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Rabah Arezki
Ana Fernandes
Federico Merchán
Ha Nguyen
Tristan Reed

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Abstract

Countries with greater commodity export intensity have more concentrated markets for imported goods. Import market concentration is associated with higher domestic prices, suggesting that markups due to greater concentration outweigh any potential cost efficiency. Tariffs, non-tariff measures, and tariff evasion are mechanisms that concentrate import markets. These results suggest a novel channel for the resource curse stemming from the monopolization of imports.

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Rabah Arezki, Ana Fernandes, Federico Merchán, Ha Nguyen, Tristan Reed*

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*Rabah Arezki is Director of Research at the French National Research Center (CNRS) and a Senior Fellow at the Harvard Kennedy School, Ana Fernandes and Tristan Reed are Lead Economist and Economist at the World Bank Development Research Group, Ha Nguyen is Economist at the International Monetary Fund (IMF), and Federico Merchán is a Junior Researcher at the Institute for the World Economy (IFW).
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1 Introduction

Dependence on natural resources for exports creates a variety of macroeconomic challenges known collectively as 'the resource curse' (Sachs and Warner, 2001; Van der Ploeg, 2011; Frankel, 2012; Venables, 2016; Arezki, Ramey and Sheng, 2017). One challenge is the so-called Dutch disease wherein a natural resource discovery or price appreciation is accompanied by a real exchange rate appreciation, which in turn shrinks the non-resource tradable sector leading to de-industrialization. Such appreciation also leads to an increase in the size of the import market.[1] Another challenge faced by resource-dependent economies is rent-seeking wherein natural resource rents controlled by the state increase the return to state capture, leading to inefficient policy choices in the absence of strong institutions. In principle, both the Dutch disease and rent-seeking challenges could interact to form an under-explored "import" channel for the resource curse. Foreign exchange receipts from natural resources combined with real exchange rate appreciation expand the domestic demand for imports, increasing the domestic import market. By making the import market larger, natural resources raise the return to effort by importers towards capturing the state and using trade or industrial policy to shield them from competition. Yet, existing theoretical models of state capture in natural resource-dependent economies (Tornell and Lane, 1999; Robinson, Torvik and Verdier, 2014) do not emphasize profits in the import market as a source of rents.

Anecdotal evidence is consistent with this import monopolization effect, as the wealth of many billionaire businesspeople in natural resource-dependent economies is linked to profits in import markets. Prominent billionaires Femi Otedola in Nigeria, Abdul Latif Jameel in Saudi Arabia, and Igor Kesaev in the Russian Federation accumulated their wealth respectively as a fuel importer, an exclusive distributor for a car manufacturer, and an importer of alcohol, cigarettes, and food.[2] This paper moves beyond anecdotes and provides systematic

[1] Harding and Venables (2016) document a positive association between resource export revenues and the size of the import market. In our sample, a bivariate regression confirms that a 1 percentage point increase in the share of commodities in total merchandise exports is associated with a 0.6 percent increase in the value of the import market.

[2] See Freund (2016) for an account of the origin of billionaires' wealth in emerging markets.

evidence that natural resource dependence is associated with monopolization of imports, and that trade policy is a mechanism behind this association. The term 'monopolization' is used to describe a shift in market structure toward one that is more concentrated.

The analysis exploits a novel database of all firm-level import transactions in 53 developing economies. These data reveal that natural resource-dependent economies have more concentrated markets for imported products. This main result is illustrated in Figure 1a, which shows a positive association between countries' commodity exports as a share of total merchandise exports and the weighted average Herfindahl–Hirschman index (HHI) across their imported product markets. The HHI for an imported product market is the sum of the squared market shares of every firm importing that product. Econometric estimates show this relationship is robust to a variety of controls including country-product and product-year fixed effects. An alternative specification shows exogenous increases in world commodity prices also increase import market concentration, suggesting the relationship is causal.

Traditional models of Dutch disease emphasize the increase in the price of non-tradable goods relative to the price of tradable goods hence the appreciation of the real effective exchange rate. Yet, these models ignore elements of market structure and the presence of markups. These elements can affect prices over and above the effect on relative prices stemming from the traditional Dutch disease. Our results suggest that prices are elevated due to higher markups ensuing from monopolistic or oligopolistic pricing by importers. Data on import unit values and domestic price levels show that import market concentration can account for higher prices. This result is not obvious ex-ante: if higher market concentration is associated with a higher fixed cost but lower marginal cost of importing, import market concentration could be associated with lower prices, even if it contributes to higher markups. Along these lines, contributions by Edmond, Midrigan and Xu (2023) and Aghion, Bloom, Blundell, Griffith and Howitt (2005) show that increased markups stemming from high market concentration may (though need not) harm welfare. Higher prices associated with concentration could shape firms' international input sourcing decisions, as recently analyzed using United States data (Antràs, Fort and Tintelnot, 2017; Goldberg and Reed, 2023). To the extent that import monopolization raises costs of input procurement in global value chains, it may impede countries' efforts to diversify exports away from natural resources.

We provide evidence suggesting trade policy is a channel for import monopolization in natural resource-dependent economies. Figure 1b shows the commodity export share is positively associated with higher import tariffs. We also find the commodity export share is associated with greater use of non-tariff measures (NTMs) such as quotas, that limit entry into imports.

Trade protection increases import market concentration through direct and indirect mechanisms. The direct mechanism is that trade protection, ceteris paribus, both reduces demand and raises the cost of importing, which could lead firms to exit and increase concentration. Our evidence is consistent with this mechanism: imported product markets with higher tariffs are more concentrated, conditional on country-year and product-year fixed effects. The country-year fixed effects rule out this evidence being driven by differences in national market size or institutions, and the product-year fixed effects rule out this evidence being driven by differences in the global product market, like technology or the product's share in the import basket of a typical developing country.[3]

The indirect mechanism is tariff avoidance. Certain importers may be able to avoid paying tariffs, either by securing legal exemptions or by illegal tariff evasion. They thus achieve an asymmetric cost advantage that allows them to sell imports more cheaply than firms that cannot avoid tariffs, expanding their market share and increasing market concentration. The seminal literature on rent-seeking suggested as much, arguing tariff avoidance could explain the persistence of high tariffs, as elites that enjoy the advantage of avoidance are a constituency in favor of tariffs remaining high (Tullock, 1967; Krueger, 1974).

[3]Our data, which begin in 1997, succeed major tariff reforms in most countries, so we are unable to exploit within country-product variation in trade policy that would allow inclusion of country-product fixed effects in this analysis.

Our evidence is also supportive of this indirect mechanism, but only in countries with certain types of commodity exports. Isham, Woolcock, Pritchett and Busby (2005) argue rent-seeking associated with the resource course is greater in fuel exporting economies because fuel extraction is point-based, meaning revenues typically transit directly through government coffers, in contrast with economies exporting commodities with a more diffuse production base. Consistent with this, we find that control of corruption measured by expert surveys is weaker in economies dependent on fuel exports compared to economies specializing in exports of ores and metals or food commodities. In our sample, the association between tariffs and import market concentration is stronger for economies that are dependent on fuel exports than for those that are dependent on ores and metals or food. Using a measure of tariff evasion based on the underinvoicing of imports relative to exports reported by partner countries, we find a positive relationship between the tariff rate and tariff evasion in economies dependent on fuel exports, but not in economies dependent on other commodity exports. This evidence suggests that tariff evasion explains import market concentration especially in fuel exporting economies.

Our paper is the first to systematically explore differences across countries in import market structure, contributing to several literatures beyond that about the resource curse. While the export sector has been the traditional focus of the trade and development literature, in developing countries the value of imports is about as large as that of exports, and many exported goods are produced using imported inputs (UNCTAD, 2021). We identify patterns in import market structure that contrast starkly with those in studies examining export market structure. Fernandes, Freund and Pierola (2016) use the same customs transactions data on the export side to document that higher-income economies have more exporting firms, but also more concentrated export markets dominated by "superstars," or firms with especially large market shares, whose characteristics are described by Freund and Pierola (2015, 2016).[4] The pattern in import markets is the opposite. Higher-income economies

[4]Freund and Pierola (2015) show national revealed comparative advantage is shaped by the presence of

have less concentrated import markets, independent of their commodity export intensity.

Our paper provides general insight into differences in market concentration across countries. Leone, Macchiavello and Reed (2024) describe how concentration leading to high markups has raised prices in Africa's domestic cement industry, and conclude the reason for concentration is small national market size, rather than entry costs that are higher in Africa. In contrast, the present paper provides evidence of entry costs in importing that are unique to commodity export intensive economies and can account for higher costs in these economies.

The remainder of the paper is organized as follows. Section 2 describes the data and measurement of import market concentration. Section 3 shows the main result in Figure 1a is robust to a battery of controls and alternative regression specifications. Section 4 presents evidence that tariffs, non-tariff measures, and tariff evasion are mechanisms that concentrate import markets. Section 5 documents the positive association between domestic prices and import market concentration. Section 6 concludes.

2 Data and measurement

Import Market Concentration. Import market concentration is measured using a novel database of all firm-level import transactions recorded by customs authorities in 53 countries, geographically and institutionally diverse, and broadly representative of middle-income economies (see Table S1). The database has the same source as the World Bank Exporter Dynamics Database described by Fernandes et al. (2016) but includes import rather than export transactions. The sample period covers 1997-2021 but with different year coverage for each country. We eliminate observations in HS27 (oil, petroleum, natural gas, and coal) as their trade is not uniformly reported across countries' customs data. Country-year total

superstar exporters. Gaubert, Itskhoki and Vogler (2021) discuss the policy implications of such "granular" comparative advantage in exports. Our evidence highlights that import markets can also be granular, with implications for the price level.

non-oil imports in our data are very similar to the corresponding total non-oil imports reported by COMTRADE (the average difference across country-years is 5.6%). COMTRADE data is accessed through WITS (World Bank, 2024b).

Measuring import market concentration requires defining a relevant market, or the set of products over which the firms in question have market power. While relevant market definition is the object of intense debate in antitrust litigation, a general principle is that it should include the set of goods that are close substitutes for the same set of consumers (Davis and Garcés, 2009). Benkard, Yurukoglu and Zhang (2021) note that economic census data, whereby firms are classified into industries, are collected at the point of production rather than consumption, and so may be less useful for analyzing the relation between market concentration and market power. In contrast, the Harmonized System (HS) product categories defined by the United Nations used in trade data classify goods with a similar end-use, and so are conceptually like the relevant product markets in antitrust analysis. Following Fernandes et al. (2016), we use a time-consistent consolidated classification that concords and harmonizes product codes across the HS revisions present in the raw data.[5]

Our baseline measure of import market concentration is the Herfindahl-Hirschman Index (HHI) or

$$HHI_{c,i,t} = \sum_{j}^{J} \left(100 \times \frac{M_{c,j,i,t}}{M_{c,i,t}} \right)^2$$

where $M_{c,j,i,t}$ is the import value of firm j in country c of product i in year t, J is the number of firms and $M_{c,i,t}$ the total import value in the relevant import country, product market, and year. Values are measured including cost of freight and insurance (CIF) in United States dollars. Table S1 reports average and median HHI across HS 6-digit products by import country. We consider alternative measures of concentration: the share of the largest importing firm or the largest four importing firms, the number of importing firms, and the number of source countries, all defined by import country, product market and year. We also

[5]The consolidation incorporates HS revisions 1996 through 2017. A description of the methodology is available upon request.

use unit values defined as the ratio of import value to import weight by country-product-year. Moreover, we measure the import share for a specific set of firms, those that are also exporters of commodities, identified based on a database of all firm-level export transactions recorded by customs authorities in the same 53 countries.

Natural resource dependence. We employ two measures capturing natural resource dependence: (i) the share of commodities in total merchandise exports from the World Development Indicators (World Bank, 2024a); and (ii) an index relying only on fluctuations in world commodity prices (Gruss and Kebhaj, 2019).[6] Means and standard deviations of these variables are reported in Table S2. Commodities and natural resources are defined broadly to include food (e.g., animal and vegetable oils and fats, beverages, fruits and vegetables, live animals); fuels (e.g., mineral fuels, lubricants, related materials); and ores and metals (e.g., crude fertilizers, metalliferous ores, non-ferrous metals).

Measure (i) captures both price and quantity variation in commodity exports, and is our preferred measure of natural resource dependence. In some specifications we separate this into exports of different types of commodities: food, fuels, and ores and metals. Measure (ii) captures only price variation. The advantage of this measure is that it is plausibly exogenous, since it excludes quantities determined by local production costs and world prices should not be affected by local exports as economies in our sample are small relative to the commodity markets they export to. A disadvantage of this measure is that price variation alone does not capture the dependence of an economy on natural resources for export revenue. In sum, there is a trade-off between "quantity" (export share) and "quality" (price index) of variation in natural resource dependence.

[6] For country c in year t this index is given by $\sum_{k=1}^{K} \log(P_{k,t})\omega_{c,k}$ where $P_{k,t}$ is the world price of commodity k in year t, and $\omega_{c,k}$ is the weight given by the average value of commodity k's exports as a share of GDP across the 1980-2020 period. The index is scaled for each country so 100 equals the price index in 2012.

Prices. Prices are measured in two ways: (i) import unit values (import value divided by import weight); and (ii) national average prices of products collected by the International Comparison Program (ICP) (World Bank, 2011, 2017). Since import weight is not available for Chile, India, Mexico, and Vietnam, the results for unit values are based on a smaller sample.

Other variables. As measures of trade policy, applied tariff rates and NTMs for HS 6-digit products are sourced from TRAINS (UNCTAD, 2024). For tariff rates we use the simple average across origin countries of the applied tariff within an importing country-product-year. For NTMs, we focus on Chapters E "Non-automatic import licensing, quotas, prohibitions, quantity-control measures" and F "Price-control measures, including additional taxes and charges" as defined by UNCTAD (2019). We define an indicator that equals one if any of those NTMs are present within an importing country-product-year and zero otherwise. As controls, in some specifications we include log real GDP per capita at purchasing power parity and the most recent Gini coefficient from the World Development Indicators (World Bank, 2024a), and indexes of control of corruption and regulatory quality (Kaufmann, Kraay and Mastruzzi, 2010). Means and standard deviations of these variables are reported in Table S2.

3 Main result

Figure 1a showed a significant correlation between the commodity export share and import market concentration. We demonstrate that this relationship is robust to a battery of controls, using the following regression

$$HHI_{c,i,t} = \alpha_{c,i} + \delta_{i,t} + \beta_1 ExpCom_{c,t} + \beta_X X_{c,t} + \epsilon_{c,i,t} \tag{1}$$

where $\alpha_{c,i}$ is a country-product market fixed effect that captures unobserved market characteristics that may explain concentration (e.g., market size, consumer preferences) and $\delta_{i,t}$ is a product-year fixed effect that controls for global supply and demand factors in the product market that do not vary across countries (e.g., technological fixed costs, per-unit good value, logistics network requirements). The independent variable of interest is $ExpCom_{c,t}$ defined as either the commodity share of exports or the export commodity price index, measured as differences from the sample median. $X_{c,t}$ is a vector of country-year controls used in some specifications, also measured as differences from the sample median, and $\epsilon_{c,i,t}$ is an error.

This specification has several differences compared to Figure 1a. First, this specification focuses on the association of commodity exports with the level of HHI rather than the log. This approach is selected so results can be compared to a benchmark of how large an increase in HHI is presumed to increase market power. United States Federal Trade Commission (FTC) and Department of Justice (DOJ) guidelines presume that an increase in the HHI of 100 will increase market power in a highly concentrated market.[7] A market with HHI in excess of 1,800 is considered highly concentrated. Second, compared to Figure 1a, the regression weighs product markets equally rather than by value, so as not to focus primarily on highest value products (e.g., autos) and instead characterize the average product market.

Results for all products. Table 1, Panel A reports estimates of Equation 1 on a sample pooling across all imported products. Column 1 reports the raw correlation of the commodity export share (less its median) and HHI, with no fixed effects or controls. The mean dependent variable is 4,219, indicating on average highly concentrated markets according to FTC and DOJ guidelines. Here, $\beta_1 = 901$ (standard error = 132). At the median, a one standard deviation increase in the commodity export share of 0.24 is associated with an increase in HHI equal to $901 \times 0.24 = 216$, more than sufficient to increase market power according

[7] See United States Federal Trade Commission and Department of Justice (2023). Previous FTC and DOJ guidelines presumed an increase in HHI of 200 would increase market power. Nocke and Whinston (2022) conclude that an increase in HHI between 100 and 200 can reduce consumer welfare given small efficiency gains from a horizontal merger that increases concentration.

to FTC and DOJ guidelines. Column 2 reports results adding product-year fixed effects, where $\beta_1 = 1,238$ (169). The increase in the coefficient suggests that commodity exporting economies are likely to import products whose markets are less concentrated due to global factors, such as technology with lower fixed costs. Column 3 adds country-product fixed effects, which isolates only variation in HHI due to within-country over-time variation in the commodity export share. Here $\beta_1 = 438$ (228). The differences between Columns 1, 2, and 3 suggest that some, but not all, of the association between HHI and natural resource dependence is due to differences in product mix.

Column 4 adds several country-year control variables: (i) the log real GDP per capita, a proxy for market size and level of development; (ii) the Gini coefficient, a measure of inequality, which could also shape market size; and experts' perceptions of (iii) control of corruption; and (iv) regulatory quality. The estimate of β_1 is robust to their inclusion: it is 358 (170), which is lower than, but not statistically distinguishable from, the coefficient in Column 3 at standard significance levels. The coefficients on the controls are informative. Higher GDP per capita is associated with lower import market concentration. This is consistent with richer countries having larger import markets and therefore being able to sustain more entrants. This result is in contrast to the findings of Fernandes et al. (2016) that exporter concentration within a country rises with GDP per capita and suggests potential scale economies in importing. Higher control of corruption and regulatory quality are also associated with lower import market concentration, suggesting that weak institutions can concentrate markets. Most surprising is the result that greater inequality is associated with lower import market concentration. This may reflect the hypothesis that in middle-income countries imports are consumed by wealthier individuals, whereas domestic production is consumed by the poor and the middle class. Hence, inequality could increase the market size for imports, though we do not test this hypothesis in this paper.

In subsequent analysis, we do not include these controls in our main specification as they could be "bad controls" in the Angrist and Pishcke sense: outcomes of the independent variable that cause the dependent variable. For instance, weak control of corruption or low quality regulation, which enable tariff avoidance, could be mechanisms through which commodity export dependence leads to import concentration. To the extent that income and inequality proxy for institutional weakness, they are also subject to this critique. From this perspective, it is difficult to interpret the relationship between natural resource dependence and import concentration conditional on these country-year factors.

Columns 5 and 6 use the export commodity price index in the place of the commodity export share. In Column 5, which includes country-product and product-year fixed effects but no controls, $\beta_1 = 1,050$ (614). This implies that a one standard deviation increase in the price index of 0.03 is associated with an increase in HHI of $1,050 \times 0.03 = 31.5$, much smaller than a one standard deviation increase in the commodity export share, and not economically significant. In Column 6, an economically similar result obtains when adding the country-year controls. These results suggest that economically relevant variation in the HHI is driven by the quantity of commodity exports rather than their price alone. Nonetheless, these results exploiting exogenous international price variation give us confidence the association between natural resource dependence and import market concentration is causal.

Results by product category. Table 1, Panel B explores the heterogeneous association between commodity export intensity and import market concentration by splitting the sample between goods with different end uses: capital goods, consumption goods, and primary goods according to the United Nations Broad Economic Categories. Examples of primary goods are iron ore, raw sugar, soybeans, and wheat; examples of capital goods are transmission apparatuses, data processing machines, and airplanes; examples of consumption goods are medicaments, small vehicles, and televisions. Columns 1, 2, and 3 report the associations of the commodity export share and HHI of imported primary, capital, and consumption goods markets respectively; Columns 4, 5, and 6 report the associations of the export commodity price index and HHI of those same goods markets. For the export commodity share, there is no significant heterogeneity, but for the export commodity price index there is significant heterogeneity, with the association being much stronger for primary and consumption goods.

Results for alternative measures of import concentration. To complement our baseline results using HHI, we present in Table 2 estimates of Equation 1 using as dependent variables alternative import market concentration measures. The results show that commodity exports result in higher concentration of imports in the top firm (column 1) or the top four firms (column 2). Focusing on different extensive margins of imports, the evidence implies that countries more dependent on commodity exports have significantly lower numbers of importing firms (column 3) and import sources (column 4). As a manifestation of import concentration, we consider unit values per market and find them to be higher for countries with higher commodity export shares or price indexes (column 5). Finally, higher commodity export quantities or prices may increase the import market share of firms that are also commodity exporters, and thus import concentration, though the effect is not statistically significant (column 6).

4 Trade policy mechanisms for import monopolization

Figure 1b showed that commodity export dependent economies have greater trade protection. There are multiple potential reasons for this, including industrial policy intended to develop infant industries and vested interests that gain commercial advantages from avoiding tariffs. Whatever the reason for this pattern, in this section we present evidence that trade protection can concentrate import markets. We consider two protectionist trade policies: tariffs and non-tariff measures imposed on imports.

Tariffs. Tariffs could cause concentration through three mechanisms:

1. Demand decrease: When passed through to consumers, tariffs raise prices and decrease

demand, potentially leading to exit of importing firms and increased concentration of market shares.[8]

2. Symmetric cost increase: Tariffs raise working capital requirements and financing costs, since they must be paid upon import before goods are sold, potentially leading to exit of importing firms and increased concentration of market shares.

3. Asymmetric cost increase due to tariff evasion: In a weak governance environment and in the presence of corruption, tariff evasion allows evading importing firms to increase their costs by less than others, increasing their market share relative to firms that do not evade.

We test for these mechanisms using a mediation analysis that evaluates the association of tariffs and import market concentration, and how that is mediated by commodity exports. Table 3 reports regressions of the following form:

$$y_{i,c,t} = \delta_{c,t} + \delta_{i,t} + \beta_2 T_{i,c,t} + \beta_3 (T_{i,c,t} \times ExpCom_{c,t}) + \upsilon_{i,c,t} \tag{2}$$

where $y_{i,c,t}$ is an outcome, either HHI or a measure of tariff evasion, the latter to identify the role of corruption; $T_{i,c,t}$ is a measure of trade policy, either the tariff rate $\in [0,1]$ or a dummy variable $\in \{0,1\}$ indicating the presence of an NTM; $\delta_{c,t}$ is a country-year fixed effect subsuming national characteristics, including market size and commodity export dependence of country c; $\delta_{i,t}$ is a product-year fixed effect capturing global supply and demand for product i; and $\upsilon_{i,c,t}$ is an error. Country-product fixed effects are excluded so the identifying variation is across products within countries. The coefficients of interest are β_2, the direct association of trade policy and import market concentration, and β_3, the mediated association.

The estimate in Column 1 of Table 3 is consistent with the demand and symmetric cost increase channels, as β_2 = 3,514 (1,019), indicating higher tariffs are associated with

[8]We confirm in our sample that import markets shrink as they become more concentrated: the elasticity of import value to HHI, conditional on country-product fixed effects, is -0.24 (0.002).

more concentrated markets. This relationship is economically significant, with a standard deviation increase in the tariff rate of 0.05 (or 5 percentage points) raising HHI by $3,514 \times 0.05 = 176$, above the amount presumed to increase market power in current FTC and DOJ guidelines.

We test for the asymmetric cost increase channel by measuring tariff evasion directly and exploiting variation in the type of commodity export that is associated with rent-seeking. Isham et al. (2005) find that rent-seeking associated with the resource curse is greatest when countries export 'point-based' resources, whose revenues transit directly through government coffers, as opposed to 'diffuse' resources whose revenues flow to many small holders. Oil is the quintessential point-based commodity whose extraction is often controlled by the state and is associated with state capture (see, e.g., Ross, 2012). The anecdotes of import monopolies cited in the introduction are in oil-exporting states. In contrast, production of food crops is typically diffuse. Ores and metals are an ambiguous case: industrial extraction can be capital-intensive and thus point-based, but labor-intensive artisanal mining with diffuse ownership can account for a substantial portion of output in some countries due to variation in geography (Rigterink, Ghani, Lozano and Shapiro, 2022). Consistent with these arguments, Table S3 shows there is less control of corruption as the commodity export share increases, but this relationship is strongest for countries with larger fuel exports, weakest for countries with larger food exports, and of intermediate magnitude for countries with larger ore and metals exports. Table S3 also shows there is no statistically significant relationship between changes in the commodity export price index and control of corruption, suggesting that commodity export quantities generate important variation in corruption beyond price. This finding motivates our focus on the commodity export share as an independent variable in this analysis.

Column 2 of Table 3 reports estimates of Equation (2) where $ExpCom_{c,t}$ is separated into three variables, each indicating the share of exports in these three commodity types, measured as differences from the median. In this specification $\beta_2 = 1,794$ $(1,073)$, which implies that a standard deviation increase in the tariff rate increases HHI by $1,794 \times 0.05 = 90$ points. The coefficient on the interaction between tariff and fuel export share is positive $\beta_3^{fuel} = 8,696$ (1,907) indicating that the positive association between tariffs and concentration is much stronger in fuel exporting economies: at the median, a 5 percentage point increase in the tariff rate (the standard deviation) and an 18 percentage point increase in fuel export share (the standard deviation) will raise HHI by about $8,696 \times 0.05 \times 0.18 = 78$ points. The interaction term for ores and metals exports is positive, though much smaller, and the interaction term for food exports is negative. The result is clear that tariffs contribute to import market concentration, but especially in fuel exporting economies.

To confirm that the interaction effect is due to greater tariff evasion in fuel exporting economies, we use a proxy for tariff evasion as the dependent variable in the same regression. We use the measure of Fisman and Wei (2004, note 6) based on import underinvoicing:

$$\text{evasion gap}_{c,i,t} = \frac{(\text{exports}_{w,i,c,t} - \text{imports}_{c,i,t})}{(\text{exports}_{w,i,c,t} + \text{imports}_{c,i,t})}$$

where exports are total exports by all countries w of product i to destination country c (one of our importing countries) in year t reported in COMTRADE, and imports are as reported in our customs data. Results are reported in Column 3 of Table 3. The interaction coefficients follow a similar pattern as in Column 2, where the coefficient on the interaction between tariff and fuel export share is positive $\beta_3^{fuel} = 0.36$ (0.17), indicating greater evasion, but the coefficients on the interaction between tariff and ores and metals export share and food export share is negative.[9] Higher tariffs are associated with higher values of the proxy for tariff evasion in fuel exporting economies, but not in ores and metals or food exporting

[9]The import underinvoicing proxy for tariff evasion has been found to be positively correlated with higher tariffs (Bhagwati, 1964; Fisman and Wei, 2004; Mishra, Subramanian and Topalova, 2008; Javorcik and Narciso, 2017). In our sample, the value of $\beta_2 + \beta_3^{fuel} = -0.11$ (0.18) so a positive association between tariffs and evasion cannot be rejected in fuel exporting economies (i.e., the upper bound of the 95% confidence interval of this term is 0.24).

economies. This result suggests that while the demand and symmetric cost increase mechanisms of tariffs explain import market concentration in all commodity exporting economies, the asymmetric cost increase mechanism through tariff evasion has explanatory power in fuel exporting economies. This result is consistent with less control of corruption in fuel exporting economies.

Non-tariff measures. NTMs, in particular measures that restrict entry or pricing among importers, namely licenses, quotas, prohibitions, and price-control measures, including additional taxes or fees paid at customs, are other forms of trade protection that could influence import market concentration. The mean of our NTM indicator is 0.42, indicating these NTMs are quite common. Regressing this indicator on the commodity export share (less its median) in a linear probability model yields a positive coefficient on the commodity export share equal to 0.29 (0.12), indicating NTMs are more common in countries with a higher commodity export share. In our sample, at the median, an increase in the commodity export share by one standard deviation, or 24 percentage points, increases the likelihood of an NTM by $0.29 \times 0.24 = 0.07$ or 7 percentage points.

Columns 4, 5 and 6 of Table 3 replicate Columns 1, 2 and 3, but where the measure of trade protection is the NTM indicator. In Column 4, as in Column 2, the coefficient β_2 is positive, though quantitatively the effect is smaller. The coefficient β_3 is also positive. In Column 5, we again separate out the different types of commodity exports. The interactions of the NTM indicator with fuel export share and the ores and metals export share are positive, while the interaction with food exports is negative. These results indicate that NTMs can explain import market concentration, especially in fuel and ores and metals dependent economies.

The dependent variable in Column 6 is the proxy for tariff evasion, as in Column 3. In contrast to Column 3, the interaction effect for the fuel export share is negative here, indicating NTMs are not significantly associated with greater evasion in fuel exporting economies.

An explanation for this is that since NTMs provide legal asymmetric cost advantages (e.g., for firms with access to quotas), they make tariff evasion less attractive as a means to maintain market share in fuel exporting economies.

5 Import monopolization and domestic prices

A manifestation of the resource curse is higher prices in commodity exporting economies. Sachs and Warner (2001) showed that commodity export intensive economies had higher price levels relative to the global average in 1979. A question is whether import monopolization can account for this phenomenon. In theory, the relationship between concentration and prices is not obvious. If higher concentration is associated with higher fixed costs but lower marginal costs of importing, it could be associated with lower prices, even if also associated with higher markups (e.g., as in a differentiated products Nash-in-prices game). Alternatively, higher concentration could be associated with higher prices, if the associated markups outweigh any marginal cost savings.

To distinguish between these hypotheses, we relate import market concentration to ICP data on the average local currency domestic prices of 685 narrowly defined goods (i.e., parboiled long-grain rice, basmati rice, brown rice—family pack). From this correlation, we infer whether, on average, marginal cost differences associated with import market concentration outweighs the markups associated with concentration in determining equilibrium prices. The spirit of this exercise is an accounting decomposition, not an attempt to estimate a causal relationship between prices and concentration. The industrial organization literature has long argued that such causal effect is not well-defined, because a variety of economic mechanisms can cause a (positive or negative) correlation between prices and concentration (see Miller, Berry, Scott Morton, Baker, Bresnahan, Gaynor, Gilbert, Hay, Jin, Kobayashi et al., 2022). Our exercise is simply to estimate the correlation between prices and concentration, conditional on product-year fixed effects that account for global supply and demand.

Define the price of product i in country c and year t as $P_{c,i,t}^{LCU}$. The ICP provides these prices for two years, 2011 and 2017. Formally, we estimate the regression

$$\ln\left(P_{c,i,t}^{LCU}\right) = \alpha_{i,t} + \beta_4 \ln\left(HHI_{c,s(i),t}\right) + \beta_5 E^{LCU/USD} + \beta_6 \mathbf{X}_{c,t} + \epsilon_{c,i,t} \tag{3}$$

where $\alpha_{i,t}$ is a product-year fixed effect. Import market concentration $HHI_{c,s(i),t}$ is calculated at the level of the ICP basic heading s, one of 88 product groupings that include multiple products i. An example is the basic heading for rice, which includes 9 varieties, including parboiled long-grain rice, basmati rice, and brown rice—family pack. While at least one variety of rice is observed per country, not all varieties are observed in every country. Calculating the HHI at the basic heading level ensures the market definition is consistent and comparable across countries.[10]

Estimates of Equation 3 are reported in Table 4. In Column (1), the coefficient $\beta_4 = 0.07$ (0.02) indicates a 1 percent increase in HHI (i.e., an increase of 42 units, since the mean value of HHI is 4,211 in Table 1, Panel A, Column 1) is associated with 0.07 percent higher prices. In Column (2), country-year controls are included and the coefficient falls to $\beta_4 = 0.04$ (0.02), though it remains positive and statistically significant at the 5 percent level. The controls apparently explain some variation in prices correlated with HHI, but not all of it.

The value added of these regressions, beyond the magnitude of the coefficient, is that they indicate that markups associated with higher concentration appear to outweigh any lower marginal costs of importing, at least on average. This is consistent with a model of a competitive world price and importers who are price-takers but have market power in local distribution. Importing firms in India, for example, have been shown to conform to this model (De Loecker, Goldberg, Khandelwal and Pavcnik, 2016). The association between import concentration and higher prices—a symptom of the resource curse—suggests

[10]When experimenting with specifications we found the log of HHI to fit better than the level of HHI, consistent with the non-linear associations of HHI with prices, conditional on marginal cost, in the Cournot model.

import concentration is a novel channel through which the curse materializes. An exciting avenue for future research would exploit data on prices, domestic consumption, and market concentration to estimate demand and evaluate the consequences of import monopolization for consumer welfare.

6 Concluding remarks

This paper identifies a novel channel for the 'resource curse': the monopolization of imports. Commodity export intensity is associated with more concentrated import markets, which can account for the higher price levels typically attributed to the Dutch disease. Trade policy measures and tariff evasion are mechanisms contributing to import market concentration.

While economies' export orientation has been the focus of the trade and development literature, the role of imports and import market structure has been overlooked. Openness to imports is generally thought to increase competition in an economy, but this effect could attenuate severely in the presence of importer market power. Further research could explore which domestic value chains can emerge from more competitive import markets, especially in commodity export intensive economies.

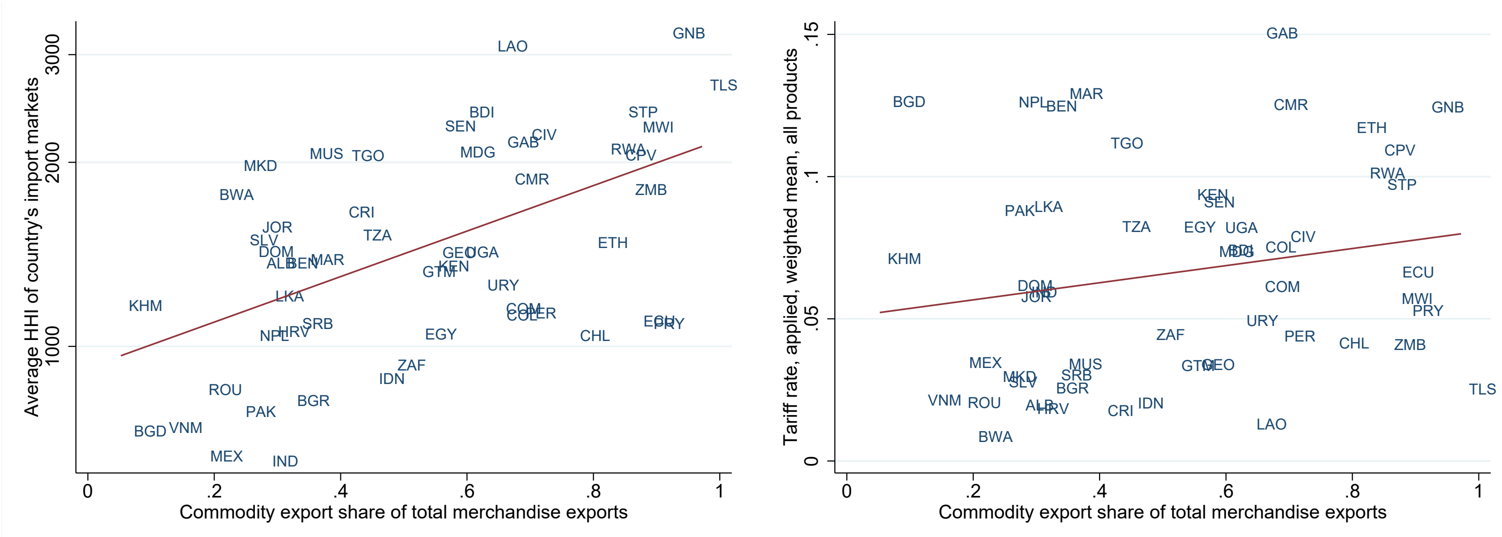
Given the size of the import sector in developing countries, the policy agenda to de-monopolize imports is paramount. Direct policy interventions to increase import competition include reforms that lower tariffs and remove NTMs such as quotas that restrict entry. The creation or strengthening of credible independent local bodies will help promote competition in general and in the import sector in particular. Fighting anti-competitive practices can prevent the perpetuation of oligarchies who constitute an important lobby and can seize control of liberalization attempts. Another integral part of a competition agenda is transparency and data availability. In many countries, barriers to entry into the import sector like licenses and the exact role of state-owned enterprises are not easily measured. The flow of funds between public banks and other state-owned enterprises is opaque and leads to asymmetric cost advantages. Transparent public procurement and the use of auctions to allocate import licenses could also increase import market competition.

Exhibits

Figure 1: Import market concentration in natural resource-dependent countries and a potential mechanism

(a) Import market concentration

(b) Trade protection



Notes: Panel A displays the average HHI of a country's import markets and the country's average commodity export share, where averages are taken over years. Within years, the HHI is the import value-weighted average of the log of the HHI across HS 6-digit products for a given country. The slope of the best fit line in Panel A is 0.86 (standard error = 0.19). Panel B displays the import value-weighted average tariff rate of a country and the country's average commodity export share, where averages are taken over years. The slope of the best fit line in Panel B is 0.031 (0.022).

Table 1: Import market concentration and commodity exports

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	HHI	HHI	HHI	HHI	HHI	HHI
Panel A) All Products						
Commodity export share $\in [0, 1]$	901***	1,238***	438*	358**		
	(132)	(169)	(228)	(170)		
Export commodity price index (1=2012)					1,050*	767
					(614)	(488)
Log GDP per capita				-665***		-684***
				(163)		(161)
Gini coefficient $\in [0, 1]$				-2,904***		-1,645***
				(574)		(553)
Control of corruption				-484***		-553***
				(65)		(64)
Regulatory quality				-391***		-291***
				(74)		(74)
R-squared	0.00	0.40	0.75	0.76	0.75	0.76
Number of observations	2,190,652	2,188,974	2,176,363	1,716,738	2,249,099	1,789,513
Dependent variable mean	4,219	4,216	4,198	4,121	4,184	4,107
Country-product fixed effects	No	No	Yes	Yes	Yes	Yes
Product-year fixed effects	No	Yes	Yes	Yes	Yes	Yes
Panel B) By Product Category						
Broad Economic Category (BEC)	Primary	Capital	Consu-mption	Primary	Capital	Consu-mption
Commodity export share [0,1]	500**	489*	458*			
	(219)	(254)	(264)			
Export commodity price index (1=2012)				1,141*	338	1,616**
				(581)	(769)	(686)
R-squared	0.72	0.73	0.72	0.72	0.73	0.72
Number of observations	103,755	334,895	613,310	107,580	345,683	632,973
Dependent variable mean	6,015	3,544	3,630	5,990	3,529	3,622
Country-product fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Product-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the HHI, i.e., the sum of squared percent import market shares in a country-product-year, which has a maximum value of 10,000. Products are classified by the 6 digit Harmonized System. The number of observations summed across columns (1)-(3) or (4)-(6) in Panel B is smaller than the total number of import markets in columns (3) and (5), respectively, of Panel A because intermediates in the BEC product categories are not considered in Panel B. Standard errors clustered at the country-year level are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 2: Alternative measures of import market concentration

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Share of the largest importer	Share of the 4 largest importers	Log number of importers	Log number of source countries	Log unit value	Share of commodity exporters
Panel A)						
Commodity export share $\in [0, 1]$	0.04*	0.02	-0.25*	-0.23***	0.33*	0.00
	(0.02)	(0.01)	(0.13)	(0.08)	(0.18)	(0.02)
R-squared	0.73	0.85	0.94	0.90	0.82	0.56
Number of observations	2,176,363	2,176,363	2,176,363	2,176,363	1,818,137	1,969,637
Dependent variable mean	0.530	0.807	2.616	1.762	1.739	0.189
Panel B)						
Export commodity price index (1=2012)	0.09*	0.04	-0.40	-0.58***	0.95***	0.01
	(0.05)	(0.04)	(0.35)	(0.20)	(0.27)	(0.06)
Number of observations	2,249,099	2,249,099	2,249,099	2,249,099	1,883,317	2,034,411
R-squared	0.73	0.85	0.94	0.90	0.82	0.57
Dependent variable mean	0.53	0.81	2.63	1.77	1.74	0.19
Country-product fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Product-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Dependent variables in columns 1, 2, and 6 range from 0 to 1. Standard errors clustered at the country-year level are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 3: Trade policy mechanisms for import market concentration

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	HHI	HHI	Evasion $\in [-1, 1]$	HHI	HHI	Evasion $\in [-1, 1]$
Tariff $\in [0, 1]]$	3,514***	1,794*	-0.48***			
	(1,019)	(1,073)	(0.13)			
Commodity export share x Tariff	-1,636					
	(1,399)					
Fuel export share x Tariff		8,696***	0.36**			
		(1,907)	(0.17)			
Ores and metals export share x Tariff		1,459	-0.24			
		(1,827)	(0.18)			
Food export share x Tariff		-9,887***	-0.93***			
		(1,551)	(0.16)			
NTM $\in \{0, 1\}$				35	1	-0.00
				(40)	(47)	(0.01)
Commodity export share x NTM				58		
				(137)		
Fuel export share x NTM					146	-0.02
					(186)	(0.02)
Ores and metals export share x NTM					532***	0.03
					(201)	(0.03)
Food export share x NTM					-126	-0.04**
					(174)	(0.02)
Number of observations	1,848,851	1,848,851	1,848,851	342,148	342,148	342,148
R-squared	0.47	0.47	0.19	0.52	0.52	0.17
Dependent variable mean	3,896	3,896	0.0439	3,429	3,429	0.03
Country-year fixed effects	Yes	Yes	Yes	No	Yes	Yes
Product-year fixed effects	Yes	Yes	Yes	No	No	No

Notes: Commodity, fuel, ores and metals, and food exports shares are measured in difference from their median value. Non-tariff measures (NTMs) are those those in Chapters E and F of the UNCTAD classification. Standard errors clustered at the country-year and country-product levels are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 4: Import market concentration and domestic prices

	(1)	(2)
Dependent variable	Log domestic price	Log domestic price
Log HHI	0.07***	0.04**
	(0.02)	(0.02)
Log nominal exchange rate with US dollar	0.92***	0.87***
	(0.01)	(0.01)
Log GDP per capita		-0.04
		(0.02)
Gini coefficient		5.34***
		(0.31)
Control of Corruption		0.14***
		(0.02)
Regulatory Quality		-0.23***
		(0.03)
R-squared	0.91	0.90
Number of observations	19,215	15,900
Dependent variable mean	6.53	6.80
Product-year fixed effects	Yes	Yes

Notes: The HHI is calculated at the level of the ICP basic heading level (e.g., rice) which is constructed to include at least one product in each country and maps roughly one-to-one to 2 digit HS codes. There are 88 distinct basic headings. Domestic prices are observed for 685 distinct goods (e.g., long grain rice; basmati rice) though not all are observed in each country. Standard errors clustered at the ICP basic heading-year are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

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Online Supplement to

Arezki, Fernandes, Merchán, Nguyen, and Reed

“Natural Resource Dependence and Monopolized Imports”

Table S1: Import market structure and commodity exports by country

No.	Country	Min. year	Max. year	Median HHI	Average HHI	Commodity export share	Fuel export share	Ores & metal export share	Food export share
1	Albania	2007	2021	3285	4258	0.27	0.11	0.09	0.07
2	Bangladesh	2005	2015	2885	3983	0.06	0.01	0.00	0.04
3	Benin	2016	2021	5632	5949	0.30	0.00	0.01	0.30
4	Botswana	2004	2010	3321	4201	0.20	0.00	0.16	0.03
5	Bulgaria	2001	2006	2555	3531	0.32	0.09	0.13	0.10
6	Burundi	2010	2021	6408	6413	0.59	0.00	0.06	0.53
7	Cabo Verde	2010	2021	4069	4914	0.84	0.00	0.00	0.84
8	Cambodia	2016	2021	4489	5134	0.05	0.00	0.00	0.05
9	Cameroon	2007	2017	4019	4785	0.67	0.34	0.06	0.27
10	Chile	1997	2021	2357	3403	0.77	0.01	0.53	0.22
11	Colombia	1997	2021	2468	3465	0.65	0.47	0.01	0.17
12	Comoros	2016	2021	5317	5730	0.65	0.00	0.01	0.64
13	Costa Rica	2010	2021	2922	3926	0.40	0.00	0.01	0.38
14	Cote d'Ivoire	2000	2021	4212	4915	0.69	0.20	0.00	0.49
15	Croatia	2007	2015	2167	3257	0.29	0.13	0.04	0.12
16	Dominican Republic	2002	2021	3081	4052	0.26	0.04	0.02	0.20
17	Ecuador	2002	2021	2739	3791	0.87	0.48	0.01	0.38
18	Egypt, Arab Republic	2005	2016	2442	3495	0.52	0.33	0.05	0.14
19	El Salvador	2006	2021	3304	4252	0.24	0.03	0.01	0.20
20	Ethiopia	2012	2021	3756	4605	0.79	0.00	0.00	0.79
21	Gabon	2009	2021	4471	5134	0.65	0.62	0.03	0.00
22	Georgia	2000	2021	3689	4582	0.55	0.04	0.21	0.29
23	Guatemala	2005	2013	3082	4070	0.52	0.05	0.05	0.41
24	Guinea-Bissau	2014	2018	8068	7059	0.91	0.00	0.00	0.91
25	India	2016	2021	1527	2516	0.28	0.13	0.04	0.11
26	Indonesia	2020	2020	1978	2929	0.45	0.16	0.06	0.24
27	Jordan	2008	2021	3837	4688	0.26	0.01	0.09	0.17
28	Kenya	2006	2021	3403	4310	0.54	0.04	0.04	0.46
29	Lao PDR	2015	2021	5641	5998	0.64	0.17	0.25	0.21
30	Madagascar	2007	2021	4578	5197	0.58	0.04	0.20	0.34
31	Malawi	2005	2021	4767	5321	0.87	0.00	0.03	0.84
32	Mauritius	2000	2021	3554	4431	0.34	0.00	0.01	0.33
33	Mexico	2011	2021	1598	2539	0.18	0.08	0.03	0.07
34	Morocco	2002	2013	2417	3504	0.34	0.04	0.10	0.20
35	Nepal	2011	2014	2886	3898	0.26	0.00	0.04	0.22
36	North Macedonia	2008	2018	3213	4187	0.23	0.04	0.06	0.13
37	Pakistan	2019	2021	2410	3623	0.24	0.01	0.04	0.19
38	Paraguay	2000	2021	3338	4328	0.88	0.35	0.01	0.53
39	Peru	2000	2021	2568	3567	0.68	0.08	0.41	0.19
40	Romania	2005	2011	1864	2806	0.18	0.08	0.04	0.06
41	Rwanda	2002	2016	5198	5582	0.82	0.00	0.36	0.46
42	Sao Tome and Principe	2017	2019	5166	5714	0.84	0.00	0.02	0.82
43	Senegal	2000	2020	4319	5026	0.55	0.17	0.05	0.33
44	Serbia	2006	2007	2377	3403	0.33	0.03	0.11	0.19
45	South Africa	2010	2021	2108	3058	0.48	0.10	0.27	0.10
46	Sri Lanka	2016	2021	3107	4040	0.28	0.02	0.01	0.25
47	Tanzania	2003	2021	3608	4477	0.43	0.01	0.10	0.32
48	Timor-Leste	2018	2021	4757	5357	0.97	0.67	0.00	0.30
49	Togo	2015	2021	5824	6157	0.41	0.06	0.13	0.22
50	Uganda	2011	2020	3669	4536	0.59	0.03	0.01	0.55
51	Uruguay	2001	2021	3118	4105	0.62	0.02	0.00	0.59
52	Vietnam	2018	2021	1569	2577	0.12	0.01	0.01	0.09
53	Zambia	2010	2021	3567	4451	0.85	0.01	0.76	0.08

Table S2: Summary statistics of independent variables and controls

Variable	Mean	Std. Dev.
Commodity export share	.53	.24
Food export share	.31	.22
Fuel export share	.12	.18
Ores and metals export share	.11	.17
Commodity price index (1=2012)	.99	.03
Log GDP per capita	8.82	.85
Gini coefficient	.45	.08
Control of corruption	-.32	.67
Regulatory quality	-.12	.61
Tariff, applied	.08	.05
NTM, Chapter E or F	.44	.50
Evasion gap	.05	.51

Notes: Summary statistics are based on the estimating sample for all products used in Table 1.

Table S3: Natural resource dependence and control of corruption

	(1)	(2)	(3)
Dependent variable	Control of corruption	Control of corruption	Control of corruption
Commodity export share $\in [0,1]$	-0.39**		
	(0.17)		
Fuel export share $\in [0,1]$		-0.64***	
		(0.14)	
Ores and metals export share $\in [0,1]$		-0.27	
		(0.26)	
Food export share $\in [0,1]$		-0.02	
		(0.23)	
Export commodity price index (1=2012)			-0.59
			(0.48)
Log GDP per capita	0.58***	0.65***	0.59***
	(0.11)	(0.11)	(0.11)
Gini coefficient	0.90*	1.18**	0.55
	(0.51)	(0.52)	(0.43)
Regulatory quality	0.52***	0.49***	0.48***
	(0.06)	(0.06)	(0.06)
R-squared	0.95	0.95	0.95
Number of observations	488	488	508
Dependent variable mean	-0.301	-0.301	-0.313
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.