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# Who really benefits from export processing zones? Evidence from Nicaraguan municipalities☆

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## HIGHLIGHTS

- Increase in average levels of expenditure per capita of about 10% overall
- Positive average effects hide large variations across the expenditure distribution.
- Main beneficiaries of policy are at the top of the distribution in treated areas.
- Heterogeneous time dynamics for the rest of the segments
- Bulk is concentrated on the high skill working age group, suggesting skill premium.

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## ABSTRACT

Export processing zones are popular trade policies in developing countries, but there is limited empirical evidence on their local effects. This paper examines the impact of their establishment on the levels of per capita expenditure across Nicaraguan municipalities for the period 1993 to 2009. Using the time and cross-section variation of park openings in a difference-in-differences framework, I find that on average consumption levels increased by 10 to 12% in treated municipalities. Yet, average effects mask significant disparities across the expenditure distribution. The results suggest that the policy benefited the upper-tail the most: expenditure levels increased by up to 25% at the 90th percentile. At the opposite of the distribution, only the bottom decile registered a small positive effect of close to 10% across the period.

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## 1. Introduction

The use of Export Processing Zones (EPZs)[1] as a policy for trade and economic development has exponentially grown in the past decades, particularly in developing countries. In 1986, the International Labour

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[1] When discussing EPZs, a variety of terminologies, such as Industrial Free Zones, Free Trade Zones, Special Economic Zones and Maquiladoras are used interchangeably in the literature. Although each has their own particularity, we will consider the broad definition of them being "demarcated geographic areas contained within a country's national boundaries where the rules of business are different from those that prevail in the national territory. These differential rules principally deal with investment conditions, international trade and customs, taxation, and the regulatory environment; whereby the zone is given a business environment that is intended to be more liberal from a policy perspective and more effective from an administrative perspective than that of the national territory" (Farole and Akinci, 2011:23).

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Organization (ILO) estimated that there were 176 zones in 47 countries. By 2008, the number reached more than 3000 zones in 135 countries, accounting for over 40 million direct jobs and over US$200 billion in global exports (Farole and Akinci, 2011). Despite the importance of the phenomenon, there is surprisingly little empirical evidence for evaluating these programmes in the context of developing countries.[2] Further, the focus has remained on aggregate and traditional outcomes (FDI, exports, firm dynamics), and little attention has been paid to understanding the welfare and distributional effects resulting from the establishment of EPZs.

To fill this gap this study takes advantage of the gradual establishment of EPZs in Nicaraguan municipalities during the period 1993–2009 to assess the average effect and the distributional pattern of this spatially-bound policy within the host municipalities. Nicaragua provides an excellent setting to study this phenomenon. The number of firms operating under the regime has increased markedly since its inception in the early 1990s, across more than 20 of the 153 municipalities of the country. By 2010, EPZs accounted for 50% of total exports, and nearly 90% of manufacturing exports. The government considers that in the same year, EPZs jobs represented 25% of total formal work across the country, with on average firms directly employing around 7.5% of the total labour force of the municipalities where they locate.[3] Yet, no empirical assessment exists.

While having a wider reach than traditional place-based policies (i.e. diversify exports, increase FDI), EPZ programmes are prone to have a significant influence on the local economies (Wang, 2013) as they operate with incentives to hire and create economic activity in or near the areas where they locate fostering agglomeration economies (Combes et al., 2010). In this sense, local welfare effects might differ substantially from those at the aggregate level, particularly in cases with labour market frictions. Labour mobility and land-price responses may be such that the jobs created go to non-poor residents and that the gains from land prices benefit higher-income segments (Neumark and Simpson, 2014). As stressed by Kline and Moretti (2014) and shown by Reynolds and Rohlin (2015) for the case of US federal empowerment zones, positive average effects of spatially-tied policies can mask significant disparities in terms of the actual beneficiaries across the income distribution in treated areas. There are heterogeneous effects according to whether individuals are homeowners or renters, or more generally by skill and initial income levels, that are not necessarily captured by looking at the average effect on local wages (Neumark and Simpson, 2014). In this sense, disentangling in what way the establishment of an EPZ profits the different segments of the income distribution within concerned areas helps to shed light on the mechanisms of the policy and ultimate local beneficiaries. The question is of great policy relevance in developing economies with already large levels of overall income disparities.

For the analysis here, I exploit a repeated cross-sectional dataset based on official household surveys and construct a unique municipal-level panel that allows for the examination of different moments of the expenditure distribution before and after the policy implementation. By focusing on the aggregate outcomes at the municipal level and on household per capita expenditures, the study captures general equilibrium effects of EPZ establishment within a locality.[4] The identification strategy is straightforward. I use both the time and cross-section variation of zones' establishment across municipalities to estimate their average effect on the levels of real expenditure per capita of working age individuals, and across all the deciles of the expenditure distribution in treated municipalities. In the main approach, I use a difference-in-differences (DID) strategy extended to quantiles (Athey and Imbens, 2006). An important feature of the overall empirical strategy needs to be emphasized. The approach does not aim at measuring the impact of the EPZ policy on inequality across Nicaragua as a whole. Rather, it looks at the question of knowing whether within municipalities exposed to the establishment of EPZs, certain segments of the distribution capture more or less of the resulting gains or losses.

This analysis builds on two complementary bodies of research. Mostly, it borrows from the large literature that has looked at evaluating place-based programmes in the US and Europe (Busso et al., 2013; Neumark and Kolko, 2010), and adds to the nascent counterpart studying the impact of EPZ policies at the subnational level in developing countries. Findings in these papers are revealing of the extent to which local economies are influenced by the establishment of an exporting zone. Using employment data and census statistics on educational outcomes at the municipal-level for Mexico, Atkin (2012) finds an increase in school dropouts in concerned municipalities following the arrival of new better-paying export jobs. Similar in strategy to this paper, Wang (2013) shows that Chinese Special Economic Zones (SEZ) benefit local economies through higher levels and growth rates of per capita FDI and total factor productivity (TFP), as well as higher average wages that compensate any increase in the local cost of living. Additionally, this paper adds empirical evidence to the literature analysing the effects of trade policies on local labour markets in developing countries. This area of research has emphasized the importance of understanding the impact of trade policies at the local level, particularly in cases of limited factor mobility (see Goldberg and Pavcnik, 2007 for an extensive review).

The validity of my findings rely on the assumption that the different empirical methods successfully account for the underlying differences in municipalities' characteristics that are likely to explain the non-random choice of EPZs location across time and space. In the absence of a credible instrument, I take care of unobservable confounders by allowing for time and municipalities fixed-effects across specifications. I also include province and region-time dummies to control in a flexible manner for the fact that EPZs concentrate in the western part of the country. Further, I use information on accessibility and socio-economic indicators to build alternative sets of control municipalities that are likely to be more meaningful comparable groups under the DID setting. My preferred control group is balanced on covariates and pre-treatment trends of outcomes, and the assumption of parallel trends of main outcomes holds.

Further threats to validity concern possible spillover dynamics and the relocation of individuals across treated and control areas. I address these concerns in several ways. First, I test for the existence of spillovers on the outcomes variables of neighbouring areas using varying degrees of distance. I find no evidence supporting large firm relocations or commuting flows. This is consistent with the literature registering small backward linkages generated by EPZ policies, and the low commuting of the Nicaraguan labour force (Jansen et al., 2007). The potential threat from labour mobility is harder to address. There are two dimensions to consider: in and out-migration. Both may have compositional effects that may alter firms location decisions (related on skills and local wages effects) as well as outcomes. Reassuringly, I find no evidence of large population readjustments across municipalities when measuring the effect of the policy on the likelihood of migrating for the working-age sample. Results are also unchanged when adding baseline population weights. Although, I find evidence of compositional changes towards an increase in the share of the high-to-low skill ratios in treated municipalities, the size is too small to challenge the identification validity, and if anything, contributes to elucidating the mechanisms of the policy. Finally, the results are also robust when excluding the capital city and municipality of Managua.

[2] Aside notable exceptions, the literature is limited to case studies and macro-economic reviews. See Farole and Akinci, 2011; Engman et al., 2007; Aggarwal, 2006 and Glick and Roubaud, 2006, for recent examples.

[3] Data obtained from the Comisión Nacional de Zonas Francas (CNZF) and Nicaragua's Central Bank (BCN).

[4] In the absence of disaggregated property prices and firm-level data, using expenditure data remains the best strategy to capture the net effect of EPZ establishment. A similar strategy was used by Topalova (2010) to measure the local effect of trade liberalization within Indian districts.

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