# Give & Take?
# Child Benefits & Prices in Northern Canada

Angela Daley
University of Maine
angela.daley@maine.edu

Nicholas Li
Toronto Metropolitan University
nicholas.li@torontomu.ca

Barry Watson
Acadia University
barry.watson@acadiau.ca

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**Data Availability:** The data used in this analysis are not publicly available due to Statistics Canada's confidentiality requirements. Housed at Statistics Canada Research Data Centres located throughout Canada, this dataset can only be accessed upon acceptance of a research proposal. For more information, see: https://www.statcan.gc.ca/en/microdata/data-centres.

**Conflicts of Interest:** Angela Daley was employed by the North West Company in Gjoa Haven and Taloyoak, Nunavut from 2004-2006. She was a store-level employee and did not have influence on the company's broader operations or policies.

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**Abstract**

Cost of living is comparatively high in Northern Canada, which is a remote and sparsely populated region served by retail oligopolies (about 34 percent of communities feature a monopoly, while the rest feature a duopoly). Government transfers constitute a large share of household income in Northern communities, and child benefits are particularly important, with these programs having expanded in recent years (Universal Child Care Benefit in 2015 and Canada Child Benefit in 2016). We assess the extent to which increased child benefits are "captured" by higher prices. Using the Longitudinal Administrative Database and community-level data on prices and food shipments from Nutrition North Canada (2012-2019), we find that expanded child benefits are associated with higher prices (with an elasticity of 0.02), which for a family of four, offset about 24 percent of the increased purchasing power resulting from the expansion. Our results suggest that expanded child benefits increase food demand and that the main transmission mechanism leading to higher prices is markups, as our price effects hold conditional on the quantity of food shipped and are mostly driven by monopoly communities where about 61 percent of increased purchasing power is offset by higher food prices. Thus, Northern communities are not pure "price-takers" and policies that increase cash assistance should consider the implications for local prices.



**JEL Codes:** I18, J15, D42

**Keywords:** Northern Canada; Subsidies; Prices; Competition; Monopoly

# 1. Introduction

> Our largest customer segments derive most of their income directly or indirectly from government infrastructure spending or direct payment to individuals in the form of social assistance, child care benefits and old age security. While these tend to be stable sources of income, independent of economic cycles, a decrease in government income transfer payments to individuals, a recession, or a significant and prolonged decline in consumer spending could have an adverse effect on the Company's operations and financial performance. (North West Company, 2016, p.18)

Burnett and Hay (2023) describe how the long history of government financial support in remote Indigenous communities has served as a form of corporate welfare, supporting the profits of the Hudson Bay Company and the successor of its operations in Northern Canada, the North West Company. As traditional Indigenous food pathways became circumscribed, the government introduced family allowances that bolstered the demand for market food purchases. As late as the 1960s, many communities and individuals were subjected to forced purchasing lists. Rather than receiving an unconditional cash transfer, they could only spend their family allowances on purchases of food from specific lists, preventing them from buying the supplies needed for traditional subsistence activities, which provided the only viable alternative to retail food purchases. Policies favouring retail purchases over local food production have continued in recent years. For example, the federal government subsidises the shipping of food to remote Northern communities through Nutrition North Canada. Subsidies are paid directly to retailers, and they are expected to relay the savings to consumers in the form of lower prices. Furthermore, from its implementation in 2011 until 2019, Nutrition North Canada did not provide support for

traditional subsistence activities.

This period coincides with major changes in federal child benefits, with expansions in both 2015 and 2016. In this paper, we examine how much of the increase in child benefits was "captured" by higher food prices given the market structure of Northern communities,[1] and we provide additional evidence that this "capture" is mostly due to retailer markups. The increase in benefits was explicitly noted in a North West Company annual report, "Northern Canada is seeing more monthly income from the new Child Care Benefit payments and will gain further as infrastructure spending picks up in 2017" (2016, p. 17). The extent to which a dominant retailer in the region is able to "capture" some of the expanded child benefits in the form of higher markups is of direct relevance to policymakers, since the importance of government transfers in Northern communities where prices are persistently high and income is comparatively low. In addition to its policy relevance in Northern Canada, this study makes an important contribution to the empirical literature on the inflationary effects of government transfers as we consider extreme but clearly defined market structures across isolated communities and are able shed light on the contribution of markup versus cost factors.

Recent papers have explored a series of positive non-pecuniary outcomes from both cash and in-kind transfers, which include: peer effects on school enrollment (Bobonis and Finan, 2009), child health (Hoynes et al., 2016), and psychological well-being (Haushofer and Shapiro, 2016). However, little is known about the potential price effects of such transfers, despite their rise in popularity. This is particularly concerning given that Leung and Seo (2023) note "price effects could attenuate the real spending power of government transfer payments and distort the redistribution such transfer programs intend to achieve" (p. 1). Moreover, most studies on this

[1] As noted in Table A1, approximately 34 percent of communities feature a retail monopoly.

topic focus on randomised controlled trials in developing countries and find suggestive but not definitive evidence of price effects.[2] Jones and Marinescu (2022) are among the few focusing on the inflationary effects of cash transfers by examining a universal annual cash payment in Alaska. Spanning 1982-2015, their difference-in-differences estimates suggest that price increases resulting from the cash transfer were not statistically significant over this period.

In developed countries, most of the literature has focused on the Supplemental Nutrition Assistance Program (SNAP), which is a quasi-cash, in-kind transfer in the United States.[3] Both Jaravel (2018) and Makioka (2018) argue that the expansion of SNAP benefits during the mid 2000s has put downward pressure on grocery prices, especially in regions with higher concentrations of SNAP beneficiaries. They posit that long-run supply responses to increased demand have increased product variety and reduced retailer margins, both of which have produced welfare gains among recipients. However, Leung and Seo (2023) find that from 2006-2015, a one percent increase in SNAP transfer payments was associated with a 0.08 percent increase in grocery store prices with inflation being higher in areas with more SNAP participation and/or increased grocery store concentration. Likewise, Attanasio and Pastorino (2020) argue that when markets are not competitive, cash transfers may actually have

[2]Egger et al. (2022) show that cash transfers in Kenya predict a demand-led expansion in economic activity, which translates into rising household expenditures (even among untreated households), an increase in the wage bill, and a small increase in firm profits; there was minimal impact on local prices on average. Cunha et al. (2019) analyse the impacts of both in-kind and cash transfers in rural Mexico. Notably, cash transfers had no impact on prices, and in-kind transfers caused prices of the goods in question to fall, especially in more remote villages. Filmer et al. (2018) find that a major conditional cash transfer in the Philippines increased the nutritional status of children in recipient households, particularly through increased consumption of protein-rich food. They also note that there was a reduction in health among non-eligible children, arguing that this negative externality is likely the result of large scale eligibility, which had inflationary implications.

[3]Aiding about 1 in 8 individuals, or almost 20 percent of households, SNAP is the second largest means-tested program in the United States (Hastings and Shapiro, 2018). Transfers from this program are paid out monthly, and can be used to purchase most grocery items at participating stores (Goldin et al., 2022).

harmful price effects. That is, a portion of these transfers may be appropriated by firms in order to increase profit margins. For instance, they note that the Progresa cash transfer in Mexico caused unit prices of small quantities of food to increase, while unit prices of larger quantities of the same good decreased. And, since that the poor are more likely to purchase smaller quantities, cash transfers may price the poor out of the market. Consequently, they note that an effective cash transfer must be accompanied by policies that reduce market power.

Using Statistics Canada's Longitudinal Administrative Database (LAD), combined with community-level data from the Nutrition North Canada program spanning 2012-2019, we estimate the effect of expanded child benefits on local prices and quantities of food demanded. We find that increased child benefit income is associated with higher prices for a basket of relevant goods given an estimated price elasticity of about 0.02. The quantity of food shipped to these communities is also positively associated with more child benefit income, consistent with a high marginal propensity to consume. However, price increases occurred even conditional on observed changes in quantity. Taken together, our results suggest that part of the expansion of child benefits in these communities was "captured" through higher markups, eroding some of the gains in real purchasing power.

That Northern communities may not be pure "price-takers" is further supported by specifications that examine heterogeneity by market structure. Results indicate that the average price effect is driven by communities with a retail monopoly, which feature a price elasticity with respect to child benefit income of almost 0.06. While part of this effect appears to reflect greater poverty in these communities and thus a larger demand effect per dollar of additional child benefits, our findings suggest that larger increases in retailer markups also play a role. To put this "retail capture" in perspective, for a family of four with one tax-filer, the increase in food basket costs offset

24 percent of the increased community-level purchasing power from the child benefit expansion, which increases to 61 percent in communities with a retail monopoly.

# 2. Background

## 2.1. Northern Communities & Prices

Delineated by the presence of permafrost, Northern Canada can be defined as the three territories (i.e., Yukon, Northwest Territories, Nunavut) and the portions of seven provinces that are situated above 50 degrees latitude (i.e., Newfoundland and Labrador, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia). It is a vast region, representing almost two thirds of the Canadian landmass (Natural Resources Canada, 2017). The population – which is small and largely comprised of Indigenous Peoples (i.e., those who identify as First Nations, Métis, and/or Inuit) – is located in isolated communities across the region.[4] This isolation is reinforced by limited transportation infrastructure. For example, only one percent of the Canadian road network and 0.2 percent of the rail network are located in the three territories (Dunlavy et al., 2009). Depending on the season, Northern communities receive imported goods by plane or marine service (e.g., annual sealift), as well as temporary ice roads in some cases.

The limited transportation infrastructure contributes to relatively high prices, and prices may plausibly be impacted by the lack of retail competition in the region. Of the 120 Northern communities that do not have year-round access by surface transportation, 54 percent have one full-service grocery store, while the rest have a second store. When surveyed about their concerns with the retail environment, Northern

[4]For example, only 0.3 percent of the Canadian population is located in the three territories. The share of Indigenous Peoples ranges from 22 percent in Yukon to 86 percent in Nunavut, compared to five percent in Canada as a whole (Statistics Canada, 2024).

residents reported issues related to food quality and freshness, availability and variety, and high prices (Burnett et al., 2017). Indeed, there is evidence that cost of living was 46 percent higher in the territories compared to the rest of Canada between 1997 and 2009 (Daley et al., 2015). Likewise, Duhaime and Édouard (2015) find that cost of living was 66 percent higher in Inuit Nunangat between 2007 and 2009.[5] More recently, Robitaille et al. (2018) find that cost of living was 28.7 percent higher in Nunavik (Northern Quebec) compared to Quebec City in 2016 - however, the estimate is considerably higher for certain spending categories, such as food (54.6 percent), household operations and furnishings (48.7 percent), and alcohol and tobacco products (39.4 percent).

To offset the high cost of living, the federal government subsidises the shipping of eligible goods to communities that do not have year-round access by surface transportation. This was historically done through the Food Mail Program, which was replaced by Nutrition North Canada in 2011. Under the latter program, subsidies are higher for communities that are more remote, and for food that is deemed more nutritious and perishable. Unlike the Food Mail Program – in which eligible goods received subsidised freight rates through Canada Post – subsidies are now paid directly to retailers. They submit claims after receiving eligible goods and are expected to relay the subsidy to consumers in the form of lower prices. However, Nutrition North Canada has been criticised for insufficient transparency and accountability to ensure that subsidies are "passed through" to consumers, and there is a widespread perception that the program has benefited retail oligopolies rather than consumers (Burnett et al., 2017).[6]

[5]Inuit Nunangat is the Inuit homeland in Canada, consisting of 51 communities in the Inuvialuit Settlement Region (Northwest Territories), Nunavut, Nunatsiavut (Northern Labrador), and Nunavik (Northern Quebec).

[6]This is one of many criticisms of the program. Others include: insufficient funding, the exclusion of goods that are important to Northern families, increased dependency on imports from South-

As part of the program's accountability measures, retailers are subject to periodic compliance reviews and food price surveys. In terms of the latter, retailers receiving the subsidy are required to report the prices of a time invariant fixed quantity basket consisting of 67 food items weighing approximately 52 kilograms (i.e., 38 perishable items weighing 37 kilograms and 29 non-perishable items weighing 15 kilograms). The prices of individual items are not publicly released. Rather, they are used to calculate the weekly cost of a nutritious diet for a family of four, known as the Revised Northern Food Basket (RNFB). This is done at the community-level. For communities with a monopoly, prices reported by the single retailer are used to calculate the RNFB. For communities with a duopoly, the unweighted average prices across retailers are used when the data from both retailers are deemed of sufficient quality (Galloway and Li, 2023).[7]

Using the community-level RNFB as a measure of prices, Galloway and Li (2023) assess the extent to which Nutrition North Canada subsidy changes in 2016 and 2019 are "passed through" to consumers for over 80 communities in Northern Canada. They find that in spite of existing accountability measures, an extra dollar of subsidy reduces prices by only 67 cents on average, with significantly lower pass-through for communities with a retail monopoly. This suggests that profit-maximizing retailers may behave differently in the communities where they face local competition, particularly from Inuit co-ops.

High prices – the mitigation of which is limited because subsidies are not fully "passed through" by retailers – are challenging in Northern communities where income is comparatively low. For example, Inuit Tapiriit Kanatami (2021) reports that

ern Canada, paternalism, and inadequate community consultation (Burnett et al., 2015; Food Banks Canada, 2016; Galloway, 2014, 2017).

[7]For more information, refer to Nutrition North Canada (2023) and the Minister of Public Works and Government Services Canada (2007).

most households can afford less than 40 percent of the RNFB. And, those with very low income can only afford six to 13 percent of the RNFB. This coincides with the low-income rate in Inuit Nunangat, which was 19.9 percent in 2016 – ranging from 13.2 percent in Nunavik to 22.4 percent in Nunavut. The national average was 14.5 percent (Harding and St-Denis, 2021).[8] Similarly, 57.0 percent of families in Nunavut were food insecure in 2017-18, compared to a national average of 12.7 percent. Among those with children, the rate of food insecurity was 78.7 percent in Nunavut, compared to a national average of 17.3 percent (Tarasuk and Mitchell, 2020).

There is evidence that moving from the Food Mail Program to Nutrition North Canada has exacerbated food insecurity in Northern communities. Specifically, Fafard St-Germain et al. (2019) find that the policy change coincided with a 43 percent increase in food insecurity in Nunavut. Daley et al. (2024) confirm this finding, while expanding the analysis to communities outside of Nunavut, along with considering alternative measures of food insecurity and various subgroups. They find that moving from the Food Mail Program to Nutrition North Canada increased food insecurity in the affected communities, and the impact was particularly harmful to Indigenous families in the territories and Inuit Nunangat. They also find that the detrimental impact of the policy change was heightened in the presence of children, especially severe food insecurity among Indigenous families.

[8]Low-income estimates for Inuit Nunangat do not account for differences in cost of living compared to the rest of Canada, so they are likely understated. Moreover, these estimates do not accurately reflect economic well-being in the presence of non-market subsistence activities, and they do not necessarily reflect Indigenous conceptualisations of economic well-being. For example, "Inuit define poverty as lacking economic well-being, lacking human capacities and capabilities, and social exclusion, including loss of self-reliance and connectedness" (Inuit Tapiriit Kanatami, 2018, p. 4).

## 2.2. Reliance on & Expansion of Child Benefits

Coinciding with high prices and low income, Northern families are reliant on government transfers. For example, in Northern communities represented in the RNFB data, Galloway and Li (2023) report that approximately 25 percent of household income was derived from government transfers in 2015. Moreover, benefits targeted to families with children are especially important in Northern Canada because the population is relatively young. In Nunavut, for example, the median age is 25.6 years (versus 41.6 at the national level) and children are present in 46.8 percent of families (versus 29.3 percent at the national level) (Statistics Canada, 2023). The importance of child benefits to Northern families is confirmed in Figure 1, which shows that the income share of such transfers is considerable in communities represented in the RNFB data, and it increased from 4.5 percent in 2012 to almost 7 percent in 2019.

As summarised by Baker et al. (2023), there were major changes in federal child benefits during our study period.[9,10] Moreover, in addition to the major changes to federal programs described in our paper, it should be noted that child benefits vary across provinces/territories (Kesselman, 2019) and federally across time due to inflation indexing (Baker et al., 2023). First, the Universal Child Care Benefit (UCCB), which was a taxable transfer for families with young children, was expanded in 2015. Gross annual benefits increased from $1,200 to $1,920 for each child under the age of six, and from $0 to $720 for each child aged six to 17. The expansion was announced in October 2014 and effective as of January 2015, but it was not reflected in monthly payments until July, which included six months of retroactive benefits. Coinciding with the expansion of the UCCB, the non-refundable Child Tax Credit was elimi-

[9] In Appendix A, Figure A1, we provide a time-line of these changes, as well as expansions to Nutrition North Canada during our study period.

[10] Refer to Battle (2015) and Milligan (2016) for a further historical summary of child benefits in Canada.

nated, which was worth approximately $345 per taxpayer in 2015 (Battle, 2015).[11] However, the UCCB expansion did not impact the longstanding Canada Child Tax Benefit or National Child Benefit Supplement, which were tax-free income-tested benefits dating back to the late 1990s. As of 2014, the Canada Child Tax Benefit provided a maximum annual payout of $1,446 per child; it was clawed back for families with an after-tax income above $43,953, such that the claw back rate depended on the number of children in the household. The National Child Benefit Supplement was targeted to lower-income families, providing a maximum annual payout of $2,241 per child in 2014. Benefits were clawed back for families with an income greater than $25,584, again depending on the number of children in the household (Baker et al., 2023).

These federal child benefits – the expanded UCCB, Canada Child Tax Benefit, and National Child Benefit Supplement – were replaced by the Canada Child Benefit (CCB) in 2016.[12] The CCB is a tax-free income-tested transfer, which was announced in the federal budget in March 2016. Implementation occurred in July of that year and, unlike the UCCB expansion, retroactive benefits were not provided. At the time of implementation, the CCB provided maximum benefits to families with an annual net income of $30,000 or less (i.e., $6,400 per year for each child under the age of six, and $5,400 per year for each child aged six to 17). Benefits are clawed back for households with income between $30,001 and $65,000, and again for those with income above $65,000. The claw back rates increase with the number of children in the

[11] As reported by Baker et al. (2023), the net benefit of the 2015 reforms varied depending on the household's tax situation (i.e., due to the marginal tax rate on the UCCB and elimination of the non-refundable tax credit).

[12] The CCB also replaced the Family Tax Cut, which allowed parents to shift up to $50,000 in taxable income from the higher earning spouse to the lower earning spouse (Battle, 2015). Likewise, the CCB replaced two smaller programs: (1) the Children's Fitness Tax Credit, which was worth up to $150 in refundable tax credits per child as of 2015; and (2) the Children's Arts Tax Credit, which was worth up to $75 in non-refundable tax credits per child as of 2015. Eligible expenses for these credits were halved in 2016, then completely eliminated in 2017.

household. Relative to the earlier patchwork of programs, the CCB provides constant or higher benefits for most households with children, combined with a lower implicit tax rate (Najjarrezaparast and Pendakur, 2021).[13] Focusing on single mothers with one child under the age of six, Baker et al. (2023) calculate that those with a net income of between $30,000 and $80,000 experienced an increase in child benefits of approximately $800 per year. The largest increase occurred among those with a net income of $50,000; benefits increased by about $2,000 per year. This is consistent with Najjarrezaparast and Pendakur (2021), who report that annual benefits increased by $2,300 per child for households with income below the median.

There is evidence that the 2015 and 2016 changes to federal child benefits – especially the introduction of the CCB – coincided with improvements in economic well-being at the national level. For example, Baker et al. (2023) find that the CCB reduced child poverty by 11 percent among families headed by a single mother, and by 17 percent in two-parent families. Similarly, the CCB reduced the likelihood of severe food insecurity at the national level, especially among families with low income (Brown and Tarasuk, 2019). These findings are consistent with Najjarrezaparast and Pendakur (2021), who find that rental-tenure households with less-than-median income increased their annual spending on necessities after the introduction of the CCB – by about $700 on food, $1,400 on shelter, and $350 on clothing.

## 3. Data

Our analysis combines two sources of data. We use income data from the LAD for the years 2012-2019. The LAD is an administrative dataset that includes a representative 20 percent sample of all Canadian tax-filers. These data provide us with four

[13] However, Baker et al. (2023) note that the CCB reduced benefits for some high-income families and largely benefited single parents and two-parent/single-earner families.

nominal income measures: total income and three constituent categories (i.e., market income, child benefit income, and government transfer income that excludes child benefits). We use actual dollar amounts but for disclosure reasons, we can only report income variables rounded to the nearest $100. We limit the LAD data to the set of Northern communities that are represented in the RNFB data described later. These communities are a subset of those eligible for the Nutrition North Canada program. Descriptive statistics for these communities are provided in Table A1 of the Appendix. Communities in our sample tend to be small (mean population of 1,900), mostly Indigenous (the mean share of community members that self-report Indigenous identity is 94 percent), and they have relatively low income by Canadian standards (average income per tax-filer was $36,600 in 2015).

Based on the LAD, Figure 1 provides an overview of changes in mean income for the population of tax-filers in RNFB communities during our sample period. Total income rose by almost $8,000 during this period, mostly driven by increases in market income. However the increase in child benefits was substantial at over $1,600 (from $1500 in 2012 to $3100 in 2019), representing a 107 percent increase.[14] As a share of total income in these communities, child benefit payments rose from about 4.5 percent to almost 7 percent. Increases in other government income were smaller than increases in child benefits and were concentrated in an earlier period. Notably, the population of households filing for child benefits increased over this period by about 11 percent, while the total population of tax-filers increased by 8 percent. Consequently, the share of tax-filers receiving child benefits was stable, rising slightly from 26.6 percent to 27.3 percent, and almost all of the growth in mean child benefit income in a community was on the intensive, per recipient, margin.

[14]Notably, this coincides with the expansions of child benefits in 2015 and 2016. For communities in our sample, the increase in income was $1,100 between 2015 and 2017, but we do not observe any increase in income between 2014 and 2015 despite the UCCB being implemented in 2015.

Because only one-quarter of tax-filers in these communities receive child benefits, the increase in mean child benefit income for recipients was almost four times higher than for the average tax-filer and close to $6,000 ($4,400 between 2015 and 2017). This represents a very large increase in income for a population that has lower market income and more children. Thus, this population is likely to have a much higher propensity to purchase food out of marginal income. Although the child benefits we consider are determined based on federal formulas, there is variation in the size of the child benefit income shock across communities due to differences in the joint distribution of income and children across households in each community.

The second source of data for our analysis is Nutrition North Canada (2023), which reports two important community-level public-use variables: cost of the RNFB and the quantity of (subsidised) food shipped. As noted earlier, the RNFB reflects the weekly cost of a nutritious diet for a family of four, based on food prices reported by retailers receiving the Nutrition North Canada subsidy. Items in the RNFB are selected to reflect local preferences and availability, along with nutritional adequacy; as noted above, the RFNB is a fixed basket that is time invariant. Although the basket is not representative of local diets and is biased away from unhealthy processed foods, it still captures the price of a large and important set of products (including less nutritious staples such as sugar, lard, margarine, and butter) (Minister of Public Works and Government Services Canada, 2007). The data are reported on a quarterly basis and are averaged across stores at the community-level. They are also mostly derived from three retailers. The North West Company is the dominant retailer in the region and is present in almost every sample community. The remaining two retailers are Inuit co-ops (La Federation des Cooperatives du Nouveau-Quebec and Stanton).[15]

[15] An important limitation is that one major retailer in the region, the Inuit Arctic Co-op Limited, is excluded from the public RNFB price data.

The quantity data measures the total weight of subsidy-eligible food shipped per quarter to each community.[16]

These data are supplemented with three additional variables. First, we include a "synthetic" measure of the national average price of the RNFB, derived from Statistics Canada data on the average monthly price of equivalent items. We match 40 of the 67 items in the RNFB to products in this dataset, use the RNFB quantity weights to aggregate these prices, and then scale them to equal the average price of the RNFB purchased in Ottawa between 2005 and 2009 (based on an earlier RNFB data set that reported prices for non-Northern communities). We also include a measure of average national gas prices, which affects freight and electricity costs and thus an important component of retail prices in these communities. Finally, we control for when eligible communities received access to the full Nutrition North Canada subsidy. This is important as 11 communities in our sample transitioned from a partial subsidy (worth $0.05 per kilogram for eligible goods) to a full subsidy (worth up to $2.85 per kilogram for eligible goods) in October 2016 - i.e., a few months after the introduction of the CCB.[17]

Figure 2 reports the annual average RNFB price and total quantity of subsidised shipments for our sample communities over the 2012-2019 period, with a vertical line denoting the introduction of the CCB. The left panel shows that the average cost of the the RNFB in our sample communities did not change much during our study period, but was trending up in the period before 2016, falling between 2016 and 2017, and rising once again. This pattern can also be observed in national average prices, suggesting that the path of national average prices may do a good job of capturing common cost factors affecting these communities. The right panel shows that quan-

[16] A set of descriptive statistics is presented in Table A1 of the Appendix.

[17] Note that there was an additional expansion of Nutrition North Canada in January 2019, but the increase in the subsidy content of the RNFB did not vary much across communities.

tities of subsidised food shipped fluctuated, but did not change much during the sample period; excluding 2012, there appears to be some correlation between rising food prices and a greater quantity shipped. Overall, these patterns suggest that it is important to account for national food prices, as a comparison of average food prices for RNFB communities in the periods immediately before and after the introduction of the CCB is likely to be biased.

# 4. Estimation

## 4.1. Regression Results

Our empirical approach leverages within-community ($i$) variation in income and child benefit payments over time ($t$). To estimate the effects of total income ($Y$) on the price of the RNFB ($P$), we consider the following log-log regression specification:

$$ln(\bar{P})_{it} = \alpha_i + \beta \ln(Y)_{it} + \sum_{j=1}^{K} \Omega_j X_{it}^j + \epsilon_{it}. \tag{1}$$

Notably, we use the mean RNFB cost during the year (akin to Figure 2), along with community-level total annual income, both of which are log-transformed. We also include community fixed effects ($\alpha_i$) to account for time-invariant factors that affect pricing (e.g., remoteness, retail costs and competition, a community's baseline income level and food demand). For the vector of time-varying controls ($X$), we consider the cost of the "synthetic" RNFB purchased in Ottawa and national gas prices (both log-transformed). Alternatively, we also consider regressions with year fixed effects, such that the identification of income effects comes only from comparing communities with higher versus lower income changes and we drop national-level variables. This approach discards the variation from the large average increase in child

benefits (or other income sources) during our sample period (depicted in Figure 1). Instead, it relies on the fact that differences in the joint distribution of baseline income and children in these communities lead to differential increases in child benefit income at the community-level given the national-level change in the child benefit formula. We also include a dummy variable equal to unity for the years during which a community is eligible to receive the full Nutrition North Canada subsidy; thus, capturing an additional source of time-sensitive price variation for the 11 communities in our sample that gained access to full subsidies in 2016.[18] Akin to Figure 1, we estimate specifications using (i) total income and (ii) total income divided into three categories - market income, child benefit income, and other government transfer income. Note that when comparing the magnitudes of coefficients across income sources in logs, the level of income matters. And, this is of particular interest to our study, because the base level of market income (and to a lesser extent, other government benefits) is much higher than the base level of child benefits (see Appendix Table A1). Therefore, a given percent change represents a much smaller increase for child benefits.

In addition to the impact on RNFB prices, we also consider whether income changes affect the quantity of food demanded at the community-level. Although we do not directly observe community-level food demand, we observe the total weight (in kilograms) of subsidised food shipped ($Q$) to each community during the year and can consider how this relates to measures of total community-level income (total, market, child benefits, other government transfers). Both variables are log-transformed so income coefficients can be interpreted as the percentage change in subsidised food shipped to a community given a percentage change in total income. Thus, we con-

[18] See Section 3 for details. Transition to the full subsidy occurred in October 2016. Because our price and quantity variables are annual values, which are derived from quarterly data, this dummy variable equals 0.25 in 2016 for the affected communities, thereby capturing the partial effect.

sider the following regression model:

$$ln(Q)_{it} = \alpha_i + \beta ln(Y)_{it} + \sum_{j=1}^{K} \Omega_j X_{it}^j + \epsilon_{it}. \quad (2)$$

Note that the products in the RNFB used to calculate prices do not exactly correspond to the full set of subsidised products whose shipment weight we observe, because the RNFB includes some non-subsidised goods and there are many subsidised goods not included in the RNFB. However, there appears to be a reasonably high correspondence, as the subsidy per kilogram embodied in the RNFB closely tracks the subsidy per kilogram for all subsidised goods.

To complement the above regressions, we consider "level" regressions using community-level means - i.e., we consider how mean income per tax-filer (in thousands of Canadian dollars) affects the mean cost of the RNFB (in Canadian dollars) and the mean quantity of subsidised shipments (in kilograms per capita per year):

$$\bar{P}_{it} = \alpha_i + \beta \bar{Y}_{it} + \sum_{j=1}^{K} \Omega_j X_{it}^j + \epsilon_{it} \quad (3)$$

$$\bar{Q}_{it} = \alpha_i + \beta \bar{Y}_{it} + \sum_{j=1}^{K} \Omega_j X_{it}^j + \epsilon_{it}. \quad (4)$$

Although the coefficients can be more difficult to interpret, these "level" specifications facilitate comparisons of the marginal income effects from different income sources within a community, and from similar income sources across communities, given variation in the base levels of market income, child benefits, other government income, prices, and quantities. Using means instead of totals also makes it easier to compare across communities given large differences in population that could worsen the model fit in terms of time-varying controls or the price per marginal dollar of

income relationship. Whether a log/level specification or totals/means provide a better fit to the underlying demand affecting retailer pricing and quantity is unclear *ex-ante*, but we provide a parametric interpretation of both for a profit-maximizing firm facing linear demand in Appendix B.

Table 1 reports the community-level regression results for price based on Equations 1 and 3, using ordinary least squares where observations are weighted by the population of tax-filers in each community.[19] Standard errors are clustered by community. Columns 1 through 4 capture income elasticities in terms of total community income, while columns 5 and 6 depict average level effects at the community-level. As expected, local food prices reflect national food and energy price trends over time and are lowered when communities gain access to the full Nutrition North subsidy. Neither total, nor average income in the community, appears to be strongly related to RNFB prices. But, when we separate the sources of income, we find a statistically significant elasticity of 0.0214 for child benefit transfers. The price elasticities with respect to other sources of income are not significantly different than zero. Columns 3 and 4 repeat the same specifications but with time fixed effects, such that the income coefficients can be interpreted as causal, subject to the standard assumptions about two-way fixed effects and difference-in-differences regression models. The magnitudes and statistical significance of the coefficients are similar, suggesting that our controls in columns 1 and 2 indeed capture the common time-varying factors relevant for prices in these communities. In columns 5 and 6 we see that the magnitude of the association between average community-level income and average price is largest for child benefits compared to other sources of income, but in this specification, the child benefits coefficient has a large standard error and is not statistically significant at conventional levels.

[19] Unweighted estimates are similar and available on request.

Table 2 reports analogous specifications for quantity based on Equations 2 and 4. The results indicate that for both log and level specifications, total income is strongly associated with the quantity of subsidised food shipped, suggesting a high marginal propensity to consume these foods given increases in income. The elasticity for total income is about 0.4, and column 3 shows that this result is robust to the inclusion of time fixed effects. In column 5 the level specification implies that one thousand dollars of additional income per tax-filer is associated with a 1.856 kilogram increase in per capita shipments of subsidised food. When we separately examine the sources of income, only market income is statistically significant when measured as an elasticity in columns 2 and 4. However, with the low base rate, the quantity elasticity estimates for child benefits are consistent with potentially large effects per dollar.[20] When measured in levels, the coefficient for average child benefits is large and statistically significant in column 6 - i.e., an increase of one thousand dollars in child benefits per tax filer is associated with a 17.68 kilogram increase in per capita shipments of subsidised food, an order of magnitude larger than the effect for average income from all sources in column 5. Section 4.3 interprets these results in greater detail through a theoretical lens.

## 4.2. Characterizing Market Structure

The results in Table 1 indicate that communities, which experienced larger increases in child benefits, also experienced larger increases in food demand and food prices. This is the standard economic implication of a positive demand shock given an upward supply curve, and suggests that Northern communities may not be pure "price-takers", where prices are largely determined in the national/global market. How-

[20] Although not presented, we also find that child benefit income has a statistically significant association with quantity in the log-log specification when we do not control for other income sources.

ever, this does not specifically implicate the behaviour of local retailers or limited competition. To shed more light on this transmission mechanism, we consider a series of regressions in which we interact our income variables with an indicator for whether there is a retail monopoly in the community. About 34 percent of the communities in our data (30 out of 87) feature a retail monopoly (see Table A1), typically owned by the North West Company, while the remainder tend to be characterised by duopoly competition between a North West Company store and a Co-op.[21]

Because most of the competing stores are Inuit Co-ops, the presence of a monopoly is largely collinear with Inuit majority in the community; thus, we can consider this as a separate but negatively correlated interaction. Inuit communities are different in many ways, one of which is that they are farther North and typically served by a seasonal summer sealift rather than a seasonal winter road. Galloway and Li (2023) note that non-monopoly and Inuit communities also have higher incomes on average. This is consistent with the descriptive statistics in Table A1 of the Appendix, which show that average household income was about 28 percent lower in monopoly versus non-monopoly communities in 2015 (i.e., $28,000 versus $39,100). We also consider interactions with mean community income in the initial 2012 period (measured in continuous terms), as an increase in child benefits is likely to be more impactful on food demand when it is large relative to other sources of income. We consider interactions with these three variables separately and together, with the caveat that they are highly correlated with each other and we only have 87 communities; therefore, we have low power to detect statistically significant interactions when including all three terms.

[21]This classification is similar to the one reported in Galloway and Li (2023), which was based on community profiles available on archived Nutrition North Canada websites, but has been updated based on feedback from Nutrition North Canada officials who suggested that we take account of communities with high levels of shipments from "Southern suppliers" even when they lack a physical retail store.

Table 3 presents the results of these interaction specifications, which reveal a substantial degree of heterogeneity. The results suggest that the effects of child benefit income on prices are largely driven by the communities with a retail monopoly - i.e., the coefficient on the monopoly interaction term is about 0.04 and statistically significant, with only a small drop in magnitude when all interaction terms are included. Additionally, the uninteracted coefficient for child benefits, which can be interpreted as the price effect of child benefits for non-monopoly communities, is generally small (0.015-0.017) and not significantly different than zero. However, when combined, these estimates imply an elasticity of almost 0.06 for communities with a retail monopoly and this joint effect is significant at the 1 percent level. In column 8 we see a similar pattern with a highly significant interaction term for child benefits and monopoly and an uninteracted effect of child benefits that is not significantly different than zero. When we also include interactions of child benefits with initial income and the indicator for Inuit communities, we find in columns 3, 6, and 9 that these other interaction terms are not statistically significant; the magnitude of the interaction with monopoly changes little but the joint effect is no longer significant, which likely reflects the small sample size and multi-collinearity from including three highly correlated interaction terms. Interestingly we also see that in columns 1 and 4 there is some evidence that total income from all sources affects prices for monopoly communities, although the joint effect is not significant when including time fixed effects. We conclude from this analysis that the price effects of child benefits that we detect are largely driven by communities with a retail monopoly, with suggestive but not definitive evidence that it is the monopoly power of retailers in these communities (rather than income, transportation, or other characteristics) that leads to this heterogeneity.

Table 4 presents analogous interaction specifications for quantities. The results

suggest that the income elasticity of demand for subsidised food shipments with respect to child benefits is slightly higher in monopoly communities but not significantly so. In the log-log specifications, none of the interactions for Inuit population, the presence of a monopoly, and having a lower initial income are significant. However, when measured in levels (columns 7-9), there is some evidence to suggest that the quantity effect of child benefits is larger in monopoly communities, with a very large but noisy coefficient on the monopoly interaction. This suggests that the magnitude of the demand shock for food, resulting from child benefit expansion, was larger in monopoly communities for reasons that are unclear, but perhaps related to differences in the joint distribution of income and children across households that lead to a higher marginal propensity to consume food out of higher child benefits. Since these communities experienced larger price increases, this can be seen both as a positive (i.e., child benefits still translated into greater food shipments despite retailers raising prices), or as part of the causal mechanism underlying the heterogeneous price effects, which we discuss next.

## 4.3. Mechanisms - Markups or Costs?

Theoretically, a positive demand shock for food, due to an expansion of child benefits, could lead to higher prices through two mechanisms: an increase in marginal costs or an increase in markups. Increasing marginal costs could occur due to industry-level decreasing returns to scale, even under perfect competition and zero markups (e.g., the canonical upward sloping supply curve in a perfectly competitive market). But they could also occur in cases where firms charge constant markups, while marginal costs increase for various reasons (e.g., monopolistic competition with heterogeneous firm productivity and entry by less productive firms, or firms with individual cost

functions that are increasing in quantity). Although there is no entry or exit of retailers in our data, one plausible source of decreasing returns to scale concerns shipping - if demand for non-perishables exceeds anticipated demand and inventory, retailers are forced to bring in product by air freight, rather than through cheaper seasonal sealift and/or winter road freight. Air freight to these communities could also be subject to decreasing returns to scale, although this is less plausible given the high fixed costs and lower efficiency of operating smaller planes.[22]

While both the marginal cost and markup mechanisms are consistent with our findings that a positive demand shock can lead to increases in both prices and quantities, only the markup mechanism is consistent with increases in prices *conditional on quantity*. Thus, we estimate a version of Equation 1 where we control directly for the quantity of subsidised food shipments, with results presented in Table A2 of the Appendix. This analysis shows that the price effects remain virtually unchanged when controlling for quantity, and if anything, the negative coefficient on quantity suggests that there are (small) increasing returns to scale. In Table A3 we provide further evidence by controlling for quantity in the monopoly interaction specifications, and once again, we find that price effects are larger in monopoly communities, conditional on their (slightly larger) quantity response.

Because we consider the long-run response of prices to an anticipated demand shock in a setting where small scale is a major source of high costs, the lack of a quantitatively important marginal cost channel is not surprising. However, our findings are still somewhat puzzling in the sense that monopoly communities, which experience a significantly larger price response, do not experience a significantly smaller quantity response (which would be expected if these communities had a similar de-

[22]For example, Nutrition North Canada air freight subsidies are higher for smaller communities due to their higher commercial rates. This suggests that increasing returns are more likely than decreasing returns.

mand shock). To help interpret and reconcile our results for prices and quantities, when comparing monopoly and non-monopoly communities, or when comparing log and level specifications, we provide the following observations using a pricing model that assumes linear demand and constant marginal costs in Appendix B:

1. A demand shock may cause a larger price increase (but smaller quantity increase) in communities where retailers have less price sensitive demand (e.g., monopolies).

2. A change in income can lead to a different sized demand shock across communities, and larger demand shocks lead to larger increases in both price and quantity.

3. The base level of income is important to interpreting results of log-log models, along with comparing elasticities across sources of income and communities.

Our analysis shows that the price and quantity responses to an income shock will be different across income sources. In levels, if there is a higher marginal propensity to consume out of a given source of income, there will be a larger quantity and price response, which is what we consistently observe for child benefits. In logs, the overall importance of the income source also matters. For instance, changes in child benefits may generate a high marginal propensity to consume food but may only make up a small share of total income in most communities.

The analysis in Appendix B also highlights that the price and quantity response to an income shock can vary across communities for multiple reasons. While monopolies may experience larger price effects and smaller quantity effects for a given demand shock, if monopoly communities have demand that is more sensitive to changes in child benefit income, or if child benefits constitute a greater share of their

income, then they could have a similar or even greater quantity response than non-monopoly communities (despite experiencing some dampening of the quantity response due to a greater increase in markups). Table A1 shows that the increase in child benefits was almost identical for monopoly and non-monopoly communities, but that child benefits constitute a much larger share of income in monopoly versus non-monopoly communities, and are therefore likely to contribute much more to food demand.

Our empirical results are thus less puzzling when we interpret the heterogeneity across income sources and across communities through the lens of this theoretical model. Comparing across income sources, child benefit income has a stronger relationship with quantities and prices than other sources of incomes, but this effect may be stronger in levels than in logs because of the low base level compared to market income. Looking across communities, monopoly communities likely experienced a larger demand shock from the same increase in child benefit income, leading simultaneously to larger price increases (even conditional on quantity) and similar or larger quantity increases (despite larger price increases). This analysis also highlights that there are likely to be multiple factors explaining the differential response of monopoly and non-monopoly communities. While the evidence against cost-related scale effects is strong, we cannot precisely quantify the importance of differences in a market power price sensitivity parameter (which affects markup changes conditional on a demand shock), along with differences in demand shocks under a similar price sensitivity parameter.

## 4.4. Event Study - Child Benefit Expansion

Although child benefit expansion was a national policy and did not target community-level trends, the potential correlation of such trends with changes in child benefits across communities is the main threat to our identification strategy. To address this concern, we consider a "dynamic" regression, where we replace the contemporaneous measure of child benefits ($CB$) with the change in child benefits experienced by each community between 2015 and 2017 interacted with a dummy variable for every period ($d$). We use the specifications where we control for all income sources and find statistically significant effects (i.e., the log-log estimates for price in the second column of Table 1 and estimates for average quantity in the final column of Table 2). That is, we consider the following regressions:

$$\ln(\bar{P})_{it} = \alpha_i + \sum_{m=2012}^{2019} \beta_m \Delta \ln(Tot.\, CB)_i \times d_m + \sum_{j=1}^{K} \Omega_j X_{it}^K + \epsilon_{it} \tag{5}$$

$$\bar{Q}_{it} = \alpha_i + \sum_{m=2012}^{2019} \beta_m \Delta(\bar{CB})_i \times d_m + \sum_{j=1}^{K} \Omega_j X_{it}^K + \epsilon_{it}. \tag{6}$$

In both instances, $\beta_m$ captures the effect of child benefit expansions in different years. We would expect zero effects in the pre-period, as well as persistent positive price and quantity effects in the post-period (2016 and later), if our results are driven by exogenous across-community variation in benefits, due to changes in the federal funding formula that were uncorrelated with across-community trends.

We report the coefficients for every year in Figure 3 for prices (left panel) and quantities (right panel), along with 95 percent confidence intervals. We omit the 2015 interaction term so that coefficients can be interpreted as the effect of the 2015-2017 child benefit expansion on prices and quantities relative to the year before benefits increased. For prices, there do not appear to be any significant trends correlated with

the benefit expansion prior to 2015, and there is an immediate and persistent increase in prices thereafter (although the 2017 coefficient is not statistically significant on its own). For quantities of subsidised food, we again see no significant effects in the pre-period and an increase in the post period, although the impact on quantity is smaller than the impact on price in the first year (perhaps because benefits increased in July but retailers raised prices in anticipation). The standard errors are large but our findings provide some support for the parallel trends assumption and are consistent with persistent increases in prices and quantities after 2015.

## 4.5. Interpreting magnitudes

To interpret the magnitude of our estimated price effects, and gauge the extent of program "leakage," we compare the increase in child benefits to the estimated change in RNFB prices. Consider the implications of our estimated child benefit price elasticities for the average community (Table 1, column 4) and average monopoly community (Table 3, column 5). For sample communities, child benefits rose from \$85.8 to \$145.9 million between 2015 and 2017, representing a \$60.1 million (70 percent) increase. For monopoly communities, child benefits rose from \$21.3 million to \$37.2 million, a \$15.9 million (74 percent) increase. Consequently, the implied increase in log RNFB equals: $0.0217 \times ln(145.9/85.8) = 0.012$ on average and $(0.0423 + 0.0156) \times ln(37.2/21.3) = 0.032$ for monopoly communities. Based on the RFNB price in 2015 being approximately 413 dollars for both types of communities, this implies an increases in the weekly RNFB price of about 5 dollars for the entire sample and 13 dollars for monopoly communities. This represents a \$260 increase in the average annual grocery bill for a family of four; \$676 in monopoly communities. Increased food prices can be compared to an increase in benefits of \$1,100 for the average tax-

filer and $4,400 for the average tax-filer that receives child benefits (similar for both monopoly and non-monopoly communities). Thus, for the average tax-filer supporting a family of four and purchasing the RNFB, about 24 percent of the increase in their purchasing power brought about by the 2015-2017 expansion in benefits, was offset by higher RNFB prices; this value reaches 61 percent in monopoly communities. For the average tax-filer receiving child benefits, the reduction in purchasing power is only about one-quarter of these values (i.e., 5.9 percent on average and 15.4 percent in monopoly communities).

These estimates indicate that child benefit expansion imposes a substantial negative externality on non-recipients, who experience higher prices with no change in income, and offsets a non-trivial share of the increased income for recipients. Importantly, these calculations are based only on changes in prices for a specific (albeit critically important) set of food staples. While it is conceivable that price effects are smaller for the actual set of goods that households purchase in these communities, the fact that our estimates only factor in staple foods, and exclude other goods (e.g., temptation goods, clothing, toys), suggests that they are more likely to be a lower bound estimate of the true cost-of-living effects.

Using additional assumptions, the magnitude of our results in terms of the net transfer from consumer to producer surplus can be estimated. Consider a shock that increases demand from an initial price ($p_0$) and quantity ($q_0$). The new equilibrium is expressed by $p_1$ and $q_1$. Determining the total change in consumer surplus is difficult since it requires an estimate of the entire demand curve, but it is straightforward to calculate the loss of consumer surplus due to higher prices. The area of the rectangle with a height of $p_1^h - p_0$ and length $q_1^h$ measures the hypothetical increase in consumer surplus that would have occurred absent a change in price, but was "captured" as profit/producer surplus. While our regression analysis considers $\partial p$ and $\partial q$

separately, they both contribute to this transfer. For the price change induced by the transfer ($p_1^h - p_0$), we use our estimates from Table 1, column 4 (average) and Table 3, column 5 (monopoly communities). For simplicity, we consider the post-period amount, $q_1$, as an upper-bound estimate for $q_1^h$ since observed $q_1$ may be biased if other factors contributed to changes in quantity over time; alternatively we can use the baseline amount ($q_0$) as a lower-bound estimate. Given that the RNFB weighs about 50 kilograms, the estimates above imply that price rose by about \$0.1/kilogram on average and by \$0.26/kilogram for monopoly communities. Under the assumption that our quantity of subsidised food shipments is a reasonable proxy for the RNFB, we can use the 2015 observed quantities of 24.2 million kilograms for the entire sample and 3.99 million kilograms for monopoly communities as the lower-bound, or the 2017 quantities of 27.1 and 5.63 million kilograms as the upper-bound. This implies that between 2.42-2.71 million dollars are transferred from consumer surplus to producer surplus per year for the entire sample as a result of price increases, representing about 4-4.5 percent of the increase in benefits. For monopoly communities, the transfer ranges from 1.04-1.45 million dollars per year, representing about 6.5-9 percent of the increase in benefits. As with our earlier calculation, these numbers are likely a lower bound on the total transfer from consumer to producer surplus, because several goods are not included in our price and quantity data.

## 5. Discussion & Conclusion

We present evidence that cash transfers have inflationary effects on food prices in remote Northern communities. These are communities where retailers have substantial market power relative to the remote communities considered in the development literature or the poor households considered in the literature on SNAP in the United

States. In our study, communities are small and remote, fixed costs/scale economies are important, entry is rare, and many communities could be considered "natural monopolies" for retail. When there is a high propensity to purchase food from marginal transfer income, it appears that these retailers have the ability and incentive to "capture" some of the transfer through price increases. The child benefit expansion we consider increased income by about $4,400 for the average recipient but was associated with an average annual increase of $260 in the RNFB, rising to $676 in monopoly communities. Thus the purchasing power of these benefits in terms of food was eroded by 6 percent on average (comparable to the estimate by Leung and Seo (2023) for SNAP expansion in the United States), and by over 15 percent in monopoly communities. While recipients of the transfer still experience a large net increase in their real income (in terms of food), it should be noted that these higher prices impact everyone in the community, leading to a much higher loss of "community-level" real income in terms of food equal to 24 percent of the average increase in child benefits per tax-filer and 61 percent for monopoly communities. Our estimates exclude inflationary effects on some food items and all non-food items, suggesting that the overall effects on the cost-of-living could be much larger.

We identify three avenues of future research. First, product-level price data has recently become available to researchers; however, restrictions currently make it impossible to merge it with confidential tax data. In addition to observing whether new products are introduced in communities with relatively more child benefits, regressions examining product-community-time triads could shed light on the price effects for goods that are more likely to be purchased by households with children. With data on expenditure patterns, differential price responses across products have important implications for inequality in inflation across households. Further, Attanasio and Pastorino (2020) find that cash transfers can lead to different price effects across

package sizes for a specific product - the smaller packages purchased by low income households tend to have larger price increases in response to benefit expansions. Examining differential price responses along this margin would be interesting in our context. Second, while the child benefit expansion represented a large shock in these communities, the income shock from COVID-19 benefits was even larger. Further, the implications of this shock in our setting may be quite different, as it was not expected to be permanent and coincided with supply-shocks and behavioural changes; hence, these transfers warrant deeper investigation. Finally, an examination of the effects of income shocks on the harvesting and consumption of traditional foods is warranted since this is an important source of food in these communities and it may be quite income elastic (Georgiev and Li, 2024).

Understanding the effects of targeted cash transfers, such as child benefits, on prices for the "extreme" market structures we consider adds to the limited literature on this topic in developed countries. Work to date has primarily focused on the United States, with particular emphasis on SNAP, and has not looked at small spatial scales where researchers can identify locations with high degrees of market power. While this paper offers a first look at the impacts of cash transfers on retail prices in Northern Canada (which is comprised of a relatively young and vulnerable population), outcomes like nutrition, consumption, and food insecurity are also important when assessing such transfers. In addition to the recent work that has analysed the impact of policy changes on food insecurity in Northern Canada (Daley et al., 2024; Tarasuk and Mitchell, 2020), examining the marginal impact per dollar of various subsidies (e.g., Nutrition North Canada, CCB) on health and well-being would allow policymakers to evaluate current programs in greater depth and compare incidence across households and firms.

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# 6. Figures and Tables

Figure 1: Mean community-level income changes

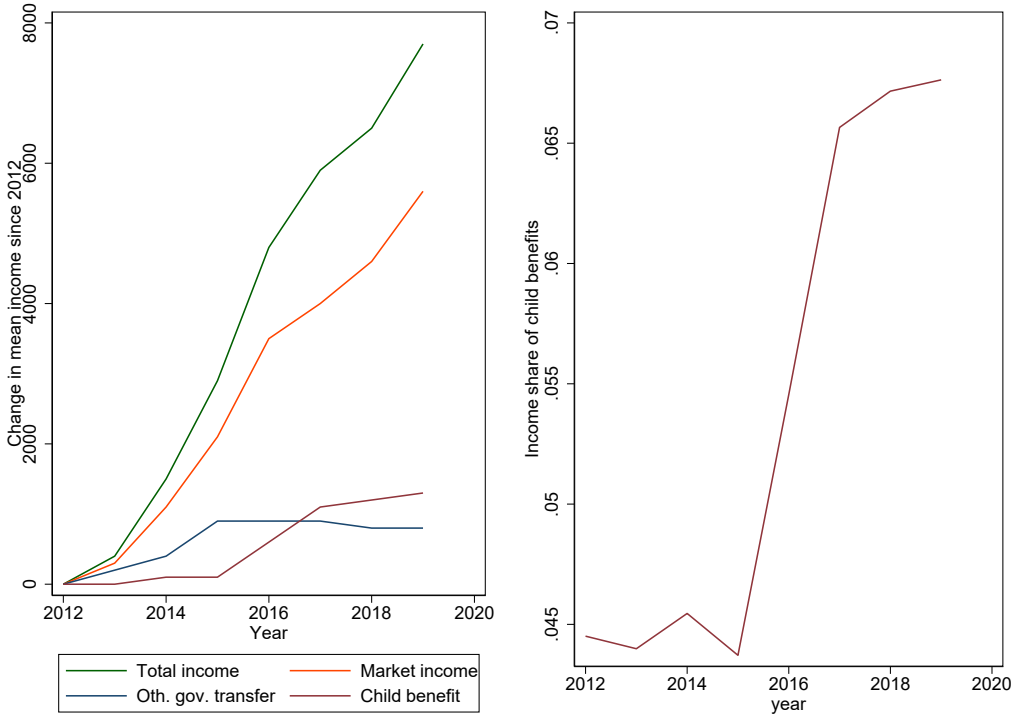


Figure 2: Mean community-level prices and quantities across time

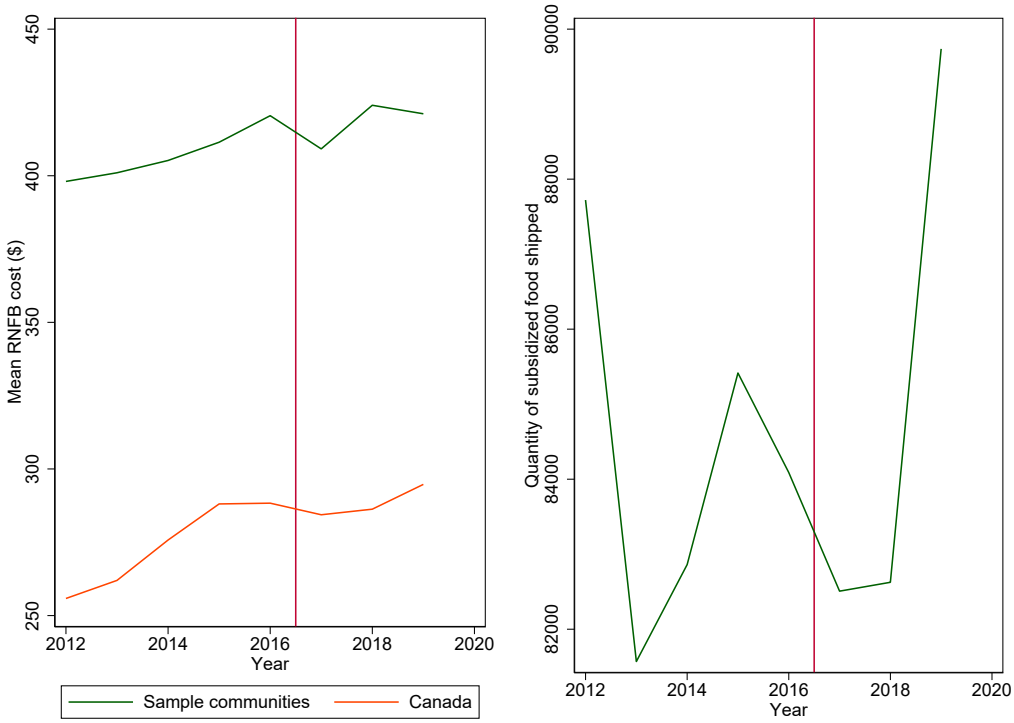
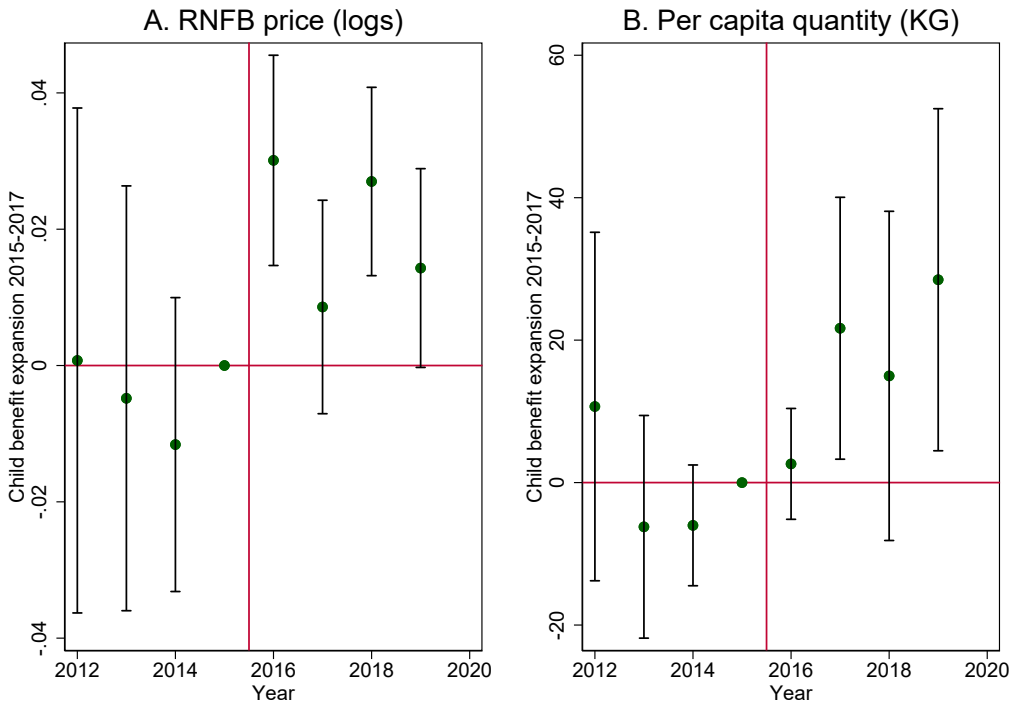


Figure 3: Event study of child benefit expansion effects at different time points




Notes: These figures were derived using Equation 5 (Panel A) and Equation 6 (Panel B). Panel A depicts the impact of child benefit expansion (between 2015 and 2017) on the log of RNFB price. Panel B presents the effect of this expansion on the quantity of subsidised goods.

Table 1: Estimated effects of income on prices in Northern communities

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | ln(RNFB Price) | | | | Ave. RNFB | |
| Full subsidy | -0.0594*** | -0.0611*** | -0.0631*** | -0.0590*** | -24.43*** | -25.54*** |
| | (0.0115) | (0.0124) | (0.0135) | (0.0131) | (4.847) | (5.060) |
| ln(Synthetic RNFB) | 0.411*** | 0.346*** | | | 164.5*** | 146.1*** |
| | (0.0935) | (0.0960) | | | (40.20) | (41.95) |
| ln(Gas prices) | 0.0743 | 0.0527 | | | 30.13* | 28.46 |
| | (0.0453) | (0.0505) | | | (18.00) | (19.56) |
| ln(Total income) | 0.00172 | | -0.00908 | | | |
| | (0.0161) | | (0.0202) | | | |
| ln(Total market income) | | -0.0154 | | -0.0169 | | |
| | | (0.0137) | | (0.0149) | | |
| ln(Total child benefits) | | 0.0214* | | 0.0217* | | |
| | | (0.0112) | | (0.0119) | | |
| ln(Total oth. gov.) | | -0.0159 | | -0.0157 | | |
| | | (0.0142) | | (0.0174) | | |
| Ave. total income (in 000s) | | | | | 0.0561 | |
| | | | | | (0.354) | |
| Ave. market income (in 000s) | | | | | | -0.0359 |
| | | | | | | (0.354) |
| Ave. child benefits (in 000s) | | | | | | 1.798 |
| | | | | | | (1.622) |
| Ave. oth. gov. (in 000s) | | | | | | 1.399 |
| | | | | | | (1.230) |
| Constant | 3.366*** | 4.064*** | 6.193*** | 6.255*** | -641.9** | -537.2* |
| | (0.626) | (0.734) | (0.347) | (0.233) | (288.8) | (307.1) |
| Community FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | No | No | Yes | Yes | No | No |
| R-squared | 0.834 | 0.838 | 0.850 | 0.852 | 0.837 | 0.838 |

Standard errors clustered by community in parentheses. *** p<0.01, ** p<0.05, * p<0.10. We are not able to report the number of observations but our sample is an unbalanced panel containing up to 87 communities and up to 8 years per community (ranging from 2012-2019). The synthetic RNFB and gas price variables are dropped with the inclusion of time fixed effects, given they have no within-community variation.

Table 2: Estimated effects of income on subsidised quantities in Northern communities

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | ln(Quantity Subsidised) | | | | Ave. Quantity Subsidised | |
| Full subsidy | 0.104 | 0.105 | 0.0595 | 0.0467 | 28.63 | 21.07 |
| | (0.0712) | (0.0820) | (0.0868) | (0.0979) | (20.31) | (21.20) |
| ln(Synthetic RNFB) | 0.158 | 0.187 | | | 332.1 | 122.0 |
| | (0.710) | (0.649) | | | (263.8) | (114.4) |
| ln(Gas prices) | 0.564 | 0.531 | | | 112.9 | 101.1 |
| | (0.543) | (0.564) | | | (90.23) | (110.7) |
| ln(Total income) | 0.415** | | 0.350* | | | |
| | (0.175) | | (0.178) | | | |
| ln(Tot. market income) | | 0.348* | | 0.350* | | |
| | | (0.192) | | (0.186) | | |
| ln(Tot. child benefits) | | 0.0320 | | -0.0787 | | |
| | | (0.0329) | | (0.0795) | | |
| ln(Tot. oth. gov.) | | -0.0598 | | 0.0498 | | |
| | | (0.125) | | (0.152) | | |
| Ave. total income (in 000s) | | | | | 1.856* | |
| | | | | | (1.092) | |
| Ave. child benefits (in 000s) | | | | | | 17.68* |
| | | | | | | (8.939) |
| Ave. market income (in 000s) | | | | | | 0.902 |
| | | | | | | (1.499) |
| Ave. oth. gov. (in 000s) | | | | | | 19.92 |
| | | | | | | (28.28) |
| Constant | 1.931 | 3.665 | 6.755** | 7.220*** | -2,221 | -1,076 |
| | (5.794) | (6.265) | (3.076) | (2.203) | (1,879) | (1,221) |
| Community FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | No | No | Yes | Yes | No | No |
| R-squared | 0.955 | 0.955 | 0.959 | 0.959 | 0.842 | 0.850 |

Standard errors clustered by community in parentheses. *** p<0.01, ** p<0.05, * p<0.10. We are not able to report the number of observations but our sample is an unbalanced panel containing up to 87 communities and up to 8 years per community (ranging from 2012-2019). The synthetic RNFB and gas price variables are dropped with the inclusion of time fixed effects, given they have no within-community variation. Average income values are reported in 1000s of dollars and average quantities of subsidised shipments are reported in kilograms.

Table 3: Heterogeneous effects of child benefits on prices in Northern communities

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| | ln(RNFB Price) | | | | | | Ave. RNFB | | |
| Full subsidy | -0.0694*** | -0.0792*** | -0.0823*** | -0.0740*** | -0.0776*** | -0.0840*** | -25.46*** | -34.97*** | -34.65*** |
| | (0.00992) | (0.0119) | (0.0129) | (0.0109) | (0.0122) | (0.0134) | (4.345) | (4.676) | (5.940) |
| ln(Synthetic RNFB) | 0.420*** | 0.355*** | 0.381*** | | | | 166.5*** | 150.7*** | 156.3*** |
| | (0.0966) | (0.0981) | (0.103) | | | | (41.12) | (42.08) | (42.14) |
| ln(Gas prices) | 0.0765* | 0.0555 | 0.0584 | | | | 30.54* | 30.33 | 32.21 |
| | (0.0452) | (0.0508) | (0.0510) | | | | (18.13) | (19.57) | (19.83) |
| ln(Total income) | -0.0104 | | | -0.0225 | | | | | |
| | (0.0211) | | | (0.0286) | | | | | |
| ln(Total income) × Monopoly | 0.0566* | | | 0.0593* | | | | | |
| | (0.0292) | | | (0.0309) | | | | | |
| ln(Tot. child benefits) | | 0.0168 | 0.0150 | | 0.0156 | 0.00720 | | | |
| | | (0.0125) | (0.213) | | (0.0136) | (0.225) | | | |
| ln(Tot. child benefits) × Monopoly | | 0.0429** | 0.0339* | | 0.0423** | 0.0320* | | | |
| | | (0.0175) | (0.0176) | | (0.0168) | (0.0171) | | | |
| ln(Tot child benefits) × Inuit | | | -0.0220 | | | -0.0274 | | | |
| | | | (0.0157) | | | (0.0167) | | | |
| ln(Tot. child benefits) × $\bar{y}_{2012}$ | | | 0.00180 | | | 0.00233 | | | |
| | | | (0.0209) | | | (0.0219) | | | |
| Ave. total income | | | | | | | -0.0069 | | |
| | | | | | | | (0.405) | | |
| Ave. total income × Monopoly | | | | | | | 0.433 | | |
| | | | | | | | (0.696) | | |
| Ave. child benefits | | | | | | | | 0.623 | 24.79 |
| | | | | | | | | (1.824) | (52.16) |
| Ave. child benefits × Monopoly | | | | | | | | 8.485** | 5.744 |
| | | | | | | | | (3.273) | (3.834) |
| Ave. child benefits × Inuit | | | | | | | | | -2.500 |
| | | | | | | | | | (4.928) |
| Ave. child benefits × $\bar{y}_{2012}$ | | | | | | | | | -2.246 |
| | | | | | | | | | (5.412) |
| Constant | 3.349*** | 3.972*** | 3.930*** | 6.256*** | 6.224*** | 6.357*** | -653.9** | -565.5* | -606.6* |
| | (0.622) | (0.737) | (0.726) | (0.438) | (0.243) | (0.309) | (294.3) | (307.7) | (309.8) |
| P-value: $CB$ & $CB$ × Monopoly | 0.039 | 0.0002 | 0.815 | 0.138 | 0.0008 | 0.859 | 0.473 | 0.0018 | 0.547 |
| Community FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | No | No | No | Yes | Yes | Yes | No | No | No |
| R-squared | 0.835 | 0.842 | 0.843 | 0.852 | 0.856 | 0.858 | 0.837 | 0.841 | 0.843 |

Standard errors clustered by community in parentheses. *** p<0.01, ** p<0.05, * p<0.10. We are not able to report the number of observations but our sample is an unbalanced panel containing up to 87 communities and up to 8 years per community (ranging from 2012-2019). Other income sources are also included as controls but not reported. Average income values are reported in 1000s of dollars.

Table 4: Heterogeneous effects of child benefits on subsidised quantities in Northern communities

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| | ln(Quantity Subsidised) | | | | | | Ave. Quantity Subsidised | | |
| Full subsidy | 0.0805 | 0.0154 | -0.00408 | 0.0302 | -0.0466 | -0.0867 | 2.911 | -51.20 | -75.75 |
| | (0.0946) | (0.138) | (0.143) | (0.116) | (0.157) | (0.170) | (37.04) | (57.14) | (55.61) |
| ln(Synthetic RNFB) | 0.178 | 0.215 | 0.370 | | | | 342.7 | 147.3 | 136.4 |
| | (0.728) | (0.668) | (0.695) | | | | (227.6) | (123.0) | (113.2) |
| ln(Gas prices) | 0.566 | 0.529 | 0.542 | | | | 120.6 | 106.1 | 90.46 |
| | (0.544) | (0.550) | (0.551) | | | | (86.07) | (104.3) | (87.99) |
| ln(Total income) | 0.388* | | | 0.316 | | | | | |
| | (0.208) | | | (0.216) | | | | | |
| ln(Total income) × Monopoly | 0.128 | | | 0.154 | | | | | |
| | (0.269) | | | (0.273) | | | | | |
| ln(Tot. child benefits) | | 0.0110 | -0.196 | | -0.106 | -0.619 | | | |
| | | (0.0420) | (0.983) | | (0.101) | (1.063) | | | |
| ln(Tot. child benefits) × Monopoly | | 0.204 | 0.154 | | 0.207 | 0.150 | | | |
| | | (0.227) | (0.237) | | (0.206) | (0.212) | | | |
| ln(Tot. child benefits) × Inuit | | | -0.147 | | | -0.205 | | | |
| | | | (0.101) | | | (0.127) | | | |
| ln(Tot. child benefits) × $\bar{y}_{2012}$ | | | 0.0303 | | | 0.0597 | | | |
| | | | (0.0930) | | | (0.0982) | | | |
| Ave. total income | | | | | | | -0.456 | | |
| | | | | | | | (1.751) | | |
| Ave. total income × Monopoly | | | | | | | 14.85* | | |
| | | | | | | | (8.848) | | |
| Ave. child benefits | | | | | | | | 4.151 | -937.3** |
| | | | | | | | | (11.85) | (408.0) |
| Ave. child benefits × Monopoly | | | | | | | | 79.58 | 79.06* |
| | | | | | | | | (48.82) | (41.69) |
| Ave. child benefits × Inuit | | | | | | | | | -103.1** |
| | | | | | | | | | (45.99) |
| Ave. child benefits × $\bar{y}_{2012}$ | | | | | | | | | 99.11** |
| | | | | | | | | | (42.63) |
| Constant | 1.903 | 3.393 | 3.116 | 6.899** | 7.076*** | 7.744*** | -2,306 | -1,175 | -982.4 |
| | (5.795) | (6.376) | (6.585) | (3.206) | (2.343) | (2.138) | (1,647) | (1,178) | (1,001) |
| P-value: $CB$ & $CB$ × Monopoly | 0.0083 | 0.304 | 0.960 | 0.0135 | 0.499 | 0.613 | 0.0644 | 0.0577 | 0.0271 |
| Community FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | No | No | No | Yes | Yes | Yes | No | No | No |
| R-squared | 0.955 | 0.956 | 0.956 | 0.959 | 0.959 | 0.960 | 0.859 | 0.867 | 0.890 |

Standard errors clustered by community in parentheses. *** p<0.01, ** p<0.05, * p<0.10. We are not able to report the number of observations but our sample is an unbalanced panel containing up to 87 communities and up to 8 years per community (ranging from 2012-2019). Other income sources are also included as controls but not reported. Average income values are reported in 1000s of dollars and average quantities of subsidised shipments are reported in kilograms.

# Appendix A

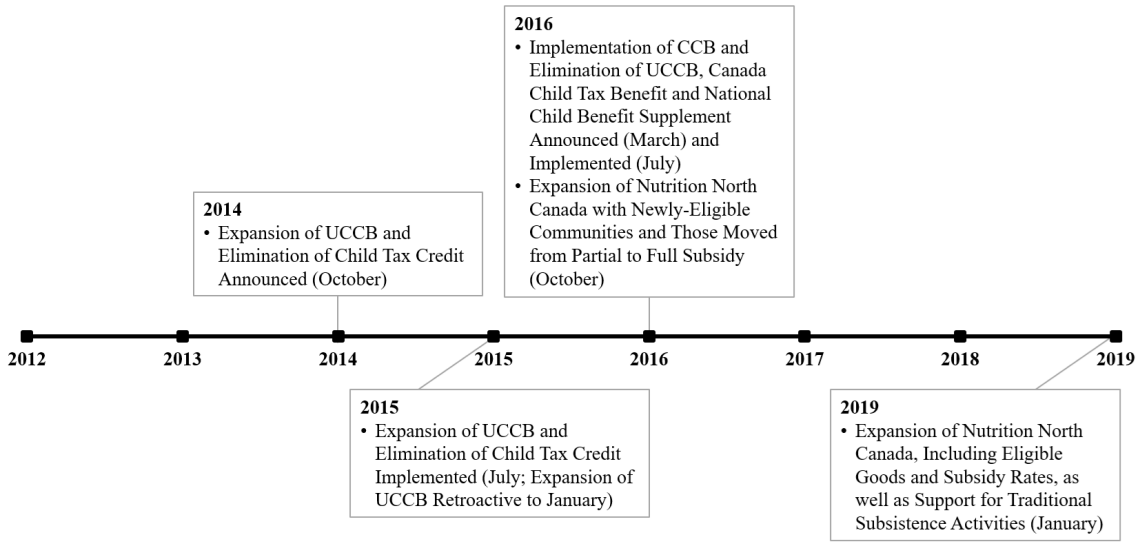



Figure A1: Major changes to Nutrition North Canada and federal child benefits during study period (2012-2019)

Table A1: Descriptive statistics for the entire sample, non-monopoly, and monopoly communities in 2015

| | (1) Entire Sample | (2) Non-Monopoly | (3) Monopoly |
|---|---|---|---|
| Number of communities | 87 | 57 | 30 |
| Ave. community population | 1,901 | 2,576 | 667 |
| RNFB price ($) | 413 | 412 | 414 |
| RNFB subsidy ($) | 112 | 125 | 80 |
| Quantity shipped (KG/2016 Pop) | 245 | 280 | 181 |
| Inuit indicator | 0.51 | 0.69 | 0.20 |
| Ave. total income/tax-filer ($) | 36,600 | 39,100 | 28,000 |
| Ave. market income/tax-filer ($) | 29,400 | 32,100 | 20,000 |
| Ave. child benefits/tax-filer ($) | 1,600 | 1,500 | 1,700 |
| Ave. oth. gov. income ($) | 5,700 | 5,500 | 6,300 |
| Percentage receiving child benefits | 26 | 26 | 25 |
| $\Delta$ child benefits 2012-2019 | 1500 | 1500 | 1500 |
| $\Delta$ child benefits 2015-2017 | 1100 | 1100 | 1100 |

Table A2: Estimated effects of income on prices in Northern communities conditional on quantity

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | ln(RNFB Price) | | | | Ave. RNFB | |
| ln(Subsidised quantity) | -0.0131* | -0.0145** | -0.00863 | -0.00830 | -5.086* | -4.939* |
| | (0.00740) | (0.00691) | (0.00784) | (0.00758) | (2.873) | (2.836) |
| Full subsidy | -0.0480*** | -0.0500*** | -0.0522*** | -0.0487*** | -19.78*** | -21.04*** |
| | (0.00964) | (0.0108) | (0.0117) | (0.0116) | (4.224) | (4.521) |
| ln(Synthetic RNFB) | 0.394*** | 0.325*** | | | 156.8*** | 136.8*** |
| | (0.0921) | (0.0960) | | | (39.70) | (41.77) |
| ln(Gas prices) | 0.0696 | 0.0459 | | | 28.18 | 25.84 |
| | (0.0461) | (0.0515) | | | (18.37) | (19.96) |
| ln(Total income) | 0.00798 | | -0.00569 | | | |
| | (0.0147) | | (0.0191) | | | |
| ln(Tot. market income) | | -0.00960 | | -0.0138 | | |
| | | (0.0121) | | (0.0140) | | |
| ln(Tot. child benefits) | | 0.0229** | | 0.0219* | | |
| | | (0.0112) | | (0.0121) | | |
| ln(Tot. oth. gov.) | | -0.0188 | | -0.0159 | | |
| | | (0.0145) | | (0.0180) | | |
| Ave. total income (in 000s) | | | | | 0.158 | |
| | | | | | (0.341) | |
| Ave. market income (in 000s) | | | | | | 0.0546 |
| | | | | | | (0.347) |
| Ave. child benefits (in 000s) | | | | | | 2.158 |
| | | | | | | (1.633) |
| Ave. oth. gov. (in 000s) | | | | | | 1.396 |
| | | | | | | (1.258) |
| Constant | 3.531*** | 4.317*** | 6.236*** | 6.301*** | -532.4* | -416.8 |
| | (0.632) | (0.746) | (0.333) | (0.228) | (283.7) | (307.6) |
| Community FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | No | No | Yes | Yes | No | No |
| R-squared | 0.834 | 0.838 | 0.850 | 0.852 | 0.837 | 0.838 |

Standard errors clustered by community in parentheses. *** p<0.01, ** p<0.05, * p<0.10. We are not able to report the number of observations but our sample is an unbalanced panel containing up to 87 communities and up to 8 years per community (ranging from 2012-2019). The synthetic RNFB and gas price variables are dropped with the inclusion of time fixed effects, given they have no within-community variation.

Table A3: Heterogeneous effects of child benefits on prices in Northern communities conditional on quantity

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | ln(RNFB Price) | | | | Ave. RNFB | |
| ln(Subsidised quantity) | -0.0128* | -0.0145** | -0.00846 | -0.00838 | -5.234* | -5.372* |
| | (0.00694) | (0.00679) | (0.00729) | (0.00746) | (2.782) | (2.741) |
| Full subsidy | -0.0577*** | -0.0674*** | -0.0629*** | -0.0666*** | -21.09*** | -30.79*** |
| | (0.00764) | (0.0105) | (0.00877) | (0.0106) | (3.745) | (4.335) |
| ln(Synthetic RNFB) | 0.403*** | 0.333*** | | | 159.1*** | 141.0*** |
| | (0.0946) | (0.0979) | | | (40.65) | (41.90) |
| ln(Gas prices) | 0.0713 | 0.0482 | | | 28.57 | 27.28 |
| | (0.0459) | (0.0518) | | | (18.43) | (19.96) |
| ln(Total income) | -0.00317 | | -0.0182 | | | |
| | (0.0194) | | (0.0274) | | | |
| ln(Total income) × Monopoly | 0.0523* | | 0.0556* | | | |
| | (0.0279) | | (0.0291) | | | |
| ln(Tot. child benefits) | | 0.0188 | | 0.0163 | | |
| | | (0.0125) | | (0.0137) | | |
| ln(Tot. child benefits) × Monopoly | | 0.0393** | | 0.0390** | | |
| | | (0.0173) | | (0.0166) | | |
| Ave. total income (in 000s) | | | | | 0.0842 | |
| | | | | | (0.394) | |
| Ave. total income (in 000s) × Monopoly | | | | | 0.533 | |
| | | | | | (0.690) | |
| Ave. child benefits (in 000s) | | | | | | 1.108 |
| | | | | | | (1.824) |
| Ave. child benefits (in 000s) × Monopoly | | | | | | 7.936** |
| | | | | | | (3.024) |
| Constant | 3.525*** | 4.241*** | 6.302*** | 6.280*** | -543.8* | -433.8 |
| | (0.629) | (0.748) | (0.419) | (0.235) | (288.1) | (307.2) |
| P-value: $CB$ & $CB$ × Monopoly | 0.0173 | 0.0003 | 0.100 | 0.0011 | 0.286 | 0.0007 |
| Community FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | No | No | Yes | Yes | No | No |
| R-squared | 0.834 | 0.838 | 0.850 | 0.852 | 0.837 | 0.838 |

Standard errors clustered by community in parentheses. *** p<0.01, ** p<0.05, * p<0.10. We are not able to report the number of observations but our sample is an unbalanced panel containing up to 87 communities and up to 8 years per community (ranging from 2012-2019). The synthetic RNFB and gas price variables are dropped with the inclusion of time fixed effects, given they have no within-community variation. Other income sources are also included as controls but not reported. Average income values are reported in 1000s of dollar.

# Appendix B

Consider quantity $q$ and price $p$, which correspond to the annual shipments of subsidised goods to community $i$. While we do not observe expenditures, we do observe total income ($Y$), which comes from various sources (e.g., child benefits). Further, assume a linear community-level demand function that includes a shift variable, $X$:

$$q_i = X_i - b_i p_i.$$

Note that parameter $b$ captures the sensitivity of quantity to changes in price and can vary across communities (e.g., monopoly retailers may have a lower $b$ parameter). A profit maximizing firm chooses quantity such that:

$$\max_q \ \pi = p(q)q - c(q).$$

We could interpret $q$ and $X$ in terms of total quantity/demand at the community-level or in per capita terms; in the latter case, the profits are scaled by population (which we assume to be exogenous with respect to the retailer's problem).

Assuming a competitive market, retailers set price equal to community-level marginal cost: $p = \partial c/\partial q$. If decreasing returns to scale (i.e., increasing marginal costs) are present, an exogenous positive demand shock results in a higher price because firms selling more quantity must raise the price, given rising marginal costs. However, in the presence of market power, community-level demand equals firm-level demand, and a profit-maximizing retailer consequently has variable price elasticity of demand. This provides a second channel through which demand shocks can affect prices, and may exist even in the presence of constant or decreasing marginal costs.

To rule out the first first channel, our empirical analysis considers specifications

that condition on $q_i$. The effects of income shocks on prices are similar when controlling for quantity, and the quantity parameter estimate is typically zero (or slightly negative), implying constant or possibly decreasing marginal costs. This rules out decreasing returns to scale as a quantitatively important factor; therefore, we assume constant marginal costs (e.g., $c(q)_i = c_i q_i$). Assuming market power, linear demand, and constant marginal costs, the profit maximizing price can be expressed as:

$$p_i^* = \frac{1}{2}\left(c_i + \frac{X_i}{b_i}\right).$$

Where the markup over cost equals:

$$\frac{p_i^*}{c_i} = \frac{1}{2}\left(1 + \frac{X_i}{b_i c_i}\right).$$

And, the profit maximizing quantity is:

$$q_i^* = 0.5(X_i - b_i c_i).$$

This implies that, *ceteris paribus*, a retailer observing a relatively low value of $b$ (e.g., a monopolist) will charge a higher price and sell a lower quantity.

Operating through $X$, consider an exogenous increase in $Y$ that increases demand. This implies the following changes:

$$\frac{\partial p}{\partial Y} = \frac{1}{2b}\frac{\partial X}{\partial Y};$$
$$\frac{\partial q}{\partial Y} = \frac{1}{2}\frac{\partial X}{\partial Y}.$$

In elasticity terms, we can write this as:

$$\frac{\partial p}{\partial Y}\frac{Y}{p} = \frac{Y}{X + bc}\frac{\partial X}{\partial Y};$$
$$\frac{\partial q}{\partial Y}\frac{Y}{q} = \frac{Y}{X - bc}\frac{\partial X}{\partial Y}.$$

Thus, when an exogenous increase in income causes a positive demand shock, both price and quantity increase. Since, a smaller price sensitivity parameter is likely to occur in a less competitive market, a demand shock in this instance is predicted to cause a relatively larger increase in price (in both level and elasticity terms) and a smaller increase in quantity (in elasticity terms).

Greater sensitivity of demand to marginal income (similar to a higher marginal propensity to consume) increases the response of quantity and price; thus, the effect of a change in income depends on both the type of income and characteristics of the recipients. When analysing changes in logs, a further consideration is the ratio $Y/X$, which measures the initial magnitude of income relative to the initial magnitude of demand (conditional on price). When this is high, it amplifies the quantity and price response, while the marginal cost acts similar to the sensitivity parameter (dampening the price response but amplifying the quantity response).

These considerations are relevant when comparing the price and quantity effects of exogenous income increases across communities. For example, in level regressions, we might expect to see larger effects per dollar for child income than market income because of a higher $\partial X/\partial Y$; we might not see larger effects in log regressions since $Y/(X + bc)$ is much lower for child income than market income. Similarly, while monopoly communities may be expected to have a lower $b$, leading to larger price increases in response to an exogenous increase in income, whether they experience

smaller quantity increases also depends on whether they have a similar $\partial X/\partial Y$ and similar values for $Y$, $X$, and $c$.