

Gerritse, Michiel

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Does trade cause long-run development? Theory and evidence from countries behind the Suez channel*

MICHEL GERRITSE[†]
University of Groningen

PRELIMINARY

In progress:

Theory redeveloped under more general assumptions

(see autumn 2014 version for complete model)

Robustness check on alternative institutional definition

March 2, 2015

Abstract

Does trade improve institutions and contribute to long run growth? I develop a theory of trade, in which trade liberalization provides incentive to change institutions in two ways. On the one hand, trade leads to specialization according to comparative advantage, expanding the industries that do not rely on contracting institutions in less developed countries. The Heckscher-Ohlin-type effect lowers the demand for contract enforcement, as documented in earlier literature. On the other hand, if firms are imperfectly competitive, they benefit from lower marginal costs. Reducing institutional frictions in factor markets increases sales, and this effect is larger, the easier the access to foreign markets. Thus, trade liberalization may also increase the demand for good institutions. That idea underlies much of the debates on globalization and "aid for trade", and this is one of the first papers to provide an economic rationale.

I exploit the 1967-1975 war-induced closing of the Suez channel as a quasi-natural experiment. During the closing of the channel, countries in the east of Africa had substantially larger trade costs towards Europe than countries on the western coast, which led to significant declines in trade volume. When the Suez channel was closed, countries with increased trade costs specialized in industries that relied less on institutions (less fixed costs, less differentiated products, less contract-intensive inputs). The opening up of the Suez channel in 1975 caused the opposite effect. The trade cost shock is arguably exogenous and I use a dif-in-dif-in-dif (country - industry - trade cost) estimator to control for the effects of trade costs at the country and industry level. The results persist even though comparative advantage determines trade patterns - capital-intensive industries benefitted from increased trade costs to Europe. The results therefore suggest that trade liberalization does not deteriorate institutions in less developed countries.

Keywords: institutions and trade, long run development, dif-in-dif,

JEL-codes: O19; F63; F43; C31; F11; N77; F12; O43; O11

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[†]Faculty of Economics and Business, University of Groningen. Nettelbosje 2, 9747 AE Groningen, The Netherlands. email: michiel.gerritse@rug.nl, tel: +31 (0)50 363 5995.

1 Introduction

Does trade openness lead to development? Apart from the direct effects, trade may have an indirect effect on development: international trade changes domestic institutions, which in turn cause development. In the words of Rodrik et al. (2004), "once institutions are controlled for, trade is almost always insignificant [in determining growth]". Yet, in that triad of economic growth, institutions and trade, the edge between institutions and trade has possibly been investigated least of the three. That is not to say it has gone unstudied: institutions like contract enforcement and credit clearly determine trade patterns (de Groot et al., 2004; Nunn and Treffer, 2013a) and trade openness changes institutions.

History provides plenty of examples where exposure to international trade has fortified one of the most likely sources of growth: institutions. Freeing up to trade has improved contract enforcement, increased the accountability of trade partners, or restricted powerful elites. Puga and Treffer (2014) show that the growth of long-distance trade enabled Venetian merchants to constrain the Doge. The access to trading routes to the East empowered merchants to set up a parliament and improve contracting institutions. Greif (1989) shows how overseas trade and contract enforcement interact to allow Maghribi traders to set up trading systems. In Europe, rising trade led to increased property rights formulated in Merchant Law (Greif et al., 1994), and Acemoglu et al. (2005) argue that Atlantic trade crucially brought the wealth to the merchant class needed to limit monarchical power. Jha (2008) shows that in India, long distance trade sparked the development of institutions to avoid conflict, and that such institutions still prevent conflict between Muslims and Hindus today.

Whether trade improves growth prospects is a matter of great debate. Economic globalization has two faces in popular discourse: while some consider access to international product markets and investments an opportunity, others see dangers of multinationals entering poor countries, and Western rules imposed on poorer countries. The first view that trade helps development underlies very substantial parts of development policies. The "aid for trade" programmes pioneered by the World Trade Organization in 2005 are now a mainstay of European Union programmes and find support by organizations like the UN and the OECD (OECD/WTO, 2013). In the US, the United States Trade and Development Agency partners export promotion with development aid flows. In 2013, the UK government concluded that "ultimately, trade is the most important driver of growth".¹ Yet, several NGOs (like ITCSD) are less convinced, citing the varying outcomes, large trade effects but small growth effects, and lack of insitutional capacity in receiving countries.

Systematic research into the effect of trade on institutions paints a similar, if somewhat less clear picture. Regressing trade openness on institutional indexes, Ades and di Tella (1999) find trade openness to improve law enforcement in a cross-section of countries. The statistical association between trade and institutions is informative, but could be biased by reverse causation, or an by omitted variable that really explains the two. However, methodologies to address this concern broadly confirm the result. Rodrik et al. (2004) and Levchenko (2013) use geography-predicted openness as instruments for actual trade openness showing in a cross-section that trade openness causes better institutions. This instrument was suggested by Frankel and Romer (1999). Rigobon and Rodrik (2005) shows a similar results by identification through conditional heteroskedasticity. Giavazzi and Tabellini (2005) and Tavares (2007) study trade liberalizations in with in a difference-in-difference setting to obtain the same result (e.g. on corruption). The measures to deal with endogeneity, however, are not beyond discussion. The Frankel and Romer instrument for openness may have distance effects other than trade (for instance, information flows or shared history and culture), possibly invalidating it as an instrument in a regression that explains institutional quality. Moreover, the instrument is not robust to geographical controls (Rodriguez and

¹Secretary of State for International Development Greening in July, 2013 (see <https://www.gov.uk/government/speeches/justine-greening-global-trade-can-help-us-end-the-need-for-aid>).

Rodrik, 2001; Irwin and Tervio, 2002). Similarly, for the difference-in-difference estimates to yield causal estimates, there can be no unobserved variables systematically related to trade and institutions; and trade changes should not anticipate institutional change - both are hard to exclude with certainty. Other studies have shown more circumstantial evidence. Kelejian et al. (2013, using cross-sectional lags) and Faber and Gerritse (2012, using cross-sectional lags and instruments) show that neighboring countries are likely to determine local institutional quality. The cross-sectional nature of these more systematic inquiries brings two issues: it is not obvious how to deal with the causality problem; and uniform measures of institutional quality over different countries tend to vary little over time.

In recent years, many theories have been proposed on how international trade determines long-run development prospects. Many of these refer to technology adoption. Technology adoption and its related investments can legally be defined only imperfectly, and so the completeness and enforceability of contracts is paramount in such decisions. In an international setting, good contracting can therefore be a source of comparative advantage, and openness to trade can influence the technology adoption choice (Acemoglu et al., 2007; Cervellati et al., 2014). Similarly, international sourcing is affected by the quality of host institutions (Nunn and Treffer, 2013b). Trade may also affect the politics conducive to infrastructure investment (Hochman et al., 2013) and education (Tang, 2012). In a direct way, international trade can reduce the rate of expropriation by changing skill demand (Ghosh and Robertson, 2012). Similarly, assuming that conflict is a labor-intensive activity, it matters whether international trade liberalization expands labor- or capital intensive industries (dal Bó and dal Bó, 2011).

The theory in this paper suggests that the effects of trade on institutions may well be positive. Most theoretical papers on this is, rather contrary to the empirical results, imply that trade liberalization can deteriorate rule of law in institutionally poor countries. When trading with institutionally advanced countries, lagging countries are likely to specialize in industries that are less institutionally intense, increasing the local demand for easy expropriation. By incorporating a comparative advantage motive for trade, this paper obtains similar results. In this sense, my paper is mostly related to Levchenko (2007), who also highlights a such a comparative advantage mechanism; and Do and Levchenko (2009), who study institutions as entry costs in a monopolistic setting. In their overview of the relation between trade and institutions, Nunn and Treffer (2013a) conclude that the effects of international trade on domestic institutions are more likely explained by comparative advantage than by levels of trade. This paper, in contrast to earlier theories, explores imperfect competition as an additive motive to trade. In the model below, entrepreneurs need up front, expropriable investments to produce. Poor institutions lead to larger obstacles in attracting production factors, raising factor prices. The ensuing increase in the final goods price leads to lower sales under imperfect competition. This effect becomes stronger when access to foreign markets is easier - then, lower pricing pays off more. As a result, trade liberalization could push all firms to demand better property rights, effectively to prevent them from inducing risk premia. This beneficial channel could counter the negative, sectoral effects. While such arguments have been made implicitly in the public debate, this paper is one of the first to formalize a beneficial channel. Dixit (2003, JPE) develops a similar idea, although inverse: in larger markets, informal enforcement becomes ineffective.

To investigate the link between openness and good institutions empirically, the results exploit that sectors have different sensitivities to institutional quality. This mechanism was most famously described by Nunn (2007), showing that institutionally developed countries export more products that rely on good institutions. The approach of this paper was inspired by an essay of Fernando Ortíz of 1940, explaining how on Cuba, the production of tobacco takes time but little manpower, whereas sugar grows fast and is harvested at great scale using laborers intensively. The differences in production methods tobacco and sugar caused tobacco to be "liberal, not to say revolutionary", while sugar is "conservative, if not

reactionary".² This paper is surely not among the first to exploit this dimension. Bruhn and Gallego (2012) document that regions in North and South America specialized in increasing-returns-to-scale production long ago fared differently from regions that specialized in constant-return-to-scale goods. Similarly, a country's endowment relevant for industries that encourage poor institutions, such as a large share of sugar in total production may promote coercive institutions (Dippel et al., 2012; Sokoloff and Engerman, 2000).

In the empirical part of the paper, I combine the sectoral approach with the closing of the Suez channel as an exogenous shock to trade openness. An Egyptian-Israeli war closed off the Suez channel completely, cutting off countries behind the Suez channel from a quick route into the Mediterranean. This approach yields two merits. Firstly, by looking at the sectoral exports of affected countries, the analysis can provide alternative evidence to the evidence based on current-day institutional indexes; and it can accurately gauge the comparative advantage argument for institutional change. Secondly, exploiting the Suez channel lockdown, it studies an arguably exogenous change in trade openness: African countries behind the Suez channel did not anticipate, let alone influence the closing of this channel. Thus, this methodology allows presenting evidence based on a quasi experiment, complementary to the instrumental variable and difference-in-differences evidence. The use of the Suez channel as a natural experiment was also exploited by Feyrer (2009), although in a different setting.

The results suggest that closing down trade hurts domestic institutional quality. Conversely, opening up the Suez channel expanded export sectors in Eastern Africa that rely on institutions intensively. This holds for different definitions of institutional intensity and for a number of robustness checks. My results are, effectively, also a test of trade theory based on comparative advantage. In Eastern African countries, which probably had no abundance of capital, capital intensive industries flourished when the Suez channel closed. Thus, the beneficial effects of trade seem present despite comparative advantage-based trade at work.

The next section develops a structural trade model, in which institutional quality is the outcome of a political process. It derives predictions about how trade liberalization affects domestic institutional quality. Section 3 presents the data, examines the trade shock, and the empirical results. Section four concludes.

2 A theory of trade costs and institutional quality

To structure the analysis, I develop a model of international trade in which interest group bargain for the institutions they like. The model of international trade combines monopolistic competition with intersectoral trade, so that different incentives from trade liberalization can be studied. Comparable setups are studied in Helpman and Krugman (1985), Bernard et al. (2007), German (2012). The formulation of institutions follows a Grossman-Moore-Hart formulation, as also studied in Levchenko (2007). In short, capital owners lose some of their capital in production due to ill defined property rights, and other production factors have incentive to bribe policymakers into imperfect institutions.

The main idea in the model is that trade liberalization expands the sectors that have prices that are low relative to world prices (i.e. in which the home country has a comparative advantage). If this occurs in labor-intensive industries, then the base of bribers for poor institutions grow. On the other hand, under monopolistic competition, lower marginal costs better help exploit large market access. Low marginal costs, especially for attracting capital, depend on the quality of institutions. As a result, producers may put less effort into deteriorating institutions.

This section first discusses the transaction between firms and suppliers of capital, which is interpreted

²As quoted in Tom Miller's "Trading with the Enemy".

as the institution-intensive good. The section subsequently develops an illustrative open-economy model.

2.1 Institutions and production factors

To consider an economy where contracting is imperfect, I assume that the use of capital requires relation-specific investments. By capital, I mean a production factor for the property rights cannot be perfectly established, so it could be read as financial capital, but also human or physical capital. By assuming that contracts are incomplete for some production factors, this setup follows a property-rights approach, discussed in Tirole and Maskin. Essentially, both the supplier and user of a unit of capital have a cost of the transaction, which are lost if the transaction fails. When a transaction fails, there are alternative firms and capital suppliers to set up an alternative transaction. The opportunity costs, determined by the quality of contracting, determine the transaction price.

The structure of the transaction is as follows. At date 0, the user of capital (the firm) and a supplier sign a contract for a unit of capital, specifying the financial return on the contract. At date 1, the supplier transfers the capital, and the firm adapts it to its standard. At date 2, when there is no negotiation, the producer produces and subsequently pays back the capital owner. In equilibrium, there is no renegotiation, although the effective return on capital is determined by off-equilibrium paths. For the firm, after receiving the capital, there are costs to adapting the capital to its production process, which require an effort (expressed in money) of e_F per unit of capital. Using r as the agreed return on capital, the firm's cost of capital are $r + e_F$ in equilibrium. For the capital supplier, the return is r .

The intended transaction can be renegotiated after the capital has been transferred. I assume that for a share ϕ of capital, the property rights cannot be established, because contracting is imperfect. The firm can choose to abandon the contract, in which case it needs to look for a new supplier. If the firm abandons the contract, it retains share ϕ of the capital. However, the firm needs to refinance $1 - \phi$ of each unit of capital, for which it uses an alternative source of financing at $\tilde{r} > r$. Having to adapt its new capital, the costs of capital when renegotiating the contract for the firm are: $(1 - \phi)\tilde{r} + e_F + (1 - \phi)e_F$. The term $(1 - \phi)e_F$ enters, because after renegotiating, the firm needs to adapt another $1 - \phi$ units of capital. The supplier, however, can also renegotiate on the contract. In that case, the supplier receives back $1 - \phi$ units of capital, which it can reinvest during the production stage at an alternative end yielding r^* . The payoff to renegotiating the contract for the supplier is thus $(1 - \phi)r^*$.

The firm and the supplier of capital agree on a return through Nash bargaining. This is a fairly standard approach to (equally) splitting the gains of the trade (Maskin and Tirole). Equally splitting the surplus of the trade implies that:

$$-[r + e_F] + \left[(1 - \phi)\tilde{r} + e_F + (1 - \phi)e_F \right] = r - (1 - \phi)r^*.$$

The agreed rate of return implied by the bargaining equilibrium is: $r = \frac{1}{2} \left[(1 - \phi)(\tilde{r} + e_F - r^*) + (2 - \phi)e_F \right]$. The agreed rate of return is the average of the outside option of the firm and the outside option of the supplier. Most importantly, the rate decreases if contract enforcement is poor: the outside option for the supplier is poor, so he will not renegotiate the contract. By the same reasoning, the refinancing costs for the firm \tilde{r} and the costs of installing capital e_F increase the agreed rate, whereas the alternative investment return for the supplier r^* reduces the equilibrium cost of capital.

The imperfect contracts in this model are a cause of redistribution, but not necessarily of inefficiency. As the welfare per unit of capital equals $e_F + r - r$, the parametric effort parameter determines welfare. It would be straightforward to introduce a distortion by allowing the quality of capital to depend on the investments of both parties, but that is not the focus of the paper. In other respects, the model is a simplified version of property rights models (Aghion et al. 1994; Noldeke-Schmidt, 1997). Maskin

and Tirole (2001) show this approach to be intimately tied to bilateral monopoly models (Hart-Moore, 1988), where a hold up situation emerges from the partner-specific investments. The essence of the argument is that the incomplete enforcement of contracts yields an advantage for the firm that has hold of the institution-intensive capital. The renegotiation is illustrative for other poor institutions. The impossibility to write perfect contingent contracts or costly verification of firms' reports on capital returns poses a similar problem. In an Appendix, I explore an alternative model, in which capital returns may be lower than expected and the firm can misreport the return to capital. In that case, poor institutions, interpreted as the inability to write perfect contracts or verify true return lead to the supplier of capital being cheated more often, yielding low expected returns.

2.2 The trade model

To study how international trade can change institutions, I embed the problems that arise with imperfect contracting in a small country opening up to world trade. There are many sectors and each sector is populated with many firms. The assumption that the country is small helps to understand the results. In an Appendix, I further study the effects of trade liberalization if the country is large.

Firms use three production factors, labor l , capital k and a sector-specific factor e . To produce, a fixed factor f_z needs to be sunk. The Cobb-Douglas weights of production are specific to the sector, z :

$$q_i = e_z^{1-\alpha_z-\beta_z} l^{\alpha_z} k_i^{\beta_z} \quad (1)$$

To start producing, an entrepreneur buys the sector-specific production factor e at price ρ and enters the capital market with a contract to rent capital. After that, he hires workers at wage rate w to start producing. We assume that the wage rate in the country under study is the economy's numeraire. With symmetric access to the sector-specific production factor, the price of that factor is E_z/n_z , where n_z is the number of firms in sector z . Additionally, firms face symmetric capital supply functions, leading to a sector-specific return on capital r_z , which is affected by the firms' outside options for refinancing and the installation costs of capital. Optimizing factor demand shows that the marginal costs of producing one unit is equal to:

$$mc_z = (E_z/n_z)^{1-\alpha_z-\beta_z} r_z^{\beta_z}.$$

Consumers have a nested CES utility function:

$$U = \int b_z \ln C_z dx; \quad C_z = \left[\int_{i \in z} c_i^{(\sigma-1)/\sigma} di \right]^{\sigma/(\sigma-1)}.$$

For a representative consumer, the demand function is:

$$c_i = \frac{\bar{p}_i^{-\sigma}}{\int_{i \in z} \bar{p}_i^{1-\sigma} di} b_z y, \quad (2)$$

where y denotes the income and the bar over p indicates delivered prices. For further reference, I use the harmonized price index of an industry as $P_z = \left[\int_{i \in z} \bar{p}_i^{1-\sigma} di \right]^{1/(1-\sigma)}$. Facing the constant-elasticity demand function, markup pricing is optimal for the firm:

$$p_i = \frac{\sigma}{\sigma-1} mc_z. \quad (3)$$

Production technologies are constant within the sector across countries. Production requires three factors:

Given the above technology and demand curve, markup pricing is optimal for the firm: where we allow the rental rate for capital to vary across sectors. The reason is that sector-specific differences in institutional structure can induce risk premia. This formulation is different from Levchenko, where wages can vary by sector. The markup price determines the equilibrium production of the firms, and its revenue $R_i = p_i q_i$. Moreover, given the fixed markup, operating profits π_i are a fixed share of revenue: $\pi_i = R_i / \sigma$.

For tractability, I study how incentives change in a small country opening up to world trade. The small country case preserves most political incentives that follow from trade liberalization. In an Appendix, I examine the effects of the trade liberalization for large countries.

Consumers have a nested utility function:

The entrepreneur promises that capital owner a rental rate r in the contract. Part ϕ of the investment is relation-specific to firm i . As in Levchenko, once the capital has been invested, the capital owner can only recover from $1 - \phi$ of his capital from the firm. Alternative uses for the capital provide the capital owner with a return of r^* . After production and sales, the entrepreneur bargains with the capital owners over the residual revenue. This residual revenue is the operating profits, less the fixed costs, and less any political contributions ω that the entrepreneur sends to the policymaker: $pq/\sigma + \phi kr - f_z - \omega$. Suppose the capital owners gets a share κ of the surplus. The participation constraint for capital owners is:

$$r(1 - \phi)k + \kappa\pi/\sigma \geq r^*k \quad (4)$$

This implies that the entrepreneur faces the marginal costs of capital: (drop bargaining?)

$$r = \frac{r^*}{1 + \phi} - \frac{pq/\sigma - f_z - \omega}{\sigma(1 - \phi)k} \quad (5)$$

I will focus on equilibria where firm entry is free, so that pure profits are driven to zero. In that case, the second term of (#) tends to zero: capital owners simply want to be compensated perfectly for the relation-specific investment.

The profit function for a firm that can retain capital is

$$\pi = R - wl - r^*k - \rho e_z - fmc_z + \phi r^*k - \omega. \quad (6)$$

$$= R/\sigma + \phi r^*k + \quad (7)$$

From the optimization problem,

$$r^*k = s_k \frac{\sigma - 1}{\sigma} R$$

where $s_k = \delta_z \frac{r^{*1-\beta}}{w^{1-\beta} + r^{*1-\beta}}$. Using this definition,

$$\pi = \frac{R}{\sigma} [1 + \phi s_k] - f_z mc_z - \omega. \quad (8)$$

1: $d\pi/d\phi$

2: $d^2\pi/(d\phi d\tau)$

$$d\pi/d\phi = \frac{R}{\sigma} (1 + \phi s_k) \left[\hat{R} + \frac{\phi s_k}{1 + \phi s_k} \hat{s}_k \right] - F_z [m\hat{c}_z] - d\omega/d\phi = 0 \quad (9)$$

Change in total contributions:

$$\begin{aligned}\frac{d}{d\phi} \int n_z \omega_z dz &= \int \left[\frac{dn_z}{d\phi} \omega_z + n_z \frac{d\omega_z}{d\phi} \right] dz \\ &= \int n_z \omega_z [\hat{n}_z + \hat{\omega}] dz\end{aligned}$$

The aggregate political contributions promoting poor contract enforcement are summarized as:

$$\int \frac{d\omega}{d\phi} di = \int n_z \left(\frac{R}{\sigma} (1 + \phi s_k) \left[\hat{R} + \frac{\phi s_k}{1 + \phi s_k} \hat{s}_k \right] - F_z [m \hat{c}_z] \right) + dz \quad (10)$$

Collecting different results:

$$\begin{aligned}\hat{R} &= (1 - \sigma) m \hat{c} \\ m \hat{c} &= (1 - \delta) \hat{n}_z + (1 - s_k) \hat{w} + s_k \hat{r}^* \\ (1 - s_k) \hat{w} &= 0 \\ \hat{s}_k * s_k &= \delta_z (1 - \beta) \frac{r^{1-\beta}}{w^{1-\beta} + r^{*1-\beta}} \hat{r} - \delta \frac{r^{*1-\beta}}{(w^{1-\beta} + r^{*1-\beta})^2} (1 - \beta) r^{*1-\beta} \hat{r} \\ \hat{s}_k &= \delta_z (1 - \beta) (1 - s_k) \hat{r} \\ \hat{n}_z &= ? \\ \hat{r}_z &= \frac{1}{(1 + \phi)}\end{aligned}$$

The equilibrium consists of six relations: a free entry-condition for entrepreneurs, clearing of the three factors markets, clearing of the goods market and trade balance with the rest of the world. They are achieved by the goods price and factor prices. For the clearing of the factor markets, it proves useful to write the revenue as $R_i = (\tau p_i)^{1-\sigma} b_z Y_w / P_{z,w}^{1-\sigma}$. In the expression for revenue, Y_w is world market expenditure and $P_{z,w} = \left[\int_{i,z,w} p_i^{1-\sigma} di \right]^{1/(1-\sigma)}$ is the world market price index of industry z . Clearing on the labor market requires that $wL = w \int_n l_i di = \frac{\sigma}{\sigma+1} \int R_i \alpha_z di$; and on the capital market $rk = r \int k_i di = \frac{\sigma}{\sigma+1} \int R_i \alpha_z di$. Note that with symmetric firms, the price of the sector-specific factor is $(1 - \alpha_z - \beta_z) \frac{\sigma}{\sigma+1} \int_z R_i di / e_z$, which suggest that the price of the final good tends to zero if nobody uses the sector-specific factor. As a result, while specialization may surface due to institutional differences or labor or capital endowments, perfect specialization does not occur: every sector has positive production. A similar effect occurs in the heterogeneous firm model of Bernard et al., as some very productive firms tend to stay in business. Free entry by entrepreneurs determines the equilibrium number of firms in each industry. Entrepreneurs enter as long as the pure profits $pq/\sigma + \phi kr - f_z - \omega$ are positive. The interest of the paper is not in a full derivation of the equilibrium in this economy (as solved in Bernard et al, and German); studying some equilibrium relations suffices to understand the effect of trade liberalization on institutional quality.

2.3 Politics

The policymaker makes a tradeoff between maximizing social welfare and accepting contributions from entrepreneurs. The political objective function is

$$G = \lambda S(\phi) + (1 - \lambda) \Omega$$

If $\lambda = 1$ the policymaker is perfectly benevolent. If λ is smaller than 1, the policymaker is increasingly corrupt. I assume that maintaining property rights is costless, and that the policymaker's interest in bribes prevents him from developing optimal institutions (in which $\phi = 0$).

The first-order condition for the policymaker implies that:

$$-\frac{\lambda}{1-\lambda} \frac{dS}{d\phi} = \frac{d\Omega}{d\phi}, \quad (11)$$

the social costs of poor institutions are weighed with the benefits of political contributions. The rate at which the marginal social costs are weighed against financial contributions is higher if the policymaker is less corrupt (λ is higher).

The entrepreneur decides his level of political contributions for poor contract enforcement by maximizing his returns $R_i/\sigma + rk_i\phi - c - f$. Multiplying the demand function (X) with prices for a firm in a small country, the revenue function is

$$R = p^{1-\sigma} \frac{\tau^{1-\sigma} b_z Y}{n^w p_w^{1-\sigma}}$$

where $p_i = \frac{\sigma}{\sigma-1} \rho_z^{\delta_z} w^{\alpha_z} r_z^{\beta_z}$, and p_w is the (symmetric) world price of goods in the same industry. Differentiating the revenue function with respect to the degree of contract enforcement gives

$$\frac{dR}{d\phi} = \left(\frac{p}{p_w}\right)^{1-\sigma} \frac{\tau^{1-\sigma} b_z Y}{n_w} \frac{(1-\sigma)\beta_z}{1-\phi} < 0 \quad (12)$$

For any industry, reducing the quality of contract enforcement (increasing ϕ) reduces the revenue from sales. The reason is that poor contract enforcement increases the costs of attracting capital, thus raising the marginal costs. However, the poor institutions work out at different magnitude per industry. Firstly, if the reliance on capital in the industry is large (β_z is high), then poor property rights especially reduce sales. The reason is that marginal costs rise more strongly with poor contract enforcement if the firm uses capital intensively. Moreover, poor property right enforcement is harmful especially for firms that have a comparative advantage versus the rest of the world. For industries in which final prices relative to world prices are particularly low (p/p_w), the reduction in sales is large, compared to relatively high-priced industries.

The entrepreneur also cares about the degree to which he can use relationship-specific investments. The proceedings of keeping shares of capital are $\Delta = rk_i\phi = \sigma/(\sigma+1)\beta_z R\phi$. Differentiating with respect to contract enforcement and dividing by Δ gives that the relative change in the retained capital is:

$$\frac{d\Delta/d\phi}{\Delta} = \frac{1}{\phi} - \frac{(\sigma-1)\beta_z}{1-\phi}.$$

The returns follow an "institutional Laffer curve". If contract enforcement is perfect, ϕ tends to zero and the returns to increasing the specificity rate are infinite. On the other hand, if nearly all capital can be claimed by the entrepreneur (ϕ tends to one), capital requires extreme returns, and the resulting high final price results in zero sales.

Taking the sales and capital claim effects of contract enforcement into account, the entrepreneur can develop his preferred level of contract enforcement. The first-order condition is given by

$$\beta_z \left(\frac{p}{p_w}\right)^{1-\sigma} \frac{\tau^{1-\sigma} b_z Y}{n_w} \left[\frac{1-\sigma}{1-\phi} + \frac{1}{1/\sigma + 1 + \sigma\phi\beta_z} \right] = \frac{d\omega}{d\phi}.$$

The number in between brackets is positive if $\phi < 1/\sigma^{-2}/(1 + (\sigma-1)\beta_z)$. Thus, this first-order condi-

tion is negative for very capital intensive firms (high β_z), suggesting they would pay to improve institutions, rather than increasing the share of capital they can retain. I assume that firms are organized in their industries, so that free-riding on bribes to the policymaker is not possible. Aggregating the first-order condition of all firms, the pressure on the policymaker to change institutions is:

$$\int_i \frac{d\omega}{d\phi} (i) di = \frac{d\Omega}{d\phi} = -\frac{\lambda}{1-\lambda} \frac{dS}{d\phi}.$$

Thus, taking symmetric firms within industries, the deviations from optimal institutional policy are determined by:

$$\int n_z \left(\frac{p_z}{p_{zw}} \right)^{1-\sigma} \frac{\tau^{1-\sigma} b_z Y}{n_{zw}} \left[\frac{1-\sigma}{1-\phi} + \frac{1}{1/\sigma + 1 + \sigma\phi\beta_z} \right] dz = -\frac{\lambda}{1-\lambda} \frac{dS}{d\phi}.$$

This aggregated first-order condition shows different effects that trade liberalization has on the pressure on the policymaker to distort institutions. Firstly, a decrease in τ increases the term $\tau^{1-\sigma}$ (sometimes also called the trade freeness), thus lowering a home producer's foreign prices and increasing foreign sales. This increases revenue, and expropriable revenue from capital. However, the industrial price index falls, too, due to increased competition from foreign firms. In case the country is perfectly small (asymptotically all consumption is imported and all production is exported), these effects cancel out. Secondly, trade liberalization increase the relative price of the abundant factor in this economy (Redding). In labor abundant countries, this has two effect: the relative price falls

this proceeding and dividing by the

The entrepreneur maximizes the residual claim he has on the firm: the operating profits and the firm-specific capital he does not pay for, minus the political contributions and the fixed costs; $R_i/\sigma + rk_i\phi - c - f_z$. The value of capital employed is $rk_i = \beta_z R_i \frac{\sigma}{\sigma+1}$. The entrepreneur thus maximizes:

$$\frac{R_i}{\sigma} - f_z + R_i\phi\beta_z \frac{\sigma}{\sigma+1} - c. \quad (13)$$

The first two terms are the operating profits less fixed costs. The third term $R_i\phi\beta_z \frac{\sigma}{\sigma+1}$ is the value of the capital that the entrepreneur retains due to incomplete contracts. The amount of capital thus earned follows an "institutional Laffer curve": if ϕ is zero, there is no revenue, but as ϕ tends to 1, the capital costs become prohibitive to profitably produce. The rent-maximizing level of institutions is somewhere between zero and 1.

When attempting to change institutional quality, the entrepreneur knows that demanding lower property rights is more costly: $dc/d\phi > 0$. Optimizing the demand for poor contract enforcement, the entrepreneur sets:

$$\frac{dR_i}{d\phi} \left[\frac{1}{\sigma} + \phi\beta_z \frac{\sigma}{\sigma+1} \right] + R_i\beta_z \frac{\sigma}{\sigma+1} = \frac{dc}{d\phi}. \quad (14)$$

$$\beta_z R_i \left[-\frac{(\sigma-1)}{1-\phi} \left(\frac{1}{\sigma} + \phi\beta_z \frac{\sigma}{\sigma+1} \right) + \frac{\sigma}{\sigma+1} \right] = \frac{dc}{d\phi}. \quad (15)$$

$$\beta_z R_i \left[-\frac{(\sigma-1)/\sigma}{1-\phi} + \frac{\sigma}{\sigma+1} \left(1 - \frac{(\sigma-1)}{1-\phi} \phi\beta_z \right) \right] = \frac{dc}{d\phi}. \quad (16)$$

This first-order condition states that the margin revenue of worsening institutional context balance with the cost of bribing the policymaker into worse contract enforcement.

Free entry into the market (setting up firms) will drive pure profit down to zero. The zero-profit condition requires that $R_i \left[\frac{1}{\sigma} + \phi\beta_z \frac{\sigma}{\sigma+1} \right] - f_z - c = 0$. As the number of firms that enters rises, the

revenue per firms falls. To see this most easily, consider that in an equilibrium with symmetric firms and fixed income in a single location, the revenue is $R = b_z Y/n_z$. Firms enter until revenue is driven and capital expropriation is driven down so far that it barely covers the fixed costs and political contributions. NB fixed costs are built with capital too!

All firms deal with the same policymaker, but not all firms have the same preference for institutional quality. We assume that firms in a sector organize to pressure the policymaker into bad policy until their first-order condition is met. The resulting equilibrium looks like a Lindahl equilibrium, except that it is not generally optimal: firms bribe instead of paying taxes

2.4 Trade liberalization and institutional change

The value of capital employed is $rk_i = \beta_z R_i \frac{\sigma}{\sigma+1}$.

if $r = r^*$ (Levchenko)

$$\kappa pq/\sigma = \phi r^* k \tag{17}$$

Faced with the demand curve, a typical producer will set

$$p_i = \frac{\sigma}{\sigma-1} \rho^{1-\alpha_z-\beta_z} w^{\alpha_z} r^{\beta_z}$$

and the equilibrium firm revenue is

$$R_i = \left(\frac{\sigma}{\sigma-1} \rho^{1-\alpha_z-\beta_z} w^{\alpha_z} r^{\beta_z} \right)^{1-\sigma} b_z \left[\frac{Y}{P_z^{1-\sigma}} + \tau^{1-\sigma} \frac{Y^*}{P_z^{1-\sigma}} \right]$$

and the surplus is R_i/σ , and the return for an entrepreneur is $(1-k) R_i/\sigma$.

To convince the capital owner to invest, the entrepreneur needs to offer

$$r_z (1-\phi) \geq r^*$$

The

3 Evidence from the closing of the Suez channel

The above theoretical model suggests that trade liberalization may cause opposing pressures on institutions. On the one hand, access to international market is overall beneficial as producers demand better institutions, but the potential specialization in industries that rely less on good institutions may reduce the demand for high-quality institutions. This section evaluates the results empirically, describing the Suez channel as a "quasi-experiment" and discussing difference-in-difference evidence. The background on the Suez channel is kept to a minimum; a more extensive description of the events that led to the closing of the channel can be found in Feyrer.

3.1 The Suez channel

The Suez channel was shut from 1967 to 1975. In 1955, after the Egyptian approachement to the Soviets, the UK withdrew its financial support for the construction of the Aswan (high) dam and the US followed the next year, in 1956. In response, the Egyptian president Nasser nationalized the Suez channel, earlier held by the British, to finance the Aswan dam construction. To avert an Israeli (backed by the British and French) dispute with Egypt, the United Nations passed the Pearson resolution in 1956. The Pearson resolution left the Suez channel freely navigable under UN control. It was not until the Six Day war with

Israel that Egypt closed the channel again. During the Six Day war, Israeli forces took control of the Sinai peninsula, leading the Suez channels to be a warfront. Egypt closed down the channel by sinking ships. The closure of the channel was unexpected: in fact, a group of ships (the "Yellow Fleet") were caught in the channel after it had been closed, only to be released in 1975. In 1973, the channels was once again the scene of war, this time of the Yom Kippur war. By 1974, the UN had regained control over the Suez channel, but the wartime debris and mines made the channel innavigable. After clearing the channel, it was formally reopened on June 5th, 1975.

The closing of the Suez channels poses a possible quasi-experiment for the countries behind the Suez channel. While Egypt was clearly involved in the conflict that lead to the closing of the channel, but many coastal countries south of the channel were not involved in the conflict. Exporting many agricultural goods and resources, these countries have had clear transport cost shocks while other freight costs (air transport) remained fairly constant. Moreover, as argued in Feyrer (2009), the conflict broke out unexpectedly (some ships were caught in passing the canal) and fighting continued over the course of the closing spell, so the change in transport costs was not anticipated.

To proxy the change in transports costs, I exploit the change in kilometers of sea navigation required for a set of African countries to reach a European port. For countries on the East coast of Africa, the closing of the Suez channel implied a shipping route around the South Cape. For countries on the West coast (that is, South Africa and countries located more West), shutting down the eastern route had no consequences for the shortest path. To quantify these changes, I have taken sea route data from searates.com (see Appendix), for shipping to the (then) largest part of Europe, Rotterdam. I compared the length of the route in kilometers via the Suez channel, and the route via South Africa.³ The regressions use only countries that have access to the ocean, because for land-locked countries like Zambia or Uganda, it is uncertain whether the shortest route is affected. The Appendix provides a list of the African countries in the sample; which ports I took to be their main seaport. Figure 1 summarizes the percentage change in shipping distance to Rotterdam. The mean distance to the port of Rotterdam before 1967 was around 10,600 kilometers. For the affected countries, the mean distance increased from 10,400 kilometers to 14,900 kilometers.

The closing of the Suez channel had substantial effects on trade. Feyrer (2009) documents that the closing of the Suez channel led to significant decreases in aggregate traed for country pairs whose quickest route used the channel. Focusing on agricultural exports, my main data, this picture is confirmed. Figure 2 traces the development of the (total) agricultural exports in my data for affected countries (for who the shipping distances increased in 1967, on the eastern coast of Africa) and unaffected countries. Affected countries show a drop in exports in 1967, moreover, high export growth experienced elsewhere on the continent remained very low. A simple difference in difference regression of the log of total exports on the interaction of dummies for being affected and for the years 1967-1975; and for country and time fixed effects confirms this: the interaction term takes a coefficient -0.11, suggesting that affected countries had 11% lower exports than could be expected if under the same circumstances as the unaffected countries.

[discussion on markets in Eastern Africa]

3.2 Evidence from agricultural data

There are no direct measures for institutional quality in Africa in the 1960s. Instead, as suggested by Nunn and Treffer (2013a), I use the variation in the dependence of good institutions in different

³The second route is the sum of two parts, shipping to South Africa, and subsequently shipping to Rotterdam. To infer the cost of the stop in South Africa, I compared the kilometers shipping from Mozambique to Botswana, to the kilometers shipping from Mozambique to South Africa to Botswana. The results do not change whether subtracting this "South Africa stopover" difference from the imputed length of the southern route. I also used the shipment time, but as it is highly correlated to the kilometers, the results do not change between using time or kilometers.

Figure 1: Shipping distance changes to Rotterdam (%) due to Suez channel closing by country

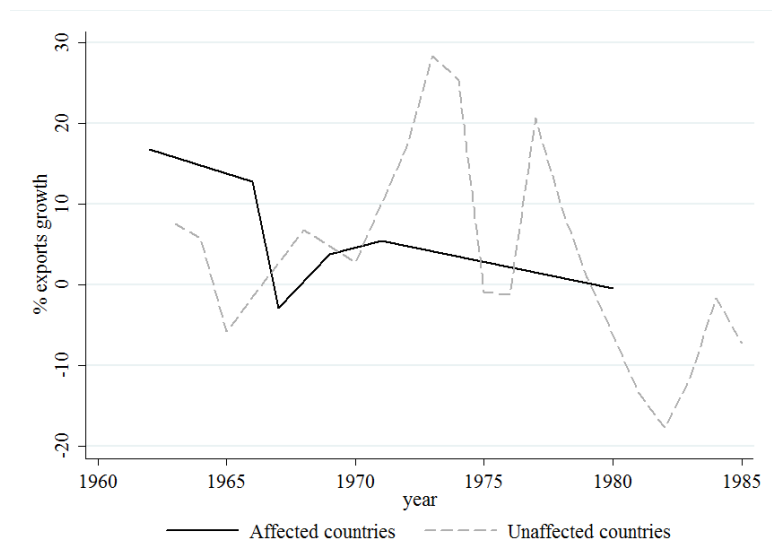
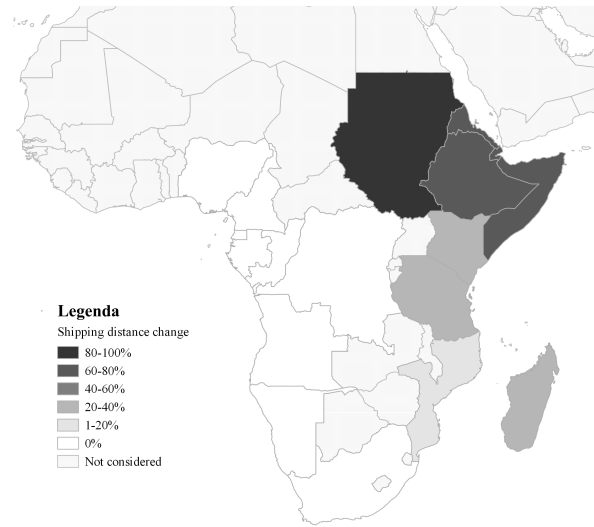


Figure 2: Evolution of agricultural trade for affected and non-affected countries

industries. To study the heterogeneous effects of the effects of transport costs, I use the variation in different agricultural products.

Agriculture differs throughout countries in the world, but the characteristics of the same crops in different places in the world are rather similar. What offsets cow farming from sugar production in American countries, also holds in African countries: the labor costs in sugar production are higher than that in cow farming, while the capital required for holding cows is far higher. By my knowledge, there are no data about the specific costs involved in different sectors of agriculture in Africa in the 1960s. However, these costs can be proxied by accounts from the US. A disadvantage of using the input measures from another country is that the technology may be quite different. Yet, if the inherent qualities of the crop are similar, they can still reflect the productive aspects of the crop. Moreover, in the difference-in-difference approach, changed technology will only bias the results if it systematically related to underlying characteristics of the crop. An advantage of using the input measures from another country is that the local prices do not bias the use of labor or capital, making the expenditure shares poorer proxies of technology.

The sensitivity of different products to institutions is quantified using data on expenses from the US Department of Agriculture in 1975 (or for some industries, the earliest possible date). My theoretical model suggests that exposed factors of production will be used less when contract enforcement is poor. The factors that can be hired "at the spot" has less usch exposure, but the upfront investments and non-variable stages of production are likely to be more sensitive. To proxy the less institutionally sensitive factor employment, I take the share of total costs that is classified as variable costs of production from the USDA statistics for individual crops and animals, assuming that products that rely heavily on variable stages of production are institutionally less sensitive. Because the model also suggests comparative advantage arguments, I also proxy capital employment by calculating the share of total costs due to non-land capital. If these industries face similar wages and rental rates, the relative costs of a production factor proxy for the relative employment of that factor - given the difference-in-difference strategy, getting the absolute factor employment right is not a priority. An overview of the product groups used from the USDA data, as well as a crosswalk developed to match the export data is available in the Appendix.

The characteristics of different agricultural products are matched with export profiles of all countries in the sample from 1961 to 1985(X). The exports reflect data from the respective country to the entire world. The commodity export data are available from the FAO trade statistics database.

Using the data on exports, commodity characteristics and the transport cost shock, a difference-in-differences equation can evaluate how the export of products responded to transport cost shock. Using statistical associations between trade and institutions as evidence for the effect of trade on institutions leads to a host of objection. Countries differ widely across Africa, and some would be more likely to trade as well as to have better institutions, for instance for historical (colonial) reasons; geography, soil and climate; or their position relative to other countries. Some countries may have specialized into institutionally (in)sensitive industries that have performed better over the years. Over time, political leaders may have better understood institutions, the climate for development aid may have changed, or international legislation has adapted. Country's local politics, conflicts, disasters or other major events could have distoredted traed in general. The difference-in-differences strategy can control for such concerns, because it compares the changes for different industries between countries over time, controlling for country-specific, sector specific and time-specific explanations. The question remains whether the causality runs from trade openness to institutions or vice versa, but in case of the Suez channel, the effect of East African institutions on the closingof the channel can be ruled out. The difference in differences equation thus avoids pitfalls in evidence from comparisons over time (unaffected countries might have the same results), of cross-sections (countries might be different to start with) and in yearly country comparisons (the events in one year differ per country, or international events have different impacts

between countries). I use the following equation, based on a simple gravity model:

$$\begin{aligned} \log \text{exports}_{ict} = & \beta_0 + \beta_1 \log \text{distance}_c + \beta_2 \text{variable cost}_i + \beta_3 \left(\log \left(\text{distance}_{ct}^{\text{shock}} \right) - \log \left(\text{distance}_c \right) \right) \\ & + \beta_4 \text{variable cost}_i \times \left(\log \left(\text{distance}_{ct}^{\text{shock}} \right) - \log \left(\text{distance}_c \right) \right) + \alpha_i + \mu_c + \gamma_t + \varepsilon_{ict}. \end{aligned} \quad (18)$$

This equation is formulated in log-log form, following the gravity equation. Because the distance to the same port is captured in the distance variable, the output of the destination country is not considered. The variable "distance_c^{shock}" reflects the shipping distance in the time 1967-1975, which is higher than the pre 1967 shipping distance ("distance_c") for affected countries. The specification includes fixed effects to control for country-level effects (μ_c), specific crop characteristics (α_i) and yearly fixed effects (γ_t). As the fixed effects μ_c and α_i are collinear with "logdistance_c" and "variable cost_i", their parameters β_1 and β_2 are not identified.

The coefficient of interest in this regression is β_4 . Coefficient β_4 shows how the exports of a specific commodity respond to the shock in transport costs, depending on whether that commodity relies heavily on the variable stages of production. Because the shock can only increase the transport distance, a positive coefficient of β_4 implies that industries relying on variable stages of production heavily expanded more. Effectively, this equation is a "difference-in-difference-in-difference" specification, because it compares the exports of different products over transport costs differences over industries over time. However, the specification where the shock is formulated in differences saves room in the specification.⁴

The estimation of this equation needs two modifications from regular OLS. Firstly, around 60% of the export flows are zero. This is not surprising, given that the data are effectively sectoral. Given the zero trade flows, taking the log of exports would lead to a substantial, non-random loss of data. Instead, I estimate the equation using the Poisson quasi-maximum likelihood estimator, which is consistent and can deal with zero-valued flows in the logarithmic form (Silva and Tenreyro, 2006). The standard errors are robust. Secondly, the distance shock is not independent within countries: every industry in the same country is affected in the same way. Therefore, I cluster the standard errors at the country level not to understate the standard errors.

Table 1 presents the results of the regressions. Most importantly, the coefficient on the interaction between variable cost shares is positive, suggesting that industries relying on larger fixed costs of production were hurt significantly worse by the increased transport costs than firms that have less of such non-variable costs. The results thus imply that the institutionally intense sectors suffered from the rise in transport costs; or put loseley, that larger transport costs have probably reduced the quality of domestic institutions. Column 1 also shows that intuitively, the transport shock has decreased the export flow.

Arguably, the transport cost shock occurred twice: first when the Suez channel closed, and then when it opened. To exploit the difference, columns 2 and 3 present the results of running the same regression in a split sample, before 1971 and after 1971 (the middle of the treatment spell). The results remain similar: the blocking of the channel and subsequent opening had effects of similar magnitude, the closing leading

⁴The alternative "diff-in-diff-in-diff" formulation would be:

$$\log \text{exports}_{ict} = \beta_0 + \beta_1 \log \text{distance}_c + \beta_2 \text{variable cost}_i + \beta_3 \left(\log \left(\text{distance}_c^{\text{shock}} \right) - \log \left(\text{distance}_c \right) \right) + \beta_4 \text{D}(1967-1975) + \beta_5 \text{variable cost}_i \times \left(\log \left(\text{distance}_{ct}^{\text{shock}} \right) - \log \left(\text{distance}_c \right) \right) + \beta_6 \text{D}(1967-1975) \times \left(\log \left(\text{distance}_{ct}^{\text{shock}} \right) - \log \left(\text{distance}_c \right) \right) + \beta_7 \text{D}(1967-1975) \times \text{variable cost}_i \times \left(\log \left(\text{distance}_{ct}^{\text{shock}} \right) - \log \left(\text{distance}_c \right) \right) + \alpha_i + \mu_c + \gamma_t + \varepsilon_{ict}$$

where D(1967-1975) is a dummy indicating the years 1967 to 1975. The coefficient of interest is then β_7 , equal to β_5 discussed in the text.

to shrinking of institutionally intensive industries, the opening leading to an expansion of institutionally intensive industries.

The change in transport cost could also have led to specialization in comparative advantage industries. To investigate this issue, columns 4 and 5 introduce the employment of capital (share of total cost) into the methodology. Column 4 shows that indeed, the closing of the canals caused a rise in capital-intensive production. While this is consistent with our model ascribing the rise of capital intensive industries to improved institutions, it could also be a reversal of the Heckscher-Ohlin theorem: as capital abundant countries become more remote, local production becomes more capital intensive. Discriminating between these would need an alternative test. When controlling for the capital intensity of an industry to rule potential Heckscher-Ohlin patterns, the result on the role of fixed costs persists. If this such pattern exists, it does not seem to run via capital and labor intensities; the capital cost share and the variable costs are virtually uncorrelated (see Figure A1 in the Appendix).

Lastly, to rule out that the specification is picking up any other effects, I run a placebo regression. It uses the same sample and the same transport costs shock. However, the regression is run as if the shock hit between 1961 and 1964; relatively peaceful years for the Suez channel. As can be seen from column 6, artificially dating the shock earlier in time leads to insignificant results both on the overall export effect of the shock and on the specialization. Another concern could be that before the Suez channel re-opened in 1975, mines needed to be cleared from the channel before it became navigable. One might argue that the opening of the Suez channel could be anticipated by one year (mine clearing started in 1974). In order to investigate this, I have rerun the specification allowing the spell to end in 1974 and 1973. The (unreported) regressions show no change in the results.

Table 1: Agricultural products

	(1)	(2)	(3)	(4)	(5)	(6)
		pre 1971	post 1971			placebo
shock log km	-16.25** (7.10)	-15.31** (7.39)	-15.52** (6.70)	-11.61*** (2.02)	-16.18*** (3.91)	-4.63 (5.34)
variable share x shock log km	29.14** (12.96)	26.97** (12.81)	27.61** (12.39)		12.25*** (4.57)	6.58 (9.98)
capital share x shock log km				95.98*** (20.51)	77.42*** (18.08)	
Observations	5,100	2,040	2,856	5,100	5,100	5,376
country FE	yes	yes	yes	yes	yes	yes
crop FE	yes	yes	yes	yes	yes	yes
year FE	yes	yes	yes	yes	yes	yes

Clustered at country level, robust standard errors in parentheses

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

3.3 An alternative definition of institutions

The identifying assumption in the above regressions is that different agricultural products respond differently to institutional changes due to differences in their production technology. As Berkowitz et al. (2006) argues, the main channel through which institutions affect trade is through production costs rather than through transaction costs. However, recent studies also use product types to measure institutional dependence. To corroborate evidence from agricultural production, I present similar regressions based on different definitions of institutional dependence. Instead of the variable and fixed cost shares, I rely

on the good's type as classified by Rauch (1999) into differentiated and homogenous (reference-priced or organized exchange). This primarily follows Ranjan and Lee (2007) and Berkowitz et al. (2006), who both argue that a good's degree of differentiation determines how intensively it relies on institutions to be produced. The idea is that goods that are easily sold if a trade partner cannot be held to his contractual obligations run less risk when contract enforcement is poor. Differentiated goods, which cannot easily be substituted and are often tailored to the buyer, require larger relationship-specific investments, which have high exposure if contract fail. Both Ranjan and Lee and Berkowitz et al. show that good institutions are conducive to trade in differentiated goods especially. I also follow Nunn (2007), who argues that the contractual intensity of a good depends on the type of goods used as inputs: firms that need differentiated products from upstream supplier rely more heavily on easy contract enforcement. Nunn similarly shows that institutional quality works as a comparative advantage, as high indexes of institutional quality in a country lead to relative specialization into firms that use differentiated inputs.

The export-to-world data for these regressions are from the COMTRADE database, based on an SITC4 classification. These are matched with the Rauch classification, and the upstream product characteristics from Nunn using a crosswalk provided by Markusen.⁵ The empirical strategy is the same as described in the previous subsection, except that I now condition the effect of the distance shock on goods differentiation instead of on fixed cost share.

Table 2 present the results using product differentiation as a measure of the dependence on contract enforcement. The negative effect of the interaction shows that when the distance shock took place, firms that produced differentiated, institutionally dependent goods were particularly hit. The more homogenous goods consist of goods traded on an organized exchange and those with reference prices. The second column of Table 2 runs the regression for goods sold on an organized exchange, confirming that these were affected less (the third, reference priced group is the complement to the other two). Following the argumentation of Nunn (2007), the third column considered an industry's dependence on differentiated inputs, rather than its final product. Whether the firm produces differentiated goods or uses differentiated goods as inputs does not seem to matter much: either way, dealing with differentiated goods led to stronger contractions when the Suez channel closed. The matching of input industries for this sample is much harder though, resulting in a significant sample selection. These results, based on product types, confirm the results from the agricultural data. The underlying measures of dependence on contract enforcement are quite different, though: the product type data rely on the complexities of designing contracts for transactions, while the agricultural data used above rather quantify exposure of production factors to poor property right definitions.

4 Conclusions

This paper exploits the closing of the Suez channel to assess how international trade affects institutions. My theoretical model of trade and endogeneous institutions predicts that degree to which firms have a different sensitivity to institutional quality, varying with the size of fixed stages of production, the capital intensity of a good and the differentiation in the product sector. The model highlights two opposing forces of trade liberalization on production. On the one hand, trade may lead to specialization in comparative advantage industries. In developed countries, such specialization increases the power of institutionally less sensitive industries that most likely demand poor property rights and contract enforcement. On the other hand, increased access to the world market pushes all firms to demand productivity-conducive institutions. The empirical results show that when the Suez channel closed, African countries behind the Suez channel saw a fall in institutionally intensive production. This sectoral pattern implies that

⁵The crosswalk can be found on James Markusen's website but it matches few sectors. I will use another crosswalk.

Table 2: Differentiated products

	(1)	(2)	(3)
shock log km	4.11* (2.48)	0.19 (1.45)	8.47** (2.11)
shock log km x differentiated	-7.42* (3.79)		
shock log km x organized		0.27 (1.80)	
shock log km x inputs diff.			-10.73** (1.12)
Observations	24,510	24,510	3,917
country FE	yes	yes	yes
crop FE	yes	yes	yes
year FE	yes	yes	yes

Clustered by country. Robust standard errors in parentheses

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

international trade contributed to local institutions, rather than eroded them. This holds true for different definitions of institutional dependence, at the opening and closing of the Suez channel, and controlling for shifts in production factors.

The evidence that this paper offers complements and sometimes improves earlier evidence, providing support in an important policy debate. The closing of the Suez channel was not influenced nor anticipated by the countries in the sample, making it a "quasi-experiment" for a substantial shock to trade costs. The quasi-experiment addresses issues raised against earlier instrumental variable approaches and dif-in-dif approaches. Moreover, the industrial focus of the paper joint with the African setting allows an accurate evaluation of the "institutional comparative advantage" argument against international trade - the idea that institutionally poorly developed countries specialize further into institutionally malevolent industries when opening up to trade. Eastern African countries in the 1960s and 1970s were institutionally disadvantaged compared to the European countries they were cut off from, so if the "institutional comparative advantage" argument (formulated in Levchenko, 2007, and ensuing literature) held, it would be likely to apply here. That the opposite seems to occur is valuable in the discussion on recent development policies tending to "aid for trade" - combining infrastructure and trade liberalizations with development aid.

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A Figures

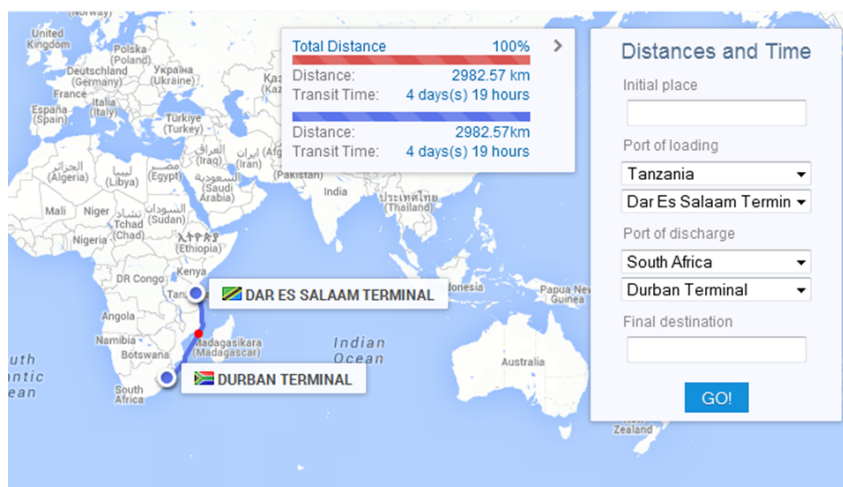


Figure 3: Shipping distance calculator from searates.com

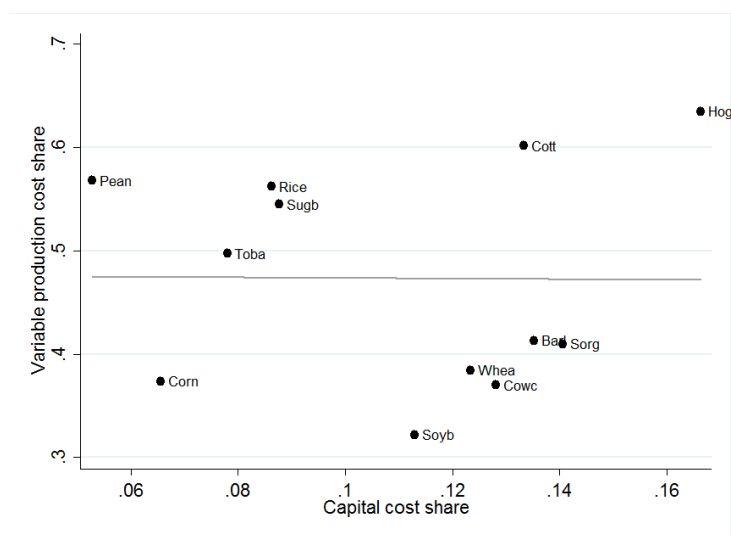


Figure 4: Capital cost share and variable input cost share for different industries

B Countries in the sample and their main ports

Angola (Luanda); Cameroon (Douala); Congo (Pointe Noire); Democratic Republic of the Congo (Matadi); Djibouti (Djibouti); Equatorial Guinea (Bata); Eritrea (Assab); Ethiopia PDR (Djibouti); Gabon (Libreville); Kenya (Mombasa); Madagascar (Toamasina); Malawi (); Mozambique (Beira); Namibia (Walvis Bay); Nigeria; Somalia (Mogadishu); South Africa (Durban); Sudan (former) (); United Republic of Tanzania (Dar Es Salaam).

C Products by category

The following code in stata maps the COMTRADE data into USDA sectors:

```
replace Bar1=1 if crop=="Barley"|crop=="Barley, pearled"

replace Corn=1 if crop=="Sweet corn frozen"|crop=="Sweet corn prep or preserved"
\quad |crop=="Flour, maize"|crop=="Maize"|crop=="Maize"|crop=="Oil, maize"|crop=="Cake, maize"

replace Cott=1 if crop=="Cotton lint"|crop=="Cotton linter"|crop=="Cotton waste"
\quad |crop=="Cottonseed"|crop=="Cotton, carded, combed"|crop=="Oil, cottonseed"|crop=="Cake, cottonseed"

replace Cowc=1 if crop=="Butter, cow milk"|crop=="Cheese, whole cow milk"
\quad |crop=="Milk, skimmed cow"|crop=="Milk, whole fresh cow"|crop=="Skins, calve, wet salted"|crop=="Milk, whole fresh cow"

replace Hogs=1 if crop=="Meat, pig"|crop=="Meat, pig sausages"
\quad |crop=="Meat, pig, preparations"|crop=="Offals, pigs, edible"|crop=="Meat, pork"

replace Pean=1 if crop=="Peanut butter"

replace Rice=1 if crop=="Rice total (Rice milled equivalent)"|crop=="Bran, rice"

replace Sorg=1 if crop=="Sorghum"|crop=="Flour, mixed grain"|crop=="Grain, mixed"

replace Soyb=1 if crop=="Oil, soybean"|crop=="Soya sauce"|crop=="Soybeans"
\quad |crop=="Cake, soybeans"

replace Sugb=1 if crop=="Sugar beet"|crop=="Sugar Raw Centrifugal"|crop=="Sugar refined"
\quad |crop=="Sugar, nes"|crop=="Sugar confectionery"

replace Toba=1 if crop=="Tobacco products nes"|crop=="Tobacco, unmanufactured"

replace Whea=1 if crop=="Wheat"|crop=="Bran, wheat"|crop=="Buckwheat"|crop=="Flour, wheat"
```