Who Benefits from Food Tax Exemptions in Lower Income Settings? Evidence on Pass-Through and Incidence*

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Abstract

Governments worldwide use VAT exemptions on basic foods to reduce the cost of living for poorer households. We study the unanticipated removal of VAT on selected food items in Papua New Guinea by conducting a difference-in-differences analysis using administrative data, a supermarket price census, web-scraped online prices, and a nationally representative phone survey panel. We find complete pass-through in formal supermarkets in central urban districts, where retail competition is strong, but no pass-through in informal stores or rural areas, where poorer households mainly shop. For every dollar of foregone revenue, only five cents accrued to the poorest quintile, while the richest quintile and store owners each accrued one-third of the benefits. This degree of regressivity was largely unanticipated by 237 experts who participated in a prediction survey. Our findings demonstrate that food tax exemptions are inherently regressive in lower-income settings, due to high informality, substantial market segmentation, and positive income elasticity of demand for basic food.

JEL Classification: H20, H22, H23

Keywords: Public Finance, Industrial Organization, Taxation, Incidence, Pass-through

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1 Introduction

Consumption tax exemptions are a significant form of foregone revenue worldwide, particularly in low- and middle-income countries, accounting for around two percent of GDP (Redonda et al., 2025). They exist to varying extents in all countries, with most governments exempting at least some basic food items from tax.[1] The rationale for these exemptions is typically to minimize the tax burden faced by poorer households (Warren, 2008; Thomas, 2024).[2] However, this overlooks the fact that stores may not fully pass-through exemptions to consumers via lower prices, and that most food consumption in lower-income countries falls outside the tax net (Bachas et al., 2023). This is particularly relevant for poorer households, who rely disproportionately on subsistence farming, informal stores, and have less access to competitive urban markets (World Bank, 2022). There is very little empirical evidence, especially in the presence of high informality, on whether consumption tax exemptions lower retail prices, under what conditions this varies, and to what extent poorer households benefit.

We study the pass-through to prices and the distributional impact of introducing Value-Added Tax (VAT) exemptions, by far the most common form of consumption tax, in a lower income setting. In 2025, the government of Papua New Guinea (PNG) introduced VAT exemptions for 10 basic food items, providing retailers with only 10 days notice before the change came into effect. This reform removed the 10 percent VAT rate for these 10 items (keeping it in place for all other food items), for a period of 19 months, at a cost of around USD150 million.[3] The setting in PNG mirrors that of many lower-income countries, as there

[1] There are some high-income countries (e.g., New Zealand) that do not have any tax exemptions on food, but all lower-income countries exempt some food items from tax.

[2] This justification can be compelling in lower-income countries, where, on net, fiscal policies increase monetary poverty (World Bank, 2022). This is because consumption taxes account for a larger share of household expenditure for poor households than government transfers, such as social protection and subsidies.

[3] There were three other items, soap, diapers and sanitary products, but these made up a very small fraction of the overall loss of foregone revenue and as a result we do not focus on these items.

are very high rates of informality and a largely rural, subsistence-based population, with VAT collection concentrated in the largest urban area. To estimate the causal effect of this unanticipated reform on prices, we use a difference-in-differences approach to compare price changes between exempt and non-exempt food items. We draw on detailed administrative data, a monthly panel of nationally representative phone surveys, data scraped from supermarket websites, and a monthly census of prices across all formal supermarkets in the largest city. Collectively, these data sources provide around half a million price points from formal and informal stores with detailed location information. To assess the contribution of our study to the existing knowledge base, we conducted a prediction survey with 237 experts, where they were asked to predict the pass-through and incidence of this reform.

We find very high pass-through of VAT exemptions to prices in formal stores in urban areas; however, there was a minimal impact elsewhere, resulting in poorer households benefiting only marginally. There was near-complete pass-through in the central area of the largest city, according to the price data we collected from the supermarket census and multiple sources of administrative data. In the outer suburbs of the largest city, there was slightly lower pass-through in formal stores; and the phone survey showed little evidence of price reductions in informal stores and those in rural areas. Three months after the reform, the average pass-through rate in formal stores in urban areas was 70 percent, according to the phone survey. The phone survey results suggest that store owners and consumers in the richest quintile were the main beneficiaries of the reform, accumulating around two-thirds of the foregone revenue, with the remaining one-third shared among the rest of the population. The poorest quintile received only around five percent of the foregone revenue. The prediction survey revealed that, on average, experts underestimated the extent of pass-through in formal stores in urban areas, overestimated pass-through elsewhere, and expected significantly greater benefits from the introduction of VAT exemptions for poorer households.

The variation in pass-through rates is consistent with the level of competition between

stores driving the extent to which prices fall with the introduction of VAT exemptions. The strongest competition is between supermarkets in central urban areas, where, on average, each supermarket is around 150 meters from its nearest competitor. In contrast, there is limited competition between stores elsewhere, especially in rural areas. In fact, even stores within the same supermarket chain lowered their prices to varying degrees by location, with higher pass-through observed only in central urban areas. Further evidence of this behavior is that the supermarket chain that offers in-store and online shopping did not lower its online prices following the reform, but only lowered its in-store prices. In rural areas, the introduction of VAT exemptions appears to have had a negligible effect on prices, likely because stores, both formal and informal, exercise significantly greater spatial monopolistic power over prices. It is unlikely that the differences we observe are due to other factors, such as differences in the pressure applied to stores to pass-through VAT exemptions to prices. The PNG government did not invest meaningfully in monitoring whether stores lowered prices, and no fines were issued, nor was the reform legally binding (i.e., no legislation was passed by the national parliament). Rather, the extent of pass-through would appear to be driven by price competition between stores. The contrast between our results and expert predictions is likely due to misjudgments about the role of competition, which led both to underestimating the impact in central urban areas and to overestimating it elsewhere.

The limited benefits to poorer households from the introduction of VAT exemptions are partly due to differential pass-through, as they are more likely to purchase from informal stores and from stores facing less competition. Most households in central urban areas have significantly higher living standards than those in rural areas, and they benefit from high store competition, leading to greater price pass-through. In contrast, poorer households are less likely to purchase from formal supermarkets, rely more on subsistence agriculture, and consume less food. Each of these factors reduces the extent to which poorer households benefit from the removal of VAT from food items. Our results show that differential pass-

through due to informality and competition contributes at least as much as consumption patterns, and potentially more, to the regressivity of VAT exemptions. On average, experts did not predict that this reform would be regressive; rather, they thought it would benefit each quintile relatively evenly, in absolute terms. This could be because many of the food items are very basic (e.g., rice and flour), and experts may have considered them to be inferior goods (i.e., consumer demand falls with income). However, we show that before and after the reform, even for the most basic items, richer households purchase relatively more and at lower or equivalent prices compared to poorer households.

This paper contributes to four strands of the existing literature related to: the pass-through of tax exemptions to prices; tax incidence; public finance and industrial organization work in data-scarce environments; and recent studies examining expert predictions. First, this is one of the first studies to causally examine the impact of VAT exemptions on prices in low- and middle-income countries. The vast majority of previous research on the pass-through of consumption taxes to prices has taken place in high-income countries (e.g., Benzarti et al., 2020; Benzarti and Carloni, 2019), where levels of informality, particularly subsistence farming, and the structure of economies are dramatically different. Recent examples in slightly less developed settings such as Argentina (Benzarti et al., 2024), Mexico (Bachas et al., 2023), and India (Brusco and Velayudhan, 2025) begin to shed further light, but it remains an open question how generalizable the conclusions are to lower-income settings, especially where the majority of food consumption is informal. Our study makes a significant contribution to this evidence base for several reasons. First, these results in PNG are likely to be highly relevant for the poorest third of humanity, who live in settings that share similar characteristics, including high informality, heavy reliance on subsistence agriculture, positive income elasticity of demand for basic food items, and limited competition between stores in peri-urban and rural areas. Second, understanding pass-through and incidence of VAT exemptions is arguably more important in lower-income countries as

they are the main form of assistance for poorer households, and misperceptions about their effectiveness can lead to underinvestment in alternative policies (e.g., the establishment and use of social protection systems). Beyond the novelty of the setting, we also add to this literature by studying the pass-through when VAT exemptions are first *introduced* on food, whereas prior causal, empirical work has only examined what happens to prices when VAT exemptions are *changed* (i.e., expanded or reduced), as almost every country already has these types of exemptions in place. In addition, we draw on a more diverse range of data sources than existing studies, allowing us to paint a far richer picture of how VAT exemptions pass-through to prices throughout an economy, depending on the formality of stores, competitiveness of markets, geographic location, and transaction modality (e.g., online vs in-store prices).

Second, this study makes a substantial contribution by capturing the economic incidence of VAT exemptions by observing the actual purchase price and consumption behavior across the income distribution. This builds on previous research by Bachas et al. (2023), which uses household surveys across countries to measure differences in the types of households that purchase from formal and informal stores. To the best of our knowledge, this is the first study to systematically illustrate how differential pass-through rates (due to informality and competition) and consumption patterns contribute to the incidence of VAT exemptions across households. Past work has only indirectly examined this issue by using price data at the store level and inferring differences across the distribution based on store type (Benzarti et al., 2024) or examined household-level consumption by store type without information about prices paid by households (Bachas et al., 2023). We also contribute to the broader, nascent literature on the incidence of taxation in lower-income countries (Jensen et al., 2024; Blasco et al., 2023). The results about the economic incidence of food tax exemptions are also potentially relevant, although to a lesser extent, in higher-income countries, where fresh food is often sold in local, informal markets (e.g., "farmers markets"). Our findings

on the regressive nature of VAT exemptions also align with previous work, which shows that alternative fiscal policies would be far more effective in supporting poorer households (Warwick et al., 2022; Inchauste et al., 2024).

Third, we also contribute to the existing knowledge base by conducting a rigorous, causal study in a very data-scarce environment, helping to illustrate the potential for empirical industrial organization analysis even in challenging settings. Seminal studies in this field have been conducted in high-income countries, where it is possible to collect broadly representative price data via supermarket scanners (Benzarti et al., 2024); however, this is not feasible in less advanced settings. Benzarti (2025) outlines how the frontier of this research agenda is understanding how tax exemptions impact prices in the short and medium term (i.e., hysteresis in prices) and how this varies across settings. Our study, in the context of PNG, offers new insights into this, as it not only shares similar economic structures with other lower-income countries but also faces comparable data challenges.[4] Despite these limitations, we illustrate that price data can still be obtained in data-scarce environments through methods such as web scraping, phone surveys, direct observation in-store, and drawing on administrative data. By using several data sources, we conduct our analysis with the most informative data available for each question and verify that our conclusions are robust across sources. In addition, this study provides rigorous evidence on a region of the world that is typically overlooked in economic research (some exceptions include Hoy et al. (2024) and Beath et al. (2018)), partly due to perceptions of data scarcity. Furthermore, this paper adds to the growing body of public finance research in data-scarce settings, such as the Democratic Republic of the Congo (Weigel, 2020; Balán et al., 2022; Bergeron et al., 2024) and Somalia (Van den Boogaard and Hoy, 2026).

Finally, we conduct one of the largest expert prediction surveys to date, which reveals

[4]For example, the last household survey on living standards in PNG was conducted in 2009, and only five countries (Trinidad and Tobago, Guyana, Turkmenistan, Azerbaijan, and Venezuela) have less recent data than this (World Bank, 2026).

novel insights worthy of attention in their own right. With 237 participants, this study has a larger sample size than 95 percent of the studies listed on the Social Science Prediction Platform, the preeminent platform for expert prediction surveys (DellaVigna and Vivalt, 2025). The comparison of our study's results with experts' predictions reveals significant misperceptions about consumption tax exemptions in lower-income countries. In particular, most experts underestimated the extent of pass-through to prices in formal stores in urban areas, overestimated pass-through rates elsewhere, and expected significantly greater benefits from the introduction of VAT exemptions for poorer households. The differences between subgroups of experts (e.g., those with or without experience working in lower-income countries) are small relative to the gap between expert predictions and actual outcomes. No subgroup of experts came close to predicting the extreme regressivity of VAT exemptions observed in the data. We rationalize these results by experts' misjudging how economic factors operate in these settings, such as price competition between stores, informality, and the income elasticity of consumer demand for basic food items. Many of these experts provide advice to governments in lower-income countries, and our results provide evidence for the need to pause and consider the extent to which this guidance is well-founded.

The rest of the paper is structured as follows. Firstly, we provide details about the setting and the VAT reform. This is followed by information about the data and methodology. Next, we present the main findings about pass-through to prices and the incidence of the foregone revenue, including providing evidence about the mechanisms and the likely impact of alternative policies. Finally, we discuss the implications of the results and generalizability to other settings.

2 Background

2.1 Setting

The study is set in Papua New Guinea (PNG), which, in many ways, can be considered a typical lower-income country, despite its location in the East Asia and Pacific region. In 2024, PNG had a GNI per capita (Atlas Method) of USD 2,940, and 52 percent of the population lived below the extreme poverty line (USD 3 (2021 PPP) a day), making the country one of the poorest in the world outside of Sub-Saharan Africa (World Bank, 2026). There are very high levels of informality, with 85 percent of the population of over 10 million living in rural areas and primarily relying on subsistence agriculture (World Bank, 2026). Similar to many lower-income countries, there is one major economic urban center (Port Moresby), where most VAT is collected, and this city is home to most of the richest households in the country (Hoy et al., 2024; World Bank, 2026). Outside of Port Moresby, there are a small number of supermarkets in regional towns that are registered with the revenue authority, but most places that sell food items are informal, known as a "canteen" or "tuckerbox" (Pacific Data Hub, 2026). These informal stores often purchase stock from supermarket shelves in regional centers, as many lack an elaborate network of wholesale suppliers.

The patterns of food consumption in PNG reflect its level of development and its heavy dependence on subsistence agriculture. Households in the poorer quintiles typically have lower calorie intakes, which fall well below recommended levels (Schmidt and Yadav, 2026). Most households rely on starch and grains for the majority of their calories, which are primarily sourced from subsistence farming (Schmidt and Yadav, 2026). Only 17 percent of calories come from protein, fruit, and vegetables, for households in the two poorest quintiles of the distribution, and this is marginally higher for the rest of the population (Schmidt and Yadav, 2026).

Consistent with prior work, our phone survey reveals three facts about how consumption varies across the income distribution in PNG. First, the volume of consumption of each food item increases across quintiles; as such, we do not detect any evidence of inferior goods (see Figure A1 to Figure A7 in the Appendix for further details about consumption patterns observed in our phone survey).[5] Second, reliance on subsistence farming decreases across quintiles, with around two-thirds of consumption coming from households' own production for the poorest quintile, and this falls to around one-third for the richest quintile. Third, food purchases from formal stores increase across quintiles, with less than 20 percent made at formal stores in the poorest quintile, compared to over 40 percent in the richest quintile.

In general, these consumption patterns suggest that policies such as VAT exemptions, even on basic food items, are likely to be regressive: poorer households consume less food and obtain a smaller share of their food consumption through market purchases. Beyond consumption patterns, the place of purchase also makes VAT exemptions more regressive, as poorer households rely more on informal stores and are more likely to reside outside of Port Moresby than higher-income households.

2.2 Details about the VAT exemption reform

For the first time in its history, the PNG government introduced VAT exemptions on 1 June 2025 for 10 food items. The intended aim of the reform was to ease the cost-of-living pressures on poorer households by lowering the prices of basic goods. Specifically, 10 food items were zero-rated for VAT, which had previously been levied at 10 percent. These items are: Cooking oil, Rice, Tinned fish, Tea, Flour, Tinned beef, Chicken, Noodles, Biscuits, and Coffee (see Figure A8 in Appendix for the first official notice issued by the PNG Government). The expected annual cost to the government was nearly USD100 million in foregone revenue, and at the time of writing, the exemptions were scheduled to remain in place for 19 months.

[5] Even cooking oil consumption is skewed towards the richer quintiles, albeit less so than for other goods.

As such, the PNG government estimates the total foregone revenue to be in the order of USD150 million. In practice, the zero-rating for VAT functioned like a pure exemption, as most exempt items are imported directly, resulting in minimal value added in the supply chain. To be eligible for the exemption, the food items must have been imported on or after January 1, 2025.

The announcement of the VAT exemption reform was particularly abrupt, and efforts to pressure stores to pass-through VAT cuts to lower retail prices were minimal, especially in the first 10 weeks of the reform. The PNG government first publicly stated in late November 2024 the possibility of removing VAT from some basic items in mid-2025, but the details were limited, and its credibility was unclear (see details about the timeline of the reform and the data sources we draw on in Table A1 in the Appendix). Then, on 19 May 2025, policymakers announced that effective June 1, 2025 (i.e., 10 days later), VAT exemptions would be implemented for the 10 food items outlined above. This gave stores almost no time to raise prices in anticipation of the reform. There were also no legal grounds for the government to require stores to lower their prices, such as by fining stores for noncompliance (i.e., no legislation was passed, and the parliament was suspended for an open-ended period). There was also ambiguity about which government agency, the revenue authority (IRC) or the competition agency (ICCC), was responsible for monitoring. Rather, the PNG Government relied on a series of public announcements to try to pressure stores to fully pass-through the VAT reduction to prices. In light of the ambiguity surrounding this reform, the PNG Government issued an updated public notice on 8 August 2025 (see Figure A9 in Appendix). This provided more details on the VAT exemptions, including how policymakers planned to monitor the reform. Although the legality of these adjustments was unclear, as no law had been passed by parliament, and there was no legal mechanism to fine stores for non-compliance.

3 Methodology

3.1 Data

There are two main types of price data that we draw on for this study. One focuses on prices at formal supermarkets in Port Moresby, PNG's largest city. The other measures household consumption data, both expenditure and quantities, throughout the country. Before providing details about each data source indiviudally, we provide a brief summary.

3.1.1 Summary of data sources

Table 1 compares these four data sources in terms of their coverage, unit of analysis, types of stores covered, key strengths, and main limitations. Details about the timing of the collection of each data source are presented alongside the timeline of the reform in Table A1 in the Appendix. The monthly supermarket census provides price data for 20 items from the universe of formal supermarkets in Port Moresby, allowing us to compare pass-through across the city; however, as the timing of the reform was unanticipated, there are limited pre-trends. In contrast, the administrative data (from BPNG and the NSO) includes price information for over 100 items over a two-year period, but only from a subset of formal supermarkets in Port Moresby. The scraping of websites provides price information for over 500 items in the weeks leading up to and following the reform; however, this only covers the two supermarket chains that offer online shopping. Finally, the monthly phone survey panel captures price information from a nationally representative sample of households, covering both formal and informal stores, and allows us to conduct a decomposition of incidence; however, the data is self-reported and consequently more noisy than the directly observed price data. Taken together, we view the four data sources as complementary and, combined, we believe they provide a rich picture of how the VAT-exemption reform affected prices; however, each source on its own has limitations.

Table 1: Summary of data sources

	Supermarket census	**Administrative data**	**Scraping of websites**	**Phone survey panel**
Location	Port Moresby	Port Moresby	Port Moresby	Nationwide
Unit	Store	Store	Store	Household
Store type	Formal	Formal	Formal	Formal + Informal
Coverage	All	Subset	All online	Representative
Frequency	Monthly	Monthly	Weekly	Monthly
Exempt items	10	10	10	8
Non-exempt items	10	129	566	10
Time period	May-Nov 25	Dec 23 - Sept 25	May-Aug 25	Oct 23 - Dec 25
Strengths	All formal stores	Multi-year	All products	Consumption data
Limitations	Limited pre-trends	Non-representative	Only two chains	Self-reported

Notes: This table summarizes the four data sources used in the analysis. Location refers to geographic scope. Unit refers to whether the data covers stores or households. Store type refers to whether the data sources cover just formal or formal and informal stores. Coverage refers to whether the data source captures the universe of relevant outlets or a subset. Frequency refers to how often the data was collected. "Exempt items" and "non-exempt items" denote the number of treated and comparison-group product categories used in each source. Time period refers to the period for which this data source was collected.

3.1.2 Price data in Port Moresby

The three main sources of price data in Port Moresby are a monthly supermarket census, detailed administrative data, and information scraped from supermarket websites.

Monthly census of supermarkets in Port Moresby

For this study, we collected price data through direct observation in-store by an implementation team, covering all 83 formal supermarkets in Port Moresby between May and November 2025. The team first compiled a comprehensive store list by scraping publicly available online

information–primarily from social media–on store presence and locations in Port Moresby. This produced an initial list of roughly 250 distinct buildings (excluding informal vendors operating from carts or selling on the ground). The team then verified each location through in-person visits, which led to substantial revisions based on whether the site still operated as a retail outlet selling a broad set of the food items that became VAT-exempt under the reform. We also excluded locations where prices were not clearly posted and instead had to be obtained by asking a seller, since such prices may reflect negotiation rather than the posted prices faced by all consumers. During fieldwork, a small number of additional stores without an online presence were identified and added to the list when they clearly operated as formal supermarkets.

This listing exercise resulted in the inclusion of 83 supermarkets, which we understand to constitute the universe of formal supermarkets in Port Moresby that sell at least some of the newly exempt items and for which retail prices are directly observable. Based on our engagements with PNG government officials, we understand that each of these supermarkets is registered for tax purposes. Figure 1 maps their locations, distinguishing stores in close proximity to competitors (red) from more isolated stores; proximity is measured using the Ahlfeldt–Redding–Sturm–Wolf proximity score (Ahlfeldt et al., 2015). On average, high-proximity stores are approximately 150 meters from their nearest competitor, and all high-proximity stores are located within a central area of less than 2 km^2 in Port Moresby.

The implementation team collected monthly price data from each supermarket for 20 food items: 10 items that became exempt and 10 used as a comparison group (see Section 3.2 for details). To ensure comparability, a specific product was selected to capture the price changes for each item, such as 100g of the most common brand of tea. The selection of these specific products was an iterative process during the listing exercise, based on the availability in each store. In most instances there are only around 4-6 specific products that fall into a given food item category (e.g., six types of tea are sold, whereby there are two brands with

three different quantities each). When the specific product was not available in a store at the time of price observation, information about the closest alternative was captured, such as 50g of the same brand of tea, and this deviation was noted during data collection. In practice, product variety within each food item is limited, and prices are typically proportional to quantity (i.e., a constant unit price, so 100g of tea costs about twice as much as 50g). As a result, even when we recorded prices for close substitutes, these observations still provide informative evidence on the magnitude of price changes. The data collection process was closely monitored, with monthly random checks to verify that the implementation team was accurately recording prices.

Detailed administrative data

We draw on two separate administrative data sources that monitor supermarket prices in Port Moresby: one collected by the Consumer Price Index (CPI) team at the PNG National Statistics Office (NSO) and the other by the research team at the Central Bank of PNG (BPNG). This microdata is used by the NSO and BPNG to produce regular estimates of the CPI and Retail Price Index (RPI). Both data sources contain extensive price data for over 100 food items (with various specific products within a food item, such as four different types of chicken) from a small number of supermarkets, collected monthly in 2024 and 2025. The administrative data sources are an ideal complement to the supermarket census: the former covers a much larger set of products over a longer period, while the latter captures the universe of supermarkets in Port Moresby. The NSO and BPNG data are collected by separate teams of trained enumerators, many of whom have been involved in this process for several years. The two organizations work completely independently and do not share their microdata on supermarket prices with each other. In fact, the NSO and BPNG compete to collect the highest-quality price data to help inform the government's decision-making, particularly the appropriate level of interest rates.

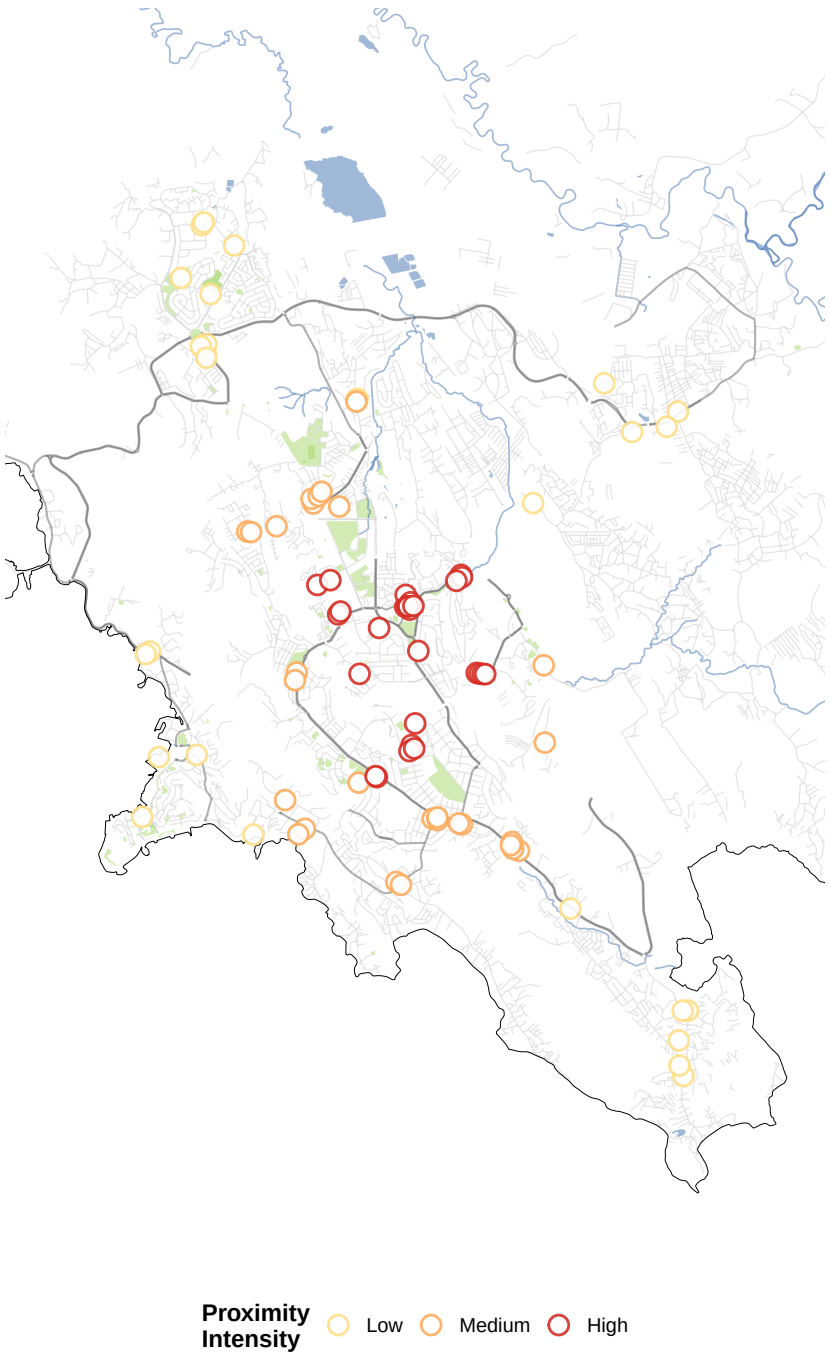


Figure 1: Map of Port Moresby with supermarket locations

Notes: This figure maps the 83 formal supermarkets included in the Port Moresby supermarket census. Marker shading indicates stores' proximity to competitors, based on the Ahlfeldt–Redding–Sturm–Wolf proximity measure, with darker markers denoting greater local competitive intensity. High-proximity stores are concentrated in central Port Moresby.

Data collected from scraping supermarket websites

We assemble a weekly panel from May to August 2025, comprising all online prices for food products from the two supermarket chains that offer online shopping in PNG (RH Hypermarkets and FoodPro PNG).[6] Each observation records product name, product category, product code, price, and extraction date. Using the data from all weekly website scrapes, the unbalanced panel contains 7,779 observations covering 576 specific products. Of these specific products, 97 were exempted because they fall under one of the 10 food items subject to the VAT exemption reform (rice, wheat flour, instant noodles, biscuits, tinned fish, tinned meat, chicken, cooking oil, coffee, tea). To avoid products entering or exiting over time, we restrict our focus to a balanced panel, defined as products present every week during the data collection period. This restriction yields 7,588 observations, covering 542 specific products, of which 94 were exempted. However, the key patterns remain largely unchanged whether the balanced or unbalanced panels are used. It is important to note that only RH Hypermarkets has a chain of in-person stores and an online shopping option. FoodPro PNG operates solely online and supplies some other supermarkets and retail outlets (e.g., Buffalo Burger). A third chain, Stop and Shop, which had offered online shopping during the COVID-19 pandemic, left the online market within a couple of years.

3.1.3 Consumption data across Papua New Guinea

The consumption data (both expenditures and quantities) used for this study were sourced from a monthly panel phone survey of approximately 1,000 households, which are broadly representative of the PNG population. The panel survey ran for over two years from the end of 2023 to the end of 2025 and was implemented by the largest telecommunications company in the region (Digicel), with technical and quality oversight provided by the World Bank.

The first phase of the phone survey was conducted in a repeat cross-sectional manner

[6] As a robustness check we use a "time machine" web application to examine prices prior to May 2025 and do not observe any abrupt changes in prices in the previous 12 months.

from 2021 to 2023, using random digital dialing and quotas for the over 1,000 operational telecommunication towers. This ensured the sample was broadly representative of the population and that respondents participated from each of the 22 provinces across the country. In the second phase, the survey transitioned to a panel, where the sample was a random selection of respondents who had previously participated in the first phase, with strata defined by location. This led to a sample of respondents that was still broadly representative of the PNG population and located in each province (see Figure 2). In the Appendix, we provide more details about the representativeness of the sample of respondents (see Table A2). Since the start of 2024, around 1,000 respondents have participated monthly in this phone survey, though some did not participate every month. As a robustness check, we rerun our main analysis with a purely balanced panel and do not find any meaningful differences in the results compared to the unbalanced panel.

Phone survey respondents were asked about their consumption over the previous month, including any purchases of 20 items (18 of which were food), 8 of which were subject to the VAT exemption reform.[7] These questions captured information about the item purchased, the location, the quantity (in standard measurement units), and the expenditure. For example, they were asked if they had purchased any rice, and if so, how many kilograms, how much they spent, and from which type of store. Importantly, the information captured on the type of store where the purchase occurred is comparable to what is used in Bachas et al. (2023), which allows us to distinguish between formal supermarkets and informal "stores"—typically called "canteens" or "tuckerboxes" in PNG.

[7]The number of food items they were asked about expanded in early 2025. Our main results do not change meaningfully if we exclude the newer items from our analysis.

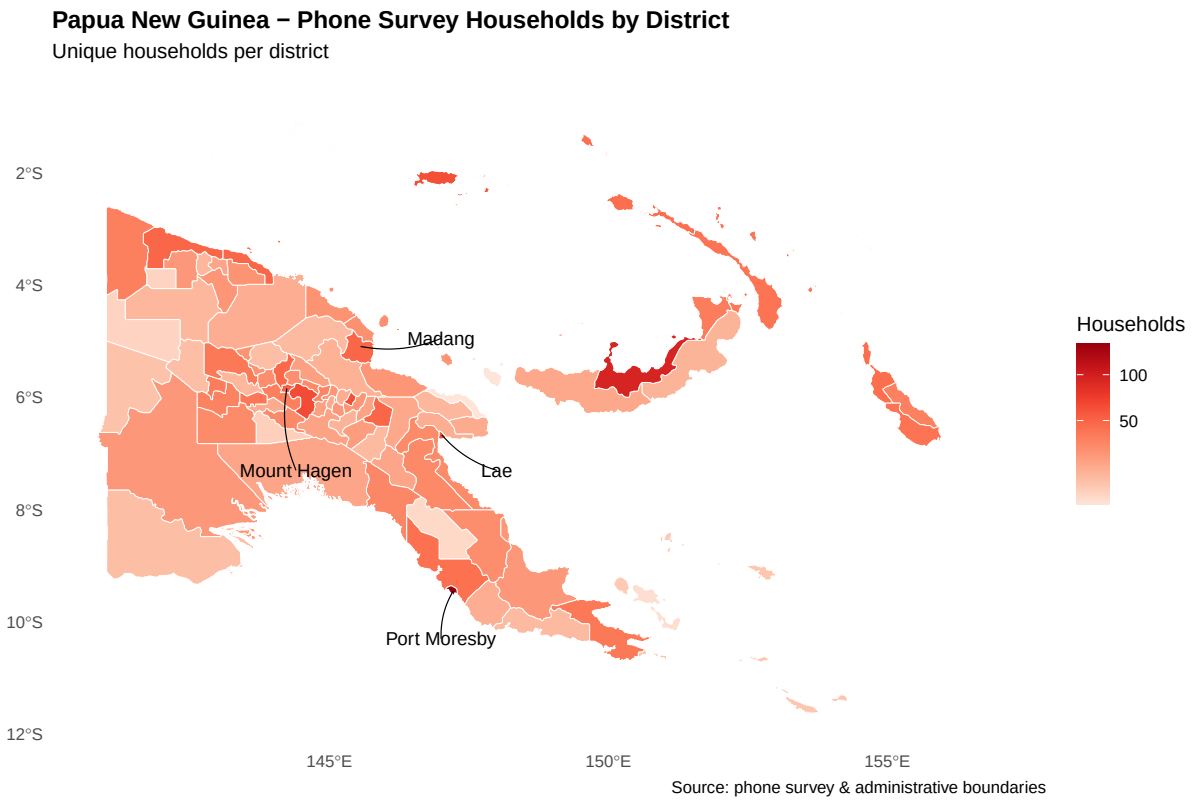


Figure 2: Map of Papua New Guinea with respondents' locations

Notes: This figure maps the geographic distribution of households in the monthly phone survey panel. Shading indicates the number of unique respondent households observed in each district over the sample period. The figure illustrates the survey's broad national coverage.

A potential limitation of relying on self-reported data is that we assume the VAT exemption reform does not influence respondents' recall of the expenditures and the quantity purchased. To check whether this could be an issue, we asked respondents about their awareness of the reform six months after its implementation. Around 97 percent of respondents stated that they were not very familiar with the VAT exemption reform (see Table A3 in the Appendix). This makes it unlikely that the reform induced misreporting. Moreover, most respondents had answered the same food-purchase questions more than 20 times prior

to the reform, since these items were included in phases one and two of the phone survey. Respondents were therefore highly familiar with the questions, and it is reasonable to expect that they interpreted and answered them similarly before and after the reform.

3.2 Empirical analysis

To estimate the pass-through of the VAT-exemption reform to prices, we implement a difference-in-difference design that compares changes in prices for VAT-exempt food items to changes for a comparable set of food items that remained subject to VAT. This approach, which focuses on a single sharp reform date, remains robust to recent critiques of difference-in-differences designs and is consistent with other seminal studies on pass-through of reforms to prices, such as Benzarti et al. (2024). Selecting an appropriate set of items to estimate the counterfactual price trends is a key practical challenge. In particular, we need to avoid choosing items that are near-perfect substitutes for the exempt items, since the reform could induce substitution in consumption and thus generate second-round effects on prices (e.g., see Minton and Mulligan, 2024). In our data, however, we do not detect meaningful changes in consumption patterns following the reform, suggesting that this concern is unlikely to be important in our setting.

We adapted the exact composition of items in the comparison group based on what was feasible for each data source. In the case of the supermarket census, we used 10 other food items that were available at all supermarkets in Port Moresby, for which the administrative data suggested that the change in price was similar to that of the exempt items over the year prior to the reform.[8] In the phone survey data, we restricted our focus to items purchased by at least 50 respondents each month to minimize the risk of outliers or measurement issues impacting our results. By doing so, we reduced the number of items in the exempt and

[8]Those are: Butter, Kaukau (sweet potato), Tinned baked beans, Broccoli, Sugar, Sausages, Powdered milk, Breakfast cereal, Bananas, and Milo.

comparison groups to eight each.[9] In the administrative data, the comparison group consisted of prices for a subset of food items collected by the NSO and BPNG, which were similar to the comparison group items included in the supermarket census. Each organization provided slightly different comparison groups with a larger number of food items than the supermarket census, but removing these additional items did not change our findings. Finally, for the web scraping data, the comparison group consisted of all food items available online that were not exempt from the VAT reform.

Our empirical specification is given by:

$$Y_{sit} = \sum_{\tau \neq \text{May 2025}} \beta_\tau \left(D_i \cdot \mathbf{1}[t = \tau] \right) + \mu_s + \lambda_i + \gamma_t + \varepsilon_{sit} \tag{1}$$

where Y_{sit} is the tax-inclusive price of item i in store s at time t, normalized to 1 in May 2025. $D_i \in \{0, 1\}$ is a time-invariant indicator equal to 1 if item i received a VAT exemption in June 2025. β_τ captures the differential price change for treated items in period τ relative to the May 2025 baseline. μ_s, λ_i, and γ_t are store, item, and time fixed effects, respectively. The set of fixed effects included varies by data source: μ_s only in the supermarket census, λ_i only in the phone survey and administrative data, and both μ_s and λ_i in the web-scraped data.

In addition to the monthly coefficients β_t, we report two summary measures of the average post-reform effect. The first is the simple average of the post-reform event study coefficients, $\bar{\beta} = \frac{1}{T_{\text{post}}} \sum_{t > \text{May 2025}} \hat{\beta}_t$, which places equal weight on each post-reform month. The second is a pooled two-way fixed effects estimate obtained from a separate regression that replaces the event-time interactions in Equation 1 with a single treated $\times$ post indicator, $D_i \times \mathbf{1}(t >$ May 2025), while retaining the same fixed effects structure. This estimator implicitly gives more weight to periods with more observations and less residual variance.

[9]The exempt items were: Cooking Oil, Rice, Tinned fish, Tea, Flour, Chicken, Noodles, Biscuits. The comparison items were: Kaukau, Aibika, Sugar, Sausages, Bananas, Butter, Milo, Phone credit.

Our difference-in-differences design relies on two main identifying assumptions. First, we assume that the introduction of VAT exemptions was not anticipated by firms or consumers. This assumption is plausible given the institutional context: the policy was announced with only 10 days notice, in the midst of an extended parliamentary suspension due to a pending no-confidence motion, which could have led to the dissolution of the current government. This meant there was no public debate, no amendments to the two-decade-old VAT legislation, and no legislative signaling in advance of the reform. As such, there was limited scope for preemptive price adjustments or inventory management. Consistent with this, we find no evidence of differential pre-reform price trends between exempt and non-exempt products. Furthermore, the PNG government did not announce and implement a plan to monitor the reform until August 2025 (i.e., more than two months after the VAT exemptions came into effect). In fact, it is likely that very few policymakers were even aware of the VAT exemption reform prior to the announcement by the PNG Treasurer.

Second, we assume that non-exempt food items serve as valid counterfactuals for exempt items in the absence of the policy change. This requires that the reform did not induce differential demand shifts or substitution between exempt and non-exempt products that would, in turn, affect prices. We show that quantities purchased and expenditure shares remain stable around the reform date, and our results are robust to restricting the control group to close substitutes and to alternative product groupings (see Figure A10 and Figure A11 in Appendix for details). In fact, each of our four data sources uses different items for the comparison group, and we find very similar results. Furthermore, around 97 percent of respondents to the phone survey were not very familiar with the reform six months after its implementation (see Table A3 in the Appendix), suggesting that most consumers were not changing their purchases as a result of the reform.

4 Results

4.1 Pass-through of VAT exemptions to prices

4.1.1 Main results about Pass-through in Port Moresby

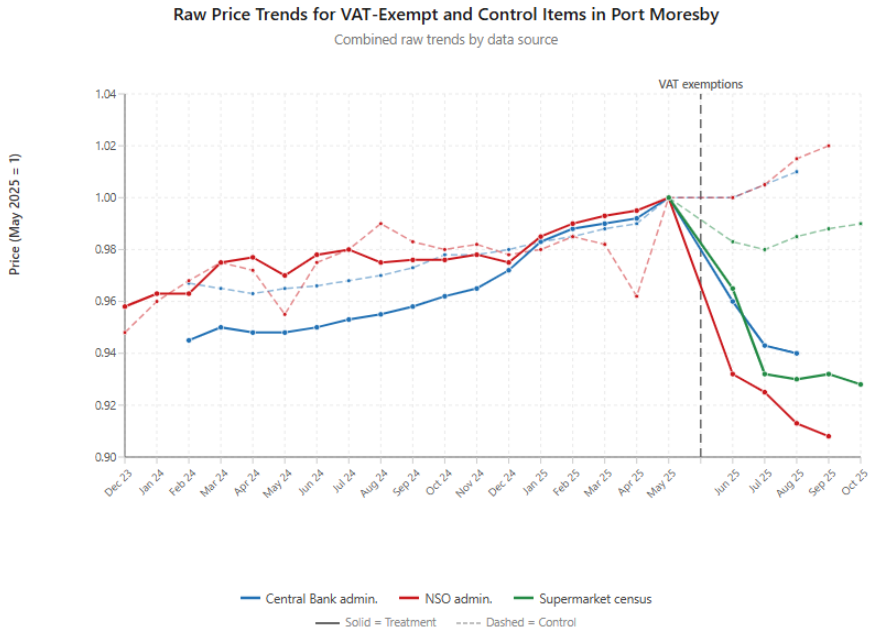
As mentioned in Section 2, the majority of formal supermarkets, and around 70 percent of VAT collection, are in the country's main economic center, Port Moresby, for which we have three independent data sources for our empirical analysis. We find near-complete pass-through of the VAT exemption to prices in formal supermarkets in Port Moresby across all three data sources. Figure 3 shows, for each data source, the raw price trends in Panel (a) for VAT-exempt food items ("treatment") and the comparison group ("control"), normalized to 1 in May 2025, along with the difference-in-differences estimates in Panel (b) based on Equation 1. The results for each data sources are presented individually in Figure A12 in the Appendix.

Panel (a) of Figure 3 shows that prices in the treatment and control groups were increasing steadily in the 18 months prior to the reform, and prices in the treatment group fell considerably following the introduction of VAT exemptions, but continued to increase in the control group. This is based on administrative data from BPNG and the NSO, which included a year and a half of monthly pre-reform price data for treatment and control groups, allowing us to examine pre-trends directly. The observed pre-reform dynamics strengthen our confidence that price changes in the control group provide a reasonable proxy for the counterfactual evolution of treatment-group prices absent the reform. We conduct a joint Wald test of the null hypothesis that all pre-treatment coefficients are zero. For the BPNG administrative data, we obtain a Wald statistic of $\chi^2(15) = 2.36$ ($p > 0.99$), and for the NSO administrative data, $\chi^2(17) = 2.41$ ($p > 0.99$). In both cases, we comfortably fail to reject the null at any conventional significance level. As such, not only are the differences

in pre-trends between prices in the treatment and control groups close to zero, they are also statistically insignificant. This is not surprising, given that in the absence of shocks, food prices tend to rise steadily over time (see Figure A13 in the Appendix showing the long-term trends in the CPI, prices for all food items, and prices for items in the control and treatment groups in the NSO administrative data). A similar counterfactual has been used in other studies, such as Benzarti et al. (2024).

Panel (b) of Figure 3 shows the corresponding difference-in-differences estimates, comparing price changes in the treatment and control groups, suggesting a 5-7 p.p. effect on prices in the first month, and this reaches near complete pass-through within three months. All three data sources, which are entirely independent, provide very similar results. The administrative data sources provide the most robust results as they track prices of the same products in the same supermarkets in Port Moresby for the year and a half leading up to and following the reform (also see similar results in Figure A14 in the Appendix showing difference-in-difference estimates based on aggregate NSO administrative data using the CPI, prices for all food items, and prices for items in the control and treatment groups over the last four years). However both of these data sources are based on a subset of supermarkets in Port Moresby, which may not be representative. As a result, we complement them with the census of all formal supermarkets in Port Moresby, which covers the majority of purchases of food items from formal stores that became VAT-exempt in PNG. An important limitation is that this data source only includes prices from the month prior to the VAT reform, which prevents us from assessing pre-trends with this data alone. However, the administrative data sources track prices of the same products in supermarkets in Port Moresby for the year and a half leading up to the reform, and they show no signs to suggest that the parallel trends assumption is invalid. The fact that we conduct the equivalent analysis using the supermarket census data and find the effectively identical results, is reassuring that the patterns we observe are not due to the selection of the supermarkets in the administrative data.

(a) Raw trends



(b) Differences-in-Differences results

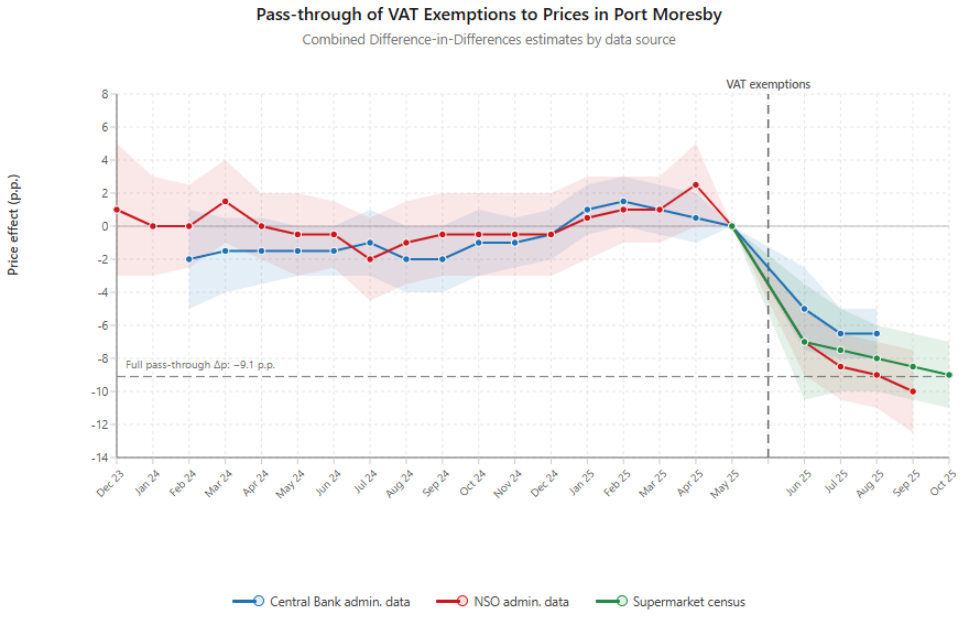


Figure 3: Pass-through of VAT exemptions to prices in Port Moresby by data source

Notes: Panel (a) plots normalized price indices for VAT-exempt (treatment) and non-exempt (control) items by data source, with prices scaled to equal one in May 2025. Panel (b) reports difference-in-differences estimates of the price effect of the VAT exemption reform, relative to May 2025. Estimates are based on Equation (1). The vertical line marks the introduction of the VAT exemptions on 1 June 2025, and the horizontal reference line denotes full pass-through of a 10 percent VAT removal. Shaded bands show 95 percent confidence intervals.

Taken together, Figure 3 indicates near-complete pass-through of the VAT exemption to prices in all supermarkets in Port Moresby, while the pre-trends analysis provides supporting evidence for the parallel trends assumption. The fact that three independent data sources yield consistent patterns provides compelling evidence for this conclusion.

4.1.2 Heterogeneity and Mechanisms in Port Moresby

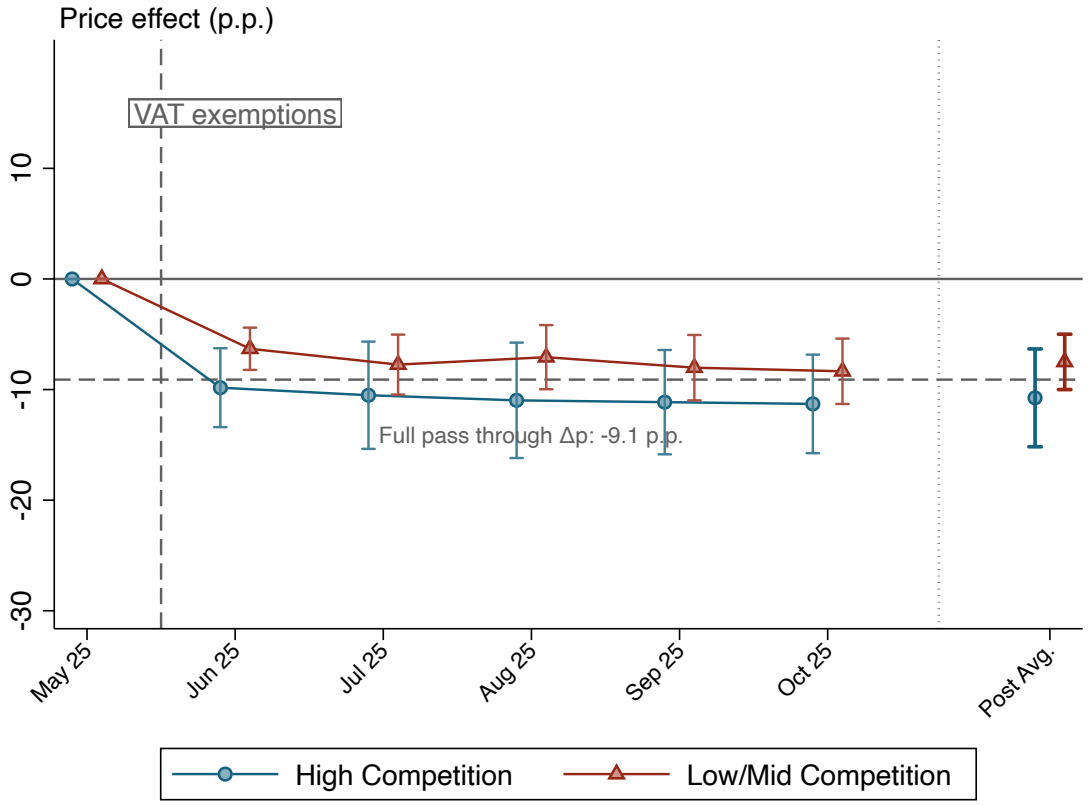
The overall pattern of near-complete pass-through in Port Moresby masks important heterogeneity across stores that illustrate the role of local competitive conditions. Pass-through is substantially higher in supermarkets located in central Port Moresby, where competition is more intense. Figure 4 presents the difference-in-differences estimates from Figure 3, disaggregated by stores' proximity to competitors, along with the distribution of store-level pass-through rates, and compares differences in pass-through within the same chains.

Panel (a) shows that supermarkets with high proximity to competitors — defined as located within the central district of Port Moresby, where, on average, supermarkets are within 150 meters of their nearest competitor — exhibit immediate full pass-through that is sustained over time. In contrast, pass-through is initially just over 50 percent among stores with lower proximity to competitors, and remains below full pass-through even four months after the reform. The differences in pass-through between these store types are statistically significant when examining the average across the post-reform period (see Figure A15 and Figure A16 in the Appendix for more details).

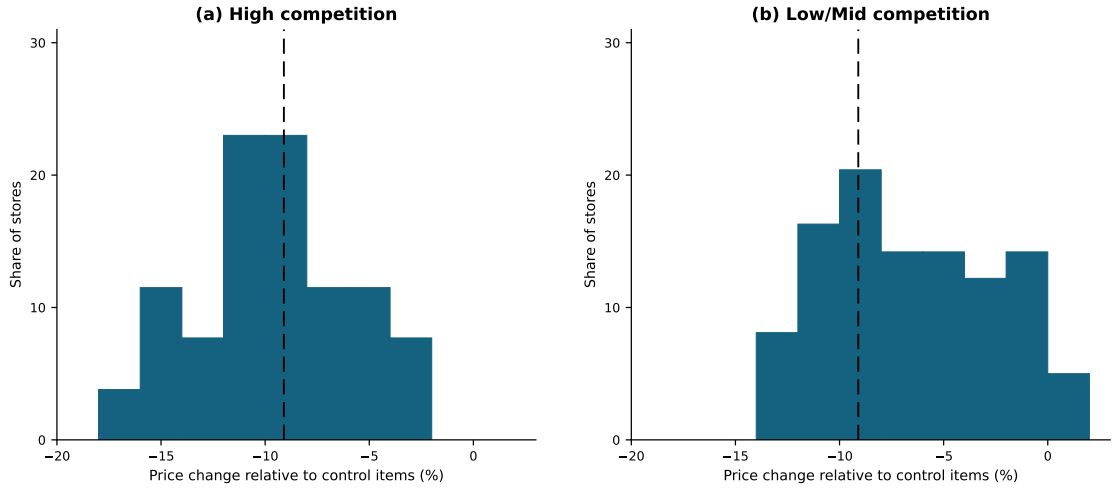
Panel (b) depicts the distribution of store-level pass-through rates three months after the reform for stores facing high competition (i.e., those with high proximity to competitors) and those that do not. Differences are evident not only in average pass-through, but also in the tails of the distribution. For instance, roughly one-quarter of low-competition stores have pass-through rates below 30 percent, whereas every store in a high-competition area has a pass-through rate above 30 percent. These differences are not driven by whether stores

are independent or part of a chain (see Section 4.4 for more details).

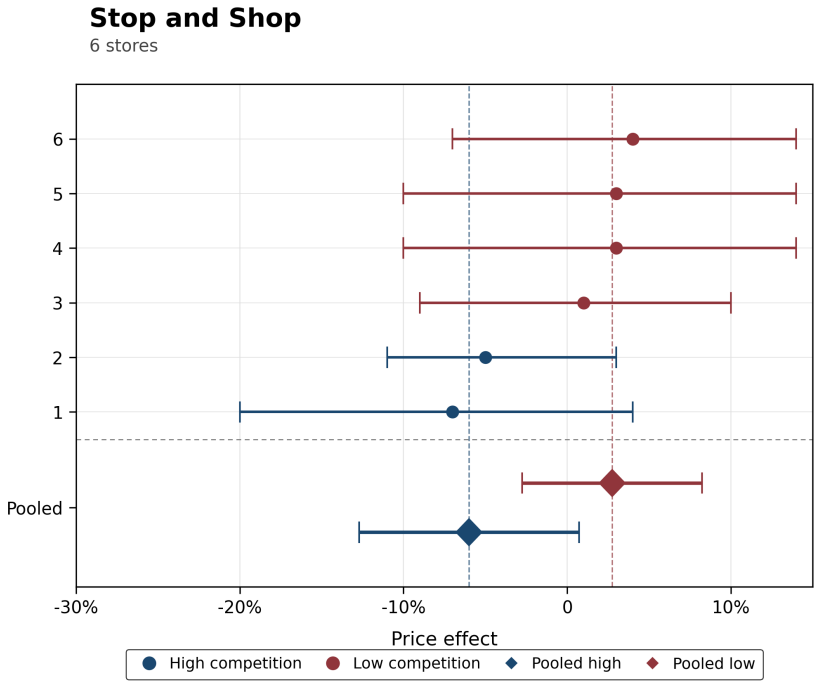
(a) Difference-in-Difference results by proximity



(b) Distribution of pass-through rates



(c) Differences in pass-through within the largest supermarket chain



(d) Differences in pass-through online vs in-store

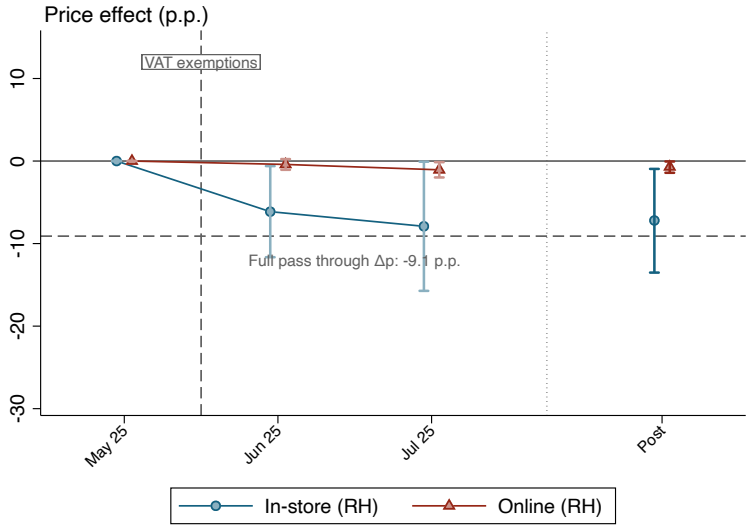


Figure 4: Heterogeneity of pass-through based on level of competition

Notes: This figure examines heterogeneity in pass-through by local market competition using the supermarket census data. Panel (a) reports difference-in-differences estimates separately for stores in high-competition and low/mid-competition areas. Panel (b) shows the distribution of store-level pass-through rates three months after the reform. Panel (c) compares pass-through across stores within the largest supermarket chain, and Panel (d) compares online and in-store prices within the same chain. The vertical line marks the reform date, and the dashed horizontal line indicates full pass-through of the VAT removal.

Panel (c) shows these patterns hold even within the same chain. There is higher pass-through in high-competition areas across stores within the largest supermarket chain, Stop & Shop. On average, pass-through in the two stores in central Port Moresby is around 70 percent. In contrast, there is effectively zero pass-through in the four stores elsewhere in the city. The difference between the pooled results is highly statistically significant, even though we are comparing only within a single supermarket chain. It is notable that at the time of the reform, this supermarket chain advertised that it was lowering prices on exempt items to attract customers from competitors (see the example in Figure A17 in the Appendix).

Panel (d) shows that there were also substantial differences in pass-through within the same chain between their online and in-store prices.[10] Within the same chain, RH Hypermarkets, there was almost complete pass-through to in-store prices, but no price reductions for online customers. This supermarket chain has far greater market power online; there are only two options, and RH Hypermarkets has around five times as many products available as the other option. Whereas there is far more competition for its stores, which are located in central Port Moresby. In the Appendix, we present the full results of the analysis using the online supermarket data (see Figure A18).

4.1.3 Pass-through to prices nationwide

We now turn to the nationwide pass-through of the VAT reform, drawing on the phone survey data. While these estimates are noisier than those from the other data sources, they indicate that pass-through of the VAT exemptions to prices across PNG was substantially more limited than in Port Moresby. Figure 5 reports the difference-in-differences estimates, including results disaggregated by store formality and by rural versus urban location.

Panel (a) shows the overall results. Pass-through is initially minimal, but reaches roughly 50 percent three months after the reform. However, the estimates are imprecise, and the pre-

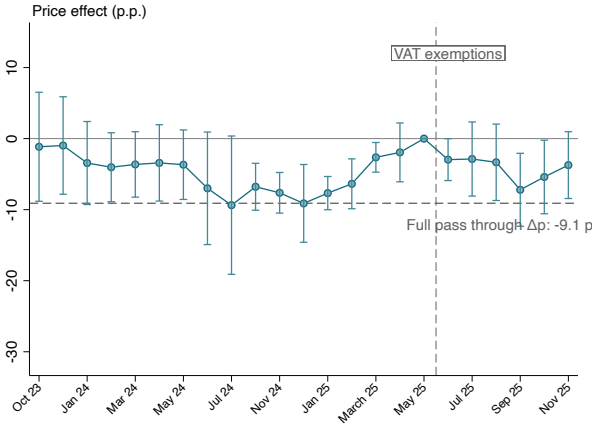
[10]For this analysis, we ignore any delivery fees that online customers may face.

trends data are noisy. Panel (b) disaggregates by informal versus formal stores, and the point estimates suggest higher pass-through in formal stores—around 70 percent three months after the reform—alongside little to no pass-through in informal stores. Panel (c) replicates panel (b), restricting to urban areas, and the point estimates suggest even higher pass-through in formal urban stores, consistent with the Port Moresby results. The differences in pass-through between formal and informal stores in urban areas are statistically significant when examining the average across the post-reform period (see Figure A19 to Figure A26 in Appendix). Finally, panel (d) replicates panel (b) for rural areas, and the point estimates suggest limited differences between formal and informal stores, together with minimal pass-through to prices.

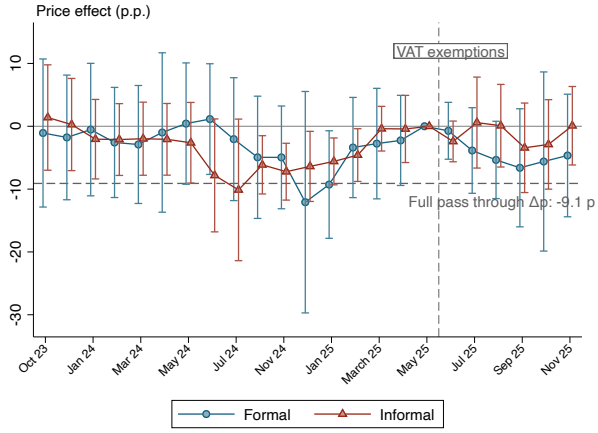
There is considerable variation, which is partly to be expected given the self-reported nature of the data.[11] We conduct a series of analyses to assess the robustness of the pre-trends and conclude that the data still exhibit meaningful variation informative about the reform. Joint Wald tests of the null that all pre-treatment coefficients equal zero fail to reject at any conventional significance level across all panels of Figure 5, with p-values ranging from 0.96 to 0.99. However, we note that the phone survey estimates are considerably less precise than those from the administrative data, and the failure to reject is driven primarily by wide confidence intervals rather than tightly estimated pre-treatment coefficients near zero. We therefore interpret the phone survey results with appropriate caution, treating them as complementary to, rather than a substitute for, the more precise estimates from the administrative data and supermarket census.

[11] In the Appendix, we show the raw trends in prices for the treatment and control groups in the phone survey data since the end of 2023 (see Figure A27 and Figure A28).

(a) Pass-through rate nationwide

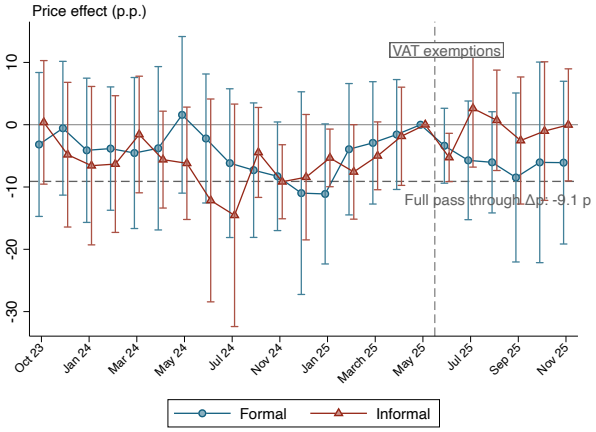


(b) Pass-through rate by store formality



Pass-through rate by store formality and area

(c) Urban areas



(d) Rural areas

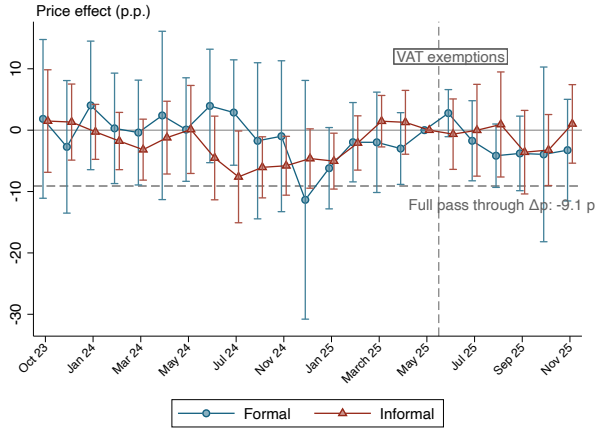


Figure 5: Pass-through nationwide based on the phone survey data

Notes: This figure reports difference-in-differences estimates using the nationally representative phone survey. Panel (a) shows the average pass-through nationwide. Panel (b) disaggregates by store formality. Panels (c) and (d) further split the results by urban and rural location. The vertical line marks the June 2025 reform, and the dashed horizontal line indicates full pass-through of the VAT removal.

4.2 Incidence of VAT exemptions

4.2.1 Estimating the incidence

The incidence of VAT exemptions across the income distribution is determined by the interaction of households' consumption patterns and realized pass-through to prices. As discussed in Section 2, households in richer quintiles purchase more basic food items than poorer households, including each of the items that became VAT-exempt (i.e., they are normal goods), reflecting lower reliance on subsistence farming and higher overall consumption. In addition, richer quintiles pay prices that are comparable to, or even lower than, those paid by poorer households. Together, these patterns imply that the incidence of VAT exemptions is regressive, in part because of differences in consumption across the distribution.

Poorer households are also more likely to purchase food from informal stores and to reside in rural areas, which are further from competitive retail markets. These features further reduce the extent to which poorer households benefit from VAT exemptions, since our results show that prices declined primarily in formal stores in urban areas. Consequently, the incidence of VAT exemptions is regressive not only because of consumption patterns, but also because pass-through rates differ systematically across the income distribution.

We combine our data on consumption patterns with our estimates of realized pass-through to quantify how the benefits of the VAT exemptions were distributed across the income distribution. We then decompose overall incidence to assess the extent to which it is driven by differences in consumption patterns versus by differences in realized pass-through across store types (i.e., formal and informal) and locations (i.e., rural and urban). We show this formally as follows:

Let $q \in \mathcal{Q}$ index household expenditure (or income) quintiles, and let $i \in \mathcal{I}$ index goods (items). Let $s \in \mathcal{S}$ denote store type (or store), and $a \in \mathcal{A}$ denote geographic area. Define P_i^0 as the baseline (pre-reform) price of item i. Let $\text{Quantity}_{q,i}$ denote the average quantity

of item i purchased by households in quintile q over the relevant horizon (e.g., per month). Let $\text{PassThrough}_{s,a,i}$ denote the estimated pass-through rate for item i at store type s in area a, i.e., the fraction of the statutory tax change that is reflected in consumer prices for that item–store–area cell.

$$\text{Benefit}(q) = \sum_{i \in \mathcal{I}} \sum_{s \in \mathcal{S}} \sum_{a \in \mathcal{A}} \omega_{q,s,a,i} \Big(\text{Quantity}_{q,i} \times P_i^0 \times \text{PassThrough}_{s,a,i} \Big), \tag{2}$$

In the weighted formulation, $\omega_{q,s,a,i}$ denotes the expenditure share capturing where quintile-q households purchase item i: $\omega_{q,s,a,i} \geq 0$ and $\sum_{s \in \mathcal{S}} \sum_{a \in \mathcal{A}} \omega_{q,s,a,i} = 1$ for each (q, i). The total monetary benefit accruing to quintile q from the reform is then given by summing, across items (and across purchasing locations when using weights), the product of (i) baseline spending on the item and (ii) the location-specific pass-through rate.

4.2.2 Main results

Figure 6 presents the results. The dotted gray line at 0 corresponds to a benchmark in which each quintile benefits equally from the policy. The blue line reports incidence when we incorporate differences in consumption patterns but ignore differences in pass-through. Under this scenario of equal pass-through across store types and locations, most of the benefits accrue to richer households, and the two poorest quintiles receive roughly 30% of the total. The green line then incorporates the estimated heterogeneity in pass-through due to informality (ignoring differences due to location). Once differential pass-through is taken into account, incidence becomes substantially more regressive. The red line then incorporates differences in incidence due to consumption patterns, and heterogeneity in pass-through due to informality, as well as location. Once all these factors are taken into account, the poorest two quintiles only receive about 15% of the benefits, while the richest quintile receives more than half. These results provide compelling evidence that heterogeneity in

pass-through contributes at least as much as consumption patterns—and potentially more—to the regressivity of VAT exemptions.

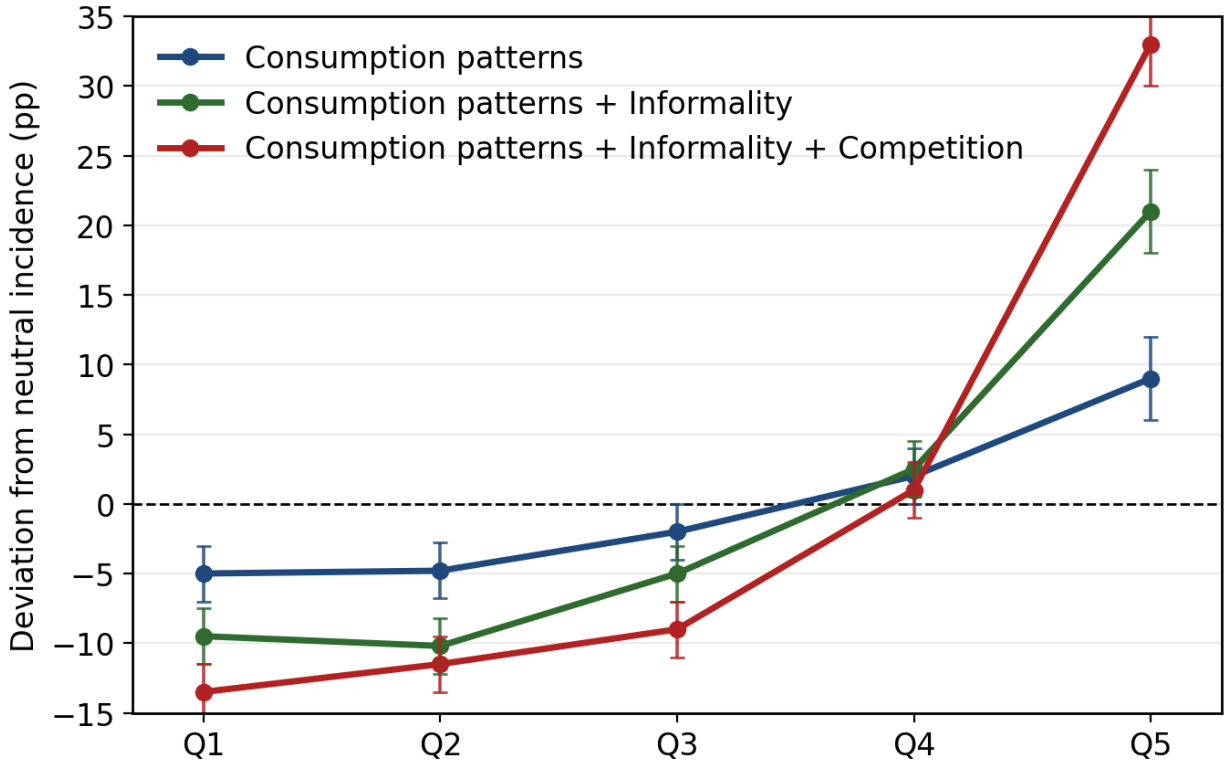


Figure 6: Incidence of VAT exemptions due to consumption and pass-through

Notes: This figure decomposes the incidence of the VAT exemptions across expenditure quintiles. The blue series incorporates differences in consumption patterns only; the green series additionally incorporates heterogeneity in pass-through by store formality; and the red series further incorporates heterogeneity in pass-through by location and competition. Values are shown as deviations from equal incidence across quintiles, so the zero line corresponds to an equal per-quintile share of total benefits. Positive values indicate that a quintile captures more than an equal share of the foregone revenue.

These results raise the question as to how plausible it is for VAT exemptions for a food item *to ever* be progressive. For this to occur, the consumption of the food item would need to be so skewed towards the poorest deciles (i.e., a strongly inferior good) to offset the countervailing effects of informality and competition that make VAT exemptions regressive. In terms of what this would mean for Figure 6, the slope of the blue line would need to be negative enough to offset the slope contributed by differential pass-through (i.e., the slope

of red minus blue). Given in low-income settings, such as PNG, there is an absence of inferior goods; it is completely implausible for a VAT exemption on food to be progressive. Even in higher-income settings, such as the United States, truly inferior food items (atleast broadly defined) are rare. The clearest evidence is regarding beans/legumes being inferior food items, but even in that case it is unlikely that it would be 'inferior enough' to overturn incidence patterns driven by where households shop and the pass-through they face. Even in the instance that there was no informality, higher competition influencing pass-through is still likely to be prevalent and could easily offset any progressivity due to consumption patterns alone.

4.2.3 Alternative policies to assist low-income households

We consider how "efficient" the VAT exemption reform in PNG was in terms of benefiting the poorest quintile of the income distribution, relative to a cash transfer program. Table 2 shows a series of alternative policies that could have delivered the same monetary benefit to the poorest quintile. A perfectly targeted transfer would achieve the same benefit for the cost of only 5 percent of the foregone revenue. A completely untargeted, universal cash transfer to households — requiring no information about income, etc — would achieve the same outcome for 25 percent of the cost. If half of the universal transfer were to "leak", this would still only have half the cost of the current VAT exemption policy. These stylized examples are consistent with more advanced work by Warwick et al. (2022), raising serious concerns about the efficiency of VAT exemptions as a poverty alleviation tool.

Table 2: Cost of delivering USD 7.5 million to the poorest quintile under alternative policies

Policy	Cost to deliver	Share of foregone revenue
Perfect targeting (Q1 only)	USD 7.5 million	5%
Universal transfer (no targeting)	USD 37.5 million	25%
Universal transfer (50% leakage)	USD 75 million	50%
VAT exemption (actual)	USD 150 million	100%

Notes: This table compares the fiscal cost of alternative policies that would deliver the same monetary benefit to the poorest quintile as the VAT exemption reform. The benchmark assumes that the actual VAT exemption delivers approximately USD 7.5 million to the poorest quintile, or about 5 cents of each dollar of foregone revenue. The alternative rows report stylized transfer schemes under different targeting assumptions and implied leakage.

4.3 Comparison with Expert Predictions

4.3.1 Data collection

We conducted an expert prediction survey to provide a quantitative illustration of how the results contribute to the existing knowledge base. The survey was hosted on the Social Science Prediction Platform (SSPP) for a 12-week period from July to September 2025. Experts were invited to complete the survey from an existing pool of researchers maintained by SSPP, through social media advertisements, and emails from the authors. A total of 237 experts accepted the invitation and participated in the survey. Among those who participated, 92 percent declared economics as their main field, 62 percent worked in academia, 53 percent stated they were a public finance expert, and 62 percent had very relevant country experience. Further details about the experts are in the Appendix (see Table A4).

4.3.2 Results

Experts substantially misjudged the extent of pass-through across store types, locations, and data sources, and overestimated how much poorer households would benefit from this reform (see detailed results in Figure A29 to Figure A39 in the Appendix). On average, experts predicted similar pass-through rates to prices across the four main data sources used

in this study. They accurately predicted that there would be minimal differences between formal chains and independent supermarkets and that informal stores would have lower pass-through rates. However, they surprisingly expected the foregone revenue from the VAT exemptions to benefit poorer quintiles slightly more than richer quintiles.

Overall, heterogeneity between experts is modest (see Figure A40 and Figure A41 in the Appendix). Self-reported confidence in predictions has essentially zero correlation with accuracy. Expertise in tax incidence is associated with a higher predicted share for the richest quintile and those with a development economics background were more likely to predict a lower share for the poorest quintile. The magnitude of the gaps between expert subgroups is small relative to the gap between expert predictions and actual outcomes. No subgroup of experts came close to predicting the extreme regressivity of VAT exemptions observed in the data.

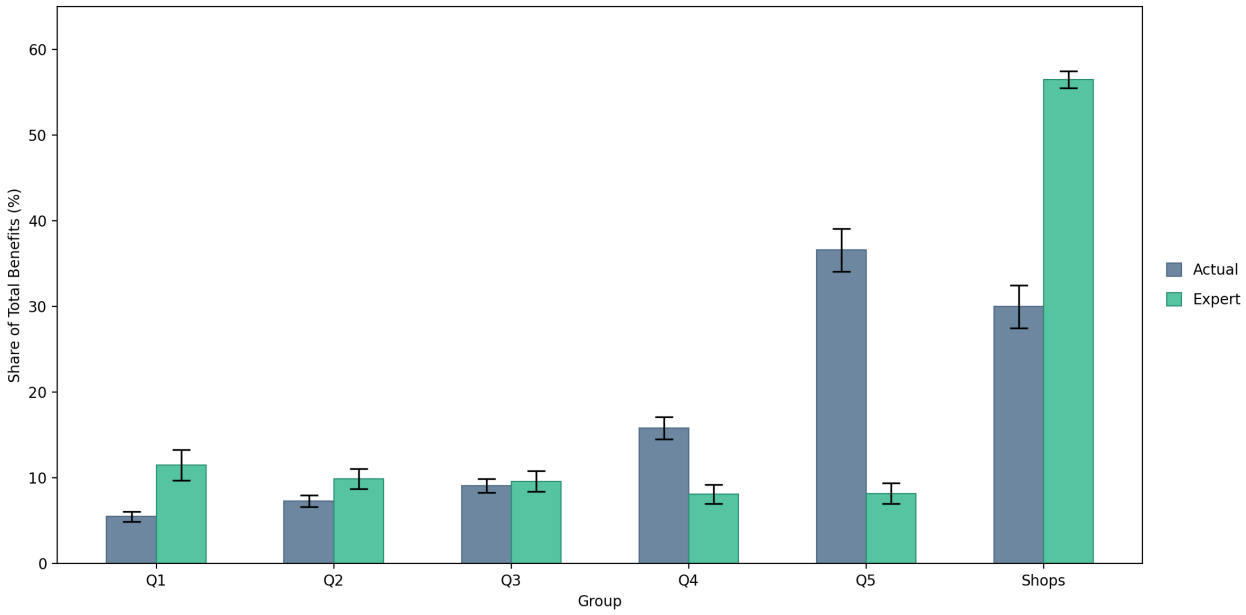


Figure 7: Actual incidence vs. expert predictions of revenue lost across quintiles and stores

Notes: This figure compares the realized incidence of the VAT exemption reform with experts' ex ante predictions. Bars show the share of foregone revenue accruing to formal stores and to each household expenditure quintile. Realized incidence is computed from the phone survey using observed consumption patterns and estimated pass-through, while predicted incidence is based on the expert survey. The figure highlights the gap between expected and actual distributional outcomes.

We aggregated the expert predictions of pass-through and incidence and directly compared this with what we actually observed in the data. Figure 7 presents a summary of what, on average, expert predictions (green bars) suggest about how the foregone revenue would be distributed between shops and each quintile of the household income distribution. They expected half of the foregone revenue to be captured by formal stores, and the remainder to be split relatively evenly across quintiles. This contrasts starkly with the actual results presented in 7 (blue bars). Formal store owners and consumers in the richest quintile were the main beneficiaries of the reform, accruing around two-thirds of the foregone revenue. This left around one-third of the benefits for the poorest 80 percent of the population. The poorest quintile only captured about five cents of every dollar in foregone revenue.

4.4 Additional analysis

4.4.1 Differences between chain and independent stores

The pass-through to prices was similar in chain and independent stores. In the Appendix, we show the difference-in-differences results based on the supermarket census data disaggregated by whether stores were part of a chain or independent (see Figure A42 and Figure A43). There is an almost identical average pass-through rate in these store types and a similar distribution of pass-through rates within each store type. This result is counter to a recent study that shows that the pass-through rates of VAT cuts tend to be lower in independent stores compared to chain supermarkets (Benzarti et al., 2024). The authors argue that this is because chain supermarkets and independent stores are subject to different levels of political pressure, government monitoring, and competition. In our context, the level of political pressure applied to supermarkets was very superficial, and there was no legal mechanism to force stores to lower prices. This could explain why we do not observe a similar pattern.

4.4.2 Differences between products

Pass-through to prices was substantially higher for basic food items (e.g., rice) than for "quasi-luxury" items (e.g., tinned meat). In the Appendix, we present difference-in-differences estimates from the supermarket census data disaggregated by whether items are more basic or more "luxurious", where this classification is based on the share of households from each income quintile that purchase each item in the phone survey (see Figure A44). We find markedly lower initial pass-through for quasi-luxury items, which are disproportionately sold in higher-end supermarkets. In contrast, basic items—which tend to be available across nearly all stores—exhibit effectively full pass-through immediately following the reform. This pattern is consistent with competition being a key driver of heterogeneity in pass-through. Quasi-luxury items are carried by fewer stores, so retailers selling them face weaker competitive pressure and therefore pass-through a smaller share of the VAT exemption. Conversely, basic items are available in most stores, implying stronger competition and substantially higher pass-through of the VAT exemption to prices.

5 Discussion

We demonstrate that the introduction VAT exemptions in a lower-income country setting with high informality did not significantly benefit poorer households; rather, richer households and store owners were the primary beneficiaries. This result is despite very high pass-through rates in formal supermarkets in the central area of the largest city, driven by high levels of competition. Elsewhere in the country, store owners were able to exercise some degree of spatial monopolistic power and avoid passing through a substantial share of the VAT exemptions to consumers. On average, we estimate that 30 percent of the foregone revenue went to formal store owners nationwide, as the pass-through rate was 70 percent in these stores three months after the reform. The key reasons why richer households benefited

the most from the reform are that they consume more of the exempt items, are less likely to rely on subsistence agriculture, and are more likely to purchase from formal stores in urban areas—which face more competition and thus pass-through a larger share of the VAT exemption to prices. This resulted in the richest quintile collecting around one-third of the foregone revenue, while the poorest quintile collected only around five percent.

This study provides unparalleled evidence in a lower-income country context, illustrating that VAT exemptions are an inefficient way for governments to support poorer households. We build on prior work by being the first to illustrate the regressivity of differential pass-through to prices. Our results also shed novel light on how misperceptions about competition, informality, and the income elasticity of consumer demand for basic foods may explain why policymakers still use VAT exemptions. The contrast between the expert predictions and our findings illustrates that VAT exemptions are even more regressive than initially appreciated and raise questions about the suitability of VAT cuts as an equity-enhancing policy instrument in low-income countries, underscoring the need for alternative fiscal policies, such as cash transfers. While concerns remain about the ability to reach poorer households with cash transfers in lower-income settings — characterized by high informality and limited administrative data — we demonstrate that even a poorly targeted social protection program is likely to be orders of magnitude more progressive than VAT exemptions.

Future research could proceed in several directions. First, studies could leverage price data linked to household purchases to shed further light on the pass-through and incidence of VAT exemptions, particularly the conditions under which differential pass-through generates regressive outcomes and the settings in which it is most pronounced. Second, researchers could examine more systematically the role of competition in shaping the efficiency and distributional consequences of tax policy in lower-income countries, as our findings suggest that experts often misjudge its relevance. Third, it remains an open question how the pass-through and incidence of VAT exemptions operate for inferior goods, and at what levels

of development this may actually becomes policy relevant. Finally, our study highlights substantial scope for using novel sources of price data to conduct rigorous analyses of public finance and empirical industrial organization questions even in highly data-constrained environments.

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Appendix - Additional Figures and Tables

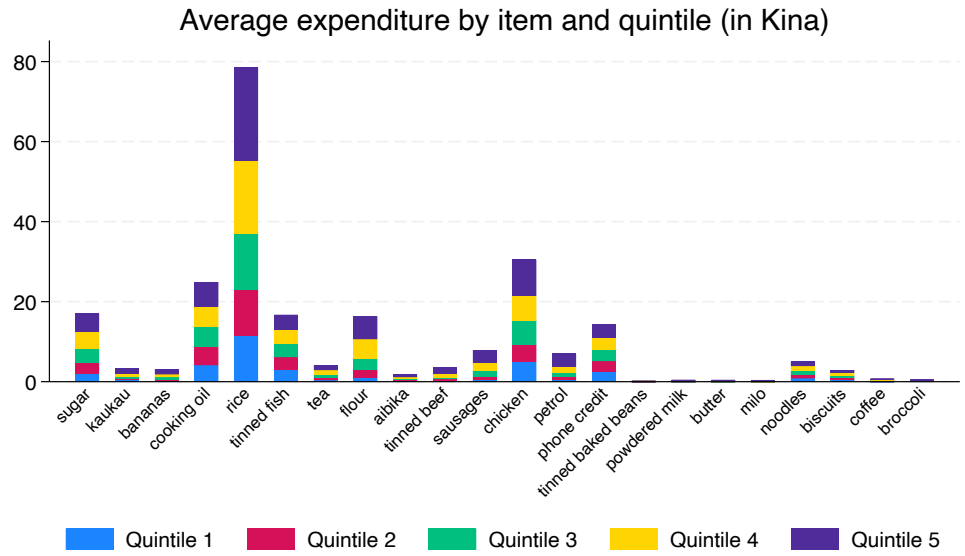


Figure A1: Average expenditure by item per quintile

Note: This figure shows the average expenditure by item per quintile in Kina.

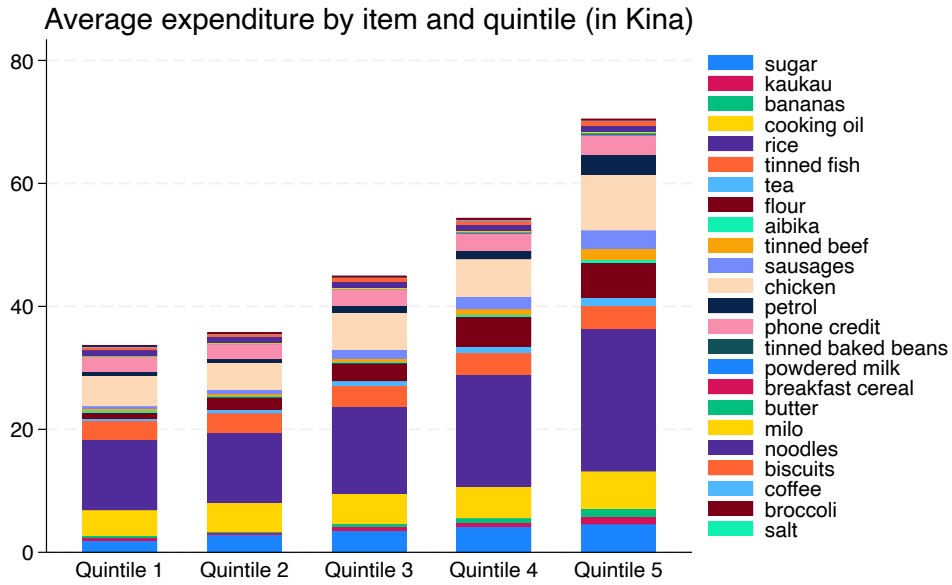


Figure A2: Average expenditure by quintile per item

Note: This figure shows the average expenditure by quintile per item in Kina.

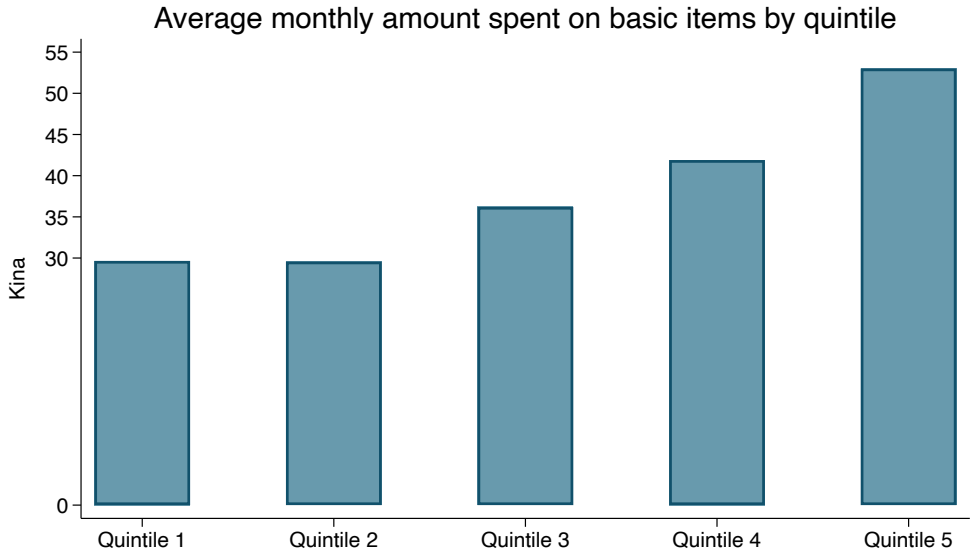


Figure A3: Average expenditure by quintile on basic items

Note: This figure shows the average expenditure by quintile on basic items in Kina.

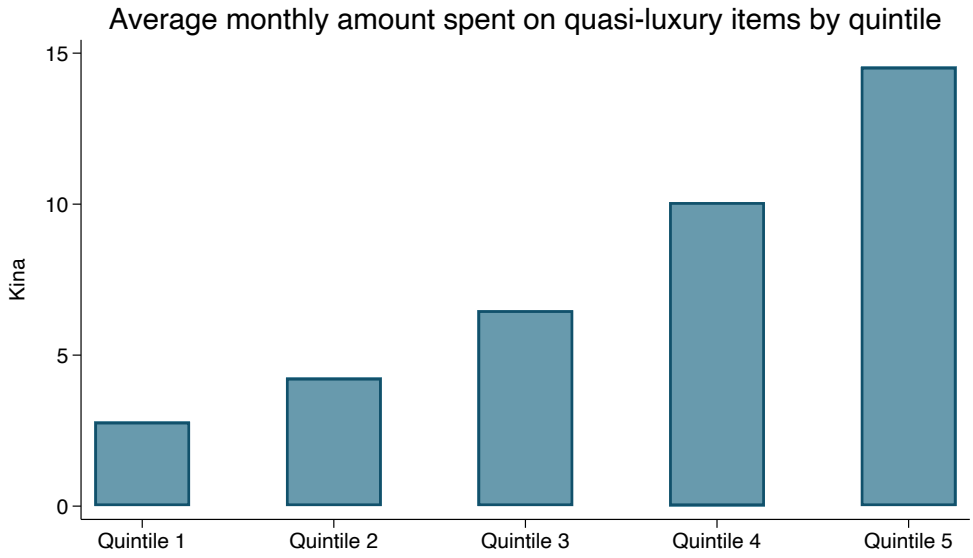


Figure A4: Average expenditure by quintile on quasi-luxury items

Note: This figure shows the average expenditure by quintile on quasi-luxury items in Kina.

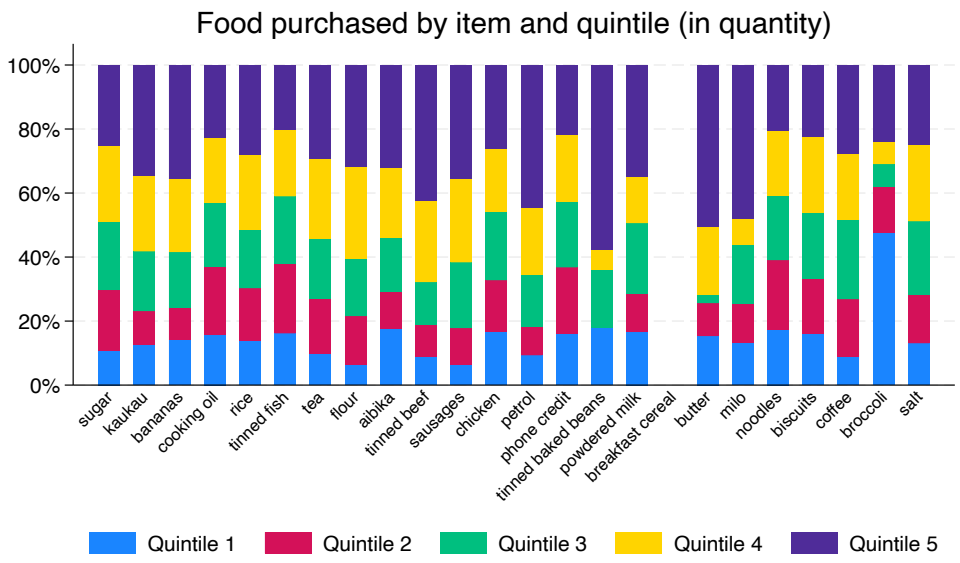


Figure A5: Quantity purchased by item per quintile

Note: This figure shows the quantity purchased by item per quintile.

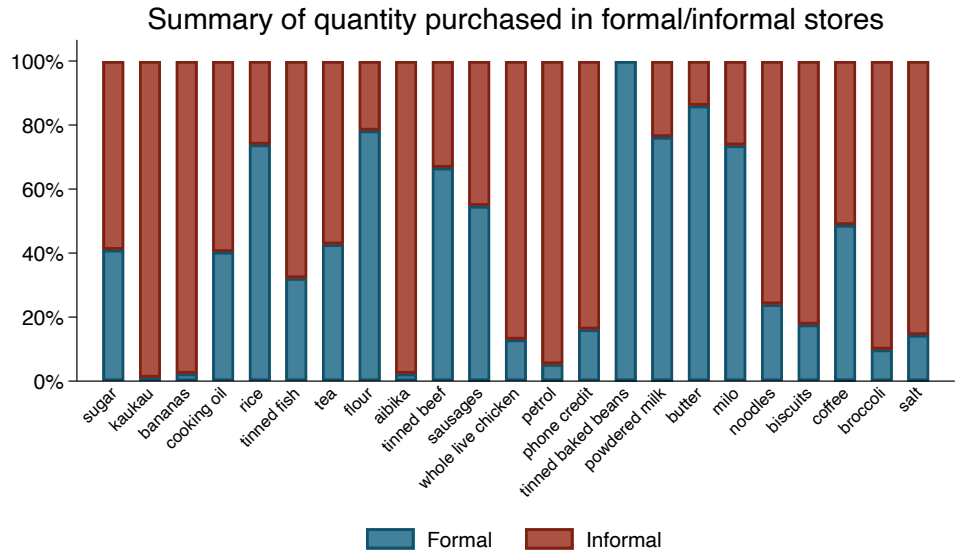


Figure A6: Quantity purchased by item by store type

Note: This figure shows the quantity purchased by item by store type.

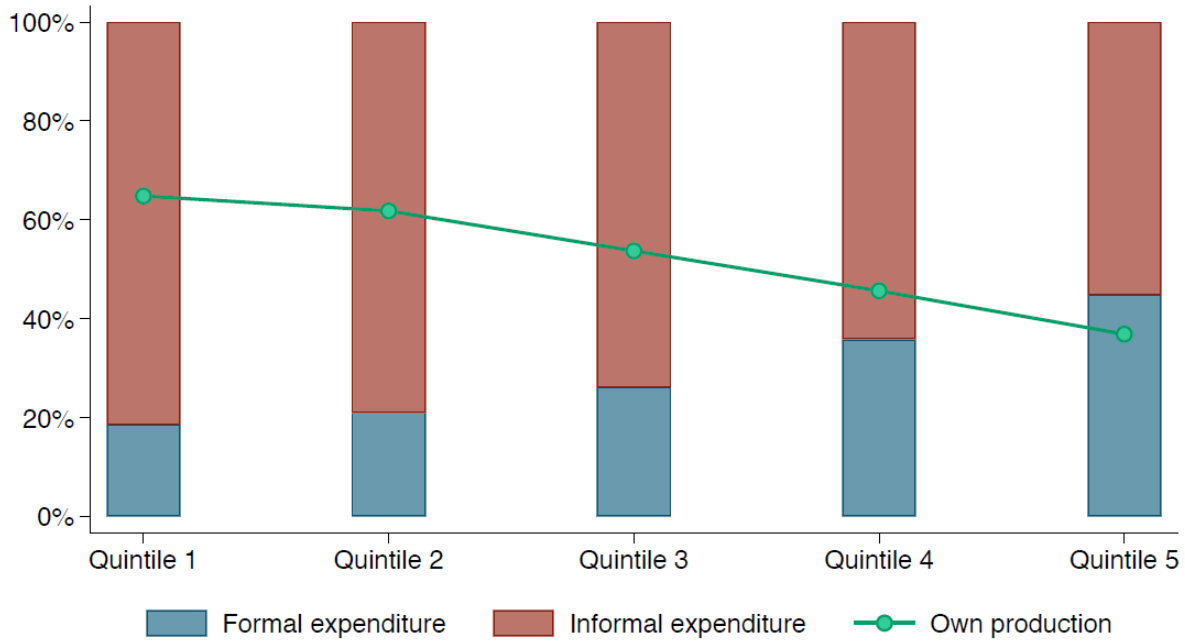
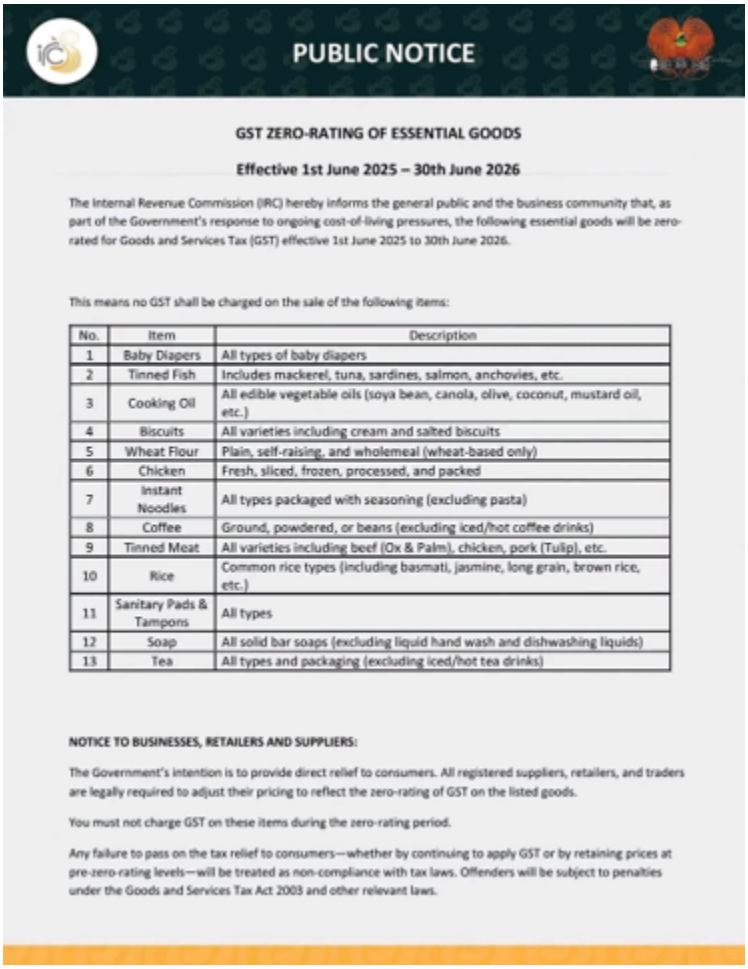


Figure A7: Type of consumption and expenditure by quintile

Note: This figure shows the type of consumption and expenditure by quintile based on 2024 data from the phone survey.



PUBLIC NOTICE

GST ZERO-RATING OF ESSENTIAL GOODS

Effective 1st June 2025 – 30th June 2026

The Internal Revenue Commission (IRC) hereby informs the general public and the business community that, as part of the Government's response to ongoing cost-of-living pressures, the following essential goods will be zero-rated for Goods and Services Tax (GST) effective 1st June 2025 to 30th June 2026.

This means no GST shall be charged on the sale of the following items:

No.	Item	Description
1	Baby Diapers	All types of baby diapers
2	Tinned Fish	Includes mackerel, tuna, sardines, salmon, anchovies, etc.
3	Cooking Oil	All edible vegetable oils (soya bean, canola, olive, coconut, mustard oil, etc.)
4	Biscuits	All varieties including cream and salted biscuits
5	Wheat Flour	Plain, self-raising, and wholemeal (wheat-based only)
6	Chicken	Fresh, sliced, frozen, processed, and packed
7	Instant Noodles	All types packaged with seasoning (excluding pasta)
8	Coffee	Ground, powdered, or beans (excluding iced/hot coffee drinks)
9	Tinned Meat	All varieties including beef (Ox & Palm), chicken, pork (Tulip), etc.
10	Rice	Common rice types (including basmati, jasmine, long grain, brown rice, etc.)
11	Sanitary Pads & Tampons	All types
12	Soap	All solid bar soaps (excluding liquid hand wash and dishwashing liquids)
13	Tea	All types and packaging (excluding iced/hot tea drinks)

NOTICE TO BUSINESSES, RETAILERS AND SUPPLIERS:

The Government's intention is to provide direct relief to consumers. All registered suppliers, retailers, and traders are legally required to adjust their pricing to reflect the zero-rating of GST on the listed goods.

You must not charge GST on these items during the zero-rating period.

Any failure to pass on the tax relief to consumers—whether by continuing to apply GST or by retaining prices at pre-zero-rating levels—will be treated as non-compliance with tax laws. Offenders will be subject to penalties under the Goods and Services Tax Act 2003 and other relevant laws.

Figure A8: First official notice from the PNG Government about the VAT exemption reform

Note: This figure shows the first official notice from the PNG Government about the VAT exemption reform.

Table A1: Timeline of the VAT Exemptions Reform and Study Data Collection

Date	Event
Dec 2023 to Sept 2025	**Administrative data** collected monthly by (i) Central Bank of PNG research team and (ii) National Statistics Office CPI team; providing detailed price data for over 100 items from a subset of formal supermarkets in Port Moresby.
Jan 2024 to Dec 2025	Nationally representative, monthly **phone survey panel** (about 1,000 households/month) measuring quantities, expenditures, and store type (formal/informal) for 20 items.
29 Nov 2024	PNG government first publicly stated the *possibility* of removing VAT from some basic items in mid-2025; details were limited and credibility unclear.
19 May 2025	Policymakers announced that VAT exemptions for 10 food items (and 3 non-food items) would take effect on **June 1, 2025** (i.e., 10 days later).
May-Aug 2025	Weekly web-scraped all **online prices** from the two chains offering online shopping in Port Moresby (including the use of "time machine" software to check prices before reform announced).
May-Nov 2025	Monthly in-store **supermarket census** collected prices for 20 food items (10 exempt and 10 non-exempt) in all 83 formal supermarkets in Port Moresby.
1 June 2025	Reform implemented: VAT on 10 food items set to zero-rated (functionally close to an exemption in practice). Exemptions scheduled to remain in place for at least 13 months.
July-Sep 2025	Expert prediction survey hosted on SSPP to benchmark beliefs about pass-through and incidence against realized outcomes.
8 Aug 2025	Policymakers issued revised guidance clarifying the details of the reform and outlining plans to monitor its impact on prices.
25 Nov 2025	PNG government announced an extension of the VAT exemption policy to the end of 2026 (i.e., 19 months in total).
Dec 2025	Phone survey question about how familiar households are with the details of the reform six months after implementation.

Notes: The table lists both policy milestones and the data-collection windows used to estimate pass-through and incidence.

PUBLIC NOTICE

RETRACTION AND REPLACEMENT OF NOTICE ON GST ZERO RATING OF ESSENTIAL GOODS DATED 8 AUGUST 2025

The Internal Revenue Commission (IRC) wishes to inform the general public, businesses, and all relevant stakeholders that the public notice regarding the GST Zero Rating of **essential goods issued on 19th May 2025** is hereby **retracted** and replaced with this updated list, effective 8 August 2025.

This is to ensure clarity and consistency in the application of GST zero rated household goods.

Important Changes:

- The previous list of "essential goods" under GST Zero Rating is obsolete and no longer valid.
- This new list strictly applies to designated **household goods** which are now subject to **0% GST**. The list specifies the exclusions and also includes descriptions under the Notice on HS codes released on the 19th May 2025.
- All other goods not listed below will continue to attract the standard GST rate.

List of GST Zero-Rated Household Goods were no GST charge on the sale of goods.

No.	Item Name	Description
1	*Baby Diapers	Sanitary Napkins – *Specifically* disposable diapers designed for babies. Example - Huggies, Mamy Poko, Pampers, Diapers etc. *Excluding Adult diapers and reusable cloth nappies*
2	Tinned Fish	Canned fish varieties. Example - Canned mackerel, Canned Tuna, Canned Salmon, Canned anchovies, Canned Herrings, Canned Sanidines, sardinella and brisling or sprats, Canned Skipjack, Canned Bonito. *Excluding - Seasoned or gourmet tins with added sauces and Canned fish for animal consumption*
3	Cooking Oil	All edible vegetable oils. *Specifically*: Vegetable fats and oils, Refined Palm Oil and Virgin oil Example - Soybean oil, sunflower oil, canola oil, vegetable oil, cotton oil, sesame oil, ground-nut oil, colza oil, soya bean oil, maize (corn) oil. Microbial fats and oils and their fractions - Other microbial fats apart from fungi (Inc. yeasts), bacteria and micro algae. *Excluding - Crude Oil*
4	Biscuits	Specifically - Cream crackers, wafer biscuits, savory and salted biscuits e.g. em-nau biscuit, snax, etc. *Excluding - All sweet biscuits*
5	Wheat Flour	Wheat or meslin self-raising flour for household use (wheat-based only). *Specifically* - Plain flour, self-raising flour, wholemeal flour. *Excluding - Baker flour, Biscuit flour, Noodle flour, Soft biscuit flour, Soft flour*
6	Chicken	a. Chicken: Whole chicken, not cut into pieces, fresh or chilled Whole chicken, not cut into pieces, frozen Chicken pieces or internal parts (like liver or heart), fresh or chilled b. Chicken pieces or internal parts, frozen: Those that are not mechanically deboned, pieces that still have bones in them. *Excluding* - Chicken sausage
7	* Instant Noodles	Dried noodles with seasoning sachets in retail packs. Example - Maggi noodles, Indomie cup noodles, Wai Wai noodles etc. *Excluding - Pasta*

8	Coffee	Instant and brewed coffee, caffeinated or decaffeinated, in standard household sizes *Specifically* - Nescafe Classic, NESCAFÉ Gold, Robert Timms, instant coffee powders, brewed ground coffee, 3-in-1 sachets (plain only) *Excluding - Roast coffee or coffee beans, caffeinated or decaffeinated that is flavored or milk-added variations)*
9	Tinned Meat	Canned chicken, Canned pork, Canned corned beef for household consumption. *Specifically* - Ox & Palm Corned Beef, Spam, canned chicken chunks, canned pork, picnic ham. *Excluding - Mixed meals or spiced/curried varieties, tinned meat for animal feed not for human consumption.*
10	Rice	Common varieties consumed in households Specifically - Jasmine rice, long grain rice, medium grain, soft rice, ori rice, sweet rice commercial. *Excluding - Animal feed rice or broken rice for stock feed.*
11	*Sanitary Pads & Tampons	Feminine hygiene products. Example - Always, Libra, Softy, Whisper, tampons etc. (packaged for household retail use)
12	Soap	All solid bar soaps. Example - e.g. WasWas, Klina, etc. *Excluding - Liquid hand wash, powdered soaps, dishwashing liquids*
13	Tea	All types and packaging. *Excluding - Herbal or medicinal teas, iced /hot tea drinks*

** These goods will require the taxpayer to request in writing to the Internal Revenue Commission for GST zero-rated on the household goods imported.*
Addressed to: Internal Revenue Commission (IRC), P.O. Box 777, Port Moresby, NCD.
Attention: GST zero-rated Household Goods

1. **Important Conditions**
   a. Stock Eligibility Date
      - Only household goods acquired or imported on or after 1 January 2025 and held in stock as of 1 June 2025 will qualify for GST zero-rating.
      - Any stock acquired before 1 January 2025 will not be eligible for GST zero-rating.

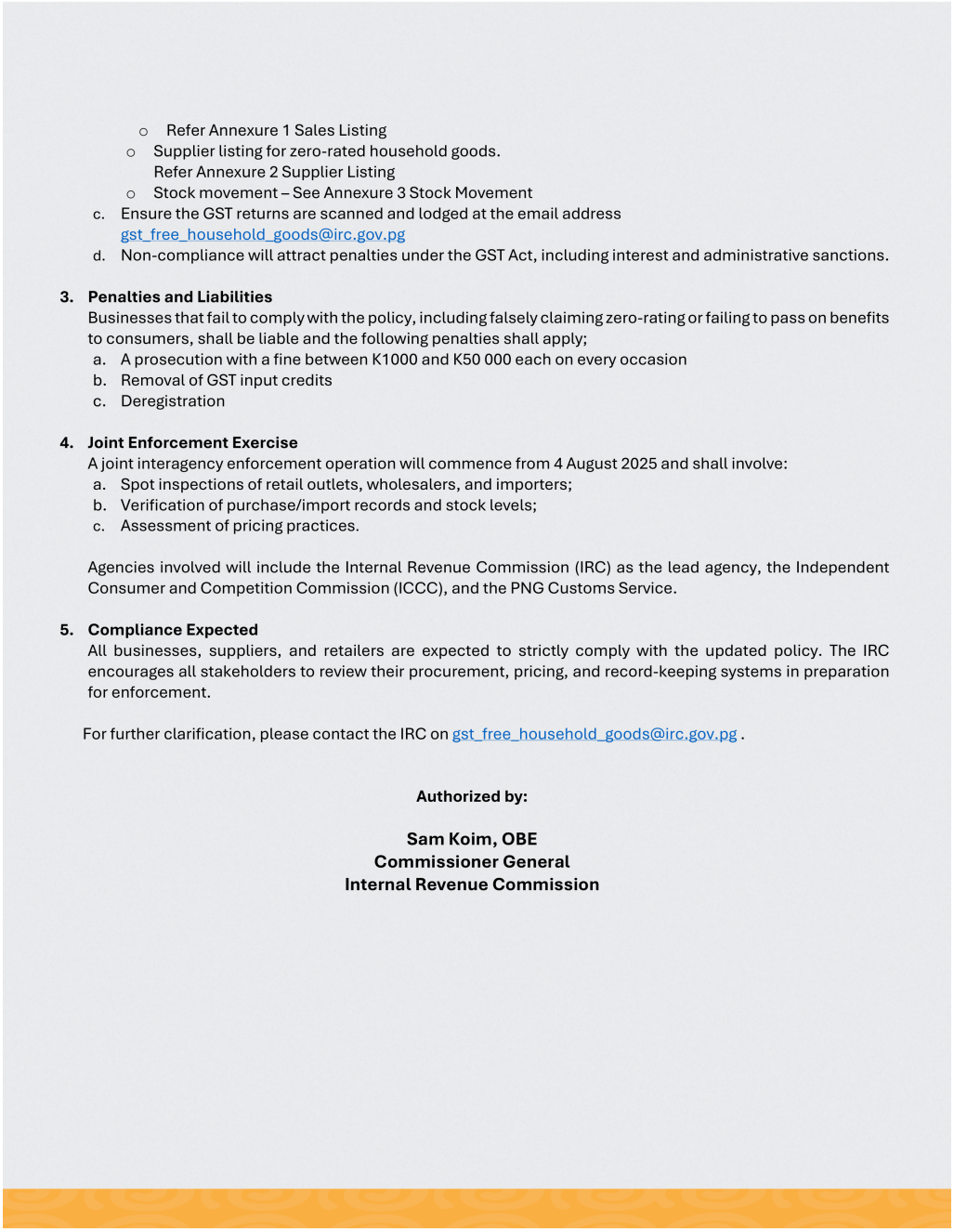
   b. Input Tax Credit Condition
      - Input tax credits will only be allowed if the business can demonstrate, with documentation, that the benefit of the zero-rating has been passed on to the final consumer through reduced prices.

   c. Proof of Compliance
      - Businesses must retain valid purchase/import documents, stock records, and sales invoices showing compliant pricing structures.

   Notwithstanding the above, businesses are hereby advised that input tax credits will only be allowed if proven that the benefits of zero-rating were passed on to the consumers.

2. **Important Information for Retailers and Suppliers:**
   a. All businesses are required to
      I. Update their pricing, invoicing, and accounting systems to reflect the revised zero-rated household goods list.
      II. Clearly indicate on the shelf the essential goods being GST Zero rated with the pricing.

   b. Lodge GST returns accurately reporting zero-rated sales from the effective date with the following attachments:
      - Cover letter - Label the letter clearly: "GST Zero-Rated Household Goods".
      - Sales listing for zero-rated household goods.



- Refer Annexure 1 Sales Listing
- Supplier listing for zero-rated household goods.
  Refer Annexure 2 Supplier Listing
- Stock movement – See Annexure 3 Stock Movement

c. Ensure the GST returns are scanned and lodged at the email address gst_free_household_goods@irc.gov.pg
d. Non-compliance will attract penalties under the GST Act, including interest and administrative sanctions.

3. Penalties and Liabilities

Businesses that fail to comply with the policy, including falsely claiming zero-rating or failing to pass on benefits to consumers, shall be liable and the following penalties shall apply;

a. A prosecution with a fine between K1000 and K50 000 each on every occasion
b. Removal of GST input credits
c. Deregistration

4. Joint Enforcement Exercise

A joint interagency enforcement operation will commence from 4 August 2025 and shall involve:

a. Spot inspections of retail outlets, wholesalers, and importers;
b. Verification of purchase/import records and stock levels;
c. Assessment of pricing practices.

Agencies involved will include the Internal Revenue Commission (IRC) as the lead agency, the Independent Consumer and Competition Commission (ICCC), and the PNG Customs Service.

5. Compliance Expected

All businesses, suppliers, and retailers are expected to strictly comply with the updated policy. The IRC encourages all stakeholders to review their procurement, pricing, and record-keeping systems in preparation for enforcement.

For further clarification, please contact the IRC on gst_free_household_goods@irc.gov.pg .

Authorized by:

Sam Koim, OBE
Commissioner General
Internal Revenue Commission

Figure A9: Second official notice from the PNG Government about the VAT exemption reform

Note: This figure shows the second official notice from the PNG Government about the VAT exemption reform.

	Survey			Census
	All months	1-month	Monthly average	
BOUGAINVILLE	4.81	5.76	4.62	3.51
CENTRAL	3.00	2.49	2.73	3.01
CHIMBU	5.52	7.20	5.73	5.54
EAST NEW BRITAIN	4.93	5.10	4.51	4.25
EAST SEPIK	5.84	6.02	5.91	6.36
EASTERN HIGHLANDS	8.68	7.72	7.72	9.97
ENGA	4.65	5.63	5.50	5.56
GULF	2.01	1.96	2.45	1.88
HELA	3.23	5.10	4.25	4.75
JIWAKA	4.62	4.97	5.33	4.74
MADANG	6.07	5.24	6.24	6.27
MANUS	2.49	2.62	2.52	0.75
MILNE BAY	2.37	1.83	2.10	4.02
MOROBE	8.28	6.54	7.62	9.46
NATIONAL CAPITAL DISTRICT	5.68	5.89	4.15	3.46
NEW IRELAND	3.43	2.62	3.45	2.16
NORTHERN (ORO)	2.09	2.09	2.55	2.48
SOUTHERN HIGHLANDS	4.93	6.54	6.34	6.40
WEST NEW BRITAIN	4.50	2.88	3.69	3.69
WEST SEPIK (SANDAUN)	4.54	3.66	4.07	3.27
WESTERN	1.78	1.05	1.54	2.28
WESTERN HIGHLANDS	6.55	6.81	6.98	6.19

Table A2: Distribution of survey respondents relative to population

Note: This table shows the distribution of survey respondents relative to the population.

Table A3: Familiarity with National Government's Efforts to Reduce Tax

Response	Freq.	Percent	Cum.
Not at all	510	38.06	38.06
A little	536	40.00	78.06
Somewhat	248	18.51	96.57
Very Familiar	46	3.43	100.00
Total	1,340	100.00	

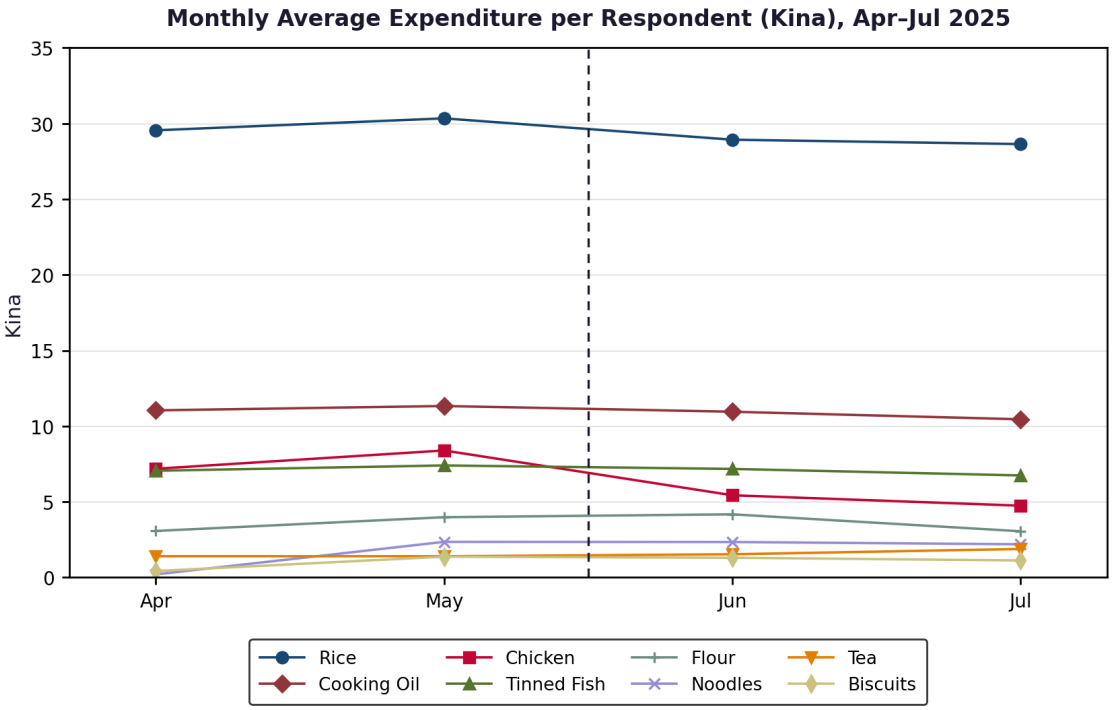


Figure A10: Average monthly expenditure on exempt items

Note: This figure shows the average monthly expenditure on exempt items.

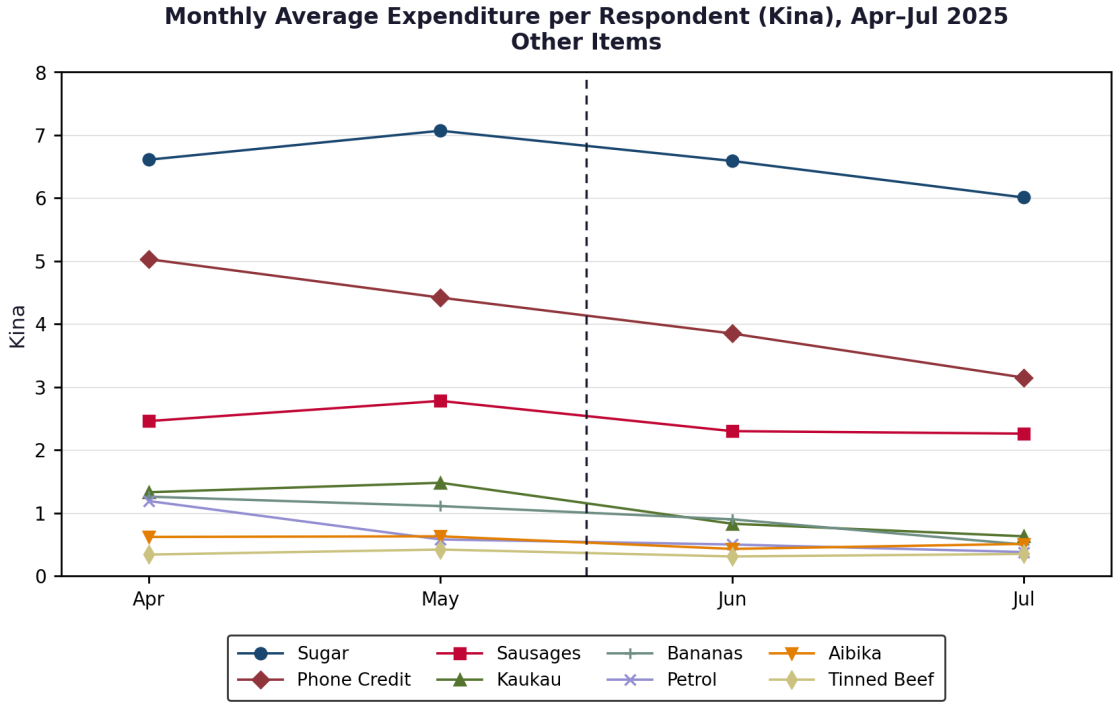
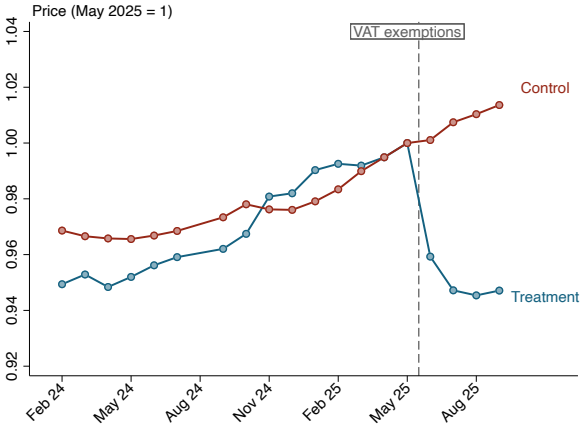


Figure A11: Average monthly expenditure on non-exempt items

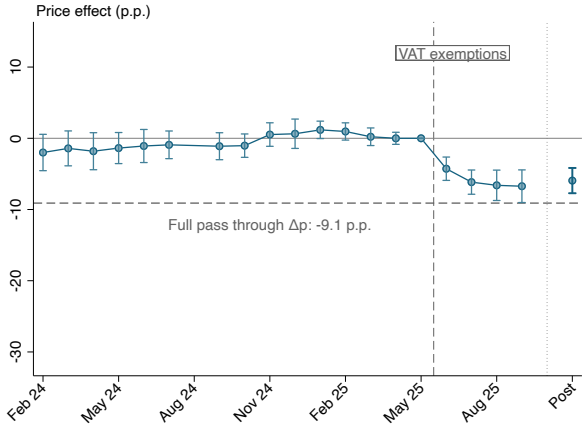
Note: This figure shows the average monthly expenditure on non-exempt items.

Central Bank administrative data

(a) Raw trends

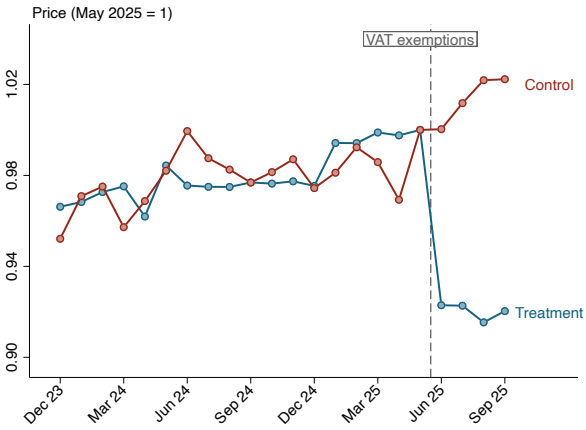


(b) Differences-in-Differences results

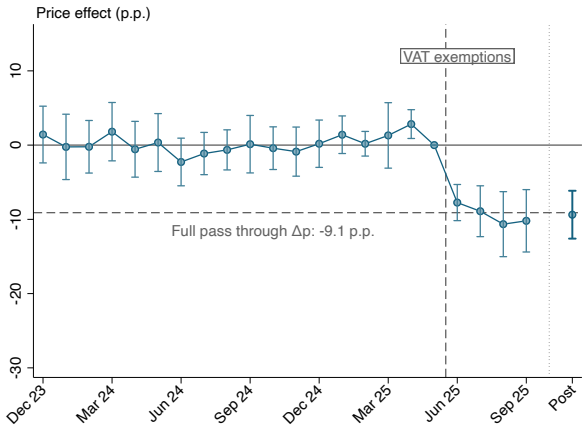


NSO administrative data

(c) Raw trends

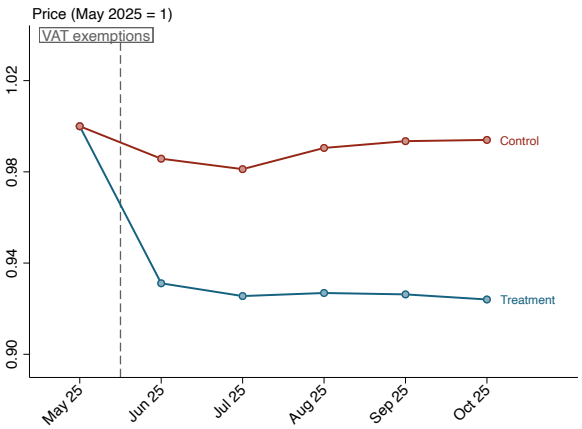


(d) Differences-in-Differences results



Supermarket census data

(e) Raw trends



(f) Differences-in-Differences results

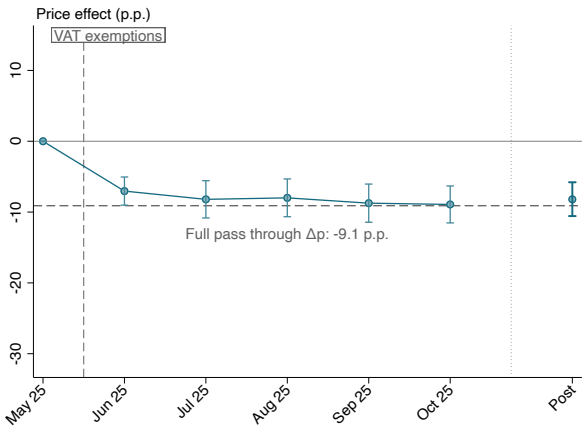


Figure A12: Pass-through of VAT exemptions to prices in Port Moresby by data source

Note: This figure shows the raw trends and difference-in-differences results by data source.

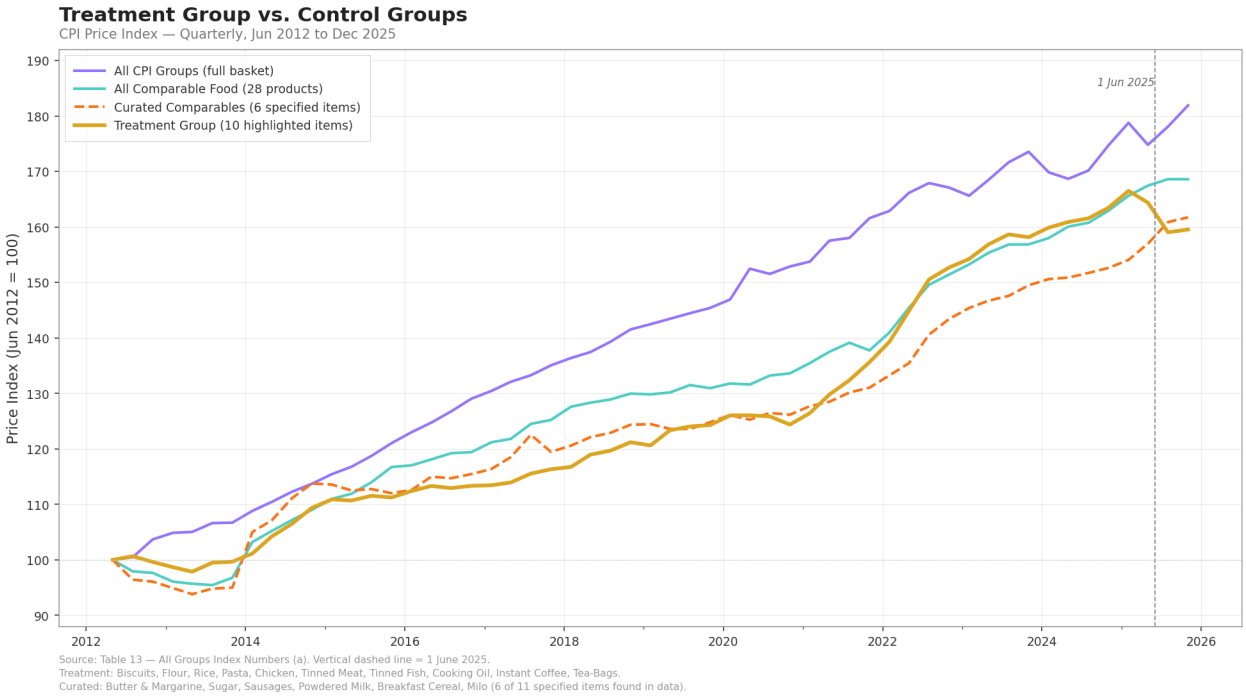


Figure A13: Raw trends in prices over the last 14 years according to NSO administrative data

Note: This figure shows the raw trends in prices over the last 14 years according to NSO administrative data.

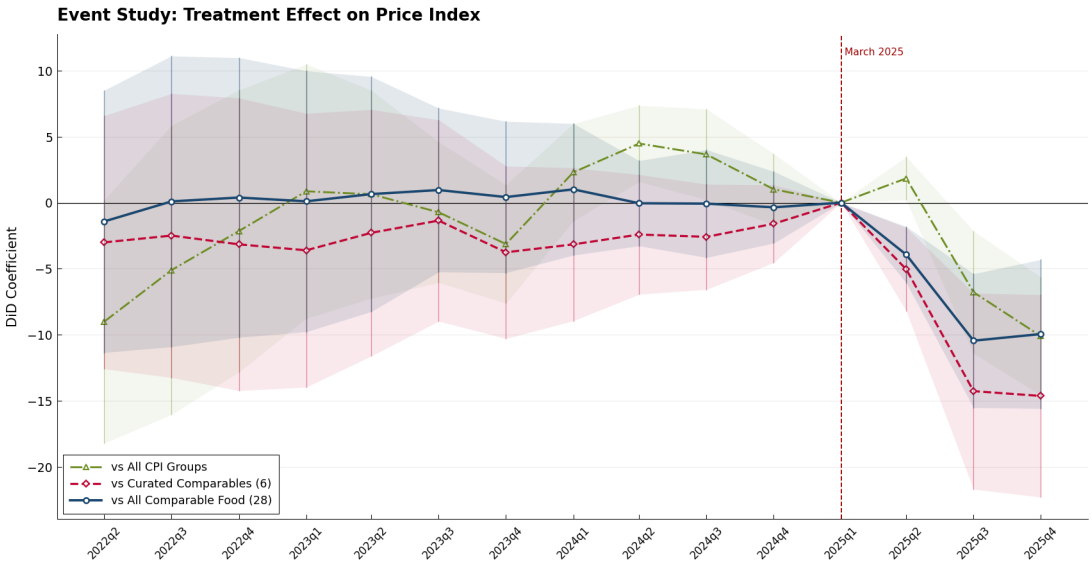


Figure A14: Differences-in-difference results with different comparison groups over the last four years according to NSO administrative data

Note: This figure shows the differences-in-difference results with different comparison groups over the last four years according to NSO administrative data.

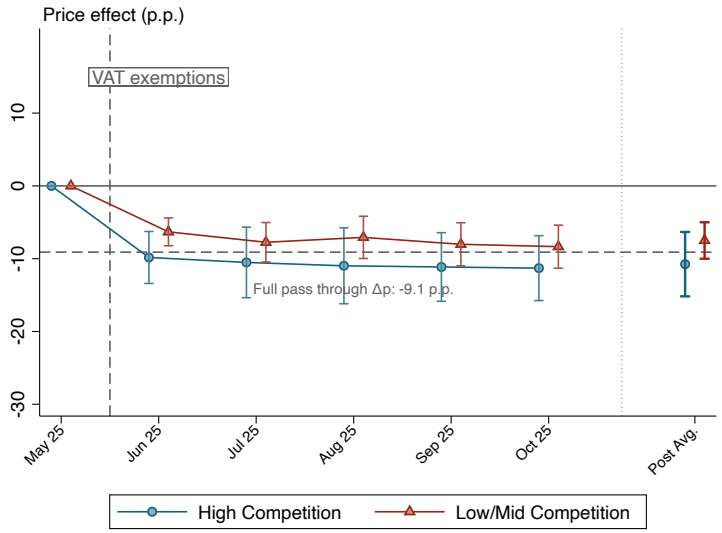


Figure A15: Differences-in-Difference with average effects by store proximity post reform

Note: This figure reproduces the results from Figure 5a), including the pooled TWFE DID estimate by store proximity post-reform (balanced panel).

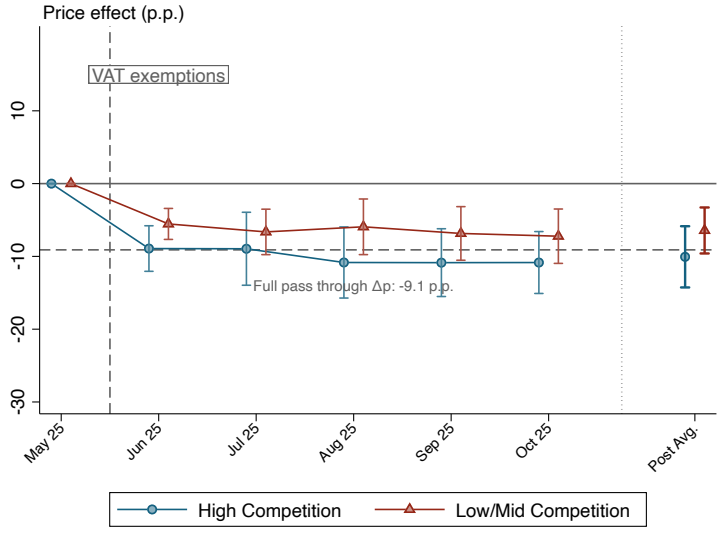


Figure A16: Differences-in-Difference with average effects by store proximity post reform

Note: This figure reproduces the results from Figure 5a), including the pooled TWFE DID estimate by store proximity post-reform (unbalanced panel).

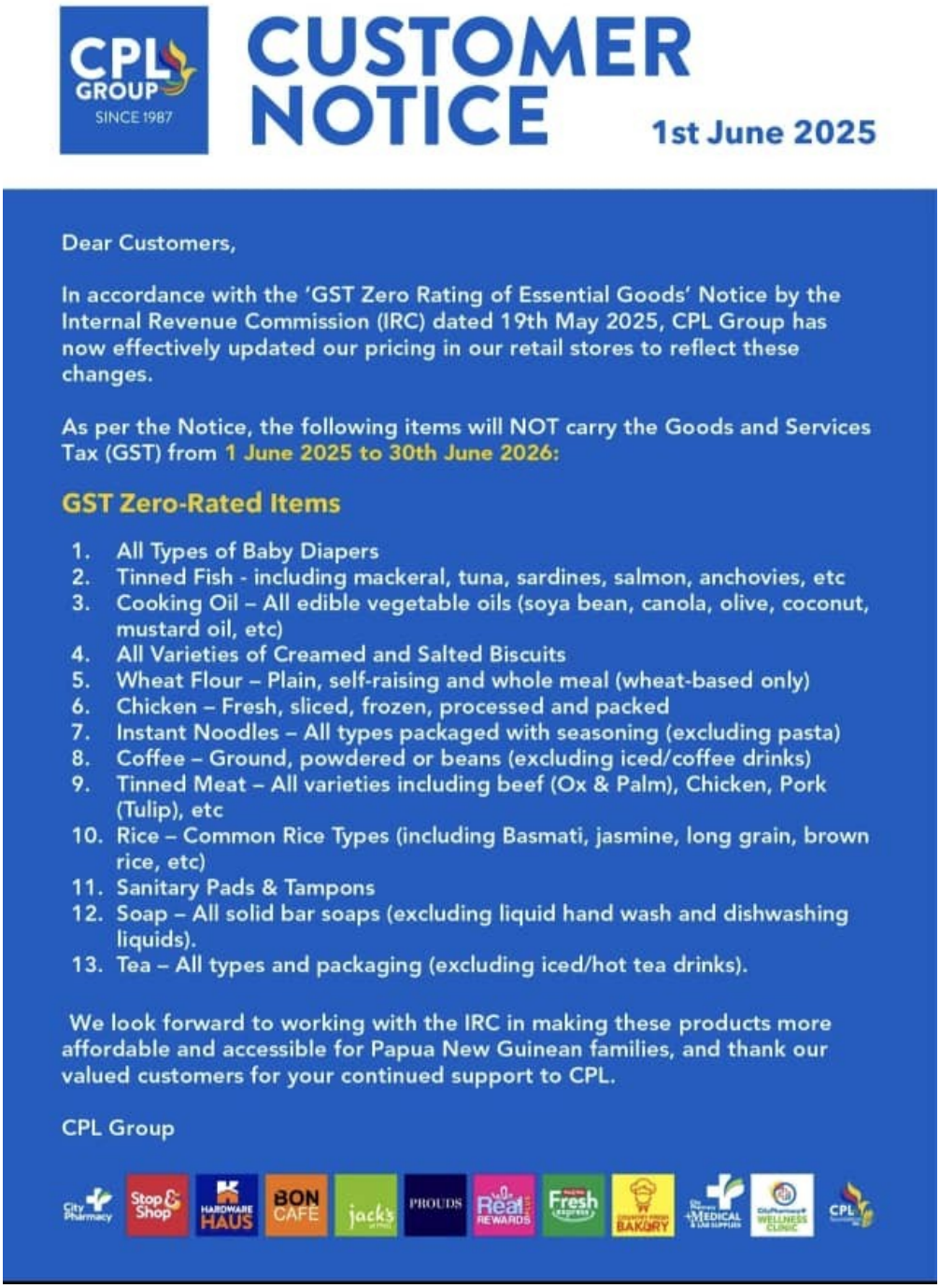


Figure A17: Advertisement from Stop and Shop

Note: This figure presents an advertisement from the largest supermarket chain, Stop and Shop.

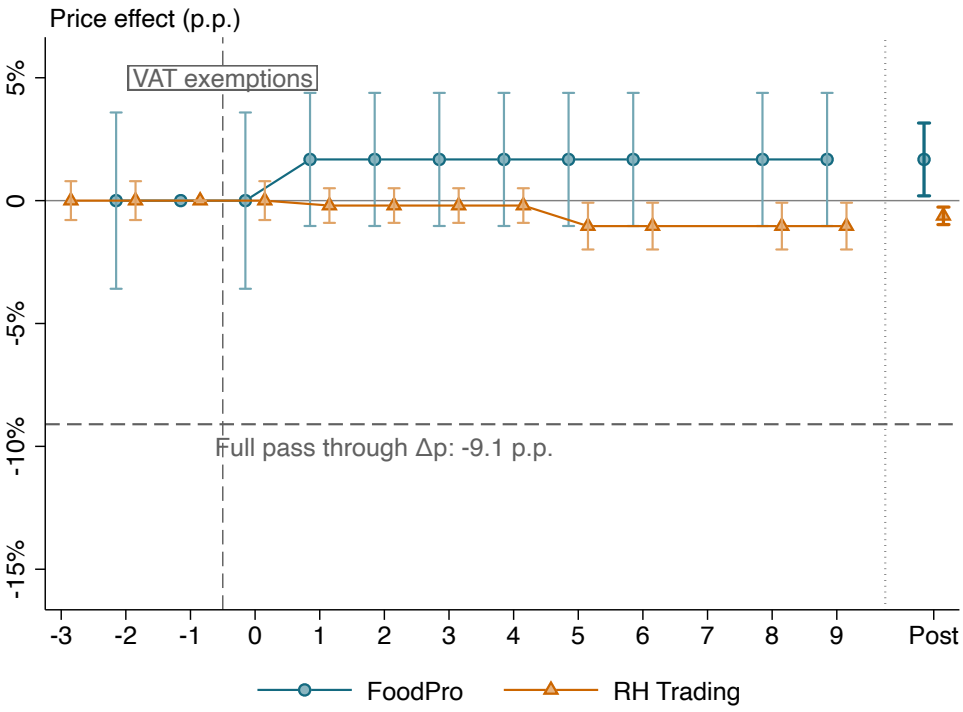


Figure A18: Differences-in-Difference results based on online price information

Note: This figure presents event study estimates of the VAT exemption effect on log prices from online stores (FoodPro and RH Trading), including the pooled TWFE DID estimate post-reform (balanced panel).

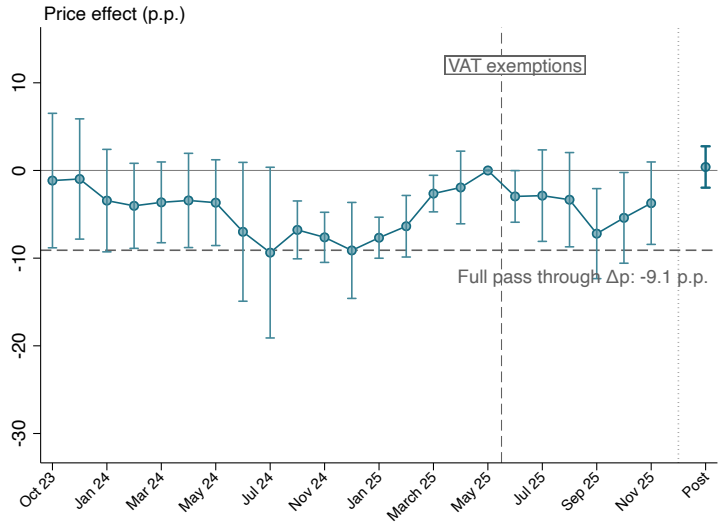


Figure A19: Differences-in-Difference with average effects post reform

Note: This figure reproduces the results from Figure 6a), including the pooled TWFE DID estimate post-reform.

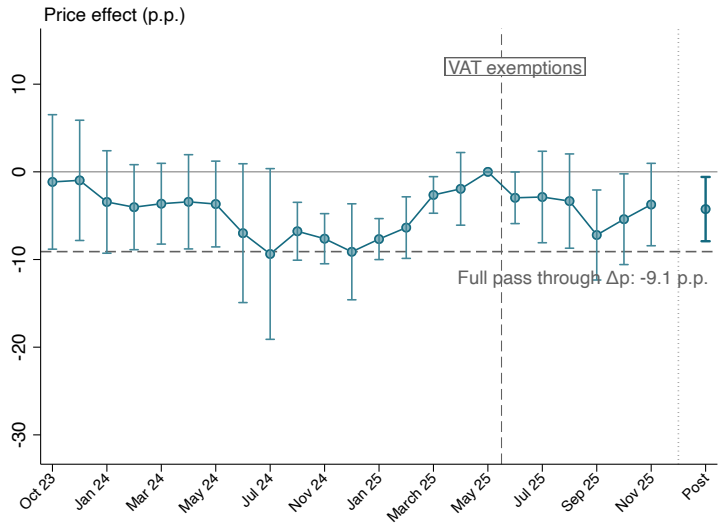


Figure A20: Differences-in-Difference with average effects post reform (reference = May 2025)

Note: This figure reproduces the results from Figure 6a), including the average of post-reform event study coefficients (reference = May 2025).

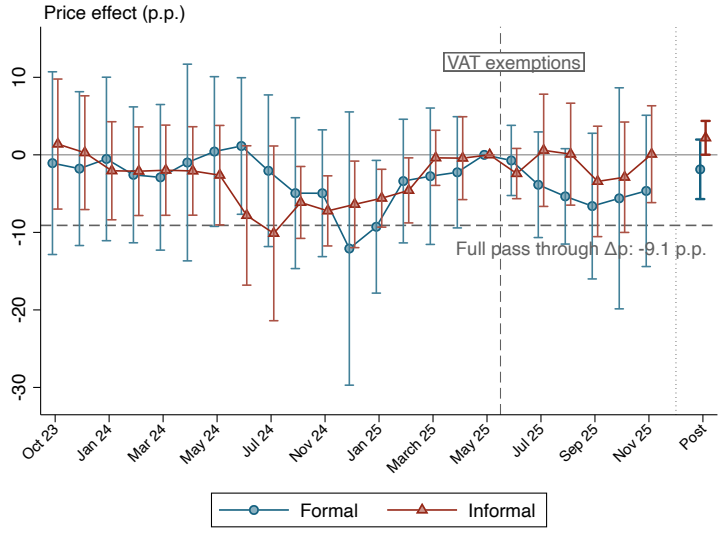


Figure A21: Differences-in-Difference with average effects post reform, by store type

Note: This figure reproduces the results from Figure 6b), including the pooled TWFE DID estimate post-reform, by store type.

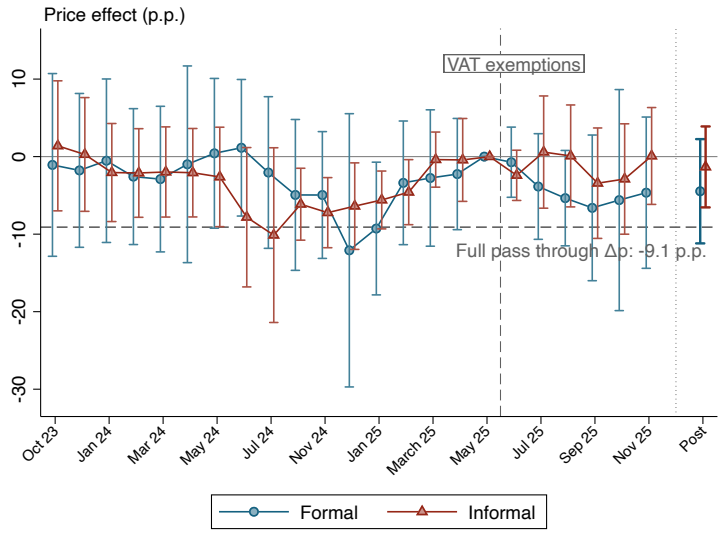


Figure A22: Differences-in-Difference with average effects post reform (reference = May 2025), by store type

Note: This figure reproduces the results from Figure 6b), including the average of post-reform event study coefficients (reference = May 2025), by store type.

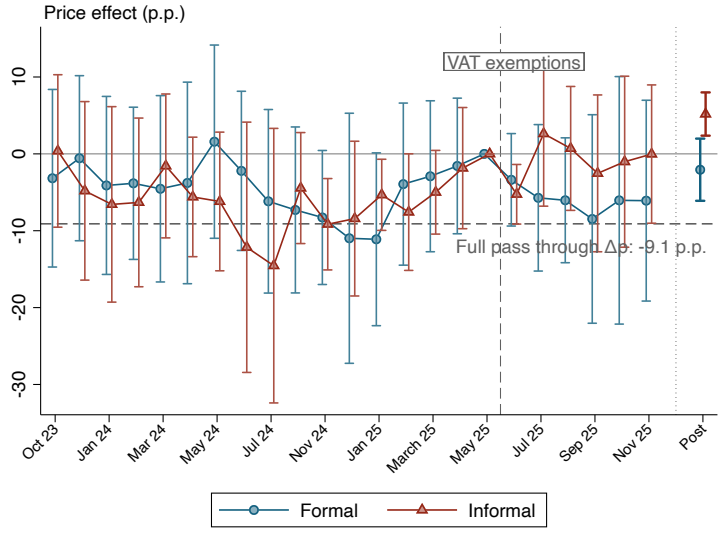


Figure A23: Differences-in-Difference with average effects post reform, by store type in urban areas

Note: This figure reproduces the results from Figure 6c), including the pooled TWFE DID estimate post-reform, by store type in urban areas.

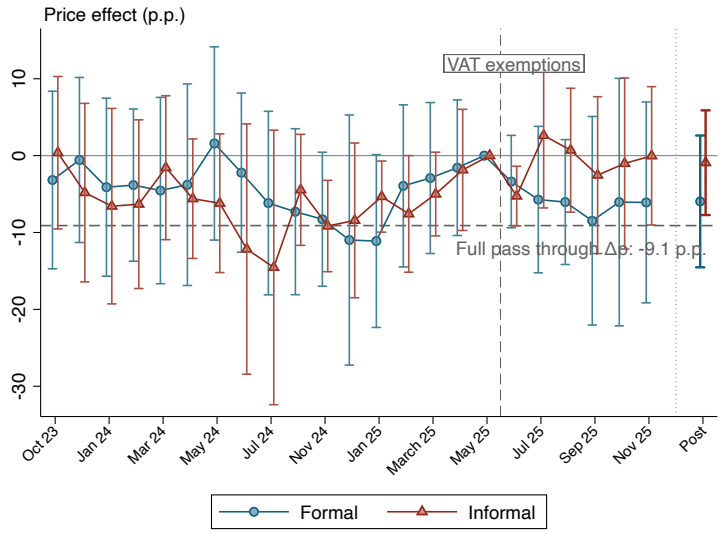


Figure A24: Differences-in-Difference with average effects post reform (reference = May 2025), by store type in urban areas

Note: This figure reproduces the results from Figure 6c), including the average of post-reform event study coefficients (reference = May 2025), by store type in urban areas.

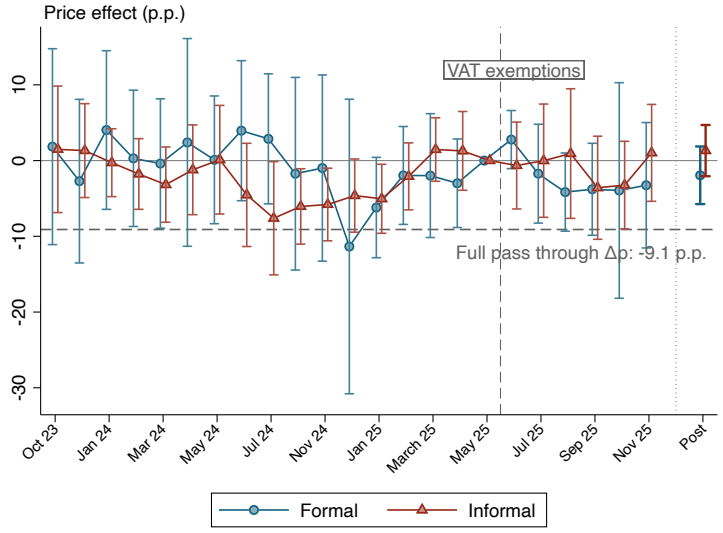


Figure A25: Differences-in-Difference with average effects post reform, by store type in rural areas

Note: This figure reproduces the results from Figure 6d), including the pooled TWFE DID estimate post-reform, by store type in rural areas.

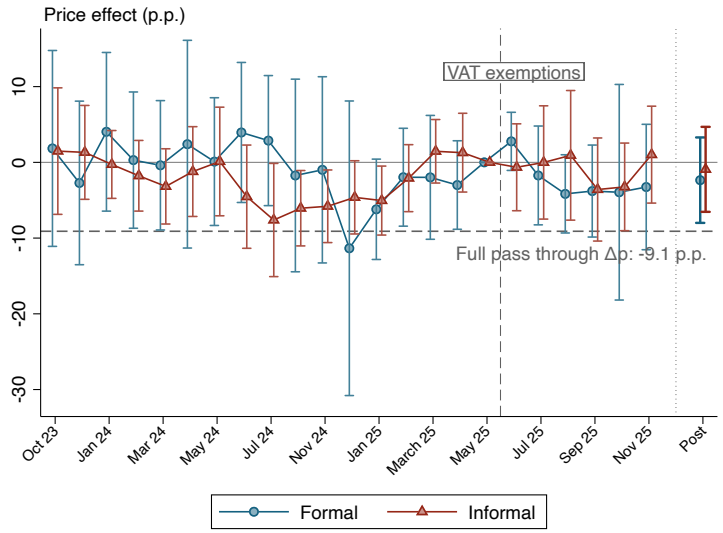


Figure A26: Differences-in-Difference with average effects post reform (reference = May 2025), by store type in rural areas

Note: This figure reproduces the results from Figure 6d), including the average of post-reform event study coefficients (reference = May 2025), by store type in rural areas.

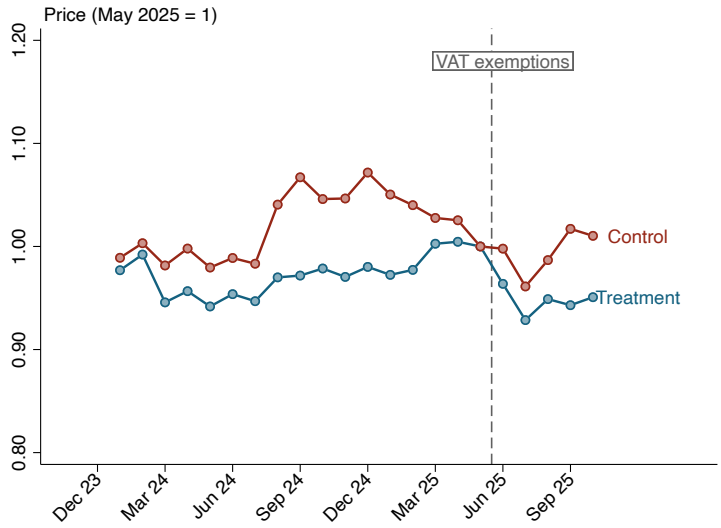


Figure A27: Raw trends in prices in treatment and control groups in the phone survey data

Note: This figure shows the raw trends in prices in treatment and control groups in the phone survey data.

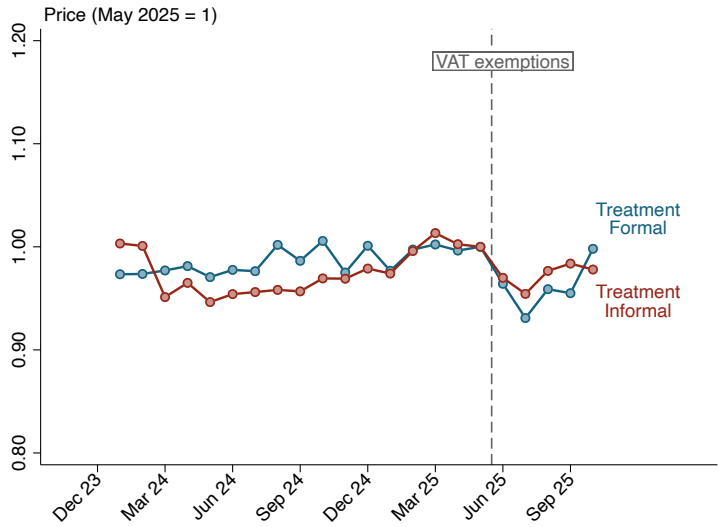


Figure A28: Raw trends in prices in treatment group between formal and informal stores in the phone survey data

Note: This figure shows the raw trends in prices in treatment group between formal and informal stores in the phone survey data.

Finished (%)	73.84
Median duration (minutes)	8.97
Researcher (%)	62.44
Economics (%)	92.44
Research experience in:	
Public Finance (%)	52.54
Tax Incidence (%)	31.07
Development (%)	58.76
Industrial Organization (%)	16.38
Low-middle income countries (%)	62.15
Number of responses	237
Number of complete responses	175

Table A4: Background information about expert prediction survey

Note: This table shows background information about the expert prediction survey.

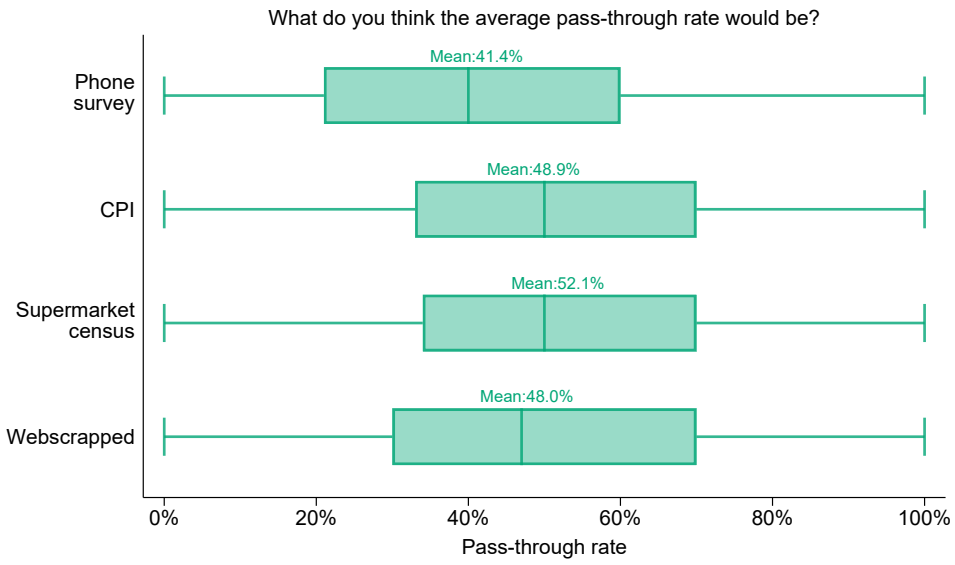


Figure A29: Experts' predictions of pass-through by data source

Note: This figure shows experts' predictions of pass-through by data source.

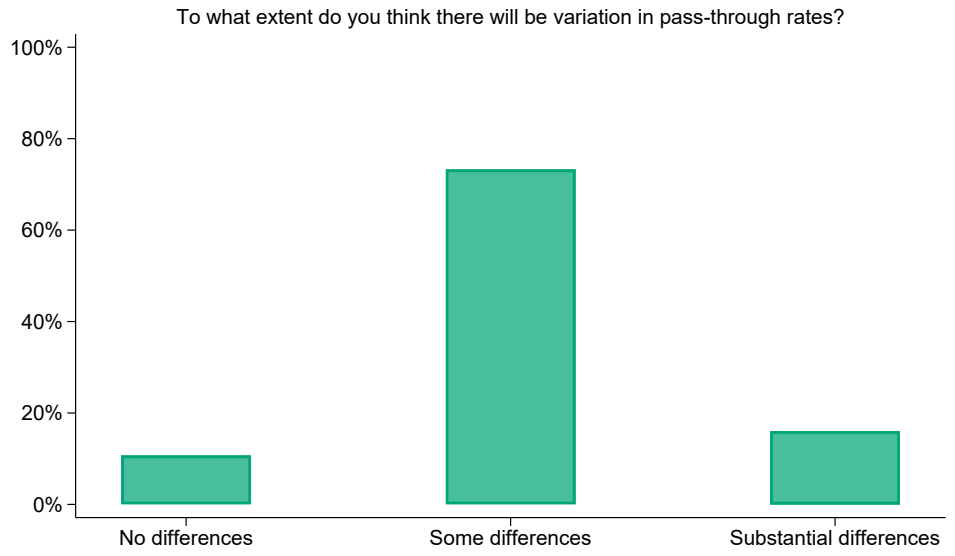


Figure A30: Experts' predictions of variation in pass-through

Note: This figure shows experts' predictions of variation in pass-through.

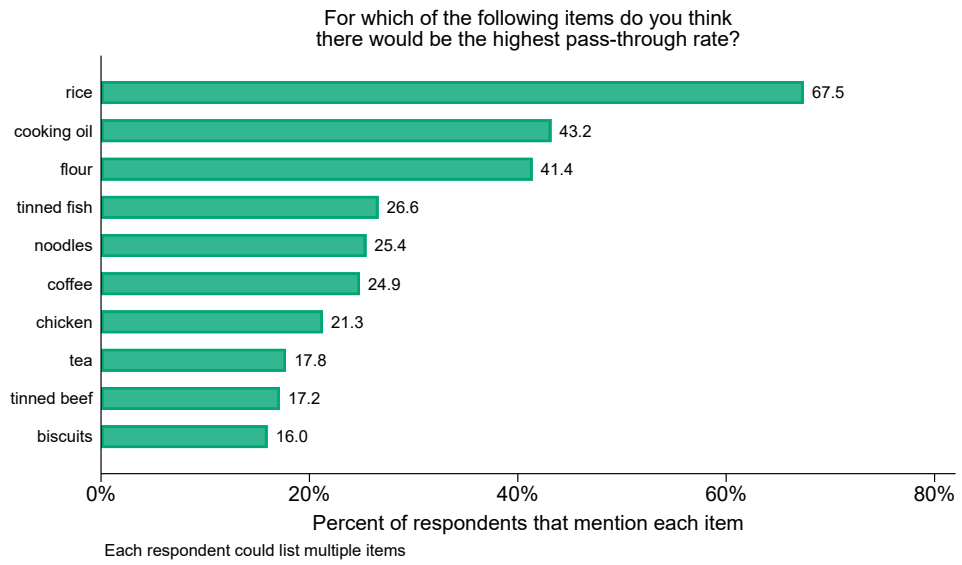


Figure A31: Experts' predictions of items with high pass-through

Note: This figure shows experts' predictions of items with high pass-through.

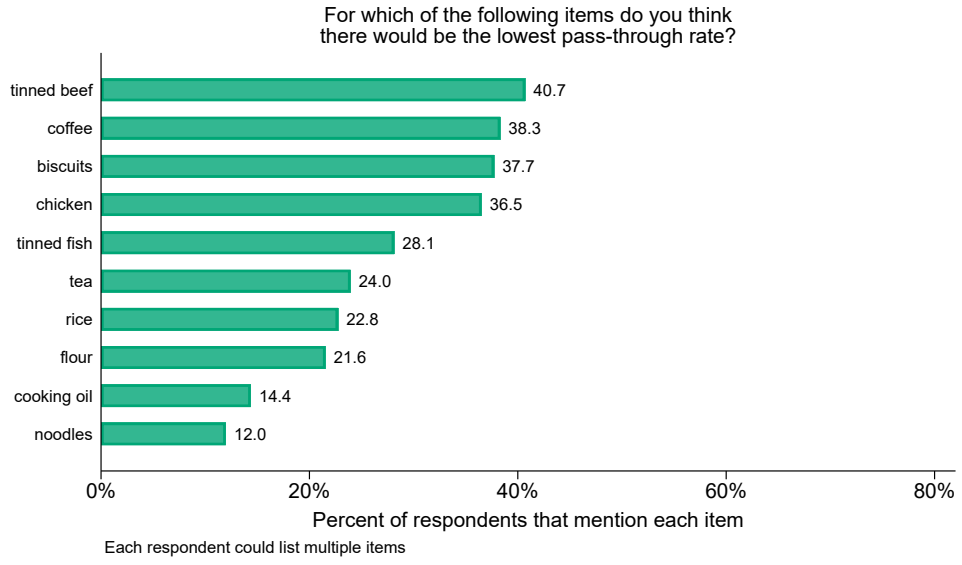


Figure A32: Experts' predictions of items with low pass-through

Note: This figure shows experts' predictions of items with low pass-through.

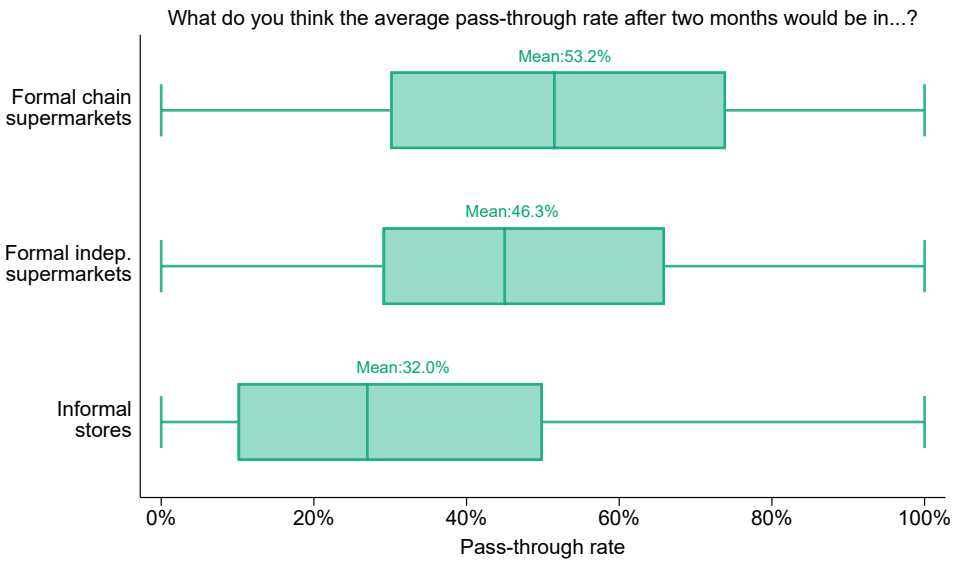


Figure A33: Experts' predictions of pass-through by store type

Note: This figure shows experts' predictions of pass-through by store type.

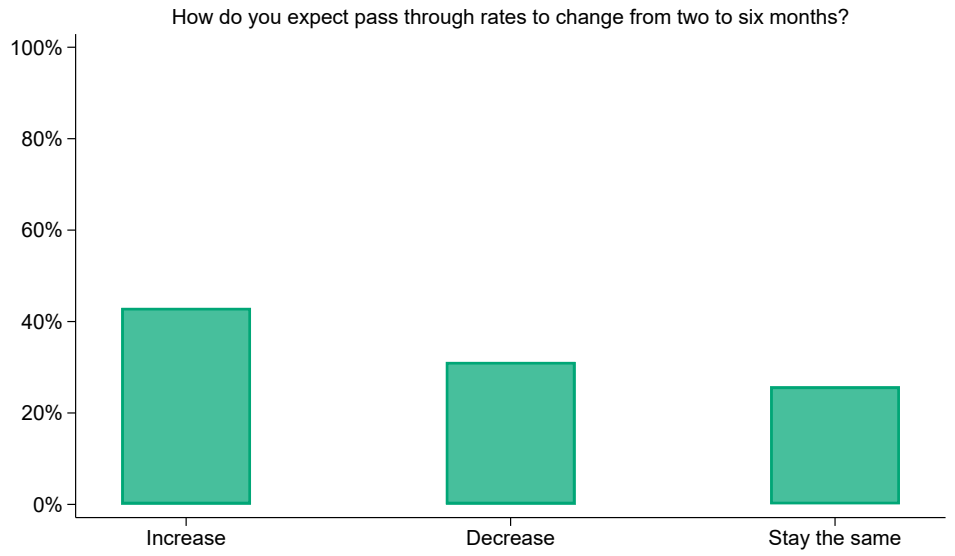


Figure A34: Experts' predictions of changes in pass-through over time

Note: This figure shows experts' predictions of changes in pass-through over time.

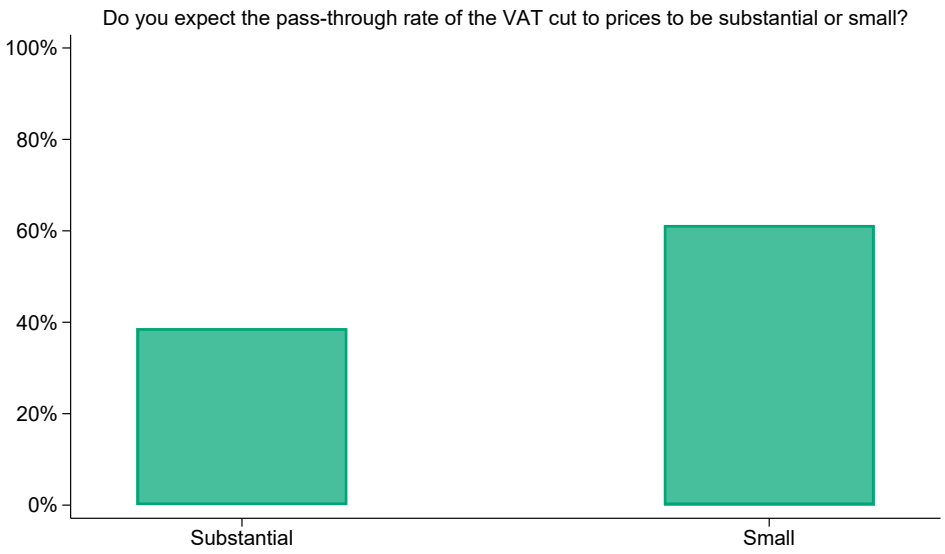


Figure A35: Experts' predictions of size of pass-through

Note: This figure shows experts' predictions of size of pass-through.

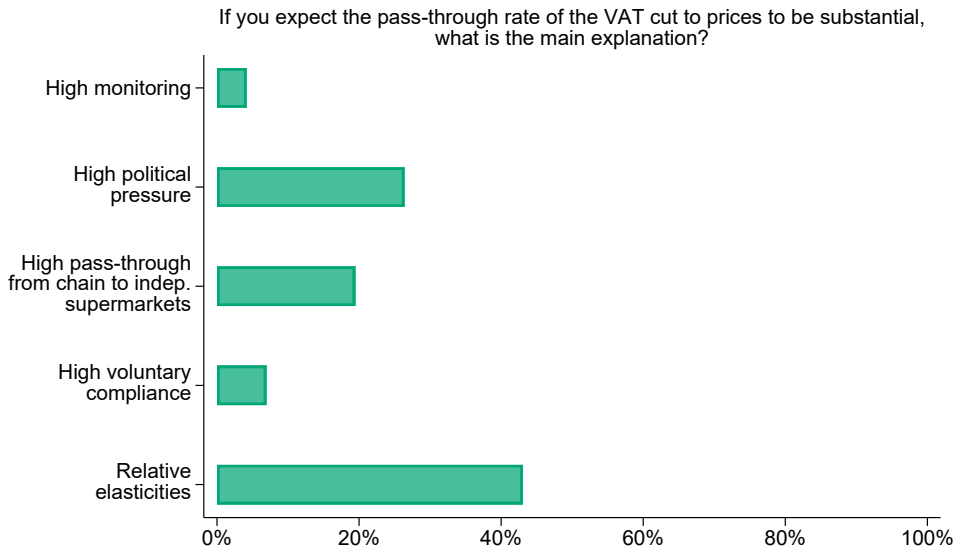


Figure A36: Experts' reasons for substantial pass-through

Note: This figure shows experts' reasons for substantial pass-through.

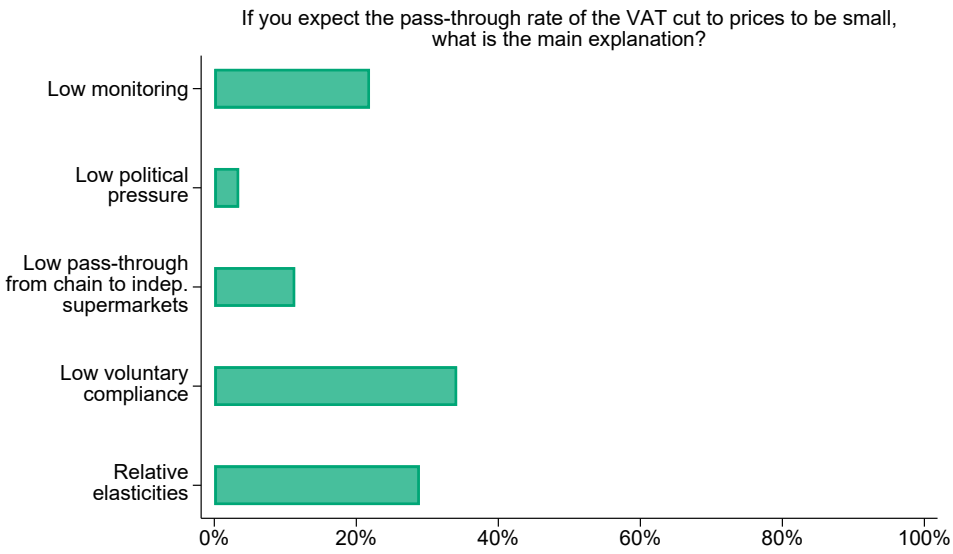


Figure A37: Experts' reasons for small pass-through

Note: This figure shows experts' reasons for small pass-through.

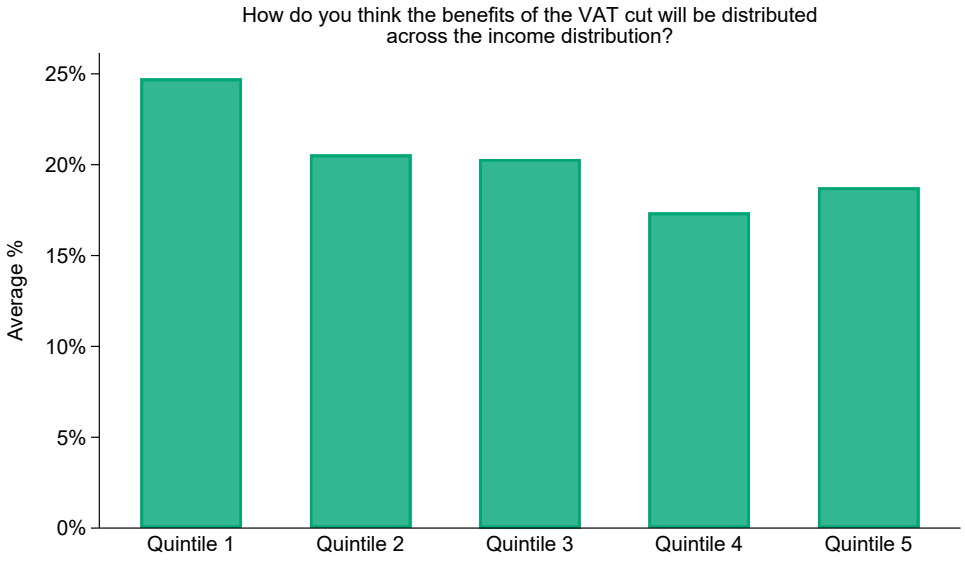


Figure A38: Experts' predictions of incidence of reform by quintile

Note: This figure shows experts' predictions of incidence of reform by quintile.

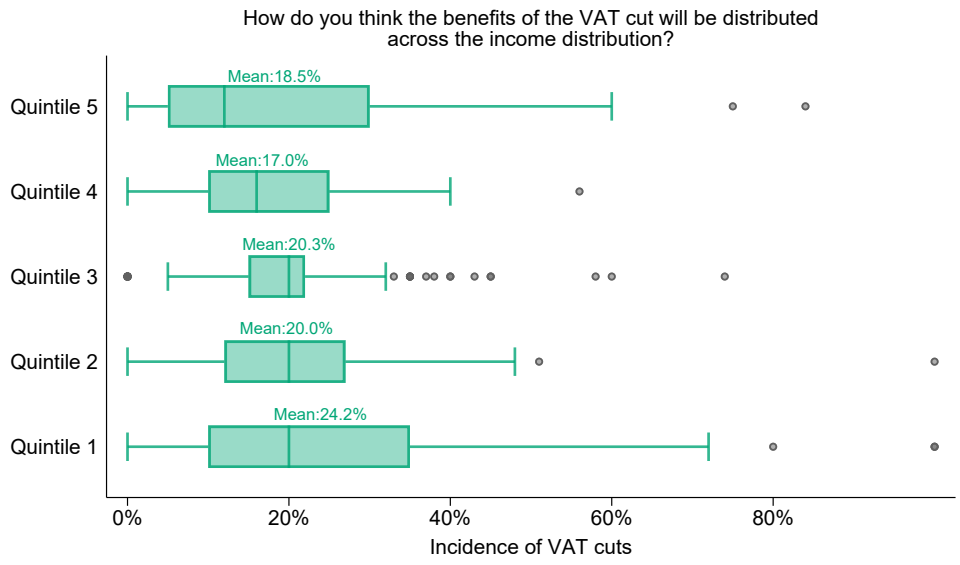


Figure A39: Experts' predictions of incidence of reform by quintile (boxplot)

Note: This figure shows experts' predictions of incidence of reform by quintile (boxplot).

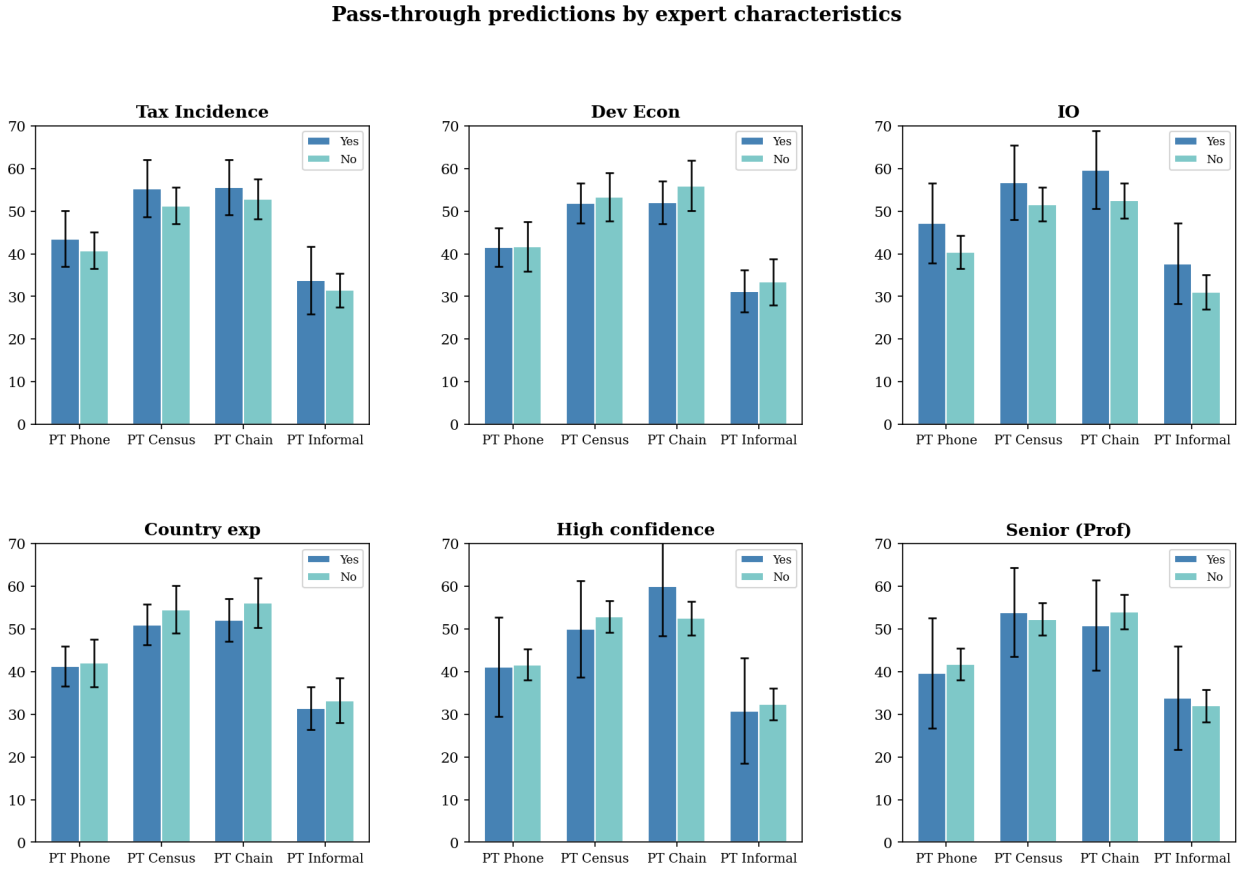


Figure A40: Heterogeneity in experts' predictions of pass-through

Note: This figure shows heterogeneity in experts' pass-through predictions.

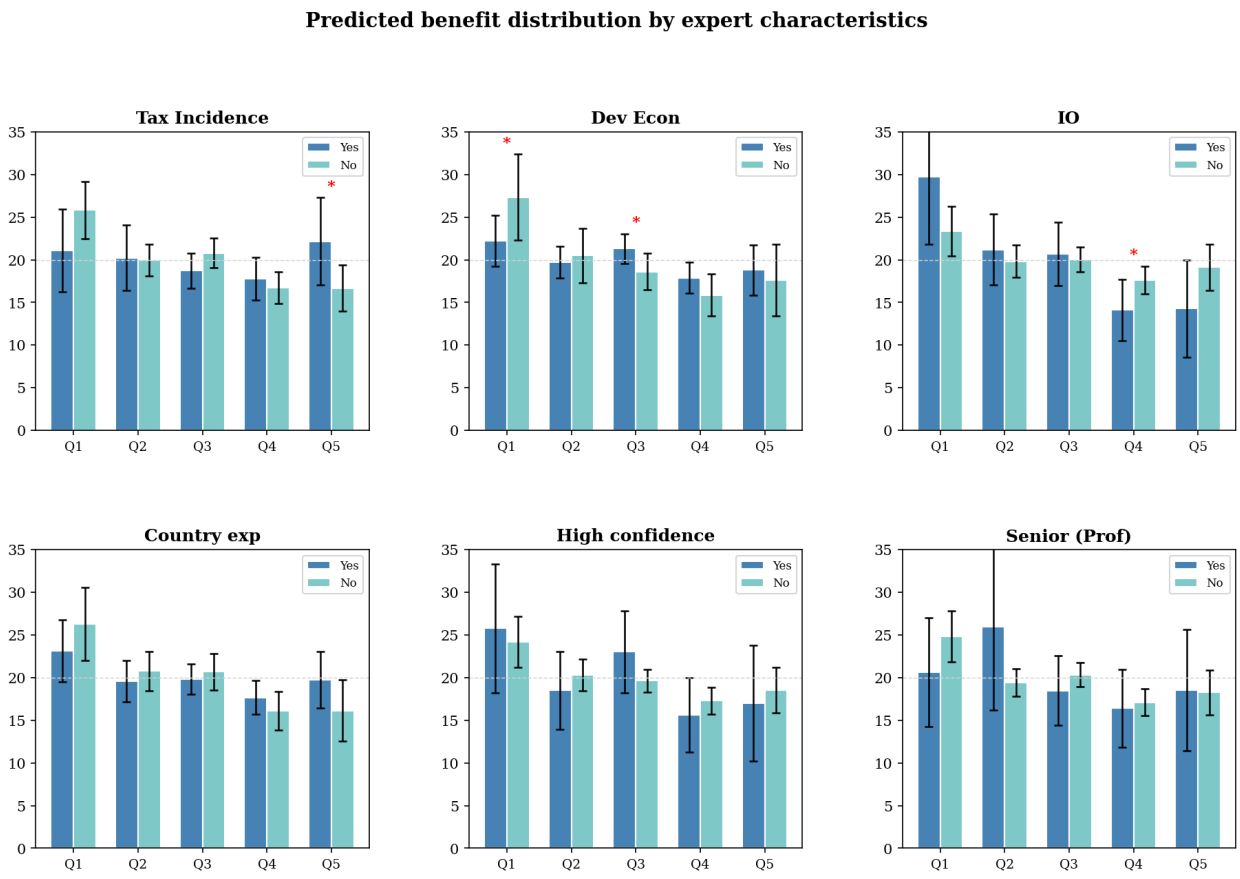


Figure A41: Heterogeneity in experts' predictions of incidence

Note: This figure shows heterogeneity in experts' predictions of incidence.

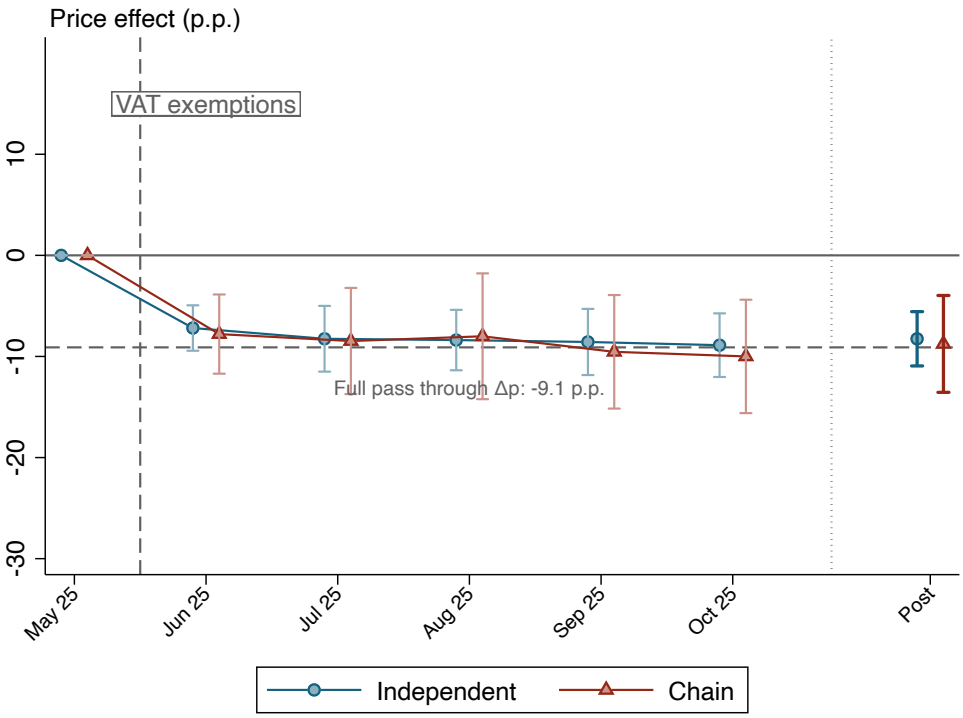


Figure A42: Differences-in-Difference results by chain vs independent stores

Note: This figure presents event study estimates including the average of post-reform event study coefficients (reference = May 2025), by chain vs independent stores (balanced panel).

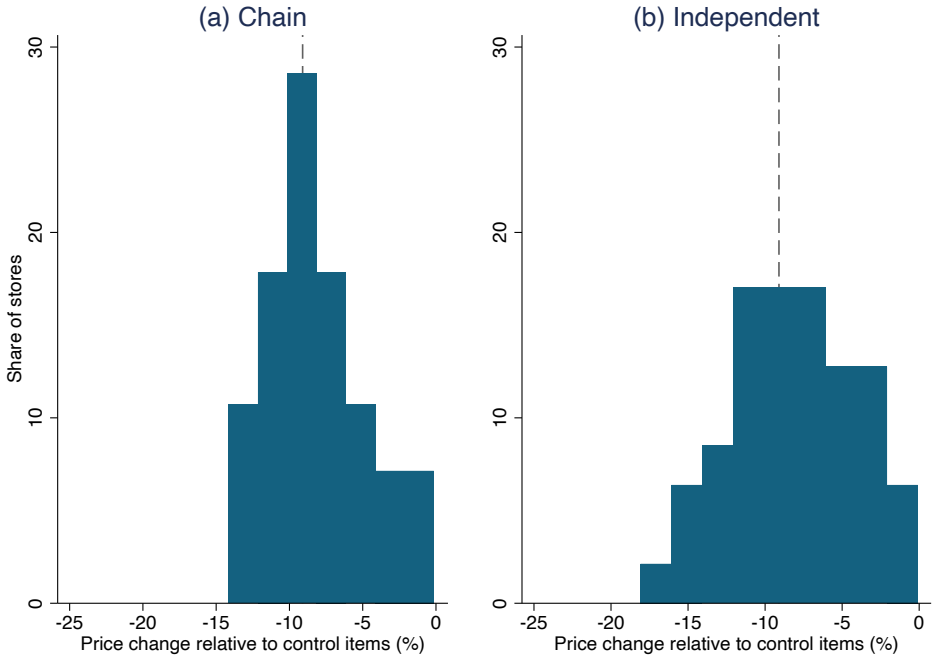


Figure A43: Heterogeneity of pass-through based on chain vs independent stores

Note: This figure shows how the pass-through rate varies by chain vs independent stores, conducting the analysis outlined in Equation 1 using the supermarket census data.

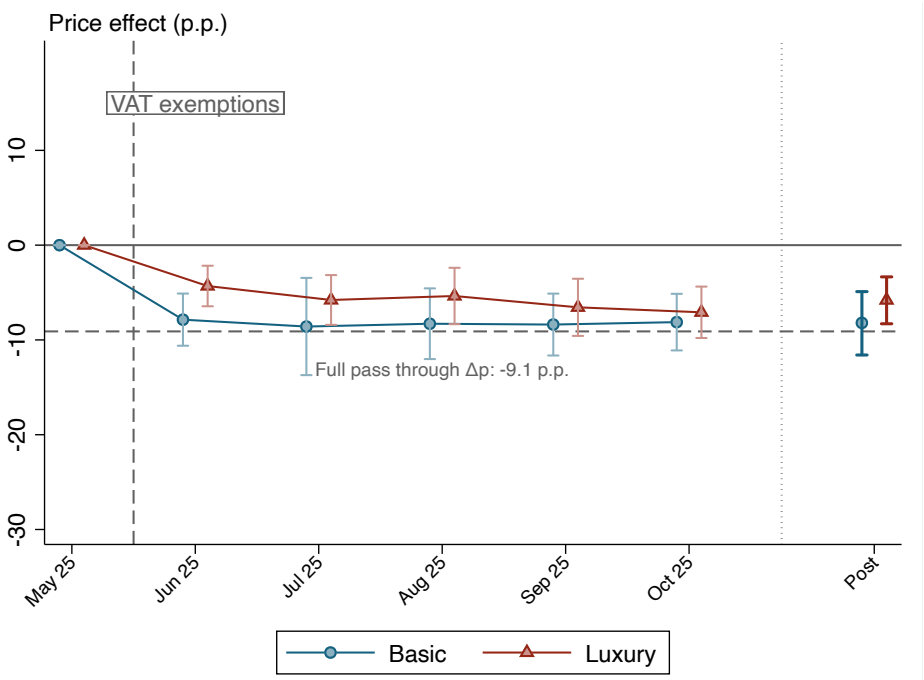


Figure A44: Differences-in-Difference results by product type

Note: This figure presents event study estimates including the average of post-reform event study coefficients (reference = May 2025), by basic vs luxury products (balanced panel).