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Abstract

Countries with greater commodity export intensity have more concentrated markets for imported goods. Within countries over time, import market concentration is associated with higher domestic prices, suggesting that markups due to greater concentration outweigh any potential cost efficiency. Hydrocarbon fuel exporting economies especially have higher tariffs, tariff evasion, and non-tariff measures that concentrate markets. These results suggest a novel channel for the resource curse stemming from the monopolization of imports.

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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 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. Another challenge is the so-called Dutch disease wherein a natural resource discovery or price appreciation is accompanied by an increase in the real exchange rate, which in turn shrinks the non-resource tradable sector. In principle, both challenges could interact. Foreign exchange receipts from natural resources increase domestic demand for imports, increasing the value of the domestic import market. By making the import market larger, natural resources raise the return to effort by importers towards capturing the state and directing state power 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 of the richest businesspeople in natural resource dependent economies is linked to profits in import markets. Prominent billionaires in Nigeria, Saudi Arabia, and the Russian Federation accumulated their wealth for instance as a fuel importer, an exclusive distributor for a car manufacturer, and an importer of cigarettes, food, and alcohol.[1] This paper moves beyond anecdotes and provides systematic evidence that natural resource dependence causes the monopolization of imports, and that this monopolization can account for higher price levels in the non-resource tradable sector of natural resource dependent economies. 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 29 developing and emerging market economies. These data reveal that natural resource dependent economies have more concentrated markets for imported products. This basic pattern is illustrated in Figure 1a, which shows a positive association across countries between commodity exports as a share of total merchandise exports and the average Herfindahl–Hirschman index (HHI) across all imported product markets in a country. 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 controlling for GDP per capita,

[1] See Freund (2016) for an account of the origin of billionaires' wealth in emerging markets. Other than imported product markets, ownership of firms in the telecom and logistic sectors, which can be natural monopolies, are important sources of such wealth.

a crucial test since smaller markets could mechanically be more concentrated under fixed import costs. A panel specification with country-product fixed effects reassures that the relationship is causal, as does a specification that uses exogenous increases in world commodity prices instead of the commodity share of exports.

Import monopolization can account for a stylized fact about commodity exporting countries, which is that their prices of tradable goods in a common currency are higher than those in other countries. While this fact is typically attributed to the Dutch disease, an alternative mechanism suggested by our results is that prices are elevated due to higher markups ensuing from monopolistic or oligopolistic pricing by importers. Data on domestic price levels from the International Comparison Program (ICP) show that within countries over time greater import market concentration can account for higher prices of tradable goods relative to the United States (U.S.), ICP's benchmark economy. 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.

Two additional pieces of evidence suggest that capture of trade policy is a mechanism for import monopolization in natural resource dependent economies.

First, commodity export intensive economies place higher tariffs on imports, as shown in Figure 1b. The seminal literature on rent-seeking suggested tariff evasion could explain the persistence of high tariffs, as elites that enjoy the advantage of evasion are a constituency in favor of tariffs remaining high (Tullock, 1967; Krueger, 1974). State capture allows elites to evade tariffs (Rijkers, Baghdadi and Raballand, 2017) and it is well documented, including in our sample, that import underinvoicing, a method for tariff evasion, increases with the tariff rate (Bhagwati, 1964; Fisman and Wei, 2004; Yang, 2008; Mishra, Subramanian and Topalova, 2008; Sequeira, 2016; Javorcik and Narciso, 2017). Greater tariff evasion can create market concentration when a subset of firms evades tariffs. In this case, firms obtain a cost advantage that allows them to increase their market share relative to those that cannot evade tariffs.

Second, within countries over time, tariffs and tariff evasion have a stronger effect on import market concentration during oil export booms compared to booms of other commodities. Isham, Woolcock, Pritchett and Busby (2005) document that among natural resource dependent economies, governance is especially weak in those economies dependent on commodities whose extraction is point-based, meaning revenues typically transit directly through government coffers, as opposed to commodities with a more diffuse production base. Oil is the quintessential point-based commodity, and fuel export intensive economies have weaker control of corruption. Non-tariff measures in the form of import quotas and price

restrictions based on Kee and Nicita (2022) are associated with import monopolies, and are also more prevalent 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 and emerging markets the value of imports is about as large as the value of exports, and many exported goods are made 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 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).[2] The pattern in import markets is the opposite. Higher-income economies have less concentrated import markets, independent of their commodity export intensity.

More generally, our paper informs a macroeconomics literature interested in measuring the association between market structure and welfare. While contributions by Edmond, Midrigan and Xu (forthcoming) and Aghion, Bloom, Blundell, Griffith and Howitt (2005) show that increased markups stemming from high market concentration may (though need not) harm welfare, less is known empirically about differences in market concentration across economies, and their causes and implications. A recent paper by Leone, Macchiavello and Reed (2021) describes how high market concentration leading to high markups has raised prices in Africa's domestic cement industry, though they argue that the source of these markups is small national market size in the presence of fixed costs, rather than higher entry costs that are unique to African economies. In contrast, the present paper provides evidence of entry costs in importing that are unique to commodity export intensive economies, and which can account for higher costs in these economies.

Finally, we demonstrate that the association between exports of commodities and import market concentration is strongest for inputs like primary goods, parts, and semi-finished materials. This implies that import market concentration could shape firms' international input sourcing decisions, a topic of recent research using U.S. 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 efforts to diversify exports away from natural resources.

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

2 Commodity export intensity and import market concentration

2.1 Measuring import market concentration

Our analysis relies on a novel database of all firm-level import transactions recorded by customs authorities in 43 countries that are geographically and institutionally diverse and broadly representative of middle-income economies (see Table A1). 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 1998-2018 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 non-oil imports in our data are very similar to the corresponding total non-oil imports reported by COMTRADE (the average difference is 5.6%).

Measuring 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 often 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 consumer welfare. 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.

As a first pass, in Figure 1a, we define imported product markets at the HS 4-digit level. These markets are quite specific though in principle could capture a market that is broader than a relevant consumer market. For instance, HS2101 includes "extracts, essences and concentrates of coffee, tea or mate and preparations thereof." While coffee and tea are substitutes, oligopoly power could be most relevant within the markets for coffee or tea, as some consumers drink only coffee, while others drink only tea. Hence, in subsequent analysis we also define markets at the HS 6-digit level, separating for instance HS210111 "Extracts, essences and concentrates, of coffee," which includes Nescafe instant coffee; from HS210120 "Extracts, essences and concentrates, of tea or mate, and preparations with a basis of these extracts, essences or concentrates, or with a basis of tea or mate," which includes Lipton tea bags. Though the six-digit classification ultimately provides more specificity, it is reassuring

that the qualitative patterns are similar when using the four-digit categories and do not depend on relevant market definition. Following Fernandes et al. (2016), we use a time-consistent consolidated classification that concords and harmonizes product codes across the HS 1996, 2002, 2007, and 2012 versions (present in the raw data).

Import market concentration is measured as the Herfindahl-Hirschman index or

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

where $M_{c,i,s,t}$ is the import value in country c of firm i in relevant market s in year t, and I is the number of firms in the relevant market, country, and year. Values are measured including cost of freight and insurance (CIF) and are either reported by customs agencies in US dollars or converted from local currency to US dollars using the current exchange rate from IMF International Financial Statistics. Table A1 reports the distribution of HHI for HS 6-digit products by country.

2.2 Panel evidence

Considering Figure 1a, one might be worried about omitted variables at the country level such as economic size that could mechanically influence concentration in the presence of fixed costs. To discipline the analysis further, we specify a fixed effects panel regression using about 10 years of data for each country:

$$HHI_{c,s,t} = \alpha_{c,s} + \tau_{s,t} + \beta_1 ExpCom_{c,t} + \beta_2 \log(GDPPC_{c,t}) + \epsilon_{c,s,t} \tag{1}$$

where $\alpha_{c,s}$ is a country-product market fixed effect that captures unobserved market characteristics that may explain concentration (e.g., market size, consumer preferences) and $\tau_{s,t}$ controls for global product-year specific factors that do not vary across countries (e.g., technological fixed costs, per-unit good value, logistics network requirements). The independent variable of interest is the percent of commodity exports in total merchandise exports, denoted by $ExpCom_{c,t}$, a measure of natural resource dependence from the World Development Indicators. The regression includes economic size, measured by (the log of) GDP per capita, $\log(GDPPC_{c,t})$ since in the presence of fixed costs of importing, smaller markets could be mechanically more concentrated (population is slower moving over time, and so its effect is subsumed into the country-product fixed effect). Moreover fixed costs of importing could increase as income grows, and wages and the price level increase. The coefficient β_1 is the main parameter of interest. The term $\epsilon_{c,s,t}$ is an error.

Panel A of Table 1 reports estimates of Equation 1. Within country-product markets over time an increase in commodity exports is positively associated with import market concentration, similarly to the cross sectional relationship in Figure 1a. Column 1 of Panel A defines relevant product markets at the HS 4-digit level within a country. The estimate of β_1 implies that a 1 percentage point increase in commodity export intensity is associated with a statistically significant increase in the HHI of 4.97 (standard error = 1.97), everything else equal. US Department of Justice (DOJ) guidelines consider markets with an HHI in excess of 2,500 to be highly concentrated. The average market in column 1 has an HHI of 3,224. DOJ guidelines further suggest that an increase in the HHI of 200 should be expected to increase market power in a highly concentrated market.[3] Consequently, an increase in commodity export intensity by $200/4.97 = 40.24$ percentage points would be expected to increase market power according to these guidelines.[4] Economically significant variation in importer market power is present in our sample, where commodity export intensity ranges from 8.5% in Bangladesh to 92% in Zambia (Table A1).

Column 2 defines sectors at the HS 6-digit level, which is more narrow and likely closer to a relevant market in antitrust litigation. Here, as expected, average concentration according to the HHI is higher compared to column 1, at 4,101. A 1 percentage point increase in commodity export intensity is associated with a statistically significant increase in the HHI of 6.31 (2.33). Column 3 uses another measure of concentration, the largest firm concentration ratio (market share of the largest importer). Quantitatively moving from the commodity export intensity of Bangladesh to Paraguay increases the largest importer's market share by 4.2 percent (0.0005×84).

One interesting pattern across these columns is that an increase in GDP per capita significantly reduces 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.

Exploiting only international commodity price variation An alternative measure of natural resource dependence relies only on fluctuations in world commodity prices. These prices are plausibly exogenous since the economies in our sample are small relative to the world economy and do not have major export shares in key commodity groups. For instance,

[3]See `https://www.justice.gov/atr/herfindahl-hirschman-index`. Nocke and Whinston (2022) come to a similar conclusion in their analysis of the potential price effects of mergers.

[4]This magnitude of 40 percentage points is roughly the difference in commodity export intensity between Gabon, which exports almost exclusively oil, and Mauritius, which exports food commodities but also manufactures.

on oil exports, our sample does not include Russia, Saudi Arabia, and the United States, the 3 largest exporters. The time-varying measure of commodity export intensity is the commodity export basket price index from Gruss and Kebhaj (2019). For country c in year t this is index is $\sum_{j=1}^{J} \log(P_{j,t})\omega_{c,j}$ where $P_{j,t}$ is the world price of commodity j in year t, and $\omega_{c,j}$ is the weight that equals to the average value of commodity j'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. Column 4 of Table 1, Panel A shows results using this index in place of the commodity export share. A 1% increase in the commodity price index, which is in the 75th percentile of year-on-year changes in the index, increases the HHI by 31.17 percent (7.70). This effect is smaller in magnitude than the effect measured using the commodity export share. Though capturing different variation, these results exploiting exogenous international price variation give us confidence the association between natural resource booms and import market concentration is causal.

Heterogeneity across product type We explore 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, materials (parts and semi-finished goods), and primary goods according to the Broad Economic Categories (Revision 5). Materials represent 48% of total import value in our sample, capital goods 27%, consumption goods 12%, primary goods 12%, and the remainder are not classified. Common examples of intermediate goods are electronic circuits; examples of capital goods are transmission apparatuses, data processing machines, and airplanes; examples of consumption goods are medicaments, small vehicles, and televisions; and examples of primary goods are iron ore, raw sugar, soybeans, and wheat.

Table 1, Panel B reports estimates of Equation (1) restricting the sample to capital, consumption, intermediates, or primary goods. The association between commodity export intensity and concentration is smallest for capital goods in column 1. In contrast, markets for primary goods, in column 4, where average HHI is 5,964 and higher than average, a 1 percentage point increase in commodity export intensity is associated with a statistically significant increase in the HHI of 14.85 (2.55). Effects on consumption goods and intermediates in Columns 2 and 3 are in between these extremes, and economically significant based on DOJ guidelines.

An explanation for this result could be that primary goods are often the focus of trade policies restricting entry. For example, raw sugar and wheat imports are often subject to tight government control. In Nigeria, refined sugar imports are banned. Imports of raw sugar are dominated by two firms that import raw sugar into the country where it is refined

and sold (Premium Times, 2021). Wheat imports in many countries are handled by state monopolies (Ackerman and Dixit, 1999). In contrast, capital goods are typically less subject to entry restrictions as developing countries often do not produce them and thus rely mostly on foreign supply. In addition to primary goods, trade policies restricting entry can focus on consumption goods and materials when the intention is to substitute away from imports.

3 Import market concentration and welfare

The resource curse manifests in higher costs and lower per capita consumption expenditure in commodity exporting economies.[5] The question is whether import monopolization can account for this phenomenon. In theory, the relationship between concentration, costs, and expenditure 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 commodity export intensity and import market concentration to International Comparison Program (ICP) data on domestic prices and per capita consumption expenditure. An advantage of the ICP is that measured prices and consumption are measured in local markets, and so capture a potential mitigating role of competition from domestic supply in product markets.

We emphasize that 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 to infer whether the marginal costs associated with concentration outweigh the markups associated with concentration in determining equilibrium prices.

The ICP reports the purchasing power parity price for a product category s in country c ($PPP_{c,s}$) as the ratio of the domestic price denominated in local currency units ($P_{c,s}^{LCU}$) to the price in the United States denominated in US dollars ($P_{USA,s}^{\$}$): $PPP_{c,s} = P_{c,s}^{LCU}/P_{USA,s}^{\$}$. For every dollar spent in category s in the U.S., $PPP_{c,s}$ local currency units are needed to purchase the same product in country c. We define the relative price level of the product

[5]Sachs and Warner (2001) show, for example, that commodity export intensive economies had higher price levels relative to the global average in 1979.

category in U.S. dollars as $RelativePrice_{c,s} \equiv PPP_{c,s}/E_c = P^{LCU}_{c,s}/P^{\$}_{USA,s}E_c$, or the local price in U.S. dollars at the market exchange rate between country c's local currency and the U.S. dollar (E_c), divided by the U.S. price in U.S. dollars. The ICP also reports consumption expenditure per capita by country, which we use to test whether import market concentration is associated with lower consumption, as would be expected if it is associated with higher prices. Using these data we construct for each country c and product category s a measure of relative per capita consumption $RelativeConsumption_{c,s} \equiv C^{LCU}_{c,s}/C^{\$}_{USA,s}E_c$, where $C^{LCU}_{c,s}$ is local per capita consumption in local currency units and $C^{\$}_{USA,s}$ is U.S. per capita consumption in U.S. dollars.

We focus on the 2011 and 2017 rounds of ICP data as those two years overlap available import concentration measures in most countries in our sample. The product categories for which the ICP reports PPP prices and consumption are much broader than the HS 4-digit classification. For instance, the ICP contains prices and consumption for two categories called "general purpose machinery" and "special purpose machinery," whereas our data contain 135 unique HS 4-digit product categories within the HS 2-digit chapters related to machinery: HS84 "nuclear reactors, boilers, machinery and mechanical appliances; parts thereof" and HS85 "electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles." Therefore, we relate relative prices and consumption in ICP broad categories to the HHI recalculated using the market shares of all firms importing any products in that broad category.

We confirm that relative prices are higher and per capita consumption is lower in commodity exporting countries. We estimate the regressions

$$\log\left(\frac{P^{LCU}_{c,s,t}}{P^{\$}_{USA,s,t}E_{c,t}}\right) = \alpha_c + \tau\{t = 2017\} + \beta_3 ExpCom_{c,t} + \epsilon_{c,s,t} \tag{2}$$

and

$$\log\left(\frac{C^{LCU}_{c,s}}{C^{\$}_{USA,s}E_c}\right) = \alpha_c + \tau\{t = 2017\} + \beta_3 ExpCom_{c,t} + \epsilon_{c,s,t} \tag{3}$$

where s is an ICP product category, β_3 is the coefficient of interest, $\tau\{t = 2017\}$ is a fixed effect for year 2017, and α_c are country fixed effects.[6] Columns 1 and 2 in Table 2 confirm the resource curse: countries with a 1 percent higher commodity share of exports have 0.25

[6]Country fixed effects ensure the identifying variation is relative prices and consumption within countries, as commodity prices change. We experimented with including country-product fixed effects. Point estimates were similar though standard errors were larger. Taking the log of the dependent variables also produced better fit due to right skew in the variables, especially relative consumption.

(0.10) percent higher prices and 0.45 (0.17) percent lower consumption per capita.

We now examine whether import market concentration, which is higher in commodity exporting countries, can account for the higher prices and lower consumption observed in these countries. Cross-product correlations of concentration and prices or consumption can be misleading, since the relationship between concentration and marginal cost, an omitted variable, varies across products. To avoid this issue, we restrict our analysis to changes in concentration within product categories using two regressions

$$HHI_{c,s,t} = \alpha_{s,c} + \tau\{t = 2017\} + \beta_4 \frac{P^{LCU}_{c,s,t}}{P^{\$}_{USA,s,t} E_{c,t}} + \epsilon_{c,s,t} \tag{4}$$

and

$$HHI_{c,s,t} = \alpha_{s,c} + \tau\{t = 2017\} + \beta_4 \frac{C^{LCU}_{c,s}}{C^{\$}_{USA,s} E_c} + \epsilon_{c,s,t} \tag{5}$$

where $\alpha_{s,c}$ is a country-product fixed effect. The coefficient β_4 describes alternatively the correlation between relative prices or relative consumption per capita and import market concentration within country product markets.

Column 3 of Table 2 reports estimates of equation 4 showing that rising domestic prices relative to the U.S. are associated with rising import market concentration between 2011 and 2017. The results are economically significant, with a 100 percent increase in price being associated with higher HHI of 197.47 (93.52), off a mean of 1,821. Consistent with this result, column 4 reports estimates for equation 5 that confirm increases in concentration are associated with lower consumption in addition to higher prices.

The within-product market correlations indicate that markups associated with higher concentration appear to, on average, outweigh any lower marginal costs of importing. 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 panel association between import concentration and the symptoms of the resource curse (higher prices and lower expenditure) suggest import concentration could be a channel through which the curse materializes.

4 Trade policy mechanisms for import monopolization

It remains to illustrate the mechanisms through which commodity exports cause import market concentration. Our argument is that vested interests in the import sector in some commodity exporting countries are able to capture the state and direct trade policy in ways

that reinforce import monopoly. Since this likely occurs in secret, there is little direct evidence of state capture for this purpose beyond anecdotes. Therefore we take an indirect approach. First, we demonstrate the direct effect of trade policy on import market concentration. Second, we demonstrate how specific types of export commodities that coincide with institutional weakness mediate the effect of trade policy on import market concentration.

Isham et al. (2005) argue 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). In contrast, production of food crops is diffuse outside of plantations. Ores and metals are an ambiguous case; although industrial extraction can be capital-intensive and thus point-based, 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).[7] Building on these ideas, our strategy to pinpoint a role for state capture in import monopolization is to examine whether the relationship between trade policy and concentration is stronger in hydrocarbon fuel exporting economies.

To confirm the theory that 'point-based' resource exports lead to corruption in our sample, Table 3, column 1 reports results from a regression of the control of corruption score from the Worldwide Governance Indicators (Kaufmann, Kraay and Mastruzzi, 2010) on the share of exports in three types of commodities: hydrocarbon fuels; ores and metals; and food.[8] The regression uses the country-product-year sample from Table 1, but does not include country fixed effects to capture both the short-run and long-run relationships of commodity exports and control of corruption. Consistent with the theory of 'point-based' commodity exports, control of corruption is lower in fuel export intensive economies. In contrast, ores, metals and food exports are associated with stronger control of corruption.

Next, we consider trade policies that could influence import market concentration. The obvious candidates are non-tariff measures (NTMs) that specifically restrict entry or pricing among importers: Chapters E "Non-automatic import licensing, quotas, prohibitions, quantity-control measures" and F "Price-control measures, including additional taxes and charge" as defined by UNCTAD (2019). Table 3, column 2 estimates a linear probability

[7]These authors show that after positive commodity price shocks there is more violence in locations where industrial mining faces competition from artisanal mining compared to locations suitable for industrial mining only.

[8]The control of corruption score is based on expert assessments and measured in standard deviations from the mean. The export shares in each type of commodity are measured in differences from the mean, without dividing by the standard deviation, so they are interpretable as the effect of a 1 percentage point change in exports of that commodity.

model where the left hand side variable equals one if such an NTM is present and zero otherwise. Very few products have such an NTM, as shown by the mean of the dependent variable. An increase in the fuel export share by 1 percentage point increases the likelihood of an NTM by 0.07 percentage points off a mean frequency of 1.18 percent. In contrast, increases in ores, metals and food exports reduce the likelihood of NTMs.

Column 3 establishes the association between trade policy and market concentration. The specification includes HHI as dependent variable and export shares of the different commodities, a trade policy variable, the NTM in that market, and interactions of the NTM with export shares of the different commodities as regressors in 2018. Strikingly, the coefficient on the NTM is 17,516 (4,212) above the HHI variable range, whose maximum is 10,000 when a single monopolist imports a good (market share is 100, so HHI = 100 $\times$ 100). NTMs are associated with import monopolies, not just concentration of multiple firms. The interaction effects demonstrate that NTMs are associated with even greater concentration in commodity exporting countries. This could reflect different implementation of NTMs in commodity exporting countries.

NTMs are gazetted regulations imposed by local authorities that create import monopolies. The avoidance of regulation rather than adherence to it may also help to concentrate markets. It is well documented that tariff evasion is greater in the presence of higher tariffs (Bhagwati, 1964; Fisman and Wei, 2004; Mishra et al., 2008; Javorcik and Narciso, 2017), and that politically connected elites are uniquely able to evade tariffs (Rijkers et al., 2017). When a subset of firms evades tariffs, these firms obtain a cost advantage that allows them to increase their market share, increasing concentration. In column 4 one plus the ad-valorem import tariff is the dependent variable, with the shares of exports of different types of commodities as regressors. Unlike NTMs, tariffs are observed in all years. Even so, no country fixed effects are included in this specification for comparison with columns 1 and 2. Larger fuel and food export shares are associated with higher tariffs, but ores and metals are associated with lower tariffs if anything, suggesting a more nuanced picture than that implied by Figure 1b which showed a positive relationship between tariffs and the share of all commodities in total exports.

To explore whether tariff evasion specifically could lead to importer concentration, column 5 uses the HHI as dependent variable and the three types of commodity exports, the tariff, and its interaction with the three types of commodity exports as regressors. Two findings emerge. First, tariffs are positively associated with importer concentration, with a 100 percent tariff being associated with an increase in HHI of 748 (157). This is not consistent with a perfectly competitive import market. If tariffs change the price for all firms equally, and demand is inelastic, nothing needs to trigger concentration of market share. However, if

demand is elastic, some firms may exit, increasing concentration. Alternatively if, under the tariff regime an individual firm is able to gain a cost advantage through evasion, its market share could increase, increasing concentration. The interaction terms suggest the positive effect of tariffs on concentration is arising from fuel exporting economies. A 1 percentage point increase in the fuel export share (relative to the mean) and a 100 percent increase in the tariff increases concentration by 6.8 (1.4). In contrast, these interaction terms are negative for ores, metals, and food. While NTMs have similar associations with importer concentration across economies, the association between tariffs and importer concentration is special to fuel exporting economies.

Tariff evasion can be measured by comparing import and export mirror statistics. We use the measure of Fisman and Wei (2004) that allows for zeros in the value of exports, or the

$$\text{evasion gap} = \frac{(\text{exports} - \text{imports})}{(\text{exports} + \text{imports})}$$

where exports are as reported by other countries in COMTRADE, and imports are as reported in our customs data. Column 6 uses HHI as dependent variable and the evasion gap term and its interaction with the export shares of different commodities as regressors, again including country fixed effects. As expected, more evasion is associated with greater importer concentration, as was the case for tariffs.[9] A 100 percent increase in the evasion gap increases concentration by 2,407.4 (55.5), more than enough to warrant scrutiny under DOJ guidelines. More interesting is the significant interaction between the evasion gap and fuel exports equal to 22.2 (3.5). In contrast, the interaction with food exports is 11.4 (2.6) and with ores and metals exports 1.8 (2.9). These patterns match the pattern of interactions with tariffs, where the interaction has the largest positive coefficient for fuel exports. This suggests that tariff evasion can explain the positive association between tariffs and import concentration, especially in fuel export intensive economies.

Taking stock, there is a nuanced relationship between import concentration, trade policy, and the varieties of commodities exported by countries. Non-tariff measures lead to import monopolies, and are most common in fuel exporting economies. Tariffs contribute to import market concentration, especially in fuel exporting economies and because of greater tariff evasion. Since control of corruption is weaker in fuel exporting economies, these results suggest that weak institutions mediate the effect of trade policy on import concentration.

[9] As a sense check, we confirm that tariffs and evasion are positively correlated. In a similar specification with the evasion gap as dependent variable and tariffs as regressor controlling for product-year and country fixed effects and the different commodity export shares, a 100 percent increase in tariffs is associated with a 0.013 (0.0031) increase in the evasion gap.

5 Concluding remarks

This paper identifies a novel channel for the 'resource curse,' the monopolization of imports. Commodity export intensity causes concentration of import markets, which can account for the higher price levels typically attributed to the Dutch disease. Trade policy measures and tariff evasion are mechanisms through which imports are monopolized.

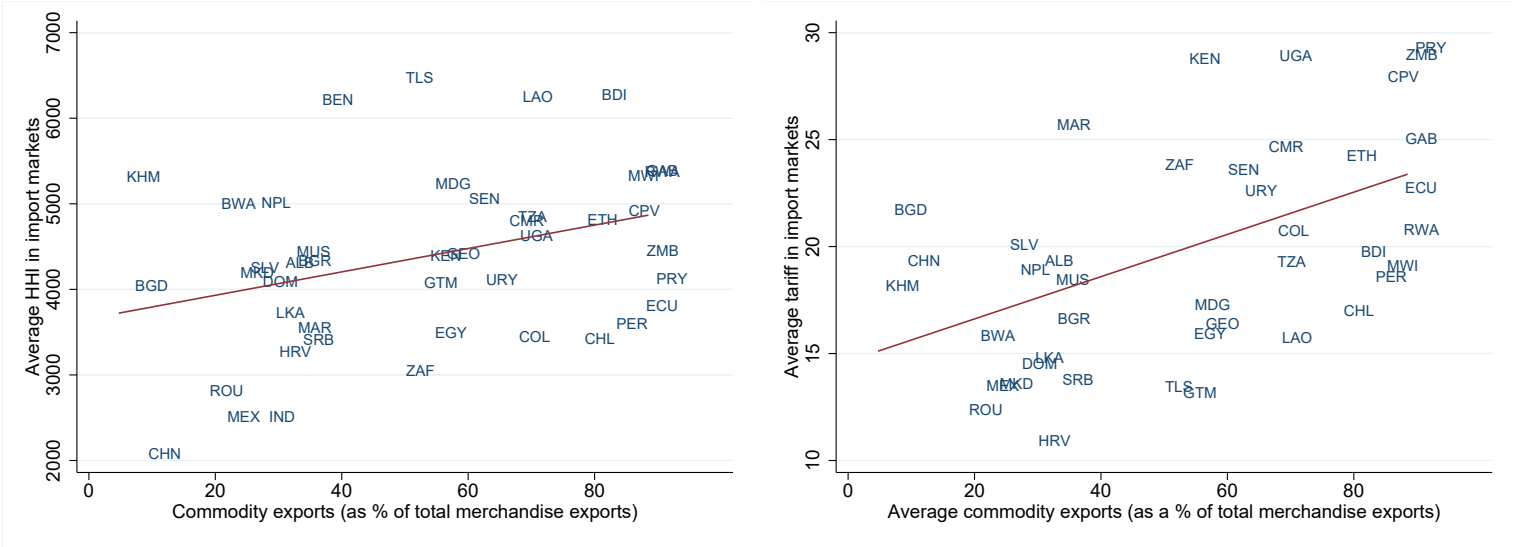
While economies' export orientation has been the focus of the literature on trade and development, the role of imports and import market structure has been overlooked. While openness to imports is generally thought to increase competition in an economy, this effect could attenuate severely in the presence of importer market power, with implications for welfare. Further research could explore which domestic value chains could emerge from more competitive import markets, especially in fuel export intensive economies. As natural resource dependent economies such as those in Africa embark on regional integration, the lever of de-monopolization of imports could be of relevance as a method to increase the benefits of integration, and develop their domestic productive base.

Exhibits

Figure 1: Import market concentration and trade protection in natural resource dependent countries

(a) Import market concentration

(b) Trade protection



Notes: Values for each country are the simple mean across all years of the sample in Table A1. The slope of the best fit line in Panel A is 13.5 (standard error = 5.45), with an R-squared of 0.13. The slope of the best fit line in Panel B is 0.099 (0.026) with an R-squared of 0.26.

Table 1: Import market concentration, commodity exports, and GDP per capita

Panel A)	(1) HHI	(2) HHI	(3) Market share of largest importer (%)	(4) HHI
Commodity export share $\in [0, 100]$	4.97**	6.31***	0.0005***	
	(1.97)	(2.33)	(0.0002)	
Export commodity price index (100=2012)				31.17***
				(7.70)
Log(GDP per capita)	-969.90***	-1,184.56***	-0.1103***	-1,305.17***
	(182.37)	(217.31)	(0.0191)	(226.97)
R-squared	0.76	0.79	0.74	0.76
Observations	1,470,225	1,470,225	1,470,225	1,470,225
Dependent variable mean	3,224	4,101	52.06	4,101
HS digit product category	4	6	6	6
Country-product fixed effects	Yes	Yes	Yes	Yes
Product-year fixed effects	Yes	Yes	Yes	Yes

Panel B)	HHI	HHI	HHI	HHI
Product type	Capital	Consumption	Materials	Primary
Commodity export share $\in [0, 100]$	2.167	4.289***	6.546***	14.85***
	(2.139)	(1.095)	(2.388)	(2.550)
Log(GDP per capita)	-704.3***	-723.8***	-753.7***	-690.6***
	(51.66)	(28.55)	(45.91)	(47.88)
R-squared	0.44	0.42	0.43	0.35
Observations	226,051	412,230	763,084	73,053
Dependent variable mean	3,480	3,528	4,459	5,964
HS digit product category	6	6	6	6
Country-product fixed effects	Yes	Yes	Yes	Yes
Product-year fixed effects	Yes	Yes	Yes	Yes

Notes: HHI is the sum of squared percentage import market shares for each country-product market with a maximum value of 10,000. Product markets are classified by either the 6 digit or 4 digit Harmonized System (HS) groupings. Product types correspond to the Broad Economic Categories of the HS. In Panel A, column 4, the export commodity price index is a country-year index of world commodity prices, where each commodity price is weighted by the long-run average share of the commodity's exports in GDP (Gruss and Kebhaj, 2019). Standard errors clustered at the country-year level are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 2: Import market concentration, prices, and per capita consumption

	(1) $\log\left(\frac{P^{LCU}}{P^{\$}E}\right)$	(2) $\log\left(\frac{C^{LCU}}{C^{\$}E}\right)$	(3) HHI	(4) HHI
Commodity export share $\in [0, 100]$	0.0025**	-0.0045**		
	(0.0010)	(0.0017)		
$P^{LCU}/P^{\$}E$			197.47**	
			(93.52)	
$C^{LCU}/C^{\$}E$				-40.71
				(38.36)
R-squared	0.1243	0.3202	0.90	0.90
Observations	3,883	3,869	2,716	2,722
Dependent variable mean	-0.247	-2.608	1,821	1,819
Year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	No	No
Country-product fixed effects	No	No	Yes	Yes

Notes: E is the exchange rate of local currency units per U.S. dollar. HHI is calculated pooling within a country importers of all goods in an ICP product category. Standard errors clustered at the country-year level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Products are International Comparison Project broad product categories.

Table 3: Trade policy mechanisms for import market concentration

	(1)	(2)	(3)	(4)	(5)	(6)
	Control of corruption	NTM (=1)	HHI	Tariff	HHI	HHI
Fuel export share $\in [0, 100]$	-0.0075***	0.0007***	-15.1	0.0004***	-1.8	28.3***
	(0.0014)	(0.0002)	(14.1)	(0.0001)	(2.6)	(4.0)
Ores and metals export share $\in [0, 100]$	0.0104***	-0.0002	-10.1	-0.0001	12.2***	11.8**
	(0.0023)	(0.0001)	(11.6)	(0.0001)	(4.5)	(5.1)
Food export share $\in [0, 100]$	0.0015	-0.0004*	20.6	0.0007***	12.1***	20.0***
	(0.0017)	(0.0002)	(13.5)	(0.0001)	(3.5)	(4.1)
NTM (=1)			17,516.9***			
			(4,212.2)			
Fuel export share × (NTM = 1)			79.6***			
			(15.4)			
Food export share × (NTM = 1)			65.9***			
			(16.7)			
Ores and metals export share × (NTM = 1)			1,726.6***			
			(412.4)			
Tariff					748.5***	
					(157.2)	
Fuel export share × Tariff					6.8***	
					(1.4)	
Food export share × Tariff					-2.7***	
					(1.0)	
Ores and metals export share × Tariff					-1.2	
					(1.2)	
Evasion gap						2,407.4***
						(55.5)
Fuel export share × Evasion gap						22.2***
						(3.5)
Food export share × Evasion gap						11.4***
						(2.6)
Ores and metals export share × Evasion gap						1.8
						(2.9)
R-squared	0.1406	0.2192	0.5	0.9431	0.5	0.5
Observations	1,430,239	12,843	12,843	1,504,443	1,504,443	1,504,443
Dependent variable mean	-0.227	0.0118	3,880	1.200	4,169	4,169
Product-year fixed effects	No	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	Yes	Yes

Notes: HHI is calculated pooling within a country importers of all goods in an HS 6 digit product category. Standard errors clustered at the country-year level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Columns (2)-(3) are based on data for 2018 given that NTMs are available for that year only.

Appendix

Table A1: Import market structure by country

			HHI for HS 6-digit products					Commodity export	Fuel export
Country	Start	End	min	p25	p50	p75	max	share (%)	share (%)
Albania	2007	2018	39.37	1673	3355	6505	10000	58.76	31.00
Bangladesh	2004	2015	32.07	1213	2950	6333	10000	8.570	1.873
Benin	2016	2018	103.8	3273	6046	10000	10000	37.32	2.579
Botswana	2004	2010	105.5	2101	4275	8214	10000	26.36	0.357
Bulgaria	2002	2006	36.29	1576	3363	6599	10000	42.03	13.28
Burundi	2010	2016	23.45	3416	6146	10000	10000	88.96	2.324
Cambodia	2016	2016	145.6	2463	4756	8736	10000	4.730	0.00786
Cameroon	2007	2017	13.81	1808	4039	7997	10000	76.94	58.68
Cabo Verde	2010	2018	62.21	1990	4086	8212	10000	87.09	0.000589
Chile	1998	2018	31.89	1164	2348	4821	10000	82.30	2.904
Colombia	1998	2018	37.51	1197	2374	4759	10000	80.14	69.64
Croatia	2007	2015	38.41	1038	2178	4739	10000	31.90	13.91
Dominican Republic	2002	2017	49.06	1470	3137	6154	10000	37.07	8.209
Ecuador	2002	2018	35.40	1331	2756	5540	10000	89.41	61.72
Egypt, Arab Rep.	2005	2016	6.380	1129	2431	5078	10000	65.31	56.39
El Salvador	2006	2018	91.59	1602	3313	6386	10000	29.59	3.554
Ethiopia	2008	2016	52.04	1847	4081	7994	10000	84.57	6.646
Gabon	2009	2009	87.33	2372	4851	9131	10000	86.92	83.13
Georgia	2000	2018	22.45	1461	3371	6968	10000	68.32	8.446
Guatemala	2005	2013	20.08	1525	3094	6021	10000	59.67	8.806
India	2016	2018	23.46	705.0	1529	3346	10000	28.72	14.93
Kenya	2006	2018	25.13	1709	3514	6675	10000	58.12	7.141
Lao PDR	2014	2016	355.2	3406	6116	9916	10000	69.40	0.251
Macedonia, FYR	2009	2017	91.91	1587	3229	6308	10000	31.33	8.715
Madagascar	2007	2017	116.3	2283	4633	8777	10000	67.93	6.960
Malawi	2005	2017	15.62	2417	4826	8810	10000	89.98	0.186
Mauritius	2000	2018	74.57	1705	3550	6817	10000	40.44	1.575
Mexico	2011	2016	42.50	783.8	1564	3337	10000	26.57	16.31
Morocco	2002	2010	46.50	1196	2459	5151	10000	35.06	2.819
Nepal	2011	2014	129.2	2145	4341	8207	10000	29.02	0.0127
Paraguay	2012	2018	78.28	1543	3111	6090	10000	90.17	31.21
Peru	2000	2018	53.32	1267	2574	5078	10000	87.78	16.06
Rwanda	2005	2016	50.60	2422	4942	8987	10000	94.49	0.240
Senegal	2000	2018	44.50	2180	4379	8375	10000	71.13	34.31
Serbia	2006	2007	50.35	1106	2383	4888	10000	33.84	3.507
South Africa	2010	2018	28.20	1080	2109	4214	10000	51.84	12.59
Sri Lanka	2016	2017	69.54	1336	2772	5424	10000	29.39	2.571
Tanzania	2003	2012	11.27	1829	4128	8122	10000	71.22	2.931
Uganda	2011	2018	27.33	1778	3806	7494	10000	74.47	6.678
Uruguay	2002	2018	53.54	1542	3128	5995	10000	67.56	4.855
Zambia	2010	2018	3.247	1797	3588	6766	10000	92.39	1.913

Note: US antitrust authorities generally consider markets in which the HHI is between 1500 and 2500 points to be moderately concentrated, and consider markets in which the HHI is in excess of 2500 points to be highly concentrated.

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