CESifo WORKING PAPERS

9254
2021

August 2021

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

CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
https://www.cesifo.org/en/wp
An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
· from the RePEc website: www.RePEc.org
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CESifo *Working Paper No. 9254*

Natural Resource Dependence and Monopolized Imports

Abstract

This paper explores the effect of natural resource dependence on market concentration of imports. Using a new panel database for importing firms in developing and emerging market economies, the paper shows that higher natural resource dependence is associated with larger market concentration of imports and with higher tariffs. The effect on the concentration of imports is found to be more pronounced for exporters of 'point-based' resources, imports of primary and consumption goods than for capital goods and is associated with higher domestic prices and lower consumption expenditure. Results suggest a novel channel for the resource curse stemming from the "monopolization" of imports.

JEL-Codes: D200, F100, L100, O100, Q000.

Keywords: imports, market concentration, natural resources, resource curse.

Rabah Arezki
African Development Bank
Abidjan / Ivory Coast
rarezki.econ@gmail.com

Ana Fernandes
World Bank, Development Research Group
Washington DC / USA
afernandes@worldbank.org

Federico Merchán
Kiel University / Germany
federicomerchan@gmail.com

Ha Nguyen
World Bank, Office of the Middle East and North Africa / Washington DC / USA
hanguyen@worldbank.org

Tristan Reed
World Bank, Development Research Group
Washington DC / USA
TReed@worldbank.org

August 2021

We thank Olivier Blanchard, Shanta Devarajan, Simeon Djankov, Jeffrey Frankel, Caroline Freund, Penny Goldberg, Jean Imbs, Daniel Lederman, Rick van der Ploeg, Gregoire Rota-Graciozi and Tony Venables for comments and suggestions. Mayra Monroy and Gaston Nievas provided excellent research assistance. This paper has benefited from support from the Umbrella Facility for Trade trust fund financed by the governments of the Netherlands, Norway, Sweden, Switzerland and the United Kingdom. The findings, interpretations, and conclusions expressed in this paper do not necessarily reflect the views of the African Development Bank, the World Bank, the Executive Directors of the African Development, the Executive Directors of the World Bank or the governments they represent.

I. INTRODUCTION

Natural resource dependence subjects developing and emerging market economies to macroeconomic challenges. One challenge traditionally emphasized in the literature is rent seeking, wherein natural resources increase the return to state capture, potentially leading to inefficient policy choices in the absence of strong political institutions.[1] Another is the so-called Dutch disease wherein a natural resource discovery or price appreciation is accompanied by an overvalued real exchange rate, which in turn shrinks the non-resource export sector.[2] In principle, both challenges could interact. Foreign exchange receipts from natural resources imply greater demand for imports, increasing the value of the domestic import market, especially in developing economies where domestic substitutes are lacking. Consequently, natural resources raise the return to effort by importers lobbying the state to erect barriers to entry into the market, increasing their

[1] Tornell and Lane (1999) describe a "voracity effect" in which a terms of trade windfall leads to state capture by powerful groups. Robinson, Torvik, and Verdier (2014) provide a similar model in which incentives for state capture increase with natural resources exports. See Ross (2012) for examples of rent seeking in the oil industry.

[2] Eastwood and Venables (1982) show how in the standard neoclassical model, an oil discovery will lead to an appreciation of the real exchange rate, operating through an increase in the relative price of non-tradeable. Torvik (2001) shows the Dutch disease can be avoided in a more sophisticated model by allowing for learning-by-doing in the non-tradable sector and knowledge spillovers from the non-tradable to tradable sector. See Arezki and Ismail (2013) and references therein for discussion of the mixed empirical evidence in favor of the Dutch disease.

rents. Though the role of the state in their enrichment is opaque, the origin of the wealth of many of the richest business people in natural resource dependent economies is linked to imports. For instance, billionaires Femi Otedola from Nigeria, Abdul Latif Jameel from Saudi Arabia, Igor Kesaev from Russia reportedly made their wealth respectively as fuel importer, as exclusive distributor of a car manufacturer, and as importer of cigarettes, food, and alcohol.[3]

Despite these anecdotes, the literature has paid little attention to the dynamics of imports in the context of natural resource booms. That is surprising considering the seminal work by Tullock (1967) and Krueger (1974) emphasizing the potentially large welfare cost of rent seeking activities including the imposition of import tariffs and the monopolization of import goods. Conceptually, rent seeking behavior could be even more prevalent in the import sector compared to the non-resource export sector. This asymmetry stems from the fact that exporters must reckon with global competition, while importers can shield themselves from domestic competition through collusion or lobbying to erect barriers to entry.

In this paper, we explore empirically how natural resource dependence can lead to the monopolization of imports, and the welfare implications of this association. The term monopolization is used loosely to encompass a shift in the market structure toward monopoly or oligopoly, though we provide evidence that state intervention contributes to this shift. The analysis

[3] See Freund (2016) for a detailed account of the origin of wealth of billionaires in emerging markets, based on the Forbes list of billionaires and other sources. Other than import sectors, ownership of firms in the telecom and logistic sectors, which may be natural monopolies, have been important sources of wealth.

relies on a new and comprehensive database of firm-level import transactions obtained from customs authorities in 29 developing and emerging market economies.

We introduce three results. First, in the cross-section, countries that are more dependent on commodity exports have more concentrated markets for each imported product. This basic pattern is confirmed in Figure I, which shows a positive cross-country correlation between commodity exports as a share of total exports, and the average across imported products of the Herfindahl–Hirschman index (HHI), equal to the sum of squared market shares of importers of a given product. Using regressions, we show this relationship is robust to controlling for market size, a crucial test since with fixed costs smaller markets could mechanically be more concentrated. It is also confirmed in a panel regression including country-product fixed effects that the concentration of import markets increases when the price of a country's commodity export basket appreciates. While the theoretical intuition provided above suggests the relationship between commodity export intensity and import market concentration should hold both in the cross-section and over time, potential omitted variable bias is a concern when taking the cross-sectional relationship at face value. The panel specification using exogenous variation in world prices provides assurance that the association between natural resource dependence and the concentration of import markets is causal.

[FIGURE I HERE]

Second, as evidence in favor of the hypothesis that this relationship is due in part to rent-seeking rather than solely the Dutch disease, we show that the cross-sectional relationship is driven by dependence on fuel exports specifically, rather than agricultural commodities. Rent seeking in principle is easier for point-based resources such as hydrocarbons and minerals, as opposed to

those with a diffuse production base such as agricultural products. Further, when disaggregating results by types of imported products, we find that the cross-sectional relationship between commodity export intensity and concentration of the import market is most pronounced for consumption and intermediate goods but does not hold for capital goods. This result is consistent with the intuition of Tornell and Lane (1999) that elites control the capital stock. Consequently, they have an interest in maintaining a competitive market for capital goods. Conversely, monopolization of consumption goods, which comprise a much smaller share of elite expenditure, can provide elites with an additional opportunity for profit. Intermediate goods are a more ambiguous case theoretically, though markups over these goods due to market concentration could be passed on to consumers if production is vertically integrated.

Third, tariffs and non-tariff measures appear to be mechanisms through which imports are monopolized. In the cross-section, ad-valorem tariffs are higher in economies with greater commodity export intensity. Since tariffs increase the cost of importing, they may serve as a barrier to entry into importing, contributing to monopolization. This pattern is visible in Figure II. Non-tariff measures, which include phytosanitary inspection requirements and other product quality standards that restrict entry of lower-quality imports, are also more common in economies with greater commodity export intensity. This cross-sectional result is confirmed more rigorously using regressions.

Overall, the resulting import market concentration in natural resource dependent economies appears to harm welfare. In theory, this is not obvious. If higher market concentration is associated with higher fixed costs, but lower marginal costs of importing, market concentration could result in lower prices, even if it is associated with higher markups. However, cross-sectional

regressions show that importer market concentration is associated with both higher prices in local markets and lower expenditure consumption per capita, affecting negatively aggregate consumer welfare.

[FIGURE II HERE]

The paper contributes to at least four literatures. First, we highlight import monopolization as a novel mechanism through which natural resource dependence could harm welfare in developing economies. Venables (2016), Frankel (2012), and van der Ploeg (2011) survey the voluminous literature on the so-called 'resource curse,' which has not yet emphasized this mechanism. Theoretical models such as those of Robinson, Torvik, and Verdier (2014) and Tornell and Lane (1999) emphasize the potential for natural resource abundance to contribute to state capture and inefficient policy choices, but do not locate these policy choices in the import sector or emphasize their role in distorting domestic competition.

Second, this paper informs a macroeconomics literature interested in the association between market structure and welfare. While theoretical contributions by Baqaee and Farhi (2020) and Aghion et al. (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, or its causes. One exception is Leone, Macchiavello and Reed (2021), who describe how high market concentration leading to high markups has elevated prices in Africa's domestic cement industry, though they argue that the source of these markups is benign, stemming from a small market size in the presence of minimum efficient scale that does not vary across continents, rather than barriers to entry that are unique to Africa. In contrast, we provide

evidence that the import sector, which is easier to regulate through trade policy, may be characterized by barriers to entry in commodity export intensive economies.

Third, this paper contributes to a literature that has sought to explain the political economy of trade policy, and specifically the origins of import barriers (Blanchard and Matschke, 2015; Ossa, 2014, Bown and Tovar, 2011; Nunn and Treffler, 2010; Mobarak and Purbasari,2005; Goldberg and Maggi, 1999; Grossman and Helpman, 1994). Our findings confirm the intuition from this literature that the market power of importers could be an important factor in explaining policy choices, while highlighting that such considerations could be especially salient in commodity export intensive economies, due either to rent seeking or Dutch disease mechanisms.

Fourth, given the data source, the paper is related to a smaller and more recent literature on the market structure of exports. Fernandes et al. (2016) use the same source to document that diversified, higher-income economies have more numerous exporters, but also more concentrated export markets. Freund and Pierola (2015, 2020) document the existence export "superstars," or firms with especially large market shares, and describe their characteristics. Our paper is distinct in that we focus on importers, and document substantially different patterns. Higher-income economies appear to have less concentrated import markets, with concentration being especially high in the least diversified, commodity export intensive economies. While the export sector has been the traditional focus of the literature on trade and development, the import sector could also be critical for development, especially in the presence of imperfect competition. In developing and emerging markets, the value of goods imported is about as large as the value of exports (UNCTAD, 2021).

The remainder of the paper is organized as follows. Section 2 presents the data. Section 3 documents the main result on the relationship between import market concentration and commodity export intensity. Section 4 presents extensions. Section 5 addresses potential endogeneity issues and verifies the relationship between import market concentration and welfare relevant outcomes. Section 6 concludes.

II. DATA

a. Import Market Structure

The analysis relies on a newly-constructed database of firm-level import transactions from customs for 29 developing and emerging market economies.[4] The database is based on the same source as the World Bank's Exporter Dynamics Database described by Fernandes et al. (2016), though focuses on imports rather than exports. The total value of imports for each country reported in the customs data is very similar to the corresponding total value of imports reported by COMTRADE (on average the difference is 5.6%).

The dataset includes the values of import transactions for each firm, which are used to construct our measure of import market concentration, $HHI_{c,s}$, the Herfindahl-Hirschman Index, or the sum of squares of firm-level market shares in imports of each HS 4-digit product *s* in each

[4] Countries included in the database are: Albania, Bangladesh, Chile, China, Cote d'Ivoire, Colombia, Dominican Republic, Ecuador, Egypt, Ethiopia, Gabon, Guatemala, Croatia, Kenya, Morocco, Madagascar, Mexico, North Macedonia, Mauritius, Malawi, Peru, Paraguay, Romania, Rwanda, Senegal, El Salvador, Serbia, Uruguay, South Africa.

country *c*. The HHI ranges from $\frac{1}{n^2}$ to 1 where *n* is the number of importing firms in an HS 4-digit import industry. The larger the HHI index the more concentrated the industry is. In anti-trust analysis, relevant product markets are defined as those comprising all products that are close substitutes for the same set of consumers (see Benkard, Yurikoglu, Zhang 2021). Since HS4 categories defined by the United Nations are designed to comprise groups of substitutable products with a similar end-use, the groupings used here may be understood as consumer-relevant product markets. Product categories are defined using a time-consistent consolidated Harmonized System (HS) classification that concords and harmonized product codes across the HS 1996, 2002, 2007, and 2012 versions (used in the raw importer-level datasets), as described in Fernandes et al. (2016). Import values are Cost Freight and Insurance (CIF) figures measured in USD converted from local currency to USD when necessary using exchange rates taken from the IMF's International Financial Statistics.

To smooth out annual fluctuations, we first calculate $HHI_{c,s}$ by averaging over a consistent three-year period for each country. We use the 2011-2013 period, for which data are available for the most countries, though for some we must draw on alternative periods, specifically China (2006-2008), Romania (2009-2011), and Paraguay (2012-2014). This approach allows us to do away with the time dimension in the initial analysis.

Table 1 presents descriptive statistics for each country, based on the importer analysis. Larger countries tend to have fewer importers per capita, but larger import value per firm. Note there is a positive correlation (equal to about 0.5) between average commodity exports and the average market share of the largest importer across products, and between average commodity exports and the average HHI.

[TABLE I HERE]

b. Commodity Export Intensity

The main independent variable of interest is the share of commodities in total exports, denoted by $ExpCom_c$. We define commodities initially as all fuel, ores and metals, and food exports, though disaggregate these categories in the analysis. To capture predetermined commodity export intensity rather than commodity export intensity contemporaneous to our measurement of market structure, we calculate the variable by averaging within each country over five-year period prior to the three-year sample period of the firm-level import data. An alternative measure for natural resource dependence that we include is the share of natural resource rents in GDP, which values of the stock of natural resource capital at current market prices. Both variables are reported in the World Bank's World Development Indicators.

c. Controls

In the analysis we also include certain variables for domestic market size: the logarithm of the 3-year average GDP per capita, $log(GDPPC_c)$, and the logarithm of the 3-year average GDP, $log(GDP_c)$. We do not include direct measures of institutions, for instance measures of the cost of doing business, because these institutions are the channels through which commodity export dependence could affect importer market concentration.

d. Tariffs and non-tariff measures

For tariffs, we rely on a global tariff database from Teti (2020) covering tariffs at the HS 6-digit product level for all importing countries in our sample and all their trading partners for the same sample period as the importer-level customs data. The database addresses missing data and

misreporting problems that characterize tariff data from TRAINS. For non-tariff measures, we rely on the global database on non-tariff measures[5] from TRAINS.

e. Domestic Prices and Consumption

To gauge the potential effect of import market structure on welfare, we rely on data from the International Comparison Program (ICP), which provides information on domestic prices and consumption of certain goods.[6] The ICP defines the PPP price for product *s* in country *c* ($PPP_{c,s}$) as the ratio of domestic price in local currency ($P_{c,s}$) relative to the US price in US dollars ($P_{usa,s}$) ($PPP_{c,s} = P_{c,s}/P_{usa,s}$). This measure indicates that for every dollar spent in product *s* in the US, it is necessary to spend $PPP_{c,s}$ local currency units to purchase the same good in country *c*. Then, the relative PPP price to US in USD ($Relative\ PPP_{c,s}$) is defined as the PPP price for product *s* in country *c* ($PPP_{c,s}$) divided by the exchange rate between country *c* and US ($Relative\ PPP_{c,s} = PPP_{c,s}/ER_{c,s}$), which allows to compare the price of the good *s* between country *c* and US in the same currency. Additionally, the consumption variable was defined as the expenditure per capita in country *c* for product *s* in USD relative to the expenditure per capita for product *s* in US, indicating that welfare is measured not only as absolute consumption but also as convergence to the largest economy consumption.

III. THE RELATIONSHIP BETWEEN IMPORT MARKET STRUCTURE AND COMMODITY EXPORT ITENSITY

a. In The Cross-Section

We analyze the cross-sectional relationship in Figure I more rigorously using the following regression:

[5] See https://trains.unctad.org/

[6] See https://www.worldbank.org/en/programs/icp

$$HHI_{c,s} = I_s + \alpha ExpCom_c + \beta_1 log(GDP_c) + \beta_2 log(GDPPC_c) + \epsilon_{c,s} \quad (1)$$

The coefficient α is the main object of interest. The specification includes several control variables: economic size, and level of development. Market size captured by GDP is a crucial control. In the presence of fixed costs, smaller markets could be mechanically more concentrated. Controlling for GDP per capita is important because fixed costs might also be higher in more developed markets, where wages and the price level are higher. The term I_s is a vector of product-specific fixed effects that capture unobserved industry specificities that can explain product market concentration across countries such as technological fixed costs, per-unit good value, or logistics network requirements. Finally, $\epsilon_{c,s}$ is an independent and identically distributed error. Equation (1) is estimated by ordinary least squares (OLS) with standard errors clustered at the country level.

[TABLE II HERE]

Table II presents the main results from estimating Equation (1). A country's pre-existing exposure to commodity exports is significantly and positively associated with higher import concentration across firms at the product level. The regression in Column 1 of Table II implies that a 1 percentage point increase in commodity export intensity is associated with an increase in the HHI of 0.0008 everything else being equal. United States Justice Department guidelines suggest that an increase in the HHI of 0.02 (when the index is scaled between 0 and 1) should be expected to increase market power[7], consequently, an export commodity boom that increase 25 percentage points the commodity export share would be potentially harmful to the import markets competitiveness. Columns 2, 3, and 4 show that this main result is qualitatively robust to

7 See https://www.justice.gov/atr/herfindahl-hirschman-index

controlling for country market size (proxied by $log(GDP_c)$, the level of economic development proxied by logarithm of GDP per capita, $log(GDPpc_c)$. Note that both country economic size and level of development are negatively associated with concentration, indicating that larger or more developed countries have less concentrated import markets.

Table A1 reports the same specification as in Column 4 of Table II for these alternative measures of market concentration: (i) the market share of the largest importer in an HS4 product, and (ii) the highly concentrated product indicator (a dummy variable that equals 1 if HHI was larger than 2500 and increased more than 200 points in any of the 3 years, based on the US Department of Justice standard[8]). Results are very similar. Table A2 shows a similar specification to Equation 1 where the right-hand side variable is natural resource rents as a share of GDP, and the outcome variables are alternatively HHI and the two other measures of concentrations. For all measures, there is a positive and significant relationship between natural resource rents and import market concentration.

b. In the Panel

A potential concern is that the cross-sectional relationship between import market concentration and commodity export intensity documented is not causal. The specification in Equation 1 addressed this concern by (i) using a measure of commodity exports which is pre-determined (averaging over the previous 5 years), to account for potential simultaneous causality, and (ii)

[8] In this case, the HHI was calculated as the sum of the squares of the firm's participation percentage in the import market. For example, the HHI for an industry with 2 firms with equal import values will be calculated as: HHI = 50^2+50^2. Consequently, a highly concentrated product will have a HHI value close to 10,000.

including income per capita and market size as controls, to account for potential omitted variable bias. However, it is possible to address this concern further using time series variation.

To this end, we estimate a panel regression, which regresses the HHI on country-product fixed effects and an alternative measure of commodity export intensity driven by fluctuations in world commodity prices, which are arguably exogenous for as the countries included in our sample are small relative to the world economy. This specification exploits only time series variation, within a national product market.

Our alternative measure of commodity export intensity is the commodity export basket price index provided by Gruss and Kebhaj (2019). For country c in year t this is defined as

$$\log(ComPI)_{c,t} = \sum_{j=1}^{J} \log(P_{c,t})\Omega_{c,j}$$

where $P_{j,t}$ is the real world price of commodity j in year t, and $\Omega_{c,j}$ is a time-invariant, but commodity- and country-specific weight

$$\Omega_{c,j} = \frac{1}{T}\sum_{t=1}^{T} \frac{x_{c,j,t}}{GDP_t}$$

where $x_{c,j,t}$ is the value of the exports of commodity j by country c in year t. The share of exports is measured over the long-run, between 1960 and 2018. Since $\Omega_{i,j}$ is fixed, only the change in prices drives the change in the commodity export price index.

The HHI is regressed on this commodity export basket price index in the following regression

$$HHI_{c,s,t} = I_{c,s} + I_{s,t} + \rho\log(ComPI)_{c,t} + \epsilon_{c,s,t} \quad (2)$$

where $I_{c,s}$ is a country-product fixed effect and $I_{s,t}$ is a product year fixed effect, which are included to ensure that the coefficient of interest ρ is identified based only on variation within each national product market, and that trends in global prices of each product are controlled for.

The results from estimating Equation (2) are shown in Table III. The exogenous Commodity Export Price Index is found to have significant and positive effects on HHI, even in our stringent specification that includes product-country and product-year fixed effects. A 1 percent increase in Commodity Export Price Index causes a 0.006 unit increase in HHI.

[TABLE III HERE]

IV. Mechanisms

As described in the Introduction, a positive association between import market concentration and commodity exporter intensity could arise through several mechanisms. As the import market becomes more valuable due to real exchange rate appreciation and the classic Dutch disease, importers will expand their businesses, which could (though need not) lead to more concentration. A benign mechanism could be that increased concentration occurs as the result of economies of scale or scope in import distribution rather than barriers to entry established through lobbying, although the result in Table II that larger economies have less concentrated import markets pushes against this mechanism. In this section, we return to the cross-sectional analysis and provide several results consistent with the hypothesis that capture of the state by importers plays a role in increasing concentration. Since state capture in response to commodity export intensity is expected to lead to long-run, persistent differences in institutions across countries, we expect any mechanisms at play to be apparent in cross-sectional relationships.

a. Point-Based vs. Diffuse Commodity Exports

First, we explore heterogeneous effects by the type of commodity export on the right-hand side of the regression in Equation (1). Isham et al. (2005) argue that the resource curse should be more pronounced for countries that export fuel and minerals than for those that export agricultural product exporters. The intuition behind this is that incentives for state capture are greater in the context of fuel, ores and metals exports, since they are 'point-based' resources, whose revenues typically transit directly through government coffers, as opposed to 'diffuse' resources, such as agricultural products, whose revenues flow to small holders. If state capture is the mechanism that explains import market concentration, one would expect that concentration would be higher specifically in countries that export fuel, ores, and metals. If more benign factors are at play, the effect would be present in all countries that export commodity, due to the Dutch disease mechanism.

[TABLE IV HERE]

To investigate this hypothesis, Table IV presents the results of a similar regression to the one presented in Table II, but where commodity export intensity is broken down into food, ores and metals and fuel (each as a share of total exports). In Column 1, dependence on fuel exports and ores and metals exports have significant impacts on import concentration. In contrast, food exports have no significant effect on import concentration. In Columns 2 and 3 of Table III it is shown that similar results hold when using alternative measures of market size.

b. Differential Results by Type of Imported Product

The richness of the import database allows us to explore the heterogenous effect of commodity export intensity on import market concentration across different types of imported

goods. Equation 1 is estimated again using subsamples of good types corresponding to the Broad Economic Categories (Revision 4) of the Harmonized System: consumption goods, intermediate goods, primary goods, capital goods, and other non-classified goods. Across all products, intermediate goods represent 48% of total imported value in our sample, capital goods 27%, consumption goods 12%, primary goods 11.8%, and the remainder are not classified.[9] Examples of major intermediate goods imports globally are refined petroleum and electronic circuits; medicaments, small vehicles, and televisions are major consumption goods; and transmission apparatuses, data processing machines, and airplanes are common capital goods imports. Crude oil, iron ore, coal and soybeans are examples of primary goods imports.

Results are reported in Table V. Comparing Columns 1, 3, 5, and 7, which are the same specification as in Table II, observe that the association between import market structure and commodity export intensity is positive and statistically significant for intermediate, consumption and primary goods, yet is a tightly estimated zero for capital goods imports.[10] These results are consistent with the intuition of Tornell and Lane (1999) that elites control the capital stock. Consequently, they have an interest in maintaining a competitive market for capital goods.

[9] Recall the unit of analysis is a product grouping at the HS4 level in order group close substitutes together in their relevant market. For this reason, we classify products according to the modal Broad Economic Category across all HS6 products within each HS4 group of products.

[10] We do not present the effects of commodity exports on non-classified goods because the sample size is very small.

Conversely, monopolization of consumption goods, which comprise a much smaller share of elite expenditure, can provide elites with an additional opportunity for profit. Intermediate goods are a more ambiguous case theoretically, though markups over these goods due to market concentration could be passed on to consumers if production is vertically integrated.[11] The strongest association is found with primary goods. An explanation for this could be that primary goods, by their essential nature, are often the focus of licensing and trade policies that could restrict entry. For example, raw sugar and wheat are of primary goods whose imports are often subject to tight government control.[12]

Columns 2, 4, 6, and 8 show the association between import market concentration of the different product types and the different commodity export intensities, as in Table IV. For consumption and intermediate goods, the pattern is similar, with export intensity being associated

[11] The problem of `double marginalization' occurs when market power exists in the final good and intermediate goods market. This can be overcome by vertically integrating final and intermediate good production, so that the final goods producer no longer must pay a mark-up on the intermediate good, leading to a more efficient outcome. While we do not observe firms' activities in domestic production, many intermediate goods importers are also final goods producers, and so need not charge themselves markups over intermediate goods, even if the market is concentrated.

[12] For example, in Nigeria, imports of refined sugar are restricted as part of an import substitution policy. Imports of raw sugar are dominated by the Dangote Group, which sells refined sugar to the local market (see FAO, 2013 and a discussion in Premium Times, 2021). Wheat imports in many countries handled by state monopolies (Ackerman and Dixit, 1999).

with market concentration only for fuels, ores, and metal, but not food. For capital goods, there is no significant association between market concentration and export intensity in fuels, ores, and metal. There is also a positive and significant association between market concentration and food export intensity, which could reflect that countries dependent on food exports have government controls over primary food imports. Interestingly, there is a negative and statistically association between food export intensity and concentration, while the association of fuels, ores and metals export intensity and concentration is a reasonably precise zero. Table A3 replicates these regressions using the alternative commodity dependence measure of natural resources rents, which may also be segmented into oil, natural gas, coal, forest, and mineral rents. The patterns are qualitatively similar, with the largest association in primary goods, and with effects concentrated in countries exporting oil and minerals.

c. Tariffs, Non-Tariff Measures, and the Market Share of State-Owned Importers

We now turn to evidence on associations between commodity export intensity and actual policy outcomes that create barriers to entry into importing. Since tariffs increase the cost of importing, they may serve as a barrier to entry in importing, contributing to monopolization. Table VI reports estimation of baseline regression (equation 1) replacing the dependent variable by different trade policy variables: ad-valorem import tariffs, non-tariff measures (NTM), and stated-owned enterprises (SOE) import market share. Columns 1 and 4 show that fuel exports have a positive and significant effect on two trade policy instruments: i) ad-valorem import tariffs, which confirms the positive association in Figure II between tariff rates and commodity export intensity, and ii) export-related NTM coverage ratio, which refers to measures applied to the exported goods by the

exporting country government.[13] Also, columns 2 and 3 indicate that food exports have a positive impact on the overall NTM coverage ratio, and the import-related NTM coverage ratio.[14] This set of findings is consistent with the trade policy substitution between tariffs and NTM found in the recent literature (see Gunesse et al, 2018, and Herghelegiu, 2017); the 'point-based' resource exporters tend to lobby for higher import tariffs and lower NTM export-related measures, while the 'diffuse' resource exporters tend to pressure for higher import-related NTM. Finally, column 5 shows that there is no effect of commodity exports on SOE import market share, indicating that SOE could not be as efficient as private firms to take advantage in the import market of rents provided by natural resource exports' booms. However, data availability (SOE sample includes only 8 countries) does not allow to infer robust conclusions, and this is a topic to be explored in future research.

[TABLE VI HERE]

V. LINKING CONCENTRATION TO WELFARE RELEVANT OUTCOMES

We now turn to the question of whether import market concentration in natural resource dependent economies affects welfare. In theory, this is not obvious. If higher market concentration is associated with higher fixed costs, but lower marginal costs of importing, market concentration could result in lower prices, even if it is associated with higher markups. Alternatively, higher

[13] For instance, exports of rice must be inspected for sanitary conditions. See description Chapter P: Export-related measures in International Classification of Non-Tariff Measures by UNCTAD: https://unctad.org/system/files/official-document/ditctab2019d5_en.pdf

[14] See Chapter A, B, C, E, F, G, H, I in the International Classification of Non-Tariff Measures by UNCTAD: https://unctad.org/system/files/official-document/ditctab2019d5_en.pdf

market concentration could lead to higher prices, if the associated markups (e.g., as in a differentiated products Nash-in-prices game) outweigh any cost savings from economies of scale. To distinguish between these hypotheses, we document the association between import market concentration and domestic prices and consumption of goods for which cross-country data are readily available from the International Comparison Program for the 2011 year. A key advantage of these data is that prices and consumption both reflect also domestic supply, which may have a substantial market share that is not measured in the database of import transactions.

We analyze the causality between import market concentration and domestic prices with a cross-sectional regression like the baseline model described above in equation 1:

$$Price_{cs2011} = I_s + \alpha HHI\ Imports_{c,2010} + \beta_1 log\left(GDP_{c,2011}\right) + \beta_2 log\left(GDPPC_{c,2011}\right) + \epsilon_{c,s} \quad (3)$$

where $Price_{cs2011} = \left(\frac{P_{c,s}}{P_{usa,s}}\right) * \left(\frac{1}{ER_{c,usa}}\right)$, where $P_{c,s}$ is price of product s in country c in local currency, $P_{usa,s}$ is price of product s in US in USD and $ER_{c,usa}$ is the nominal exchange rate between country c and US. $HHI\ Imports_{c,2010}$ is the national average imports HHI across products. The specification includes the same controls variables described above for the baseline model, the term I_s is a vector of product-specific fixed effects, and $\epsilon_{c,s}$ is an independent and identically distributed error. Equation (3) is estimated by ordinary least squares (OLS) with standard errors clustered at the country level, and the sample is restricted to goods products excluding services.

Column 1 of table VII shows that a country's predetermined positive shock on import concentration in 2010 increases domestic prices in 2011, indicating that importers operate in low competitive domestic markets

in which they have monopolistic or oligopolist power. As a robustness check, the baseline model (equation 1) was estimated replacing HHI by domestic prices. Results in column 2 and 3 in table VII check that a country's predetermined positive shock on commodity export (2006-2010) has also a positive impact on domestic prices in 2011. On the other hand, coefficients in column 4 do not capture a significant negative effect of import concentration on consumption expenditure per capita relative to US, evidencing that importers tend to operate in low demand elasticity goods where the decrease in the demand quantities is lower in absolute value than the increase in prices, in response to a commodity exports shock. Nevertheless, column 6 reports a negative and significant effect of a predetermined fuel exports shock on the consumption expenditure per capita relative to US, supporting the point-based resources hypothesis described above.

VI. CONCLUDING REMARKS

This paper investigates the effect of natural resource dependence on market concentration of imports. Using a novel database covering importing firms in developing and emerging market economies, the paper shows that countries more dependent on commodity exports have larger market concentration of imports. Within a country, increases in international prices of exported commodity goods cause a significant increase in the market concentration of imports. The effect on the concentration of imports is more pronounced for primary and consumption goods than for capital ones. The paper verifies that higher market concentration of imports is associated with higher tariff and non-tariff barriers. In addition, higher market concentration is associated with higher domestic prices and lower domestic consumption relative to US.

While the policy debate has often focused on export orientation to achieve better development outcomes, import dynamics, and specifically market structure around imports have been overlooked. These results suggest a novel channel for the resource curse stemming from the "monopolization" of imports. Further research could explore which specific elements of domestic

value chains could emerge from more contestable import sectors in developing and emerging markets. As developing and emerging markets such as those in Africa embark in deepening regionalization efforts, the lever of de-monopolization of imports could be of relevance to develop their domestic productive base.

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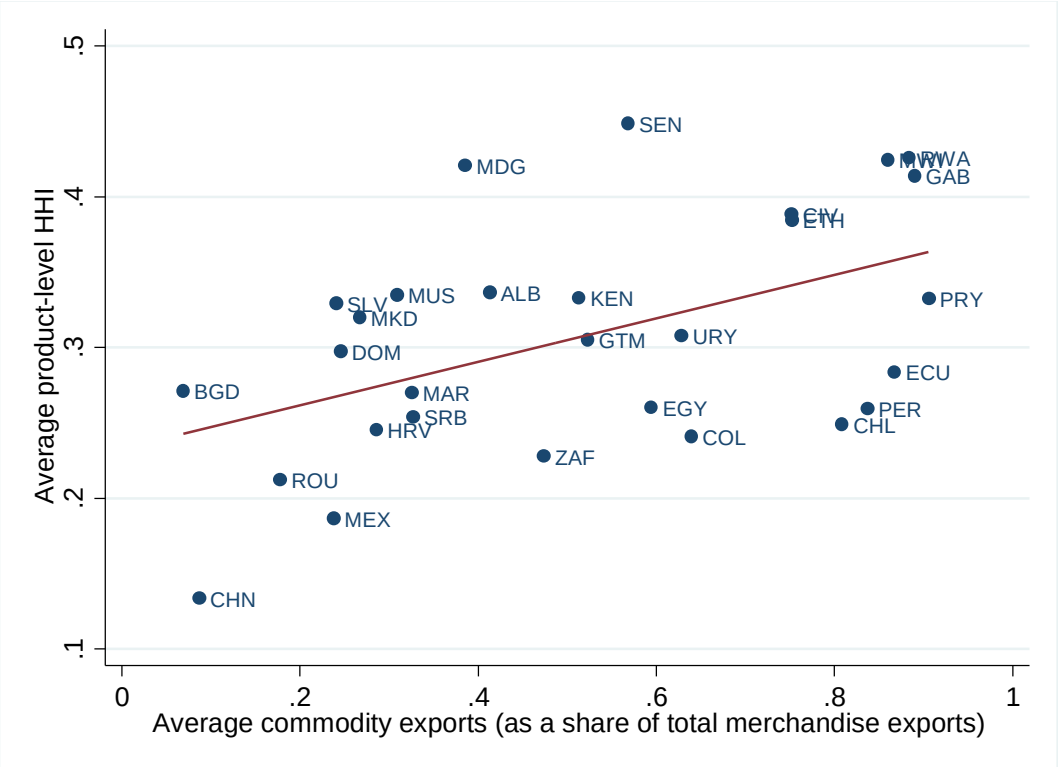
EXHIBITS

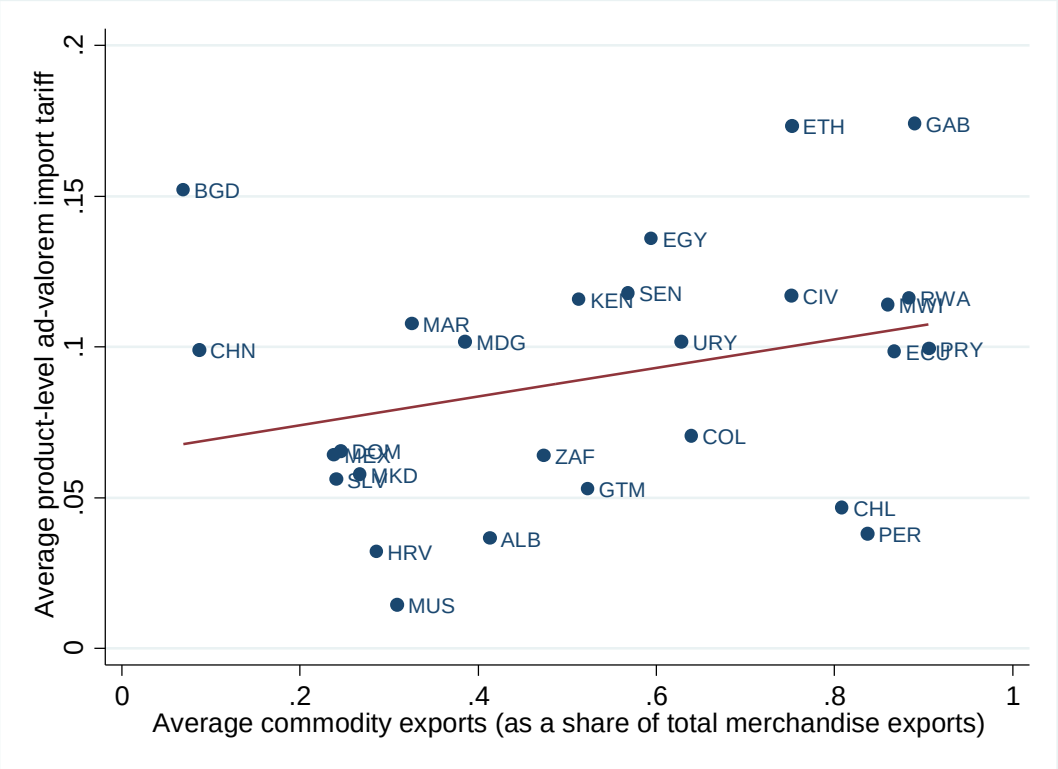
Figure I: Natural Resources and the Concentration of Imports Across Firms within Products



Sources: Customs data collected as part of updates to Exporter Dynamics Database described in Fernandes et al. (2016) and World Development Indicators (WDI).

Notes: Simple scatterplot between the Herfindahl-Hirschman Index (HHI), or the sum of squared firm market shares, calculated for each product and then averaged within each country, and commodity exports as a share of total merchandise exports in the previous five years. Data are averaged over the years 2011-2013 for most countries. Exceptions are China, where the sample is 2006-2008; Romania, 2009-2011; and Paraguay, 2012-2014. The coefficient of the regression *Average product-level HHI* on *Average commodity exports* is 0.14 with a pi-value of 0.007 and R-squared 0.24.

Figure II: Natural Resource Exports and Trade Barriers



Sources: CESIFO-World Bank based on Teti (2020) and the World Development Indicators (WDI).

Notes: Simple scatterplot between average ad valorem tariff rate across products and average commodity exports as a share of total exports in the previous five years. Sample is the same as in Figure I. The coefficient of the regression *Average product-level import tariff* on *Average commodity exports* is 0.047 with a pi-value of 0.133 and R-squared 0.08.

Table I. Import Sector Size and Market Structure

	Average commodity exports (as a share of total merchandise exports)	Total Import Value (USD billions)	Number of Importers	Number of Importers per 1000 Persons	Mean Import Value per Firm (USD thousands)	Median Import Value per Firm (USD thousands)	Average HHI across HS4 products	Average market share of largest importer across HS4 products
Paraguay†	0.91	12.3	10,547	1.62	1175	24.7	0.33	0.45
Gabon	0.89	3.7	8,048	4.6	478.5	7.8	0.41	0.53
Rwanda	0.88	1.7	13,913	1.32	123.2	3.7	0.43	0.54
Ecuador	0.87	24.17	22,442	1.45	1076.4	27.5	0.28	0.40
Malawi	0.86	2.6	13,316	0.86	195.4	3.7	0.42	0.54
Peru	0.84	41.2	28,566	0.97	1441.7	50	0.26	0.38
Chile	0.81	65.43	39,240	2.25	1667.8	19.5	0.25	0.37
Ethiopia	0.75	9.78	12,362	0.13	791.7	63.4	0.38	0.49
Cote d'Ivoire	0.75	9.73	5,148	0.24	1871.3	26.4	0.39	0.51
Colombia	0.64	55.31	26,203	0.57	2111.3	75	0.24	0.36
Uruguay	0.63	11.09	14,095	4.17	787.3	28.2	0.31	0.43
Egypt,	0.59	70.62	40,365	0.47	1754.5	45.6	0.26	0.37
Senegal	0.57	6.16	2,834	0.21	2178.6	61.3	0.45	0.56
Guatemala	0.52	17.02	55,673	3.65	306.7	3.6	0.3	0.42
Kenya	0.51	10.93	32,156	0.73	346.9	8.3	0.33	0.45
South Africa	0.47	103.05	46,977	0.89	2194.7	33.4	0.23	0.35
Albania	0.41	5.05	16,573	5.71	499.5	36.3	0.34	0.46
Madagascar	0.39	2.36	2,880	0.13	819.3	39.4	0.42	0.53
Serbia	0.33	16.49	22,522	3.13	732.2	35.9	0.25	0.37
Morocco	0.33	44.52	25,317	0.76	1760.8	63.3	0.27	0.39
Mauritius	0.31	5.55	12,521	9.97	443.2	9.9	0.33	0.45
Croatia	0.29	21.81	22,541	5.28	976	24.5	0.25	0.36
North Macedonia	0.27	5.84	9,420	4.54	620.4	36.7	0.32	0.44
Dominican Rep	0.25	17.13	34,709	3.5	494.6	3.4	0.3	0.42
El Salvador	0.24	8.67	30,051	4.82	288.4	0.5	0.33	0.45
Mexico	0.24	374.45	66,783	0.57	5657.8	74.4	0.19	0.30
Romania†	0.18	62.31	31,940	1.58	1947.3	129.7	0.21	0.33
China†	0.09	642.57	126,794	0.1	5113.1	211.7	0.13	0.23
Bangladesh	0.07	37.25	24,220	0.16	1537.8	96.1	0.27	0.38

Notes: Total import value (in USD billions) is the average total import value per year for a given country. Number of importers is the average number of importers per year in each country. Mean import value per firm (in USD thousands) is the mean import value across all importers in a given country per year. Average HHI across HS4 products is the Herfindahl-Hirschman Index (HHI), or the sum of squared firm market shares, calculated for each HS4 product code and then averaged across products within each country. Average market share of largest importer across HS4 products is the average market share of the largest importers in each HS4-product. Values in the table are averaged across the years 2011-2013 for most countries. † indicates exceptions to the sample period: for China, the averages are taken

from 2006-2008, for Romania from 2009-2011, and for Paraguay 2012-2014. Average commodity exports as a share of total merchandise exports is calculated for the previous five years for each country.

Table II. Regressions of Import Market Structure on Commodity Export Intensity

VARIABLES	(1) HHI	(2) HHI	(3) HHI
Total commodity exports (%) (t-1,t-5)	0.0805**	0.0621**	0.0699*
	(0.0316)	(0.0233)	(0.0373)
Log GDP	-0.0470***	-0.0407***	-0.0355***
	(0.00587)	(0.00371)	(0.00811)
Log GDPpc		-0.0377***	0.00733
		(0.00834)	(0.0152)
Observations	34,383	34,383	34,383
R-squared	0.628	0.639	0.596
Product fixed effects	Yes	Yes	Yes
Product value weights	No	No	Yes

Notes: Values are averaged over the 3 years of data available for each country. HHI is the sum of squared firm market shares, calculated for each HS4 product code. Natural logs are taken over average values. Sample is the same as in Table I. Robust standard errors clustered at country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Constant no reported.

Table III: Panel Regression of Import Market Structure on Commodity Export Prices

VARIABLES	(1) HHI	(2) HHI
Log export commodity price index (fixed weights 2012=100)	0.616***	0.715***
	(0.140)	(0.174)
Observations	98,456	90,033
R-squared	0.878	0.882
Product-country fixed effects	Yes	Yes
Product-year fixed effects	No	Yes

Notes: The export commodity price index is a country-specific index of commodity price levels, where each is weighted by the share in the country's exports (Gruss and Kebhaj 2019). Robust standard errors clustered at country-year level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Constant no reported.

1

Table IV. Regressions of Import Market Structure on Commodity Export Intensity Disaggregated by Commodity Type

VARIABLES	(1) HHI	(2) Share largest importer	(3) Highly concentrated product indicator
Food exports % (t-1, t-5)	0.0124	0.0148	-0.00945
	(0.0329)	(0.0298)	(0.0302)
Ores metal exports % (t-1, t-5)	0.0221	0.0310	0.0781**
	(0.0281)	(0.0264)	(0.0338)
Fuel exports % (t-1, t-5)	0.120***	0.114***	0.103**
	(0.0323)	(0.0297)	(0.0385)
Log GDP	-0.0420***	-0.0423***	-0.0440***
	(0.00362)	(0.00292)	(0.00368)
Log GDPpc	-0.0467***	-0.0431***	-0.0613***
	(0.00850)	(0.00771)	(0.00713)
Observations	34,383	34,383	33,217
R-squared	0.642	0.633	0.246
Product fixed effects	Yes	Yes	Yes

Notes: Values are averaged over the 3 years of data available for each country. Food, ores and metals, and fuel exports are measured as a share of total exports. HHI is the sum of squared firm market shares, calculated for each HS4 product code. Highly concentrated product indicator is a dummy variable that equals 1 if HHI was larger than 2500 and increased more than 200 points in any of the 3 years, based on the US Department of Justice standard (the HHI was calculated in the scale from 0 to 10,000 in this case). Sample is the same as in Table I. Robust standard errors clustered at country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Constant no reported.

Table V. Regressions of Import Market Structure on Commodity Export Intensity by Product Type

	Intermediate		Capital		Consumption		Primary	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	HHI	HHI	HHI	HHI	HHI	HHI	HHI	HHI
Total commodity exports (%) (t-1,t-5)	0.0685**		-0.00823		0.0650**		0.118***	
	(0.0258)		(0.0205)		(0.0238)		(0.0403)	
Food exports % (t-1,t-5)		0.0229		-0.0581**		0.00148		0.0809
		(0.0362)		(0.0249)		(0.0406)		(0.0558)
Ores metal exports % (t-1,t-5)		0.0337		-0.0122		0.0254		0.00882
		(0.0317)		(0.0231)		(0.0343)		(0.0684)
Fuel exports % (t-1,t-5)		0.120***		0.0282		0.132***		0.214***
		(0.0364)		(0.0327)		(0.0249)		(0.0468)
Log GDP	-0.0501***	-0.0514***	-0.0344***	-0.0361***	-0.0125***	-0.0143***	-0.0638***	-0.0643***
	(0.00438)	(0.00445)	(0.00372)	(0.00399)	(0.00373)	(0.00358)	(0.00550)	(0.00571)
Log GDPpc	-0.0332***	-0.0414***	-0.0312***	-0.0398***	-0.0478***	-0.0591***	-0.0425**	-0.0502***
	(0.00842)	(0.00891)	(0.00656)	(0.00623)	(0.00964)	(0.0112)	(0.0158)	(0.0151)
Observations	17,943	17,943	4,328	4,328	8,186	8,186	3,603	3,603
R-squared	0.619	0.621	0.709	0.711	0.539	0.546	0.565	0.573
Product fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Columns (1) and (2) restrict the sample to only intermediate goods, according to the BEC5 product type classification; columns (3) and (4) restrict the sample to capital goods; columns (5) and (6) consumption goods; and columns (7) and (8) primary goods. Product type classifications are collectively exhaustive and mutually exclusive. Sample is the same as in Table I. Robust standard errors clustered at country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Constant no reported.

Table VI: Regressions of Commodity Export Intensity on Tariffs, Non-Tariff Measures, and Market Share of State-Owned Importers

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Ad-valorem import tariff	NTM coverage ratio	Import-related NTM coverage ratio	Export-related NTM coverage ratio	SOE Market Share
Food exports % (t-1, t-5)	0.0153	0.391**	0.420**	0.0363	0.0111
	(0.037)	(0.165)	(0.153)	(0.130)	(0.00814)
Ores metal exports % (t-1 ,t-5)	-0.021	-0.0315	0.0218	-0.343**	-0.00393
	(0.022)	(0.130)	(0.117)	(0.151)	(0.00321)
Fuel exports % (t-1 ,t-5)	0.117***	-0.211	-0.157	-0.309**	0.00395
	(0.036)	(0.192)	(0.179)	(0.128)	(0.00584)
Log GDP	0.00798**	0.0941***	0.102***	0.0661**	0.000369
	(0.003)	(0.020)	(0.0157)	(0.0269)	(0.000951)
Log GDPpc	-0.0339***	-0.06	-0.0689**	-0.0346	-0.00268
	(0.009)	(0.037)	(0.0310)	(0.0289)	(0.00237)
Observations	31,524	15,913	15,913	15,913	9,447
R-squared	0.094	0.451	0.448	0.349	0.197
Product fixed effects	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered at country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Constant no reported. SOE: Stated-owned enterprise. Sample for the Ad-valorem import tariff regression is the same as in Table I. Sample for NTM (Non-tariff measures) covers the latest year for each country, which varies across countries depending on data availability: Chile (2018), China (2016), Cote d'Ivoire (2012), Colombia (2018), Ecuador (2018), Ethiopia (2015), Morocco (2016), Mexico (2018), Mauritius (2017), Peru (2018), Paraguay (2018), Senegal (2012), El Salvador (2018) and Uruguay (2018). Average commodity exports as a share of total exports is calculated for the previous five years for each country. The *import-related* NTM measures covers: Chapter A. Sanitary and phytosanitary measures, Chapter B. Technical barriers to trade, Chapter C. Pre-shipment inspection and other formalities, Chapter E. Non-automatic import licensing, quotas, prohibitions, Chapter F. Price-control measures, including additional taxes and charges, Chapter G. Finance measures, Chapter H. Measures affecting competition, Chapter I. Trade-related investment measures. The *export-related* NTM measures covers: Chapter P. Export-related measures. Sample for SOE market regression covers Cote d'Ivoire, Colombia, Gabón, México, Perú, Paraguay, El Salvador, and Uruguay.

Table VII: Regressions of HHI Imports and Commodity Export Intensity on Prices and Consumption Expenditure per capita

	(1)	(2)	(3)	(1)	(2)	(3)
	Relative PPP Price to US (USD), 2011			Expenditure per capita relative to US (USD), 2011		
VARIABLES						
HHI Import (simple average by product), 2010	0.604***			-0.419		
	(0.202)			(0.351)		
Total commodity exports (%) (2006,2010)		0.192**			-0.160	
		(0.0709)			(0.127)	
Food exports % (2006,2010)			0.283**			0.0398
			(0.130)			(0.214)
Ores metal exports % (2006,2010)			0.154**			-0.111
			(0.0709)			(0.143)
Fuel exports % (2006,2010)			0.157			-0.314**
			(0.130)			(0.150)
Log GDP	-0.0185	-0.0192	-0.0154	-0.0670	-0.0524*	-0.0457*
	(0.0298)	(0.0188)	(0.0188)	(0.0518)	(0.0269)	(0.0224)
Log GDPpc	0.143***	0.130***	0.144***	0.253***	0.250***	0.283***
	(0.0241)	(0.0209)	(0.0275)	(0.0341)	(0.0350)	(0.0517)
Observations	2,028	2,262	2,262	1,872	2,088	2,088
R-squared	0.571	0.557	0.559	0.403	0.388	0.389
Product fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered at country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Constant no reported. Sample is restricted to goods, excluding services. Relative PPP Price to US (USD)= $\left(\frac{P_{c,s}}{P_{usa,s}}\right) * (\frac{1}{ER_{c,usa}})$, where ($P_{c,s}$) is price of product s in country c in local currency, $P_{usa,s}$ is price of product s in US in USD and $ER_{c,usa}$ is the nominal exchange rate between country c and US. Product categories from the International Comparison Program differ from the product categories from the Harmonized Systems (HS). Regression sample exclude China, Mexico and Paraguay because there is no available import custom information for 2010.

Online Appendix --- NOT FOR PUBLICATION

Table A1. Alternative Import Market Structure Measures and Commodity Export Intensity

VARIABLES	(1) Share of the largest importer	(2) Highly concentrated product indicator
Total commodity exports (%) (t-1,t-5)	0.0624***	0.0620**
	(0.0212)	(0.0249)
Log GDP	-0.0409***	-0.0412***
	(0.00307)	(0.00363)
Log GDPpc	-0.0346***	-0.0495***
	(0.00749)	(0.00702)
Observations	34,383	33,217
R-squared	0.630	0.246
Product fixed effects	Yes	Yes

Notes: Robust standard errors clustered at country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. No constant reported. Highly concentrated product indicator is a dummy variable that equals 1 if HHI was larger than 2500 and increased more than 200 points in any of the 3 years, based in the US Department of Justice standard (the HHI was calculated in the scale from 0 to 10,000 only for the identification of this variable

Table A2. Regressions of Import Market Structure on Natural Resources Rents

VARIABLES	(1) HHI	(2) Share of the largest importer	(3) Highly concentrated product indicator
Total natural resources rents (% of GDP) (t-1,t-5)	0.263***	0.248***	0.289***
	(0.0611)	(0.0530)	(0.0560)
Log GDP	-0.0436***	-0.0438***	-0.0441***
	(0.00315)	(0.00251)	(0.00266)
Log GDPpc	-0.0406***	-0.0375***	-0.0524***
	(0.00640)	(0.00590)	(0.00510)
Observations	34,383	34,383	33,217
R-squared	0.641	0.632	0.247
Product fixed effects	Yes	Yes	Yes

Notes: Robust standard errors clustered at country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. No constant reported.

Table A3. Regressions of Import Market Structure on Natural Resources Rents, Disaggregated by Commodity Type

	Intermediate		Capital		Consumption		Primary	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	HHI	HHI	HHI	HHI	HHI	HHI	HHI	HHI
Total natural resources rents (% of GDP) (t-1,t-5)	0.275***		0.237***		0.476***		0.114	
	(0.0584)		(0.0786)		(0.0874)		(0.0733)	
Oil rents (% of GDP), (t-1,t-5)		0.308***		0.367***		0.558***		0.146*
		(0.0680)		(0.0585)		(0.0830)		(0.0844)
Natural gas rents (% of GDP), (t-1,t-5)		-0.0687		-0.496		-0.482		1.121
		(1.276)		(0.942)		(1.544)		(0.962)
Coal rents (% of GDP), (t-1,t-5)		-0.261		-0.428		-1.118		0.165
		(0.377)		(0.337)		(0.753)		(0.294)
Forest rents (% of GDP), (t-1,t-5)		0.237		-0.272		0.368		0.0683
		(0.220)		(0.219)		(0.216)		(0.154)
Mineral rents (% of GDP), (t-1,t-5)		0.155		0.202**		0.252*		-0.0143
		(0.0928)		(0.0843)		(0.144)		(0.0753)
Log GDP	-0.0534***	-0.0517***	-0.0156***	-0.0138***	-0.0698***	-0.0656***	-0.0338***	-0.0345***
	(0.00397)	(0.00412)	(0.00339)	(0.00297)	(0.00522)	(0.00596)	(0.00368)	(0.00459)
Log GDPpc	-0.0363***	-0.0365***	-0.0508***	-0.0675***	-0.0475***	-0.0486***	-0.0311***	-0.0317***
	(0.00650)	(0.0122)	(0.00858)	(0.0136)	(0.0124)	(0.0171)	(0.00541)	(0.00747)
Observations	17,943	17,943	8,186	8,186	3,603	3,603	4,328	4,328
R-squared	0.621	0.621	0.541	0.545	0.569	0.571	0.710	0.711
Product fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. No constant reported.