Managing the Principal Agent Problem in Bolsa Familia

A look at contextual factors that affect the quality of implementation

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Preface

Through ESRC/DFID Award RES-167-25-0563, a three-year grant from the UK Economic Social Research Council (ESRC) and Department for International Development (DFID), RAND Europe and the Institute for Fiscal Studies assessed the effectiveness of conditional cash transfer programmes (CCTs) in low- and middle-income countries. By analysing the impact of external conditions on CCTs at both the institutional and household level we aim to address some of the gaps in our understanding of the effectiveness of CCTs, and therefore to contribute to more efficient government programmes to alleviate short- and long-term poverty.

CCTs have been extensively evaluated, but important questions remain unanswered. CCTs produce extremely varied results in different contexts. We need to understand how this variety is explained by for instance environmental factors, the availability of health and education services, and individual background variables. We need also to understand the mechanisms by which CCTs secure the results they do. Without this knowledge we cannot determine whether CCTs are likely to alleviate poverty effectively in the current economic climate.

This report is the second in a series and looks in more detail at the relationship between the capacity of municipalities and support services involved in the delivery of the programme and the outcomes of Bolsa Familia, the largest CCT in Brazil. It tries to establish which factors are associated with more effective implementation.

This report is directly relevant for policymakers and those involved in the administration and design of CCTs.

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Summary

Bolsa Familia (BF) is a conditional cash transfer programme (CCT) introduced in 2003 in Brazil. It is one of the largest CCTs in the world, including about 25% of the population as beneficiaries. This report aims to understand the principal agent problem in BF. A principal agent problem arises when agents implementing a programme, in this case the municipalities and support services (health and education), do not have the right incentives, information and capacity to provide services in the programme for the principal, here the Brazilian federal government, on whose behalf they act. As a result, the quality of implementation and the outcomes of the programme can suffer. In this report, we want to look at the agents across the territory implementing BF and providing support services such as health and education services. We do this by running three generalised linear models to find associations between contextual factors against outcome measures related to the quality of the provision of services such as registries. The results provide useful information on the quality of implementation of a CCT and in turn the effectiveness of such programmes.

Our findings suggest that those implementing services must have a clear incentive in the programme, either through an accountability relationship with the beneficiary, strong oversight such as the monitoring of local implementation by the federal government, or direct support to those implementing the programme. Smaller municipalities and those with poorer constituencies tend to have more accurate registries. Health and education services seem to have less incentive to operate in BF as they have no electoral incentive and receive no direct support under BF. In addition, our results show that the potential asymmetries in information between poorer potential beneficiaries, municipalities providing services and the state appear less significant in explaining differences in quality of implementation between localities. Finally, our models show that more integration between BF and health and education services is associated with better-reported implementation.

These findings contribute to the debate on what is important in the implementation of a CCT and how such implementation should be organised and supported.

Acknowledgements

Abbreviations

BF	Bolsa Familia
CCT	Conditional Cash Transfer Programme
CRAS	Centros de Referência de Assistência Social (social assistance centres)
GDP	Gross National Product
ENDF	National Education Development Fund
FNAS	National Social Assistance Fund
ICS	Health Conditions Index
IDEB	Basic Education Index
IDSE	Socio-economic Development Index
IDSUS	Health Service Performance Index
IESSM	Structure of the Municipality's Health System Index
IGD	Índice de Gestão Descentralizada (Decentralised Management Index)
INEP	Anisio Teixeira National Institute for Educational Studies and Research
MDS	Ministry of Social Development
TAC	Taxa de Atualização de Cadastros (share of households with registries updated at least within the last two years)
TCF	Taxa de Crianças com Informações de Frequência Escolar (the share of children in the programme with complete information on compliance with education conditionalities (as a share of all BF children aged 6–15)
TCQC	Taxa Cobertura Qualidade de Cadastros (share of households with a complete and consistent registration)
TFS	Taxa de Famílias com Acompanhamento da Agenda de Saúde (the share of households with complete information on compliance with health conditionalities)

1. Introduction

Bolsa Familia (BF) is the largest conditional cash transfer programme (CCT) in the world. It includes over 13 million poor Brazilian households or about 25% of the population (Hall, 2011). It aims to provide cash transfers to poor households. In exchange, households have to comply with a number of conditionalities including sending children within the household to school and visiting health clinics for vaccinations and regular check-ups for mothers and children (Lindert et al., 2007). BF was introduced in 2003 and brought together a range of federal CCTs including most prominently Bolsa Escola, which was aimed at improving school enrolment (Lindert et al., 2007).

The logic behind CCTs is that a cash payment will lift households out of poverty and lead to healthier and better-educated children and mothers, in turn resulting in positive human capital development in the longer term. Evidence collected mainly in Latin America but also more widely as the programmes have spread globally suggests that CCTs can be successful in reducing poverty and also improving school enrolment and the take-up of health services (Fiszbein et al., 2009; Fried, 2012). Though the effects of CCTs are increasingly and better understood, as are, in particular, the linkages between the coverage, the size of the incentive, the targeting regime and overall effect (Fiszbein et al., 2009), less is known about the programme and external factors that contribute to this overall effect (this is also noted in Collins, 2012). We have for instance less systematic evidence about the effect of how services within CCTs are provided and the effect of the quality of these services. This matters as CCTs are increasingly used globally and are seen as an effective way to support human capital development and poverty reduction. To understand particular issues around the transferability and scalability of programmes, the evidence base needs to be developed further.

From a public administration point of view, programmes such as BF mostly involve a decentralisation process whereby third parties are asked to provide services to citizens/recipients on behalf of the state. This presents a principal agent problem whereby the agents, in this case the municipality and support services, may not provide (high-)quality services for the federal government of Brazil (see e.g. Bossert et al., 2000).

The lack of good implementation could be for a variety of reasons such as the incentives of the agent, capacity, or an asymmetry of information. Incentives in this case would refer to a direct accountability relationship between provider and recipient, a clear policy framework, or potentially a financial incentive to provide good-quality services. Intermittent and inconsistent policy may also be a factor, as seen in municipal support for refuse collectors in Brazil (see Pinto et al., 2012). In this case, the agent (recycling refuse collector) finds it difficult to operate and build capacity without a consistent policy framework and incentive from the municipality. Finally, the accountability relationships between citizen and state may be

changed as a third party (or third parties) is (are) interjected. The changing accountability relationships result in an increased emphasis on how the state manages third parties effectively (e.g. performance management) and how citizens can hold their government to account over service provision. One assumes that with better accountability relationships those providing services will have an incentive to improve the quality of implementation.

In addition, quality of service provision may be quite heterogeneous, varying according to the capacity (e.g. budget, manpower, infrastructure) of the agent(s) in different locations to deliver these services (Lindert et al., 2007, 24). This point is especially relevant in a large and diverse country such as Brazil. There are also suggestions that co-location and deeper integration between agents supplying services can lead to better-quality services (Grindle & Thomas, 1989). Integration and better coordination tend to improve administrative capacity and seem to be associated with agents acting more in the spirit of what was intended in the programme design and, as a result, better alignment of incentives.

Finally, asymmetries of information exist in many programmes, often between the provider, the state and the recipient. Recipients are often poor and vulnerable and as such may struggle to understand their rights and obligations under the programme or to hold the service provider to account, which may exacerbate the principal agent problem (Woolcock, 1998). Thus, the federal government of Brazil may not have the right information on how registration occurs in all municipalities and potential beneficiaries may have insufficient voice to hold providers to account. The problem could be more severe in municipalities with poorer populations.

The key area of interest for this report is how the principal agent problem manifests itself in BF. BF lends itself well to such analysis for a number of reasons. Firstly, Brazil is a sizeable country with varying geography. Secondly, the main interface between claimants and the programme is at a municipal level (see Table 1). With over 5,564 municipalities, Brazil provides variance across service providers. In most cases, municipalities have a dedicated BF implementation unit that is part of the municipal social assistance unit. This unit serves as a point of contact for the programme and is involved in its coordination and monitoring and registering claimants. Interestingly, Brazil is one of the few countries to have introduced a CCT which closely monitors the quality of implementation at a municipal level and reports on this. This approach aims to mitigate the principal agent problem by reducing the asymmetry of information between state and providers, but also provides important information on the quality of implementation as captured in the quality of implementation index of BF. A further factor related to the principal agent problem is the visibility of the programme. BF is well known across the population and eligibility criteria are reasonably well understood by most claimants (Lindert et al., 2007). Thirdly, Brazil also has particularly good federal data collection, which offers information on variables that relate to the programme, such as quality of health and education services.

Table 1. Approach to implementation of BF at different levels

Level	Competencies
Ministry of Social Development	• Policy setting • Programme supervision • Payment authorisation • Supervision of conditionality compliance • Coordination with ministries • Training of municipal officers • Programme guidance • Undertaking impact evaluations and monitoring
States	• Training and support to municipalities • Oversight over the consistency of implementation
Municipalities	• Point of contact for BF • Coordination of local services • Registering claimants • Updating registries • Monitoring health and education compliance • Referring claimants to other services • Local programme monitoring
Ministries of Health and Education	• Guidance and training for municipal officers • Providing information on conditionalities
Caixa Econômica Federal	• Management of national registry database • Provision of unique identifiers • Making payment to claimants
Control bodies such as the General Controller's Office, the Federal Audits Court and the Office of the Public Prosecutor	• Providing formal oversight

Source: Own compilation based on Lindert et al. (2007).

Our approach was to first identify the programme and external factors that the literature shows are important in the implementation of a CCT and that relate to the principal agent problem. We then reviewed the federal datasets and tried to find proxies in the datasets for those variables.

The variables broadly relate to factors important in understanding a principal agent problem, such as the capacity of municipalities, the supply of services, the integration of services, political incentives, levels of poverty, and urban versus rural context. In terms of education and health services, studies point to the importance of differences in the quality of services in effective BF implementation (Rocha, 2009). Poor quality of services could affect how claimants engage with services as well as the benefits they derive from them. Moreover, poor integration and coordination of services also seem to hamper programme implementation (Magalhaes et al., 2011). The relevant studies emphasise a perceived link between greater

integration and coordination and the quality of implementation. Political incentives seem to matter: the studies suggest a positive relationship between successful BF implementation and electoral outcomes (de Janvry et al., 2010; Zucco, 2011). On the one hand the popularity of CCTs may have an electoral effect in general, mostly independent of political party affiliation (Hall, 2011). This means that even parties that did not assist in the introduction of BF at the national level may benefit from BF implementation at the municipal level. On the other hand, there may be specific relationships between electoral gain and quality of implementation, and a positive relationship between re-election of the incumbent mayor and the impact of the programme (Zucco, 2011). In terms of poverty, extreme poverty seems to be negatively related to programme efficacy as it may limit the claimant's ability to take up the full benefits of the programme (Fiszbein et al., 2009). This is often linked to asymmetries of information related to programme enrolment between recipients, providers and the federal state (see e.g. Bastagli, 2010; Sanchez-Ancochea & Mattei, 2011). The recipient may not have enough information about the programme to make an informed decision to enrol and the federal state too little information on who enrols to hold local providers to account. Studies also suggest an interaction between poverty and geography. Programmes in poorer and more remote rural areas appear to have higher dropout rates and could have a poorer quality of implementation (Bastagli, 2010). However, some studies claim that there is little difference between programme effectiveness for urban and rural areas and even suggest that the positive impact of a CCT on poorer rural households may be greater than in urban areas (see e.g. Sanchez-Ancochea & Mattei, 2011).

As an outcome measure, this report looks at administrative data, in particular the quality of implementation index used in BF, the Decentralised Management Index (Índice de Gestão Descentralizada [IGD]). This index allows the Ministry of Social Development (MDS), which oversees BF, to monitor the quality of implementation. It also serves as a tool to allocate resources to municipalities. Initially each municipality had a quota of claimants that it could enrol set by the MDS. If a municipality performs well according to the index, it can receive additional BF resources either through an increased quota of claimants or, more recently, as the coverage of BF has been extended, through wider programme resources such as administrative funds. This index is calculated on the basis of reported data from municipalities and health and education sources. The MDS and Brazilian audit institutions perform regular inspections to test the accuracy of the data supplied (see e.g. Lindert et al., 2007). Table 1 gives an overview of the main responsibilities in administering BF. The index consists of four components: the share of households with a complete and consistent registration (Taxa Cobertura Qualidade de Cadastros [TCQC]); the share of households with registries updated at least within the last two years (Taxa de Atualização de Cadastros [TAC]); the share of households with complete information on compliance with health conditionalities (Taxa de Famílias com Acompanhamento da Agenda de Saúde [TFS]); and the share of children in the programme with complete information on compliance with education conditionalities (as a share of all BF children aged 6–15) (Taxa de Crianças com Informações de Frequência Escolar [TCF]). The sum of these components is then divided by four to arrive at a value for the IGD.

In this report, we take the key variables from the literature and outcome variables in the IGD and test the following hypotheses that relate to the principal agent problem present in programmes like BF:

1. If the incentives of agents are more closely aligned (e.g. the presence of a financial programme incentive and/or accountability relationship) to those of the principals the quality of implementation tends to be greater (H1);

2. The capacity of the agent relates directly to the quality of service delivery (H2);

3. Deeper integration of service provision between agents can lead to better quality of implementation (H3); and

4. More disenfranchised (poorer and living in remote or rural geographies) populations receive worse quality of implementation (H4).

In the following chapters, we provide more detail on the variables we considered, the modelling approach, our findings and the limitations in our approach.

2. Data

In the first instance, we collected proxy variables from the federal datasets to cover the types of variable that the literature has deemed important in the implementation of BF. These variables fall into five main categories (we present more detail on each category in the appendix to this report):

- municipal capacity variables that relate to budgets and general resources;
- variables that relate to both the quality of these services and how the services are provided at municipal level;
- variables that relate to electoral outcomes;
- demographic variables (e.g. poverty levels and ethnicity);
- geographic variables that relate to regions, rural versus urban contexts, etc.

Most of these variables were collected in 2010 and some in 2011, as specified below. Election data are from 2008. We have gathered these data from a variety of sources which have used a variety of survey instruments for data collection (see Appendix).

In this study, we only included per capita revenue, specific revenue streams associated with education, health and social services, and GDP per capita as capacity proxies. It was hard to collect dedicated staffing levels for specific services at municipal level. The Treasury Secretariat (Secretaria do Tesouro Nacional) of the Ministerio da Fazenda provides access to financial information at the municipal level.

In terms of the supply of education and health services, we included variables on the quality of services and the integration of services at municipal level. The Health Service Performance Index (IDSUS) for 2011 is a composite index on the scale of 0 to 10. The Ministry of Health assigns this index after giving consideration to a variety of factors including population, socio-economic background and child mortality. IDSUS encompasses three sub-indices: Socio-economic Development (IDSE), Health Conditions (ICS) and Structure of the Municipality's Health System (IESSM). It captures the level of access and quality of health services based on the above three indices and groups the municipalities in six homogeneous groups on the basis of their score. The Basic Education Index[1] (IDEB) for 2011 is developed by the Anisio Teixeira National Institute for Educational Studies and Research (INEP) under

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[1]Source:
http://download.inep.gov.br/educacao_basica/portal_ideb/o_que_e_o_ideb/Nota_Tecnica_n1_concepcaoIDEB.pdf (accessed September 2012).

the Ministry of Education to measure the flow and quality of education on the scale of 0 to 10. We used the IDEB values for fourth-grade students in schools administered by municipalities. In terms of integration, we also measured: information sharing, evidenced, for example, by the existence of records of beneficiaries and compliance conditionalities, the degree of IT integration between the various actors, and the degree of operational integration between services operating at a municipal level. We created composite indices for relationships between municipal social assistance centres called Centros de Referência de Assistência Social (CRAS) and other services. Each index on the scale of 0 to 8 was developed from the following conditions and the satisfaction of the respondent with each aspect of service provision of each condition counted as one point in the index.

1.   Has location data (address, phone, etc.)

2.   Accepts users referred by this CRAS

3.   Forwards users to this CRAS

4.   Tracks referrals

5.   Holds regular meetings

6.   Information exchange

7.   Performs case studies together

8.   Carries out activities in partnership.

CRAS provide social services directly to the public and also serve as referral centres for the public to access wider public services. We take the degree of integration between CRAS and other services as a proxy of local integration. BF claimants often enrol in BF at dedicated BF implementation units, which are mostly separate from CRAS. Therefore, we also measure the level of integration between CRAS and BF units.

The data related to electoral outcomes were obtained from the website of Estatistica TSE (www.tse.jus.br). These political variables correspond to the results of the 2008 municipal elections. We take a variety of outcome measures such as the winning percentage, size of majority and whether there is same-party affiliation at municipal and state levels.

Finally, we take the poverty estimates from the preliminary 2010 poverty census produced by the Ministry of Social Development These were collected by means of household surveys. The Brazil census classifies population groups mainly on the basis of skin colour and whether they belong to indigenous groups. We look at poverty in terms of geography and ethnicity.

Rather than looking at the IGD as a whole as a proxy for the quality of implementation, in this report we take parts of the IGD as proxies for the performance of different actors in BF, the municipalities and education and health services on the supply side. In terms of municipalities, we build a new composite index out of the two index components related to the quality of registration and updating of the registry: the TCQC and TAC, respectively. The quality of information in the registry may also reflect on the municipality's overall ability to manage the demand for BF services. For the health and education services, we take reported compliance with health and education conditionalities respectively as outcome measures. At the very least, the TFS and TCF give information on the quality of reporting by health and education services. However, it is likely that these measures also tell us about how claimants are engaging with the

health and education services, respectively, be it through the willingness of claimants to take up services or the absence of adequate service provision. We distinguish between compliance with education and compliance with health services.

3. Approach

We developed three separate models taking the three outcome measures introduced earlier as dependent variables. This gives us a model looking at the quality and updating of registries (the TCQC–TAC model), a model focusing on compliance with the health conditionality (TFS), and a model covering compliance with the education conditionality (TCF). Our analysis showed that this approach made sense as each outcome measure measured different aspects of the quality of implementation of BF across municipalities (see Table 2 below).

Table 2. Pearson correlation coefficients of three models

	Avg TCQC_TAC (quality of registry)	Avg TFS (health compliance)	Avg TCF (education compliance)
Avg TAC–TCQC (quality of registry)	1.0		
Avg TFS (health compliance)	0.1996	1.0	
Avg TCF (education compliance)	-0.0407	0.2178	1.0

Source: Own calculations.

We collected data from the IGD published monthly by the MDS. We took the average of the IGD components over a period from January 2009 to October 2010. Each one of these four components (TCQC, TAC, TFS, and TCF) is measured on a scale between 0 and 1. The municipalities have a performance incentive to achieve an IGD score of 0.8, which results in additional programme resources (either through an increased quota of claimants or wider programme resources [administrative funds]). As such, we expect the outcome measures to cluster around 0.8. This is visible in Figure 1.

We then used regression analysis to examine the associations between the contextual (programme and external) variables and the outcome variables, the TCQC_TAC, TFS, and TCF. We ran three models and used the TCQC_TAC, TFS, and TCF score for each municipality as the dependent variables in the analysis. We then tested their correlation with the contextual variables. As the values of dependent variables are between 0 and 1, we used a fractional logit model as proposed by Papke and Wooldridge (1996) for our data analysis.

The generalised linear model can be denoted as:

$$g(\mu) = \sum_{k=1}^{K} \beta_k X_k \qquad\qquad\qquad\qquad \text{Eq. (1)}$$

where μ is the expected value of the dependent variable, and

g(μ) is a smooth and invertible link function.

The outcome variable which is confined to the interval [0,1] is transformed using the logit link function defined as g(μ) = log[μ/(1- μ)] to an entire real line from -∞ to ∞. Note that the equation above summarises the systematic component of the GLM representing the measurable predictor terms in the model. The error term or the random component of the model represents the measurement error and specifies the conditional distribution of the dependent variable given the values of the independent variables X. Since the dependent variable is in the range [0,1] we use binomial distribution (family) as set out by Papke and Wooldridge (1996). β_k are the unknown parameters to be estimated and a positive value indicates that the kth independent variable (e.g. per cent of rural households in poverty) is positively correlated with the dependent variable (e.g. TCQC_TAC). More specifically it indicates the expected change in the log odds of increase in the dependent variable. For a binary variable (presence of food card programme Yes=1, No=0) the coefficient indicates the log of odds ratio between group with value 1 and group with value 0. The glm was estimated using maximum likelihood estimation in STATA.[2]

In developing the model we retained only those variables which were significant at the 90 per cent level of confidence. The number of observations for the model depends on the missing values in the dependent variables. We had to exclude 35 municipalities with missing values in the IGD.

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[2] See details at: http://www.stata.com/support/faqs/statistics/logit-transformation/

4. Findings

The model results show the associations between the key independent variables and dependent variables included in the model. The model fit in each of these three models involves comparing the log pseudo-likelihood values for the (full) models with those of corresponding models with only the constants (i.e. without any independent variables). A likelihood ratio test was conducted to test if this difference in log likelihood (full-constant) is statistically significant. The results show that all three models are better than the constant-only model in terms of fit to the data. We present the results for the three models in the appendix to this report.

The significant findings of each model can be simplified as follows. Table 3 presents the summary of model results expressed as odds ratio. Odds ratio over 1 represents positive association between dependent and independent variables and odds ratio less than 1 indicates negative association.

Table 3. Synthesis of significant results across models (odds ratios)

Significant variables in each model	TAC_TCQC (quality of registry)	TFS (health compliance)	TCF (education compliance)
Municipal capacity variables			
Log (per capita transfers from the National Education Development Fund – ENDF)			1.011
Log (per capita transfers from federal government)		1.242	
Log (per capita transfers from the National Social Assistance Fund – FNAS)	1.008	1.013	
Log (per capita transfers from state)	0.964		
Binary (municipality in top 100 GDP)			1.196
Log (total households in the municipality)	0.961	0.856	0.895
Binary (population of municipality is over 100,000)	0.858	0.853	
Log (per capita budget revenues)		0.758	

Quality of health and education services			
Health Service Index	1.021	1.084	
Basic Education Development Index		1.129	1.125
Integration and coordination with other local services			
Indicator for CRAS relationship with BF programme (score 0 to 8)	1.014		1.009
Indicator for CRAS relationship with health services (score 0 to 8)		1.019	
Binary (presence of food card)	1.052	1.156	
Politics- and voting-related variables			
Percentage votes for the winning party		1.308	
Binary (same party in government at state and municipal level)		0.932	
Demography- and poverty-related variables			
Percentage of indigenous people in poverty	1.705		0.595
Percentage of black people in poverty	1.395		0.429
Percentage of brown people in poverty	2.250	1.240	0.571
Percentage of yellow people in poverty	7.471		
Percentage of rural households in extreme poverty	1.327	1.180	
Percentage of urban households in extreme poverty	2.677		1.679
Geographical and regional variables			
Binary (municipality in CW region)		0.914	0.703
Binary (municipality in N region)	1.085	1.115	0.841
Binary (municipality in NE region)	1.324	1.406	1.147
Binary (municipality in S region)		1.096	0.864
Percentage of households in rural areas		1.283	1.118

Legend:

CW region – Central West region

Source: Own calculations.

This leads us to the following findings.

4.1. Municipal size and capacity

There seems to be an overall negative association between the number of households in the municipality and the outcome variables in all three models. Moreover, municipalities with populations over 100,000 seem to have worse quality of registration and health compliance than smaller municipalities. Finally, the budget per capita variable seems negatively associated with the outcome measure looking at health services' reports on how claimants comply with health conditionalities.

A first conclusion is that smaller (in terms of overall number of households) municipalities have better-reported performance in BF using our outcome measure. If we equate maintaining accurate registries with better-overall-quality BF implementation, then our findings could suggest that small municipalities are better at delivering a programme to eligible claimants. To validate this claim, we would require better information on the link between accurate registries and wider outcomes such as municipal targeting data and human capital outcomes. A second conclusion runs contrary to the evidence presented more anecdotally in the literature (see, for example, Sanchez-Ancochea & Mattei, 2011). Overall municipal capacity as measured by the budget-per-capita proxy variable is seemingly not very important in terms of BF performance as measured by our outcome variables. This would run contrary to hypothesis 2 on capacity. However, this finding needs to be qualified. It appears that the per capita size of specific transfers is positively associated with several of the outcome measures. For instance the size of transfer from the National Education Development Fund seems positively related to reported compliance with the education conditionality. Similarly, overall transfers aimed at social assistance seem positively related to reported compliance with the health conditionality. As such, specific targeted funds may achieve a positive impact on compliance with health and education conditionalities. In addition, the size of the specific social assistance transfer seems to be positively related to how municipalities maintain their registries. This finding suggests that perhaps overall resources appear to matter less to BF implementation than the presence or size of targeted transfers.

4.2. The quality of services

As expected from the literature, there seems to be a positive relationship between indices on educational performance and the quality of health services and respective outcome measures related to compliance with education and health conditionalities. This finding appears interesting in two ways. Firstly, it suggests that higher-quality agents would also deliver better services under BF. Secondly, this finding also gives us more confidence that reported compliance with conditionalities can tell us something about the overall quality of services on the supply side. This association seems intuitively logical. At a minimum, this suggests that better-quality services are better at reporting compliance. However, given that most services in 2010 seemed to report compliance data (Fiszbein et al., 2009), the relationship likely reflects to some extent on actual service delivery. This indicates that better compliance reporting may indeed promote better access to services in BF and be associated with better take-up of services among claimants. For the health compliance indicator, there is a positive association with the education quality index, suggesting perhaps that there are clusters of good-quality services across sectors at a municipal level.

4.3. Integration and coordination of services

To measure integration and coordination of service provision, we took data from a survey of local CRAS. CRAS are the main contact point/gateway between citizens and social services. Similarly, the education and health units at municipal levels, which do not have a clearly delineated role in BF implementation guidance, play varying roles in BF implementation depending on the municipality. The CRAS survey asked a variety of questions on how services are coordinated and integrated with the BF programme. We then developed an index of integration on the basis of the aspects of services that respondents said were integrated. These included aspects of integration such as registering BF claimants in the CRAS (in addition to the municipal BF unit), using databases across services, and referring claimants to other services offered at a municipal level. In this way, we established a degree of integration. The findings suggest a significant positive association between education conditionalities and the way municipalities keep the BF registries accurate and up to date with the degree of integration of CRAS in BF. This also holds for the level of integration of CRAS with health units in the model looking at the health compliance outcome measure. Here, integration between CRAS and health services is a proxy for wider integration and coordination between social programmes such as food cards and health services. The findings largely confirm hypothesis 3 and suggest that better integration at a municipal level is associated with better-reported management of the registry and compliance with health conditionalities.

4.4. Electoral outcomes

The literature suggests that there may be a positive association between electoral gain and BF implementation (Zucco, 2011). Firstly, the percentage vote of the winning party is associated with better BF implementation. This assumes a direct relationship between BF implementation and electoral gain. Secondly, the occurrence of a supplementary election may indicate a weak electoral mandate for those governing and as such weaker BF implementation. We suggest that a very large majority (above 95%) is associated with worse-reported BF implementation as parties probably have less direct incentive to provide good services to the local population. Gaining very large majorities may mean political parties become complacent in service delivery. Finally, we assume that if governing parties are the same at state and municipal level, there is less conflict and potentially better delivery of BF.

Our findings in the three models are relatively inconclusive. It is difficult to find a direct link between a (political) incentive and BF implementation as suggested in hypothesis 1. We find no significant relationships in two of the three models.

It is important to emphasise a nil finding here. Party affiliation proved not significant in two of our models and had a negative association with health compliance, suggesting perhaps that there is no real link between party and our outcome variables. This suggests that if BF implementation is associated with electoral outcomes, this effect is largely the same across the political spectrum.

4.5. Poverty

The literature expects that poorer households would struggle to take up services in BF due to their circumstances (Fiszbein et al., 2009). Our findings across the models seemingly contradict this. On the one hand, they indicate that municipalities with more households living in extreme poverty (regardless of urban or rural context) and those municipalities with larger percentages of poor indigenous and, according to the Brazilian poverty census, poor 'coloured' groups (including groups coded as yellow, brown and black) report better management of the BF registries. The suggestion here is that municipalities with a larger constituency of BF claimants also deliver better BF performance. This may indicate some municipal specialisation in how BF is delivered. Municipalities with a higher proportion of poor constituents may have a greater (electoral) incentive to manage BF registries better; they may also be more responsive to the resource incentive under the BF programme for good performance and specialise more in BF implementation, creating more efficient systems to manage the enrolment of beneficiaries. This finding speaks to our hypothesis on aligning incentives (H1) but also appears to contradict our hypothesis on poorer recipients (H4). The latter finding is interesting as it indicates that the asymmetry of information in terms of poorer potential recipients lacking information to successfully enrol in the programme plays less of a role than expected. It may also indicate that the performance management system in BF is relatively successful in allowing the federal level to hold municipalities to account.

On the other hand, the models related to compliance with the education conditionality find that municipalities with a larger proportion of poor 'coloured' and indigenous people according to the Brazilian census have worse-reported education compliance under BF. These findings are not as pronounced as the positive association between poverty indicators and municipalities keeping good registries and updating them. There could be a number of reasons for the findings. Firstly, education services in poorer areas are likely to suffer from limited capacity. They also have a different accountability relationship with the public compared to municipalities involved in BF. As such, they may have less incentive to prioritise BF applicants. Moreover, the resources of these services are less directly ring-fenced compared to municipalities, which have to provide dedicated units for BF implementation. Secondly, poor claimants from different groups could have a different relationship with the municipal government compared to education services. There could be different barriers to access. It may be one thing to register for BF and to collect a cash transfer, but another to send a child to school. Interestingly, there is a positive relationship between health compliance reporting and the presence of certain poor groups in locations in our model. This suggests that compliance reporting is differential in poor areas and does not necessarily need to be associated with levels of poverty. These findings speak to both hypotheses 1 and 4 and to some extent to capacity.

4.6. Geography

Our expectation here would be that the poorest regions would also struggle on the outcome measures in our model (hypothesis 4). However, similar to 'poverty' our models find that municipalities in the poorest regions of Brazil show better-reported management of BF registries than municipalities in richer regions. We also find this association for the Northeast region and quality of registration and health and education

compliance. Again, this could speak to relative specialisation with regard to BF implementation in poorer areas and also the political salience of BF implementation in these areas. Our significant results for other regions offer a more mixed and contradictory picture. The North region appears to have municipalities that report accurate BF registries and health compliance. However, its reported education compliance is worse than in other regions. The North is the largest and the most sparsely populated region of Brazil, incorporating most of the Amazon rainforest. Areas with more rural households show better-reported health and education compliance than other areas. These findings would suggest that at a minimum those living in rural areas do not appear at a disadvantage in terms of the outcome measures included in the education and health models compared to urban areas.

The comparatively richer Central West and South regions show varying results. In the former, reported health and education compliance is worse than in other regions. The South reports relatively good health compliance but shows worse performance on education compliance. It is difficult to make sense of these findings without further contextual analysis beyond what this modelling exercise could achieve.

5. Limitations

Our approach has a number of limitations. The first relates to data capture. Our datasets do not all cover the same period given that data are not captured consistently and continuously. As such, they may not capture specific and substantial changes between years.

Secondly, this study provides only a snapshot and not a longitudinal picture of developments in Brazil. As such, we cannot capture the influence of wider socio-economic developments on the BF programme. Also, the datasets we used cannot capture all relevant variables. There are a wider range of variables that we could have considered. For example, we do not measure staff levels or staff skills or motivations. The analysis does not include particular variables on accountability and oversight as they were not available.

Thirdly, our dependent variables are self-reported. Despite the controls used in the BF programme, this leaves data submitted open to gaming, as the performance incentive offered under the programme means certain municipalities may still report better performance than actually achieved. We have some confidence that this is not occurring, for two reasons. Firstly, the distribution of data shows a wide range of municipal performance (see Figure 1). The plot in Figure 1 corresponds to the average of the two components TCQC and TAC (TCQC_TAC) which is used as the dependent variable for the first model (quality of registration in municipalities).

Figure 1. Average distribution of TCQC_TAC (quality of registry) variable
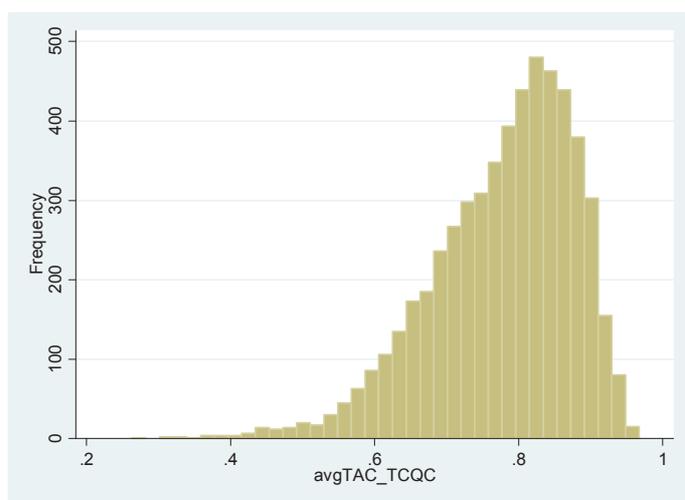
Source: Own calculations.

Secondly, site visits conducted as part of this research suggested that frequent inspections and audits to some extent limit such gaming in BF.

Finally, our outcome measures are limited in what they can say about wider outcomes. They measure the capacity of the services to keep accurate registries and measure and report on compliance, but it is less clear what these variables can say more generally about wider outcomes relating to human capital (e.g. health and school outcomes). Additional research is required in order to link human capital outcomes as captured in household surveys to administrative data.

6. Conclusion

The models presented here seem plausible and broadly consistent with the more anecdotal evidence collected in the literature. As such, the analysis seems to provide a wider body of evidence on contextual factors and their relationship with CCT outcomes that is currently lacking.

Our findings here relate to how municipalities manage BF enrolment as part of a mandate from federal government as captured by proxy variables relating to how accurate and up-to-date municipal BF registries are, and also to compliance reporting (visits to health clinics and school attendance) by health and education services supporting the supply side of BF.

In terms of how municipalities manage the BF registries, our models show two interesting findings. Firstly, small may be better. Small municipalities report better management of the BF registry than larger municipalities. It may be that size matters when it comes to providing BF services in closer proximity to the citizen. Small municipalities may be better at enrolling poor households and keeping their registries up to date as they are likely to know more about the circumstances of their citizens and how to reach them. Secondly, our findings suggest some form of municipal specialisation. The poorest regions and municipalities with a greater number of poorer households appear better at managing the registry. This finding appears to confirm hypothesis 1 but also appears to suggest that the nature of poverty and geography may not matter as much for programme implementation as some of the literature suggests (H4). This would also imply that the asymmetry of information between provider and recipient and federal government does not appear a significant barrier to successful implementation in this programme. Municipalities appear to serve their constituents either because they have a clear electoral incentive to do so, and/or have become more efficient in BF enrolment, and/or are more sensitive to BF resources being made available for good performance. Similarly, municipalities with relatively fewer poorer households may give greater priority to other areas of service delivery. Finally, municipal capacity as measured by resources per capita is negatively associated with how municipalities manage their registries. This appears to confirm our finding on specialisation. It also suggests that improving overall municipal resources as such would not be particularly effective in improving this aspect of programme management. This is an interesting observation in terms of our capacity hypothesis (H2). In this case aligning incentives appears more important as an explanatory variable than demography, geography or capacity alone.

In terms of reported compliance with health and education conditionalities, our models suggest that quality of services matters in how claimants comply with conditionalities as reported by the health and education authorities. This finding seems logical. Higher capacity services would, at a minimum, provide more complete and higher-quality reporting on conditionalities. In addition, this association most likely

also reflects to some extent on wider service delivery in the education and health sectors. Capacity may matter more in the provision of health and education services than in the provision of general BF services. Our model finds positive associations between higher specific transfers and better-reported compliance with education and health conditionalities in localities. As such, it appears these specific transfers could play a role in improving the effectiveness of the supply side of a CCT. Both observations seem to confirm our hypothesis on capacity (H2). We also have wider indications that capacity may work differently for education and health services compared to municipal BF services. Municipalities with a relatively greater number of poorer households report in general worse compliance with supply-side conditions (though it can vary between health and education conditionality compliance) but appear to report better management of registries. The former result confirms our hypothesis (H4) on the characteristics of the potential recipient while the latter seems to contradict it. This difference is interesting and worth further investigation. It could indicate that claimants have a different relationship with BF than with education and health services that are part of BF conditionalities. In addition, this finding could also reflect on the different incentives for municipal government and local education and health services set by the federal government. Municipal government has a clear electoral incentive to implement BF well and also receives administrative support from the government (receiving greater support if it implements the programme well), while there is little electoral incentive or direct support for those providing local education and health services. Clearly, this support may therefore be more important to small municipalities with few resources. BF is also highly visible, which raises its political salience for municipal actors, especially those with relatively poorer constituents. Finally, it is important to highlight specific positive associations between areas with a higher percentage of certain/particular poor groups and rural households and better compliance reporting. This may suggest that issues around remoteness and poverty in education and health compliance can be overcome and have been overcome in certain areas.

Our models also reflect on the relationship between the actors involved in providing services. The degree of integration between these seems positively associated with how well municipalities manage the registries and compliance with conditionalities. Moreover, the research finds that there are clusters of good service provision, municipalities where all services ranging from registering claimants to health and education compliance appear to be of higher quality. Our findings largely confirm hypothesis 3.

There are a number of lessons for policymakers. Firstly, it may be more effective to implement CCTs through smaller administrative units as smaller municipalities tend to manage BF registries better. Larger municipalities may want to adopt decentralised or ward-based approaches to BF implementation. The key factor seems to be that those responsible for implementation need to have a clear incentive to do so, either through the provision of direct support under the programme or perhaps through the process of democratic accountability. Secondly, asymmetries of information between recipient, provider and federal government can be overcome. Our suggestion is that the performance management system put in place by the federal government to monitor the enrolment of potential beneficiaries is relatively effective at holding municipalities to account. Thirdly, specific transfers, particularly those focused on the supply side, could be effective in strengthening the supply side of a CCT. This seems particularly true for supply-side services in municipalities with relatively more poor households. Fourthly, more integration and coordination between the demand and supply sides of a CCT is likely to improve overall quality of implementation. The last two findings would suggest that those designing policy should pay much more

attention than is paid at present to the provision of those services that support the conditionalities of a CCT.

References

Bastagli, F. 2010. *Poverty, Inequality and Public Cash Transfers: Lessons from Latin America*. London: London School of Economics and Political Science.

Bossert, T., O. Larrañaga, and F. Ruiz Meir. 2000. 'Decentralization of health systems in Latin America.' *Revista Panamericana de Salud Pública* 8(1/2): 84–92.

Collins, P. 2012. 'Governance and the Eradication of Poverty: An Introduction to the Special Issue.' *Public Administration and Development* 32(4–5): 337–344.

Fiszbein, A. and N. Schady. 2010. *Conditional Cash Transfers: Reducing Present and Future Poverty* 2009: With Francisco H. G. Ferreira, Margaret Grosh, Nial Kelleher, Pedro Olinto, and Emmanuel Skoufias. Washington, D.C.: World Bank.

Fried, B.J. 2012. 'Distributive Politics and Conditional Cash Transfers: The Case of Brazil's Bolsa Família.' *World Development* 40(5): 1042–1053.

Grindle, M.S. and J.W. Thomas. 1989. 'Policy Makers, Policy Choices, and Policy Outcomes: The Political Economy of Reform in Developing Countries.' *Policy Sciences* 22(3/4): 213–248.

Hall, A. 2008. 'Brazil's Bolsa Família: A Double-Edged Sword?' *Development and Change* 39(5): 799–822.

———. 2011. 'The Last Shall Be First: Political Dimensions of Conditional Cash Transfers in Brazil.' *Journal of Policy Practice* 11(1–2): 25–41.

de Janvry, A., F. Finan, and E. Sadoulet. 2010. *Local electoral incentives and decentralized program performance*. Cambridge: National Bureau of Economic Research.

———. 2005. 'Brazil's Bolsa Escola Program: The Role of Local Governance in Decentralized Implementation.' The World Bank.

Lindert, K., A. Linder, J. Hobbs, B. de la Brière. 2007. 'The Nuts and Bolts of Brazil's Bolsa Família Program: Implementing Conditional Cash Transfers in a Decentralized Context.' The World Bank.

Magalhães, R., A.V. Coelho, M.F. Nogueira, C. Bocca. 2011. '[Intersectoral, convergent and sustainable actions: the challenges of the "Bolsa Família" programme in Manguinhos shantytown in Rio de Janeiro].' *Ciência & Saúde Coletiva* 16(11): 4442–4453.

Papke, L.E. and J.M. Wooldridge. 1996. 'Econometric Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rate.' *Journal of Applied Econometrics* 11(6): 619–632.

Peci, A., J. Figale, and F. Sobral. 2011. 'The Invasion of Manufactured Civil Society: Government–non-profit Partnerships in a Brazilian State.' *Public Administration and Development* 31(5): 377–389.

Pinto, R.F., and M.S. Do Carmo. 2012. 'Fighting Poverty and Protecting the Urban Environment: The Refuse Collectors of Rio de Janeiro, Brazil.' *Public Administration and Development* 32(4–5): 402–415.

Rocha, C. 2009. 'Developments in National Policies for Food and Nutrition Security in Brazil.' *Development Policy Review* 27(1): 51–66.

Sánchez-Ancochea, D. and L. Mattei. 2011. 'Bolsa Família, Poverty and Inequality: Political and Economic Effects in the Short and Long Run.' *Global Social Policy* 11(2/3): 299–318.

Woolcock, M. 1998. 'Social Capital and Economic Development: Toward a Theoretical Synthesis and Policy Framework.' *Theory and Society* 27(2): 151–208.

Zucco, C. 2011. 'When Pay Outs Pay Off: Conditional Cash-Transfers and Voting Behavior in Brazil 2002–2010,' in working paper series 2011. New Jersey: Rutgers University.

Appendix

Table 4. Description and details of the variables available for regression

Variable description	Variable details
Revenue- and finance-related variables	
Municipal GDP	Municipality is in the list of 100 highest revenue (GDP) municipalities
Municipal budget	Per capita municipal budget revenues (R$)
Government transfers to municipality	Per capita transfers from federal government (R$)
State transfers to municipality	Per capita transfers from state (R$)
Transfer from Health System to municipal level	Per capita transfer of Resources Health System (R$)
Transfer from National Assistance Fund to municipal level	Per capita transfer of resources from the National Social Assistance Fund – FNAS (R$)
Transfer from National Education Development Fund to municipal level	Per capita transfer of resources from the National Education Development Fund – ENDF (R$)
Variables related to other programmes	
Presence of food card programme at municipal level	Presence of food card programme in the municipality (1: yes, 0: no), data from year 2011
Quality of health service	IDSUS performance (Health service) index, data from year 2011
Quality of education	Basic Education Development Index, data from year 2011
Municipal information sharing	Does the municipality have list of beneficiaries of the BF programme?
	Does the municipality have list of families in violation of conditionalities of education in the BF programme?
	Does the municipality have list of families in violation of conditionalities of health in the BF programme?
Integration software questions: Does the CRAS have access to following federal computer systems, and for what purpose? 0: no access, 1: for consultation/data entry, 2: for both consultation/data entry	
CRAS access to user registry	CadÚnico – Single Registry for Social Programmes of the Federal Government
CRAS access to conditionality compliance system	SICON – Integrated Management of the Conditionalities of BF Programme

CRAS access to benefit claimant system	SIBEC – Citizen Benefit System

Type of relationship between CRAS and other entities. Codes 0 to 8 (0: no relationship or entity does not exist, >0: sum of the relationship indicators)

Strength of CRAS relationship with other entities	Public Units of the Basic Social Protection Network
	Covenanted Units of the Basic Social Protection Network
	Units of the Special Social Protection Network
	Health Services
	Education Services
	Agencies/Services related to Labour and Employment
	Services and Programmes for Food Security
	Services and Programmes of Public Safety
	BF Grant Programme
	Protection Council
	Council Public Policy and Advocacy
	Programmes and Projects Digital Inclusion
	Non-governmental Organisations (NGOs)

Political variables, data from year 2008

Political mandate of largest party	Percentage votes won by the party in power in the municipality
Presence of contested election	Supplementary election held (1: yes, 0: no)
	Same ruling party both at municipal and state level (1: yes, 0: no)
Achievement of absolute majority	Ruling party secured over 95% (almost all) of the votes (1: yes, 0: no)

Population-related variables (D)

Total households	Number of households
	Log (total households in the municipality)
Municipality	Population of the municipality is over 100,000 (1: yes, 0: no)

Poverty-related variables

Distribution of households/residents living in extreme poverty on the basis of urban/rural, gender, race and ethnicity	Percentage of households that are in rural areas
	Percentage of households in rural areas that are in poverty
	Percentage of households in urban areas that are in poverty
	Percentage of males among residents who are in extreme poverty
	Percentage of white residents who are in extreme poverty
	Percentage of black residents who are in extreme poverty

	Percentage of yellow residents who are in extreme poverty
	Percentage of brown residents who are in extreme poverty
	Percentage of indigenous residents who are in extreme poverty
	Percentage of black or indigenous residents who are in extreme poverty
	Percentage of black, yellow and indigenous residents who are in extreme poverty
Geography	
Region	North (1: if municipality is situated in North region, 0: otherwise)
	South (1: if municipality is situated in South region, 0: otherwise)
	Southeast (1: if municipality is situated in Southeast region, 0: otherwise)
	Northeast (1: if municipality is situated in Northeast region, 0: otherwise)
	Central West (1: if municipality is situated in Central West region, 0: otherwise)

Source: Adapted from van Stolk and Patil (2013).

Table 5. Significant results from TCQC_TAC (quality of registration) model

Variable	Coeff.	Std. Er	Z	P	90% CI	
Log (per capita transfers from the National Social Assistance Fund – FNAS)	0.008	0.002	3.32	0.001	0.004	0.012
Log (per capita transfers from state)	-0.036	0.008	-4.70	0.000	-0.049	-0.024
Log (total households in the municipality)	-0.039	0.008	-4.88	0.000	-0.053	-0.026
Binary (population of municipality is over 100,000)	-0.153	0.031	-4.97	0.000	-0.203	-0.102
Health Service Index	0.021	0.010	2.04	0.041	0.004	0.037
Indicator for CRAS relationship with BF programme (score 0 to 8)	0.014	0.003	4.66	0.000	0.009	0.019
Binary (presence of food card)	0.051	0.020	2.60	0.009	0.019	0.083
Percentage of indigenous people in poverty	0.533	0.084	6.33	0.000	0.395	0.672
Percentage of black people in poverty	0.333	0.113	2.93	0.003	0.146	0.520
Percentage of brown people in poverty	0.811	0.051	15.82	0.000	0.727	0.895
Percentage of yellow people in poverty	2.011	0.570	3.53	0.000	1.074	2.948
Percentage of rural households in extreme poverty	0.283	0.099	2.85	0.004	0.120	0.446
Percentage of urban households in extreme poverty	0.985	0.203	4.84	0.000	0.650	1.319
Binary (municipality in N region)	0.081	0.031	2.58	0.010	0.029	0.133
Binary (municipality in NE region)	0.280	0.024	11.61	0.000	0.241	0.320
Constant	0.941	0.120	7.85	0.000	0.744	1.139

Number of observations: 4,146

Log pseudo-likelihood: -1,453.0

Deviance: 111.38

Log pseudo-likelihood (constant-only model): -1,505.65

Deviance (constant-only model): 216.76

R2 = 0.48

Source: Own calculations.

Table 6. Significant results from TFS (health compliance) model

Variable	Coeff.	Std. Er	Z	P	90% CI	
Log (per capita transfers from federal government)	0.217	0.125	1.74	0.082	0.012	0.422
Log (per capita transfers from the National Social Assistance – FNAS)	0.013	0.005	2.64	0.008	0.005	0.021
Log (total households in the municipality)	-0.156	0.039	-4.05	0.000	-0.219	-0.093
Binary (population of municipality is over 100,000)	-0.159	0.068	-2.35	0.019	-0.270	-0.048
Log (per capita budget revenues)	-0.277	0.075	-3.68	0.000	-0.401	-0.153
Health Service Index	0.081	0.020	3.94	0.000	0.047	0.114
Basic Education Development Index	0.121	0.021	5.85	0.000	0.087	0.156
Indicator for CRAS relationship with health services (score 0 to 8)	0.019	0.006	3.08	0.002	0.009	0.029
Binary (presence of food card)	0.145	0.040	3.62	0.000	0.079	0.211
Percentage votes for the winning party	0.268	0.088	3.04	0.002	0.123	0.413
Binary (same party in government at state and municipal level)	-0.071	0.032	-2.18	0.029	-0.124	-0.017
Percentage of brown people in poverty	0.215	0.098	2.18	0.029	0.053	0.377
Percentage of rural households in extreme poverty	0.166	0.150	1.10	0.270	-0.082	0.413
Binary (municipality in CW region)	-0.090	0.049	-1.84	0.066	-0.171	-0.009
Binary (municipality in N region)	0.109	0.060	1.83	0.068	0.011	0.208
Binary (municipality in NE region)	0.341	0.054	6.27	0.000	0.252	0.430
Binary (municipality in S region)	0.091	0.042	2.15	0.031	0.022	0.161
Percentage of households in rural areas	0.249	0.080	3.13	0.002	0.118	0.380
Constant	1.209	0.775	1.56	0.119	-0.066	2.485

Number of observations: 3,777

Log pseudo-likelihood: -1,565.14

Deviance: 439.63

Log pseudo-likelihood (constant-only model): -1626.95

Deviance (constant-only model): 563.26

R^2 = 0.22

Legend:

CW region – Central West region

Source: Own calculations.

Table 7. Significant results from TCF (education compliance) model

Variable	Coeff.	Std. Er	Z	P	90% CI	
Log (per capita transfers from the National Education Development Fund – ENDF)	0.011	0.006	1.77	0.077	0.001	0.022
Binary (municipality in top 100 GDP)	0.179	0.072	2.48	0.013	0.060	0.298
Log (total households in the municipality)	-0.111	0.010	-10.82	0.000	-0.127	-0.094
Basic Education Development Index	0.118	0.016	7.25	0.000	0.091	0.144
Indicator for CRAS relationship with BF programme (score 0 to 8)	0.009	0.004	2.15	0.032	0.002	0.016
Percentage of indigenous people in poverty	-0.519	0.135	-3.83	0.000	-0.742	-0.297
Percentage of black people in poverty	-0.845	0.161	-5.25	0.000	-1.110	-0.580
Percentage of brown people in poverty	-0.560	0.082	-6.85	0.000	-0.695	-0.426
Percentage of urban households in extreme poverty	0.518	0.218	2.38	0.017	0.160	0.876
Binary (municipality in CW region)	-0.353	0.037	-9.65	0.000	-0.413	-0.292
Binary (municipality in N region)	-0.173	0.048	-3.60	0.000	-0.253	-0.094
Binary (municipality in NE region)	0.137	0.040	3.46	0.001	0.072	0.202
Binary (municipality in S region)	-0.146	0.032	-4.53	0.000	-0.199	-0.093
Percentage of households in rural areas	0.112	0.059	1.91	0.056	0.015	0.208
Constant	2.598	0.147	17.65	0.000	2.356	2.840

Number of observations: 3,783

Log pseudo-likelihood: -1,019.17

Deviance: 134.29

Log pseudo-likelihood (constant-only model): -1,030.50

Deviance (constant-only model): 156.93

R2 = 0.14

Legend:

CW region – Central West region

Source: Own calculations.