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One more resource curse: Dutch disease and export concentration☆

Dany Bahar[a,b,*], Miguel A. Santos[b,c]

[a] Brookings Institution, USA
[b] Harvard Center for International Development, USA
[c] Instituto de Estudios Superiores de Administración, Venezuela

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ABSTRACT

Economists have long discussed the negative effect of Dutch disease episodes on the non-resource tradable sector as a whole, but little has been said on its impact on the composition of the non-resource export sector. This paper fills this gap by exploring to what extent concentration of a country's non-resource export basket is determined by their exports of natural resources. We present a theoretical framework that shows how upward pressure in wages caused by a resource windfall results in higher export concentration. We then document two robust empirical findings consistent with the theory. First, using data on discovery of oil and gas fields and of commodity prices as sources of exogenous variation, we find that countries with larger shares of natural resources in exports have more concentrated non-resource export baskets. Second, we find capital-intensive exports tend to dominate the export basket of countries prone to Dutch disease episodes.

1. Introduction

The literature on Dutch disease is extensive when it comes to documenting the negative impacts of natural resource exports on non-resource tradable goods as an aggregate (e.g., Corden and Neary, 1982; Corden, 1984; Sachs and Warner, 1995).[1] Little has been said on the impact of natural resources on non-resource export concentration. And yet, different branches of the economic literature have documented the beneficial impacts of export diversification on various grounds (e.g., Imbs and Wacziarg, 2003; Klinger and Lederman, 2004; Hausmann et al., 2007; Hidalgo et al., 2007; Koren and Tenreyro, 2007; Cadot et al., 2011). This study lies at the junction of these two strands of the economic literature, as it explores and documents non-resource export basket concentration in countries suffering Dutch disease episodes.

To explore this question we first describe a theoretical framework of heterogenous firms in two sectors –a labor-intensive one and a capital-intensive one– that models the impact of a resource windfall on export diversification, following the seminal works of Melitz (2003) and of Bernard et al. (2007).[2] In our framework a resource windfall increases domestic expenditure which puts upward pressure on wages, thus affecting the competitiveness of exporting firms particularly in the labor intensive sector. Given that we model each firm as having a different productivity parameter and as exporting a different variety, these dynamics result in a lower set of varieties being exported. A resource windfall thus leads to higher export concentration.

We test these dynamics using international trade data for 128 countries and 27 years. Using this data we estimate the impact of Dutch disease on non-resource export concentration. In particular, we test the impacts of the share of natural resources in exports on a number of non-resource export concentration indexes: Gini coefficient,

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* Corresponding author. 1775 Massachusets Ave, Washington DC 20001, USA.
E-mail address: db21@post.harvard.edu (D. Bahar).

[1] See Lederman and Maloney (2006) for a review of this literature.

[2] Other papers that model the economic implications of Dutch disease in the context of a Melitz (2003) framework are Van der Ploeg and Venables (2013); Beine et al. (2015); Ostenstad and Vermeulen (2016).

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Herfindahl-Hirschman index, the number of active export products or varieties, and the Theil index. The use of the Theil index allows us to explore whether the concentration is occurring more at the extensive margin (numbers of products or varieties exported) or intensive margin (changes in the relative size of already existing products). We use multiple indexes to ensure that our findings are not dependent on the particular way in which export concentration is measured.

We find a consistent and significant positive relation between the share of natural resources in exports and non-resource export concentration: Countries more prone to suffer from Dutch disease tend to have more concentrated non-resource export baskets. In order to deal with endogeneity concerns, we present a number of results that shed light on the causal direction of the relationship. In particular, we make use of data on commodity prices and on discovery of oil and gas fields to instrument for the share of natural resource exports in an economy, and find that a larger share of natural resource exports increases non-resource export concentration. In addition, using a difference-in-differences framework, we also find larger non-resource export concentration occurs in countries experiencing increases in exports of natural resources due to unusual commodity price fluctuations. Our results suggest that countries with roughly one standard deviation in the share of natural resources in total exports above average tend to have higher non-resource export concentration of up to one-half standard deviation measured through the different concentration indexes. This relationship is quite consistent across very different empirical methods used in the paper. We also find that most of the impact on the Theil index is due to changes in the relative size of existing products (the intensive margin), and not due to changes in the closing of product lines (the extensive margin). All in all, we consistently find that these results are predominantly driven by developing countries.

We then dig deeper into the non-resource export basket of countries to test another prediction from the theoretical framework: Labor-intensive varieties are more affected by a resource windfall. To explore this relationship we use export data at the country-product-year level, together with product-level indicators on capital intensity from NBER's productivity dataset (Becker et al., 2013), considering about 600 different non-natural resource products. Our findings indicate that countries prone to suffer from Dutch disease tend to be more concentrated towards capital-intensive export products, as opposed to labor-intensive ones. We also find that this concentration towards capital-intensive goods is non-linear, and responds to a U-shaped curve that depends on the initial level of the overall capital content of the export basket, as measured by sum of product-level capital intensity weighted by each product's share in the export basket. Intuitively, if a country has none to very few capital-intensive products in its export basket, then a resource windfall at first would be correlated with diversification towards capital-intensive products. However, above certain threshold of capital content in the export basket, it is concentration what follows a resource windfall. For the vast majority of the country-year pairs in the sample, however, the capital content of their export basket already stands above this threshold.

Our paper can be framed within the early economic literature studying Dutch disease, a condition likely to show up in resource abundant countries, and can be framed within the literature that evolved after the seminal works by Neary (1982) and Corden and Neary (1982), who discuss the ways through which Dutch disease impacts the economy. Within the context of Dutch disease, our paper also contributes to the literature studying different drivers of export diversification (e.g., Imbs and Wacziarg, 2003; Hausmann et al., 2007; Hidalgo et al., 2007; Cadot et al., 2011; Bahar et al., 2014, 2017; Bahar and Rapoport, 2018).

The paper is organized as follows: Section 2 describes a theoretical framework that links export diversification to Dutch disease dynamics. Section 3 presents the data, and provides some stylized facts. Section 4 contains our regressions at the country-year level and presents results on the positive relationship between larger shares of natural resources in exports and our different measures of non-resource export concentration. These results use a number of different econometric estimation techniques that deal with endogeneity issues. Section 5 looks into another set of predictions from the theoretical framework using data at the country-product-year level, in particular shedding light on dynamics of capital-intensive export products following episodes of Dutch disease. Conclusions and policy implications are presented in Section 6.

2. Theoretical framework

To analyze the impact of a resource windfall, we model a small open economy consisting of two industries, one of which is labor-intensive while the other is capital-intensive. Both industries consist of heterogeneous firms producing differentiated products. Labor in the economy is supplied inelastically and the total supply of labor is fixed. Workers can move at zero cost across firms and across industries but cannot move across countries. Capital, on the other hand, is bought and sold on the world market and firms in the small open economy act as price takers. The only sources of income are wages, rent from capital and an exogenous resource windfall.

Production in both the domestic market and the export market involves the payment of sunk costs which depends on the factor content of production as in Bernard et al. (2007). In addition, firms incur in transport costs on each unit of product sold abroad. As in Melitz (2003), these costs imply that only the most productive firms can afford to export. A resource windfall increases domestic expenditure which, given the fixed labor supply, puts upward pressure on wages as firms try to meet the increased consumer demand. This raises unit costs and leads to a more concentrated export basket because foreign expenditure remains unchanged. Furthermore, because the labor-intensive industry is more sensitive to changes in wages, the effect of a windfall is greater for this industry than for the capital-intensive industry.

2.1. Preferences and demand

As in Bernard et al. (2007), consumers maximize

$$U = \sqrt{C_1 C_2} \tag{1}$$

subject to $P_1C_1 + P_2C_2 \leq Y$. Let L be the fixed supply of labor, let K^H be the domestic supply of capital, w be wage payments to labor, and r be the rental rate of capital. National income Y is the sum of total labor income, total capital income, and an exogenous windfall Z and is given by $Y = wL + rK^H + Z$. The values C_1 and C_2 are industry-level aggregates of output from individual firms. Formally,

$$C_i = \left(\int_{\omega \in \Omega_i} q(\omega)^{\frac{\sigma-1}{\sigma}} d\omega \right)^{\frac{\sigma}{\sigma-1}} \tag{2}$$

for $i \in \{1, 2\}$ where Ω_i represents the set of varieties produced in industry i, $q(\omega)$ is the quantity of variety ω produced, and $\sigma > 1$. The utility function (1) implies that a constant share of income will be spent in each industry. Expenditure on industry i is therefore given by $E_i = Y/2$. Using the aggregator (2) yields the demand function

$$q_i(\omega) = E_i P_i^{\sigma-1} p_i(\omega)^{-\sigma} \tag{3}$$

where $P_i \equiv \left(\int_{\omega \in \Omega_i} p(\omega)^{1-\sigma} \right)^{\frac{1}{1-\sigma}}$ is an industry-level price index.

2.2. Production

Firms in each industry i use labor (l) and capital (k) in fixed-proportions with production given by:

$$q_i(l, k; \phi) = \phi \min \left[\frac{l}{\beta_i}, \frac{k}{1 - \beta_i} \right]$$

Furthermore, as in Bernard et al. (2007) and Ostenstad and Vermeulen (2016), firms pay a fixed cost that depends on factor intensity. Let f_j rep-