# Informality, Incidence and Pass-through of VAT Exemptions*

Christopher Hoy[abcde], Matias Strehl-Pessina[f], and Ruggero Doino[b]

February 5, 2026

**Abstract**

We study the pass-through and distributional incidence of Value Added Tax (VAT) exemptions on food in a lower-income setting with very high informality. Exploiting the unanticipated removal of VAT on selected food items, we combine detailed administrative data, a monthly census of supermarket prices, web-scraped online prices, and a nationally representative monthly phone survey panel. Using a difference-in-differences design, we estimate pass-through by comparing price changes for exempt and non-exempt items, and we measure incidence using household-level data on prices, quantities, and place of purchase. We find near-complete pass-through in formal supermarkets in central urban areas, but limited price reductions elsewhere in the country. Spatial heterogeneity in pass-through is strongly associated with local retail competition. In terms of incidence, VAT exemptions are highly regressive: for every dollar of foregone revenue, only five cents accrue to the poorest quintile. This is because poorer households are less likely to purchase from formal stores in urban areas, rely more on subsistence farming, and consume fewer food items overall. We compare these outcomes to predictions from 237 economists and show that experts systematically misjudge pass-through and substantially overestimate the benefits for poorer households. Taken together, our findings highlight how informality, competition, and demand elasticity shape the pass-through and incidence of food tax exemptions, raising serious concerns about their effectiveness as a poverty alleviation tool.

**JEL Classification:** H20, H22, H23

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

*We are grateful for funding from the World Bank Global Tax Program and comments from seminar participants at the World Bank, Australian National University, University of Papua New Guinea, and the Australian Department of Foreign Affairs and Trade. We are incredibly thankful to William Seitz. Barry Lei, Jennifer Balen, Cathy Philip, Boniface Aipi, Ishmel Libitino, Brent Jamma, Justin Hallett, Percy Tauni, Vaashal Mudaliar, and Lachlan Bruce for their support in gathering the data used in this study.
[a] University of Melbourne, [b] World Bank, [c] Institute for Fiscal Studies, [d] Australian National University, [e] Corresponding author (choy@worldbank.org), [f] UC Santa Barbara

# 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 (World Bank, 2022). This is particularly relevant for poorer households, who rely disproportionately on informal food consumption[3] and have less access to competitive retail markets. Under certain assumptions, it is plausible that consumption tax exemptions may even be quite regressive in these settings (Bachas et al., 2024). In practice, 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 setting with very high levels of informality. In 2025, the government of Papua New Guinea (PNG) introduced VAT exemptions for 10 basic food items, providing retailers with only two weeks notice before the change came into effect. This reform removed the 10 percent VAT rate, which had been in place for all food items, for a period of 19 months, at a cost of

[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 is particularly 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, including for the poorest quintile, than government transfers, such as social protection and subsidies, combined.

[3] Due to a greater reliance on subsistence farming and a higher share of purchases from informal stores.

around USD150 million.[4] The setting in PNG mirrors that of many lower-income countries, as there 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 limited impact elsewhere in the country, 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 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 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

[4]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.

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. 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 near-complete pass-through of VAT exemptions in central urban areas would appear to be driven by price competition between stores. 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 two main supermarket chains that offer online shopping did not lower their online prices following the reform, but only lowered their 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. 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 can 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 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 several strands of the existing literature. 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 in 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 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.[5] 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

[5]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. 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 findings from the main data sources and some additional analysis. 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 low— and lower-middle—income countries, there is one major economic urban center (World Bank, 2026), and this is where most VAT is collected (Hoy et al., 2024). Outside of this city, 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.

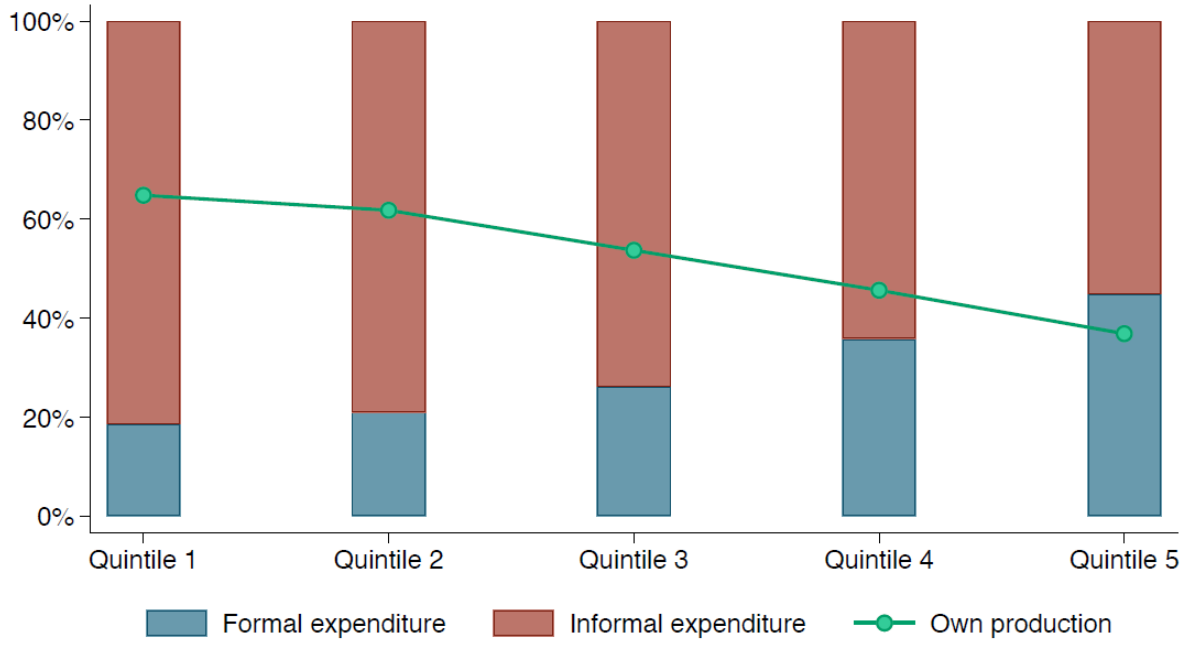



Figure 1: Type of consumption and expenditure by quintile

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

The patterns of food consumption in PNG reflect its level of development and heavy reliance 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 poorest two 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 that food consumption volume increases further up the income distribution, and this holds for each food item (i.e., we do not detect evidence of inferior goods). Even cooking oil consumption is skewed towards the richer quintiles, albeit less so than for other goods (see Figure A1 to Figure A6 in the Appendix for further details about consumption patterns observed in our phone survey). Figure 1 shows that around two-thirds of consumption comes from households' own production (i.e., subsistence farming) for the poorest quintile of households, and this falls to around one-third for the richest quintile. Conditional on purchasing food, less than 20 percent of purchases are made at formal stores among the poorest quintile, compared to over 40 percent among the richest quintile.

In general, consumption patterns in PNG suggest that policies such as VAT exemptions, even on basic food items, may 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 than higher-income households.

## 2.2 Details about VAT exemption reform

For the first time in its history, the PNG government introduced VAT exemptions in 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 A7 in Appendix for official notice from the PNG Government). The expected annual cost to the government is nearly USD100 million in foregone revenue, and at the time of writing, the exemptions were scheduled to remain in place for 19 months. 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.

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 superficial. The PNG government first publicly stated in December 2024 the possibility of removing VAT from some basic items in mid-2025, but the details were limited, and its credibility was unclear. Then, in mid-May 2025, policymakers announced that effective June 1, 2025 (i.e., two weeks 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 means 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.

# 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.

### 3.1.1 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 2 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.

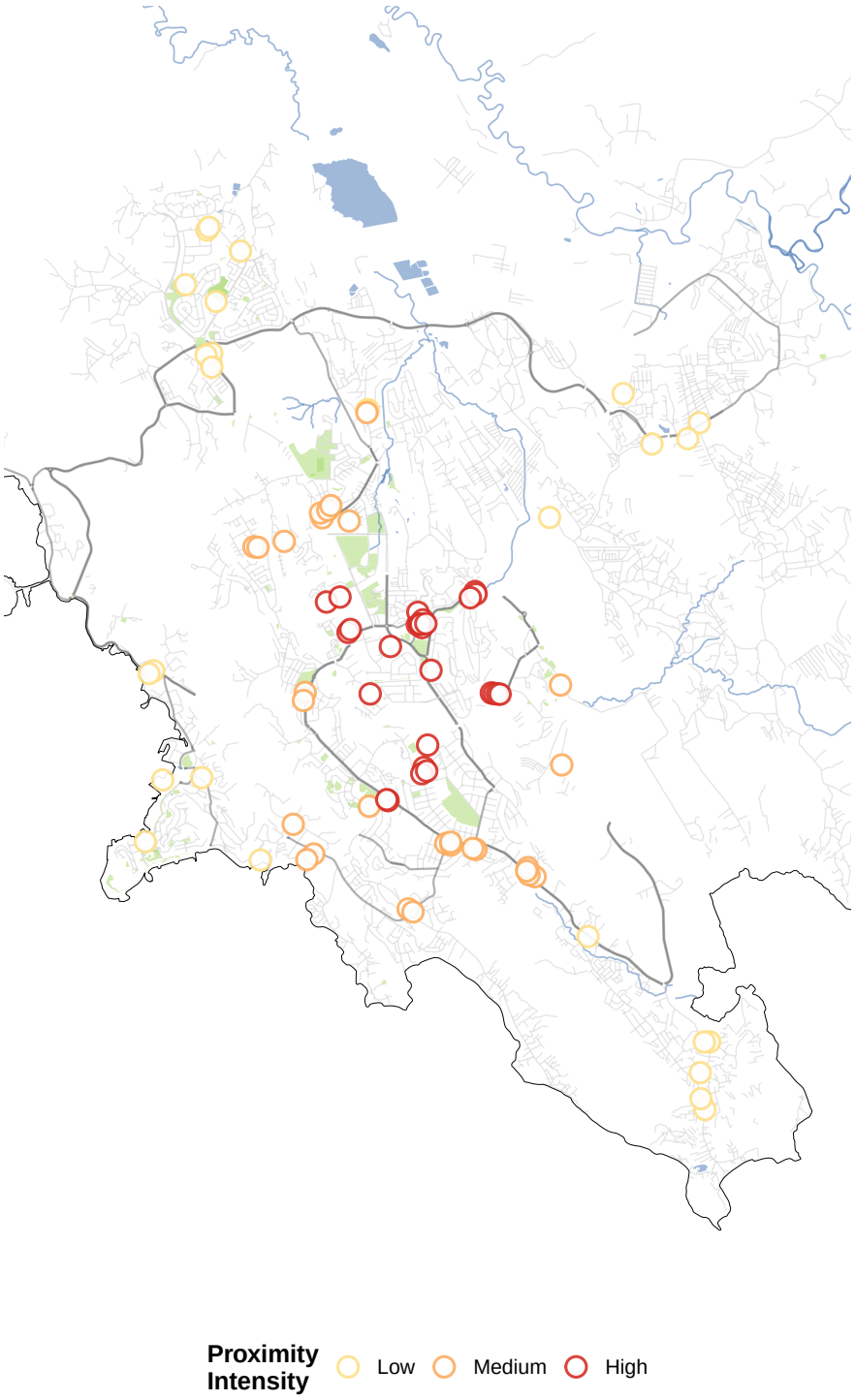



Figure 2: Map of Port Moresby with supermarket locations

Note: This figure shows the location and relative proximity of the 83 stores included in the supermarket census.

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 the next subsection 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 (National No1 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 recording prices accurately.

**Detailed administrative data**

We draw on two separate administrative datasets that monitor supermarket prices in Port Moresby: one collected by the consumer price index team at the PNG National Statistics Office (NSO) and the other by the research team at the Central Bank of PNG (BPNG). Both datasets contain extensive price data on 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 datasets 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.

**Data collected from scraping supermarket websites**

We assemble a weekly panel from 12 May to 4 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). 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 the volume of online purchases is much lower than in-store, and that the two supermarket chains that offer online shopping effectively operate as a duopoly. A third chain, which had offered online shopping during the COVID-19 pandemic, left the online market within a couple of years.

### 3.1.2 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 from the start of 2024 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 and funding from the Australian Government.

The first phase of the phone survey was conducted in a repeat cross-sectional manner 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 3). In the Appendix, we provide more details about the representativeness of the sample of respondents (see Table A1). 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.[6] 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),

[6]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.

which allows us to distinguish between formal supermarkets and informal "stores"—typically called "canteens" or "tuckerboxes" in PNG.

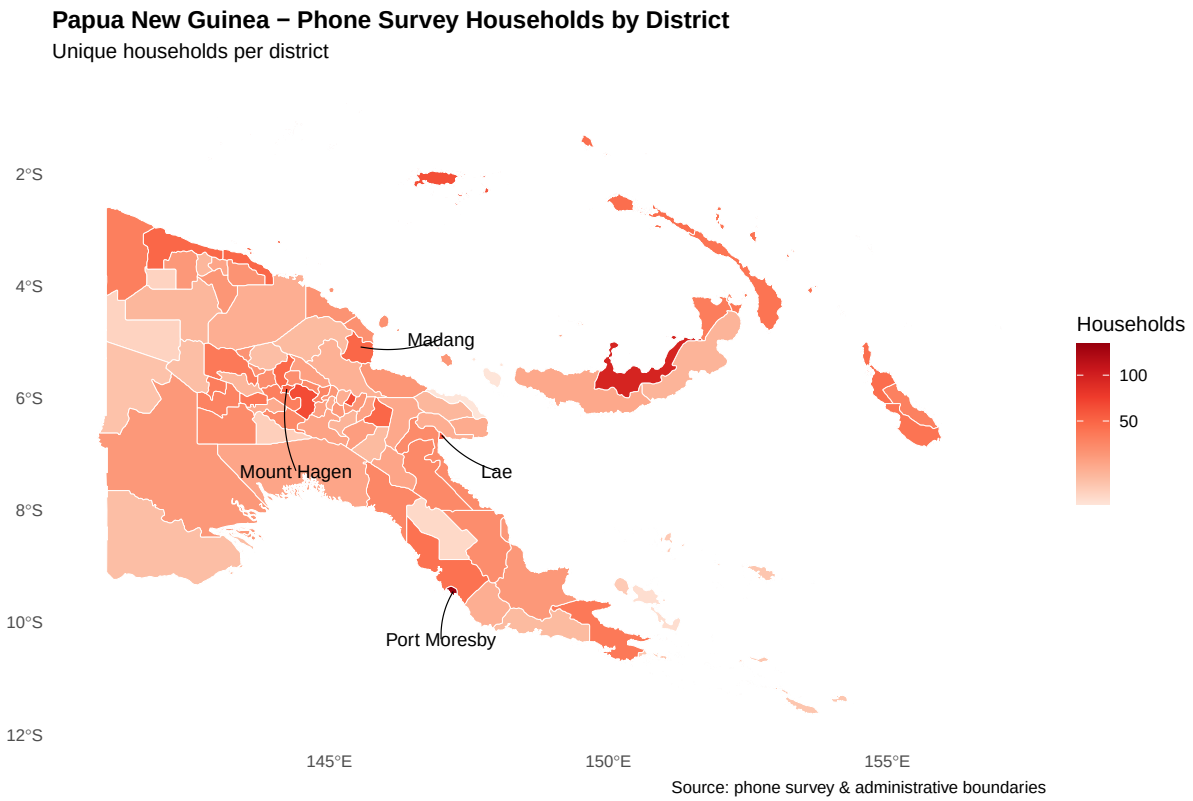



Figure 3: Map of Papua New Guinea with respondents' locations

Note: This figure shows the number of households in the phone survey dataset by district.

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 90 percent of respondents stated that they were not very familiar with the VAT exemption reform. 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.

### 3.1.3 Summary of data sources

Table 1 compares the data sources we draw on for this study, including their coverage and main limitations. The monthly supermarket census provides price data for 20 items from the universe of supermarkets in Port Moresby; however, as the timing of the reform was unanticipated, there are limited pre-trends. In contrast, the administrative data covers prices for many more items and for a longer period (two years), but only from a subset of supermarkets. The scraping of websites provides price information for hundreds of products in the weeks leading up to and following the reform; however, this only covers the two large supermarket chains that offer online shopping. Finally, the phone survey captures price data from a nationally representative sample of households and covers both formal and informal stores; however, the data is self-reported. 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.

| **Data Source** | **Coverage** | **Store type** | **Limitations** |
|---|---|---|---|
| Supermarket census | Port Moresby | Formal | Limited pre-trends |
| Administrative data | Port Moresby | Formal | Subset of locations |
| Scraping of websites | Port Moresby | Formal (Chain) | Only largest chains |
| Phone survey panel | Nationwide | Informal + Formal | Self-reported |

Table 1: Summary of data sources

Note: This table provides a summary of the data sources used in this study.

## 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 is similar to that of other studies, 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 dataset. 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.[7] 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 comparison groups to eight each.[8] 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

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

[8]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.

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:

$$Y_{it} = \alpha_i + \gamma_t + \sum_{t \neq May2025}^{2025} \beta_t D_{it} + \epsilon_{it} \tag{1}$$

where $Y_{it}$ denotes the tax-inclusive price of a given good $i$ at time $t$. $Y_{it}$ is normalized to 1 for each item $i$ in May 2025. The indicator $D_{it}$ equals one if item $i$ is treated in month $t$ and zero otherwise, and $\epsilon_{it}$ is the error term. Standard errors are clustered at the item level. The coefficients of interest $\beta_t$'s capture the dynamic treatment effects, i.e., the average price difference between treated and control items in each month $t$, relative to the baseline month (May 2025). In addition, we include store fixed effects when using the supermarket census, store and item fixed effects when using the website scraping data, and item fixed effects when using the administrative data and the phone survey data.

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 two weeks' 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 collection 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.

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 for non-exempt items remain stable around the reform date, and our results are robust to restricting the control group to close substitutes and to alternative product groupings. In fact, each of our four datasets uses different items for the comparison group, and we find very similar results. The fact that around 90 percent of respondents to the phone survey were not very familiar with the reform six months after its implementation would also suggest that most consumers were not changing their purchases as a result of the reform.

## 3.3 Expert prediction survey

We conducted an expert prediction survey to complement the main analysis and 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, 59 percent had detailed subject matter, and 62 percent had very relevant country experience. Further details about the experts are in the Appendix (see Table A2).

# 4 Results

## 4.1 Main Results about Pass-through of VAT exemptions

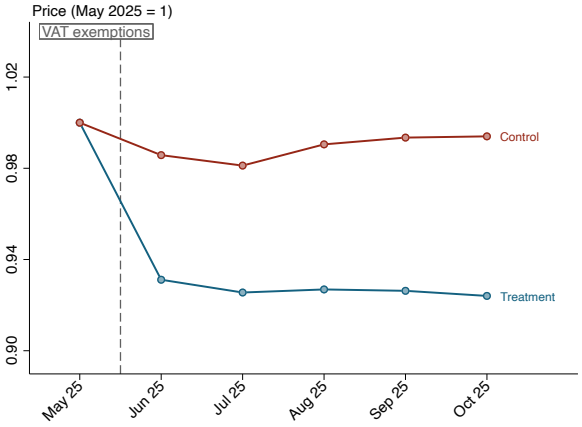
### 4.1.1 Pass-through to prices in Port Moresby

As mentioned in Section 2, the majority of formal supermarkets—and thus the bulk of VAT revenue—are located in the country's main economic center, Port Moresby, for which we have several data sources for our empirical analysis. Across all three data sources, we find near-complete pass-through of the VAT exemption to prices in formal supermarkets in Port Moresby. Figure 4 shows, for each data source, the raw price trends for VAT-exempt food items ("treatment") and the comparison group ("control"), normalized to 1 in May 2025, along with the difference-in-differences estimates based on Equation 1.

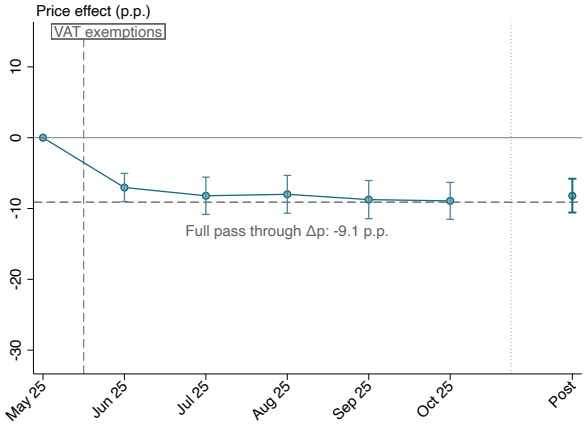
The first row of Figure 4 presents results from the supermarket census data. Panel (a) shows a clear decline in treatment-group prices of about 7% immediately following the reform, which persists for five months, while prices in the control group change negligibly. Panel (b) reports the corresponding difference-in-differences estimates, comparing price changes in the treatment and control groups, and confirms almost complete pass-through immediately after the reform and full pass-through within four months. As discussed in Section 3.1, this dataset covers the universe of supermarkets in Port Moresby and, consequently, the majority of purchases of food items from formal stores that became VAT-exempt in PNG. An important limitation is that this dataset only includes prices from the month prior to the VAT reform, which prevents us from assessing pre-trends with this data alone. To address this, we also analyze additional data sources that tracked prices for these same food items in supermarkets in Port Moresby in the year and a half leading up to the reform.

Supermarket census data

(a) Raw trends

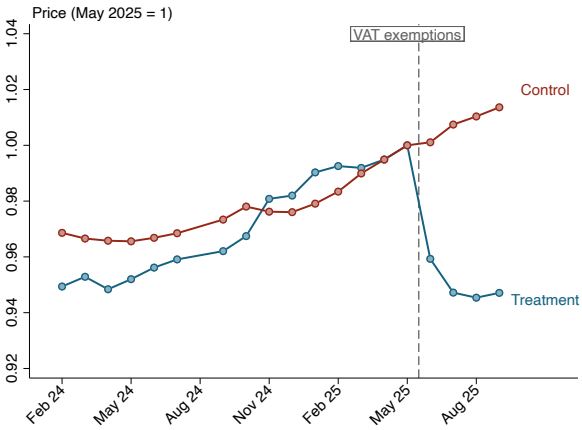



(b) Differences-in-Differences results

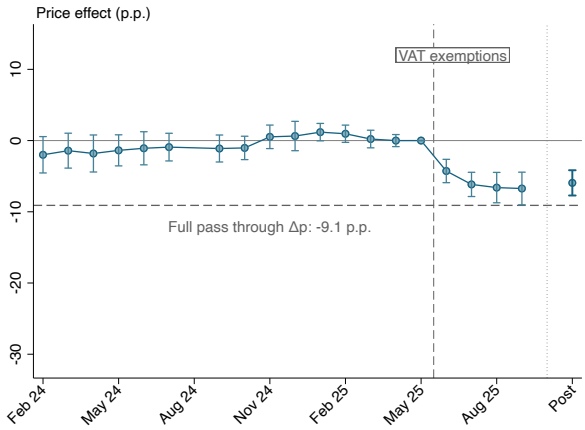



Central Bank administrative data

(c) Raw trends

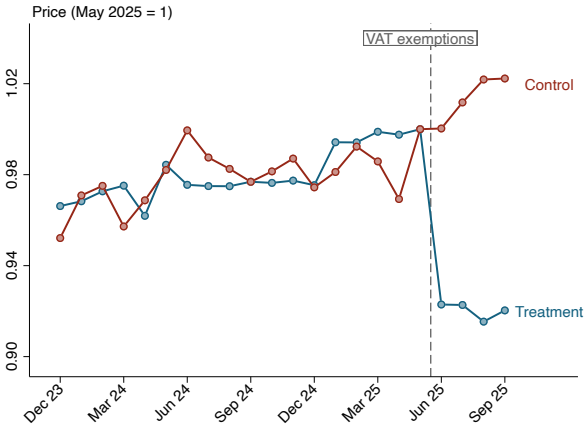



(d) Differences-in-Differences results




NSO administrative data

(e) Raw trends




(f) Differences-in-Differences results

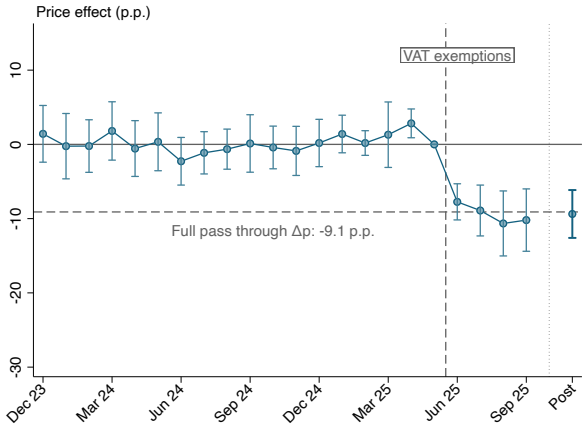





Figure 4: Pass through of VAT exemptions to prices in Port Moresby by data source

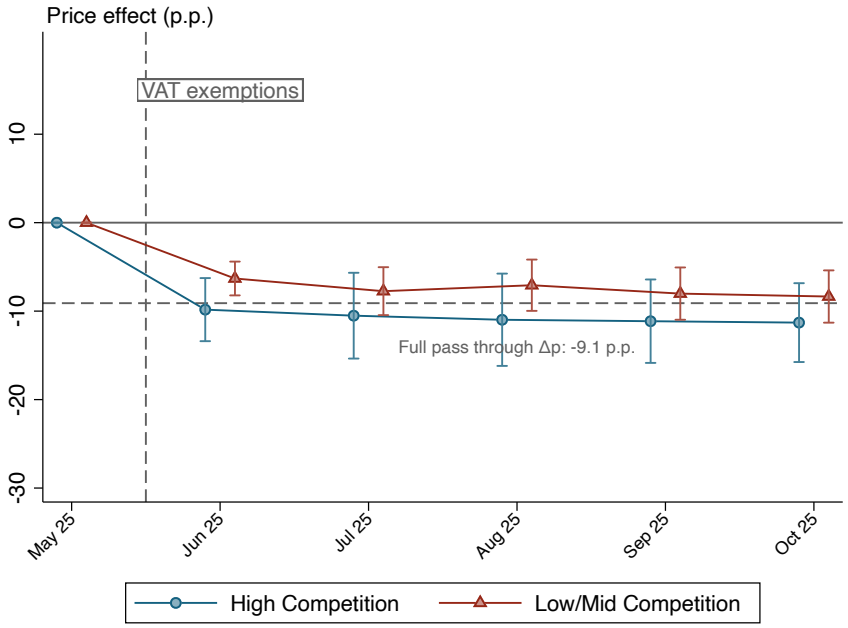
Note: This figure shows the raw trends and difference-in-differences results by data source.

In the second row of Figure 4, panels (c) and (d) report the analogous analysis but using administrative data from BPNG and show a very similar pattern. This dataset includes 17 months of pre-reform price data for both 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: the pre-trends estimates in panel (d) are close to zero and statistically insignificant. Finally, in the third row of the figure, panels (e) and (f) present the same analysis using NSO administrative data and yield an almost identical result. This is not surprising, given that in the absence of shocks, food prices tend to steadily rise over time.

Taken together, Figure 4 indicates near-complete pass-through of the VAT exemption to prices 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.

The overall pattern of near-complete pass-through in Port Moresby masks important heterogeneity across stores by local competitive conditions: pass-through is substantially higher in supermarkets located in central Port Moresby, where competition is more intense. Figure 5 presents difference-in-differences estimates from the supermarket census, disaggregated by stores' proximity to competitors, along with the distribution of store-level pass-through rates. 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 A8 and Figure A9 in Appendix).

(a) Difference-in-Difference results




(b) Distribution of pass-through rates

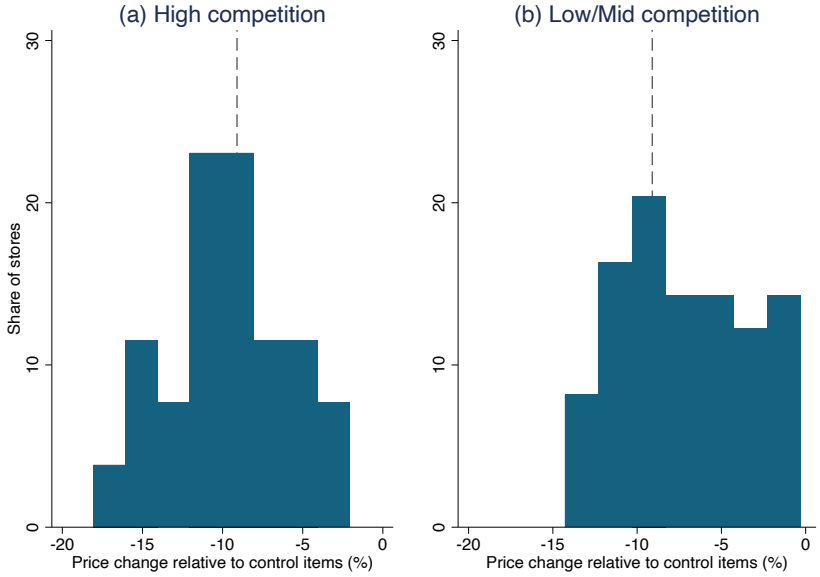



Figure 5: Heterogeneity of pass-through based on level of competition

Note: This figure shows how the pass-through rate varies by the level of competition stores face, conducting the analysis outlined in Equation 1 using the supermarket census data.

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 high-competition areas exhibits pass-through rates above 30 percent. In the following section, we show that these differences are not driven by whether stores are independent or part of a chain. The patterns hold even within chains: supermarkets in the same chain display higher pass-through in high-competition areas (see Figure A10 in Appendix).

### 4.1.2 Pass-through to prices nationwide

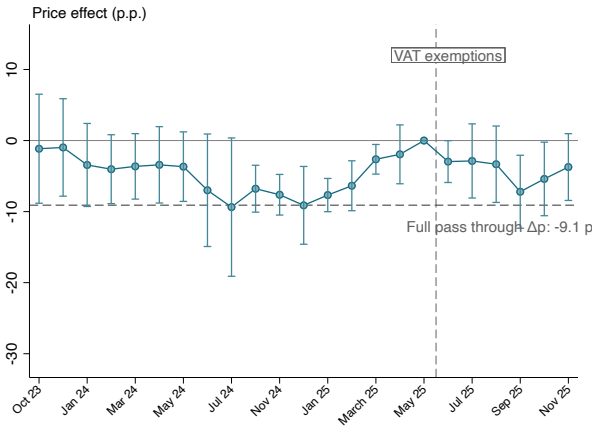
We now turn to the nationwide pass-through of the VAT reform, drawing on the phone survey data. While these estimates are noisier than those from the other datasets, they indicate that pass-through of the VAT exemptions to prices across PNG was substantially more limited than in Port Moresby. Figure 6 reports the difference-in-differences estimates, including results disaggregated by store formality and by rural versus urban location.[9]

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-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

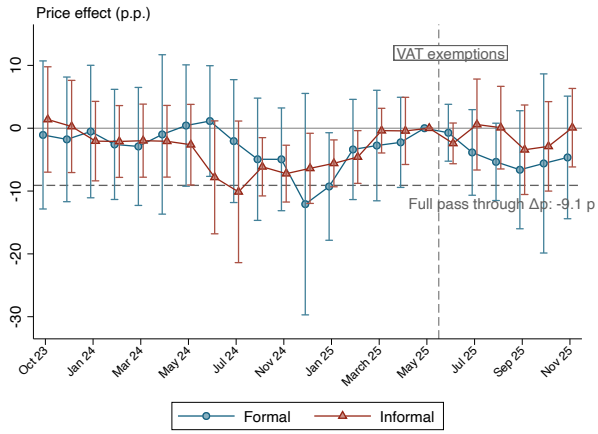
[9]In the Appendix, we show the raw trends in prices for the treatment and control groups in the phone survey data since the end of 2023 (see Figure A11 and Figure A12). There is considerable variation, which is partly to be expected given the self-reported nature of the data. We conduct a series of analyses to assess the robustness of the pre-trends and conclude that the data still exhibit meaningful variation informative about the reform.

pass-through between formal and informal stores in urban areas are statistically significant when examining the average across the post-reform period (see Figure A13 to Figure A20 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.

(a) Pass-through rate nationwide

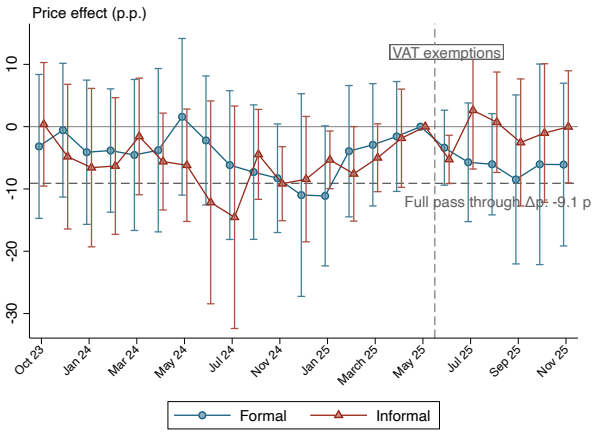



(b) Pass-through rate by store formality




Pass-through rate by store formality and area

(c) Urban areas




(d) Rural areas

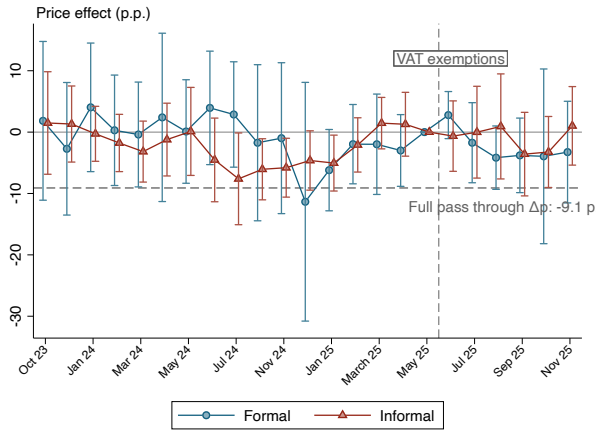



Figure 6: Pass-through nationwide based on the phone survey data

Note: This figure shows how the pass-through rate varies by store formality and location, conducting the analysis outlined in Equation (1) using the phone survey data.

## 4.2 Main Results about the Incidence of the Reform

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.

Figure 7 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.

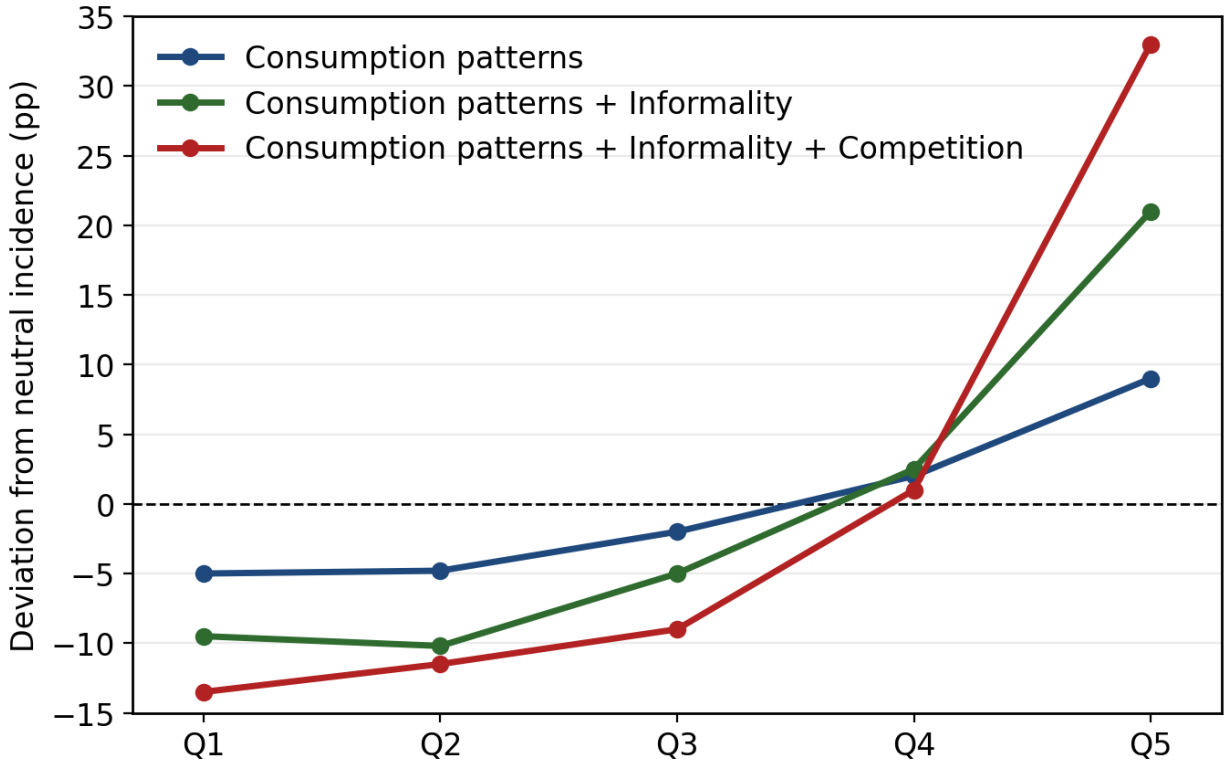



Figure 7: Incidence of VAT exemptions due to consumption and pass-through

Note: This figure shows the incidence of VAT exemptions due to consumption patterns and the additional regressivity generated from differential pass-through

## 4.3 Comparison of Main Results with Expert Predictions

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 Figure A21 to Figure A31 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.

We aggregated the expert predictions of pass-through and incidence and directly compared this with what we actually observed in the data. Figure 8 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 shops, and the remainder to be split relatively evenly across quintiles. This contrasts starkly with the actual results presented in 8 (blue bars). 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.

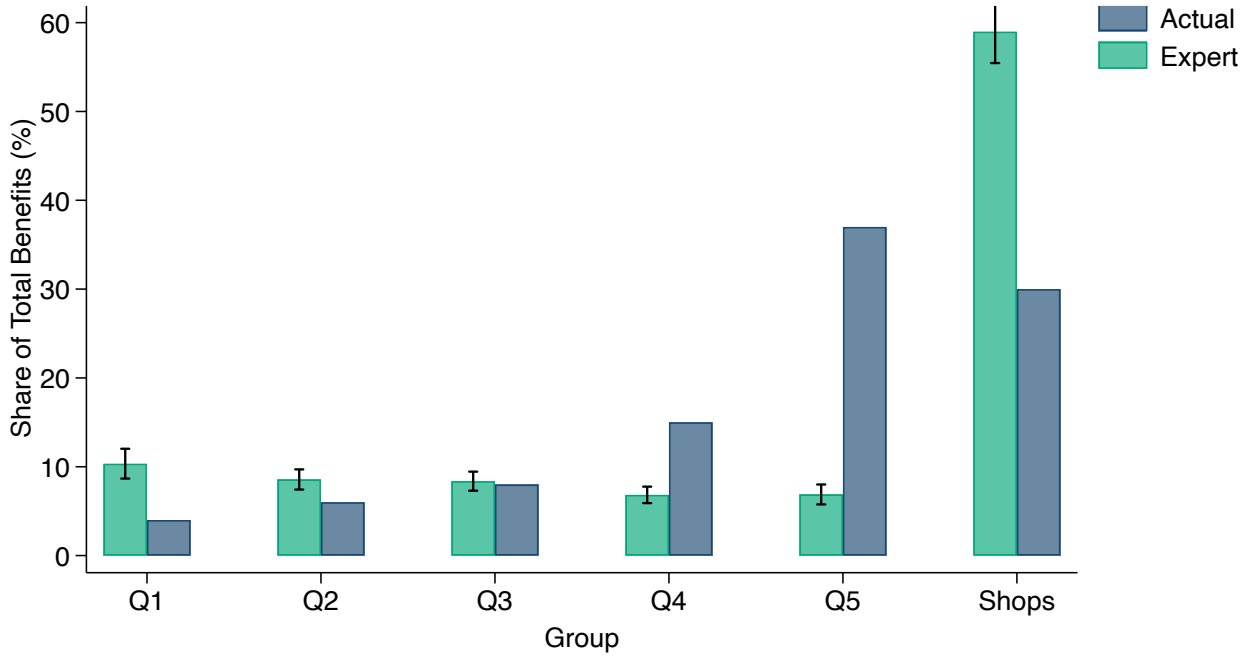



Figure 8: Actual incidence vs. expert predictions of revenue lost across quintiles and stores

Note: This figure shows expert predictions of and the actual realized incidence of foregone revenue across income quintiles and store owners based on the results from the phone survey using the combination of consumption patterns and realized pass-through.

## 4.4 Additional analysis

### 4.4.1 Scraping of supermarket websites

Scraping of supermarket websites in the lead-up to and for 10 weeks following the VAT exemption reform showed that there was no meaningful pass-through to prices for online shopping. In the Appendix, we present the results of the difference-in-differences analysis using the online supermarket data, which was collected weekly in the lead-up to and following the reform (see Figure A32). We show that there is effectively zero pass-through to prices from the VAT exemptions reform. In addition, we demonstrate that the same supermarket chains lowered their in-store prices but did not do so for online shopping. This result is consistent with earlier findings supporting our interpretation that competition is the main driver of pass-through, such as the same chain having far greater pass-through to prices in stores closer to competitors.

### 4.4.2 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 A33 and Figure A34). 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.

### 4.4.3 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 A35). 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, which appears to be driven by high levels of competition. Elsewhere in the country, it appears that 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 distinction becomes quantitatively important. For example, several products made VAT-exempt in PNG would likely be inferior goods in higher-income settings, in which case the regressivity of VAT exemptions may be less extreme. 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.

# References

**Ahlfeldt, Gabriel M., Stephen J. Redding, Daniel M. Sturm, and Nikolaus Wolf**, "The Economics of Density: Evidence From the Berlin Wall," *Econometrica*, 2015, *83* (6), 2127–2189.

**Bachas, Pierre, Lucie Gadenne, and Anders Jensen**, "Informality, Consumption Taxes, and Redistribution," *The Review of Economic Studies*, 09 2023, *91* (5), 2604–2634.

**Balán, Pablo, Augustin Bergeron, Gabriel Tourek, and Jonathan L. Weigel**, "Local Elites as State Capacity: How City Chiefs Use Local Information to Increase Tax Compliance in the Democratic Republic of the Congo," *American Economic Review*, March 2022, *112* (3), 762–97.

**Beath, A., A. BenYishay, G. d'Adda, P. Grosjean, and R.A. Weber**, "Can vouchers reduce elite capture of local development projects? Experimental evidence from the Solomon Islands," *Journal of Public Economics*, 2018, *160*, 117–131.

**Benzarti, Youssef**, "Tax Incidence Anomalies," *Annual Review of Economics*, 2025, *17* (Volume 17, 2025), 615–634.

_ **and Dorian Carloni**, "Who Really Benefits from Consumption Tax Cuts? Evidence from a Large VAT Reform in France," *American Economic Journal: Economic Policy*, February 2019, *11* (1), 38–63.

_ , _ , **Jarkko Harju, and Tuomas Kosonen**, "What Goes Up May Not Come Down: Asymmetric Incidence of Value-Added Taxes," *Journal of Political Economy*, 2020, *128* (12), 4438–4474.

_ , **Santiago Garriga, and Darío Tortarolo**, "Can VAT Cuts and Anti-Profiteering Measures Dampen the Effects of Food Price Inflation?," Technical Report, National Bureau of Economic Research 2024.

**Bergeron, Augustin, Gabriel Tourek, and Jonathan L. Weigel**, "The State Capacity Ceiling on Tax Rates: Evidence From Randomized Tax Abatements in the DRC," *Econometrica*, 2024, *92* (4), 1163–1193.

**Blasco, Julien, Elvire Guillaud, and Michaël Zemmour**, "The inequality impact of consumption taxes: An international comparison," *Journal of Public Economics*, 2023, *222*, 104897.

**Brusco, Giacomo and Tejaswi Velayudhan**, "VAT incidence in real VAT systems," *Journal of Public Economics*, 2025, *249*, 105447.

**DellaVigna, Stefano and Eva Vivalt**, "Forecasting Social Science: Evidence from 100 Projects," Technical Report, National Bureau of Economic Research 2025.

**den Boogaard, Vanessa Van and Christopher Hoy**, "Fiscal Descentralization and Tax Morale: Evidence from a Fragile State," 2026. Mimeo.

**Hoy, Christopher, Luke McKenzie, and Mathias Sinning**, "Improving Tax Compliance without Increasing Revenue: Evidence from Population-Wide Randomized Controlled Trials in Papua New Guinea," *Economic Development and Cultural Change*, 2024, *72* (2), 691–723.

**Inchauste, Gabriela, Christopher Hoy, Mariano Sosa, and Daniel Valderrama**, "Governments Could Do Far More to Level the Playing Field Through Fiscal Policies," *Leveling the Playing Field*, 2024, *Washington, DC: Wolrd Bank*, 229.

**Jensen, A, A Brockmeyer, and L Gadenne**, "Taxation and development," *VoxDevLit*, 2024, *12* (1), 3.

**Minton, Robert and Casey B Mulligan**, "A Market Interpretation of Treatment Effects," Technical Report, National Bureau of Economic Research 2024.

**Pacific Data Hub**, "Data and knowledge about the Pacific region. Pacific Community," 2026. Retrieved from
https://pacificdata.org
.

**Schmidt, Emily and Shweta Yadav**, "Papua New Guinea rural household survey (2023): Synopsis of selected results. Papua New Guinea Project Note 15. Washington, DC: International Food Policy Research Institute," 2026.

**Warwick, Ross, Tom Harris, David Phillips, Maya Goldman, Jon Jellema, Gabriela Inchauste, and Karolina Goraus-Tańska**, "The redistributive power of cash transfers vs VAT exemptions: A multi-country study," *World Development*, 2022, *151*, 105742.

**Weigel, Jonathan L**, "The Participation Dividend of Taxation: How Citizens in Congo Engage More with the State When it Tries to Tax Them*," *The Quarterly Journal of Economics*, 07 2020, *135* (4), 1849–1903.

**World Bank**, "World Development Indicators," 2026. Retrieved from
https://databank.worldbank.org/source/world-development-indicators
.

# Appendix - Additional Figures and Tables

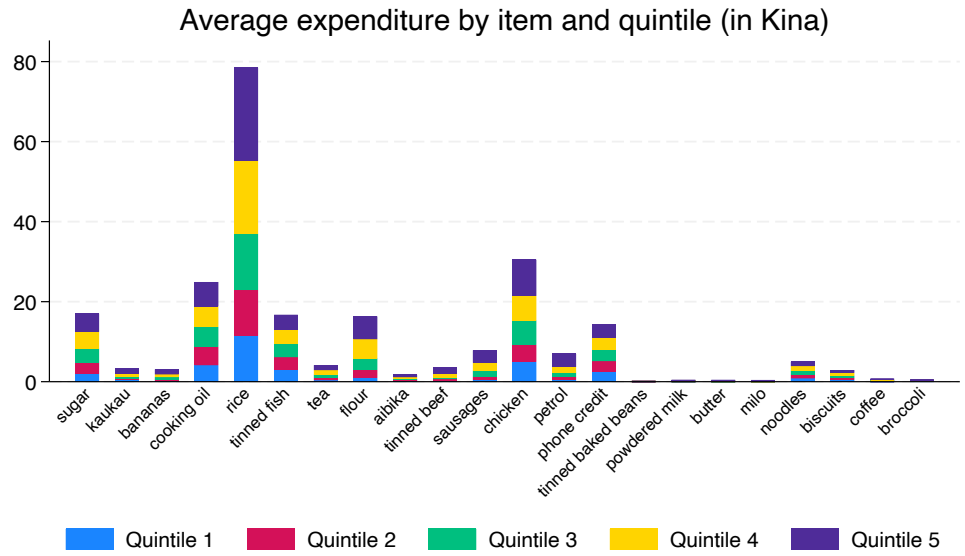



Figure A1: Average expenditure by item per quintile

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

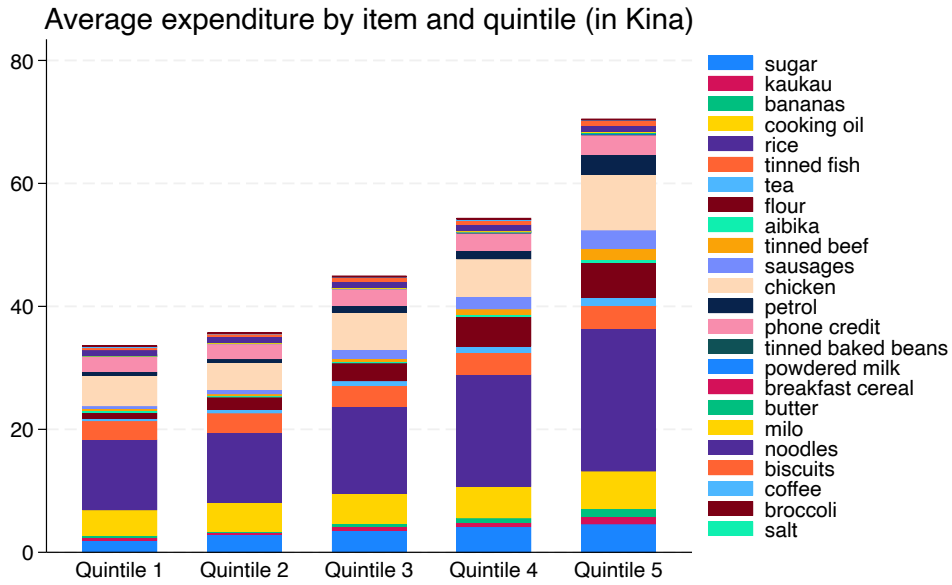



Figure A2: Average expenditure by quintile per item

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

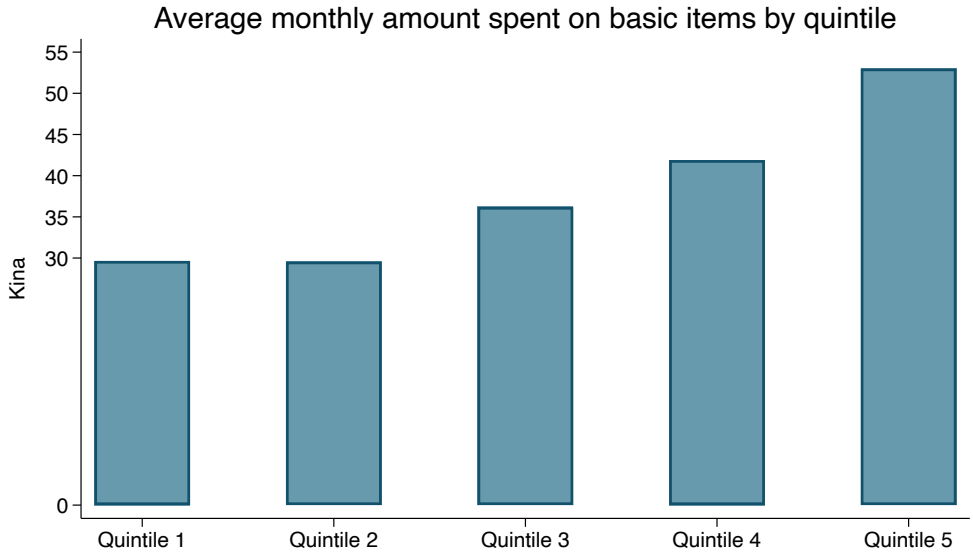



Figure A3: Average expenditure by quintile on basic items

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

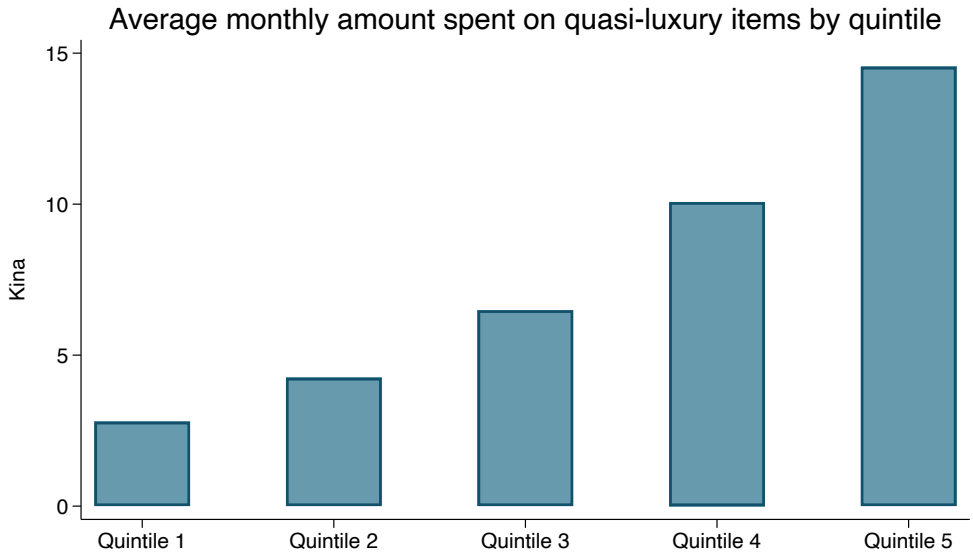



Figure A4: Average expenditure by quintile on quasi-luxury items

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

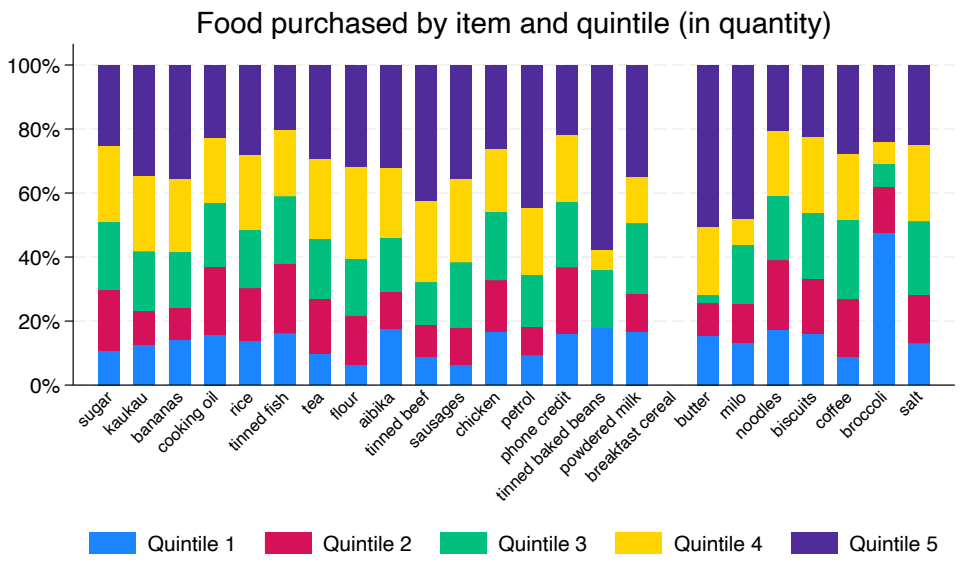



Figure A5: Quantity purchased by item per quintile

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

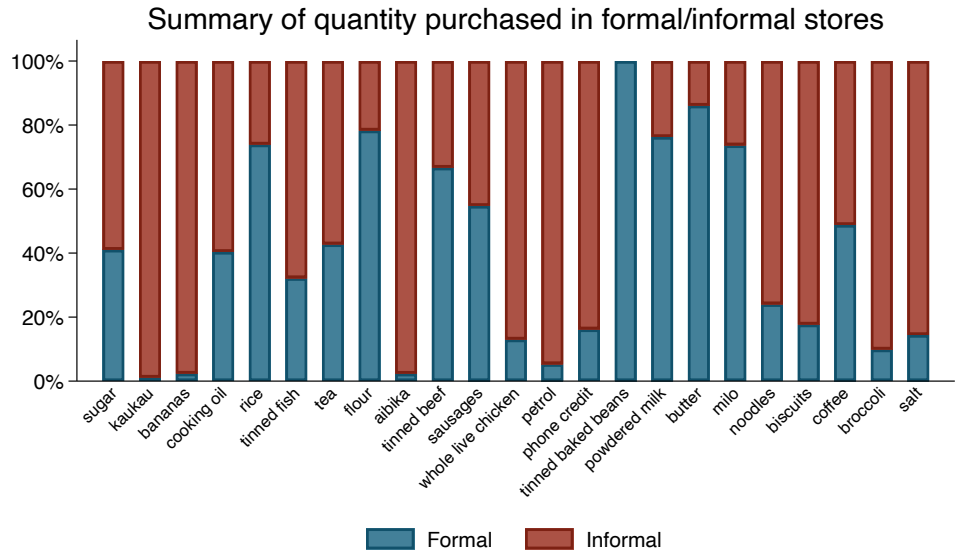
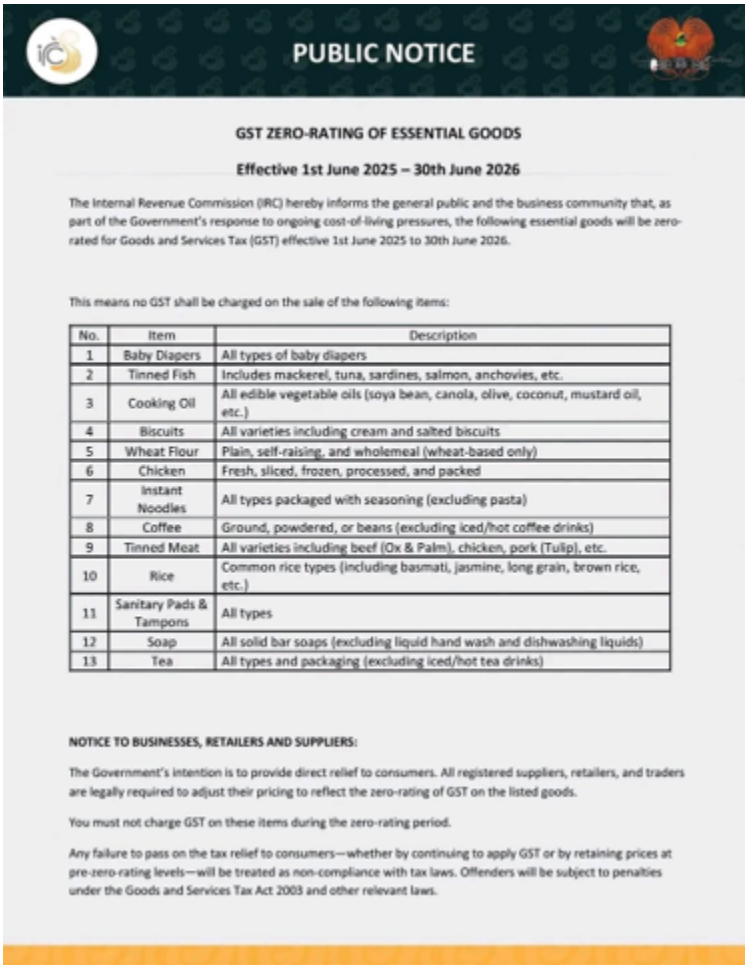



Figure A6: Quantity purchased by item by store type

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



# 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 A7: Official notice from the PNG Government about VAT exemption reform

Note: This figure shows the official notice from the PNG Government about 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 A1: Distribution of survey respondents relative to population

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

| | |
|---|---|
| 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 A2: Background information about expert prediction survey

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

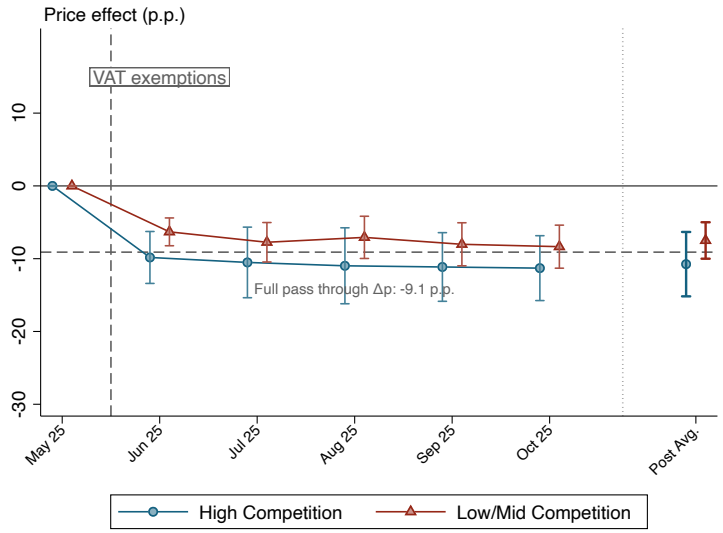



Figure A8: Differences-in-Difference with average effects by store proximity post reform

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

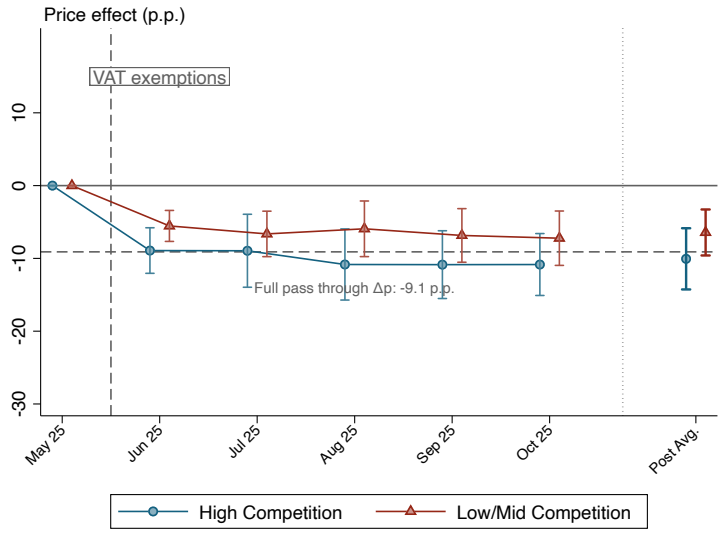



Figure A9: Differences-in-Difference with average effects by store proximity post reform

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

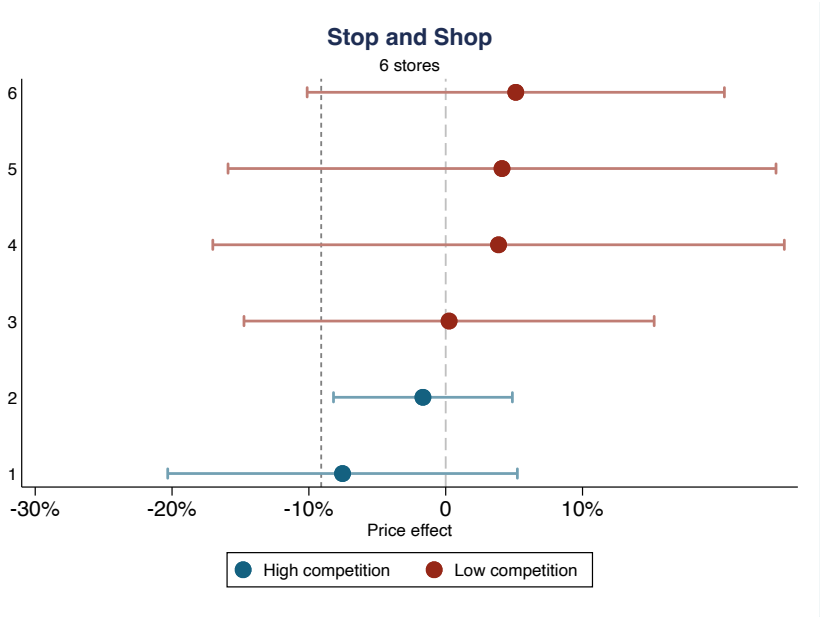



Figure A10: Differences in pass-through rate across stores in the largest supermarket chain

Note: This figure shows differences in pass-through rates across stores in the largest supermarket chain.

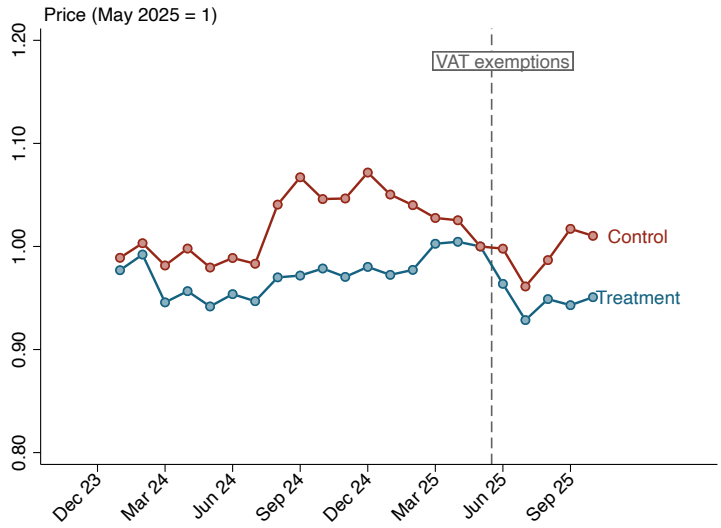



Figure A11: Raw trends in prices in treatment and control groups in the phone survey data

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

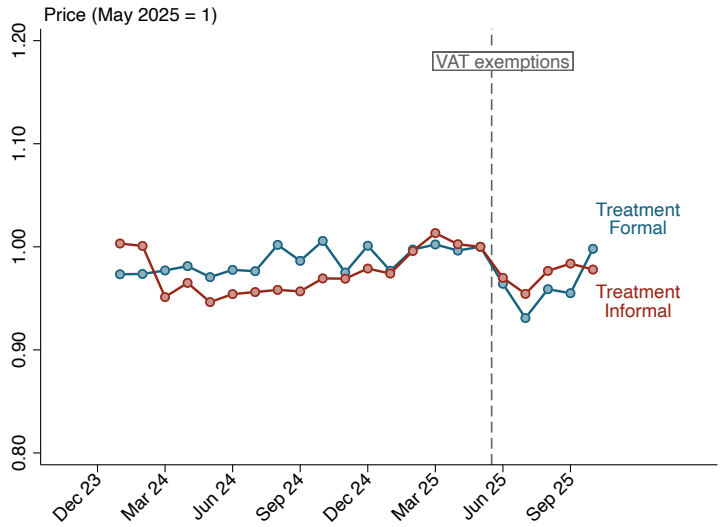



Figure A12: Raw trends in prices in treatment group between formal and informal stores in the phone survey data

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

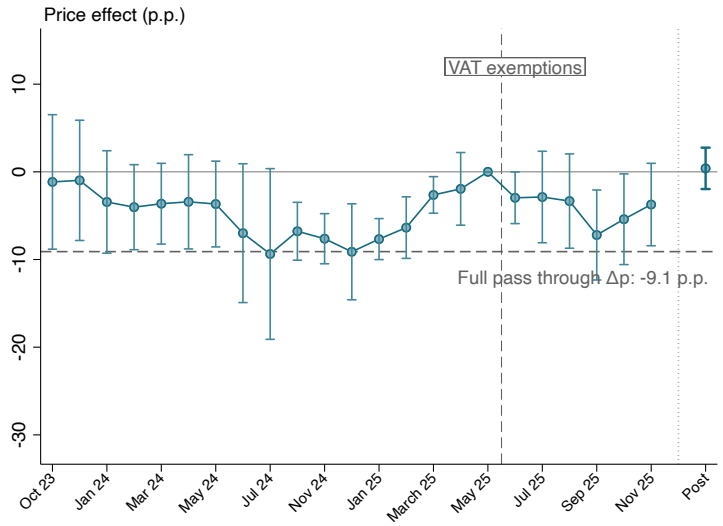



Figure A13: Differences-in-Difference with average effects post reform

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

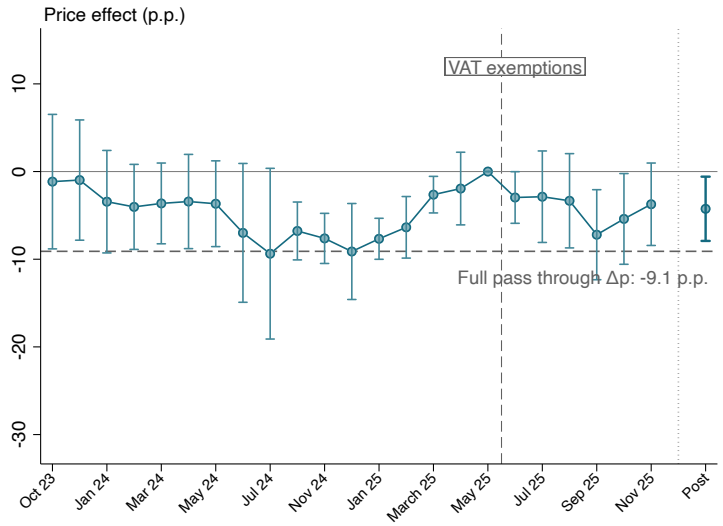



Figure A14: Differences-in-Difference with average effects post reform (reference = May 2025)

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

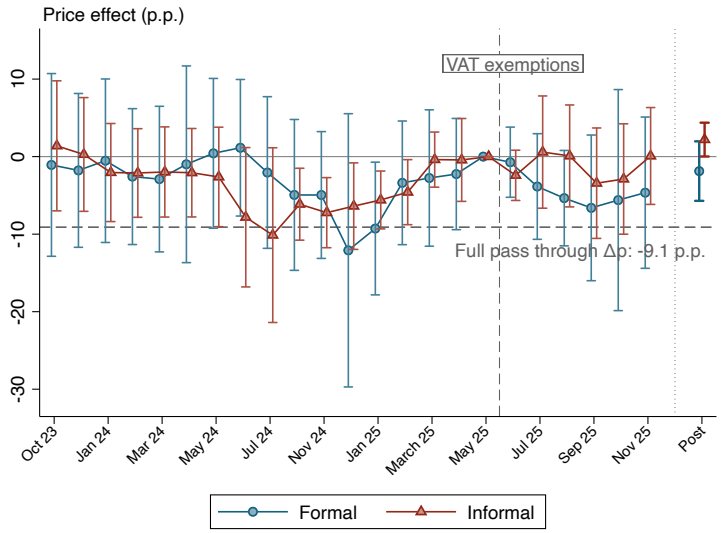



Figure A15: Differences-in-Difference with average effects post reform, by store type

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

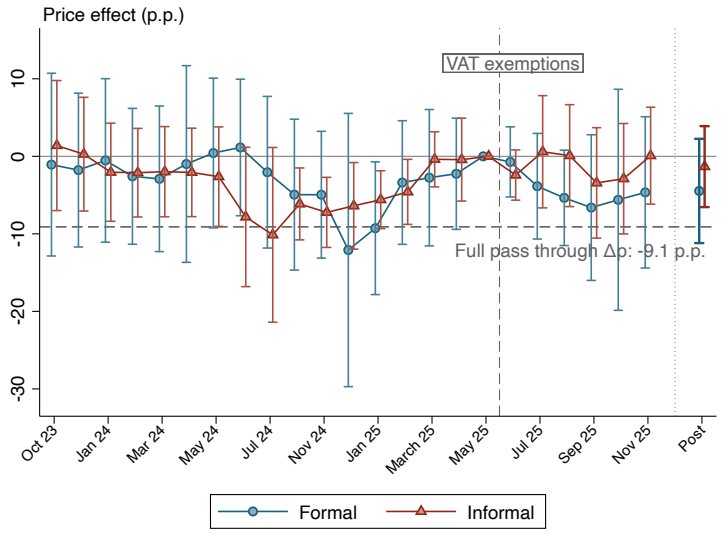



Figure A16: Differences-in-Difference with average effects post reform (reference = May 2025), by store type

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

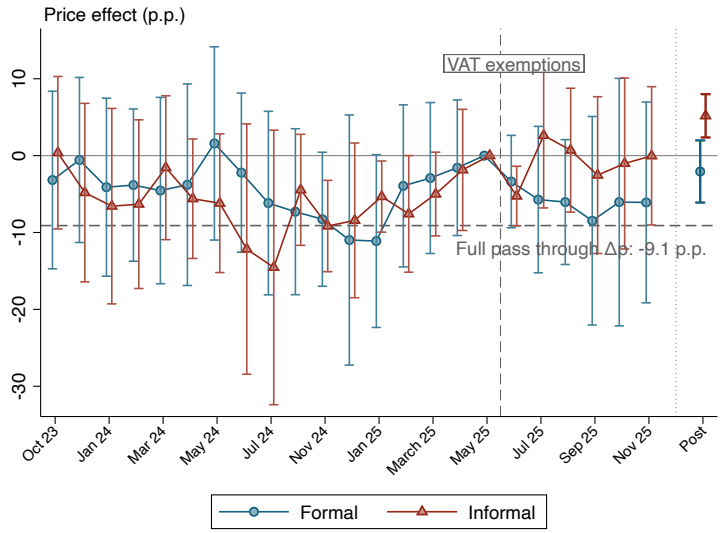



Figure A17: Differences-in-Difference with average effects post reform, by store type in urban areas

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

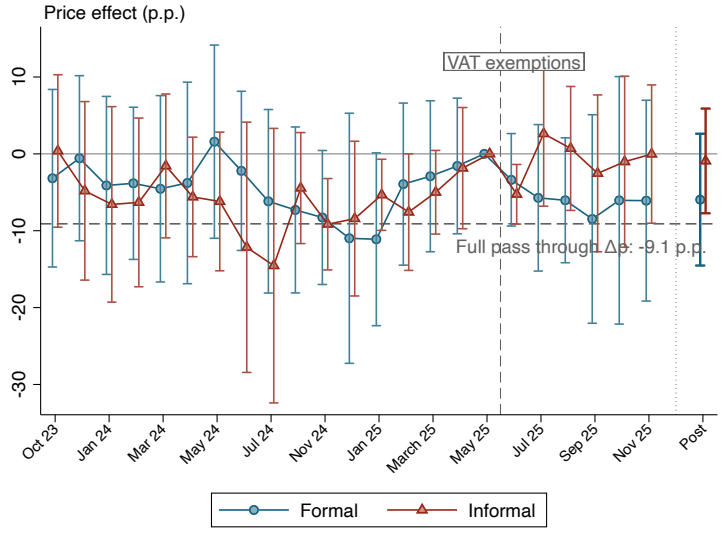



Figure A18: Differences-in-Difference with average effects post reform (reference = May 2025), by store type in urban areas

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.

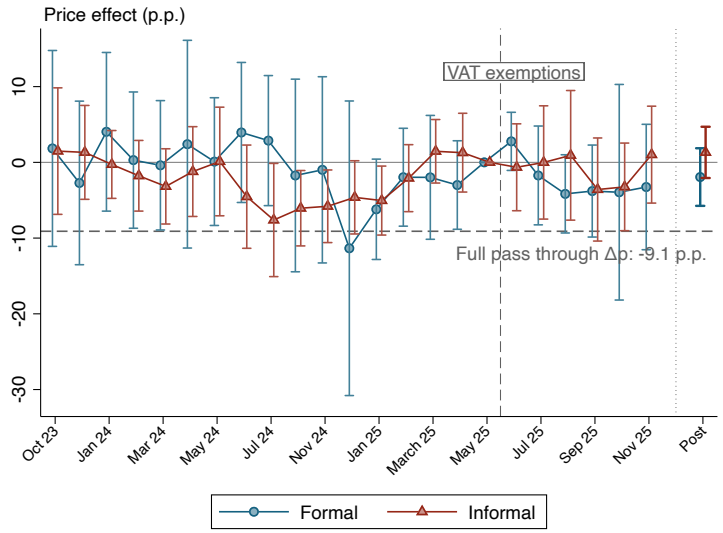



Figure A19: Differences-in-Difference with average effects post reform, by store type in rural areas

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

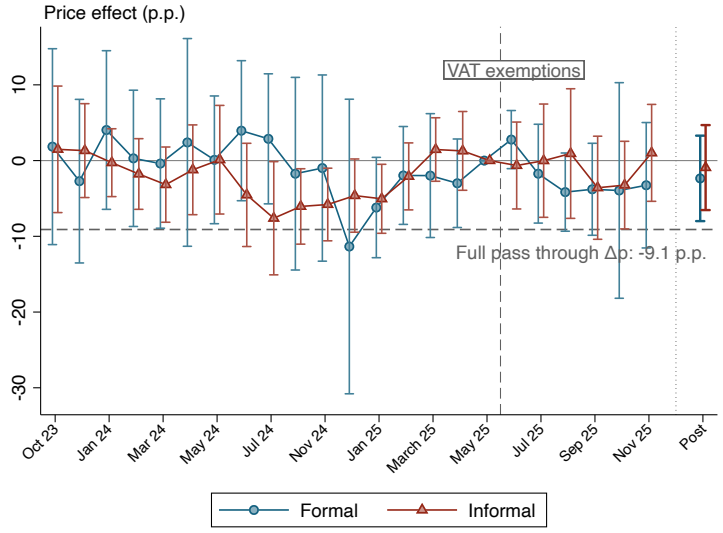



Figure A20: Differences-in-Difference with average effects post reform (reference = May 2025), by store type in rural areas

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.

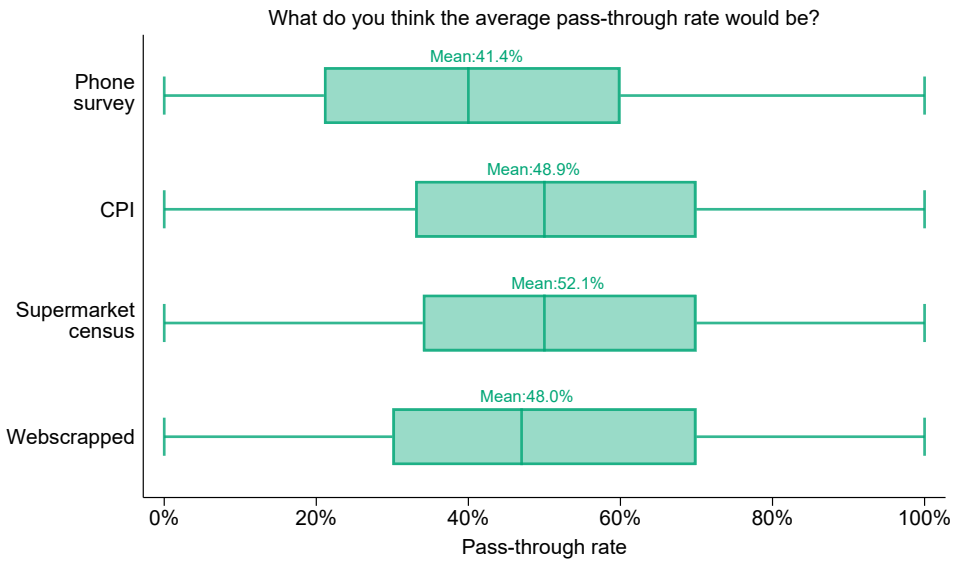



Figure A21: Experts' predictions of pass-through by data source

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

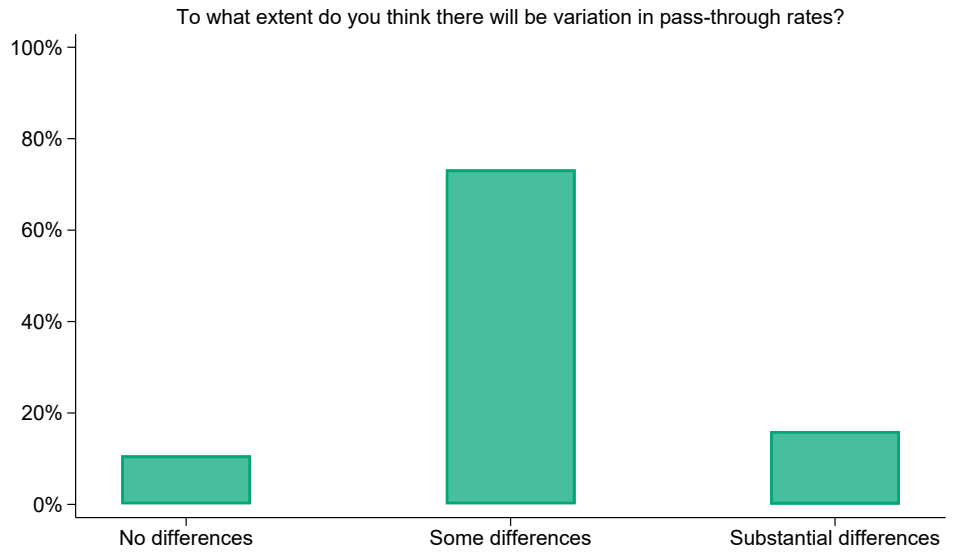



Figure A22: Experts' predictions of variation in pass-through

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

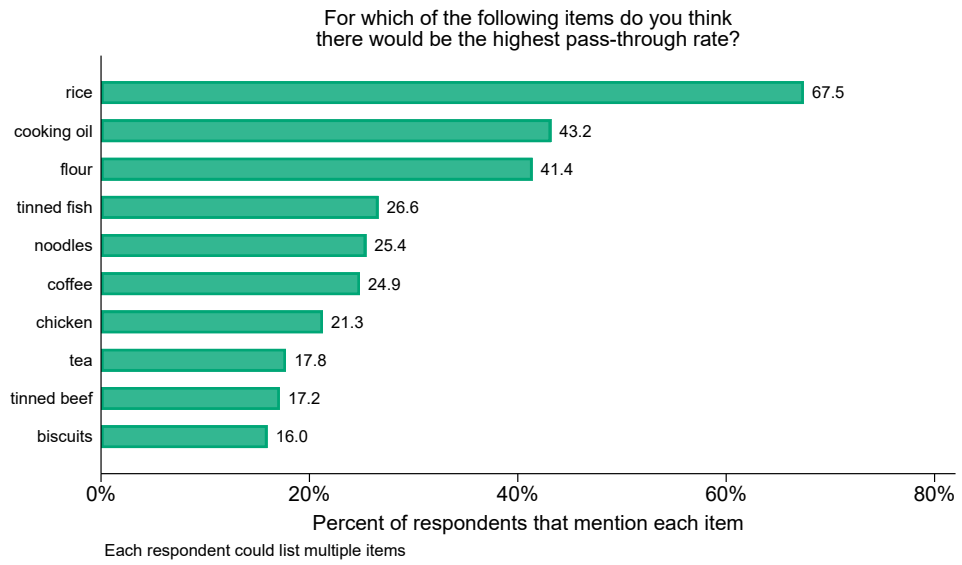



Figure A23: Experts' predictions of items with high pass-through

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

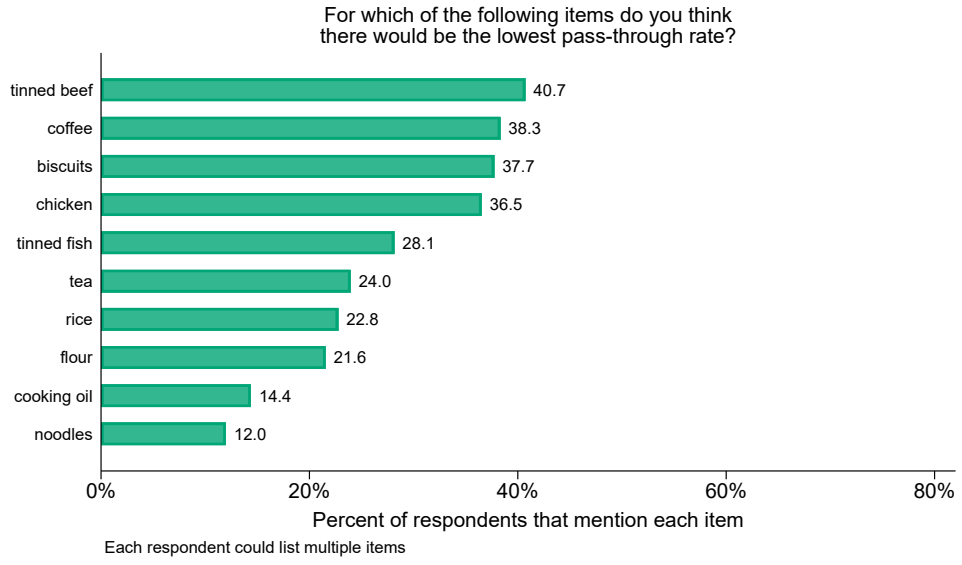



Figure A24: Experts' predictions of items with low pass-through

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

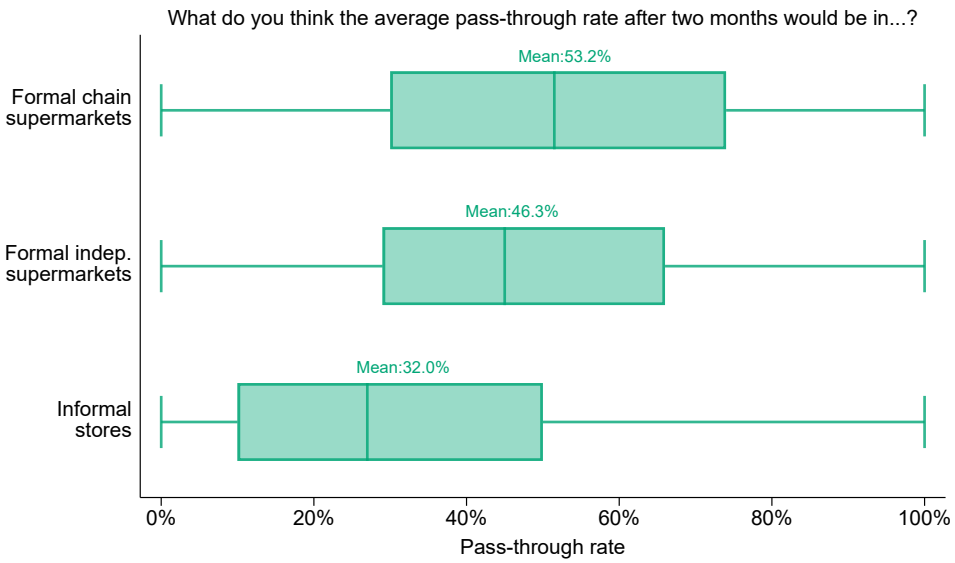



Figure A25: Experts' predictions of pass-through by store type

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

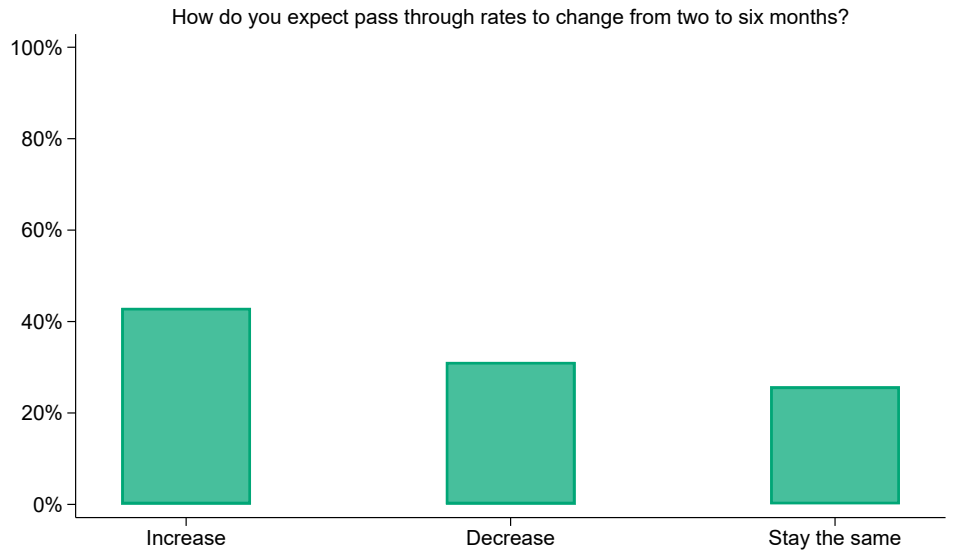



Figure A26: Experts' predictions of changes in pass-through over time

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

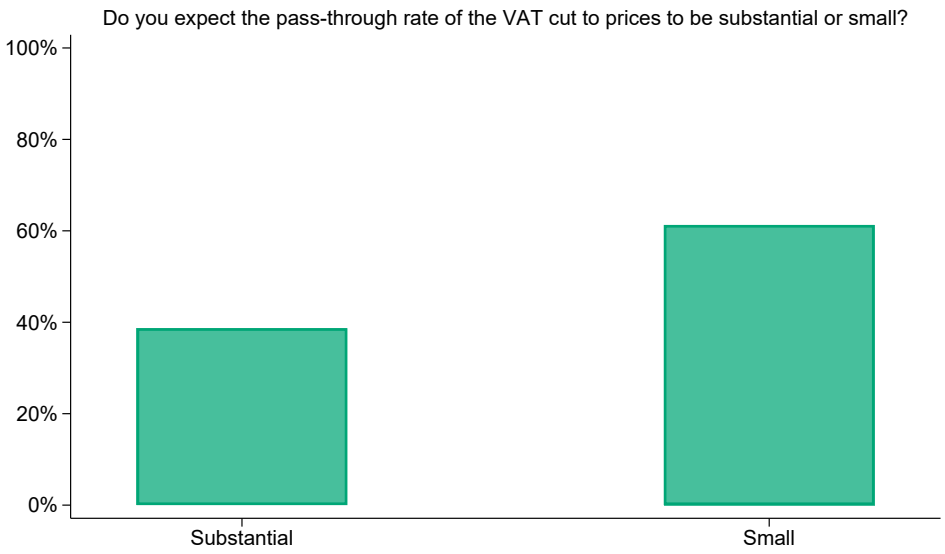



Figure A27: Experts' predictions of size of pass-through

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

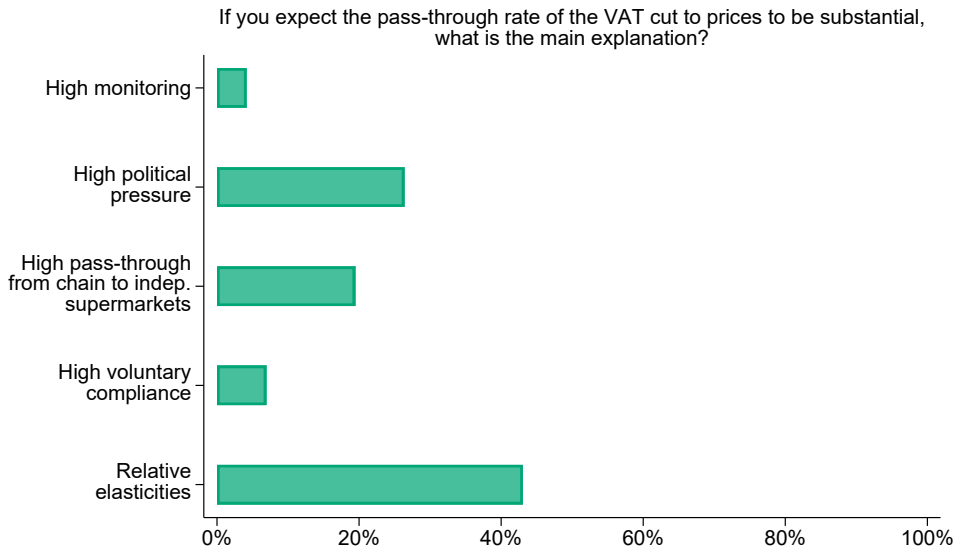



Figure A28: Experts' reasons for substantial pass-through

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

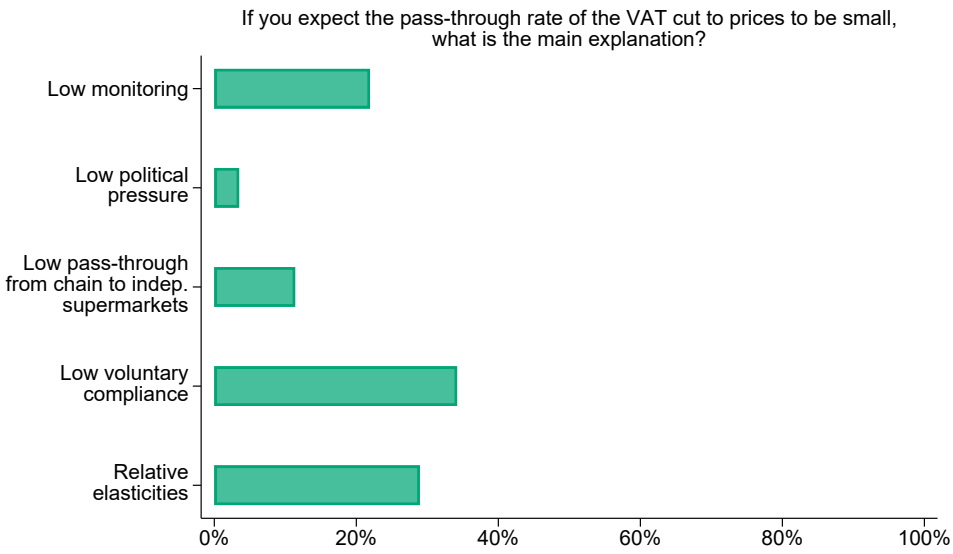



Figure A29: Experts' reasons for small pass-through

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

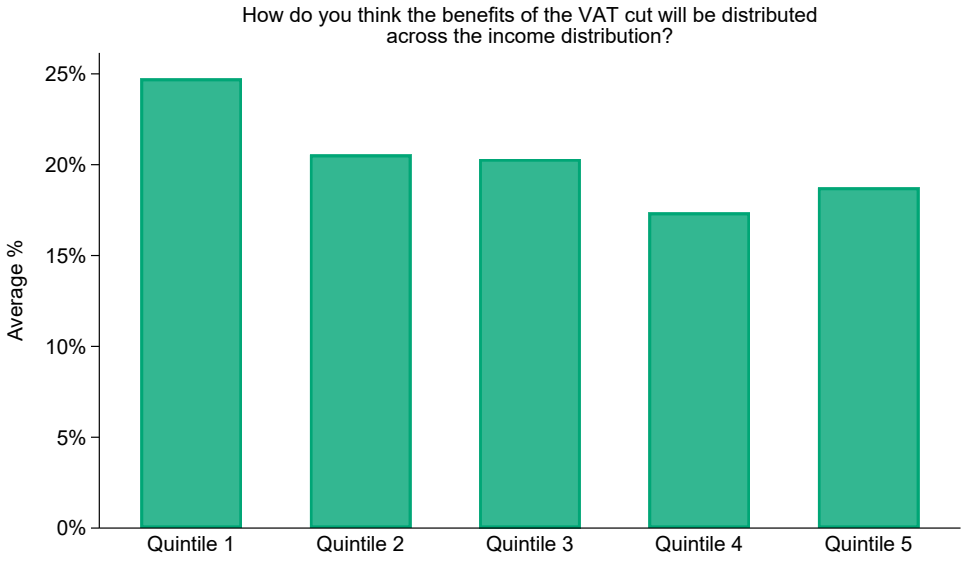



Figure A30: Experts' predictions of incidence of reform by quintile

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

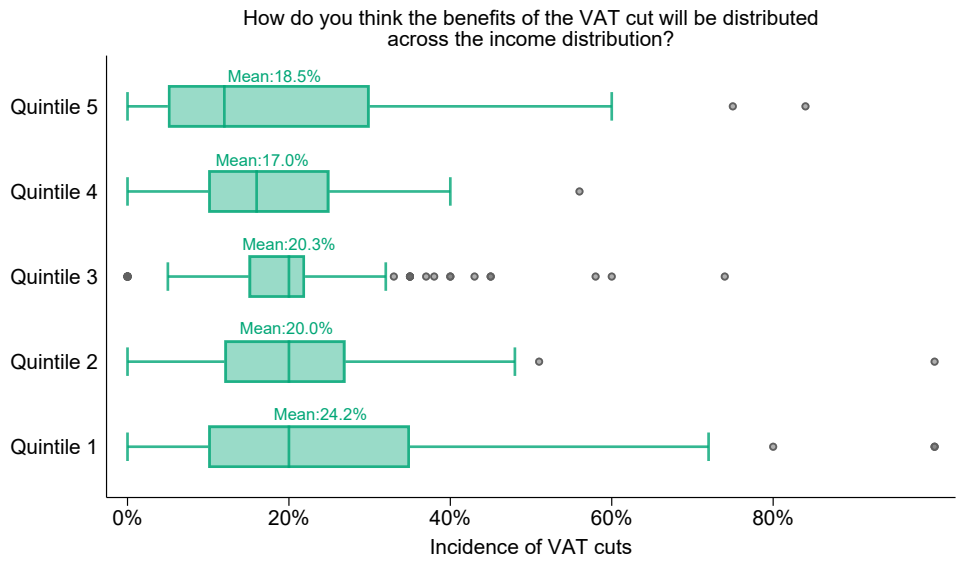



Figure A31: Experts' predictions of incidence of reform by quintile (boxplot)

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

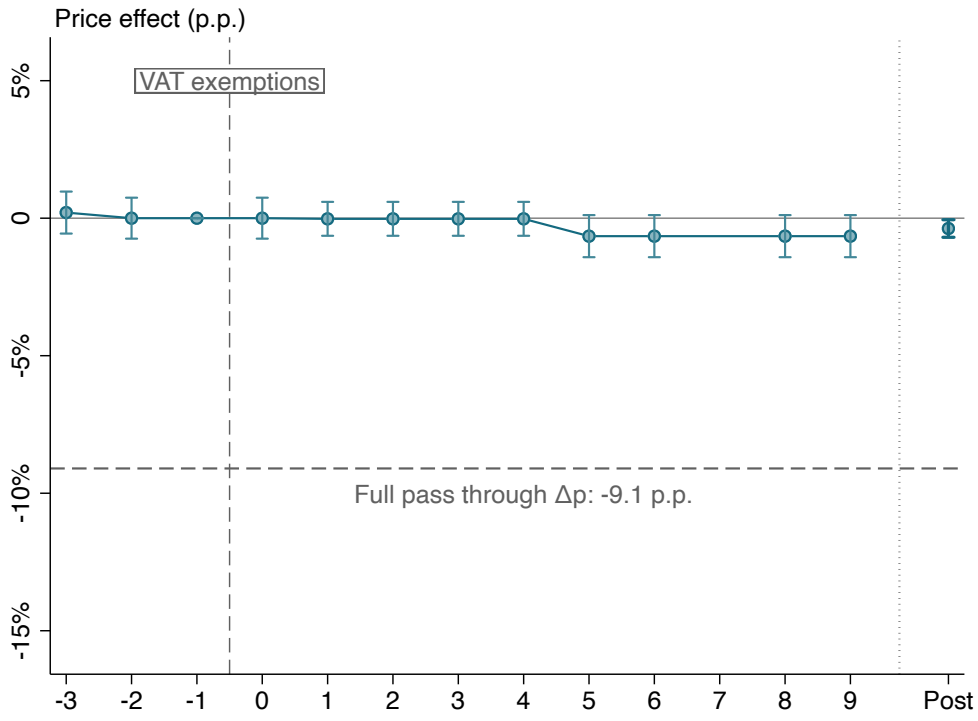



Figure A32: Differences-in-Difference results based on online price information

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).

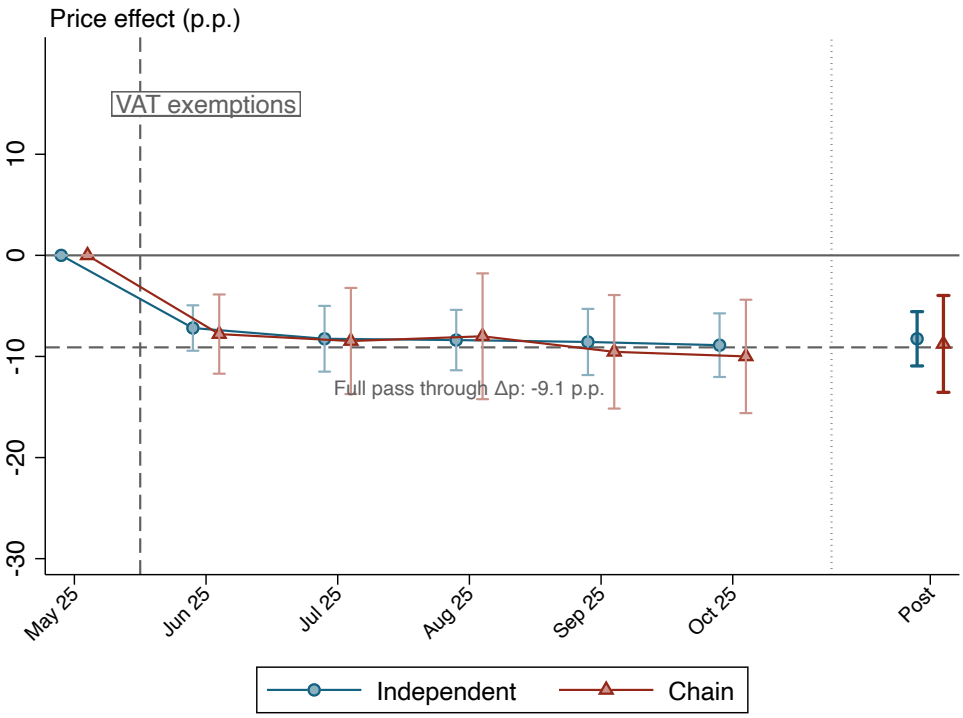



Figure A33: Differences-in-Difference results by chain vs independent stores

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).

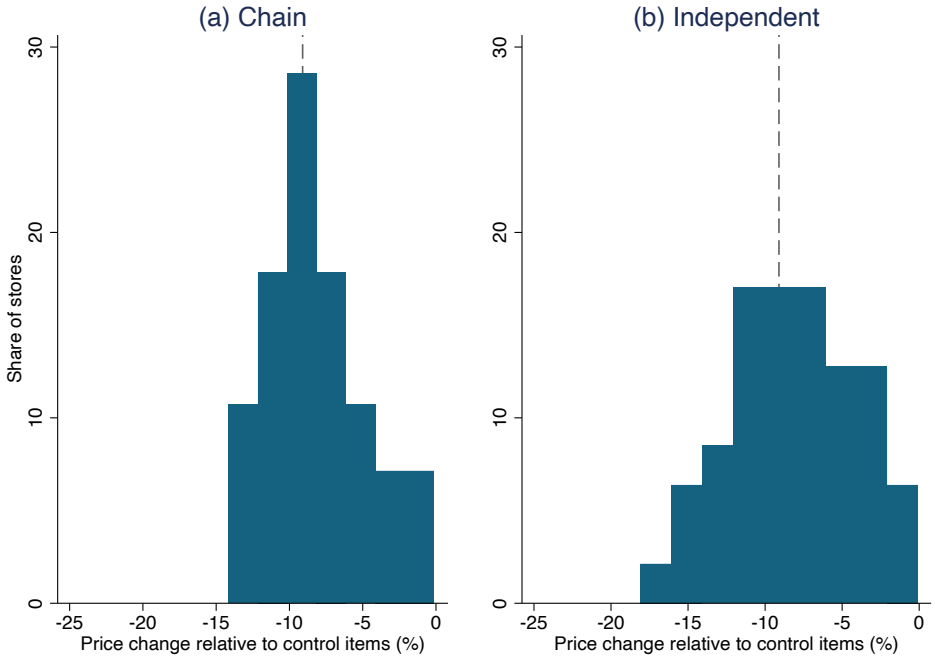



Figure A34: Heterogeneity of pass-through based on chain vs independent stores

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.

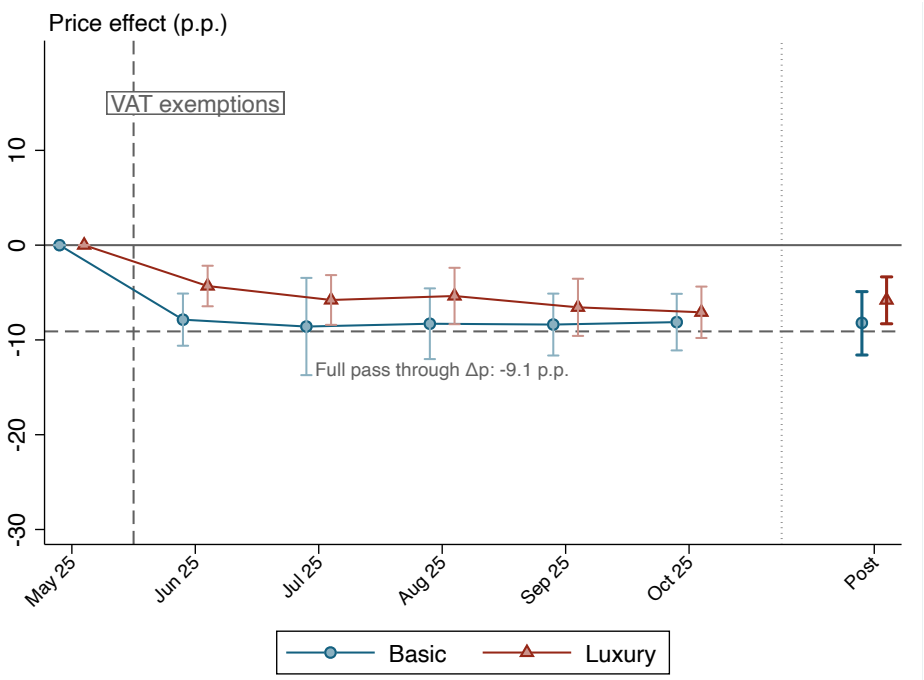



Figure A35: Differences-in-Difference results by product type

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).