



# The effect of technological intensity of exports on the economic growth of Brazilian microregions: A spatial analysis with panel data<sup>☆</sup>

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## Abstract

The objective of this study was to analyze empirically the effects of exports segmented into technological levels on the economic growth of Brazilian microregions during the period 2000–2010 in light of the Crespo-Cuaresma and Wörz's (2005) model. The hypothesis is that exports increase economic growth due to the productivity differential existing between the exporting and non exporting sectors and the positive externality generated by the exporting in the non exporting sector. Theoretically, the higher technology the exported goods have, the stronger these effects are. By classifying the exports into technological levels and estimating the empirical model using the spatial data panel technique, with fixed effect, the two central hypotheses in the Crespo-Cuaresma and Wörz's (2005) model were validated, with a productivity differential in all exporting segments, and also with a subsequent effect of externalities on the economic dynamism. This effect might go beyond territorial limits mainly when the goods exported belong to the low and mid-low technology industry. Also, a differentiated effect was observed regarding the external insertion in the economic growth of the regions with high exports vs. those with low participation in the international trade. In the former, the most intense indirect effect is mainly related to products with higher aggregated value, while in the latter more effects are seen mainly linked to the exportation of non-industrial products.

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## Resumo

o objetivo do presente trabalho é analisar empiricamente os efeitos das exportações segmentadas por níveis tecnológicos sobre o crescimento econômico das microrregiões brasileiras, durante o período de 2000–2010, à luz do modelo de Crespo-Cuaresma e Wörz (2005). A hipótese é de que as exportações aumentam o crescimento econômico em virtude do diferencial de produtividade existente entre o setor exportador e não exportador e pela externalidade positiva gerada pelo setor exportador sobre o setor não exportador. Teoricamente, esses efeitos são maiores quanto mais intensivo em tecnologia são os bens exportados. Classificando as exportações em níveis tecnológicos e estimando o modelo empírico pela técnica de painel de dados espacial, com efeito fixo, as duas hipóteses centrais do modelo de Crespo-Cuaresma e Wörz (2005) foram validadas, com um diferencial de produtividade em todos os segmentos exportadores, tendo, também, um efeito subsequente das externalidades no dinamismo econômico, efeito este que pode ultrapassar os limites territoriais especialmente quando se tem a exportação de bens da indústria de baixa e média baixa

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tecnologia. Ademais, se constatou um efeito diferenciado da inserção externa no crescimento econômico das regiões com elevada exportação versus as que tem baixa participação no comércio internacional. Para as primeiras, o efeito indireto mais intenso se dá especialmente para os produtos de maior valor agregado, enquanto que para regiões com baixa inserção externa os efeitos superiores se dão principalmente para a exportação dos produtos não industriais.

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*Palavras-chave:* Crescimento econômico; Exportações; Intensidade tecnológica; Microrregiões

## 1. Introduction

There is a vast number of works in the literature, both theoretical and empirical, showing that exports are one of the economic growth conditions in a country or region (Balassa, 1978, 1985; Feder, 1982; Salvatore and Hatcher, 1991; Crespo-Cuaresma and Wörz, 2005).

The positive effects of exports on the growth can be divided into two paths: the direct or the indirect effect. Direct effects occur because exports are one component of the Gross Internal Product of a country; therefore, an increase in exports is followed by increase in the product (Balassa, 1978). While the indirect effects are harder to be seen, since they derive from the positive effects on the economy of scale, use capability growth and productivity gains, among others (Feder, 1982; Crespo-Cuaresma and Wörz, 2005).

An important issue to be considered, and which is debated in literature, refers to the fact that the exports effect on the economic growth might be distinct, depending on the composition of the exporting agenda. The hypothesis tested in the empirical literature is that exporting more sophisticated products promotes higher product growth than exporting less sophisticated products. The explanation for that is that the production of these goods has higher potential to generate economies of scale, productivity gains and knowledge (Crespo-Cuaresma and Wörz, 2005).

The view that the composition of the exports agenda creates distinct trajectories for the economic growth is defended by Hausmann et al. (2007, p. 2). For these authors “... countries that specialize in the types of goods that rich countries export are likely to grow faster than countries that specialize in other goods”. In an attempt to confirm empirically this statement, the authors built an index of exports productivity and, later on, correlated it to the economic growth of countries. The authors found evidence that the economic growth is influenced by the composition of the exports agenda, and the high productivity (more sophisticated) exports are associated to higher economic growth rates.

Developing the same line of thought, Crespo-Cuaresma and Wörz (2005) evaluated the indirect effects of exports on the economic growth, taking as a differential the disaggregation of exports considering the technological intensity of the exported products, classifying them into: non-manufactured products, low technology manufactured products and high technology manufactured products. The data used by the authors was collected from 45 countries in the period between 1981 and 1997. In the aggregated analysis, among other results, the authors verified that the productivity of the low technology sector was lower than that of the domestic sector, and the opposite occurred in the high technology sector. Regarding the externality effect, the results were not significant. Next, those authors re-evaluated the estimates considering two sampling groups, OECD (Organization for Economic Cooperation and Development) countries and non OECD countries. The new results showed that the productivity differential previously observed remained only for the non OECD countries and, once more, the exports sector externality effects were not observed in the economy. Therefore, a general conclusion of this study was that indirect effects of exports on growth resulted from the productivity differential existing between the exports and the non exports sectors, rather than externality; moreover, the productivity differential was higher in countries that did not belong to the OECD.

Supported by recent literature, this study aimed at evaluating the effects of the composition of the exports agenda of Brazilian microregions on their economic growth rates. More specifically, it proposes to disaggregate the Brazilian microregion exports into non industrial, low technology, medium technology and high technology products and to analyze how the exportation of this kind of products influences the economic growth rate. The hypothesis guiding this study is that more sophisticated products have higher influence on the economic growth than less sophisticated ones in light of the Cuaresma and Wörz's (2005) theoretical model.

It seems important to highlight that the innovation sought by this study is not based on theoretical advances or techniques to estimate the empirical model, but rather on the object of analysis, namely the Brazilian microregions. The choice for this geographical focus is mainly motivated by the intention to consider the local heterogeneities in the

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