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The 'local economy' effect of social transfers: An empirical analysis of the local growth impact of the *Bolsa Família* Programme in the Brazilian *Nordeste*

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L'effet des transferts sociaux sur les économies locales: une analyse de l'impact du programme *Bolsa Familia* sur la croissance économique locale dans le Nordeste brésilien

Résumé

Les impacts des transferts conditionnels sur les structures de production locales ont rarement été analysés bien qu'ils conditionnent les perspectives de croissance économique future et de génération de revenus. Cet article analyse les impacts des transferts conditionnels sur la structure de la production et sur la croissance économique au niveau municipal. Nous commençons par montrer que l'impact de la croissance locale des transferts sociaux peut varier selon le type de changement des structures productives locales impulsé par les revenus supplémentaires dans le cadre d'un modèle illustratif de multiplicateur de demande avec deux types de municipalités. Il est également souligné que certaines de ces trajectoires pouvant conduire à la formation d'un piège de redistribution qui pourrait menacer à terme l'efficacité du programme pour les économies locales les moins productives. Puis, en utilisant un ensemble de données originales qui mélangent des informations sur les structures productives, les déterminants de croissance et les transferts de Bolsa Familia (BFP) pour les 184 municipalités de l'État brésilien du Ceará entre 2003 et 2010, nous constatons que bien que les transferts aient eu un effet positif global sur la croissance des municipalités, ils ont également exercé un impact indirect négatif en orientant la production locale vers les services et l'informalité. Bien que nous ne puissions trouver de support empirique pour l'hypothèse d'un piège de redistribution, puisque nous constatons un effet positif des transferts sur le développement des activités de transformation dans les municipalités ayant des capacités industrielles initiales limitées, nos estimations indiquent qu'en moyenne, l'effet de la BFP aurait pu être deux fois plus important, en l'absence de l'impact négatif des transferts sociaux sur la transformation structurelle. En outre, nous expliquons qu'en favorisant les activités de services et informelles, y compris dans les industries de fabrication légère, le BFP pourrait poser un problème éventuel de qualité des emplois à l'avenir si des politiques supplémentaires favorisant le développement productif local ne sont pas associées aux transferts sociaux.

Mots-clés: Transferts conditionnels en espèces; Programme *Bolsa Familia*; Structure productive; Municipalités; Croissance économique locale; Brésil

The 'local economy' effect of social transfers: A municipality-level analysis of the local growth impact of the *Bolsa Familia* Programme in the Brazilian *Nordeste*

Abstract

This paper analyses the various impacts of Conditional social transfers (CCTs) on the structure of production and economic growth at municipal level. CCTs impacts on local productive structures have seldom been analysed, although they condition prospects of future economic growth and income generation. We first develop a simple illustrative demand multiplier model with two types of municipalities to illustrate that social transfers' local growth impact may vary with the pattern of local productive structure change, some patterns eventually driving the formation of a redistribution trap for the least productive local economies which could well threaten the economic inclusion long-term outlook of the programme. By using an original dataset mixing up information on productive structures, growth determinants and Bolsa Familia (BFP) transfers for the 184 municipalities of the Brazilian state of Ceará between 2003 and 2010, we then find that although transfers had an overall positive effect on municipalities' local economic growth, they also exerted a negative indirect growth impact by orienting local production toward services and informality. Although we could not find support for the hypothesis of a redistribution trap, since we find a positive effect of transfers on the development of transformation industries in municipalities with limited initial industrial capacities, our estimations indicate that, on average, the growth impact of the Bolsa Familia programme could have been two times bigger, absent the adverse impact of social transfers on structural transformation. In addition, we explain that, by promoting services and informal occupations, including in light manufacturing industries, the BFP might cause a possible problem of quality of jobs in the future if additional policies promoting local productive development are not associated to social transfers.

Keywords: Conditional Cash Transfers; *Bolsa Familia* Programme ; Productive structure ; Municipalities ; Local economic growth ; Brazil

JEL: H55; J46; O14; O17; O47

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1. Introduction

Over recent years, conditional cash transfers (CCTs) have become a strategic tool of anti-poverty and social inclusion policies in many developing countries. Beyond their well documented positive effects on poverty alleviation for direct beneficiaries, CCTs may also bring about positive effects for non-beneficiaries, through the demand-side impact of additional revenue availability in poor local economies (Taylor et al., 2005; Barrientos, 2012). By enhancing opportunities for strategic complementarities between individual investments in the medium run (Alderman and Yemstov, 2014), social transfers may also increase expected investment return for both beneficiaries and non-beneficiaries and convey supply-side impacts through local production and employment opportunities in the medium run[1]. 'Local economy' impact of social transfers have started being documented only recently, with few recent studies evoking a demand multiplier mechanism prompted by state-transferred additional revenues (Taylor, 2012; Alderman and Yemtsov, 2014; Taylor and Filipsky, 2014). Yet, empirical evidence remains scarce on this important issue, notably in regard with what we should call the supply-side impact of social transfers on productive structures.

In Brazil, the *Bolsa Família* programme (hereafter BFP)[2], clustering formerly existing and independent targeted redistributive programmes and covering millions of households, was introduced in 2003 and has meaningfully contributed to alleviating poverty and extreme poverty for their beneficiaries during the past 15 years (Soares et al., 2010; Silveira Neto and Azzoni, 2011, Lustosa and Fauré, 2013; Limoeiro, 2015). Still, compared to other federal transfer programmes, like the *Benefício de Prestação Continuada* (PBC) targeting old age and disabled persons, the BFP is also considered as being particularly strategic in sustaining local growth since families and women receiving BFP benefits are likely to consume and invest more out of social transfers than old-aged and disabled individuals[3]. By supporting local consumption increase in weakly productive areas, however, social transfers are also suspected to have prompted the formation of 'consumption economies without production', as put forward by Araújo and Lima (2009)[4]. In local economies poorly endowed in transformation industries, pure consumption economies may have thrived (Maia Gomes, 2001), additional local demand out of transfers increasing consumption good's importation and orienting local investment essentially toward lightly formalized and productive retail and service

[1] Substantial improvements in asset holdings among beneficiaries of social transfer programs have been measured by empirical studies. In a recent evaluation of the Mexican *Opportunidades* programme, Gertler et al. (2012) find that beneficiary households invested 26% of their transfer principally in productive farm assets, such as farm animals and land for agricultural production, and in start-up investment in nonagricultural micro-enterprises producing handcraft for sale. Ferrario, (2014)'s estimations for the BFP are fairly different since they report that monetary transfers are essentially consumed (87% according to MDS figures) in such priority goods as food and in education ustensils representing investment in human capital and not in productive investment. For an analysis of *Bolsa Familia* Programme (BFP)'s labour impact, see Machado et al. (2011).

[2] The BFP is a typical conditional cash transfer scheme aimed at reducing poverty and inequality through the provision of a minimum level of income to extremely poor families. The programme also aims at breaking the inter-generational transmission of poverty by conditioning these transfers on beneficiary compliance with sound human capital requirements such as school attendance, vaccines, pre-natal visits (Lindert et al. 2007).

[3] Both benefits have increased rapidly during the last decade. In Ceará, the monthly average BFP individual benefit increased from 66 to 145 *reals* between 2004 and 2012 while BPC's simultaneously increased from 151 reals to 620 reals (IPEA). Although BPC's individual benefits are larger, their multiplier effect on local economies might be undermined by the lower number of beneficiaries (only 203,066 for theBPC against 1,107,009 for the BFP in 2012).

[4] Relying on simple descriptive statistics, Santos Tupy et al. (2013) have for example documented that the *Bolsa Família* had no impact in the secondary sector or in the field of formal employment in *Minas Gerais* for the period 2004-2009.

activities, while formal and genuinely productive transformation activities were increasingly polarized in a limited number of regional or national 'industrial' centres.

Because of the adverse dynamics of local economic structures, the local growth effect of social transfers might be consequently magnified in productive and exporting regions, while being conversely depressed elsewhere. Further, the indirect impact of social transfers impact on structural transformation could have driven to the formation of local redistribution traps in which more transfers would increase local economy's future dependence of transfers through distorting local economic structures in initially poorly industrialized localities. Were it to intensify, this spatial dualism would leave the municipalities that are the most dependent on transfers without any resource if transfers were to diminish in the future.

Although they point to a possible medium-run adverse effect of CCTs, all these assessments are essentially based on intuitive evidence or simple descriptive statistics and the impact of the BFP on local productive structures has never been rigorously investigated. The present paper addresses this gap by assessing the 'local economy' effects running through productive structures for the municipalities of Ceará, one of the North-eastern states of Brazil. By estimating the reduced form of a local growth model and by addressing reverse causality and spatial correlation issues, we find evidence over the 2000-2010 period supporting the assumption of a positive growth multiplier effect of conditional cash transfers in Ceará, the average additional GDP growth generated by the BFP being estimated to 2 percentage points over the period under study. Yet, the estimation of a structural model of local growth including the impact of social transfers on productive structures, shows that the overall impact of the BFP on growth was reduced by a second-order tendency of the social transfers to foster services and informal activities over manufacturing. Our estimations indicate that the overall local growth effect of BFP transfers over the medium run (6-7 years) could have been two times bigger, absent the adverse supply-side impact of social transfers on structural transformation. Lastly, we have checked that the BFP impacts on productive structure were non-linear across the distribution of municipal initial productive capacities, since, against all odds, the adverse impact on productive structure described above tends to be stronger for the most productive municipalities where industrialization has actually stagnated during the period while it was on the contrary stimulated for the municipalities that were initially the most lightly industrialized.

To our knowledge, the indirect channel of social transfer's impact on local growth, running through the structural change impact of transfers, has not been empirically documented, in Brazil or elsewhere. Although abundant, the literature on the effects of conditional cash transfers (CCTs) has essentially focused on microeconomic impacts at individual or household levels[5] and tended to disregard the growth effect of social transfers at the village level (Barrientos, 2012). One exception is the local economy-wide impact evaluation (LEWIE) designed to capture the full impact of governmental programmes by using village-level structural economic models based on social accounting matrixes to assess local economic multipliers of cash transfers in various national settings (Taylor *et al.*, 2005; Filipski and Taylor, 2012; Taylor et al., 2012)[6]. These analyses are based on simulations from local general equilibrium models, sometimes – albeit not always – calibrated through microeconomic estimations[7]. Although these studies simulate what should happen and not, the present paper investigates what has effectively happened, that is whether social transfers have, or not, spurred local economic growth in the context of a poor state in Brazil.

Closer to our approach, Barrientos and Sabatés-Wheeler (2009) and Angelucci and De Giorgi (2009) have evaluated the effects of CCTs on non-beneficiaries at the village level, although without

[5] For an overview of the microeconomic impacts of CCTs, see Fiszbein and Schady (2009).

[6] Local goods and labor market linkages may transmit the transfer's impacts from the beneficiary household to others inside and outside the local economy, including households not eligible for the transfer. *Local general equilibrium* (LGE) effects therefore depend on the local availability of factors and on the inter-sectoral linkages, with no local supply response arising in some extreme cases.

[7] Validation is a major concern in LGE modelling since the LEWIE model parameters are econometrically estimated and Monte Carlo methods are used to perform significance tests and construct confidence intervals around project impact simulation results (Taylor, 2012).

addressing the local growth effect of social transfers[8]. By matching the coverage of social transfers with economic activity through localized luminosity information, Vila (2014) finds that the Colombian *Familias en Accion* programme had a positive effect on GDP growth at the community level between 2000 and 2004. Although this approach enables addressing reverse causality issues, it does not permit to investigate the channels through which social transfers may alter or bolster the local potential for growth.

Our approach is therefore original and contributes to filling a gap in the emerging literature on local economy effects of social transfers. Addressing the productive impact of the BFP is not at odds with the basic goal of social transfers which is to reduce extreme poverty and vulnerability. Social programmes are not isolated from other policies geared toward different and complementary objectives. Their effects can therefore be evaluated with reference to other policies' goals. This is especially true if the adverse secondary outcomes of a priority policy need to be relieved or counterbalanced by other policies. We argue in the section 6's discussion of our findings' policy relevance that it is meaningful to emancipate ourselves from the narrow focus of the BFP evaluation in order to explore the ways and means by which this sustainable emancipation could be ensured through the sustained change of local economic structures.

The rest of the paper is organized as follows. Section 2 motivates the issue dealt by the paper in the context of *Ceará* and with reference to theory, then section 3 proceeds by discussing our empirical strategy before our results are presented in Sections 4 and 5. Section 6 discusses the knowledge and policy issues of our results before section 7 concludes.

2. Social transfer's local economy effect, 'economies without production' and the redistribution trap: Elements of theory

Social transfers need not necessarily have solely positive impacts on local GDP growth. Indeed, the same amount of social transfers may have heterogeneous impacts on local growth in municipalities featuring different local structural features[9]. The interaction of beneficiaries' consumption and of both beneficiaries and non-beneficiaries' subsequent investment can shift the local economic structure in various directions, conditional on initial conditions of production. In local economies without transformation industries, the local demand multiplier effect of social transfers might prompt the importation of consumption goods and investment in local, generally weakly formalized and productive, retail and service businesses that will not provide a strong support for future growth. Today, most consumption goods imported by economies with poor productive capacities are sourced from more industrialized Brazilian areas where a significant portion of the social transfers' multiplier effects is actually transferred. Consequently, the local growth multiplier effect of social transfers might be magnified in locations initially endowed with transformation industries, while it might conversely be depressed in poorly industrialized localities featuring high importation propensities. Such an unintended and indirect outcome of redistribution might prove

[8] Both evaluations have reported an increase in consumption and productive assets among non-beneficiary households in treatment areas compared to non-beneficiaries in control areas for the *Oppordunidades* (Angelucci and De Giorgi, 2009) and *Progressa* programmes (Barrientos and Sabates-Wheeler, 2011).

[9] According to Barrientos (2012), the existence and magnitude of the growth effects of transfers are also conditioned by local conditions, like liquidity constraints or thresholds in accumulation and work capacity, generating non-linearities in the dynamics of consumption and production at the household level. Moreover, when the local design and implementation of transfers are driven by political motivation, their impact on local productive capacities may be altered. Politicians purchasing political support through targeted transfers may, for exemple, trade social benefits off against the provision of broader public services on which poor people would rely, with potentially adverse effects on local economic growth (Khemani, 2015). Although similar features have been observed by De Janvry et al. (2012), Cavalcante and Uderman (2009) or Gomes and Vergolino (2010) in the case of Brazil, where local governments actually dispose of a margin of action in the delivering of social benefits, this assumption will not be tested in the present paper.

problematic in the long run if it undermines the capacity of poorer localities to provide labor market income in substitution to social transfers.

In order to clearly set up these mechanisms, this section presents a simple local demand multiplier model illustrating (1) the impact of social transfers on local economic growth, and (2) the possibility that a redistribution trap and spatial inequality would be triggered by the impact of social transfers on the dynamics of local productive capacities.

Let Y_{it} be the overall income of municipality *i* at time *t*, and C_{it}, I_{it}, G_{it}, H_{it} and M_{it} stand respectively for the overall level of final good consumption, the private investment, the amount of local public spending, the municipality's export and the municipality's import at time *t.* Export can go to other municipalities, in the same or in another state, or be sold abroad. Symmetrically, imports come from other Brazilian municipalities or from abroad. Since social transfers are integrally financed through federal transfers, they are treated as exogenous to municipality's fiscal resources and set to ST_0. For the sake of simplicity, local taxes equal local public spending, so that the impact of other government interventions local economic growth is neutralized, and there is no demand spillover across nearby municipalities.

The accounting identity is defined for each municipality *i* and year *t* as:

$$Y_{it} = C_{it} + I_{it} + G_{it} + H_{it} - M_{it} \quad (1)$$

with C and I being possibly dynamically positively related by the way of the multiplier (I to C) and accelerator (C to I) mechanisms (Khan, 1931) over the subsequent period τ. Let assume, in a standard fashion, that municipality *i*'s households consume integrally social transfers ST_{it} in addition to market income Y_{it} as in equation (2), with a portion *m* of the income being imported as in equation (3):

$$C_{it} = c(Y_{it} + ST_{it}) \quad (2)$$

and $$M_{it} = m(Y_{it} + ST_{it}) \quad (3)$$

The municipality's consumption and imports therefore proportionally increase with all sources of contemporaneous incomes, with the consumption and import propensity *c* and *m* being comprised between 0 and 1. Assuming exports H_i, and investment I_i constant and exogenously defined in the short term, and no additional transfers ST_i during the subsequent period τ, and substituting (2) and (3) into (1), the equilibrium level of local income after T years can be re-written after simple algebraic transformation as:

$$Y_{i,t+\tau} = \frac{c-m}{1-c+m}\left(ST_{i,t} + I_{i,t} + H_{i,t}\right) \quad (4)$$

An exogenous increase of social transfers $\partial ST_{i,t}$ in year *t*, with the other parameters being constant, would consequently increase local GDP by $\gamma_{i,\tau} \times \partial ST_{i,t}$ after τ years, with the demand multiplier defined as:

$$\gamma_{i,t+\tau} = \frac{c-m}{1-c+m} \quad (5)$$

From equation 5, we can see that the lower the propensity to consume and the higher the propensity to import, the lower the magnitude of the growth multiplier $\gamma_{i,t+\tau}$. Put differently, if we compare the demand multipliers γ_l and γ_h of two municipalities *l* and *h*, the former being lightly productive in basic manufactured consumption goods while the latter is highly productive, we can draw from (5) that, all other things being set equal, $\gamma_l > \gamma_h$. In the short run, propensities *m* and *c* are constant and the level of the local demand multiplier effect is pretty stable for each type of municipality.

In the longer run, though, the recurrence of social transfers could well progressively modify the economy's behavioral parameters and, consequently, the value of the demand multiplier γ. The

latter may change as a consequence of a modification of the consumption propensity *c* after a reduction of income and trade risks, locally, and/or as the result of a variation of the average import propensity *m* prompted by the detrimental effect of social transfer on local productive capacities. Although there is no theoretical reason to expect that the parameter *c* could evolve differently in *l*-type and *h*-type municipalities, it can reasonably be expected that the second parameter, *m*, may show two opposite patterns of change in the two types of municipalities. If the additional demand bolstered by social transfers has a positive supply-side impact on local production in the *h*-type municipality, then m_h might decrease and γ_h might progressively increase over time. Conversely, if the additional demand out of social transfers has a neutral or negative supply-side impact on local productive capacities in the *l-type* municipality, notably by diverting investment from production to import and trade, then m_l will increase and γ_l will decrease over the long run[10]. The long run impact of social transfers through the demand multiplier effect is therefore fairly uncertain since the value of γ may be both increased and lessened by changes of local propensities to consume and import which come along with social transfers, depending on the municipal initial conditions. In *l*-type local economies, increased average consumption might stimulate trade in imported goods, with only weak impact on local production capacities, while the reverse patterns will be observed in *h*-type municipalities[11].

Furthermore, in a dynamic set-up, subsequent waves of social transfers might bring about decreasing demand multiplier effects γ_l in lightly productive municipalities and increasing demand effects multiplier effects in initially highly productive ones γ_h. Thus, we can expect that, without additional policy intervention supporting the supply side of weakly productive local economies, local rise in income and consumption may shift productive investment towards trade and other service activities, mostly informal and low-sized, that may eventually crowd out investment in light manufacturing or in the transformation industries competing with imports[12]. This pattern might eventually reduce the capacity to produce consumption goods locally, therefore further increasing *m* and depressing the demand multiplier value γ in local economies strongly and increasingly dependent on social transfers. Local economies of a *l*-type may therefore progressively transform into consumer-based economies with low and potentially decreasing potential for added value creation, and therefore modest GDP growth when compared to *h*-type ones where local productive capacities can match local demand increase. In the longer run, these opposite patterns may eventually increase the dependence to transfers in the most vulnerable *l*-type areas, while reducing it in the least vulnerable ones. This process could even prompt the formation of redistribution traps in the most dependent-to-transfer regions where current redistribution could considerably increase the need for further redistribution in the future by distorting local economic capacities toward poorly productive activities[13].

From this theoretical illustration, we can draw two main hypotheses to be tested in the remaining of the paper. First, the BFP transfers might increase local GDP growth by combining both

[10] The likelihood that long run effects could also go through labor market where BFP may create a reservation wage that is higher than the prevailing wage is limited in Brazil by the large gap between the monthly average BFP benefit (170 reals in 2014) and minimum wage (724 reals).

[11] It is worth being noted that this gap will be even larger if municipality *h* is net exporter of consumption goods to *w*.

[12] Economic geography has shown that investment tends to be spatially concentrated in the absence of – or for modest – transport and transaction costs, as in the case of domestic trade (Krugman, 1991; Fujita et al., 1999). For evidence of industrial concentration in Brazil, see Ferreira and Facchini (2005).

[13] A simple multiple equilibrium model could be conveniently used to illustrate how the structural impact of social transfers could attract local economies in a low-level redistribution trap or a high-level productive equilibrium according to initial conditions regarding productive structure and propensity to import, with constantly declining import propensities increasing the social transfer's multiplier magnitude in *h*-type municipalities, until they reach a stable low-import-strong-multiplier equilibrium, while constantly increasing import propensities depressing the social transfer's multiplier magnitude would attract *l*-type municipalities in a stable high-import-weak-multiplier equilibrium.

demand effect, running through the Keynesian multiplier, and supply side effects, running through changes in local productive structures. Second, supply side effects running through changes in local productive structures might condition the future evolution of the local economy effect of the BFP. Our paper focuses on the first assumption. Testing the second would require more time perspective and an empirical model to test the redistribution trap assumption, which is not what our case in the present paper. Nonetheless, some of our findings are informative on the precise mechanisms by which the positive growth effect of the BFP could be undermined in the long run, say an excessive rise of services activities and of informal employment, unconditioned by initial levels of industrialization.

3. Empirical Strategy and data description

3.1. Empirical strategy

The present paper tests whether local economic growth is triggered or, on the contrary, hindered by the size of social transfers, and in the latter case, whether this adverse impact has operated through social transfers' intermediate impact on local productive structure. We consequently had to first identify the net overall impact of the BFP on local GDP growth, for similar levels of all controls, including sectoral and structural features by estimating, on the Ceará state's 184 municipalities, a reduced-form local growth model given by Equation 6:

$$\text{GDP p.c. growth}_i = \alpha_1 \text{Initial GDP p.c.}_i + \alpha_2 \text{Controls}_i + \alpha_3 \text{BFP/GDP}_i + u_i \quad (6)$$

The municipal 2000-2010 average growth of GDP per capita is therefore regressed on the initial level of GDP per capita, on our variable of interest, the period average level of BFP/GDP, and on *Controls* vector including population size, dependency ratio measured by the ratio of those aged under 15 and over 65 to those aged 15-65, secondary education level, public investment per capita, the manufacturing share of non-agricultural GDP, and employment concentration. The manufacturing share of non-agricultural GDP, measuring the dominant non-agricultural productive sector, and employment concentration, measured as the 2000-2010 average Gini index of employment concentration among employer establishments and indicating the presence of large factories or farms, respectively control for the productive structures and the technological determinants of GDP growth[14]. Data sources are described in detail in Section 3.3. The average growth impact of the amount of BFP stipends received by a municipality, identifying the average demand multiplier effect (for a similar level of economic structures), is given by the estimation of the coefficient α_3 in Equation 6. As explained in section 3.2. below, Equation 6 is estimated by using a 2SLS method and by accounting for spatial issues.

A central assumption of this paper is that the BFP might indirectly undermine the local long-run potential for economic growth in the Northeast, through the promotion of non-productive services economies based on trade and low added-value service activities. We therefore are also interested in identifying how the indirect growth effects of the BFP are channelled by such structural features as sectoral shares, average size of firms and the degree of labour market informality. Our empirical approach therefore consists in simultaneously identifying how social transfers impact each dimension of the productive structure and how local growth is affected, in turn, by this impact by estimating the structural model of local GDP growth through structural change described by Equations (7a) and (7b):

$$\text{GDPp.c. growth}_i = \alpha_1 \text{Controls}_i + \alpha_2 \text{Productive structure}_i + \text{u}_\text{i} \quad (7a)$$

$$\text{Productive structure}_i = \beta_1 \text{Controls}_i + \beta_2 \text{Social transfers}_i + \text{v}_\text{i} \quad (7b)$$

[14] Insofar as larger firms tend to have higher capital/labor ratios than smaller ones, a higher employment concentration level implies more capital intensive and modern productive structures.

Four variables featuring the productive structure are alternatively used as the dependent variable of equation (7b) and the independent variable in equation (7a): the manufacturing and service shares of non-agricultural GDP, the average size of service businesses and the level of formalization of the labour market. The BFP's indirect growth impact operating through the transformation of the local productive structure is therefore captured by the term $\alpha_3 * \beta_2$, that is the estimated coefficient (β_2) for BFP/GDP in the productive structure equation 7b times the estimated coefficient of the productive structure variable (α_3) in the growth equation 7a. If β_2 is negative and α_3 is positive, then the BFP will have an adverse effect on local GDP growth through the channel of its impact on the productive structure. Lastly, the magnitude of the BFP indirect growth effect through the productive structure assessed by $\alpha_3 * \beta_2$ can be compared to the estimates of the overall BFP growth effect α_3 in the reduced form model given by equation (6). Note that since the structural model 7a-7b only allows identifying the indirect impact of BFP on local output growth that is channelled by the productive structure, the indirect impact as assessed by $\alpha_3 * \beta_2$ is comprised in the overall impact α_3 as estimated by the reduced form Equation 5.

As in the reduced form equation (6), average GDP per capita growth is determined in equation (7a) by the initial GDP level, the population size, the employment concentration, public investment per capita, the ratio of *Bolsa Família* transfers over GDP and a productive structure variable, with the latter two variables being treated as respectively left hand side (LHS) and right hand side (RHS) endogenous terms. Since the emphasis is put on the structural features, the main sectoral controls of equation (6), that is the manufacturing share of non-agricultural GDP, was dropped from equation (7a) when the average size of service businesses and the degree of formalization of the labour market were treated as endogenous RHS variables. As for Equation (7b), it explains the productive structure variable by two exogenous controls, the initial levels of GDP per capita and population, and by our treatment variable, the municipality's ratio of *Bolsa Família* transfers over GDP, treated as endogenous and instrumented as explained in the next section 3.2.

3.2. Identification and estimation issues

Our identification strategy of the BFP local growth effect raised two main difficulties. First, we had to deal with endogeneity issues since the slowing down of economic growth might increase the amount of social transfers received by a municipality by intensifying poverty. We address this concern by instrumenting the period-average *BF*/GDP ratio by a coverage ratio defined as the municipality's percentage of the targeted poor population (as measured by the IPEA data) which was effectively registered at the *Cadastro Único*, a centralized cadastral registration service which is a prerequisite to entitlement to the Bolsa Família and a variety of other administrative programmes, during the period under investigation. Below, we present various explanations why we can reasonably believe that the coverage ratio actually reflects local administrative capacity to identify, enroll and register the poor that may be conditioned by geographical settings, like population size, remoteness and distance, and only marginally on local economic conditions and on patron-client relationships between local administrations and the poor, that could be dependent on local economic conditions[15].

First, as the size of local government is conditioned by the size of federal transfers, which is itself dependent on a population size rule[16], differences in growth and income levels across municipalities

[15] Appendix Table A2 reports pairwise correlations (with significance level) for the main variables of interest. It shows that both our coverage rate instrument and the size of the municipality are predictive of the BF over GDP ratio, while being not correlated with the local economic conditions reflected by the main productive structures variables.

[16] In Brazil, the rule of distribution of federal resources to local governments is discontinuous with respect to population thresholds. The amount that must be allocated to each municipality is clearly established by using the official number of inhabitants in any particular municipality measured every ten years by the Brazilian Census and by the independent federal agency called the *Instituto Brasileiro de Geografia e Estatistica* (IBGE). Federal transfers are thus transparent, free of political pressure and economically neutral since not geared

only have limited impact on local administration size and capacity to adequately cover its eligible population.

Second, the administrative organization of the BFP rules out the possibility of a politically-motivated manipulation of the coverage by the local administration. Fried (2012: 1044) contends that, although BFP decentralized management certainly increased the level of local variation in how the program is run and over seen, the centralized design and monitoring of the registration and distribution process has drastically reduced the risk of local manipulation. The MDS first established municipal-level quotas of the total number of "poor" families that should receive *Bolsa Família* transfers, with quota's definition being supervised by the World Bank and mainly based on poverty estimates derived from the 1991 and 2000 censuses (de la Brière and Lindert, 2005; Fried, 2012). This method therefore limits the risk that they may be caused by the posterior 2000-2010 GDP growth. Therefore, municipal governments have control neither over the number of beneficiaries in each municipality, nor over final choice of the families receiving the benefit, out of all the families enrolled and registered by municipal agents. In parallel, the MDS developed the *Cad'Unico* computerized registration system that was used for the second phase, the identification and registration of potential targets of the BFP, which was devolved to municipal-level public agents and civil society. At this stage of the process, there is no reason for local government to under-register the poorest since transfers are integrally funded by the Federal government and because the under-privileged populations are fully informed about the existence of the program (Fried, 2012)[17]. On the other hand, over-registering for the purpose of drawing more resources from the program budget would be pointless since, as already explained, both the number and identity of beneficiaries are defined by central government on the basis of centrally-gathered statistics and on technocratic criteria[18]. Ultimately, this administrative capacity to register the targeted population should have an effect on local GDP growth essentially through the social transfer channel, and not through other channels, therefore respecting exclusion restriction assumption.

For the reasons just enunciated, we claim that our coverage ratio is an adequate instrument of the BFP/GDP levels. The different tests reported in the tables (1^{st} stage F value > 10, non-rejection of the H_0 for weak instrument test for exclusion restriction validity and for Hansen J test of instrument's exogeneity) all support its statistical validity. The reduced form Equation 6 is therefore estimated by using the 2SLS method, with the BFP/GDP being instrumented by the percentage of the municipal targeted poor population which is effectively registered at the *Cad' Único*. As for the structural model (7a-7b), it is estimated by the full information 3SLS estimation technique also using external instruments in the first stage[19]. Using a full information method of identification of the coefficients of interest in a structural model including endogenous variables on the RHS requires that two

toward redistribution. Furthermore, local governments have autonomy on how to spend those transfers (Avarte et al., 2014). For empirical analyses using this rule as a source of exogenous variation of municipal public spending, see Litschig (2012), Litschig and Morrison (2013) or Brollo et al. (2013).

[17] The acknowledgment of the existence of BFP and of the modalities of access to the programme through the *Cad'Unico* by potentially eligible families is widespread since 95% of the eligible families know the programme, according to IBGE (PNAD IBGE 2014).

[18] Moreover, politically-motivated local government's strategy consisting in using transfers to clienteles as a substitute to development service provision for all may be impeded by the regular monitoring and cleaning of *Cad'Unico* registers by the MDS.

[19] The 3SLS method generalizes the two-stage least-squares method to take account of the correlations between equations in the same way that Seemingly Unrelated Regression generalizes Ordinary Least Squares. The first stage of the standard 2SLS estimation is first performed on each of the separate equations by regressing our two LHS endogenous variables (GDP growth and productive structure) on all the predetermined or exogenous variables, including the two instruments of the BFP/GDP ratio, to obtain predicted values for the endogenous regressors. The residuals generated by the 2SLS second stage are then used to estimate the cross-equation correlation matrix and the final 3SLS estimation consists in using this matrix to compute a Generalized Least Square estimation to account for the correlation structure in the disturbances across the equations (Zellner and Theil, 1962).

conditions be fulfilled. First, correct identification of the parameters of interest requires that there are at least as many predetermined variables excluded from each equation and appearing elsewhere in the system as there are endogenous variables among the regressors of this equation. In our model, this *order* condition holds since there are four predetermined or exogenous variables (the proportion of the municipality's population registered at the *Cad'Unico*, the average level of the *Bolsa Família* in the other municipalities of the micro-region, initial level of GDP per capita and initial population size) excluded from equation (7a) and two endogenous variables among the regressors. The condition also holds for equation (7b). Second, the higher than one value of the Kleibergen-Paap LM statistic of the matrix of instruments' rank (Kleibergen and Paap, 2006) testing for the rank condition reported in Table 4, indicates that the H_0 that the rank of matrix is equal to 0 or 1 can be rejected at standard levels of confidence[20]. Lastly, in Equation (7b) explaining the productive structure variable by two exogenous controls, the municipality's ratio of *Bolsa Família* transfers over GDP is treated as endogenous and instrumented in the first stage of the three-stage least-squares (3SLS) estimation by all the exogenous variables of equations (7a) and (7b) and one external instrument, used alternatively, the municipality's percentage of the poor population registered at the *Cad'Único* and the municipality's size[21].

The second identification issue is linked to spatial correlation. Obviously, the wealthiest Ceará state municipalities are likely to attract migrant workers from the poorest ones, therefore disconnecting the cadastral location of the beneficiary from the location where he/she will effectively work and partially consume. These attraction mechanisms must be accounted for by our estimation so that our estimates of local economic effect of social transfers can be netted out of this source of spatial spillover. Another source of spatial spillover transits through the demand effects of increased purchasing power beyond the administrative boundaries of each municipality that must be controlled for because they might introduce spatial correlation. The 184 municipalities are grouped into thirty-three microregions defined by the Brazilian Institute of Geography and Statistics (IBGE). These administrative regions constitute groups within which errors are potentially correlated since municipalities exist within each microregion. Since these microregions correspond to zones of planification of development policies, they may share common unobserved characteristics regarding geography or governance and therefore constitute a relevant basis for spatially clustering errors. Spatially clustering errors, however, does not control for the likely spatial correlation that may result from a clustering of similar values across geographical space for the dependent variable, namely municipality's GDP growth. A Moran's I test of spatial autocorrelation has been implemented to address this issue. Results are reported in the bottom of Table 1 below and reject the assumption of spatial autocorrelation of the dependent variable, indicating that equation (6) could simply be estimated by clustering the standard errors by micro-region without having to correct for sources of spatial autocorrelation of the dependent variable.

3.3. Data sources and description

The full set of variables used, as well as their source and descriptive statistics, are reported in the Appendix Table A1. The originality of this dataset consists in articulating at municipality level statistical data formerly available information from different sources. Most of them are drawn from reports and from the following databases: IBGE (*Instituto Brasileiro de Geografia e Estatística*),

[20] Computation of the checkreg3 test proposed by Baum et al. (2007) for Stata indicates that our system of equation (7a) and (7b) is identified if the BFP/GDP ratio is excluded from Equation (7a). Yet, this test does not allow retaining the the BFP/GDP ratio as an instrumental variable. Moreover, when the the BFP/GDP variable is dropped from equation (7a), the 3SLS estimations produce the same results as in Table 4.

[21] The agricultural share of GDP was nevertheless used as an excluded instrument for the first stage of the 3SLS estimation, after having checked by C tests that this variable can be considered as strongly exogenous in single equation 2SLS regressions of the GDP per capita growth, industrial share of GDP, service share of GDP and average size of service businesses, the dependent variables of the model (7a-7b).

IPEADATA (*Instituto – fédéral – de Pesquisa Económica Aplicada*), IPECE (*Instituto de Pesquisa e Estratégia Económica do Ceará*), *Ministério da Fazenda (Secretaria do Tesouro Nacional), Ministério do Trabalho e do Emprego, Ministério do Desenvolvimento Social*. Moreover, the authors have computed various original indicators by using geolocalized microeconomic primary data on firms that they have aggregated at the municipality's level.

In addition to identifying the possibly adverse indirect effects of redistribution through local economic structures, our paper documents a new aspect of structural change that had not been assessed by any other study at that level of disaggregation. Working with municipality-level data allows matching spatially social transfers coverage and economic activity at sectoral level, while accounting for potential local spillovers generated by redistribution policies. Our municipality level data is thus informative about structural features certainly conditioning the local impact of social transfers such as the dominant type of production (agricultural, industrial or services) or the type of labour market (skilled or unskilled, formal or informal), many dimensions that cannot be addressed through the individual level data generally used to assess the impacts of CCTs. This approach, consisting in mixing up/regrouping/gathering data from various sources and at different levels of aggregation, forced us to randomly survey one third of the municipalities of our sample to compare their municipality level figures with those provided by the federal and state statistical sources.

4. Estimation results (1): The overall growth impact of the BFP

Table 1 shows results from OLS and 2SLS estimations of equation (6) identifying the overall growth impact of the BFP, net of the supply-side effects. We have first regressed municipalities' GDP per capita growth on a set of controls all measured at the municipality level. Results of the OLS estimation of the equation (6) are reported in column 1 to 3 of Table 1. In all Table 1's specifications, the controls have the expected signs with most of them being statistically significant. All other factors being set equal, municipal GDP per capita growth is higher the lower the initial GDP per capita and the dependency ratio, and the higher the average education level. It is noteworthy that public investment has no effect on local growth. As for productive features, a higher manufacturing share of non-agricultural GDP increases a municipality's growth rates, albeit only significantly with 2SLS, while a stronger degree of employment concentration reduces it, as could be expected.

If we now turn our attention to the social transfers, columns 2 and 3 show that whereas the BFP has no impact on GDP per capita growth in OLS estimations, a positive, albeit weak, positive effect appears when endogeneity is controlled for by 2SLS estimation (column 4). IV estimation therefore corrects for an attenuating endogeneity bias that may be due to a catching-up process, the municipalities with lower initial income level (and higher growth rates during the period) having received larger amount of social transfers over the period under study, as indicated by the negative coefficient of initial GDP. Additionally, the Moran's I test reported in the lower Panel A of Table 1 rejects the hypothesis of spatial autocorrelation of GDP per capita growth for various ranges of distances around each municipality. This would mean that the outcome variable, GDP growth, does not spill over from one municipality to the nearby ones.

The standard assumption that the impact of social transfers on local growth is non-linear was also tested in Table 1's Column 4. As explained by Barrientos (2012), positive impacts of social transfers may be long to materialize, appearing only when a threshold of social transfers has been reached. Column 4 shows the estimation results of the equation (6) including the squared term of the BFP/GDP variable also treated as being endogenous[22]. If threshold effects were to exist in the case of Ceará, then the coefficient of social transfers would take a negative sign while that of squared social transfers would take a positive one. The result suggests that the assumption of a non-linear effect can be rejected at usual levels of risk for our sample of municipalities, since neither the BFP nor its squared term are significantly different from zero.

[22] The instrument for the squared term of BFP/GDP is the squared term of the instrument used for the BFP/GDP ratio, that is the number of households registered to the *Cad'Unico* over the target population.

Table 1: OLS and 2SLS regressions, GDP per capita growth (2000-2010 average values)

Dep. Var. = GDPp.c. growth	(1) OLS Baseline	(2) OLS with BF	(3) 2SLS with BF	(4) 2SLS with BF and BF^{2} [d]
Panel A: OLS and 2SLS second stage				
Initial GDP	-1.46***	-1.51***	-1.37***	-1.17***
	(.131)	(.087)	(.115)	(.322)
Pop. size	.012	.011	.014*	.026
	(.009)	(.008)	(.008)	(.017)
Education	.427***	.394***	.490***	.698**
	(.081)	(.081)	(.087)	(.349)
Depend. rate	-.002***	-.002***	-.003***	-.0034**
	(.0007)	(.0007)	(.0007)	(.0015)
Public spending	.157	.160	.152	.166
	(.108)	(.136)	(.130)	(.131)
Empl. Conc.	-.277***	-.273***	-.284***	-.353***
	(.068)	(.073)	(.067)	(.105)
Non-agric. share	-.013	-.007	.024**	.066
	(.013)	(.007)	(.010)	(.065)
Bolsa Família	-	-.0006	.0011*	.007
		(.0005)	(.0006)	(.009)
BF squared	-	-	-	4.54e-05
				(6.29e-05)
Constant	.927***	.981***	.826***	.515
	(.119)	(.102)	(.133)	(.514)
Clust. errors	No	Yes[a]	Yes[a]	Yes[a]
Moran's I	1.285 (p=.199)			
Rob. LM	1.695[b] (p=.193)			
R^2	.62	.62	.62	.60
N	184	184	184	184
Panel B: 2SLS first stage / Dep. Variable: Bolsa Família/GDP				
Cadastro Unico reg. (% poor)			15.45**	-11.12
			(5.97)	(8.25)
Cad. Unico reg. (% poor) squared			-	8.13***
				(2.04)
Other exogenous			Yes	Yes
R^2			.74	.73
1st stage F value			10.68	49.43
Hansen J test[e]			p=.721	p=.065
Weak instr.test[e]			p=.162	p=.262
C test (Cad./poor)[c]			p=.512	-

Notes: *, ** and *** respectively significant at 10%, 5% and 1% risk. Standard errors of coefficients are reported in brackets; [a] Regressor's coefficient standard errors are clustered by microregions (N=33). [b] The Robust Lagrange Multiplier test with the highest significance is reported (here the spatial lag model). [c] C tests for educ. (p=.535), Depend. Rate (p=.697), Public spending (p=.540), Employment concentration (p=.826) could not reject H0 that the tested included regressor is exogenous. [d] The instrument for the Bolsa Família squared is the Cadastro unico registration as a ratio of the municipality's poor population squared; [e] values of the Hansen J and of the Weak instrument tests fail to reject the assumption of strong exogeneity of the set of regressors at usual levels of risk (5%).

In Table 2, Equation 6 is re-estimated on various subsamples to check our results' sensibility to sample change. The positive and significant local growth impact of the BFP holds for all of them, except for the industrial municipalities loosely defined as those for which the manufacturing share of non-agricultural GDP is higher than 50% (column 4) where BFP/GDP loses its significant impact on local growth. By contrast, the BFP growth impact is stronger for the non-metropolitan (column 1), hinterland (column 2) and lightly industrialized (column 3) municipalities than for the whole sample of municipalities. These results suggest that the magnitude of the demand multiplier is higher in areas more deprived of productive capacities and modern infrastructures, and might therefore contribute to reduce the income gap between poor and wealthy locations within the state.

Table 2: 2SLS second stage estimations of GDP per capita growth (2000-2010 average values): subsample estimations

Dep. var.: GDPp.c.growth	(1) Non-metropl.	(2) Hinterland	(3) Non-Industrial	(4) Industrial
Initial GDP	-1.18***	-1.20***	-1.21***	-1.60***
	(.131)	(.133)	(.164)	(.123)
Pop. size	.0014	.0008	-.008	.023*
	(.008)	(.009)	(.012)	(.013)
Education	.449***	.413***	.342***	.611***
	(.097)	(.095)	(.123)	(.215)
Depend. rate	-.002***	-.0018**	-.9.3e-03	-.005***
	(.0007)	(.0007)	(7.6e-04)	(.001)
Publ. inv.	.153	.079	.017	.369
	(.092)	(.109)	(.118)	(240)
Empl. Conc.	-.245***	-.241***	-.137	-.443***
	(.060)	(.064)	(.089)	(.112)
Indust. share	.044**	.034**	.041	.024
	(.023)	(.014)	(.048)	(.021)
BF/GDP	.0017**	.0016**	.0012**	.0024
	(.0008)	(.0008)	(.0006)	(.0025)
Constant	.670***	.706***	.638***	1.107***
	(.142)	(.149)	(.143)	(.252)
Clust. errors	Yes[a]	Yes[a]	Yes[a]	Yes[a]
2^{nd} stage R^2	.55	.54	.56	.61
N	171	163	98	86
1^{st} stage F value	8.28	6.70	7.26	2.00
Hansen J test[b]	p=.96	p=.95	p=.74	p=.82
Weak instr. Test[b]	p=.07	p=.14	p=.18	p=.67

Notes: *, ** and *** respectively significant at 10%, 5% and 1% risk. Standard errors of coefficients are reported in brackets; [a] estimated coefficient's standard error is clustered by microregions (N=33); [b] values of the Hansen J and of the weak instrument tests fail to reject the assumption of strong exogeneity of the set of regressors at usual levels of risk (5%).

This result is important since it legitimizes social transfers on other grounds than poverty reduction for their beneficiaries. The identification of a local economy positive effect of social transfers suggests that, in the regions where issues of poverty and lack of productive structures are more acute, CCTs are able to indirectly benefit to a larger population than the targeted one. In the next section, we will present additional evidence on a possible channel of this convergence effect, that of light industrialization that is indirectly promoted by transfers.

In order to further check the robustness of our baseline result, various alternative versions of the baseline Equation 5 have been estimated. Results are reported in Table A3 in Appendix. First, the estimated growth impact of *Bolsa Família* transfers received by a given *municipality* may be magnified by demand spillovers generated by social transfers received by the nearby municipalities. In order to test this assumption, the size of BFP/GDP in the municipality *i* and the average size of this variable in all the neighbouring municipalities of the municipality *i* were simultaneously introduced in the equation (6). Estimation results reported in Table A3's column 1 show that the size of the BFP/*GDP* ratio in nearby municipalities has no significant impact on municipality *i*'s growth and that controlling for possible demand spatial spillovers produces a slightly higher magnitude of the municipality *i*'s growth effect of *Bolsa Família* transfers than that estimated in the baseline (Table 1's column 3). These results imply that the local multiplier effect is strongly spatialized.

Second, if dependence on BFP transfers was to increase with the distance to the capital city Fortalezza, or to the metropolitan region surrounding the capital city, recording significantly higher growth rates than the rest of the state, then the adverse growth impact of the BFP could well be driven by the non-inclusion of relevant geographical controls in the estimated equation. Table A3's column 2 shows that the inclusion of a dummy taking the value one for the capital city and the metropolitan zone (and 0 otherwise) does not change the sign and significance of the BFP coefficient. Likewise, Table A3's columns 3 and 4 show that including the distance to the state's capital city or the latitude and longitude of the municipality does not modify the sign and significance of the BFP coefficient, while slightly increasing its magnitude. Ultimately, the introduction of dummies accounting for the most disaggregated administrative perimeter, the thirty-three administratively defined micro-regions, and controlling for unobserved geographical or administrative factors affecting local growth, does not change the results while also lightly increasing the point estimate value (Table A3's column 5).

Lastly, it is worth remarking that the range of variation of the BFP's impact on local GDP growth is limited across the different specifications is remarkably limited since the estimated coefficient is comprised between .0011 and .0017 across all Table 2 and A3's models. This indicates that one percentage point increase in the BFP/GDP ratio leads to an increase of the local growth rate local growth comprised between .0011 and .0017 percentage point. Put differently, a one standard-deviation increase of the BFP/GDP ratio, which is by definition the sample average deviation from mean value, would lead to a range of 1.4 to 2.1 percentage point increase, that is a 12 to 18% increase, of the municipality's growth rate over the period (reaching 13.0 to 13.6% instead of 11.5%). In the next section, we check that this impact might have been higher, absent the indirect impacts of the BFP on local productive structures.

5. Estimation results (2): The indirect growth effect of social transfers channelled through productive structures

5.1. Preliminary evidence on the impact of BFP on productive structures

In this section, we assume that, in the medium run, the overall positive impact of the BFP on municipal GDP growth through demand could have been weakened by its negative likely impact on local productive structures, social transfers tending to prompt the formation of informal service economies generating low value added in the least productive economies.

In order to clearly identify the productive structure dimensions that might be channel this adverse impact, we have first estimated the single equation (7b) alternatively for six dependent variables assessing different dimensions of structural change: the manufacturing share of non-agricultural GDP, the services sector share of GDP, the log of the number of enterprises in transformation industry, the average size of firms in the service sector[23] and the degree of

[23] The business size in the service sector is measured by their number of salaried workers.

formalization of the municipality's labour market[24]. The parsimonious set of controls includes the initial levels of GDP per capita and of population size. We are interested in the impact of the local intensity of BFP, as measured by the BFP/ GDP ratio. Given that the BFP/GDP ratio might be conditioned by the local production environment, with less industrialized economies and less formalized labour markets exhibiting higher proportions of poor in their population, we have implemented a 2SLS estimation to equation 7b using the instruments for BFP/GDP described in the previous section. The tests reported at the bottom of Table 3 suggest that the instruments have good qualities. In addition, standard errors were clustered in order to control for local spatial spillovers of social transfers.

Table 3: Second stage of 2SLS regressions with spatially clustered errors, GDP growth (2000-2010)

Dep. variables	(1) Manufacturing industries (% of non-agric. GDP)	(2) Transform. industries (log nb. of entr.)	(3) Services share (% of GDP)	(4) Service business average size	(5) Labour market formalization (score)	(6) Labour market formalization (continuous)
Initial GDP	-1.74	2231.83	17.81*	1.39	5.36	-3.16
	(1.31)	(1828.43)	(10.22)	(4.15)	(3.67)	(7.17)
Pop. Size	.078*	104.1**	-.665	.535*	.360*	.593**
	(.048)	(47.64)	(.557)	(.294)	(.189)	(.258)
BFP/GDP	-.026**	-6.10*	.347***	-.057**	-.029	-.144***
	(.011)	(3.71)	(.066)	(.025)	(.022)	(.052)
Constant	1.92*	-1044 .03	-11.36	3.80	.031	5.63
	(1.12)	(917.85)	(7.71)	(3.01)	(2.78)	(5.68)
Clust. errors	Yes	Yes	Yes	Yes	Yes	Yes
1st stg F value[a]	8.64	13.63	9.69	8.72	8.64	8.64
Weak instr.[b]	p=.08	p=.45	p=.00	p=.15	p=.06	p=.06
Sargan overid.[b]	p=.74	p=.59	p=.24	p=.64	p=.69	p=.71
N	184	184	184	184	184	184

Notes: *, ** and *** respectively significant at 10%, 5% and 1% risk; standard errors of coefficients are reported in brackets; the errors are clustered by microregion; [a]the first stage instruments for BFP/GDP are the municipality' size in km^2 and latitude in degree; [b] values of the Hansen J and of the Weak instrument tests fail to reject the assumption of strong exogeneity of the set of regressors at usual levels of risk (5%).

Equation 7b estimation results are reported in Table 3. Columns 1 to 6 respectively indicate that the *municipalities* exhibiting higher levels of the BFP/GDP ratio generally show lower proportion of manufacturing value added, lower number of transformation enterprises, higher proportion of service activities in value added, smaller firms in the service sector and less formalized labour markets. As the estimated relationship is causal for most of the productive structure dimensions[25],

[24] This variable is an ordinal composite variable obtained by performing a principal components analysis and clustering analysis of a set of sixteen variables describing the initial labour markets of municipalities in 2000 and the dynamics between 2000 and 2010. The variable ranges from 1 to 5, with the most informal and/or least formalizing labour markets taking the value 1, and the most modern and formalized labour markets taking the value 5. This classification has been. Detailed results of the PCA and clustering analyses are available upon request.

[25] Except for the service share of GDP where the weak exogeneity assumption could not be rejected as suggested by the probability value of the weak exogeneity test at the bottom of column 3. The p value of the

Table 3's results provide empirical support for the assumption that although BFP has spurred GDP growth on average, high levels of social transfers intensity in local GDP may have boosted the formation of mostly informal and poorly productive service activities in the municipalities of Ceará.

In the next section 5.2, we provide evidence that this adverse impact on productive structures might have undermined the overall growth potential impact of the BFP by recomposing the indirect impact of transfers on GDP growth through the productive structure.

5.2. Recomposing the indirect growth impact of social transfers through the productive structure

The next stage consists in assessing the magnitude of the BFP indirect growth impact channelled by local productive structures by simultaneously estimating the channel (7b) and growth equations (7a) and computing $\alpha_{2*}\beta_2$.

Table 4's columns 1 to 5 report the results of the 3SLS estimation of the system 7a-7b with, respectively, the industry as a proportion of the municipal non-agricultural GDP, the log number of enterprises in transformation industries, the services as a proportion of municipal GDP, the services sector's average business size and the municipal degree of labour market formalization standing as the productive structure variable. For each column, the estimated coefficients of equation (7a) (growth equation) are reported in the upper panel A (1a to 5a), while the lower panel B (1b to 5b) exhibits the estimated coefficients of equation (7b) (productive structure equation). As explained in section 3, the indirect growth impact of the BFP channelled through productive structures may be interpreted as the supply side impact of social transfers incorporated in the overall or net impact as measured in the previous section's Equation 6 reduced form estimation.

Column 1 shows that a higher BFP/GDP ratio tends to slow down the expansion of the industrial value added share (lower panel 1b), while the latter share has a significant and strong impact on GDP growth (upper panel 1a). The same effect holds for the number of enterprises in transformation industries, as shown in column 2. Symmetrically, column 3 shows that a higher ratio of *Bolsa Família* transfers to GDP promotes service activities (lower panel 3b), which, in turn, have an adverse impact on growth (upper panel 3a). Column 4 shows that a higher BFP/GDP ratio also tends to reduce the size of businesses operating in the service sector (lower panel 4b), while local growth tends to be higher when firms in the service sector are bigger (upper panel 4a). Lastly, a higher BFP/GDP ratio tends to reduce the level of labour market formalization (lower panel 5b), while more formalized labour markets tend to prompt local economic growth (upper panel 5a).

The combination of the estimated parameters $\alpha_{2*}\beta_2$ is negative, whatever the structural channel, therefore indicating that, during the 2000s, the BFP adversely impacted local growth through the indirect channel of the local transformation of productive structures. These findings thus suggest that, for the municipalities of Ceará over 2000-2010, stronger local economy's dependence on the BFP indirectly hindered medium run GDP growth, by distorting local production structure toward weakly productive "consumption" economies featuring lower than average manufacturing shares, fewer enterprises involved into transformation industries and lower levels of business and labour market formalization.

Moreover, the estimated magnitude of the BFP negative indirect impact on growth is fairly similar to the positive overall impact estimated by the reduced form model. The computation of the indirect growth impact of the BFP $\alpha_{2*}\beta_2$ on the basis of Table 4's estimations give the values -.0011, and -.0008 for the columns 1 and 2 respectively which is close to the .0011 point-estimate of α_3 measuring the lower bound of the positive impact of the BFP (that is the sum of the direct and indirect impacts) given by Table 1 column 3's reduced form estimation. During the 2000s, the BFP's net effect on local growth has been globally positive, even though the adverse impact of social transfers on productive structure has certainly narrowed the multiplier effect.

labour market formalization score is also low, although, strictly speaking, the assumption of weak exogeneity can be rejected at the usual risk of 5% in that case.

Table 4: Third stage of the 3SLS estimation of the structural model 7a-7b (2000-2010)

Panel A - Dependent variable: GDP growth (equation 7a)

	(1a)	(2a)	(3a)	(4a)	(5a)
Initial GDP	-1.54***	-1.65***	-1.53***	-2.30***	-1.75***
	(.092)	(.120)	(.092)	(.188)	(.100)
Population	7.36e-08***	3.97e-08**	6.91e-08***	-2.77e-08	5.31e-08**
	(1.92e-08)	(1.97e-08)	(1.89e-08)	(3.75e-08)	(2.07e-08)
Education	.344***	.407***	.367***	-.445	.188*
	(.093)	(.087)	(.098)	(.328)	(.113)
Depend. rate	-.0019***	-.0017***	-.0019***	-.003***	-.0016***
	(.0006)	(.0006)	(.0006)	(.0007)	(.0006)
Public inv.	.082	.241***	.131*	-.323	-.113
	(.088)	(.055)	(.082)	(.213)	(.082)
Empl. conc.	-.253***	-.248***	.242***	-.135	-.193
	(.055)	(.056)	(.055)	(.107)	(.057)
Indust. share	.036***	-	-	-	-
	(.014)				
Transf. ind.	-	.0141**	-	-	-
		(.0058)			
Service share	-	-	-.0023*	-	-
			(.0014)		
Serv. bus. size	-	-	-	.105***	-
				(.023)	
Lab. mkt frm.	-	-	-	-	.042***
					(.008)
Constant	.996***	.962***	.999	1.50***	1.03***
	(.098)	(.099)	(.103)	(.187)	(.095)
R^2	.62	.67	.64	nr	.31
RMSE	.037	.033	.036	.125	.049
N	184	165	184	177	184

Panel B – Dependent variable: Productive structure (equation 7b)

Dep. Variables	(1b) Industrial share (% non-agr. GDP)	(2b) Transf. ind. (nb. of entr.)	(3b) Services share (%GDP)	(4b) Service business average size	(5b) Labor market formalization
Initial GDP	-1.96*	11.72***	20.50**	7.61**	5.80**
	(1.14)	(3.41)	(10.71)	(3.32)	(2.76)
Initial pop.	-1.19^{e}-07	1.66e-06***	4.02e-07	1.16e-06*	4.77e-07
	(1.84^{e}-07)	(4.70e-07)	(1.72e-06)	(6.24e-07)	(4.72e-07)
BF/GDP	-.030***	-.037***	.375***	-.022*	-.028**
	(.005)	(.015)	(.046)	(.012)	(.011)
Constant	2.31***	-1.99	-15.01**	.411	.462
	(.726)	(2.22)	(6.80)	(2.02)	(1.73)
R^2	.32	.60	.42	.28	.35
RMSE	.35	.89	3.29	1.21	.92
N	184	165	184	177	177
rk test rank=0	156.34 (p =.00)	180.14 (p=.00)	203.3 (p =.00)	162.96 (p =.00)	168.63 (p =.00)
rk test rank=1	34.98 (p=.00)	49.90 (p=.00)	70.12 (p=.00)	45.71 (p=.00)	45.58 (p=.00)
1st stage F val.	Ind. Sh.: 14.33	Tr. ind. 26.37	Serv.: 23.22	Sv. E. Sz. : 10.44	Lab. Mk.: 10.44
	BF.: 28.17	BF: 24.91	BF: 28.17	BF: 30.84	BF: 30.84

Notes: *, ** and *** respectively significant at 10%, 5% and 1% risk; standard errors of coefficients are reported in brackets. Included instruments for the first stage estimation are initial GDP per capita, initial population, initial public spending per capita and employment concentration. Excluded instruments are the *Cad'Unico* registration as percentage of the poor population for the municipality *i*, the *Cad'Unico* registration as percentage of the poor population for nearby municipalities, and municipality's latitude and longitude in degrees; in 2a and 2b, excluded instruments are the municipality's size in km^2 and longitude in degree.

Given that the reduced form estimation of the multiplier effect (α_3 in equation 6) assesses the medium run growth impact of social transfers over the period 2000-2010, incorporating both the direct demand effect and the indirect effect through the transformation of local productive structures, we can infer from the estimated magnitudes of the direct and indirect effects reported above that the net local growth effect of the BFP could have been two times larger, absent the adverse impact of social transfers on structural transformation in weakly productive local economies. When can therefore infer that in the state of Ceará during the 2003-2010 period, supply-side effects operating through local economic structures significantly lessened the demand-side multiplier effect of social transfers.

The next section 5.3 provides elements of empirical evidence concerning our assumption of a redistribution trap. More specifically, we check if the dynamics of the different structural dimensions over the period investigated should be differentiated according to the municipality's initial productive capacity, that is whether municipality was of a *l*- or a *h*-type initially (see section 2's model).

5.3. Additional empirical evidence on l-type and h-type dynamics of structural change and on the redistributive trap

As preliminary evidence, the ratio of BF over GDP against the four variables measuring the dynamics of productive structures described above, by subsets for the Top 20% and the Bottom 20% – corresponding to the *l*-type municipalities – of the distribution of the industrial share of non-agricultural GDP are plotted in Figure 1. Quite unexpectedly, and in contradiction with the hypothesis developed in the theoretical section, BFP/GDP is positively correlated with the industrial share growth and the number of enterprises in transformation industries in the Bottom 20% subset corresponding to the *l*-type municipalities. As for the other two dimensions of productive change, informality and service activity, the patterns observed are similar in the different subsets, indicating that all municipalities, whatever their initial conditions, did experience the correlation between increase of services and informality and high BFP/GDP ratio during the 2003-2010 period.

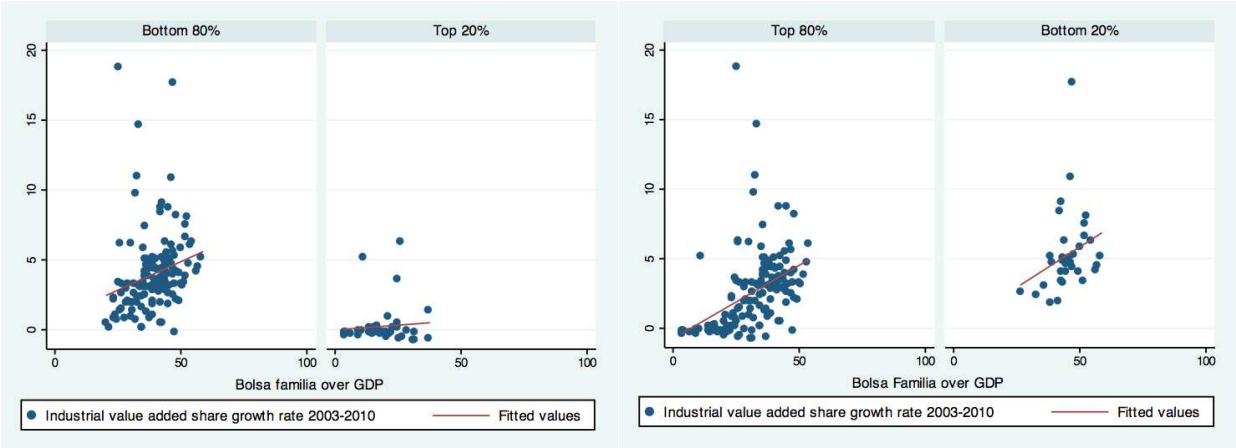
In order to test more specifically our theoretical assumption 2 of Section 2, as to lightly productive municipalities may have to suffer from more adverse dynamic structural effects of the BFP than highly productive ones, an interaction term between the BFP/GDP ratio and a dummy variable taking the value 1 for the municipalities included into the top 20% and bottom 20% of the distribution of initial levels of the industrial share of non-agricultural GDP (and taking the value 0 otherwise) has been introduced in a modified Equation (7b). In this modified equation 7b, the 2003-2010 growth rate of the four productive structure indicators, that is the industrial share of non-agricultural municipal GDP and the service share of municipal GDP, the logarithm of the number of enterprises in transformation industries, and the IPEA rate of labour market informality, are alternatively taken as the dependent variable.

Table 5's upper panel A reports estimation results for the overall sample while panel B reports those for the subsample of municipalities located in the bottom 20% of the initial industrialization level. Since the interaction term includes a supposedly endogenous continuous variance, namely the BFP/GDP, it is instrumented in the first stage by the interaction of the dummy and the instrument of the BFP/GDP, that is the share of the poor effectively registered in the *Cad'Unico*[26]. 2SLS estimation results confirm these correlation patterns since they provide evidence of a causal impact of the BFP on light industrialization in the Bottom 20% of the municipality's distribution, while documenting a similarly causal impact of BFP on informality and services share growth for all.

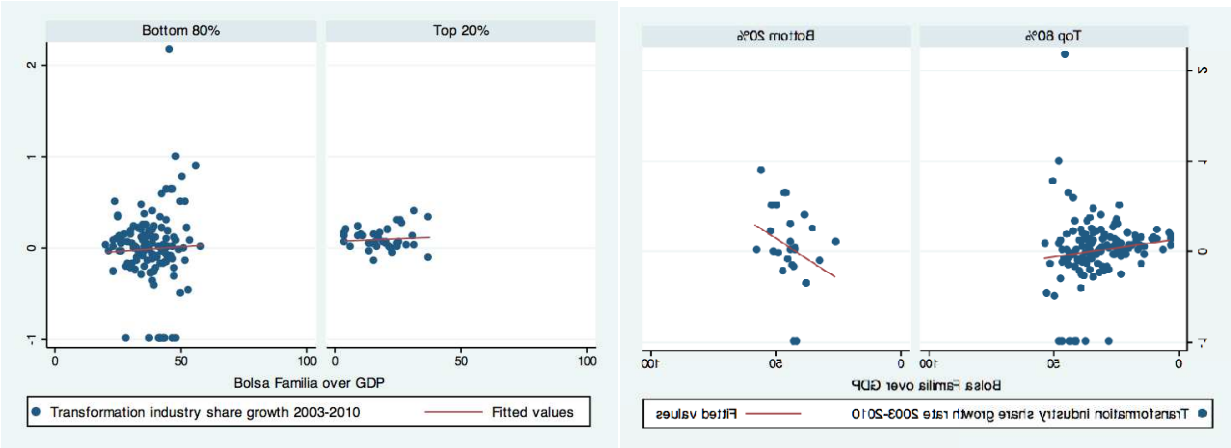
[26] The municipality's size in km^2 is used as an additional instrument to perform the over-identification test.

Figure 1: BFP/GDP *vs* relative change of productive structures by municipality's initial level of industrialization

Panel A: *Bolsa Familia* / GDP (2003-2010) *vs* industry share growth rate (2003-2010)



Panel B: *Bolsa Familia* / GDP (2003-2010) *vs* transformation industry growth rate (2003-2010)



Panel C: *Bolsa Familia* / GDP (2003-2010) *vs* services share growth rate (2003-2010)

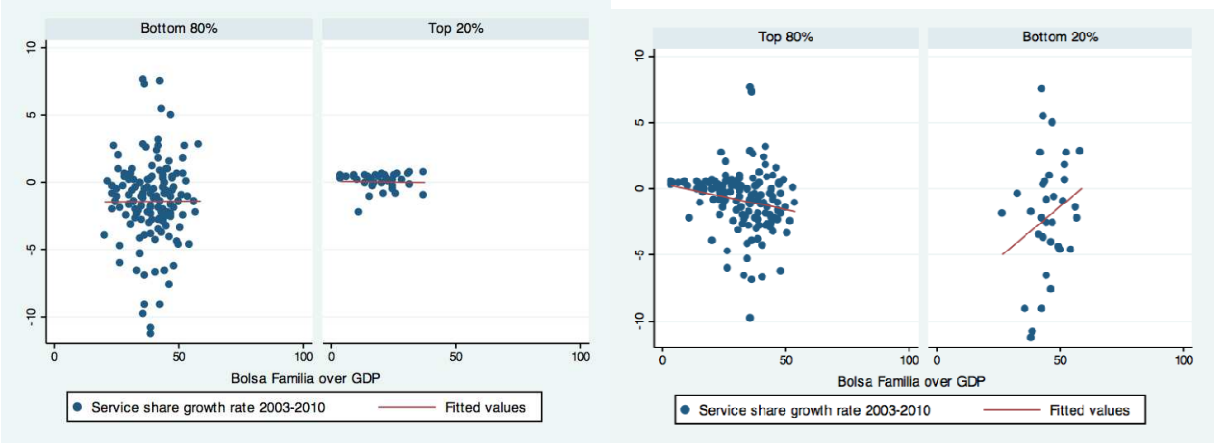
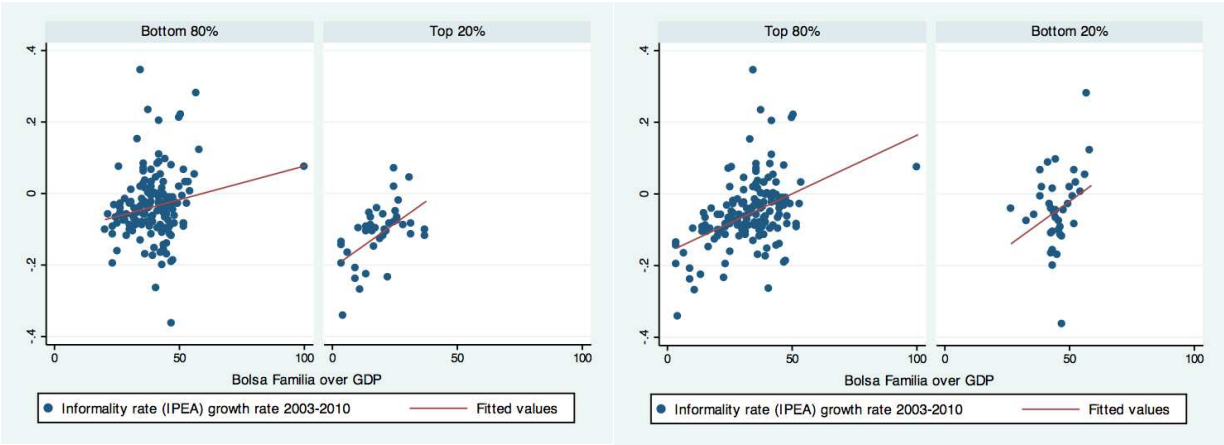


Figure 1 (continued)

Panel D: *Bolsa Familia* / GDP (2003-2010) *vs* informality rate (IPEA) growth rate (2003-2010)



These findings therefore confirm our assumption that PBF have differentiated impacts on productive structures in the most industrialized and least industrialized municipalities, albeit in an unexpected way. We therefore cannot draw from these results that the multiplier effects, γ_l and γ_h will progressively diverge over time as social transfers progressively modify local productive structures in directions consistent with the section 2's theoretical predictions. Laggard municipalities being embarked upon a catching-up dynamics towards more industrialized municipalities partially stimulated by demand and supply side impacts of the BFP.

6. Discussion: External validity and policy relevance

6.1. External relevance of our results

Since they have been estimated from a restricted sample of 184 Brazilian municipalities, out of the 5500 municipalities recorded, the relevance for other regions and for Brazil as a whole needs to be discussed. More specifically, we need to compare the social and economic characteristics of Ceará's municipalities with those of other states, within and outside the northeastern region.

Ceará is a typical North-eastern state, exhibiting both economic and social features close to the other states of the region. Even though they started to catch up early in the 20th century, Brazil's North-eastern states still lag behind the rest of the country in terms of income per capita and structural changes (Reis, 2014)[27]. Importantly, Ceará is also fairly representative of a large part of the Brazil territory, standing between the large industrialized metropolitan areas of the Southeast and the Amazonian weakly dense and industrialized region of the Northwest. We are therefore pretty confident that our results would fare with other Brazilian regions situated in this intermediate range of socioeconomic conditions.

[27] In 2012, average real labour income in Ceará amounted to 818 *Reais* against 1,404 *Reais* for the whole of Brazil (Source IPE). Only accounting for 28% of the population and 13% of national gross domestic product, the North-eastern states received more than 52% of the BFP resources in 2006 (Silveira Neto and Azzoni, 2011: 455). Their labour markets remain weakly formalized and relatively unproductive, with 61% of their labour force working in the informal sector and 63% of their workers receiving less than the minimum wage (Silveira Neto and Azzoni, 2011). These handicaps also result from the local combination of physical (soils), political (oligarchic land-owning dynasties) and cultural (low education) factors (Amaral Filho et al., 2013).

Table 5: Second stage of 2SLS estimations of the 2003-2010 growth rates of industry share, transformation industry, services share and informality

Panel A: Linear effects

	(1) Industry share growth	(2) Transf. industry growth	(3) Service share growth	(4) Labour market inform° growth
Initial level	-.059*	-.083*	-.021	-.394***
	(.032)	(.050)	(084)	(.102)
Pop. Size	.609	.238*	-1.27	-.067***
	(.494)	(.141)	(1.48)	(.016)
Bolsa Família	.096$	-.0056	-.124	.0027***
	(.060)	(.0057)	(.174)	(.0008)
Constant	-.708	-.018	7.16**	.285**
	(3.20)	(.369)	(3.38)	(.111)
Clust. errors	Yes	Yes	Yes	Yes
1st stage F test[a]	7.81	13.94	3.88	11.18
Weak instr. test	p=.39	p=.30	p=.20	p=.08 (S-W)
Hansen J	p=.33	p=.23	p=.15	p=.13
N	173	158	173	183

Panel B: Non-linear effects, by initial industrialization level: Bottom 20%

	(1) Industry share growth	(2) Transf. industry growth	(3) Service share growth	(4) Labour market inform° growth
Initial level	-.087***	-.104*	.001	-.340***
	(.032)	(.062)	(.109)	(.112)
Pop. Size	.277	.185	-1.64	-.069***
	(.447)	(.135)	(1.89)	(.018)
Bolsa Família	.013	-.013*	-.186	.0025**
	(.062)	(.007)	(.249)	(.0011)
BF*Bottom 20%	.044	.067**	.430	.0058
	(.157)	(.028)	(.456)	(.0088)
Bottom 20%	-.490	-2.93**	-18.46	-.279
	(7.191)	(1.29)	(19.19)	(.110)
Constant	2.81	.386	8.27*	.257**
	(3.09)	(.429)	(4.63)	(.111)
Clust. errors	Yes	Yes	Yes	Yes
1st stage F test[a]	5.38	12.96	2.45	6.50
Weak instr. test	p=.68	p=.17	p=.27	p=.17 (S-W)
Hansen J test	p=.40	p=.52	p=.20	p=.13
N	173	158	173	183

Notes: $, *, ** and *** respectively significant at 12%, 10%, 5% and 1% risk; standard errors of coefficients are reported in brackets; the errors are clustered by microregion; [a] the first stage instruments for BFP/GDP are the municipality' s ratio of *Cad' Unico* registration over poor, size in km^2 and longitude in degrees.

Table A4 in Appendix reports various socioeconomic indicators for the Ceará, the *Nordeste* region and Brazil. Figures show that Ceará's participation rates are close to those of other North-Eastern states which are close to those for overall Brazil. Equally, rural/urban dualism, poverty rates and participation to the BFP are very similar in comparable states (all except Amazonian and metropolitan states). The dynamics of BFP diffusion and coverage across states is also remarkably comparable. Table A4 shows that concerning the ratio of the poor covered by the BFP, Ceará is remarkably close both to the Northeast region and the Brazilian average. This means that although limited to Ceará, our results might have external validity for the rest of Brazil, except for the three strongly industrialized and urbanized regions (Rio, Sao Paulo and Belo Horizonte) and for the mostly agricultural and rural Amazonian region.

Ceará's municipalities therefore show strong proximity with those of the Nordeste and of the rest of Brazil in matters of poverty and *BF* benefits. Conversely, the Ceará's productive structure - more industrial and less agricultural than in the other states of the region - is pretty similar to the rest of Brazil. Given the importance of initial productive structure in the local growth impact of the BFP, these structural differences with the rest of Northeast could possibly undermine the external validity of our results for the whole region. This paper shows that the adverse effect of social transfers on economic structure is worse in less industrial economies. It would then ensue that the impacts estimated on Ceará may well underestimate the average magnitude of the growth's indirect effect in the less industrialized states of the Northeast region. Conversely, the magnitudes estimated on Ceará might be closer to those of the rest of Brazil, since their productive figures are close to those of Ceará - as reported by Table A4.

6.2. Policy relevance

By pointing to unintended local perverse effects of the BFP undermining the capacity of local economies to become progressively less and less dependent on social transfers to support livelihood, our findings raise obvious policy issues that should be discussed:

First, it should be recalled that the BFP was not geared towards industrialization and productive inclusion objectives but, instead, towards alleviating poverty self-sustaining mechanisms concerning access to primary consumption and production goods. Still, social transfers-induced demand has certainly sustained manufacturing structures in the municipalities that already had an industrial base before the introduction of the program. Thus, the BFP certainly had desirable general-equilibrium effects by prompting manufacturing activities in regions where Brazilian industries are already concentrated, therefore spurring trade between industrialized and non-industrialized states and municipalities. Although we don't argue that industrialization should occur equally in every municipality, we point to the risk that, while reducing consumption and income deprivation in the poorest regions of Brazil, the BFP might also contribute to aggravating spatial inequality across the country. Although the estimated overall BFP impact on local growth was positive for the 184 municipalities of Ceará, it may shrink and even vanish in the future, especially in the most vulnerable and weakly productive municipalities and regions.

Besides social transfers, various policy tools explicitly targeting structural change and productive inclusion have been implemented by the Brazilian federal government over the past two decades. Still, these policies only generated low returns in terms of industrialization[28] and could not

[28] Both the SUDENE/ADENE or the Northeast Development Agency have received the mandate to promote and support industrial development in the Northeast. They have notably supported the modernization of food and textile production in *Ceará*, notably by concentrating formerly dispersed financial means. Still, Araujo (1996, 1999) has described how the political activism of local Northeastern elites have eventually limited the objectives and perverted the SUDENE actions. Various other federal schemes have attempted to prompt local industrialization, albeit with no more success. The most spectacular one, the PAC launched in 2007, was aimed at accelerating local growth by funding and facilitating investment in three main sectors: logistics, energy and urban infrastructure. Yet, the Northeast only get 15% of the investment, while the Southeast concentrated 60% of them. Recent evaluations report disappointing results.

compensate for some of the structural trends featured by poor localities and regions. Public investment and industrial policies could not fully compensate the local multiplier leak from Northeastern states to the more South-east industrial ones running through internal importations. In the long run, spatial inequalities could even be exacerbated by the adverse indirect effects of social transfers on productive structures in the poorest states or municipalities of Brazil. Although the BFP's prime objective was to not address the inclusion of the largest possible share of the population in productive activities by prompting structural transformation, its impact on sustained economic inclusion is now cited by Brazilian authorities and multilateral aid agencies as a real concern[29]. In the *Medida Provisória* (*Provisional Measure*) No 132 of 20 October 2003 and Law No 10.836 of 9 January 2004, which enacted the BF, the objective "to stimulate the sustainable emancipation (*sustentada*) of the families who live in situation of poverty and extreme poverty" is explicitly added to the fundamental objectives of the program, that is promoting access to health, education and social assistance and tackling hunger and poverty.

Our findings therefore raise concerns about the prospects of long-term economic growth for communities currently featuring high rates of social programs participation, if no additional and renewed policy is implemented to counterbalance the adverse structural change impact of redistribution. The future trends of inequality and poverty reduction could be affected by any reversal of these federal transfer schemes. The recent announcement of drastic reduction in public spending over the long run (20 years) by the Temer government certainly threatens the stability and sustainability of the amounts transferred to the poorest populations in poor regions. Our results therefore show that the gains of BFP in terms of poverty reduction and consumption inclusion are reversible if transfers are cut off; since local productive structures in the local economies highly dependent on social transfers have not upgraded to provide production or employment opportunities, truly autonomous from federal transfers.

Ideally, the logic of assistance - backing social transfers in the first place - should dissipate over time, the improvement in living conditions of the beneficiaries being progressively supported by genuine economic inclusion of poor households and workers. Still, by using a cautious empirical approach accounting for endogeneity and spatial correlation issues, our analysis shows that, although implemented in a similar fashion in different places and applied to relatively homogeneous social groups in terms of their poverty, the transfer policy actually produces very different – and sometimes perverse – economic effects depending on the local context. In areas lacking modern productive structures and labour markets, some of the anticipated economic benefits of such transfers may actually have materialized to a very limited degree. Conversely, the most visible positive effects require the existence of favourable productive characteristics in the municipalities.

The medium-term impact of social transfers on poor regions' local productive structures should notably be more fully acknowledged by policymakers, with policies promoting small-scale formal industrialization being combined with social transfers in order to create the conditions for the emergence of a modern, formal labour market at the municipality level. The set of federal policies aimed at promoting the economic development of North-eastern Brazil includes various initiatives to boost the development of local industry. Nevertheless, the impact of these initiatives on the income and well-being of poor households will certainly remained heavily constrained by the weak development of formal labour markets in most municipalities.

7. Conclusion

[29] This enlarged objective of the BFP was notably clearly expressed by the World Bank Program Manager Bénédicte de la Brière: « *The challenge now facing the program is to enhance the impact even further by encouraging its integration with actions in other areas such as access to labor markets, income generation* (…) »(http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21447054~pagePK:64257043~piPK:437376~theSitePK:4607,00.html)

This paper tests the assumption of a negative growth impact of the Brazilian BFP running through the change of local productive structures provoked by local consumption expansion. The thriving of consumption economies with weak prospects of sustained and autonomous growth pattern is an emerging concern in Brazil, insofar as the future of social policies is made very uncertain by recent announcements of drastic cuts in public spending.

From a simple Keynesian multiplier model with two types of municipalities, the lightly and highly productive, we first draw two hypotheses: (1) Social transfers may influence local economic growth through the demand and supply side effects, yet (2) this influence may be compounded or on the contrary magnified by the impact of social transfers on local productive structures, according to the local economy's initial productive capacities. Redistribution trap is a possible medium-run outcome of this process. By using original municipal level data on the Ceará state of Brazil, we provide empirical support for the assumption of positive local economy effects of CCTs, here the BFP. We further investigate the effect on the BFP on local productive structure and find evidence of an average increase in services activities and informality during the 2000s spurred by the intensity of BFP transfers in local GDP. Our findings also confirm our theoretical assumption that BFP have differentiated impacts on productive structures in the most industrialized and least industrialized municipalities, albeit in a rather unexpected way. We therefore cannot draw from these results that the multiplier effects of the top and the bottom municipalities in terms of initial industrialization will diverge over time as social transfers progressively modify local productive structures in directions not consistent with the theoretical model, with laggard municipalities being embarked upon a catching-up dynamics towards more industrialized municipalities partially stimulated by demand and supply side impacts of the BFP.

The BFP has largely met its main goal, that is poverty and extreme poverty reduction, while significantly improving educational outcomes in the poorest regions and social groups. Undoubtedly, these outcomes might improve the long run potential for economic growth and transformation of the *Northeast* region. The results of this paper therefore support the assumption that the demand triggered by social transfers has positive multiplier effects on local growth which are empirically documented for Latin America (Barrientos and Sabatés-Wheeler, 2009; Angelucci and De Giorgi, 2009; Vila, 2014; Limoeiro, 2015). Yet, our findings also nuance this support by identifying a potential adverse indirect growth impact of social transfers conditional to the direction of structural transformation. Ultimately, our findings show that the enhanced growth potential could be well be compounded by the excessive dependence on transfers. This issue would deserve more political attention and complementary policies to support productivity enhancement and labour market formalization in poor Brazilian states.

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Appendix

Table A1: List of variables, sources and descriptive statistics

Variables	Measurement	Source	Mean Value	Min. Value	Max. Value	Standard deviation
GDP Growth	Growth rate of the GDP per capita index of Municipios HDI (2000-2010)	IBGE	0.115	-0.027	0.381	0.060
Initial GDP	GDP per capita index of Municipios HDI (2000)	IBGE	0.503	0.413	0.729	0.045
Population size	Average population of Municipio (2000-2010)	IBGE	43161	4939	2296794	170752
Education level	Average value of the education index of Municipios HDI (2000-2010)	IBGE	0.628	0.506	0.790	0.044
Dependency ratio	Average ratio of the economically inactive to the working age population. defined as those 15 to 60 years (2000-2010)	IBGE	65.547	46.890	80.505	6.174
Employment concentration	Average concentration of employment among employer establishments (Gini index. 2000-2010)	IBGE	0.836	0.667	0.920	0.050
Medical Infrastructure	Average sum of standardized values of Municipios medical infrastructures (physician. dentist. hospital bed and health care facility per habitant. 2000-2010)	IBGE	-0.113	-4.633	6.000	2.226
Agricultural share	Average value added of agricultural output as a proportion of total added value (2000-2009)	IBGE	16.621	0.090	37.908	7.335
Industrial share	Average value added of industrial output as a proportion of total added value (2000-2009)	IBGE	12.944	3.435	70.961	12.792
Service share	Average value added of services output as a proportion of total added value (2000-2009)	IBGE	70.435	28.041	84.448	10.285
Business Size	Average size (number of employees) of commercial activities (2002-2011)	IBGE	3.505	1.672	10.125	1.442
Labor Market formalization	Overall degree of municipality's labor market formalization describing various aspects of labor markets in 2010 and their independent dynamics over the 2000-2010 period. The variable is ordinal ranging from 1 (poorly formalized and formalizing) to 5 (strongly formalized or formalizing over the period).	IBGE	2.38	1	5	1.149
Bolsa Família	Average Bolsa Família share in Municipios GDP (2004-2010)	MDS	35.836	3.798	100.32	12.844

Table A2: Pairwise correlations between structural transformation variables and instruments

	Overall industry / GDP	Transformation industry / GDP	Labour market formalization	Service sector business size	BF over GDP	Cadastro registr. over poor	Municipality's size
Overall industry / GDP	1.000						
Transformation industry / GDP	0.109	1.000					
Labour market formalization	0.625*	0.243*	1.000				
Service sector business size	0.514*	0.282*	0.453*	1.000			
BF over GDP	-0.598*	-0.269*	-0.607*	-0.550*	1.000		
Cadastro registr. over poor	-0.103	-0.030	-0.0479	0.004	0.365*	1.000	
Municipality's size	-0.087	-0.031	0.023	-0.024	0.137	0.202*	1.000

Note: * for significance at 5%.

Table A3: 2SLS second stage estimations of GDP per capita growth (2000-2010 average values): spatial controls

Dep. var.: GDPp.c.gr.	(1) BF nearby municipalities	(2) Metroplitan area	(3) Distance to capital	(4) Latitude & longitude	(5) Micro-region
Initial GDP	-1.35***	-1.35***	-1.31***	-1.31***	-1.34***
	(.113)	(.112)	(.120)	(.120)	(.133)
Pop. size	.013	.013	.014*	.014*	.014*
	(.008)	(.008)	(.008)	(.008)	(.008)
Education	.482***	.485***	.485***	.485***	.489***
	(.086)	(.089)	(.093)	(.093)	(.103)
Depend. rate	-.002***	-.002***	-.003***	-.003***	-.003***
	(.0008)	(.0007)	(.0007)	(.0007)	(.0008)
Publ. inv.	.149	.140	.167	.167	.158
	(.127)	(.124)	(.130)	(.130)	(.098)
Empl. Conc.	-.291***	-.285***	-.297***	-.297***	-.288***
	(.071)	(.067)	(.070)	(.070)	(.063)
Indust. share	.024**	.020**	.025**	.025**	.025***
	(.010)	(.010)	(.011)	(.011)	(.011)
BF/GDP	.0013*	.0012**	.0016*	.0016*	.0014*
	(.0007)	(.0006)	(.0009)	(.0009)	(.0008)
BF near mun.	-.0003	-	-	-	-
	(.0004)				
Metropolitan	-	.016	-	-	-
		(.011)			
Latitude	-	-	-	-.0004	-
				(.0048)	
Longitude	-	-	-	.0017	-
				(.0030)	
Micro-region	-	-	-	-	-.0004
					(.0004)
Dist. to capital	-	-	-3.69e-05	-	-
			(3.13e-05)		
Constant	.822***	.816***	.805***	.815***	.836***
	(.137)	(.131)	(.139)	(.139)	(.135)
Clust. errors	Yes[a]	Yes[a]	Yes[a]	Yes[a]	Yes[a]
2^{nd} stage R^2	.66	.57	.55	.55	.56
N	184	184	184	184	184
1^{st} stage F test[b]	37.2	9.66	5.37	48.8	6.84
Hansen J test	p=.79	p=.74	p=.51	p=.51	p=.63
Weak instr. test	p=.15	p=.13	p=.14	p=.14	p=.10

Notes: *, ** and *** respectively significant at 10%, 5% and 1% risk; standard errors of coefficients are reported in brackets; [a] Coefficient's standard errors are clustered by microregions (N=33). [b] The instruments used for the Bolsa Família is the Cadastro Unico registration as a percentage of the municipality's poor population and the municipio's latitude and longitude.

Table A4: Socio-economic indicators: Ceará, Nordeste and Brazil

Variables	Ceará	Nordeste	Brazil
Urbanization (% of population, 2009) [a]	77.3	72.8	84.0
Unemployment (% of active population 2011) [a]	5.2	7.9	6.7
Poverty (% of population, 2011) [a]	59.5	60.3	34.0
Agriculture (% of GDP, 2010) [b]	4.2	17.1	5.3
Industry (% of GDP, 2010) [b]	23.7	12.0	28.1
Services (% of GDP, 2010) [b]	72.1	70.9	66.6
BFP beneficiaries / poor (%, 2009) [c]	31.1	26.3	30.9
BFP beneficiaries / poor (%, 2012) [c]	45.9	43.8	45.8

Sources: [a] IPECE, [b] IBGE, [c] MDS / IBGE

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