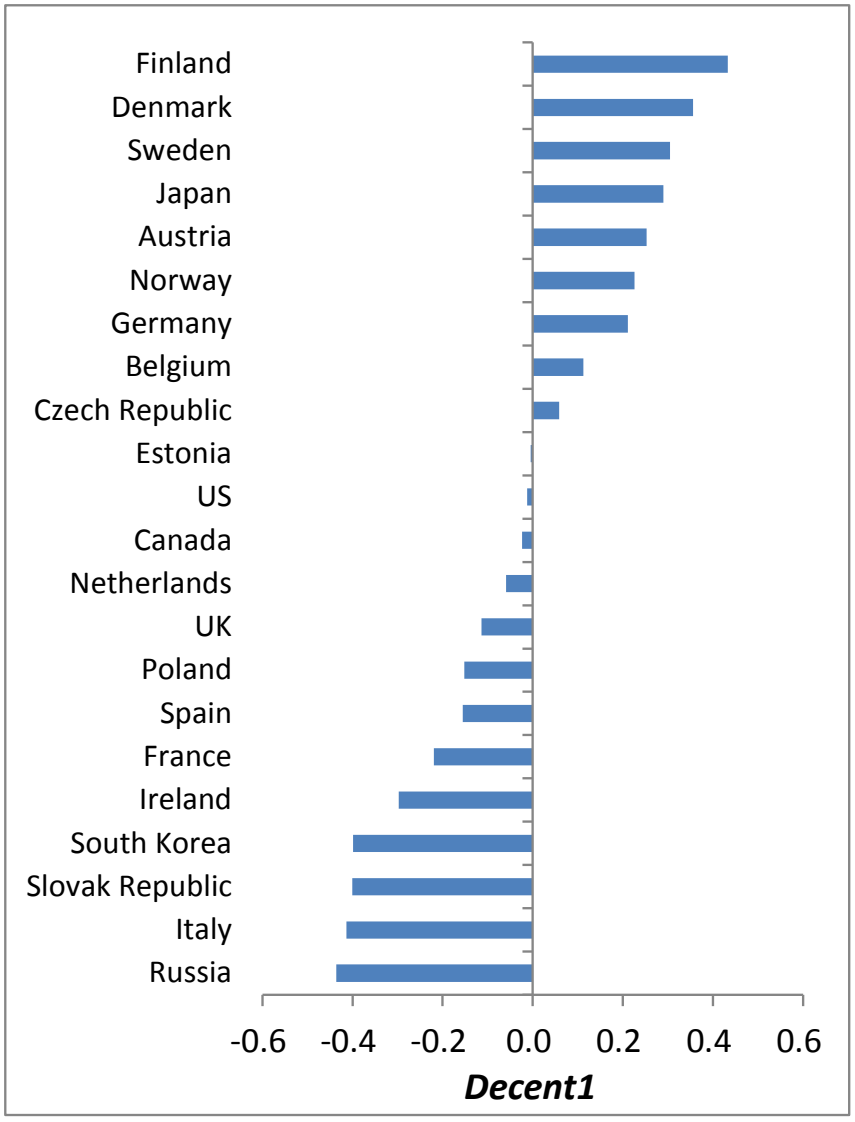

*Notes*: The scores are the country-average, computed from the PIAAC's question that asks to what extent (5-point scale) the respondent can choose or change how she does her work: 1 = not at all; 2 = very little; 3 = to some extent; 4 = to a high extent; and 5 = to a very high extent. PIAAC's sampling weight is used to calculate the average. The sample workers are non-managerial and non-supervisory workers who are examined throughout this paper. They are paid employees (excluding self-employed) and neither skilled agricultural/fishery workers nor military personnel, and have no employees to supervise or manage either directly or indirectly.
*Source*: Public Use Files (PUF) of the Programme for the International Assessment of Adult Competencies (PIAAC), generated by OECD.

Figure 1.2. Average Scores of Industries' Degree of Worker Discretion on the Way of Work



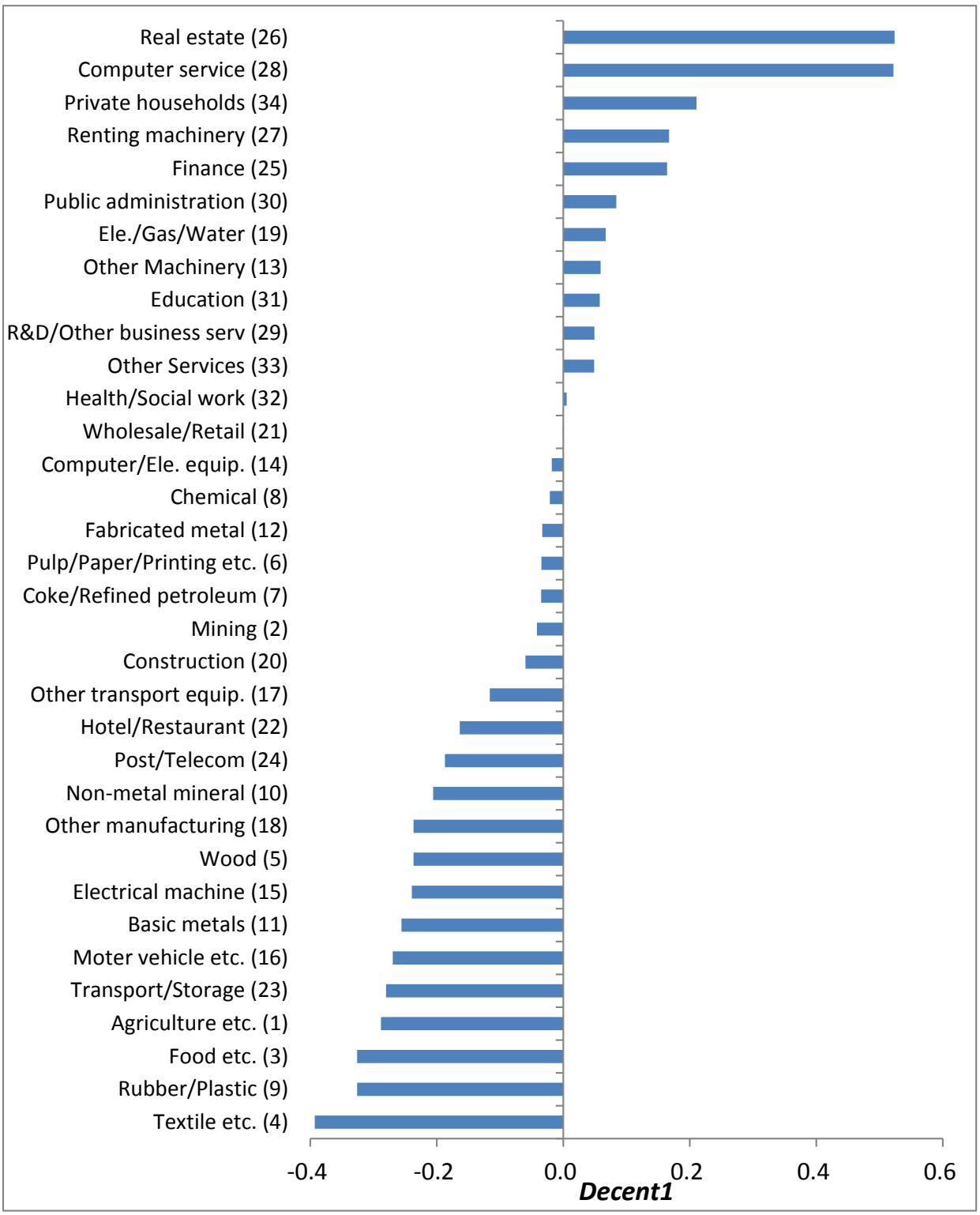

*Notes:* See Figure 1.1. Industry average is computed based on non-managerial and non-supervisory workers in all countries where the 2-digit level industry code based on ISIC Rev. 4 are available. Industry code number is in parentheses. For industry classification, see Appendix Table 1.
*Source*: See Figure 1.1.

Figure 4.1. Average Scores of Countries' Decentralization Index: *Decent1*



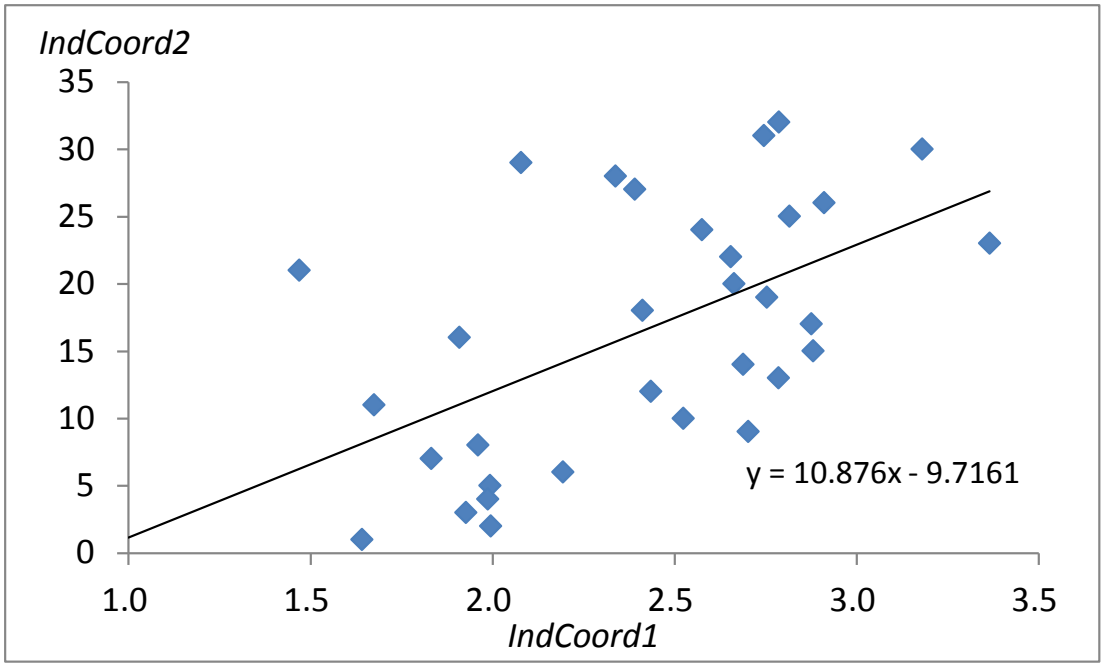

*Note*: For the definition of *Decent1*, see Section 4.2.1.

Figure 4.2. Average Score of Industries' Decentralization Index: *Decent1*



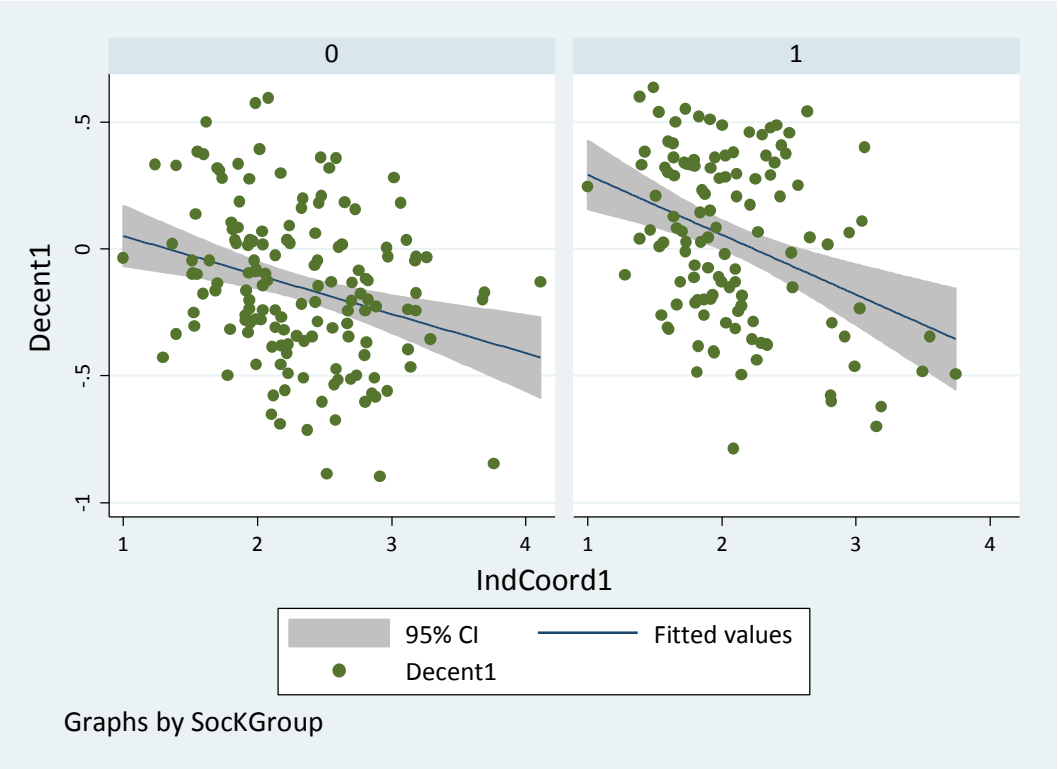

*Notes*: For the definition of *Decent1*, see Section 4.2.1. Industry code number is in parentheses. For industry classification, see Appendix Table 1.

Figure 4.3. Correlation between *IndCood1* and *IndCoord2*



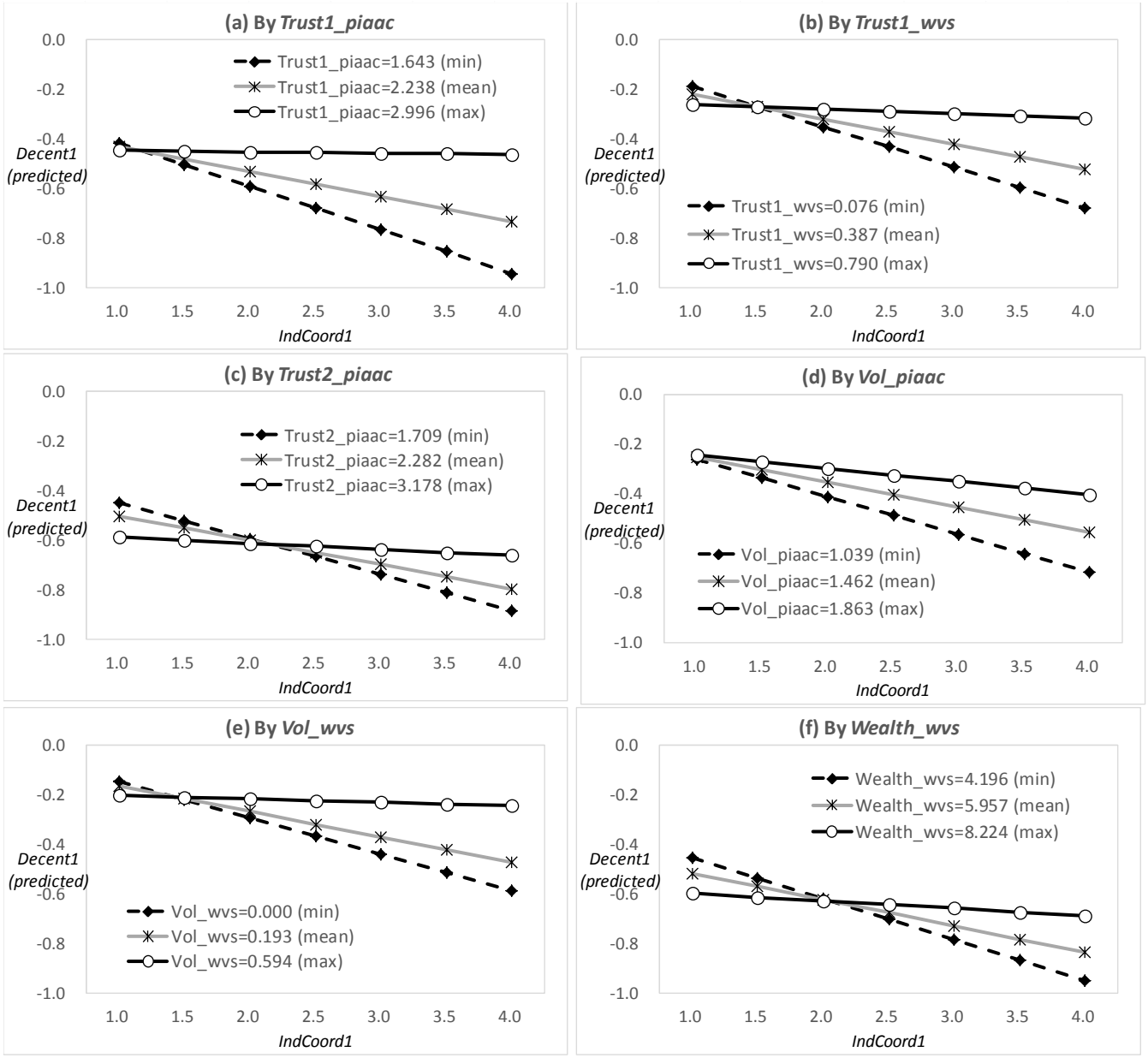

*Note*: For the definitions of *IndCoord1* and *IndCoord2* (which is based on 34 industries), see Section 4.2.2.

Figure 6.1. Decentralization (*Decent1*) and Need for Coordination (*IndCoord1*) by Level of Workers' Self-centeredness (*Trust1_piaac*)




*Notes*: Each data point plots the weighted average *Decent1* and *IndCoord1* of the cell defined by country and industry (PIAAC's sampling weight is used). Cells with fewer than 30 observations are excluded from the sample. The left and right plots are based on nine countries with low and high average *Trust1_piaac*, (i.e., high and low average self-centeredness of workers, respectively). The countries with low (respectively, high) *Trust1_piaac* include the top (bottom) nine countries (among non-italic countries that have *IndCoord1* data) in the column "*Trust1_piaac*" in Table 4.3. For the definition of variables, see Section 4.2.

Figure 6.2. Predicted *Decent1* and *IndCoord1* by Level of *SocK*




*Notes*: The above graphs plot *Decent1* that is predicted based solely on *IndCoord1* and *SocK* (= $\hat{\beta}_1 IndCoord1 + \hat{\beta}_2 SocK + \hat{\beta}_3 IndCoord1 * SocK$ ) and *IndCoord1* separately by the minimum, mean, and maximum values of *SocK* in the regression sample. The minimum and maximum of *IndCoord1* in the regression sample are 1.000 and 4.111, respectively. $\hat{\beta}_1$, $\hat{\beta}_2$, $\hat{\beta}_3$ are taken from column (3) of Table 6.1. For the definitions of variables, see Section 4.2.

Table 4.1. Industry Need for Coordination: Sorted by *IndCoord1*

| Code | Sector | Industry Description | *IndCoord1* | *IndCoord2* |
|---|---|---|---|---|
| 34 | S | Private households with employed persons | 1.000 | NA |
| 31 | S | Education | 1.469 | 21 |
| 26 | S | Real estate | 1.641 | 1 |
| 32 | S | Health and social work | 1.675 | 11 |
| 30 | S | Public administration and defence, compulsory social security | 1.707 | NA |
| 25 | S | Financial intermediation | 1.832 | 7 |
| 28 | S | Computer and related services | 1.908 | 16 |
| 29 | S | R&D and other business services | 1.926 | 3 |
| 2 | P | Mining and quarrying | 1.960 | 8 |
| 27 | S | Renting of machinery and equipment | 1.986 | 4 |
| 21 | S | Wholesale and retail trade, repair services | 1.993 | 5 |
| 33 | S | Other community, social and personal services | 1.995 | 2 |
| 24 | S | Post and telecommunications | 2.078 | 29 |
| 22 | S | Hotels and restaurants | 2.193 | 6 |
| 1 | P | Agriculture, hunting, forestry and fishing | 2.337 | 28 |
| 19 | (S) | Electricity, gas and water supply | 2.391 | 27 |
| 23 | S | Transport and storage | 2.412 | 18 |
| 20 | (S) | Construction | 2.435 | 12 |
| 6 | M | Pulp, paper, paper products, printing and publishing | 2.524 | 10 |
| 10 | M | Other non-metallic mineral products | 2.575 | 24 |
| 12 | M | Fabricated metal products | 2.655 | 22 |
| 5 | M | Wood and products of wood and cork | 2.663 | 20 |
| 4 | M | Textiles, textile products, leather and footwear | 2.688 | 14 |
| 18 | M | Manufacturing nec, recycling | 2.702 | 9 |
| 13 | M | Machinery and equipment, nec | 2.745 | 31 |
| 8 | M | Chemicals and chemical products | 2.753 | 19 |
| 3 | M | Food products, beverages and tobacco | 2.786 | 13 |
| 17 | M | Other transport equipment | 2.786 | 32 |
| 9 | M | Rubber and plastics products | 2.815 | 25 |
| 7 | M | Coke, refined petroleum products and nuclear fuel | 2.876 | 17 |
| 14 | M | Computer, Electronic and optical equipment | 2.880 | 15 |
| 15 | M | Electrical machinery and apparatus, nec | 2.911 | 26 |
| 11 | M | Basic metals | 3.180 | 30 |
| 16 | M | Motor vehicles, trailers and semi-trailers | 3.365 | 23 |

*Notes*: Figures are weighted average scores across 18 countries with 2-digit level industry codes (ISIC Rev. 4). For the definitions of *IndCoord1* and *IndCoord2* (based on 34 industries), see Section 4.2.2. P, M, and S in the column "Sector" denote primary, manufacturing, and service sectors, respectively. Electricity, gas, and water supply and construction are generally included in the "Industry" sector, but can be broadly interpreted as service sector.

Table 4.2. Description of Social Capital (Workers' Self-centeredness) Variables

| Variable | Source | Question | Description |
|---|---|---|---|
| ***Trust1_piaac*** | PIAAC | I_Q07a | *There are only a few people you can trust completely.*<br>(5-point scale: 1 = strongly agree−5 = strongly disagree) |
| ***Trust1_wvs*** | WVS-EVS (2-6 waves) | A165 | *Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?*<br>(0 = need to be very careful, 1 = most people can be trusted) |
| ***Trust2_piaac*** | PIAAC | I_Q07b | *If you are not careful, other people will take advantage of you.*<br>(5-point scale: 1 = strongly agree−5 = strongly disagree) |
| ***Vol_piaac*** | PIAAC | I_Q05f | *In the last 12 months, how often, if at all, did you do voluntary work, including unpaid work for a charity, political party, trade union or other non-profit organisation?*<br>(5-point scale: 1 = never−5 = every day) |
| ***Vol_wvs*** | WVS-EVS (3, 5, 6 waves) | A105 | Membership status of charitable/humanitarian organization<br>(3-point scale: 0 = not a member, =: inactive member, 2 = active member) |
| ***Wealth_wvs*** | WVS-EVS (2,3,5,6 waves) | E041 | Attitude on wealth accumulation<br>(10-point scale: 1 = people can only get rich at the expense of others−10 = wealth can grow so there's enough for everyone) |

*Notes*: See also Section 4.2.3.

Table 4.3. Countries' Average Social Capital (Workers' Self-centeredness)

| ***Trust1_piaac*** | | ***Trust1_wvs*** | | ***Trust2_piaac*** | | ***Vol_piaac*** | | ***Vol_wvs*** | | ***Wealth_wvs*** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FRA | 1.804 | FRA | 0.214 | ITA | 1.826 | RUS | 1.212 | *EST* | 0.018 | RUS | 4.767 |
| ITA | 1.879 | SVK | 0.218 | SVK | 1.888 | POL | 1.231 | JPN | 0.041 | SVK | 5.611 |
| SVK | 1.936 | *EST* | 0.227 | CZE | 1.932 | SVK | 1.274 | CZE | 0.044 | ESP | 5.731 |
| *EST* | 1.951 | RUS | 0.233 | POL | 1.945 | CZE | 1.295 | SVK | 0.048 | IRL | 5.789 |
| CZE | 1.953 | CZE | 0.257 | US | 1.960 | ESP | 1.314 | RUS | 0.071 | CZE | 5.809 |
| *AUT* | 2.104 | POL | 0.265 | FRA | 1.984 | *EST* | 1.320 | POL | 0.165 | FRA | 5.882 |
| IRL | 2.116 | KOR | 0.299 | *EST* | 2.041 | KOR | 1.322 | ESP | 0.167 | UK | 6.008 |
| DEU | 2.143 | ITA | 0.321 | DEU | 2.046 | ITA | 1.348 | DEU | 0.179 | SWE | 6.012 |
| BEL | 2.170 | UK | 0.332 | *AUT* | 2.051 | JPN | 1.410 | NLD | 0.207 | JPN | 6.068 |
| UK | 2.176 | DEU | 0.356 | RUS | 2.079 | FRA | 1.444 | ITA | 0.215 | NLD | 6.174 |
| POL | 2.178 | US | 0.358 | IRL | 2.084 | UK | 1.450 | *FIN* | 0.228 | US | 6.226 |
| US | 2.178 | ESP | 0.363 | KOR | 2.103 | BEL | 1.566 | FRA | 0.266 | *FIN* | 6.302 |
| KOR | 2.197 | *AUT* | 0.371 | UK | 2.106 | *AUT* | 1.596 | KOR | 0.338 | DNK | 6.309 |
| ESP | 2.208 | IRL | 0.402 | ESP | 2.126 | SWE | 1.599 | SWE | 0.354 | NOR | 6.356 |
| JPN | 2.209 | BEL | 0.404 | *CAN* | 2.210 | IRL | 1.637 | NOR | 0.370 | BEL | 6.581 |
| RUS | 2.261 | *CAN* | 0.413 | BEL | 2.257 | DEU | 1.656 | *CAN* | 0.511 | DEU | 6.612 |
| *CAN* | 2.355 | JPN | 0.413 | NLD | 2.516 | *FIN* | 1.685 | US | 0.530 | ITA | 6.651 |
| NOR | 2.543 | *FIN* | 0.547 | NOR | 2.564 | NLD | 1.727 | | | *CAN* | 6.733 |
| *FIN* | 2.548 | NLD | 0.553 | DNK | 2.809 | *CAN* | 1.766 | | | KOR | 6.778 |
| NLD | 2.580 | NOR | 0.677 | *FIN* | 2.964 | DNK | 1.767 | | | *AUT* | 7.095 |
| SWE | 2.595 | SWE | 0.683 | JPN | 2.996 | US | 1.884 | | | POL | 7.314 |
| DNK | 2.870 | DNK | 0.693 | SWE | 3.017 | NOR | 1.897 | | | *EST* | 7.432 |

*Notes*: For each social capital variable, the self-centeredness of average workers becomes lower moving down the table. Countries highlighted in gray are those not used in the regression analysis owing to lack of region information. Figures for *Trust1_piaac*, *Trust2_piaac*, and *Vol_piaac* are computed using PIAAC's sampling weight. For the definitions of social capital variables, see Table 4.2 and Section 4.2.3. As for country code, see Appendix Table A1 and the following definitions: AUT: Austria, BEL: Belgium, CAN: Canada, EST: Estonia, FIN: Finland, ITA: Italy, NOR: Norway, US: United States.

Table 5.1. Variables Standing for Potential Benefits of Decentralization

| Variable | Description | Mean | Std. Dev. | Obs. |
|---|---|---|---|---|
| ***Satisfied*** | All things considered, how satisfied the respondent is with her current job (5-point scale: 1 = extremely dissatisfied−5: extremely satisfied) | 3.892 | 0.870 | 31273 |
| ***Wage*** | Log of hourly earnings including bonuses for wage and salary earners, PPP corrected USD (constructed by PIAAC) | 2.445 | 0.723 | 27260 |
| ***Train*** | Dummy:1 if participated in any one of the following learning activities during the last 12 months: 1) open or distance education, 2) organized sessions for on-the-job training or training by supervisors or co-workers, 3) seminars or workshops, or 4) courses or private lessons, 0 if not participated | 0.433 | 0.496 | 30623 |
| ***Train_wh*** | When the ***train_2*** activity took place (4-point scale: 1 = only outside working hours, 2 = mostly outside working hours, 3 = mostly during working hours, 4 = only during working hours) | 3.088 | 1.219 | 8712 |
| ***Train_cost*** | To what degree the costs (tuition, registration or exam fees, expenses for books or other costs) of ***train_2*** were paid by the employer or prospective employer (3-point scale: 1 = not at all, 2 = partly paid, 3 = totally paid) | 2.562 | 0.795 | 7743 |
| ***Edu_demand*** | The usual educational qualifications required, if someone applies for the respondent's current job (7-point scale: 1 = primary or less, 2 = lower secondary, 3 = upper secondary, 4 = post-secondary but non-tertiary, 5 = tertiary−professional degree, 6 = tertiary−bachelor degree, 7 = tertiary−master/research degree) | 2.997 | 1.434 | 30702 |
| ***Edu_higherD*** | 3-point scale: 1 if ***edu7_demand*** is higher than the respondent's own education level, 0 if the same, and −1 if lower | -0.218 | 0.663 | 30906 |
| ***Exp_demand*** | How much related work experience required, if some applies for the respondent's current job (6-point scale: 1 = none, 2 = less than 1 month, 3 = 1−6 months, 4 = 7−11 months, 5 = 1 or 2 years, 6 = 3 years or more) | 3.075 | 1.797 | 30904 |

*Notes*: Summary statistics are computed based on the regression sample of column (1) in Table 5.2 when using *Decent1*. Both mean and standard deviations are computed using the "*repest*" command in Stata (with the revised weight).

Table 5.2. Potential Benefits and Decentralization

| *Decent* = | | ***Decent1*** | | | ***Decent2*** | | | Estimation |
|---|---|---|---|---|---|---|---|---|
| Dep. Var. | | **(1)** | **(2)** | **(3)** | **(1)** | **(2)** | **(3)** | method |
| ***Satisfied*** | *coef.* | 0.185 *** | 0.191 *** | 0.190 *** | 0.209 *** | 0.208 *** | 0.207 *** | ordered probit |
| | *se.* | (0.011) | (0.012) | (0.013) | (0.013) | (0.015) | (0.016) | |
| | *obs.* | 31273 | 29066 | 26316 | 31142 | 28956 | 26234 | |
| ***Wage*** | *coef.* | 0.036 *** | 0.032 *** | 0.029 *** | 0.050 *** | 0.041 *** | 0.040 *** | least squares |
| | *se.* | (0.006) | (0.005) | (0.006) | (0.006) | (0.006) | (0.007) | |
| | *obs.* | 27260 | 26402 | 22286 | 27162 | 26319 | 22208 | |
| ***Train*** | *coef.* | 0.045 *** | 0.036 ** | 0.033 ** | 0.081 *** | 0.068 *** | 0.065 *** | probit |
| | *se.* | (0.014) | (0.014) | (0.015) | (0.018) | (0.018) | (0.018) | |
| | *obs.* | 30623 | 28457 | 28359 | 30492 | 28346 | 28250 | |
| ***Train_wh*** | *coef.* | 0.065 ** | 0.060 ** | 0.061 ** | 0.063 ** | 0.060 * | 0.063 ** | ordered probit |
| | *se.* | (0.026) | (0.026) | (0.026) | (0.031) | (0.032) | (0.032) | |
| | *obs.* | 8712 | 8104 | 8096 | 8687 | 8082 | 8074 | |
| ***Train _cost*** | *coef.* | -0.006 | -0.014 | -0.019 | 0.014 | 0.004 | 0.001 | ordered probit |
| | *se.* | (0.036) | (0.038) | (0.038) | (0.044) | (0.048) | (0.048) | |
| | *obs.* | 7743 | 7273 | 7262 | 7723 | 7255 | 7244 | |
| ***Edu _demand*** | *coef.* | 0.030 ** | 0.034 *** | 0.031 *** | 0.089 *** | 0.095 *** | 0.092 *** | ordered probit |
| | *se.* | (0.012) | (0.011) | (0.012) | (0.016) | (0.015) | (0.015) | |
| | *N* | 30702 | 28501 | 28401 | 30578 | 28398 | 28301 | |
| ***Edu _higherD*** | *obs.* | 0.037 *** | 0.041 *** | 0.038 *** | 0.094 *** | 0.097 *** | 0.094 *** | ordered probit |
| | *se.* | (0.013) | (0.012) | (0.013) | (0.015) | (0.015) | (0.016) | |
| | *obs.* | 30906 | 28704 | 28604 | 30782 | 28601 | 28504 | |
| ***Exp _demand*** | *coef.* | 0.150 *** | 0.159 *** | 0.155 *** | 0.254 *** | 0.265 *** | 0.262 *** | ordered probit |
| | *se.* | (0.010) | (0.011) | (0.011) | (0.012) | (0.012) | (0.012) | |
| | *obs.* | 30904 | 28710 | 28610 | 30786 | 28613 | 28516 | |

*Notes*: The coefficient (*coef.*) stands for the estimated coefficient on *Decent*, when regressing the *Benefit* variable on *Decent* and other control variables. Standard errors (*se.*) in parentheses are estimated using jackknife replicate weights with the "*repest*" command (weight is revised as explained in Section 3). In addition to the *Decent* variable, column (1) controls for gender, age and its square, years of education, literacy and numeracy skills (proficiency scores), health status, foreign-born status, occupation dummies, skills used at work (reading, writing, numeracy, and ICT), fulltime-work dummy, employment size of the workplace, and public and non-profit organization sector dummies, export and import ratios of the industry, industry and country dummies. As for *Train_wh* and *Train_cost* regressions, dummies for the content of the training programs are also controlled for. In addition to these variables, column (2) controls for dummies for foreign language and indefinite employment contract. The control variables in column (3) are almost the same in column (2) except (i) that instead of age and its square, years of work experience and its square, and years of tenure at the current employer and its square are controlled for; (ii) that only in *Wage* regression are region dummies controlled for instead of country dummies; and (iii) that only in *Satisfied* regression is *Wage* is additionally controlled. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 6.1. Decentralization, Coordination Needs (*IndCoord1*), and Self-centeredness

| Dep. Var. = | *Decent1* | | | | *Decent2* | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (1) | (2) | (3) | (4) |
| ***SocK = Trust1_piaac*** | | | | | | | | |
| *IndCoord1* | -0.136 *** | -0.412 *** | -0.381 *** | -0.344 *** | -0.092 *** | -0.313 *** | -0.319 *** | -0.296 *** |
| | (0.028) | (0.090) | (0.090) | (0.091) | (0.022) | (0.074) | (0.075) | (0.075) |
| *SocK* | 0.131 ** | -0.138 * | -0.146 | | 0.111 ** | -0.103 | -0.130 * | |
| | (0.060) | (0.083) | (0.089) | | (0.045) | (0.068) | (0.072) | |
| *IndCoord1*SocK* | | 0.127 *** | 0.125 *** | 0.112 *** | | 0.102 *** | 0.110 *** | 0.103 *** |
| | | (0.039) | (0.037) | (0.037) | | (0.032) | (0.031) | (0.031) |
| *Observations* | 25475 | 25475 | 24650 | 24549 | 25351 | 25351 | 24544 | 24446 |
| ***SocK = Trust1_wvs*** | | | | | | | | |
| *IndCoord1* | -0.132 *** | -0.191 *** | -0.178 *** | -0.167 *** | -0.090 *** | -0.144 *** | -0.142 *** | -0.134 *** |
| | (0.028) | (0.039) | (0.040) | (0.040) | (0.022) | (0.031) | (0.032) | (0.032) |
| *SocK* | 0.214 ** | -0.147 | -0.302 | | 0.127 | -0.202 | -0.294 * | |
| | (0.108) | (0.186) | (0.196) | | (0.083) | (0.150) | (0.153) | |
| *IndCoord1*SocK* | | 0.167 ** | 0.201 *** | 0.198 *** | | 0.152 *** | 0.175 *** | 0.176 *** |
| | | (0.066) | (0.066) | (0.068) | | (0.056) | (0.055) | (0.056) |
| *Observations* | 25253 | 25253 | 24458 | 24356 | 25135 | 25135 | 24352 | 24253 |
| ***SocK = Trust2_piaac*** | | | | | | | | |
| *IndCoord1* | -0.136 *** | -0.312 *** | -0.285 *** | -0.259 *** | -0.093 *** | -0.262 *** | -0.251 *** | -0.232 *** |
| | (0.028) | (0.070) | (0.072) | (0.071) | (0.022) | (0.060) | (0.060) | (0.058) |
| *SocK* | 0.080 | -0.093 | -0.177 ** | | 0.056 | -0.110 | -0.192 *** | |
| | (0.071) | (0.084) | (0.084) | | (0.055) | (0.069) | (0.068) | |
| *IndCoord1*SocK* | | 0.082 *** | 0.082 *** | 0.074 *** | | 0.079 *** | 0.079 *** | 0.074 *** |
| | | (0.029) | (0.028) | (0.028) | | (0.024) | (0.024) | (0.023) |
| *Observations* | 25475 | 25475 | 24650 | 24549 | 25351 | 25351 | 24544 | 24446 |
| ***SocK =Vol_piaac*** | | | | | | | | |
| *IndCoord1* | -0.137 *** | -0.295 *** | -0.277 *** | -0.275 *** | -0.094 *** | -0.264 *** | -0.249 *** | -0.233 *** |
| | (0.028) | (0.087) | (0.089) | (0.089) | (0.022) | (0.073) | (0.073) | (0.072) |
| *SocK* | 0.230 *** | -0.015 | -0.102 | | 0.151 *** | -0.114 | -0.143 | |
| | (0.067) | (0.130) | (0.129) | | (0.051) | (0.109) | (0.106) | |
| *IndCoord1*SocK* | | 0.113 * | 0.121 ** | 0.126 ** | | 0.122 ** | 0.121 ** | 0.115 ** |
| | | (0.058) | (0.058) | (0.059) | | (0.049) | (0.048) | (0.047) |
| *Observations* | 25475 | 25475 | 24650 | 24549 | 25351 | 25351 | 24544 | 24446 |
| ***SocK = Vol_wvs*** | | | | | | | | |
| *IndCoord1* | -0.136 *** | -0.167 *** | -0.146 *** | -0.139 *** | -0.098 *** | -0.135 *** | -0.127 *** | -0.118 *** |
| | (0.034) | (0.038) | (0.040) | (0.040) | (0.028) | (0.032) | (0.034) | (0.034) |
| *SocK* | 0.250 ** | -0.114 | -0.314 | | 0.179 ** | -0.258 | -0.348 ** | |
| | (0.116) | (0.207) | (0.207) | | (0.079) | (0.162) | (0.161) | |
| *IndCoord1*SocK* | | 0.166 ** | 0.222 *** | 0.230 *** | | 0.199 *** | 0.230 *** | 0.223 *** |
| | | (0.077) | (0.080) | (0.084) | | (0.063) | (0.062) | (0.066) |
| *Observations* | 15265 | 15265 | 14487 | 14431 | 15183 | 15183 | 14417 | 14362 |
| ***SocK = Wealth_wvs*** | | | | | | | | |
| *IndCoord1* | -0.129 *** | -0.257 *** | -0.305 *** | -0.258 *** | -0.096 *** | -0.245 *** | -0.272 *** | -0.228 *** |
| | (0.028) | (0.084) | (0.089) | (0.091) | (0.022) | (0.070) | (0.071) | (0.071) |
| *SocK* | 0.033 * | -0.015 | -0.069 ** | | 0.024 * | -0.031 | -0.059 ** | |
| | (0.019) | (0.032) | (0.034) | | (0.014) | (0.024) | (0.024) | |
| *IndCoord1*SocK* | | 0.021 * | 0.033 ** | 0.027 ** | | 0.025 ** | 0.031 *** | 0.025 ** |
| | | (0.013) | (0.014) | (0.014) | | (0.010) | (0.010) | (0.010) |
| *Observations* | 22780 | 22780 | 21993 | 21900 | 22673 | 22673 | 21898 | 21807 |
| *Control vars* | Control 1 | Control 1 | Control 2 | Control 3 | Control 1 | Control 1 | Control 2 | Control 3 |
| *Industry dummies* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Country dummies* | Yes | Yes | Yes | | Yes | Yes | Yes | |
| *Region dummies* | | | | Yes | | | | Yes |

*Notes*: Standard errors in parentheses are estimated using jackknife replicate weights with the "*repest*" command in Stata (weight is revised as explained in Section 3). Control 1 includes gender, age and its square, years of education, literacy and numeracy skills (proficiency scores), health status, foreign-born status, occupation dummies, skills used at work (reading, writing, numeracy, and ICT), fulltime-work dummy, employment size of the workplace, and public and non-profit organization sector dummies, and export and import ratios of the industry. Control 2 includes dummies for foreign language and indefinite employment contract in addition to Control 1. Control 3 is almost the same as Control 2 except that instead of age and its square, years of work experience and its square, and years of tenure at the current employer and its square are included. Note that by including Control 2 or Control 3, Russian workers are excluded from the regression sample. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 6.2. Other Determinants of Decentralization (*Decent1*)

| ***SocK =*** | ***Trust1_piaac*** | | ***Trust1_wvs*** | | ***Trust2_piaac*** | | ***Vol_piaac*** | | ***Vol_wvs*** | | ***Wealth_wvs*** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** |
| *IndCoord1* | -0.381 *** | -0.344 *** | -0.178 *** | -0.167 *** | -0.285 *** | -0.259 *** | -0.277 *** | -0.275 *** | -0.146 *** | -0.139 *** | -0.305 *** | -0.258 *** |
| | (0.090) | (0.091) | (0.040) | (0.040) | (0.072) | (0.071) | (0.089) | (0.089) | (0.040) | (0.040) | (0.089) | (0.091) |
| *SocK* | -0.146 | | -0.302 | | -0.177 ** | | -0.102 | | -0.314 | | -0.069 ** | |
| | (0.089) | | (0.196) | | (0.084) | | (0.129) | | (0.207) | | (0.034) | |
| *IndCoord1*SocK* | 0.125 *** | 0.112 *** | 0.201 *** | 0.198 *** | 0.082 *** | 0.074 *** | 0.121 ** | 0.126 ** | 0.222 *** | 0.230 *** | 0.033 ** | 0.027 ** |
| | (0.037) | (0.037) | (0.066) | (0.068) | (0.028) | (0.028) | (0.058) | (0.059) | (0.080) | (0.084) | (0.014) | (0.014) |
| *Female* | -0.027 ** | -0.025 ** | -0.030 ** | -0.027 ** | -0.028 ** | -0.025 ** | -0.027 ** | -0.025 ** | -0.008 | -0.007 | -0.023 * | -0.021 * |
| | (0.012) | (0.012) | (0.012) | (0.012) | (0.012) | (0.012) | (0.012) | (0.012) | (0.015) | (0.015) | (0.013) | (0.013) |
| *Age* | -0.002 | | -0.002 | | -0.002 | | -0.002 | | -0.003 | | -0.002 | |
| | (0.003) | | (0.003) | | (0.003) | | (0.003) | | (0.003) | | (0.003) | |
| *Age^2* | 0.000 * | | 0.000 * | | 0.000 * | | 0.000 * | | 0.000 * | | 0.000 ** | |
| | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) | |
| *Exp* | | 0.003 ** | | 0.004 ** | | 0.004 ** | | 0.004 ** | | 0.004 ** | | 0.004 ** |
| | | (0.002) | | (0.001) | | (0.002) | | (0.002) | | (0.002) | | (0.002) |
| *Exp^2* | | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 |
| | | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) |
| *Tenure* | | 0.003 | | 0.003 | | 0.003 | | 0.003 | | 0.004 | | 0.002 |
| | | (0.002) | | (0.002) | | (0.002) | | (0.002) | | (0.002) | | (0.002) |
| *Tenure^2* | | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 |
| | | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) |
| *Eduy* | 0.015 *** | 0.016 *** | 0.015 *** | 0.016 *** | 0.015 *** | 0.016 *** | 0.015 *** | 0.016 *** | 0.017 *** | 0.018 *** | 0.016 *** | 0.017 *** |
| | (0.003) | (0.002) | (0.003) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) | (0.003) | (0.003) |
| *LitSkill* | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| *NumSkill* | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 ** | 0.001 * | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| *Health* | 0.029 *** | 0.029 *** | 0.028 *** | 0.027 *** | 0.029 *** | 0.029 *** | 0.029 *** | 0.028 *** | 0.035 *** | 0.034 *** | 0.029 *** | 0.028 *** |
| | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) | (0.006) |
| *Forborn* | -0.089 *** | -0.081 *** | -0.090 *** | -0.081 *** | -0.088 *** | -0.081 *** | -0.087 *** | -0.081 *** | -0.082 ** | -0.072 ** | -0.083 *** | -0.073 *** |
| | (0.024) | (0.025) | (0.025) | (0.025) | (0.025) | (0.025) | (0.025) | (0.025) | (0.035) | (0.036) | (0.026) | (0.027) |
| *Forlang* | -0.057 * | -0.058 * | -0.057 * | -0.058 * | -0.056 * | -0.058 * | -0.056 * | -0.059 * | -0.084 ** | -0.085 ** | -0.068 * | -0.068 * |
| | (0.032) | (0.033) | (0.032) | (0.033) | (0.032) | (0.033) | (0.032) | (0.033) | (0.040) | (0.040) | (0.036) | (0.036) |

| *SocK =* | *Trust1_piaac* | | *Trust1_wvs* | | *Trust2_piaac* | | *Vol_piaac* | | *Vol_wvs* | | *Wealth_wvs* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** |
| *Occ: Tech/AssoPro* | 0.007 | 0.003 | 0.005 | 0.000 | 0.006 | 0.002 | 0.008 | 0.002 | 0.016 | 0.002 | 0.009 | 0.003 |
| | (0.020) | (0.020) | (0.019) | (0.019) | (0.020) | (0.020) | (0.020) | (0.020) | (0.027) | (0.027) | (0.020) | (0.020) |
| *Occ: Clerks* | -0.037 ** | -0.042 ** | -0.038 ** | -0.042 ** | -0.036 * | -0.042 ** | -0.036 ** | -0.043 ** | -0.024 | -0.039 * | -0.036 * | -0.042 ** |
| | (0.018) | (0.018) | (0.018) | (0.018) | (0.019) | (0.018) | (0.019) | (0.018) | (0.023) | (0.023) | (0.019) | (0.018) |
| *Occ: Service/Sales* | -0.073 *** | -0.072 *** | -0.074 *** | -0.075 *** | -0.073 *** | -0.073 *** | -0.074 *** | -0.075 *** | -0.071 *** | -0.079 *** | -0.076 *** | -0.078 *** |
| | (0.019) | (0.019) | (0.018) | (0.018) | (0.019) | (0.019) | (0.019) | (0.019) | (0.025) | (0.025) | (0.019) | (0.019) |
| *Occ: Craft* | -0.052 ** | -0.061 *** | -0.051 ** | -0.059 *** | -0.053 ** | -0.061 *** | -0.053 ** | -0.061 *** | -0.052 * | -0.068 ** | -0.052 ** | -0.063 *** |
| | (0.022) | (0.022) | (0.021) | (0.022) | (0.022) | (0.022) | (0.022) | (0.022) | (0.027) | (0.027) | (0.022) | (0.022) |
| *Occ: Operator* | -0.215 *** | -0.221 *** | -0.218 *** | -0.224 *** | -0.218 *** | -0.223 *** | -0.218 *** | -0.223 *** | -0.223 *** | -0.237 *** | -0.218 *** | -0.227 *** |
| */Assembler* | (0.022) | (0.022) | (0.022) | (0.022) | (0.022) | (0.022) | (0.022) | (0.022) | (0.025) | (0.025) | (0.023) | (0.023) |
| *ICTwork* | 0.149 *** | 0.146 *** | 0.151 *** | 0.148 *** | 0.148 *** | 0.146 *** | 0.150 *** | 0.146 *** | 0.164 *** | 0.162 *** | 0.147 *** | 0.145 *** |
| | (0.010) | (0.010) | (0.011) | (0.011) | (0.010) | (0.010) | (0.010) | (0.010) | (0.014) | (0.014) | (0.012) | (0.012) |
| *ReadWork* | 0.121 *** | 0.117 *** | 0.121 *** | 0.117 *** | 0.122 *** | 0.117 *** | 0.121 *** | 0.117 *** | 0.125 *** | 0.121 *** | 0.124 *** | 0.119 *** |
| | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.017) | (0.017) | (0.013) | (0.014) |
| *WriteWork* | 0.028 *** | 0.026 *** | 0.027 *** | 0.025 *** | 0.028 *** | 0.026 *** | 0.027 *** | 0.026 *** | 0.018 | 0.017 | 0.023 ** | 0.022 ** |
| | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.013) | (0.012) | (0.010) | (0.010) |
| *NumWork* | 0.090 *** | 0.090 *** | 0.090 *** | 0.089 *** | 0.090 *** | 0.089 *** | 0.090 *** | 0.090 *** | 0.091 *** | 0.088 *** | 0.093 *** | 0.092 *** |
| | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.012) | (0.012) | (0.010) | (0.010) |
| *Fulltime* | -0.082 *** | -0.086 *** | -0.084 *** | -0.089 *** | -0.082 *** | -0.086 *** | -0.083 *** | -0.087 *** | -0.087 *** | -0.093 *** | -0.084 *** | -0.089 *** |
| | (0.014) | (0.014) | (0.015) | (0.015) | (0.014) | (0.014) | (0.015) | (0.014) | (0.016) | (0.016) | (0.015) | (0.015) |
| *Permanent* | 0.058 *** | 0.042 *** | 0.056 *** | 0.041 *** | 0.058 *** | 0.042 *** | 0.059 *** | 0.042 *** | 0.053 *** | 0.033 ** | 0.055 *** | 0.040 *** |
| | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.015) | (0.016) | (0.012) | (0.013) |
| *Estsize: 11-50* | -0.163 *** | -0.162 *** | -0.163 *** | -0.162 *** | -0.162 *** | -0.162 *** | -0.163 *** | -0.162 *** | -0.167 *** | -0.166 *** | -0.164 *** | -0.162 *** |
| | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.016) | (0.016) | (0.014) | (0.014) |
| *Estsize: 51-250* | -0.171 *** | -0.175 *** | -0.172 *** | -0.175 *** | -0.171 *** | -0.175 *** | -0.170 *** | -0.175 *** | -0.157 *** | -0.161 *** | -0.169 *** | -0.172 *** |
| | (0.017) | (0.017) | (0.017) | (0.016) | (0.017) | (0.017) | (0.017) | (0.017) | (0.022) | (0.022) | (0.018) | (0.018) |
| *Estsize: 251-1000* | -0.178 *** | -0.184 *** | -0.177 *** | -0.182 *** | -0.177 *** | -0.184 *** | -0.177 *** | -0.184 *** | -0.182 *** | -0.187 *** | -0.179 *** | -0.184 *** |
| | (0.023) | (0.023) | (0.022) | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) | (0.028) | (0.028) | (0.023) | (0.024) |
| *Estsize: 1000+* | -0.141 *** | -0.146 *** | -0.139 *** | -0.144 *** | -0.139 *** | -0.146 *** | -0.138 *** | -0.147 *** | -0.112 *** | -0.123 *** | -0.142 *** | -0.148 *** |
| | (0.025) | (0.025) | (0.024) | (0.024) | (0.025) | (0.025) | (0.025) | (0.025) | (0.030) | (0.031) | (0.026) | (0.026) |
| *PartOfFirm* | -0.043 *** | -0.045 *** | -0.041 *** | -0.043 *** | -0.043 *** | -0.045 *** | -0.044 *** | -0.046 *** | -0.031 ** | -0.033 ** | -0.040 *** | -0.043 *** |
| | (0.011) | (0.012) | (0.011) | (0.012) | (0.011) | (0.012) | (0.011) | (0.012) | (0.013) | (0.013) | (0.012) | (0.012) |

| *SocK =* | *Trust1_piaac* | | *Trust1_wvs* | | *Trust2_piaac* | | *Vol_piaac* | | *Vol_wvs* | | *Wealth_wvs* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** |
| *PublicSector* | -0.056 *** | -0.064 *** | -0.057 *** | -0.064 *** | -0.057 *** | -0.066 *** | -0.058 *** | -0.066 *** | -0.048 ** | -0.059 *** | -0.047 ** | -0.054 *** |
| | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) | (0.023) | (0.022) | (0.020) | (0.019) |
| *NPOSector* | 0.064 * | 0.060 * | 0.060 * | 0.055 | 0.064 * | 0.059 * | 0.067 * | 0.062 * | 0.082 ** | 0.075 * | 0.080 ** | 0.075 ** |
| | (0.034) | (0.034) | (0.033) | (0.033) | (0.034) | (0.034) | (0.034) | (0.034) | (0.040) | (0.040) | (0.036) | (0.036) |
| *IndExpor* | -0.001 *** | -0.002 *** | -0.001 ** | -0.002 *** | -0.001 ** | -0.001 ** | -0.001 ** | -0.001 *** | -0.002 ** | -0.002 ** | -0.001 * | -0.001 ** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| *IndImpor* | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 ** | 0.000 ** | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| *Industry dummies* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Country dummies* | Yes | | Yes | | Yes | | Yes | | Yes | | Yes | |
| *Region dummies* | | Yes | | Yes | | Yes | | Yes | | Yes | | Yes |
| *Adj. R-squared* | 0.259 | 0.263 | 0.259 | 0.263 | 0.259 | 0.263 | 0.259 | 0.263 | 0.270 | 0.273 | 0.262 | 0.266 |
| *Observations* | 24650 | 24549 | 24458 | 24356 | 24650 | 24549 | 24650 | 24549 | 14487 | 14431 | 21993 | 21900 |

*Notes*: The dependent variable is *Decent1*. Standard errors in parentheses are estimated using jackknife replicate weights with the "*repest*" command in Stata (weight is revised as explained in Section 3). The column numbers (3) and (4) indicate that the results are identical to those with the same column numbers in Table 6.1. Elementary occupation, establishment size of 1−10, and private sector are the omitted reference groups. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 6.3. Decentralization, Coordination Needs (*IndCoord2*), and Self-centeredness

| Dep. Var. = | *Decent1* | | | *Decent2* | | |
|---|---|---|---|---|---|---|
| | (2) | (3) | (4) | (2) | (3) | (4) |
| ***SocK = Trust1_piaac*** | | | | | | |
| *SocK* | 0.010 | 0.005 | | 0.010 | 0.005 | |
| | (0.066) | (0.061) | | (0.047) | (0.047) | |
| *IndCoord2*SocK* | 0.004 *** | 0.005 *** | 0.004 *** | 0.004 *** | 0.004 *** | 0.004 *** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| *Observations* | 23633 | 22852 | 22755 | 23515 | 22751 | 22657 |
| ***SocK = Trust1_wvs*** | | | | | | |
| *SocK* | 0.020 | -0.085 | | -0.062 | -0.104 | |
| | (0.120) | (0.126) | | (0.095) | (0.095) | |
| *IndCoord2*SocK* | 0.006 *** | 0.007 *** | 0.006 *** | 0.005 *** | 0.005 *** | 0.005 *** |
| | (0.002) | (0.002) | (0.002) | (0.001) | (0.001) | (0.001) |
| *Observations* | 23421 | 22671 | 22573 | 23308 | 22570 | 22475 |
| ***SocK = Trust2_piaac*** | | | | | | |
| *SocK* | -0.007 | -0.070 | | -0.026 | -0.082 * | |
| | (0.074) | (0.065) | | (0.052) | (0.050) | |
| *IndCoord2*SocK* | 0.003 *** | 0.003 *** | 0.003 *** | 0.003 *** | 0.003 *** | 0.002 *** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| *Observations* | 23633 | 22852 | 22755 | 23515 | 22751 | 22657 |
| ***SocK = Vol_piaac*** | | | | | | |
| *SocK* | 0.112 | 0.051 | | 0.010 | -0.018 | |
| | (0.085) | (0.080) | | (0.059) | (0.061) | |
| *IndCoord2*SocK* | 0.004 *** | 0.004 *** | 0.004 *** | 0.005 *** | 0.004 *** | 0.004 *** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| *Observations* | 23633 | 22852 | 22755 | 23515 | 22751 | 22657 |
| ***SocK = Vol_wvs*** | | | | | | |
| *SocK* | 0.029 | -0.056 | | -0.026 | -0.047 | |
| | (0.137) | (0.129) | | (0.092) | (0.093) | |
| *IndCoord2*SocK* | 0.006 *** | 0.007 *** | 0.006 *** | 0.006 *** | 0.006 *** | 0.005 *** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| *Observations* | 14162 | 13428 | 13375 | 14084 | 13362 | 13310 |
| ***SocK = Wealth_wvs*** | | | | | | |
| *SocK* | 0.008 | -0.029 | | -0.007 | -0.024 | |
| | (0.022) | (0.023) | | (0.018) | (0.019) | |
| *IndCoord2*SocK* | 0.001 *** | 0.001 *** | 0.001 *** | 0.001 *** | 0.001 *** | 0.001 *** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| *Observations* | 21189 | 20447 | 20358 | 21087 | 20357 | 20270 |
| *Control vars* | Control 1' | Control 2' | Control 3' | Control 1' | Control 2' | Control 3' |
| *Industry dummies* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Country dummies* | Yes | Yes | | Yes | Yes | |
| *Region dummies* | | | Yes | | | Yes |

*Notes*: Standard errors in parentheses are estimated using jackknife replicate weights with the "*repest*" command in Stata (weight is revised as explained in Section 3). *IndCoord2* is based on 71 industries. The coefficient of industry-specific *IndCoord2* is not identified because of the presence of industry dummies. Control X' (where X = 1, 2, 3) is Control X in Table 6.1 minus export and import ratios of the industry, the data for which are not available. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 6.4. Endogeneity Test for Social Capital (Workers' Self-centeredness)

| Dep. Var. = | *Decent1* | | *Decent2* | | *Decent1* | | *Decent2* | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (1) | (2) | (1) | (2) | (1) | (2) |
| | ***SocK = Trust1_piaac*** | | | | ***SocK = Trust1_wvs*** | | | |
| *IndCoord2*SocK* | 0.024 | 0.072 | -0.039 | -0.046 | -0.006 | -0.018 | 0.010 | 0.014 |
| | (0.049) | (0.157) | (0.044) | (0.109) | (0.011) | (0.034) | (0.008) | (0.027) |
| *Observations* | 21024 | 20182 | 20915 | 20092 | 20952 | 20140 | 20848 | 20050 |
| *Endogeneity test stat.* | 0.193 | 0.276 | 1.411 | 0.239 | 1.196 | 0.564 | 0.280 | 0.109 |
| *p-value* | 0.661 | 0.600 | 0.235 | 0.626 | 0.274 | 0.453 | 0.597 | 0.742 |
| *1st stage F stat.* | 7.934 | 0.931 | 7.989 | 0.944 | 439.394 | 45.405 | 421.458 | 44.267 |
| | ***SocK = Trust2_piaac*** | | | | ***SocK = Vol_piaac*** | | | |
| *IndCoord2*SocK* | -0.002 | -0.003 | 0.004 | 0.002 | -0.002 | -0.004 | 0.004 | 0.002 |
| | (0.004) | (0.006) | (0.003) | (0.005) | (0.004) | (0.007) | (0.003) | (0.006) |
| *Observations* | 21024 | 20182 | 20915 | 20092 | 21024 | 20182 | 20915 | 20092 |
| *Endogeneity test stat.* | 1.302 | 1.042 | 0.174 | 0.004 | 2.047 | 1.280 | 0.040 | 0.150 |
| *p-value* | 0.254 | 0.308 | 0.677 | 0.953 | 0.153 | 0.258 | 0.843 | 0.699 |
| *1st stage F stat.* | 477.116 | 259.714 | 467.540 | 257.604 | 2194.957 | 869.368 | 2217.709 | 868.091 |
| | **SocK = Vol_wvs** | | | | **SocK = Wealth_wvs** | | | |
| *IndCoord2*SocK* | -0.020 | -0.022 | 0.007 | 0.005 | -0.001 | -0.003 | 0.001 | 0.002 |
| | (0.020) | (0.020) | (0.014) | (0.014) | (0.002) | (0.006) | (0.001) | (0.004) |
| *Observations* | 14162 | 14100 | 14084 | 14025 | 19105 | 18305 | 19007 | 18221 |
| *Endogeneity test stat.* | 1.588 | 1.771 | 0.009 | 0.001 | 3.315 | 1.179 | 0.175 | 0.004 |
| *p-value* | 0.208 | 0.184 | 0.932 | 0.977 | 0.069 | 0.278 | 0.676 | 0.953 |
| *1st stage F stat.* | 129.259 | 129.207 | 123.072 | 123.132 | 1456.048 | 126.718 | 1413.115 | 124.608 |
| *Control vars* | Control 1' | Control 3' | Control 1' | Control 3' | Control 1' | Control 3' | Control 1' | Control 3' |
| *Industry dummies* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Region dummies* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

*Notes*: Estimation method is two-stage least squares. *IndCoord2*SocK* is instrumented with *IndCoord2*(1-Segregation)*, where *Segregation* is country-specific ethnic segregation index constructed by Alesina and Zhuravskaya (2011). The endogeneity test statistic stands for the difference of the two Sargan−Hansen statistics: one for the equation in which *SocK* is treated as endogenous and one for the equation in which *SocK* is treated as exogenous. Under the null hypothesis, *SocK* is exogenous. Standard errors in parentheses are estimated using jackknife replicate weights with the "*repest*" command in Stata (weight is revised as explained in Section 3). For the contents of Control 1' and Control 3', see Table 6.3. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

# Appendix

## Appendix A: Construction of *IndCoord2*

As mentioned in Section 4.2.2, $IndCoord2_j$ is the industry-specific skill substitutability (or complementarity) index used in Bombardini *et al*. (2012), which is the ranking of industries based on residual wage dispersion (measured in terms of standard deviation). The sample to construct $IndCoord2_j$ is based on individual-level data taken from the IPUMS American Community Survey (ACS) 2008−2012 5-year sample (Ruggles *et al*. 2015), which represent the 5% random sample of the US population. The use of a 5-year sample is appropriate because estimating industry-specific wage regressions requires large sample sizes. The time period 2008−2012 is chosen because the new industry classification began from 2008. Although this ACS sample is different from the one used by Bombardini *et al*. (2012), which is the 5% PUMS files of the 2000 Census of Population in the US, I generally follow their procedure as much as the data allow.

The sample is first restricted to full-time workers (usually worked at least 20 hours per week, worked for wages at least 14 weeks during the past year, and earned an annual salary of at least 2,000 USD), aged 16−65 years, and not living in group quarters. Different from the 2000 Census, the ACS sample does not provide the exact number of weeks worked.[1] Thus, to reduce the measurement error of weekly wages, the sample is further restricted to those who report weeks worked as either "48−49 weeks" or "50−52 weeks." Then, weekly wages are computed as the annual wage and salary income divided by the week worked (48.5 in case of 48−49 weeks, or 51 in case of 50−52 weeks).

Using this sample, the following industry-specific wage equation is estimated:

$$\log(Wage_{ij}) = \beta_j X_{ij} + \varepsilon_{ij}, \qquad \text{(A1)}$$

where subscripts *i* and *j* denote individual and industry where she is working, respectively. $Wage_{ij}$ denotes weekly wage. $X_{ij}$ is a vector of individual characteristics including four

[1] ACS just provides interval information on weeks worked (1−13 weeks; 14−26 weeks; 27−39 weeks; 40−47 weeks; 48−49 weeks; and 50−52 weeks).

educational attainment categories, a quartic polynomial in age, gender, race dummies, an interaction of gender and race, Hispanic dummy, and state of residence dummies. In addition, as Bombardini *et al*. (2012) do following Dahl (2002), self-selection into industries is corrected. In particular, a cubic polynomial in the estimated first-best selection probability ( $\hat{p}_{ij}$ ) and in the highest predicted probability for industry $j$ ( $= max\{\hat{p}_{ij}\} \forall\ j$ ) is included in $X_{ij}$ , where $\hat{p}_{ij}$ is estimated by the following procedure.

First, individuals are divided into cells defined by state of birth (foreign countries are excluded from the sample), four categories of educational attainment (high school dropout or lower, high school graduate, 1−3 years of college education, four years of college education or higher), four age intervals (16−30, 31−40, 41−50, and 51−65), two race groups (white and non-white), and two gender groups (male and female). Then, the selection probability $\hat{p}_{ij}$ is calculated as the proportion of individuals working in industry $j$ within $i$'s cell.

The standard deviation of the obtained industry-specific residual wage $\hat{\varepsilon}_{\mathrm{ij}}$ (= $\ln(Wage_{ij}) - \hat{\beta}_{\mathrm{j}} X_{ij}$ ) is further regressed on the coefficient of variation of firm size within industry $j$ ( $FirmSizeCV_j$ ). The industry-specific firm size dispersion data is constructed from the Statistics of US Businesses (SUSB) data taken from the US Small Business Administration website[2] and is calculated as follows:

$$FirmSizeCV_j = \sqrt{\sum_{\mathrm{b}}^{24} (AvgEmp_b - AvgEmp_j)^2 * Emp_b / Emp_j} \ / \ AvgEmp_j ,$$

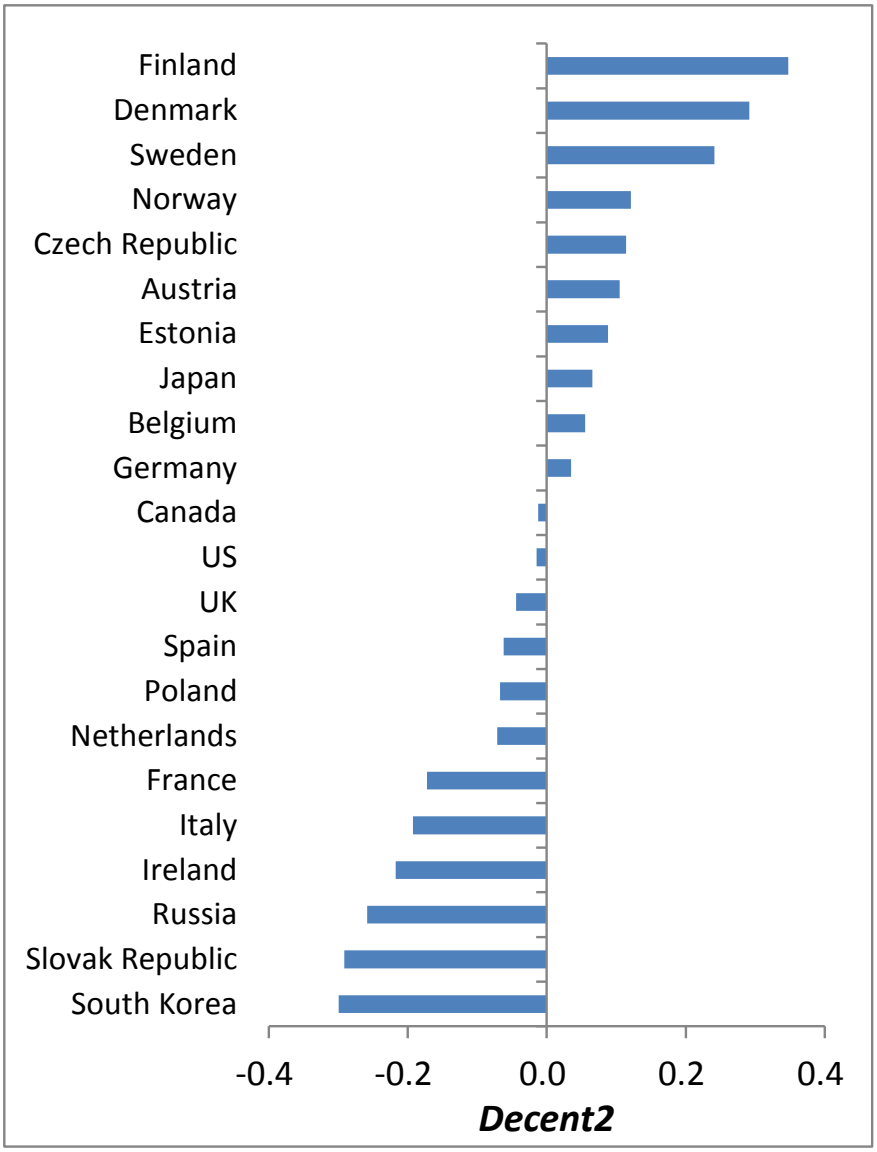
where subscript $b$ denotes 1−24 bins defined by employment size of firm, which ranges from 0−4 persons (the first bin) to 5,000 and more persons (the last bin). $AvgEmp_b$ and $AvgEmp_j$ are average employment size per firm in bin $b$ and industry $j$, respectively. $Emp_b$ and $Emp_j$ are total employment in bin $b$ and industry $j$, respectively.[3]

Finally, the industry-specific residuals from this regression (that regresses the standard deviation of residual in equation (A1) on industry's firm size dispersion) are arranged in descending order and their ranks are used as $IndCoord2_j$ .

[2] https://www.sba.gov/advocacy/firm-size-data (accessed May 26, 2016)

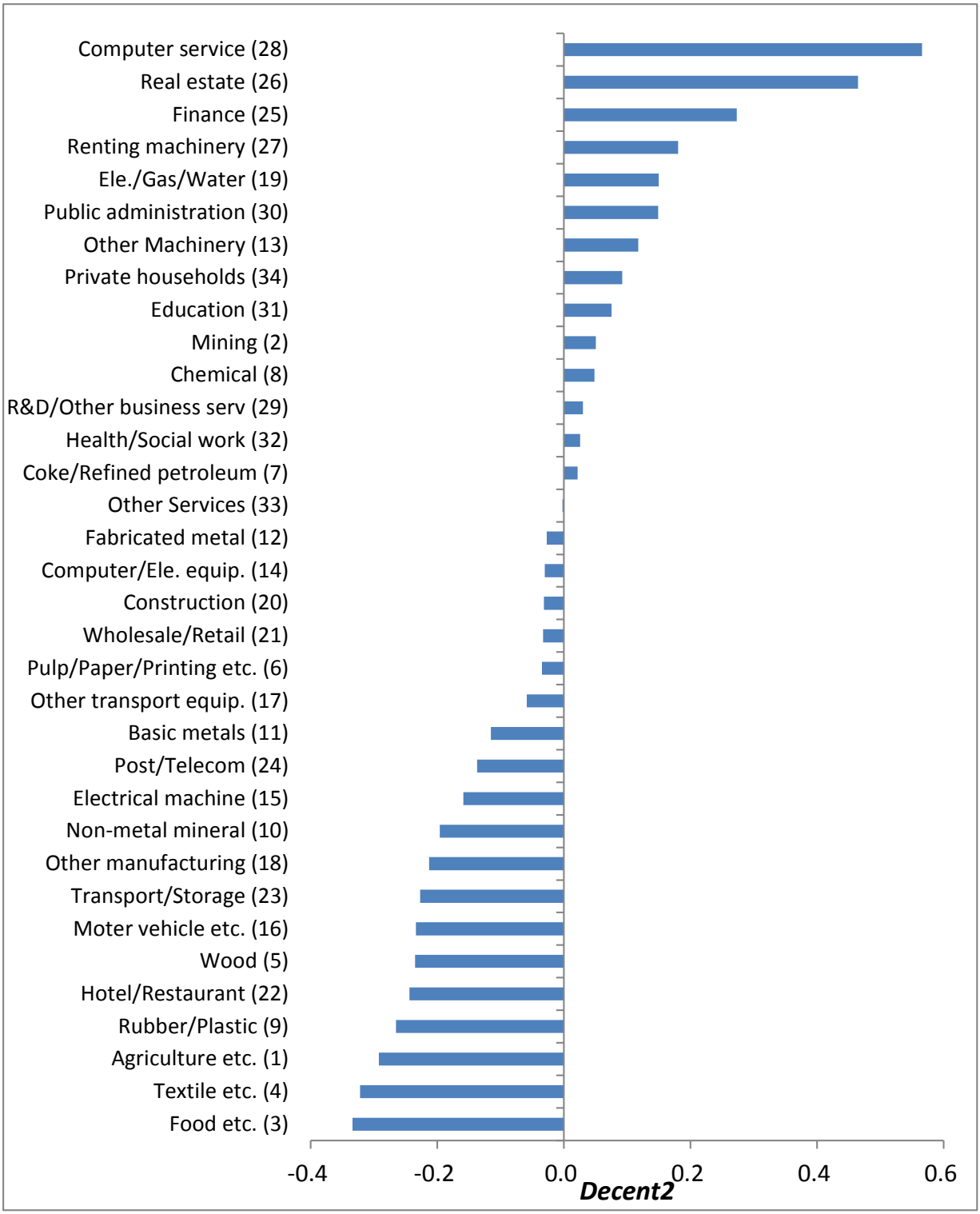
[3] Exact number of total employment is missing in some bins to protect confidentiality. In these cases, I replace the employment range code with (i) the average employment number within the range, or (ii) with the bin's minimum employment size if it is greater than (i).

Figure A1. Average Scores of Countries' Decentralization Index: *Decent2*



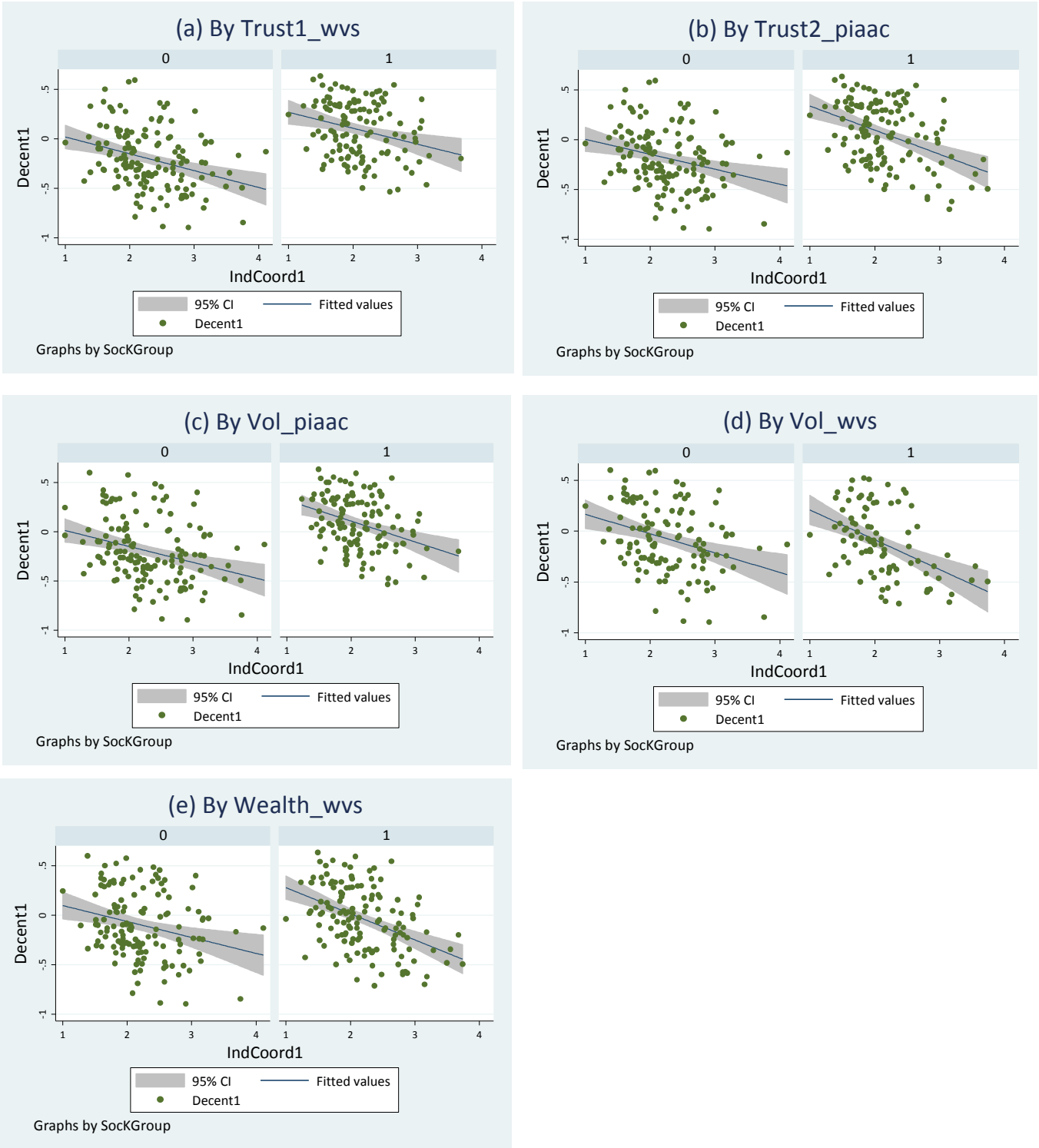

*Note*: For the definition of *Decent2*, see Section 4.2.1.

Figure A2. Average Scores of Industries' Decentralization Index: *Decent2*




*Notes*: For the definition of *Decent2*, see Section 4.2.1. Industry code number is in parentheses. For industry classification, see Appendix Table 1.

Figure A3. *Decent1* and *IndCoord1* by Level of *SocK*




*Notes*: Each data point plots the weighted average *Decent1* and *IndCoord1* of the cell defined by country and industry. Cells with fewer than 30 observations are excluded from the sample (PIAAC's sampling weight is used). The left and right plots are based on countries with low and high average *SocK*, (i.e., high and low average self-centeredness of workers), respectively. The countries with low (respectively, high) *SocK* include the top (bottom) half countries (among non-italic countries that have *IndCoord1* data) in the corresponding *SocK* column in Table 4.3. For the definitions of variables, see Section 4.2.

Table A1. Description of Variables and Summary Statistics

| Variable | Description | Mean | Std. Dev. |
|---|---|---|---|
| *Decent1* | Decentralization index 1. See Section 4.2.1. | -0.044 | 0.794 |
| *Decent2* | Decentralization index 2. See Section 4.2.1. | -0.034 | 0.670 |
| *IndCoord1* | Coordination needs of affiliated industry (Index 1 based on 34 industries) See Section 4.2.2. | 2.165 | 0.509 |
| *IndCoord2* | Coordination needs of affiliated industry (Index 2 based on 71 industries) See Section 4.2.2. | 30.968 | 18.447 |
| *Trust1_piaac* | Region's social capital representing self-centeredness of workers. See Table 4.2 | 2.238 | 0.302 |
| *Trust1_wvs* | See *Trust1_piaac* | 0.387 | 0.173 |
| *Trust2_piaac* | See *Trust1_piaac* | 2.282 | 0.413 |
| *Vol_piaac* | See *Trust1_piaac* | 1.462 | 0.207 |
| *Vol_wvs* | See *Trust1_piaac* | 0.193 | 0.159 |
| *Wealth_wvs* | See *Trust1_piaac* | 5.957 | 0.784 |
| *Female* | Dummy: 1 if female, 0 if male | 0.506 | 0.500 |
| *Age* | Age | 39.347 | 12.653 |
| *Exp* | Years of work (paid work) experience | 17.420 | 12.368 |
| *Tenure* | Years of tenure at the current employer | 7.712 | 9.156 |
| *Eduy* | Years of education | 12.405 | 2.584 |
| *Health* | Health status (1 = poor−5 = excellent) | 3.425 | 1.007 |
| *Forborn* | Dummy: 1 if born in a foreign country, 0 otherwise | 0.093 | 0.291 |
| *Forlang* | Dummy: 1 if PIAAC's test language is different from native language, 0 if same | 0.076 | 0.264 |
| *Occ: Tech/AssoPro* | Dummy: 1 if technician or associate professional, 0 otherwise | 0.174 | 0.379 |
| *Occ: Clerks* | Dummy: 1 if clerk, 0 otherwise | 0.154 | 0.361 |
| *Occ: Service/Sales* | Dummy: 1 if service worker or shop and market sales worker, 0 otherwise | 0.260 | 0.438 |
| *Occ: Craft* | Dummy: 1 if craft and related trades worker, 0 otherwise | 0.151 | 0.358 |
| *Occ: Operator /Assembler* | Dummy: 1 if plant and machine operator or assembler, 0 otherwise | 0.133 | 0.339 |
| *Occ: Elementary* | Dummy: 1 if elementary occupations, 0 otherwise | 0.129 | 0.335 |
| *ICTwork* | Mean of seven standardized scores on ICT use frequency on a 5-point scale: 1) using e-mail, 2) using the internet to better understand issues related to the work, 3) conducting transactions on the internet, 4) using spreadsheet software, 5) using a word processor, 6) using a programming language to program or write computer code, 7) participating in real-time discussions on the internet, in the job | -0.005 | 0.706 |
| *ReadWork* | Mean of eight standardized scores on reading frequency on a 5-point scale:1) directions or instructions, 2) letters, memos, or e-mails, 3) articles in newspapers, magazines, or newsletters, 4) articles in professional journals or scholarly publications, 5) books, 6) manuals or reference materials, 7) bills, invoices, bank | -0.015 | 0.628 |

| | | | |
|---|---|---|---|
| | statements or other financial statements, 8) diagrams, maps, or schematics, in the job | | |
| *WriteWork* | Mean of four standardized scores on writing frequency on a 5-point scale: 1) writing letters, memos, or e-mails, 2) writing articles for newspapers, magazines, or newsletters, 3) writing reports, 4) filling in forms, in the job | 0.007 | 0.673 |
| *NumWork* | Mean of six standardized scores on numeracy frequency on a 5-point scale: 1) calculating prices, costs or budgets, 2) using or calculating fractions, decimals or percentages, 3) using a calculator, 4) preparing charts, graphs or tables, 5) using simple algebra or formulas, 6) using more advanced math or statistics such as calculus, complex algebra, trigonometry or use of regression techniques, in the job | 0.004 | 0.684 |
| *LitSkill* | Literacy proficiency scores based on PIAAC's direct skill assessment | 270.963 | 44.195 |
| *NumSkill* | Numeracy proficiency scores based on PIAAC's direct skill assessment | 266.761 | 47.638 |
| *Fulltime* | Dummy:1 if usual work hours per week are 30 hours or more, 0: otherwise | 0.779 | 0.415 |
| *Permanent* | Dummy: 1 if having an indefinite employment contract, 0 otherwise | 0.709 | 0.454 |
| *Estsize: 1-10* | Dummy:1 if the employment size of the workplace is 1−10 people, 0 otherwise | 0.290 | 0.454 |
| *Estsize: 11-50* | Dummy:1 if the employment size of the workplace is 11−50 people, 0 otherwise | 0.311 | 0.463 |
| *Estsize: 51-250* | Dummy:1 if the employment size of the workplace is 51−250 people, 0 otherwise | 0.223 | 0.416 |
| *Estsize: 251-1000* | Dummy:1 if the employment size of the workplace is 251−1000 people, 0 otherwise | 0.111 | 0.315 |
| *Estsize: 1000+* | Dummy:1 if the employment size of the workplace is more than 1000 people, 0 otherwise | 0.065 | 0.246 |
| *PartOfFirm* | Dummy: 1 if the workplace is a part of a larger firm or organization, 0 if not | 0.593 | 0.491 |
| *PrivateSector* | Dummy: 1 if working in private sector, 0 otherwise | 0.765 | 0.424 |
| *PublicSector* | Dummy: 1 if working in public sector, 0 otherwise | 0.213 | 0.409 |
| *NPOSector* | Dummy: 1 if working in a non-profit organization, 0 otherwise | 0.022 | 0.147 |
| *IndExpor* | % of final goods exports in industry output | 18.069 | 19.832 |
| *IndImpor* | % of imports (intermediate and final goods) in industry output | 19.330 | 55.672 |
| Industry 1 | Agriculture, hunting, forestry and fishing | 0.013 | 0.114 |
| Industry 2 | Mining and quarrying | 0.004 | 0.062 |
| Industry 3 | Food products, beverages and tobacco | 0.031 | 0.174 |
| Industry 4 | Textiles, textile products, leather and footwear | 0.010 | 0.099 |
| Industry 5 | Wood and products of wood and cork | 0.006 | 0.080 |
| Industry 6 | Pulp, paper, paper products, printing and publishing | 0.013 | 0.113 |
| Industry 7 | Coke, refined petroleum products and nuclear fuel | 0.001 | 0.034 |
| Industry 8 | Chemicals and chemical products | 0.014 | 0.116 |
| Industry 9 | Rubber and plastics products | 0.008 | 0.090 |

| | | | |
|---|---|---|---|
| Industry 10 | Other non-metallic mineral products | 0.009 | 0.093 |
| Industry 11 | Basic metals | 0.006 | 0.078 |
| Industry 12 | Fabricated metal products | 0.020 | 0.139 |
| Industry 13 | Machinery and equipment, nec | 0.025 | 0.156 |
| Industry 14 | Computer, Electronic and optical equipment | 0.013 | 0.113 |
| Industry 15 | Electrical machinery and apparatus, nec | 0.010 | 0.098 |
| Industry 16 | Motor vehicles, trailers and semi-trailers | 0.025 | 0.156 |
| Industry 17 | Other transport equipment | 0.006 | 0.077 |
| Industry 18 | Manufacturing nec, recycling | 0.016 | 0.126 |
| Industry 19 | Electricity, gas and water supply | 0.011 | 0.104 |
| Industry 20 | Construction | 0.070 | 0.255 |
| Industry 21 | Wholesale and retail trade, repair services | 0.165 | 0.371 |
| Industry 22 | Hotels and restaurants | 0.056 | 0.229 |
| Industry 23 | Transport and storage | 0.061 | 0.239 |
| Industry 24 | Post and telecommunications | 0.021 | 0.142 |
| Industry 25 | Financial intermediation | 0.027 | 0.161 |
| Industry 26 | Real estate | 0.008 | 0.091 |
| Industry 27 | Renting of machinery and equipment | 0.003 | 0.052 |
| Industry 28 | Computer and related services | 0.007 | 0.083 |
| Industry 29 | R&D and other business services | 0.069 | 0.254 |
| Industry 30 | Public administration and defense, compulsory social security | 0.066 | 0.248 |
| Industry 31 | Education | 0.036 | 0.185 |
| Industry 32 | Health and social work | 0.123 | 0.328 |
| Industry 33 | Other community, social and personal services | 0.046 | 0.209 |
| Industry 34 | Private households with employed persons | 0.004 | 0.064 |
| CZE | Czech Republic | 0.083 | 0.276 |
| DNK | Denmark | 0.084 | 0.277 |
| FRA | France | 0.068 | 0.252 |
| DEU | Germany | 0.082 | 0.275 |
| IRL | Ireland | 0.064 | 0.244 |
| JPN | Japan | 0.087 | 0.282 |
| KOR | Korea | 0.067 | 0.250 |
| NLD | Netherlands | 0.073 | 0.260 |
| POL | Poland | 0.066 | 0.248 |
| RUS | Russia | 0.058 | 0.234 |
| SVK | Slovak Republic | 0.072 | 0.258 |
| ESP | Spain | 0.060 | 0.237 |
| SWE | Sweden | 0.072 | 0.258 |
| UK | United Kingdom | 0.065 | 0.246 |

*Notes*: The summary statistics are based on the regression sample (column 1 or 2 in Table 6.1 with 25,475 observations) when using *Decent1*, *IndCoord1*, and *Trust1_piaac*, except the following variables: *IndCoord2* (number of observations is 23,633), *Trust1_wvs* (25,253), *Trust2_piaac* (25,475), *Vol_piaac* (25,475), *Vol_wvs* (15,265), *Wealth_wvs* (22,780), and *Exp*, *Tenure*, *Forlang*, *and Permanent* (24,549). Industry classification is based on *IndCoord1*. Both mean and standard deviations are computed using the "*repest*" command in Stata (weight is revised as explained in Section 3).

Table A2. Pairwise Correlation among Decentralization Indices and their Components

| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | *Decent1* | *Decent2* |
|---|---|---|---|---|---|---|---|---|---|
| Q1 | 1 | | | | | | | | |
| Q2 | 0.672 | 1 | | | | | | | |
| Q3 | 0.560 | 0.617 | 1 | | | | | | |
| Q4 | 0.378 | 0.341 | 0.335 | 1 | | | | | |
| Q5 | 0.368 | 0.328 | 0.285 | 0.194 | 1 | | | | |
| Q6 | 0.425 | 0.374 | 0.347 | 0.264 | 0.646 | 1 | | | |
| Q7 | 0.167 | 0.163 | 0.121 | 0.117 | 0.274 | 0.262 | 1 | | |
| *Decent1* | 0.835 | 0.842 | 0.805 | 0.651 | 0.376 | 0.450 | 0.182 | 1 | |
| *Decent2* | 0.772 | 0.756 | 0.707 | 0.564 | 0.669 | 0.716 | 0.453 | 0.894 | 1 |

*Notes*: Correlations are calculated at the individual (non-managerial and non-supervisory workers having region information) level using the "*repest*" command in Stata (weight is revised as explained in Section 3). All correlations are statistically significant at 1% level. Q1−Q7 correspond to PIAAC questions (i)−(vii) in Section 4.2.1, respectively. For more details, see Section 4.2.1.

Table A3. Industry Need for Coordination: Sorted by 71 Industries Based on *IndCoord2*

| Sector | Industry Description | *IndCoord2* | Sector | Industry Description | *IndCoord2* |
|---|---|---|---|---|---|
| S | Real estate activities | 1 | S | Residential care activities | 37 |
| S | Motion picture, video and television program production, sound recording and music publishing activities | 2 | M | Manufacture of food products | 38 |
| S | Creative, arts and entertainment activities, gambling and betting activities, sports activities and amusement and recreation activities | 3 | M | Manufacture of basic pharmaceutical products and pharmaceutical preparations | 39 |
| S | Employment activities | 4 | M | Manufacture of beverages | 40 |
| S | Legal and accounting activities | 5 | M | Manufacture of leather and related products | 41 |
| S | Other professional, scientific and technical activities | 6 | S | Scientific research and development | 42 |
| S | Activities of membership organizations | 7 | S | Computer programming, consultancy and related activities | 43 |
| S | Retail trade, except of motor vehicles and motorcycles | 8 | S | Repair and installation of machinery and equipment, repair of computers and personal and household goods | 44 |
| S | Activities of head offices, management consultancy activities | 9 | M | Manufacture of coke and refined petroleum products | 45 |
| S | Food and beverage service activities | 10 | M | Manufacture of computer, electronic and optical products | 46 |
| P | Crop and animal production, hunting and related service activities | 11 | (S) | Sewerage, waste collection, treatment and disposal activities; materials recovery, remediation activities and other waste management services | 47 |
| S | Office administrative, office support and other business support activities | 12 | S | Education | 48 |
| S | Other personal service activities | 13 | M | Printing and reproduction of recorded media | 49 |
| S | Accommodation | 14 | M | Manufacture of textiles | 50 |
| S | Services to buildings and landscape activities | 15 | M | Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plait | 51 |
| P | Mining support service activities | 16 | P | Fishing and aquaculture | 52 |
| S | Financial service activities, except insurance and pension funding , insurance, reinsurance and pension funding, | 17 | M | Manufacture of chemicals and chemical products | 53 |

| | | | | | |
|---|---|---|---|---|---|
| | except compulsory social security, activities auxiliary to financial service and insurance activities | | | | |
| S | Advertising and market research | 18 | S | Postal and courier activities | 54 |
| S | Travel agency, tour operator, reservation service and related activities | 19 | M | Manufacture of tobacco products | 55 |
| M | Manufacture of wearing apparel | 20 | (S) | Electricity, gas, steam and air conditioning supply water collection, treatment and supply | 56 |
| S | Rental and leasing activities | 21 | S | Architectural and engineering activities; technical testing and analysis | 57 |
| S | Publishing activities, programming and broadcasting activities, telecommunications, information service activities | 22 | M | Manufacture of electrical equipment | 58 |
| S | Libraries, archives, museums and other cultural activities | 23 | M | Manufacture of fabricated metal products, except machinery and equipment | 59 |
| S | Wholesale and retail trade and repair of motor vehicles and motorcycles | 24 | M | Manufacture of furniture | 60 |
| S | Wholesale trade, except of motor vehicles and motorcycles | 25 | M | Manufacture of motor vehicles, trailers and semi-trailers | 61 |
| S | Veterinary activities | 26 | P | Forestry and logging | 62 |
| S | Warehousing and support activities for transportation | 27 | M | Manufacture of machinery and equipment nec. | 63 |
| M | Other manufacturing | 28 | M | Manufacture of other non-metallic mineral products | 64 |
| S | Social work activities without accommodation | 29 | P | Mining of coal and lignite | 65 |
| S | Security and investigation activities | 30 | M | Manufacture of rubber and plastics products | 66 |
| S | Human health activities | 31 | M | Manufacture of paper and paper products | 67 |
| P | Extraction of crude petroleum and natural gas | 32 | M | Manufacture of basic metals | 68 |
| S | Air transport | 33 | P | Other mining and quarrying | 69 |
| S | Water transport | 34 | M | Manufacture of other transport equipment | 70 |
| (S) | Construction of buildings, civil engineering, specialized construction activities | 35 | P | Mining of metal ores | 71 |
| S | Land transport and transport via pipelines | 36 | | | |

*Notes*: Figures are weighted average scores across 18 countries with 2-digit level industry codes (ISIC Rev. 4). For the definition of *IndCoord2*, see Section 4.2.2. P, M, and S in the column "Sector" denote primary, manufacturing, and service sectors, respectively.

Table A4. Pairwise Correlation among Social Capital Variables

| | *Trust1_piaac* | *Trust1_wvs* | *Trust2_piaac* | *Vol_piaac* | *Vol_wvs* | *Wealth_wvs* |
|---|---|---|---|---|---|---|
| *Trust1_piaac* | 1 | | | | | |
| *Trust1_wvs* | 0.816 | 1 | | | | |
| *Trust2_piaac* | 0.711 | 0.768 | 1 | | | |
| *Vol_piaac* | 0.544 | 0.683 | 0.446 | 1 | | |
| *Vol_wvs* | 0.396 | 0.380 | 0.180 | 0.322 | 1 | |
| *Wealth_wvs* | 0.305 | 0.346 | 0.203 | 0.245 | 0.484 | 1 |

*Notes*: Correlations are calculated at the individual (non-managerial and non-supervisory workers having region information) level using the "*repest*" command in Stata (weight is revised as explained in Section 3). All correlations are statistically significant at the 1% level. For the definitions of each variable, see Table 4.2.

Table A5. Other Determinants of Decentralization (*Decent2*)

| ***SocK =*** | ***Trust1_piaac*** | | ***Trust1_wvs*** | | ***Trust2_piaac*** | | ***Vol_piaac*** | | ***Vol_wvs*** | | ***Wealth_wvs*** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** |
| *IndCoord1* | -0.319 *** | -0.296 *** | -0.142 *** | -0.134 *** | -0.251 *** | -0.232 *** | -0.249 *** | -0.233 *** | -0.127 *** | -0.118 *** | -0.272 *** | -0.228 *** |
| | (0.075) | (0.075) | (0.032) | (0.032) | (0.060) | (0.058) | (0.073) | (0.072) | (0.034) | (0.034) | (0.071) | (0.071) |
| *SocK* | -0.130 * | | -0.294 * | | -0.192 *** | | -0.143 | | -0.348 ** | | -0.059 ** | |
| | (0.072) | | (0.153) | | (0.068) | | (0.106) | | (0.161) | | (0.024) | |
| *IndCoord1*SocK* | 0.110 *** | 0.103 *** | 0.175 *** | 0.176 *** | 0.079 *** | 0.074 *** | 0.121 ** | 0.115 ** | 0.230 *** | 0.223 *** | 0.031 *** | 0.025 ** |
| | (0.031) | (0.031) | (0.055) | (0.056) | (0.024) | (0.023) | (0.048) | (0.047) | (0.062) | (0.066) | (0.010) | (0.010) |
| *Female* | -0.027 *** | -0.023 ** | -0.030 *** | -0.026 *** | -0.027 *** | -0.024 ** | -0.027 *** | -0.023 ** | -0.014 | -0.011 | -0.026 *** | -0.022 ** |
| | (0.009) | (0.010) | (0.009) | (0.009) | (0.009) | (0.010) | (0.009) | (0.010) | (0.012) | (0.012) | (0.010) | (0.010) |
| *Age* | 0.004 * | | 0.004 * | | 0.004 * | | 0.004 * | | 0.004 | | 0.004 * | |
| | (0.002) | | (0.002) | | (0.002) | | (0.002) | | (0.003) | | (0.002) | |
| *Age^2* | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) | |
| *Exp* | | 0.004 *** | | 0.004 *** | | 0.004 *** | | 0.004 *** | | 0.005 *** | | 0.005 *** |
| | | (0.001) | | (0.001) | | (0.001) | | (0.001) | | (0.002) | | (0.001) |
| *Exp^2* | | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 * | | 0.000 |
| | | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) |
| *Tenure* | | 0.003 * | | 0.003 * | | 0.003 * | | 0.003 * | | 0.003 * | | 0.002 |
| | | (0.002) | | (0.002) | | (0.002) | | (0.002) | | (0.002) | | (0.002) |
| *Tenure^2* | | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 |
| | | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) | | (0.000) |
| *Eduy* | 0.014 *** | 0.015 *** | 0.014 *** | 0.015 *** | 0.013 *** | 0.015 *** | 0.013 *** | 0.015 *** | 0.014 *** | 0.015 *** | 0.014 *** | 0.015 *** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| *LitSkill* | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| *NumSkill* | 0.000 * | 0.000 * | 0.000 | 0.000 * | 0.000 * | 0.000 * | 0.000 | 0.000 * | 0.001 ** | 0.001 ** | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| *Health* | 0.019 *** | 0.019 *** | 0.018 *** | 0.017 *** | 0.019 *** | 0.019 *** | 0.019 *** | 0.019 *** | 0.024 *** | 0.023 *** | 0.019 *** | 0.018 *** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) |
| *Forborn* | -0.093 *** | -0.084 *** | -0.094 *** | -0.084 *** | -0.093 *** | -0.083 *** | -0.092 *** | -0.084 *** | -0.106 *** | -0.096 *** | -0.094 *** | -0.083 *** |
| | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.019) | (0.020) | (0.028) | (0.029) | (0.021) | (0.022) |
| *Forlang* | -0.042 * | -0.043 * | -0.040 | -0.043 * | -0.041 | -0.043 * | -0.041 * | -0.044 * | -0.047 | -0.048 | -0.046 * | -0.047 * |
| | (0.025) | (0.025) | (0.025) | (0.026) | (0.025) | (0.025) | (0.025) | (0.025) | (0.030) | (0.031) | (0.027) | (0.028) |

| *SocK =* | *Trust1_piaac* | | *Trust1_wvs* | | *Trust2_piaac* | | *Vol_piaac* | | *Vol_wvs* | | *Wealth_wvs* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** |
| *Occ: Tech/AssoPro* | 0.023 | 0.023 | 0.022 | 0.021 | 0.023 | 0.022 | 0.024 | 0.022 | 0.027 | 0.020 | 0.020 | 0.018 |
| | (0.017) | (0.017) | (0.016) | (0.016) | (0.017) | (0.017) | (0.017) | (0.017) | (0.021) | (0.022) | (0.017) | (0.017) |
| *Occ: Clerks* | -0.036 ** | -0.038 ** | -0.037 ** | -0.037 ** | -0.035 ** | -0.038 ** | -0.036 ** | -0.039 ** | -0.033 * | -0.042 ** | -0.040 *** | -0.042 *** |
| | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) | (0.018) | (0.018) | (0.015) | (0.015) |
| *Occ: Service/Sales* | -0.050 *** | -0.048 *** | -0.050 *** | -0.050 *** | -0.049 *** | -0.048 *** | -0.050 *** | -0.050 *** | -0.051 *** | -0.055 *** | -0.053 *** | -0.053 *** |
| | (0.014) | (0.014) | (0.014) | (0.014) | (0.015) | (0.015) | (0.014) | (0.014) | (0.018) | (0.019) | (0.014) | (0.014) |
| *Occ: Craft* | 0.009 | 0.003 | 0.009 | 0.003 | 0.008 | 0.003 | 0.008 | 0.003 | 0.005 | -0.005 | 0.003 | -0.004 |
| | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.023) | (0.023) | (0.017) | (0.018) |
| *Occ: Operator* | -0.150 *** | -0.154 *** | -0.153 *** | -0.157 *** | -0.152 *** | -0.156 *** | -0.153 *** | -0.156 *** | -0.168 *** | -0.178 *** | -0.159 *** | -0.164 *** |
| */Assembler* | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.019) | (0.023) | (0.023) | (0.021) | (0.021) |
| *ICTwork* | 0.138 *** | 0.136 *** | 0.139 *** | 0.136 *** | 0.137 *** | 0.136 *** | 0.138 *** | 0.136 *** | 0.145 *** | 0.144 *** | 0.134 *** | 0.132 *** |
| | (0.008) | (0.008) | (0.008) | (0.009) | (0.008) | (0.008) | (0.008) | (0.008) | (0.011) | (0.011) | (0.009) | (0.009) |
| *ReadWork* | 0.199 *** | 0.195 *** | 0.199 *** | 0.196 *** | 0.200 *** | 0.196 *** | 0.199 *** | 0.195 *** | 0.203 *** | 0.200 *** | 0.200 *** | 0.196 *** |
| | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.013) | (0.013) | (0.011) | (0.011) |
| *WriteWork* | 0.057 *** | 0.056 *** | 0.057 *** | 0.056 *** | 0.057 *** | 0.056 *** | 0.056 *** | 0.056 *** | 0.049 *** | 0.049 *** | 0.054 *** | 0.054 *** |
| | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.010) | (0.010) | (0.008) | (0.008) |
| *NumWork* | 0.102 *** | 0.102 *** | 0.103 *** | 0.102 *** | 0.102 *** | 0.102 *** | 0.102 *** | 0.102 *** | 0.110 *** | 0.108 *** | 0.106 *** | 0.106 *** |
| | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.010) | (0.010) | (0.008) | (0.008) |
| *Fulltime* | -0.006 | -0.007 | -0.007 | -0.009 | -0.006 | -0.007 | -0.007 | -0.008 | -0.007 | -0.010 | -0.004 | -0.006 |
| | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.012) | (0.012) | (0.011) | (0.011) |
| *Permanent* | 0.055 *** | 0.044 *** | 0.053 *** | 0.043 *** | 0.054 *** | 0.044 *** | 0.055 *** | 0.045 *** | 0.050 *** | 0.037 *** | 0.052 *** | 0.042 *** |
| | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.012) | (0.013) | (0.010) | (0.010) |
| *Estsize: 11-50* | -0.114 *** | -0.114 *** | -0.114 *** | -0.114 *** | -0.114 *** | -0.114 *** | -0.114 *** | -0.115 *** | -0.105 *** | -0.105 *** | -0.113 *** | -0.113 *** |
| | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.012) | (0.012) | (0.011) | (0.011) |
| *Estsize: 51-250* | -0.127 *** | -0.129 *** | -0.128 *** | -0.129 *** | -0.127 *** | -0.129 *** | -0.127 *** | -0.129 *** | -0.111 *** | -0.113 *** | -0.129 *** | -0.130 *** |
| | (0.015) | (0.014) | (0.014) | (0.014) | (0.015) | (0.014) | (0.015) | (0.014) | (0.017) | (0.017) | (0.015) | (0.015) |
| *Estsize: 251-1000* | -0.149 *** | -0.153 *** | -0.147 *** | -0.152 *** | -0.148 *** | -0.154 *** | -0.148 *** | -0.153 *** | -0.136 *** | -0.140 *** | -0.145 *** | -0.149 *** |
| | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.020) | (0.020) | (0.017) | (0.017) |
| *Estsize: 1000+* | -0.108 *** | -0.111 *** | -0.107 *** | -0.110 *** | -0.106 *** | -0.111 *** | -0.106 *** | -0.112 *** | -0.077 *** | -0.085 *** | -0.104 *** | -0.108 *** |
| | (0.020) | (0.020) | (0.020) | (0.019) | (0.020) | (0.020) | (0.020) | (0.020) | (0.025) | (0.025) | (0.021) | (0.021) |
| *PartOfFirm* | -0.032 *** | -0.035 *** | -0.032 *** | -0.034 *** | -0.033 *** | -0.035 *** | -0.033 *** | -0.036 *** | -0.024 ** | -0.027 ** | -0.031 *** | -0.034 *** |
| | (0.009) | (0.010) | (0.009) | (0.010) | (0.009) | (0.010) | (0.009) | (0.010) | (0.010) | (0.011) | (0.010) | (0.010) |

| *SocK =* | *Trust1_piaac* | | *Trust1_wvs* | | *Trust2_piaac* | | *Vol_piaac* | | *Vol_wvs* | | *Wealth_wvs* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** | **(3)** | **(4)** |
| *PublicSector* | -0.041 *** | -0.048 *** | -0.043 *** | -0.048 *** | -0.042 *** | -0.049 *** | -0.043 *** | -0.050 *** | -0.045 ** | -0.054 *** | -0.038 ** | -0.044 *** |
| | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.018) | (0.018) | (0.016) | (0.015) |
| *NPOSector* | 0.056 * | 0.050 * | 0.054 * | 0.046 | 0.056 * | 0.049 * | 0.059 * | 0.052 * | 0.064 ** | 0.054 * | 0.062 ** | 0.055 * |
| | (0.030) | (0.029) | (0.029) | (0.029) | (0.030) | (0.029) | (0.030) | (0.029) | (0.032) | (0.032) | (0.031) | (0.031) |
| *IndExpor* | -0.002 *** | -0.002 *** | -0.002 *** | -0.002 *** | -0.001 *** | -0.001 *** | -0.002 *** | -0.002 *** | -0.002 *** | -0.002 *** | -0.001 *** | -0.001 *** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.001) | (0.001) | (0.000) | (0.000) |
| *IndImpor* | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 *** | 0.000 *** | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| *Industry dummies* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Country dummies* | Yes | | Yes | | Yes | | Yes | | Yes | | Yes | |
| *Region dummies* | | Yes | | Yes | | Yes | | Yes | | Yes | | Yes |
| *Adj. R-squared* | 0.339 | 0.344 | 0.339 | 0.344 | 0.339 | 0.344 | 0.339 | 0.344 | 0.347 | 0.350 | 0.339 | 0.343 |
| *Observations* | 24544 | 24446 | 24352 | 24253 | 24544 | 24446 | 24544 | 24446 | 14417 | 14362 | 21898 | 21807 |

*Notes*: The dependent variable is *Decent2*. Standard errors in parentheses are estimated using jackknife replicate weights with the "*repest*" command in Stata (weight is revised as explained in Section 3). The column numbers (3) and (4) indicate that the results are identical to those with the same column numbers in Table 6.1. Elementary occupation, establishment size of 1−10, and private sector are the omitted reference groups. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.