

Factor Endowments and Institutional Specialization: Why Countries Develop Different Forms of Corruption?

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Abstract

Do countries specialize institutionally? A burgeoning literature investigates links between economic specialization and institutions, arguing that countries possess institutional comparative advantages (Trefler and Nunn 2013). This work builds on theory arguing that institutions provide the incentive structure for economic activities (North 1990), distribute economic resources (Acemoglu and Robinson 2005), or determine business opportunities (Hall and Soskice 2001). In these arguments, institutions do not only shape economic activity; economic and institutional environment coevolve in a symbiotic relationship. Institutions influence which activities are developed, while emergence of specialized organizations, technology, and concentration of economic power feeds back in to the institutional setting, adapting it to prevailing patterns of economic activity. Thus, institutions evolve to support existing economic specialization. While the channel from institutions to specialization has been studied extensively, this latter part of the symbiotic relationship remains understudied. More importantly, the empirical literature does not reflect the theoretical notion that differences in economic structure may relate to different types of institutions. This paper shows that sectoral specialization induces institutional specialization. Economies invest in combating those types of bribery that are comparatively harmful to their dominant economic activities. Empirical support comes from cross-country variation in the distribution of bribery over various branches of the public sector. By decomposing sectoral structure in its sources (tangible vs. intangible investment), which are affected differently by various forms of bribery, we link bribery types to different economic activities. Using historical variation in factor endowments as instrument for sectoral specialization, we show that the direction of causality runs (partly) from sectoral specialization to institutional specialization.

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1. Introduction

Do countries specialize in specific institutional settings? A burgeoning literature investigates links between economic specialization and institutional environment, arguing that countries possess institutional comparative advantages in certain economic activities (Trefler and Nunn 2013). This work builds on theoretical work arguing that institutions provide the incentive structure for economic activities (North 1990), distribute economic resources (Acemoglu et. al. 2005), or determine business opportunities (Hall and Soskice 2001). In these arguments, however, institutions do not only shape economic activity; specialization and the institutions environment coevolve in a symbiotic relationship. Institutions influence which activities countries develop, while the emergence of specialized organizations, directed technology, and concentration of economic power feeds back on to the institutional setting, adapting it to prevailing patterns of economic activity. Thus, economic specialization does not only respond to the institutional setting, the kind of institutions that a country develops are also a response to the existing economic specialization pattern. While the channel from institutions to economic specialization has been studied extensively, this latter part of the symbiotic relationship remains understudied. More importantly, the empirical literature's conception of institutional variation as levels of institutional development does take seriously the theoretical notion that differences in economic structure are related to different types of institutions.

In this paper, we address the question whether economic specialization induces institutional specialization. Our core tenet is that economic development induces institutional development, but that institutions develop in different directions depending on economic specialization. Focusing on country differences in the acceptance of different types of corruption, we argue that economies condone those types of corruption that are *comparatively* beneficial to their dominant economic activities, as such corruption does least harm to the business interests of existing organizations or political/economic elites. Specifically, we argue

that corruption affecting the security of property rights (judiciary corruption, corruption in land and register services) is avoided in countries specializing in manufacturing sectors reliant on long-term, tangible investments. Types of corruption mainly affecting transaction costs (corruption by police, or tax and customs authorities) are relatively more problematic for economies reliant on intangible, human capital-intensive services, and are suppressed there.

We test this argument in three steps. First, we calculate the tangible investment intensities of countries' comparative economic specialization profiles. To do so, we combine data on tangible and intangible investment intensity per sector with sectoral data on exports from the *United Nations Industrial Development Organization* (UNIDO). In a second step, we identify the relative corruption profile of countries. Exploiting little-used data from *Transparency International* on corruption specified for various branches of the public sector, we calculate the relative share of judicial, registry and land services corruption in countries' total corruption as an indicator of property-rights affecting corruption, and the relative share of police, tax, and customs corruption as indicator of transaction costs-affecting corruption. In a third step, we regress these corruption profiles on the economic specialization profiles, showing that different patterns of sectoral specialization are related to different forms of corruption. Using historical variation in factor endowments as instrument for economic specialization, we show that the direction of causality runs (partly) from sectoral specialization to specialization in different forms of corruption. Our results highlight the interplay between economic structure and institutions. Institutions do not only drive economic specialization, but economic structure also shapes the institutional setting developing in a country.

The remainder of the paper is organized as follows. In Section 2, we discuss the background behind institutions and economic specialization. Section 3 discusses the data and empirical methods. Section 4 presents results and robustness check. Section 5 concludes.

2. Background

2.1. Institutions and Economic Specialization

In recent years, a vibrant literature has emerged on the relation between institutions and economic specialization. A number of papers discuss the impact of the institutional environment on trade specialization, focusing on the quality of contracting institutions (Levchenko 2007, Nunn 2007), financial institutions (Beck 2002; Rajan and Zingales 1998), labor market institutions (Costinot 2009, Cunat and Melitz 2012), or trust (van Hoorn 2014). The general thrust of all these contributions is that there are strong sectoral differences in dependence on various aspects institutional quality. Sectors making relatively intensive use of certain institutional services then flourish in settings where these institutions are more abundant. Thus, the quality of institutions interacts with sectoral dependence on these institutions to determine economic specialization.

In this way, Nunn (2007) and Levchenko (2007) show that the quality of contracting institutions and rule of law affects trade specialization. In their argument, sectors differ in their reliance on non-commoditized inputs. Sectors using a lot of inputs that are not sold on organized exchanges or do not have reference prices are more prone to hold-up problems in the relation with their suppliers. As a result, such sectors require more and more complex contracts than sectors mainly using commoditized inputs. This implies that countries with more developed institutions offer a friendlier environment for such contract-intensive sectors and they will be more successful there. In this way, differences in institutional quality serve a basis for comparative advantage. Similarly, Beck (2002), Manova (2008) and Rajan and Zingales (1998) all argue that sectors that depend strongly on external financing (because of higher up front fixed costs (Beck 2002) or less fixed assets to use as collateral (Manova 2008) are relatively more prevalent in countries with a highly developed financial sector. Labor market institutions may also be a source of comparative advantage, for example because more complex industries

rely more on specialized, highly trained workers. Such industries can only flourish in a setting in which workers can be effectively monitored (Costinot 2009, Culpepper 2001) or where the risks of losing trained workers to competitors and hold-up by workers are reduced through institutions such as collective wage bargaining (Hall and Soskice 2001), long-term employment and protective labor laws (Tang 2012), and effective employers' associations (Culpepper 2001). In a similar vein, Cunat and Melitz (2012) show that countries with more flexible labor laws specialize in more volatile sectors. Van Hoorn (2014) extends the argument of comparative institutional advantage to informal institutions, focusing on the role of trust. Arguing that social trust is a prerequisite for giving workers more autonomy on the job, he shows that high trust countries specialize in industries whose organization is characterized by high levels of worker autonomy.

2.2. Economic Specialization and Institutions

Whereas the majority of papers in this field study the impact of institutional quality on specialization, a few papers study the opposite channel. Most of these focus on the institutional effects of specific commodities. Of these, the negative relation between oil exports and democratic institutions is probably the best documented (Ross 2001; Tsui 2011). Oil exports are associated with lower accountability (due to fiscal autonomy of the state) and enhanced corruption (Leite and Weidmann 1999). Historically, slave exports have also been associated with lower institutional quality, because of the damage it has done to trust and social capital (Nunn 2008, Nunn and Wantchekon 2011). Slightly more generally, Engerman and Sokoloff (1997, 2000) show that historical specialization in plantation products has tended to leave countries with less inclusive institutions, as plantation production is characterized by highly unequal control over production factors.

A few studies transcend the effects of these individual commodities and examine the impact on institutions of intensive use of certain production factors across industries. Braun and

Raddatz (2008), Do and Levchenko (2007) and Levchenko (2013) all present evidence that specialization in sectors with a strong dependence on financial services tends to foster financial development. The underlying mechanism is that the industries with an interest in financial development act as promoters of institutional change. The more dominant these industries are in a country, the stronger the push for financial development.

2.3. Theories of Institutional Evolution

This mechanism resonates with the theoretical contributions of Acemoglu and Robinson (2005) and North (1990, 2005). Both have sought an explanation for the long-term persistence of societally sub-optimal institutions. Acemoglu and Robinson (2005) attribute such persistence to the influence of the political power of elites. In their framework, the distribution of economic resources in an economy causes a distribution of *de facto* political power. In an economy specializing in production of good A, the actors controlling the production of good A and reaping its profits will have a strong say in how the country is run. This influence is constrained by *de jure* political power: laws, regulations and formal institutions by which powerful elites also have to abide. However, as elites have a disproportionate say in the development of economic and political institutions, they will use their influence to further stack the cards in their favor. This means that in the next period economic institutions will favor sector A even more, expanding the share of resources awarded to incumbent elites. Formal political institutions—the source of *de jure* political power—will also be transformed to their advantage. Economic and political institutions thus follow the distribution of economic resources that is generated by an economic specialization pattern, and entrench this pattern further. The upshot is that institutions that are not optimal for society as a whole may persist as long as they are serving the needs of dominant elites (Pandey 2010).

North (1981, 1990, 1992) develops a similar argument, maintaining that institutions provide an incentive structure to individuals, who develop strategies and specialized

organizations in response to this incentive structure. The resulting organizations have a strong interest in maintaining the institutional status quo, or even enhancing the distribution of incentives it generates. As in the [Acemoglu and Robinson \(2005\)](#) argument, the prevailing institutional incentive structure generates dominant actors, who in turn use their dominance to maintain or enhance the existing institutional structure. Societally sub-optimal institutions persist because they are in the interest of the rulers or dominant powers.

Especially in his later work, [North \(1992, 2005\)](#) adds a second argument, in which institutional persistence emerges not only from the symbiotic relation between institutions and power, but also from a symbiotic relation between institutions and knowledge or ideas. Institutions, stipulating which behaviors are right and wrong, are part of our mental models. They are rules of thumb that we need because we lack the cognitive capacity to calculate optimal courses of behavior at each specific moment in time. When acting upon these ideas, we get feedback on the results of our actions, allowing us to learn. However, such learning does not automatically generate knowledge fostering institutional improvement, because the present institutional setting in a society filters and shapes the information that comes in. As a result, individuals tend to interpret information in line with their prevalent models, generating a strong force for maintaining the status quo.

While presented as explanations for the persistence of differences in *quality* of institutions, especially the second argument of North suggests that institutions, ideas and norms may evolve in different *directions*. Societies may have different objective functions, and develop the institutions, strategies and specialized organizations that contribute to that. The literature on varieties of capitalism, triggered by [Hall and Soskice \(2001\)](#), treads further along this line. Comparative institutional advantage in this literature does not originate from a specific institution, but from a coherent system of complementary institutions that depend on each other for their functioning. For example, industries requiring highly specialized skilled labor do not

only depend on the institution of on-the-job-training. Such training can only function if institutional solutions are found to the risk of hold-up by trained workers or free-rider behavior by competitors poaching newly trained employees. Long-term labor relations, collective wage bargaining, and industry associations are thus all part of the system allowing specialized, skilled labor intensive industries to flourish. Countries specializing in industries that rely more on radical innovations are more dependent on flexible capital and labor markets, which depend on training of workers focused on general skills and a remuneration system that awards individual talent. The interdependencies between various institutions and between institutional setting and industrial structure create a strong path-dependent effect. As a result, economies specialize in different economic activities and develop different systems of institutions to support these. There is no single set of institutions that support market economies. Institutional heterogeneity is not so much about variation in levels of institutional development, as about variation in direction of institutional development ([Hall and Soskice 2001](#); [Rodrik 2007](#)).

2.4. Framework: Economic Specialization and Institutional Specialization

The message permeating from the theoretical literature is that economic structure and institutional setting develop in a symbiotic relationship, resulting in different economic and institutional specialization in different societies. The empirical literature, in contrast, has by and large focused on the uni-directional relation from institutional quality to economic specialization. What is more, the few exceptions studying the reverse link ([Braun and Raddatz 2008](#), [Do and Levchenko 2007](#), [Levchenko 2013](#)) focus on economic specialization as explanation for differences in levels of institutional development (more specifically financial development). Beyond the case-study approach followed in [Hall and Soskice \(2001\)](#), the theoretical notion that different forms of economic specialization may generate different types of institutional development has not been considered in the empirical literature. In this paper,

we amend for this omission, focusing on the institutions governing the control of corruption as a case in point.

Starting point is that, conform the literature on comparative institutional advantage (Nunn and Treffler 2013), industries differ in their reliance on institutional services. In particular, we argue that bribery has two main negative effects on business (Dixit 2010, Rose-Ackerman 2010). First, bribery affects the enforcement of contracts and creates uncertainty, thus increasing transaction costs. Second, bribery erodes ‘the legal entitlements to act free of threats to person or property’ (Rose-Ackerman 2010, 6), i.e. it affects property rights (Mauro 1995). These two effects of bribery are not equally important across industries, however. Property rights are primarily important for industries heavily reliant on tangible investment goods with a long maturity, as the risks of expropriation are higher in those sectors. Industries reliant on intangible investments such as human capital face less risk of expropriation and are much less affected by insecure property rights. By default, bribery’s effects on transaction costs are more important in the latter. Industries are thus differentially affected by the different effects of bribery. This is the first step in our argument.

The second building block of our argument is that different types of bribery have different dominant economic effects. Bribery in those branches of government responsible for land services, registry, or the judicial sector directly erodes the security and enforceability of private property rights. Bribery by customs officials or police has a relatively stronger effect on transaction costs and the efficient functioning of markets.

Combining these arguments, we propose that while all sectors have an interest in combating bribery in general, those sectors particularly affected by insecure property rights make a priority of reducing corruption of the property-right affecting type. Similarly, those relatively more affected by transaction costs make a priority of reducing corruption of the

transaction costs-affecting type. Figure 1 presents our framework for analyzing the ensuing evolutionary process.

<FIGURE 1 INSERT HERE>

3. Data and Methods

3.1 Comparative Levels of Bribery

We construct the measures of comparative bribery to public sector officials that affect transaction costs and the security of property rights based on *Global Corruption Barometer 2013*. Six institutional sub-sectors in the public sector are considered: (i) police, (ii) judiciary, (iii) land services, (iv) business registry and permit authorities, (v) tax and customs officials, and (vi) public utility services. Our measure of bribery captures the fraction of respondents in the survey who report paying a bribe to one of the six sub-sectors or know someone who has paid the bribes to the respective service in the public sector in the past 12 months. Although the reported bribery measure does not reflect fully unbiased fraction of the adult population paying bribes, it provides a direct first-order approximation of bribery in a given country. Compared to the perception-based indicators of corruption and from the theoretical point of view, comparative bribery rates in the public sectors allow us to decompose the corruption patterns into transaction cost and property rights categories. Such a decomposition is usually not permeated by the perception-based corruption indicators which generally capture various operational modes of corruption from a theoretical perspective such as nepotism, conflict of interest, favoritism, and clientelism (Leef 1964, Lui 1985, Beck and Maher 1986, Galtung 2006). Using comparative bribery rates in the public sector essentially allows us to construct two distinctive corruption profiles directly without conspicuous assumptions and examine the patterns of institutional specialization in the property rights-affecting corruption and transaction costs-affecting corruption.

3.2 Corruption Profiles: Property Rights vs. Transaction Costs

The dominant effects of corruption primarily reflect less secure property rights (Myrdal 1968, De Soto 1989, Mauro 1995, Acemoglu and Verdier 1998, Clague et. al. 1999, Claessens and Laeven 2003), and higher transaction costs (Lui 1985, Shleifer and Vishny 1993, Husted 1994, Lambsdorff 2002, Aidt 2003, Warren 2004, Blackburn et. al. 2006, Fishman and Svensson 2007). The effects of corruption on property rights and transaction costs clearly differ across different types of corruption. An incidence of bribery in two distinct institutional sectors may clearly exert a different set of economic effects that critically depend on the pattern of economic specialization influenced by the bribery. Sectors primarily reliant on low transaction costs might be affected differently by the incidence of bribery in the particular institutional branch than sectors dependent on secure property rights which chiefly depends on the dominant form of economic activity. Sectors relying on low transaction costs may thus prioritize easy, cheap, fast, and efficient transactions whilst sectors reliant on secure property rights prioritize secure long-term tangible investment. Subsequently, countries may specialize in two dominant forms of corruption that affects either (i) the security of property rights, or (ii) transaction costs. In either case, the selection into property rights- or transaction costs-affecting corruption profile depends on the average corruption as it designates the extent to which the particular countries are likely to specialize in each dominant form of corruption. Perception-based indicators typically disallow the construction of corruption profiles as distinctive forms of institutional specialization whereas the bribery rates highlight the observed incidence of corruption rather than a mere perception (Aidt 2009, Andersson and Heywood 2009, Dreher and Schneider 2010)

We start with the construction of the simple model of bribery. Assume the world consists of $j = 1, 2, \dots, J$ economies. Average bribery across the six institutional sectors of the government is computed as an unweighted average of bribery shares per sector:

$$C_i^j = \frac{1}{n} \sum_{i=1}^N s_i \quad (1)$$

where $i = 1, 2, \dots, n$ is the number of institutional sectors of the government where bribery is observed, and s denotes the fraction of agents bribing the public sector officials across the six institutional sectors with a normalized mass $s = \{0, 1\}$. The selection into property rights or transaction costs-affecting bribery profile is contingent on the ratio of bribery in each institutional sector of the government to the average bribery from Eq. (1) which allows us to establish the measures of institutional specialization into two dominant forms of corruption. We construct the country-level relative intensity of bribery for each institutional sector by dividing the fraction of agents bribing public officials in each sector with the total bribery:

$$S_i^{jk} = \frac{S_k}{C_i} \quad (2)$$

where S_i^{jk} is the measure of institutional specialization which is allowed to vary across the different government sectors. The sector-specific measure of institutional specialization denotes the degree to which the bribery in each sector dominates the overall bribery established by Eq. (1). It starkly contrasts the overall bribery as a measure of corruption as some economies may develop distinctive forms of bribery which can exhibit contrasting effects on economic specialization. The six institutional sectors of the government are decomposed into two dominant forms of corruption. First, the property rights-affecting bribery measure is established by constructing the additive index consisting of the relative bribery intensity in (i) judiciary, (ii) registry and permit authorities, and (iii) land services since these sectors exhibit strong direct and indirect effects on the security of property rights. And second, the transaction costs-affecting bribery measure is established through the additive index which consists of the relative bribery intensity in (iv) police, (v) tax and customs officials, and (vi) utilities. These sectors primarily affect the reliability of services and efficiency of economic transactions and thus critically affect the extent of transaction costs. Both indices are constructed as follows:

$$C_{ij}^{Property\ Rights} = S_j^{Judiciary} + S_j^{Registry} + S_j^{Land\ Services} \quad (3)$$

$$C_{ij}^{Transaction\ Costs} = S_j^{Police} + S_j^{Tax\ Customs} + S_j^{Utilities} \quad (4)$$

Two dominant corruption profiles permit the establishment of the relationship between different forms of economic specialization and two major streams of bribery since the six institutional sectors primarily affect either the security of property rights or the extent of transaction costs, and can be composed into two indices. Figure 2 displays the relationship between property rights and transaction costs-based corruption profiles from Eq. (3) and (4). It documents the persistence of the trade-off between both measures of institutional specialization. Countries that specialize in the property-rights affecting bribery exhibit a tendency to avoid the bribery affecting transaction costs while those countries with a tendency to specialize in transaction costs-based bribery are substantially more likely to avoid the institutional specialization in property rights-affecting bribery.²

<FIGURE 2 INSERT HERE>

3.3 Measuring Economic Specialization: Tangible vs. Intangible Investment

Our goal is to examine whether different forms of sectoral specialization trigger the selection into property rights- and transaction-costs affecting bribery as two dominant forms of institutional specialization across countries. Countries with distinctive forms of economic specialization might exhibit different tendencies to avoid each of the two dominant forms of bribery. The sectoral specialization in the industries sensitive to secure property rights might detract the countries away from the specialization in property rights-affecting bribery chiefly because the investment choices in such sectors are contingent on the long-term investments

² The correlation between property rights- and transaction costs-affecting bribery is -0.72 and statistically significant at 1%. The strong negative relationship between both measures does not disappear once we control for the potentially unobserved region-fixed effects. Once we condition the relationship with the unobserved region-fixed effects, the conditional correlation coefficient rises to -0.85 and remains statistically significant at 1%.

which require secure and strongly enforced property rights. Such sectoral specialization profile implies that engaging in property rights-affecting bribery is costly. The sectoral specialization in the industries sensitive to transaction costs, such as services and human capital-based industries, might divert the bribery away from the police, tax and customs services, and utilities since these institutional sectors critically impact the extent of transaction costs upon which the economic outcomes in such industries depend. Engaging in transaction costs-affecting bribery is thus costly for the sectoral specialization profile emphasizing the efficiency and reliability of economic transactions.

Economic specialization profile is best understood in terms of sectoral tangible and intangible investment intensity. Tangible investment emphasizes a disproportionate fraction of tangible assets such as plants, and equipment in the total investment share and capital structure. The specialization in tangible investments implies that such industries critically depend on the long-term investments wherein the choice of long-term over short-term investment critically depends on the security of property rights. Countries with a disproportionate share of sectors with large tangible investments are therefore more likely to avoid the bribery affecting property rights since such form of institutional specialization is costly to sectoral outcomes. Intangible investment emphasizes a large fraction of intangible investment intensity reliant on human capital and services. The specialization into intangible investment profile implies that such industries prefer the institutional arrangements that emphasize low transaction costs to boost the efficiency of economic transactions as the underlying institutional advantage for intangible investment intensive industries. Since higher transaction costs reduce the efficiency of economic transactions, countries specialized in sectors with disproportionately large fraction of intangible investments are much more likely to avoid the bribery in the sectors affecting transaction costs.

Our measure of investment tangibility and intangibility is from [Braun \(2003\)](#) and [Manova \(2008\)](#) Industry-level measures of asset tangibility and intangibility are computed for 27 3-digit ISIC sectors based on the data for all publicly listed US firms from Compustat annual industrial files. Each industry's factor utilization intensity is used to construct the measures of tangible and intangible investment intensity as the two key profiles of economic specialization. Tangible investment intensity corresponds to the median of the gross fixed capital formation to the value added ratio in the U.S. for the period 1986-1995. It captures the share of net property, plants and equipment in total book value assets for the median firm in each sector. The index of intangible investment intensity is constructed as the median of each industry's mean wage over that of the whole manufacturing sector in the U.S. It captures the contribution of intangible assets such as human capital to the economic specialization profiles. Both measures are constructed using UNIDO database.

We use the industry-level measures of investment tangibility and intangibility to construct the country-level tangible and intangible exports in the composition of trade flows. Total exports in country i are constructed by aggregating sector-level exports across 27 3-digit ISIC sectors:

$$EX_i = \sum_{j=1}^J w_j \quad (5)$$

where $j = 1, 2, \dots, J$ denotes the number of sectors, EX denotes i -th country's total exports, and w represents the sector-level exports. Tangible investment-intensive exports are computed by weighing the sector-level exports with the sector-specific investment tangibility measure from [Braun \(2003\)](#) and [Manova \(2008\)](#) and divided by country-level exports in Eq. (5) to construct a fractional measure of tangible investment-intensive economic specialization:

$$EX_i^T = \frac{\sum_{j=1}^J w_j T_j}{EX_i} \quad (6)$$

where EX_i^T denotes tangible investment-intensive exports, w is the j -th sector's total exports and T is the measure of j -th sector investment tangibility. Country-level intangible investment intensity is constructed by weighing j -th sector total exports with the sector-specific human capital intensity measure and divided by total exports:

$$EX_i^I = \frac{\sum_{j=1}^J w_j H_j}{EX_i} \quad (7)$$

where EX_i^I denotes the fraction of intangible investment-intensive exports, w is the j -th sector's total exports and H is the measure of j -th sector investment intangibility. Measure of investment tangibility and intangibility in Eq. (6) and (7) reflect the economic specialization profiles inferred directly from the sectoral intensities and aggregated to the country level to examine the effects of economic specialization on institutional specialization. Industry-level means are used to construct the representative country-level tangible and intangible investment intensity as the underlying economic specialization profiles:

$$K_i^T = J^{-1} \sum_{j=1}^J \frac{w_j T_j}{EX_i} = J^{-1} EX_i^T \quad (8)$$

$$K_i^I = J^{-1} \sum_{j=1}^J \frac{w_j H_j}{EX_i} = J^{-1} EX_i^I \quad (9)$$

Where K_i^T denotes the country-level tangible investment intensity constructed from the sectoral tangibility intensities T of exports w , K_i^I denotes the country-level intangible investment intensity constructed from the sector-specific investment intangibility intensities H of sector-level exports w where $j = 1, 2, \dots, J$ indexes the number of sectors.

3.4. Identification Strategy

Our goal is to estimate and identify the contribution of economic specialization to the institutional profiles consistently. Since our institutional profiles consist of property rights- and

transaction costs-affecting bribery indices, two basic ordinary least squares (OLS) relationship that take place are:

$$C_i^{Property\ Rights} = \alpha_0 + \beta_1 K_i^T + \beta_2 K_i^I + \varepsilon_i \quad (10)$$

$$C_i^{Transaction\ Costs} = \delta_0 + \lambda_1 K_i^T + \lambda_2 K_i^I + u_i \quad (11)$$

where i indexes country, $C^{Property\ Rights}$, and $C^{Transaction\ Costs}$ denote the indices of property rights- and transaction costs-affecting bribery, K^T , and K^I are the respective tangible and intangible economic specialization profiles, while ε , and u are the stochastic disturbances that capture the influence of omitted covariates on the property rights- and transaction costs-affecting bribery. Standard errors are clustered by country to allow for intra-group correlation of stochastic disturbances and arbitrary heteroscedasticity.

We address the endogeneity of economic specialization by exploiting the variation in historical factor endowments to identify the effects on two dominant forms of bribery, address the effects of omitted covariates and the reverse causality that jointly contaminate the OLS model specification in Eq. (10) and (11).

Our key identification assumption suggests historical factor endowments are not correlated with the stochastic disturbances in the corresponding OLS relationship. Two persistence channels defend our identification assumption. First, historical factor endowments determine the comparative advantage through the allocation of production factors. Economies with scarcity of labor supply tend to possess the relative advantage in high-wage sectors whereas the economies with abundant labor supply tend to specialize in intangible sectors emphasizing services and human capital. In this respect, the availability of historical factor endowments critically determines the path of economic evolution and specialization into either tangible or intangible investment-intensive specialization profiles. And second, since the supply

of factor endowments is influenced by physical geography, climate, and temperature, its abundance or scarcity tend to change slowly over time. Slow rate of change in the supply of factor endowments implies that the profile of economic specialization tends to persist. The two mechanisms also imply that the effects of historical factor endowments on institutional specialization is not driven by omitted covariates since the relative abundance and scarcity of endowments had been determined back in history. Subsequently, the effects of historical factor endowments are exogenous to the two dominant forms of bribery and affect it only through its influence on the pattern of economic specialization.

Table 1 presents the set of exploited historical factor endowments used to address the endogeneity of economic specialization. We exploit the set of historical factor endowments capturing (i) tropical diseases (life expectancy in 1900, 19th century male height, latitude), (ii) land fertility (soil quality, permanent crops, cultivated land), (iii) deposits of natural resources (oil reserves), (iv) market access (terrain ruggedness, distance to coast, distance from United Kingdom, density of international airports) to establish the exogenous source of variation in the two dominant forms of bribery, and address the endogeneity of economic specialization driven by the underlying omitted covariates.

<TABLE 1 INSERT HERE>

Letting $\mathbf{F}'_{i,t-1} = \{F^1_{i,t-1}, F^2_{i,t-1}, \dots, F^k_{i,t-1}\}$ denote a set of historical factor endowments, two first-stage relationships for the tangible and intangible economic specialization profiles that take places are:

$$K_i^T = \gamma_0 + \mathbf{F}'_{i,t-1}\boldsymbol{\mu} + v_i \quad (12)$$

$$K_i^I = \phi_0 + \mathbf{F}'_{i,t-1}\boldsymbol{\eta} + e_i \quad (13)$$

where \mathbf{F} denotes the vector of historical factor endowments while v , and e denotes the first-stage stochastic disturbances. The key first-stage coefficients of interest are $\boldsymbol{\mu}$, and $\boldsymbol{\eta}$ which allow us to directly test the relevance conditions for the factor endowments with respect to the

tangible and intangible specialization profile. The standard errors are clustered across countries to allow for arbitrary heteroscedasticity and serially correlated disturbances in the first stage.

3.5 Descriptive Statistics

Key descriptive statistics for the property rights- and transaction costs-affecting bribery, tangible and intangible economic specialization profiles and the set of historical factor endowments are presented in Table 2. Panel A exhibits the comparison of bribery rates across different branches of the public sector. Country-level bribery rates exhibit substantial heterogeneity within the whole sample and across sub-samples. Bribery rate in the judiciary is in the range between 0 percent and 82 percent. Zero bribery rate is found in Finland, Japan, Netherlands, Germany, and South Korea whereas the most widespread bribery is found in Mexico, Sierra Leone, Bangladesh, and Indonesia. The range of the bribery rate in the judiciary corresponds to four standard deviations and does not disappear when the 25th percentile (Austria) and 90th percentile threshold (Mexico) are compared. Similarly large heterogeneity in is evident in the distribution of bribery in the police across countries. The lowest police bribery is found in Denmark, Japan, and Finland whereas Sub-Saharan African sub-sample (Nigeria, Ghana, Sierra Leone) is characterized by the most severe bribery rate. The range in the police bribery between the 25th and 90th percentile is equivalent to 2.5 standard deviations from the mean bribery rate which testifies to the substantial institutional differences across countries in the whole sample. Mean bribery rate in the business registry and permit services is below 20 percent although the sizeable variation exists across countries, ranging from zero percent in Finland, and Uruguay to 67 percent and 71 percent in Jordan, and Sierra Leone. Unconditional mean bribery rate in the utilities is substantially lower compared to other branches of the public sector and varies from 1 percent in Australia, Netherlands, and Japan to 57 percent in Pakistan. The ratio of bribery rate in utilities between 90th and 25th percentile corresponds to two standard

deviations from the mean and is thus substantially lower from the other government branches. Comparative similar distribution of bribery is evident in the tax and customs services where the bribery rate is in the range between zero percent (Germany) to 61 percent (Sierra Leone). The highest tax and customs bribery rates are found in the Middle East and Sub-Saharan Africa whereas the lowest ones are found in Western and Central Europe. The ratio of bribery rates between 90th and 25th percentile corresponds to 2.5 standard deviations from the mean. Large differences in the bribery rate in land services are evident since the rate varies from zero percent in Malaysia, South Korea, and the Netherlands to 75 percent in Paraguay. The difference in the bribery rate for the country at 90th percentile (Tunisia) and the one at 25th percentile (Japan) roughly corresponds to 2 standard deviations from the mean which confirms sizeable institutional differences in the persistence of corruption across countries.

Less substantial heterogeneity across countries is evident in the comparison of economic specialization profiles displayed in Panel B of Table 2. Least tangible investment-intensive country in our sample is Chile whilst the most tangible investment-intensive countries are Algeria and Venezuela. The comparison of the 90th and 25th percentiles of export tangibility suggests the range between both thresholds amounts 0.15 standard deviations from the mean and thus highlights a greater degree of similarity in the tangible economic specialization pattern. In a similar vein, the ratio of intangible economic specialization profile between the 90th and 25th percentile amounts to less than a unit standard deviation from the mean, and thus implies much greater similarity of intangible economic specialization across countries in comparison with the bribery patterns.

In Panel C of Table 2, the key descriptive statistics are presented for the set of historical factor endowments used to establish an exogenous source of variation in the institutional profiles across countries through the pattern of economic specialization. Population density in 1800 is from Clio Infra Global Inequality Database based on [Klein Goldewijk et. al. \(2010\)](#)

History Database of Global Environment (HYDE). Population density is estimated for present-day territories with the spatial resolution of 5 min longitude/latitude coordinates. Terrain ruggedness, distance to coast, latitude and soil quality variables are from [Nunn and Puga \(2012\)](#). Terrain ruggedness is a measure of topographical heterogeneity calculated from the grid of elevation points based on GTOPO30 data from US Geological Survey. It captures the geographical difficulty of market access which can be compared across countries. Distance to coast is measured as the average distance to the nearest ice-free coast, calculated for every point in the country in equi-rectangular projection with the standard parallels at 30 degrees based on Digital Chart of the World from *US National Imagery and Mapping Agency (2000)*. Latitude is expressed in decimal degrees for the geographical centroid of the country. Soil quality is measured as the fraction of country area with the fertile soil defined as soil that is not subject to severe constraints for growing rainfed crops in terms of soil fertility, depth, chemical and drainage properties, or moisture storage capacity.

The variables permanent crops and cultivated land are from *CIA World Factbook 2014 Edition* are both measured as the fraction of the total land area. The data on the distribution of proven oil reserves are obtained from *US Energy Information Administration*. The data on the number of international airports equipped with customs and immigration facilities to handle international flights is from *Airports Council International*.

The variables 19th century male height and life expectancy in 1900 are from Clio Infra database. The data on 19th century male height is from [Baten and Blum \(2012\)](#) and [Köpke and Baten \(2005\)](#), and contains anthropometric information as an indicator for human health and welfare. Mid-century estimated height is taken as a measure of 19th century height. The data on the life expectancy in 1900 is from [Zijdeman \(2014\)](#) and is based on 5-year or decennial estimates.

<TABLE 2 INSERT HERE>

4. Results

In Table 3, the baseline results are presented to examine the hypothesis H1 on the decline of bribery with economic development. The examination of the hypothesis H1 is carried out in two steps. In the first step, basic OLS regressions of the level of per capita GDP (\$G-K 2005 constant prices) on the individual measures of bribery are presented both for property rights and transaction costs-affecting bribery, and individual institutional sectors of the government. In the second step, the hypothesis H1 is examined for five quintiles of the world income distribution in our sample to examine whether multiple forms of bribery exhibit a stronger tendency to decline at particular levels of development. In both instances, the dependent variable is the natural log of per capita GDP while the independent variable is the individual measure of bribery. *Panel A* exhibits the basic OLS regressions whereas *Panel B* presents the results from quantile regressions.

In columns (1), and (2) property rights and transaction costs-affecting bribery indices from Eq. (3) and (4) are used to examine the hypothesis H1. The evidence consistently suggests both dominant forms of bribery decline with the economic development whereas the effects for transaction costs-affecting bribery appears slightly stronger. The estimated effects are statistically significant at 5%. Decline of bribery affecting property rights and transaction costs remains stable across numerous subsamples when the bottom and upper tails of world income distribution are excluded from the whole sample. In *Panel B*, the evidence strongly suggests the decline of bribery is especially profound at 25th and 50th percentile of world income distribution which roughly captures middle-income countries. The estimated quantile-based coefficients show no differential trends in the decline of bribery between property rights and transaction costs-affecting bribery.

<TABLE 3 INSERT HERE>

Does the decomposition of bribery into the individual institutional sectors of the government change the pattern of decline indicated in columns (1) and (2)? In columns (3) through (8), individual measures of bribery are used from each institutional sector of the government. The results confirm a general tendency advocating both persistent and consistent decline of bribery with the rising economic development although notable contrasts are indicated. Firstly, judicial bribery declines strongly at intermediate levels of economic development whereas there appears to be no declining effect beyond the 75th percentile. Secondly, bribes to the business registry and permit services decline strong with economic development at intermediate level but not at the bottom (10th percentile) and upper (90th percentile) tail of world income distribution. And thirdly, bribery to the land services is most likely to decline at 25th and 75th percentile of world income distribution but not at the median or in the upper tail of the distribution. The decline of bribery in land services appears robust across multiple subsamples in Panel A and holds across three out of four excluded subsets.

A similar pattern is invoked in the institutional sub-sectors related to the transaction costs. The bribery to the police exhibits a strong tendency to decline at intermediate levels of economic development, particularly at the 25th percentile and the median since no discernable evidence of decline is indicated by OLS regressions. Compared to property rights-affecting bribery, bribery to the tax and customs officials and utilities declines strong with economic development. The evidence from column (7) consistently suggests that tax and customs bribery does not decline at the 10th percentile whereas the decline beyond the 10th percentile threshold is strong and consistent. A similar pattern is confirmed in the utilities bribery. Full-sample estimates in Panel A indicate a strong and robust decline of utilities bribery whereas more detailed quantile-specific estimates from Panel B show that the decline of utility bribery is most likely to materialize at higher levels of development at the 75th and 90th percentile. The results presented so far suggest bribery declines with economic development and give strong empirical

support for hypothesis H1. Transaction costs-affecting bribery is more likely to decline strongly at higher levels of economic development whereas the decline in property rights-affecting bribery is mostly likely to take place at intermediate levels of development.

In Table 4, we examine the effects of tangible (manufacturing), and intangible (services, human capital) economic specialization on comparative bribery rates in more detail. Panel C presents the basic OLS estimates for the whole sample in columns (1) and (5); without the outliers in columns (2) and (6); and without the upper and bottom 5% of the sample distribution in columns (3), (4), (7), and (8). In Panel D, baseline estimates are decomposed into the quantiles to examine how much the effects of economic specialization on comparative bribery differ across varying levels of property rights- and transaction costs-affecting corruption.

The evidence consistently suggests that countries specialized in tangible investment-intensive manufacturing are significantly more likely to experience comparatively lower levels of bribery in the institutional sectors affecting the security of property rights. In particular, 1 basis point increase in the index of tangible investment intensity is associated with a decline in the property rights-affecting bribery between 3.5 percent in 6.3 percent, depending on the composition of the sample. The contribution of tangible economic specialization to property rights-related bribery is statistically significant at 5%. The negative effect of tangible economic specialization on property rights-affecting bribery appears notably stronger in column (2) where Algeria and Venezuela are excluded from the whole sample since they fall into the outlier category. On the other hand, intangible economic specialization in human capital-intensive services does not appear to be foster or discourage the institutional specialization in property rights-affecting bribery. The estimated contribution of intangible economic specialization to property rights-related bribery appears marginally significant at 10% in column (4) where the upper 5% of countries most affected by property rights-related bribery is excluded from the whole sample, and where 1 basis point increase in the intangible economic specialization is

associated with 1.4 percent increase in the bribery related to the security of property rights. Our OLS estimates imply that tangible and intangible economic specialization explains between 7 percent and 14 percent of the property rights-affecting bribery variation across countries.

Does the pattern of economic specialization matter for transaction costs-related bribery? In column (5) through (8) in *Panel C*, the contribution of tangible and intangible economic specialization to the transaction costs-related bribery is examined. The evidence consistently suggests tangible economic specialization in manufacturing is associated with a significant increase in the index of transaction costs bribery. Our estimates imply that 10 basis point increase in the tangible economic specialization likely leads to an increase in transaction cost bribery between 4.8 percent and 6.2 percent. The estimated parameters further suggest countries specialized in intangible human capital-based services are significantly more likely to avoid transaction cost bribery. For instance, a 10 basis point increase in the intangible economic specialization tends to decrease transaction cost bribery between 1.8 percent and 2.3 percent, respectively. Tangible and intangible patterns of economic specialization account for 18 percent of the cross-country variation in transaction cost bribery.

<TABLE 4 INSERT HERE>

Quantile regression estimates in Panel D indicate a notable heterogeneity in the effects of economic specialization on the two dominant forms of corruption. The evidence across columns (1) through (4) advocates a marked decline of property rights-affecting bribery with an increasing tangible economic specialization at all respective bribery levels. Excluding Algeria and Venezuela in column (2) unveils the strongest decline of the property rights-affecting bribery following an increase in tangible economic specialization profile for the 25th percentile and 90th percentile respectively. Excluding the upper and lower tail from our sample world income distribution – a potential source of outliers – advocates the declining effect of tangible specialization of property rights-related bribery becomes stronger when countries are

further less affected by bribery that undermines property rights. Quantile sample regression estimates also highlight the fundamental importance of economic specialization for transaction costs-related bribery across columns (5) through (8). In contrast to the heterogeneous effects of economic specialization on property rights-related bribery, countries specialized in tangible exports are significantly more likely to specialize in transaction costs-affecting bribery at the lower (rather than higher) levels of transaction costs-related bribery rate. Excluding Algeria and Venezuela in column (6) also suggests the effect does not vanish at higher level of transaction costs. However, excluding the upper and bottom 5% of the distribution from the whole sample confirms the significance of the positive effect of tangible specialization on transaction costs-affecting bribery at below-median levels of this particular form of bribery. Furthermore, quantile regression estimates also provide clear, more balanced, and less ambiguous overview of the relationship between intangible specialization and transaction costs-related bribery. The evidence across columns (5) through (8) show that the decline in transaction costs-affecting bribery as a result of intangible economic specialization profile appears strongest at low and intermediate levels of transaction costs bribery rate but does declines towards zero at higher levels of transaction costs.

4.2. Causal Effects of Economic Specialization

Does tangible and intangible pattern of economic specialization causes the comparative property rights- and transaction costs-affecting bribes? In *Panel E* of Table 5, IV estimates are presented with the corresponding first-stages for the patterns of economic specialization in Panel E from Eq. (14) and (15) using the exogenous variation in historical factor endowments to establish the causality. The evidence from column (1) through (4) consistently suggests countries specialized in tangible exports are significantly more likely to avoid property rights-affecting bribery while countries specializing in intangible exports are significantly more likely

to experience consistently higher property rights-related bribery. The results are consistent with the view according to which the economic specialization in the tangible-intensive sectors such as manufacturing requires secure property rights behind long-term investments whereas intangible economic specialization in services with a high share of human capital input requires efficient, speedy, cheap, and easy transactions which make it less costly to engage in property rights-affecting bribery but costly to engage in transaction costs-affecting bribery as the former tends to reduce the efficiency of economic transactions. Countries specialized in tangible exports are simply more inclined to avoid property rights-related bribery as it renders property rights weak and thus does not secure long-term investments necessary to finance tangible assets. The economic specialization in tangible exports makes it costly for such countries to engage in property rights-affecting bribes, and less costly to specialize in transaction costs bribery since human capital-oriented services constitute the backbone of economic specialization through the efficiency and low cost of economic transactions.

First-stage estimates in Panel E confirm the importance of historical factor endowments in shaping the pattern of tangible economic specialization. Lower population density in 1800 and more rugged terrain are associated with a markedly lower propensity to specialize in tangible exports which highlights the importance of settlement pattern and physical geography for the profile of economic specialization. Countries with relatively taller male population in the 19th century, hence better nutrition status, have been significantly more likely to specialize in manufacturing-based tangible exports whereas those with higher historical life expectancy are much less likely to specialize in tangible exports. In addition, countries with historically more difficult market access, proxied by the density of international airports, and greater distance from the coast, are significantly less likely to specialize in tangible investment-intensive exports whereas the abundance of natural resources, proxied by oil reserves, tends to encourage the specialization in tangible exports. The effects of historical factor endowments

remain unchanged across columns (2) through (4), where the potential outliers are excluded from the base sample.

First-stage estimates for the intangible economic specialization across columns (1) through (4) in Panel F confirm the importance of historical factor endowments in shaping the pattern of economic specialization. Countries with less fertile land and more scarce supply of crops, proxied by the fraction of cultivated land, are systematically more likely to specialize in intangible exports. First-stage estimates also confirm the importance of market access and physical geography in influencing the intangible pattern of economic specialization. Countries located outside the tropical zone at higher latitude, and those with a greater density of international airports are significantly more likely to specialize in service- and human capital-based intangible activities.

Thus, our results clearly imply that the institutional profiles evolve symbiotically with the pattern of economic specialization. Countries specialized in manufacturing-based tangible exports which require the enforcement of strong property rights to secure long-term investments are thus systematically avoid property rights-affecting bribery that renders property rights weak and insecure, and precludes the specialization in tangible economic activities. The reliance on services and human capital, which comprise the backbone of intangible export specialization, appears to render property rights-affecting bribery less costly, as intangible economic specialization is less sensitive to the security of property rights. Testing the potentially overidentifying restrictions and underidentification of the key causal (endogenous) mechanism confirms the validity of historical factor endowments as an exogenous source of variation in the comparative bribery levels. Our results offer strong support for the hypothesis H2, and thus suggest the causal effect from the economic specialization to comparative levels of bribery. Tangible sectors primarily affected by the security or property rights clearly appear to prioritize the reduction in property rights-affecting bribery.

In columns (5) through (8), we test the hypothesis H3 and examine whether the pattern of economic specialization matters for transaction costs-affecting bribery. Hypothesis H3 implies that intangible sectors are relatively sensitive to transaction costs-affecting bribery prioritize the reduction in corruption affecting transaction costs. The IV estimates consistently suggests the opposite pattern compared to the evidence from columns (1) through (4). The specialization in tangible exports is significantly more likely to induce the increase in transaction costs-affecting bribery whereas the specialization in intangible exports tend to systematically decrease the bribery affecting transaction costs. Our point estimates imply that an increase in intangibility of exports by 10 percentage points tends to decrease transaction costs-affecting bribery rate between 3.6 and 4.2 percentage points, respectively. In addition, the corresponding increase in export tangibility tends to increase transaction costs-affecting bribery in the range between 7.2 and 10.1 percentage points, depending on the composition of the sample and tangible vs. intangible distribution cutoffs. The results across columns (5) and (8) clearly imply countries specialized into service- and human capital-based intangible exports systematically avoid transaction costs-affecting bribery. Countries specialized in intangible exports are clearly rely on the efficiency of economic transaction costs which comprise the comparative advantage of services. Hence, transaction costs-affecting bribery tends to worsen the efficiency of economic transactions and makes them more costly. It also diminishes the comparative advantage of intangible exports which offsets high economic costs of engaging in transaction costs-bribery since the intangible economic specialization comprises the prevalent economic activity in such countries.

First-stage estimates across columns (5) through (8) in Panel E and Panel F demonstrate the fundamental importance of historical factor endowments in influencing the pattern of economic specialization. Less densely populated countries by 1800 tend to specialize in manufacturing-based tangible sectors. Greater terrain ruggedness and lower density of

international airports are systematically more likely to hinder the specialization in tangible exports. Natural resource endowments, soil fertility and difficulty of market access appear to significantly influence the intangible economic specialization. Greater fraction of cultivated land tends to stifle the specialization in intangible exports. Our results also suggest the importance of proximity to the international markets for intangible economic specialization. Specifically, we use the distance from United Kingdom (UK) as a measure of proximity to international markets. The results in Panel F clearly suggests an inverse relationship between intangible economic specialization and the distance from the UK. Each additional 100 km away from the United Kingdom appear to reduce the specialization in intangible exports, which primarily rely on services and human capital, by 1 percent on average. On the other hand, countries with a greater density of international airports are significantly more likely to specialize in intangible economic activities, as a result of better access to international markets whereas the abundance of agricultural resources, proxied by the fraction of cultivated land, tends to systematically discourage the specialization in intangible exports.

Our results rely chiefly on the validity of historical factor endowments in establishing an exogenous source of variation in the comparative bribery. Across columns (1) through (8), we subject our structural model of comparative bribery to the tests of overidentifying restrictions and weak instruments. The underlying caveat is to examine the validity of first-stage historical factor endowments in addressing the endogeneity of economic specialization and check whether the endowments weakly identify the contribution of tangible and intangible exports to property rights- and transaction costs-affecting bribery. The evidence consistently suggests the validity of the exclusion restriction set by the factor endowments as the null hypothesis on the failure of exclusion restriction is consistently rejected in column (1) through (8). Weak instrument null hypothesis is further rejected across the whole set of structural specifications which highlights the relevance of factor endowments in explaining differential

economic specialization across countries. As a further check on the validity and credibility of factor endowments, we subject our structural model setup to the test of underidentification to examine whether additional instruments might be required to sufficiently identify the link between economic specialization and comparative bribery. In the similar vein, the evidence suggest the rejection of the underidentification hypothesis in six out of eight structural specifications, which rules out the possibility of the lack of sufficient identification of the structural equations for tangible and intangible exports.

4.4. Robustness Checks

4.4.1 Weighing and Reliability of Bribery Rates

The key threat to our identification strategy involves the robustness of the baseline results. The main caveat concerns the reliability and unbiasedness of the comparative bribery rates in the property rights- and transaction costs-affecting sectors. Relatively unreliable bribery rates implies that our results might be ridden with measurement error as a result of the substantial attenuation of the outcomes of interest. The bribery rates from *Global Corruption Barometer 2013* might also suffer from excessive sampling variation in the underlying indicators upon which bribery rates are constructed which can render the baseline results potentially unreliable.

We assess the robustness of the baseline results to the potential measurement error in our dependent variables by using the analytical weights in the baseline structural and non-structural model estimates to improve the reliability of the comparative bribery rates. Our focus captures three different but complementary approaches to tackle the measurement error. First, bribery rates in the *Global Corruption Barometer* have been obtained through the country-level surveys upon representative samples. However, countries differ substantially in the size of the samples upon which bribery rates have been constructed. Equivalent sample sizes in a country

with large population (Brazil) and in the country with relatively small population (Switzerland) clearly implies that bribery rates for Brazil might be ridden with substantial measurement error resulting from low factual number of respondents in the bribery survey per 100,000 inhabitants. In comparison with Brazil, small-population country like Switzerland might provide significantly more reliable bribery rates since the bribery is more easily observed in smaller population. Therefore, we construct the number of survey respondents per 100,000 inhabitants as the first weighing variable to address the potential measurement error in the bribery rates.

Second, the composition of the bribery samples actually involves respondents who entered into contact with public sector officials and those who did not. Hence, bribery rates in a country with high contact rate per institutional sectors clearly appear to be more reliable than bribery rates in a country with low contact rate with the officials disregarding the absolute and relative sample sizes. We construct the contact rates in property rights- and transaction costs-affecting bribery sectors as a second weighing variable and aggregate the rates to the two dominant levels to tackle the potential measurement error in the comparative bribery rates resulting from the differences in contact rates with the officials.

And third, countries with higher overall bribery are more likely to experience greater corruption in property rights- and transaction costs-affecting sectors simultaneously even though the measures of institutional specialization from Eq. (3) and (4) might seem low compared to average bribery. Hence, we use the average bribery rates as a weighing variable to overweigh country-level observations with greater overall bribery and examine whether the key results remain stable.

In Table 6, baseline model estimates are corrected for the three sources of measurement error and attenuation bias discussed above. Our focus captures OLS and IV-2SLS estimates with and without the exclusion of Algeria and Venezuela which appear as strong outliers in tangible and intangible export intensity. Panel F exhibits the property rights-affecting bribery

as an outcome of interest whilst the dependent variable in Panel G is the transaction costs-affecting bribery. In columns (1) through (3), the number of survey respondents per 100,000 inhabitants is used as the analytical weight on the observations in the base sample. The evidence suggests countries specialized in tangible exports are more likely to avoid property rights-affecting bribery and tend to systematically specialize in transaction costs-affecting bribery. Once the potential endogeneity of tangible and intangible economic specialization is taken into account in columns (2) and (3), specialization in intangible exports tends to discourage transaction costs-affecting bribery since services and human capital-intensive sectors by default depend more on low transaction costs which further confirms the hypothesis H3. The negative effect of intangible export specialization on transaction costs-related bribery also holds with and without the exclusion of outliers from the whole sample.

<TABLE 6 INSERT HERE>

Across columns (4) through (6), contact rates are used to weigh the cross-country observations and address the measurement error hidden in the comparative bribery rates. In column (6), once Algeria and Venezuela are excluded from the base sample, the evidence confirms the tendency of countries specialized in tangible exports to avoid property rights-affecting bribery. In column (4) of Panel G, the robustness check on the transaction costs-affecting bribery suggests the specialization in tangible exports tends to encourage the transaction costs-bribery whereas the specialization in intangible exports is systematically more likely to decrease transaction costs-related bribery which further confirms the hypotheses H2 and H3.

Finally, in columns (7) through (9), the observations are weighed using the average bribery. The evidence confirms the earlier findings. Countries specializing in tangible exports are clearly more likely to prioritize lower bribery in property rights-affecting branches of the

public sectors. On the other hand, countries specializing in intangible exports are significantly more likely to engage in property rights-affecting bribery since they do not appear to prioritize secure property rights. The results remain robust to the exclusion of outliers and across the OLS and IV estimators. The evidence also suggests that tackling the measurement error also does not violate the exclusion restrictions. The validity of historical factor endowments remains intact as the null hypothesis on the validity of instruments and exclusion restrictions is not rejected across the entire set of re-estimated and weighed specifications of the structural and OLS model both for property rights- and transaction costs-affecting bribery.

4.4.2. Quantile IV Regressions

Do the IV estimates of the institutional specialization remain stable across different levels of comparative bribery? As an additional robustness check, we focus on the stability of IV estimates across different bribery levels. Since the evidence from Table 5 provides ample support for the endogeneity of economic specialization, the underlying structural effects of tangible and intangible exports on property rights- and transaction costs-affecting bribery across various quantiles might reflect a heterogeneous pattern similar to the one in basic OLS estimates in Table 4.

In Table 7, IV regressions from Table 5 are replicated across four different quantiles.³ Columns (1) through (4) feature the quantile IV regressions with property rights-affecting bribery as the dependent variable. The evidence confirms the negative effect of the specialization in tangible exports on the property rights-affecting bribery, and highlight substantial heterogeneous effects. Once the endogeneity of tangible economic specialization is addressed, the avoidance of bribery affecting property rights in tangible investment-intensive

³ For the sake of asymptotic efficiency, the IV estimates for the 10th percentile are omitted from the main robustness check.

countries appears to persist at the median bribery rate, and in the 90th percentile – which comprises the countries ridden most by property rights-affecting bribery.

Different heterogeneous effects are indicated by the effects of intangible economic specialization on transaction costs-affecting bribery presented across columns (5) through (8). Whilst the quantile regression estimates confirm the negative effects of intangible specialization on transaction costs-affecting bribery, the effect appears to persist from 25th to 75th percentile whereas no significant effects are confirmed at the 90th percentile. Moreover, quantile IV regressions further imply that countries at all respective thresholds of transaction costs- bribery are significantly more likely to engage in such bribery as an outcome of tangible economic specialization since the significant effects remain stable across all four different quantiles.

<TABLE 7 INSERT HERE>

4.4.3. Causal Effects of Economic Specialization on Comparative Bribery with Latent IVs

The causal effects of economic specialization on the comparative bribery invariably depend on the validity of historical factor endowments in address the omitted variable bias and the reverse causality that plague the basic OLS regression estimate in Table 4. The IV estimates in Table 5 neglect the common variation in the set of historical factor endowments which renders the causal nexus between economic specialization and bribery less clear and potentially overestimated.

As a final caveat, we evaluate the robustness check on the validity of historical factor endowment by constructing a comprehensive set of historical factor endowment measures and construct synthetic indices with the maximum common variation exploiting the factor analytic approach. Similar approach to instrumental variables can be found in [Bernal and Keane \(2011\)](#) who constructed welfare policy instruments as an exogenous source of variation to evaluate the effect of child care versus maternal time inputs on child cognitive achievement.

Principally, we exploit the common variation in historical factor endowments from Table 8 and identify five synthetic indices with a maximum common variance: (i) tropical agriculture, (ii) historical income and welfare levels, (iii) access to sea routes, (iv) geographic terrain specificity, and (v) legal history (La Porta et. al. 2008, Glaeser and Shleifer 2002) with an eigenvector size of at least 2.5 to eliminate weak and inconsistent components. Twenty six specific components are rotated in the factor analytical matrix, where the components with weak factor loading (below 0.2) are excluded from the pattern matrix to facilitate internally consistent latent variables on the five key instruments with the maximum common variation. Henceforth, we reduce the absolute number of IVs into five key groups without losing the common variation in the whole set of instruments. Four synthetic IVs exhibit either good or acceptable internal consistency (using Cronbach's Alpha) in our quest to evaluate whether expanding the re-specified first-stage model of tangible and intangible specialization makes any difference to our results.

In Table 9, structural model setup from Eq. (10) and (11) and the first stages for tangible and intangible specialization from Eq. (12) and (13) are replicated using five synthetic IV in the first stages. Panel H reports the structural estimates of tangible and intangible specialization on comparative bribery while Panel I and Panel J display first-stage results for tangible and intangible specialization variables. Excluded subsets in each model estimate from Table 4 are kept intact. The evidence from the first-stage estimates across columns (1) through (4) clearly suggests the selection in tangible economic specialization is more likely with (i) less abundant tropic agricultural endowments, (ii) easier access to the coastline and overseas trade routes, (iii) less adverse geographic terrain, whereas the legal history does not appear to drive the specialization pattern. The estimated contribution of synthetic IVs – tropical agricultural endowments and terrain specificity to the tangible specialization is statistically significant at 1% and thus testifies to the relevance of historical factor endowments in accounting for the

differential patterns of tangible specialization. Second-stage estimates confirm our results from Table 5, advocating tangible investment-intensive countries are substantially more likely to avoid property rights-affecting bribery which provides additional support for hypothesis H2.

Across columns (5) through (9), the contribution of tangible and intangible specialization to transaction costs-affecting bribery is reexamined using the five synthetic IVs for both measures of specialization. The evidence from the first stage suggests a strong link between latent IVs and both measures of the specialization. In comparison with Panel I, the estimates in Panel J suggest the specialization in services- and human capital-intensive intangible exports is strongly contingent on two inter-related factors, namely: (i) historical income and welfare levels, and (ii) tropical agricultural endowments. In a comparative perspective, legal history, terrain specificity, and access to sea routes do not seem to systematically shape the pattern of tangible and intangible specialization. Latent IVs in the first stage explain between 24 percent and 32 percent of the variation in tangible and intangible specialization, and appear to be excludable (with a p -value <0.01 in each estimated model specification). Henceforth, changing the structure of IVs into latent indices using factor analysis does not change our baseline results and provides further support for hypothesis H3.

5. Conclusion

In this paper, we show that what countries produce affects the kind of institutions they develop. Focusing on various forms of corruption, we specifically show that countries with strong stakes in secure property rights due to a specialization in tangible investment intensive goods are more likely to combat the kind of corruption that erodes property rights. By contrast, countries that are more reliant on intangible investment have a stronger interest in keeping transaction costs low, and prioritize limiting those kinds of corruption that affect transaction costs.

These findings resonate with the literature on institutional comparative advantage in economics, suggesting a link between institutional environment and economic specialization. In contrast to this literature, however, we argue that economic specialization is not so much related to the quality of the institutional environment, as to the kind of institutions a country develops. What is more, we show that economic specialization is not only a consequence, but also a driver of institutional development. Different countries develop different industries, and they develop the distinctive institutions that accompany them. Our arguments are therefore theoretically closer to the idea of institutional comparative advantage as exposed in the varieties of capitalism literature, describing a symbiotic relation between economic, political and institutional evolution. Rather than arguing that institutions matter for export patterns, our results suggest that the historical developments of a country's economic structure and of its institutional setting are so inextricably interlinked that they almost appear as two sides of the same coin.

These conclusions are relevant because they strongly suggest that there is no single recipe for institutional improvement that is fitting all societies. Although we show that development is clearly related to a reduction in bribery rates in general, some forms of bribery are much more economically acceptable to some societies than to others, depending on their economic structure. In other words, different economic structures require different institutional solutions. This conclusion extends the current discussion in institutional economics, which tends to consider institutional variation on a single dimension of quality. For policy purposes, it suggests that when investing in institutional development, societies would do better to move away from externally designed blue-prints and pay closer attention to their own particular institutional needs.

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Tables and Figures

Figure 1: Symbiotic Evolution

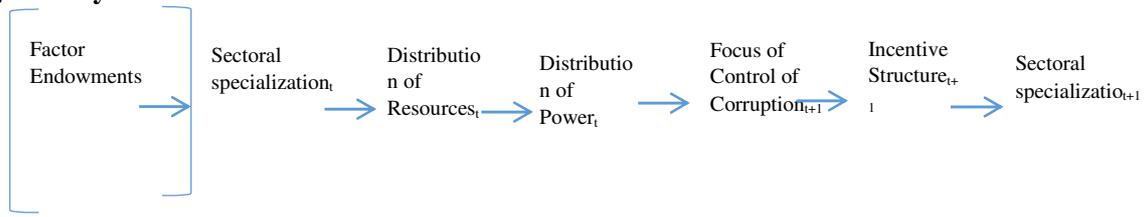


Figure 2: Property Rights and Transaction Costs-Affecting Bribery

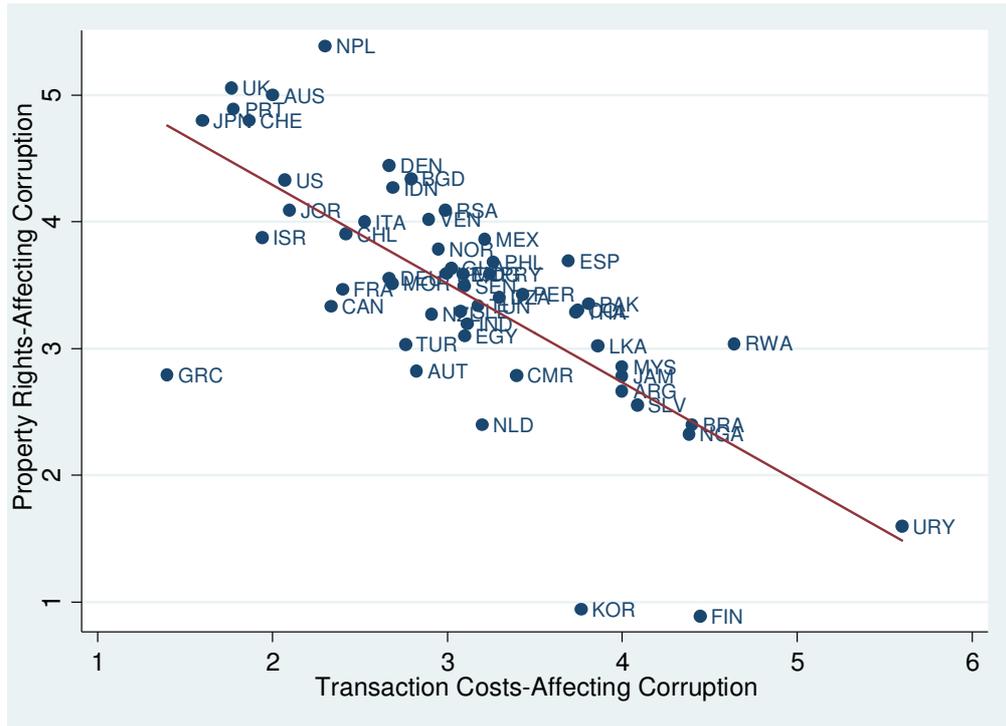


Table 1: Historical Factor Endowments

Population Density in 1800	Permanent Crops
Terrain Ruggedness	Latitude
19 th Century Male Height	Soil Quality
Life Expectancy in 1900	Distance to Coast
Oil Reserves	International Airports
Cultivated Land	

Table 2: Descriptive Statistics

	Obs	Mean	StD	Min	Max	P25	P90	Country at P25	Country at P90
<i>Panel A: Bribery Across Public Sector</i>									
Bribery in the Judiciary (%)	55	21.6	21.6	0	82	3	55	Austria	Mexico
Bribery in Police (%)	55	28.1	27.5	0	90	3	72	Spain	Bangladesh
Bribery in Registry and Permit Services (%)	55	19.3	20.4	0	71	3	54	Netherlands	Kenya
Bribery in Utilities (%)	55	10.5	13.2	1	57	2	28	Canada	Nigeria
Bribery in Tax and Customs (%)	55	13.2	17.3	0	61	2	46	Finland	Jordan
Bribery in Land Services (%)	55	18.2	19.0	0	75	4	45	Japan	Tunisia
<i>Panel B: Economic Specialization Measures</i>									
Tangible Export Intensity	55	0.33	0.65	0.2	0.6	0.2	0.3	Italy	Colombia
Intangible Export Intensity	55	1.00	0.15	0.6	1.5	0.9	1.1	New Zealand	Chile
<i>Panel C: Historical Factor Endowments</i>									
Population Density in 1800	55	20.18	28.43	0.0	145.29	1.03	64.1	Chile	Italy
Terrain Ruggedness	55	1.36	11.11	0.03	5.04	0.5	2.6	Algeria	Turkey
19th Century Male Height	55	165.9	3.81	156.3	172.03	162.9	170.5	India	Switzerland
Life Expectancy in 1900	55	34.18	9.95	20.13	54.59	25	49	Kenya	Netherlands
Oil Reserves	55	0.01	0.04	0.00	0.33	0	0.02	Nepal	Norway
Cultivated Land (%)	55	20.56	15.35	2.01	68.60	7.7	37.0	Paraguay	France
Permanent Crops (%)	55	7.30	12.85	0.02	73.5	0.6	19	Germany	Thailand
Latitude	55	18.17	27.25	-41.8	64.4	3.7	51.1	Malaysia	Germany
Soil Quality	55	39.5	18.86	0	80.1	27.4	65.2	Israel	Ghana
Distance to Near Ice-Free Coast	55	42.8	36.0	0	100	11.0	80.9	Paksitan	Italy
# International Airports	55	13.3	22.5	1	162	3	18	Venezuela	Turkey

Table 3: Bribery and Economic Development

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bribes Affecting		Bribery Decomposition					
	Property Rights	Transaction Costs	Property Rights Sub-Sectors			Transaction Costs Sub-Sectors		
			Judiciary	Registry/Permit	Land Services	Police	Tax/Customs	Utilities
Panel A: Basic OLS Regressions								
Full Sample	-.021** (.008)	-.022** (.009)	-.017** (.008)	-.020** (.007)	-.019** (.008)	-.010 (.007)	-.028*** (.007)	-.023** (.010)
Excluding Bottom 10%	-.017* (.009)	-.021** (.009)	-.015* (.008)	-.015* (.008)	-.015** (.007)	-.010 (.006)	-.025*** (.007)	-.019** (.009)
Excluding Bottom 25%	-.016** (.007)	-.021** (.008)	-.011 (.007)	-.015** (.006)	-.015** (.006)	-.009 (.006)	-.025*** (.007)	-.025*** (.007)
Excluding Upper 25%	-.008 (.009)	-.009 (.009)	-.015* (.008)	-.018** (.007)	-.018** (.008)	-.010 (.007)	-.016** (.007)	-.010 (.009)
Excluding Upper 10%	-.019** (.008)	-.022** (.009)	-.005 (.009)	-.008 (.008)	-.009 (.008)	-.001 (.007)	-.025*** (.005)	-.022** (.009)
Panel B: Quantile-Specific Regressions								
$\tau=0.10$	-.011 (.017)	-.009 (.018)	-.009 (.016)	-.011 (.014)	-.011 (.016)	-.006 (.014)	-.010 (.013)	-.011 (.020)
$\tau=0.25$	-.033** (.014)	-.031* (.017)	-.027** (.011)	-.028** (.013)	-.027* (.016)	-.024** (.011)	-.030** (.014)	-.027 (.023)
$\tau=0.50$	-.025** (.011)	-.027** (.012)	-.025** (.010)	-.027*** (.009)	-.018 (.013)	-.025*** (.008)	-.038*** (.011)	-.023 (.015)
$\tau=0.75$	-.031* (.017)	-.038** (.014)	-.005 (.017)	-.029** (.012)	-.029** (.011)	-.003 (.012)	-.039*** (.010)	-.037*** (.013)
$\tau=0.90$	-.009 (.009)	-.010 (.016)	-.006 (.008)	-.008 (.008)	-.009 (.009)	-.005 (.009)	-.024*** (.008)	-.018* (.010)
Obs	55	55	55	55	55	55	55	55

Notes: the table presents the effects of bribery across institutional sectors on the level of economic development. The dependent variable is the natural log of GDP per capita (\$2005 Geary-Khamis). Panel A displays basic OLS relationship between bribes and economic development both for the full sample and for the key subsamples by excluding the upper and lower tails from the global distribution. Panel B depicts the quantile-specific regressions of bribery on the level of economic development to control for the potentially heterogeneous effects of bribes on economic development that might change at given level. The conditional expectation function across the sets of model specifications is evaluated at five different quantiles for the aggregate and decomposed bribery measures. Standard errors are adjusted for the arbitrary heteroskedasticity and serially correlated disturbances using Huber-Eickner-White standard robust OLS variance matrix estimator. Standard errors are reported in the parentheses. Asterisks denote statistically significant coefficients at 10% (*), 5% (**), and 1% (***), respectively.

Table 4: Economic Specialization and Comparative Bribery

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	Property-Rights Affecting Bribes				Transaction-Costs Affecting Bribes				
Panel C: Basic OLS Estimates									
	Excluded Subset	None	Algeria and Venezuela	Bottom 5%	Upper 5%	None	Algeria and Venezuela	Bottom 5%	Upper 5%
Tangible Investment-Intensive Specialization in Manufacturing		-.035** (.017)	-.063** (.024)	-.041*** (.014)	-.035** (.016)	.055*** (.013)	.062*** (.020)	.054*** (.013)	.048*** (.012)
Intangible Human Capital-Intensive Specialization in Services		.010 (.009)	.003 (.010)	.013 (.008)	.014* (.007)	-.023*** (.007)	-.021** (.00)	-.022*** (.007)	-.018*** (.004)
	R2	0.14	0.09	0.10	0.07	0.18	0.18	0.18	0.17
Panel D: Quantile Regression Estimates									
<i>Tangible Investment-Intensive Specialization in Manufacturing</i>									
	$\tau=0.25$	-.036* (.019)	-.085** (.040)	-.036* (.019)	-.054 (.037)	.063*** (.017)	.071*** (.023)	.058*** (.016)	.063*** (.015)
	$\tau=0.50$	-.036 (.022)	-.054* (.030)	-.038** (.019)	-.037* (.020)	.052*** (.018)	.044 (.029)	.047*** (.018)	.042** (.020)
	$\tau=0.75$	-.041** (.016)	-.064** (.026)	-.041*** (.015)	-.043** (.017)	.052* (.030)	.107*** (.039)	.052* (.029)	.033 (.024)
	$\tau=0.90$	-.037** (.015)	-.086*** (.025)	-.037*** (.014)	-.037** (.015)	.056 (.046)	.090*** (.032)	.056* (.034)	.033 (.062)
<i>Intangible Human Capital-Intensive Specialization in Services</i>									
	$\tau=0.25$	.016* (.009)	.012 (.014)	.016 (.010)	.018 (.017)	-.019** (.008)	-.015 (.009)	-.017** (.008)	-.019** (.007)
	$\tau=0.50$	.017 (.011)	.010 (.012)	.016* (.008)	.018* (.010)	-.020** (.008)	-.020* (.011)	-.018** (.008)	-.013 (.008)
	$\tau=0.75$	.011 (.009)	.001 (.012)	.011 (.009)	.014 (.009)	-.031** (.015)	-.041*** (.014)	-.031** (.014)	-.019 (.011)
	$\tau=0.90$	.009 (.009)	-.021* (.012)	.009 (.009)	.010 (.009)	-.038 (.027)	-.033 (.020=)	-.038* (.020)	-.015 (.010)
	Obs	55	53	53	52	55	53	53	52

Notes: the table presents the effect of tangible and intangible economic specialization on comparative levels of bribery. The dependent variables are the indices of property rights-affecting bribery and transaction-costs affecting bribery. Panel C displays basic OLS relationship between economic specialization and bribery whilst Panel D presents conditional quantile-specific effects of economic specialization on comparative bribery, controlling for potentially heterogenous effects of economic specialization that changes alongside varying levels of tangible and intangible exports. The conditional expectation function for the quantile regressions is decomposed into four different quantiles allowing for a flexible setup of the underlying model of economic specialization. Country-clustered standard errors in Panel C allow for arbitrary heteroscedasticity and serially correlated disturbances that might contaminate the population effect of economic specialization on the comparative bribery. Standard errors of quantile regression coefficients in Panel D are computed using [Parente and Santos-Silva \(2015\)](#) variance matrix estimator and country-clustering allowing for intra-group correlation of stochastic disturbances and arbitrary heteroscedasticity in the distribution of error variance between countries. Asterisks denote statistically significant coefficients at 10% (*), 5% (**), and 1% (***), respectively.

Table 5: Endogenous Economic Specialization and Comparative Bribery

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Property-Rights Affecting Bribes				Transaction-Costs Affecting Bribes			
Panel E: Instrumental Variable (IV) Estimates								
Tangible Investment-Intensive Specialization in Manufacturing	-.069*** (.032)	-.102*** (.041)	-.058** (.025)	-.058** (.025)	.089*** (.022)	.101*** (.035)	.072*** (.019)	.079*** (.020)
Intangible Human Capital-Intensive Specialization in Services	.032*** (.010)	.024** (.012)	.024** (.010)	.024** (.010)	-.042*** (.009)	-.039*** (.010)	-.036*** (.008)	-.037*** (.008)
Panel F: First-Stage OLS Estimates for Tangible Investment Specialization								
Population Density in 1800	-.042** (.018)	-.048*** (.017)	-.061*** (.019)	-.055*** (.018)	-.064*** (.021)	-.062*** (.021)	-.060** (.024)	-.062*** (.022)
Terrain Ruggedness	-1.444** (.641)	-1.038** (.442)	-1.301* (.703)	-1.370* (.751)	-1.446** (.620)	-.997** (.452)	-1.691** (.656)	-1.574*** (.728)
19th Century Male Height	.470** (.215)	.315** (.139)			.228 (.195)	.166 (.176)	.230 (.229)	.210 (.233)
Life Expectancy in 1900	-.163** (.084)	-.093* (.053)			-.125* (.075)	-.066 (.059)	-.123 (.083)	-.098 (.077)
Oil Reserves	.559*** (.005)	.550 (.720)	.505*** (.069)	.513*** (.062)	.520** (.068)	.644 (.658)	.052*** (.005)	.051*** (.007)
Cultivated Land	-.067 (.055)	-.028 (.040)	-.045 (.052)	-.049 (.051)	-.044 (.060)	.001 (.046)	-.042 (.058)	-.052 (.066)
Distance to United Kingdom					-.0001 (.0002)	-.0000 (.0001)	-.0001 (.0002)	-.001 (.0002)
Latitude			.010 (.034)	.005 (.028)				
Soil Quality			.001 (.050)					
Permanent Crops					-.055 (.041)	-.062 (.042)	-.046 (.041)	-.058 (.040)
Distance to Coast			-.039* (.022)	-.039* (.021)	3.388 (3.388)		-.029 (.020)	
International Airports	-.039*** (.012)	-.046*** (.009)	-.059*** (.015)	-.055*** (.014)	-.125 (.081)	-.052*** (.000)	-.050*** (.011)	-.051*** (.011)
Panel G: First-Stage OLS Estimates for Intangible Investment Specialization								
Population Density in 1800	.093 (.075)	.086 (.067)	.027 (.050)	.036 (.049)	.039 (.066)	.041 (.059)	-.006 (.060)	.036 (.061)
Terrain Ruggedness	-.440 (2.016)	.854 (2.111)	-1.344 (2.158)	.948 (1.419)	-.703 (1.892)	.437 (1.886)	-.828 (1.838)	-1.454 (1.892)
19th Century Male Height	.694 (.527)	.258 (.406)			.459 (.523)	.195 (.482)	.736 (.532)	.104 (.483)
Life Expectancy in 1900	.155 (.236)	.275 (.178)			.086 (.201)	.189 (.162)	.053 (.039)	.244 (.173)
Oil Reserves	1.373***	3.700	1.206***	1.251***	1.304***	.280***	.133***	.120***

	(.143)	(1.266)	(.153)	(.151)	(.145)	(.153)	(.013)	(.015)
Cultivated Land	-416***	-362***	-480***	-476***	-471***	-397***	-398***	-545***
	(.130)	(.096)	(.127)	(.113)	(.142)	(.105)	(.130)	(.152)
Distance to United Kingdom					-.001***	-.001***	-.001***	-.001***
					(.0003)	(.0002)	(.0003)	(.0003)
Permanent Crops					-.004	-.041	.014	-.036
					(.113)	(.100)	(.116)	(.118)
Latitude			.222***	.211***				
			(.073)	(.063)				
Soil Quality			-.001					
			(.121)					
Distance to Coast			.017	-.004	.058	.070*	.053	.056
			(.049)	(.043)	(.039)	(.039)	(.039)	(.040)
International Airports	.139*	.129**	.087*	.077**	.138**	.130**	.137***	.119**
	(.077)	(.062)	(.050)	(.038)	(.062)	(.051)	(.065)	(.057)
Obs	55	55	53	52	55	53	53	52
Hansen J-Test of Overidentifying Restrictions (p-value)	0.60	0.48	0.46	0.45	0.58	0.54	0.62	0.43
Kleibergen-Paap Underidentification Test (p-value)	0.01	0.01	0.19	0.19	0.03	0.02	0.01	0.04
Anderson-Rubin Weak Instrument Test (p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes: the table presents the effects of tangible and intangible economic specialization on the relative levels of bribery affecting property rights and transaction costs. The dependent variables in columns (1) through (4) is the bribery index affecting property rights while the dependent variable in columns (5) through (8) is the bribery index related to transaction costs. *Panel C* exhibits basic OLS estimates with and without excluded subsets of countries. Instrumental variable (IV) estimates that account for the endogeneity of economic specialization are presented in *Panel D*. First-stage estimates of tangible and intangible economic specialization are presented in *Panel F* and *Panel G* using the variation in historical factor endowments to address the omitted variable bias, simultaneity bias, and the potential reverse causality between economic and institutional specialization. Each IV regression specification reports the underidentification test by [Kleibergen and Paap \(2006\)](#) with the null hypothesis that the historical factor endowments are correlated with endogenous tangible and intangible specialization variables and thus appropriately identify the model. Each column reports the test of weak instruments by [Anderson and Rubin \(1949\)](#) with the null hypothesis that the effect of historical factor endowments on tangible and intangible economic specialization measures is jointly equal to zero. [Hansen \(1982\)](#) test of overidentifying restrictions and validity of historical factor endowments as instruments for the measures of economic specialization is reported in each column. Standard errors are clustered across countries to allow for arbitrary heteroskedasticity and serially correlated stochastic disturbances, and reported in the parentheses. Asterisks denote statistically significant coefficients at 10% (*), 5% (**), and 1% (***), respectively.

Table 6: Bias-Corrected Baseline Model Estimates

Sample Weight	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	# Survey Respondents per 100 000 Inhabitants			Contact Rate in Property Rights/Transaction Costs Affecting Institutional Sectors			Average Bribery		
	OLS	IV-2SLS	IV-2SLS (excl. Algeria and Venezuela)	OLS	IV-2SLS	IV-2SLS (excl. Algeria and Venezuela)	OLS	IV-2SLS	IV-2SLS (excl. Algeria and Venezuela)
<i>Panel F: Dependent Variable: Property Rights-Affecting Bribes</i>									
Tangible	-.061***	-.036	-.173	-.032	-.046	-.109***	-.029**	-.065**	-.079***
Specialization	(.025)	(.056)	(.159)	(.021)	(.030)	(.034)	(.015)	(.026)	(.030)
Intangible	.021	.026	.019	.005	.014	.005	.008	.024***	.017**
Specialization	(.016)	(.019)	(.024)	(.010)	(.013)	(.012)	(.008)	(.008)	(.008)
R2	0.10	0.08	0.01	0.04	0.02	0.06	0.06	0.04	0.04
Hansen J-Test (p-value)	-	0.52	0.39		0.33	0.32		0.54	0.41
First-Stage F-Test on Excluded Instruments (p-value)	-	0.000	0.000		0.000	0.000		0.000	0.000
<i>Panel G: Dependent Variable: Transaction Costs-Affecting Bribes</i>									
Tangible	.065***	.081	.141	.054***	.089***	.111***	.044***	.077***	.088***
Specialization	(.021)	(.061)	(.154)	(.017)	(.023)	(.034)	(.015)	(.024)	(.031)
Intangible	-.038**	-.049**	-.046**	-.017**	-.038***	-.032**	-.017**	-.035***	-.033***
Specialization	(.018)	(.020)	(.019)	(.007)	(.011)	(.013)	(.007)	(.008)	(.008)
Hansen J-Test (p-value)	-	0.35	0.34		0.34	0.34		0.40	0.33
First-Stage F-Test on Excluded Instruments (p-value)	-	0.000	0.000		0.000	0.000		0.000	0.000
R2	0.22	0.20	0.13	0.15	0.04	0.05	0.16	0.01	0.01
Obs	55	55	53	46	46	45	55	55	53
<i>Notes:</i> the table presents the corrected OLS and IV estimates of the baseline model specification, arising from substantial sampling variation and the measurement error in the underlying bribery rates across countries. The dependent variable in Panel F is the property rights bribery index while the dependent variable in Panel G is the transaction cost bribery index. Analytic weights are used to address the measurement error and attenuation bias in the bribery indices arising from large sampling variation in the underlying parameters upon which aggregate bribe rates are constructed. Columns (1) through (3) weigh the cross-country specialization regressions by the number of country-level respondents per 100,000 inhabitants to address the measurement error. Columns (4) through (6) use the fraction of respondents who came into contact with public sector officials into six sub-sectors to weigh the regressions and address the measurement error and attenuation bias. Columns (7) through (9) weigh the baseline cross-country regressions by average bribery and thus overweigh countries with more widespread bribery. Standard errors are clustered across countries to allow for arbitrary heteroskedasticity and serially correlated disturbances, and are reported in the parentheses. Asterisks denote statistically significant regression coefficients at 10% (*), 5% (**), and 1% (***), respectively.									

Table 7: IV Quantile Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Property-Rights Affecting Bribery				Transaction Costs Affecting Bribery			
	Endogenous Tangible Specialization				Endogenous Intangible Specialization			
	$\tau=0.25$	$\tau=0.50$	$\tau=0.75$	$\tau=0.90$	$\tau=0.25$	$\tau=0.50$	$\tau=0.75$	$\tau=0.90$
Tangible Investment-Intensive Specialization in Manufacturing	-.046 (.043)	-.066** (.031)	-.084 (.058)	-.100* (.054)	.083*** (.023)	.052** (.024)	.079*** (.025)	.070** (.033)
Intangible Human Capital-Intensive Specialization in Services	.016 (.013)	.015 (.010)	.017 (.014)	.035** (.017)	-.040*** (.009)	-.025** (.012)	-.047*** (.014)	-.038 (.025)
Obs	55	55	55	55	55	55	55	55
# Instruments	7	7	7	7	11	11	11	11

Notes: the table presents the quantile-specific effects of economic specialization on comparative bribery using IV-2SLS regressions with endogenous economic specialization to allow for potentially heterogeneous causal effects of tangible and intangible specialization on comparative bribery. The conditional expectation function is decomposed into four quantiles to evaluate the unobserved heterogeneity in the underlying effects of economic specialization on comparative bribery. Quantile-robust [Chernzhukov and Hansen \(2008\)](#) standard errors with the potentially overidentifying restrictions, allowing for arbitrary quantile-specific heteroscedasticity and serially correlated stochastic disturbances, are denoted in the parentheses. Asterisks denote statistically significant regression coefficients at 10% (*), 5% (**), and 1% (***), respectively.

Table 8: List of Historical Factor Endowments and Latent Components as Instruments for Tangible and Intangible Economic Specialization

Historical Factor Endowments	Rotated Factor Loading	Latent-Synthetic Indices
Population Density in 1800 (# inhabitants per km ²)	.579	Tropical Agriculture (Cronbach Alpha = .0.70)
Arable Land (% total area)	.741	
Soil Quality	.567	
Rainfall Precipitation	.590	
Cultivated Land (% total area)	.781	
Male Height in 19 th Century (in cm)	.549	Historical Income and Welfare Levels (Cronbach Alpha = 0.60)
Life Expectancy in 1900 (years)	.652	
Urbanization Rate in 1800 (%)	.596	
Coast-to-Area Ratio	-.369	Access to Sea Routes (Cronbach Alpha = 0.63)
Permanent Crops	-.298	
Fraction of the Area within 100 km of Ice-Free Coast (% total area)	-.550	
Terrain Ruggedness	.894	
Terrain Slope	.889	Geographic Specificity of the Terrain (Cronbach Alpha = 0.62)
Landlocked (Dummy variable, 1 if yes, 0 otherwise)	.632	
English Common Law	.289	
French Civil Law	-.435	Legal History (Cronbach Alpha = 0.84)

Table 9: Comparative Bribery and Sectoral Specialization with Synthetic Indices of Historical Factor Endowments

	Property Rights-Affecting Bribery				Transaction Costs-Affecting Bribery			
	(1) None	(2) Algeria and Venezuela	(3) Bottom 5%	(4) Upper 5%	(5) None	(6) Algeria and Venezuela	(7) Bottom 5%	(8) Upper 5%
<i>Panel H: Endogenous Model Setup</i>								
Tangible	-.059*	-.110**	-.047	-.043	.095***	.122**	.072***	.098***
Investment-Intensive Specialization in Manufacturing	(.035)	(.050)	(.031)	(.033)	(.031)	(.052)	(.023)	(.030)
Intangible Human Capital-Intensive Specialization in Services	.0007	.003	.0002	-.001	-.029*	-.030*	-.024	-.040***
	(.021)	(.020)	(.018)	(.018)	(.017)	(.017)	(.016)	(.015)
<i>Panel I: First-Stage OLS Regression for Tangible Investment-Intensive Specialization in Manufacturing</i>								
Tropical	-.057***	-.036***	-.059***	-.057***	-.057***	-.036***	-.055***	-.061***
Agriculture	(.018)	(.013)	(.019)	(.019)	(.018)	(.013)	(.018)	(.018)
Historical	-.037	-.014	-.048	-.023	-.037	-.014	-.045	-.016
Income and Welfare Levels	(.047)	(.043)	(.047)	(.050)	(.047)	(.043)	(.048)	(.045)
Access to Sea Routes	.032	.019	.028	.030	.032	.019	.050*	.031
	(.023)	(.019)	(.024)	(.023)	(.023)	(.019)	(.024)	(.024)
Terrain Specificity	-.418***	-.287**	-.412***	-.477***	-.418***	-.287**	-.474***	-.473***
	(.158)	(.133)	(.161)	(.181)	(.156)	(.133)	(.157)	(.164)
Legal History	-3.338	-1.378	-3.175	-3.314	-3.338	-1.378	-2.798	-3.339
	(2.160)	(1.690)	(2.141)	(2.317)	(2.160)	(1.690)	(2.128)	(2.220)
First-Stage R2	0.30	0.24	0.29	0.29	0.30	0.24	0.31	0.32
<i>Panel J: First-Stage OLS Regressions for Intangible Human Capital-Intensive Specialization in Services</i>								
Tropical	-.116***	-.069*	-.116**	-.125***	-.116***	-.069*	-.117***	-.115**
Agriculture	(.045)	(.039)	(.047)	(.047)	(.045)	(.039)	(.045)	(.047)
Historical	.433***	.487***	.458***	.369**	.433***	.487***	.461***	.536***
Income and Welfare Levels	(.152)	(.144)	(.163)	(.160)	(.152)	(.144)	(.150)	(.131)
Access to Sea Routes	.013	-.014	.021	.038	.013	-.014	.041	.033
	(.055)	(.050)	(.058)	(.054)	(.055)	(.050)	(.056)	(.058)
Terrain Specificity	-.158	.145	-.183	.272	-.158	.145	-.233	-.264
	(.514)	(.493)	(.523)	(.422)	(.514)	(.493)	(.532)	(.521)
Legal History	-5.323	-.764	-.5403	-3.305	-5.323	-.764	-5.751	-7.387
	(5.625)	(4.882)	(5.615)	(5.728)	(5.625)	(4.882)	(5.585)	(5.428)
First-Stage R2	0.20	0.25	0.20	0.19	0.20	0.25	0.23	0.25
# Rotated Components	29	29	29	29	29	29	29	29
Hansen J-Test (p-value)	0.76	0.69	0.48	0.77	0.63	0.63	0.54	0.71
First-Stage F-Test on Excluded Instruments (p-value)	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00
Obs	55	53	53	53	55	53	53	52

Notes: the table presents the effects of tangible and intangible economic specialization on the relative levels of bribery affecting property rights and transaction costs using IV-2SLS setup. The dependent variables in columns (1) through (4) is the bribery index affecting property rights while the dependent variable in columns (5) through (8) is the bribery index related to transaction costs. First-stage estimates of tangible and intangible economic specialization are presented in *Panel I* and *Panel J* using the variation in historical factor endowments with synthetic (latent) instruments which extract the maximum variance from the underlying components into internally consistent synthetic indices to address the omitted variable bias, simultaneity bias, and the potential reverse causality between comparative bribery and economic specialization. Hansen (1982) test of overidentifying restrictions and validity of historical factor endowments as instruments for the measures of economic specialization is reported in each column. Standard errors are clustered across countries to allow for arbitrary heteroskedasticity and serially correlated stochastic disturbances, and reported in the parentheses. Asterisks denote statistically significant coefficients at 10% (*), 5% (**), and 1% (***), respectively.