Urban shopping patterns in Indonesia and their implications for small farmers

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15 June 2015

Paper presented at the International Conference of Agricultural Economists, Universita Delgi Studi di Milano, Milan, Italy, 8-14 August 2015

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Acknowledgements

The research behind this paper was funded by the Australian Centre for International Agricultural Research (ACIAR) under the project "Markets for high-value commodities in Indonesia: Promoting competitiveness and inclusiveness" (ADP/2005/006). The field work and analysis was carried out by a collaboration between the International Food Policy Research Institute (IFPRI), the University of Adelaide, and the Indonesian Centre for Agriculture, Socio-Economic and Policy Studies (ICASEPS).

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Abstract.

The rapid growth of supermarkets in developing countries has raised concern that small farmers may be squeezed out of urban markets by the quality standards and other requirements of supermarkets. This study explores these issues using data from a stratified random survey of 1180 urban households in Indonesia. The results suggest that 73% of urban households use modern food retailers, but these retailers account for just 19% of food expenditure. Econometric analysis indicates that the use of modern food retailers is associated with higher income, higher education, and ownership of a refrigerator and motorbike. The impact of supermarkets on fresh vegetable growers is likely to be minimal because 98% of urban vegetables are still purchased at traditional retailers. Projections based on the current relationship between income and shopping patterns suggests that traditional retailers will continue to play an important role in fresh produce marketing for the foreseeable future.

Keywords: supermarkets, horticulture, urban consumption, Indonesia

JEL codes: D12, O12, Q13, Q18,

1. Introduction

The food retail sector has undergone significant transformation in most developing countries, involving the rapid growth of hypermarkets, supermarkets, and convenience stores. The main driver of this transformation is rising income, which leads to increased consumer demand for food quality, food safety, product diversity, and improved shopping experience. In addition, urbanization and the proliferation of modern food stores have made them accessible to a larger share of the population (Reardon et al., 2003).

Indonesia is no exception to these trends. Per capita income has grown at 5.5% annually in recent years, one of the fastest in the region. The number of modern food retail outlets has increased from one in 1977 to more than 1,000 in 1999 to 11,000 in 2009. According to Euromonitor surveys, the share of food spending at modern retail outlets has increased from 5% in 1999 to 11% in 2009 (Dyck et al. 2012). Another report cited industry sources in estimating that the share of the modern food retail sector was 30% in 2007 (World Bank, 2007).

The rapid rise of the modern food retail sector has generated a number of concerns. For example, is the growth of the modern sector displacing the traditional retailers, causing hardship among traders and shop owners? In addition, is the expansion of modern food retail outlets squeezing small-scale farmers out of the supply chain? Supermarket chains often established structured supply chains with quality standards and minimum quantity requirements that small farmers have difficulty meeting (Chowdhury et al, 2006; World Bank, 2007).

This study has three objectives. The first is to examine shopping patterns in urban Indonesia, focusing on the household-level determinants of the use of modern food retail outlets. The second is to generate projections of the share of urban food expenditure that will be allocated to modern food retail outlets over time. Finally, we discuss the implications of the patterns and pace of growth in the modern retail sector on small-scale farmers and traditional retail shops. In particular, we are interested in testing the view that the growth of modern retail outlets, with their quality and quantity standards, threatens the livelihoods of small-scale farmers by limiting their access to remunerative, growing markets.

2. Data and methods

2.1. Data

As part of the study, the project carried out a survey of 1180 urban households in three cities in Indonesia: Surabaya, Bogor, and Surakarta. These were chosen to represent large, medium, and small cities, respectively. According to the 2010 population census, Surabaya has a population of 2.6 million, making it the second-largest city after Jakarta. It is a port city located in the province of East Java. Bogor has a population of 0.95 million people, making it the 11th largest city. It is located on the outskirts of Jakarta in the province of West Java. Surakarta (also called Solo) has 0.5 million people, ranking 19th among Indonesian cities. It is in the province of Central Java.

Within each city, we used stratified random sampling to select households, while oversampling higher-income neighborhoods and areas close to supermarkets. The sample design varied by city because of differing availability of information. Cities in Indonesia are divided into kecamatan (districts), kelurahan (sub-districts), Rukun Warga (wards), and Rukun Tetangga (neighborhoods). In Surabaya, 20 kelurahan were selected randomly, stratified to oversample kelurahan within 1 kilometer of a supermarket. Within each selected kelurahan, two Rukun Tetangga (RTs) were selected randomly, with oversampling of high-income RTs. Within each selected RT, 15 households were selected from lists of resident households, making a total of 600 households in the Surabaya.

In Bogor, we selected 20 kelurahan randomly, with stratification and oversampling of those with a supermarket. In each selected kelurahan, we randomly selected two RTs with oversampling of high-income RTs. Within each selected RT, seven households were randomly sampled to be interviewed, for a sample of 280 households in Bogor.

In Surakarta, 15 Rukun Warga (RW) were selected randomly using area sampling. Within these RWs, 25 RTs were selected randomly, oversampling the high-income areas by selecting a larger share of RTs in the two better-off RWs. In each of the 25 RTs, a random sample of 12 households was selected to be interviewed, making the sample 300 households in Surakarta. Sampling weights were calculated based on the inverse of the probability of selection, and were used in the calculation of all results presented here.

The 16-page questionnaire covered household composition, housing and asset ownership, shopping behavior at different types of outlets, food expenditure patterns, perceptions of each type of food retailer, and perceptions of organic food. The survey was

implemented from November 2010 to February 2011 by three teams of eleven enumerators each.

The survey collected information on shopping habits at different types of food retail outlets. Following Dyck et al. (2012), we define eight types of food retailer:.

- Hypermarkets are very large, modern food stores with ten or more cash registers. Examples include multinational chains such as Carrefour, Giant, and Makro and Indonesian chains such as Hypermart.
- Supermarkets are large, modern food stores with 3-9 cash registers. Examples include chains such as Hero, Matahari, Asia, and Yogya, although independent supermarkets exist as well.
- Minimarts or convenience stores are small, modern stores with 1-2 cash registers. Alfamart and Indomart are two large chains of minimarts in Indonesia.
- *Warung*, or small shops, are family-owned stores located in a building or part of a house, often in residential areas. They typically sell snacks, beverages, and dry goods.
- Semi-permanent stands are vendors who sell from a table, stand, cart, or stall that can be moved, but generally stays in one place during the day. They often sell fresh fruits and vegetables.
- Traditional wet markets are places where a large number of vendors can set up shop at tables or in stalls under a common roof. They are generally managed by the city.
- Peddlers are vendors who move their products around the city on foot, by bicycle, or in a motorized cart. They often bring perishable goods into residential neighborhoods or serve public areas with many pedestrians.
- Other sources of food include anything not described above, including restaurants.

The first three are considered modern food retailers, while the last five are considered traditional retailers.

2.2. Methods

In this study, we examine the determinants of the share of urban food expenditure that is allocated to modern food outlets, as defined above. About 23% of the households in our sample do not report any spending at a modern outlet, so the dependent variable has a large number of zero values, particularly for low-income households, who tend not to use modern outlets.

This is a type of corner solution model, in which a latent variable, y*, is related to the explanatory variables but is not observed. We observe y, where y=y* if y*>0 and y=0 if y*≤0. This can create a situation where observations of y are "clumped" at zero. Ordinary least squares (OLS) would predict negative values of y where y*<0, but since the observed values of y are zero, the error term will be positive for those observations. For example, if low-income households are less likely to shop at supermarkets, the error term for these households will often be positive. The correlation between the error term and the income variable means that the coefficient estimated by OLS will be biased.

One alternative is to use Tobin's probit (or Tobit) model, which assumes that the independent variables estimate a latent variable (Tobin, 1958). One limitation of the Tobit model is that the same process is used to estimate both the probability that the dependent variable is positive and the conditional value of the dependent variable.

The Cragg double-hurdle model is based on the idea that there are two distinct decisions, each with its own determinants (Cragg, 1971). The first 'hurdle' is a binary decision whether or not to participate, while the second is some measure of the degree of participation. The two stages are estimated simultaneously using maximum likelihood methods, though the first stage is equivalent to a probit model of the decision to participate. In the first hurdle, the probability of a zero is given by a probit model:

$$P(y_i = 0) = \Phi(-\beta X_i + \varepsilon_i)$$

where y_i is the dependent variable, β is a vector of parameters, X_i is a vector of explanatory variables, and ε_i is the error term. The second hurdle is a standard linear model conditional on $y_i>0$:

$$E(y_i | \, y_i > 0) = \gamma Z_i + \mu_i$$

where γ is a vector of parameters, Z_i is a vector of explanatory variables, and μ_i is the error term. In the Cragg model, unlike the Tobit model, different processes determine the binary decision and the continuous degree of participation, so that β may differ from γ and the variables in X_i may differ from those in Z_i.

The Cragg model assumes conditional independence, so that the distribution of the latent variable, y*, depends on the explanatory variables but the binary decision variable does not contribute any additional explanatory power.

In our study, the first stage estimates whether or not a household purchases any food at a supermarket or other modern retailer, while the second stage estimates the share of the food budget allocated to modern retail outlets conditional on having some purchases there. The explanatory variables include per capita expenditure, household characteristics, travel

time to the nearest modern retail food outlet, and ownership of a refrigerator or a motor vehicle. The model is implemented in Stata using the craggit module (see Burke, 2009).

We also project the urban food spending at modern retail outlets over the period from 2010 (when the survey was carried out) to 2025. The projections are based on a simplified version of the Cragg model described above, projections of income growth and urban population growth, and our estimates of the relationship between income and food share. The simplified Cragg model uses the same dependent variables, the decision to shop at modern food stores and the share of the food budget allocated to them, but limits the explanatory variables to per capita expenditure and per capita expenditure squared. For the projections, it is preferable not to control for asset ownership, education, and the other explanatory variables since these will change over time. The implicit assumption is that these variables rise with income over time at the same rate as they change across income groups in the survey. The projections assume that per capita income grows at 5.5% per year, based on recent historical experience. Urban population is assumed to grow at 2.1% per year, based on projections for the period 2010-2025 by the United Nations (2011). And the food share is determined by income growth and an income elasticity of food of 0.78, estimated from the survey data.

There are two key assumptions behind these projections. First, we assume that cross-sectional patterns with the urban population accurately reflect the changes that will occur over time as incomes rise. In other words, as the income of each household rises, it will behave like households that currently have higher incomes. Second, we assume that the income growth is shared proportionately across households. While this assumption is debateable, there is little information with which to generate separate forecasts of the income growth of different categories of households.

3. Results

The results are divided into three sections. First, we explore the shopping patterns of urban consumers using descriptive statistics. Then, we estimate the determinants of the share of food spending allocated to modern food retailers. Finally, we discuss the projections of urban food demand and the shares allocated to traditional and modern retail outlets.

3.1. Urban shopping patterns

The survey collected information on food expenditure on 67 types of food products and, for each one, the retailer where the household buys most of this product. Here, we calculate the share of aggregate food spending on each type of retailer, not the mean share across

households, so these figures give greater weight to higher-income households with larger food spending. In spite of the rapid expansion of supermarkets in Indonesia, *warungs* continue to be the most important source of food, accounting for almost one-third (31%) of urban food expenditure. Traditional wet markets are second, responsible for 24% of urban food spending. Urban consumers spend about 19% of their food budget at modern food outlets, roughly split among hypermarkets, supermarkets, and minimarts. This is considerably lower than an estimate, based on industry sources, of 30% overall, including urban and rural areas (World Bank, 2007), but roughly in line with more recent estimates by the U.S. Department of Agriculture (Dyck et al., 2012). Peddlers are surprisingly important, accounting for 11% of urban food expenditure, which is almost as much as supermarkets and hypermarkets combined.

Figure 1 demonstrates how sharply this pattern varies for different types of food products. For roots and tubers, pulses, and vegetables, the three modern outlets account for less than 5% of urban expenditure. Again, this is lower than previous estimates of 10-15% based on industry sources (World Bank, 2007). In contrast, the share of spending at modern outlets is more than 30% for dairy products, 'other food' (which includes many processed foods), and fruit. Traditional wet markets represent about half of urban spending on vegetables, meat and fish, and roots and tubers. Small shops handle about half the urban demand for grains (mainly rice) and meals outside the home, while semi-permanent stands are relatively important sources for fruit and for meals consumed outside the home.

FIGURE 1 ABOUT HERE

Looking at the disaggregated food products gives an idea of the types of products purchased at each type of outlet. Modern retail outlets account for more than half the spending on the following products: infant formula, spreads, butter and margarine, apples, alcoholic beverages, breakfast cereal, processed meat, and other processed food. In contrast, they accounted for less than 5% of the spending on rice, potatoes, poultry, fish, onions, tofu, tomatoes, garlic, chilies, shallots, leafy vegetables, and green beans. In general, processed foods tend to be purchased at modern retail outlets, while meat, fish, and vegetables are bought at traditional outlets.

Apples are the only fresh produce a majority of which is purchased at modern retailers (67%). This is probably related to the fact that virtually all apples in the country are imported, generally from China and New Zealand (FAO, 2013). Slightly less than half the

oranges, which are both imported and locally produced, are purchased in modern retailers. For most tropical fruit, such as mango, papaya, banana, mangosteen, and pineapples, modern retailers account for less than 10% of the urban demand.

The share of food spending at modern retail outlets is also strongly related to household income. The survey included modules to collect information on food and non-food expenditure, as well as rent, which were used to calculate per capita expenditure, a proxy for income. As shown in Figure 2, the share of food spending at modern retailers rises consistently across the per-capita-expenditure deciles. For example, the households in the poorest decile spend just 4% of their food budget at modern food outlets, but this rises to 8% in the fifth decile and 33% in the richest decile.

The market share of *warung* falls from 58% in the poorest decile to 21% in the richest. The share of traditional wet markets falls from 26% in the poorest decile to 15% in the richest (though it is above 30% in three of the intermediate deciles).

FIGURE 2 ABOUT HERE

Interestingly, the market share of two "traditional" retailers, peddlers and semi-permanent stands, increases gradually across the deciles. Although peddlers are considered a 'traditional' retail outlet, they are providing a time-saving service, presumably by selling at a price somewhat higher than at other outlets. This makes peddlers appealing to households with a high opportunity cost of time. It is less clear why semi-permanent stands would become more important in higher-income categories, but it may be related to the demand for prepared meals outside the house, which accounts for about one-third of the spending at semi-permanent stands.

3.2. Determinants of the food spending at modern outlets

This section examines the determinants of the share of food expenditure allocated to modern food outlets, defined to include hypermarkets, supermarkets, and minimarts. As discussed above, we use the Cragg double-hurdle model to estimate the probability of shopping at a modern outlet as well as the share of the food budget spent at modern outlets among those using them.

The explanatory variables in the model are the log of per capita expenditure, the square of the log of per capita expenditure, household size, age of the head of household, a dummy for female-headed household, a dummy for a working wife, interaction of a working

wife and the number of hours per week that she works, a dummy for refrigerator ownership, a dummy for vehicle ownership, travel time to a modern outlet, a dummy for households living in Surabaya, and a dummy for households living in Bogor. Table 1 shows weighted and unweighted means of the dependent variables and independent variables used in the model. The weighted figures take into account the sampling weights, so they describe the urban population in the three cities. The unweighted figures describe the sample itself, which over-represents households in high-income neighborhoods near supermarkets.

The table indicates that the average share of food purchased at modern retailers is 13%.[1] The average household size is about 4.5 members, 12% are female-headed households, and the average household head has about ten years of education. Refrigerators are fairly common, being owned by around two-thirds of urban Indonesian households, and vehicles (most of which are motorbikes) are owned by almost three-quarters of them. About 10% of wives have work outside the house, and the average time among those working is about 20 hours. The average time required to get to a modern retailer is just 8 minutes, although travel time to a supermarket (not shown) is close to 20 minutes.

TABLE 1 HERE

The results of the Cragg double-hurdle model are shown in Table 2. The first column shows the model of the probability of shopping at a modern outlet, while the second shows the model of the share of food purchased as a modern outlet among those who use modern food retailers. Although Table 2 identifies the independent variables that are significant predictors of shopping behavior, it does not provide useful information on the size of the effect because the coefficients do not have intuitive interpretations. In the text, we provide the average partial effect, defined as the impact of a one-unit change in the independent variable on the unconditional share of food expenditure allocated to modern retail outlets, taking into account both the probability the household shops at modern outlets and the share of the food budget spent there if they do. Because the partial effect is a non-linear function of the independent variables, we give the *average* partial effect across the households in the sample. The standard error of the partial effect is calculated using bootstrap methods, with

[1] This differs from the figure in the previous section (19%) because this is the average of household-shares, while the earlier figure was the percentage of overall food expenditure allocated to modern outlets. The latter figure gives greater weight to households with higher food expenditure.

500 replications. The variation across replications is used to estimate the standard error of the partial effect.

The results in Table 2 suggest that per capita expenditure has a statistically significant and positive effect on both the probability of shopping at a modern outlet and the share of food purchased there (conditional on shopping at a modern outlet). This is not surprising given the higher costs and greater amenities provided by supermarkets and other modern retailers. In both models, the quadratic term is statistically significant and negative. The signs of these two coefficients suggest that the share of food purchased at modern food retailers follows an inverse-U shape, but the value of the coefficients indicates that it levels off but does not decline within the observed range of incomes.

TABLE 2 HERE

The partial effect of log per capita expenditure, which incorporates the effect of both the linear and quadratic coefficients, is 0.06. This means that a 1% increase in per capita expenditure is associated with a 0.06 percentage point increase in the share of the food budget spent at modern outlets. In other words, the share of food spending at modern outlets rises with income, but only slowly. This small partial effect is not surprising in light of the fact that, from the poorest decile to the richest decile, per capita expenditure rises 12-fold, but the share of spending at modern outlets rises from 4% to 28%.

The coefficients on household size in the two models are positive and statistically significant, which implies that larger households are more likely to shop at a modern outlet and likely to spend a larger share of their food budget at modern outlets, other factors being equal. Since supermarkets tend to be farther from the average household than traditional retailers, the higher fixed cost of getting to a supermarket may be easier to justify if the household is planning to buy a large quantity of food.

The age of the head of household is not a statistically significant factor in the decision to shop at a modern outlet, but it does have a significant effect on the share of food purchased at a modern outlet among those shopping there. The coefficient is negative, indicating that younger shoppers spend a larger share of their food budget at modern outlets than older ones do.

The education of the head of household is positively and significantly related to both the probability of shopping at a modern outlet and the share of the food budget spent there, even after holding income and other variables constant. This could reflect a greater

awareness of quality and food safety issues or perhaps different social norms among more educated consumers.

Ownership of a refrigerator is also a positive and significant predictor of both the likelihood of shopping at a modern retailer and the share of food purchased there. This is not surprising given that a refrigerator allows the household to make larger and less frequent shopping trips, which reduces the relative cost of shopping at more distant supermarkets.

Owning a vehicle (including motorbikes, cars, and trucks) is positively associated with the probability of using modern food retailers, but is not associated with greater spending there. Presumably, the greater mobility associated with vehicle ownership makes traveling longer distances to a supermarket or hypermarket easier.

Finally, households living in Surabaya and Bogor are no more likely to shop at a modern outlet than those in Surakarta, but residents of the two larger cities who do shop at modern outlets spend a larger share of the food budget there than residents of Surakarta. This may reflect the size of the city (Surakarta is the smallest of the three) or the fact that municipal authorities in Surakarta have adopted a set of policies to improve standards at the traditional wet markets. After controlling for other factors, households in Surabaya and Bogor allocate 3 percentage points more of their food budget to modern retailers compared to those in Surakarta.

Somewhat surprisingly, travel time from the home to the nearest modern outlet was not a statistically significant predictor of either the probability of using a modern retailer or the share of the food budget spent at modern outlets. Similar results were obtained with travel time to a supermarket or hypermarket. Travel time from the house may not be a good measure of accessibility: a supermarket may be close to or on the route to a common destination, such as a workplace or school, making it easily accessible even if not close to the house.

Similarly, the shopping patterns of female-headed households and households in which the wife works outside the home do not seem to differ from other households in their shopping patterns, after taking into account income, education, and other variables.

3.3. Projections of the share of urban food expenditure at modern retailers

As described above, to project the growth of the urban modern food sector in Indonesia, the Cragg model in Table 2 is re-estimated, limiting the explanatory variables to per capita expenditure and per capita expenditure squared. This relationship is used to project the share of food purchased at modern retail outlets given a 5.5% annual growth in income

(expenditure) of each household. As shown in Table 3, the share of urban food purchased at modern retailers rises from 18% in 2010 to 25% in 2025. Given projections of urban population growth and the decline in the food share in household budgets, this implies that aggregate urban food expenditure at modern retailers rises from IDR 81 trillion in 2010 to IDR 267 trillion in 2025, implying an annual growth of 8.3%. Over this period, food expenditure at traditional retailers grows more slowly, at 5.3%, but the aggregate spending at traditional food retailers more than doubles over this period.

TABLE 3 ABOUT HERE

Given the uncertainty regarding the assumptions behind these projections, the last three rows of Table 3 examine the sensitivity of the results to alternate assumptions. We examine the effect of assuming that the annual growth in per capita income is 10%, rather than 5.5%. This is an extreme assumption, outside the range of historical experience in Indonesia, but it serves to explore the upper limit on growth of the modern food retail sector. Under this assumption, the modern food share rises to 28% in 2025, compared to 25% in the base scenario. However, the overall demand for food also grows faster, implying higher growth in food demand at both modern retailers (12%) and traditional retailers (7.2%).

If the elasticity of modern retailer share with respect to income is doubled, the modern share rises to 33% in 2025. This dampens growth of the traditional food retailer, but that sector still rises at an average annual rate of 4.5% per year.

Finally, if we combine higher (10%) income growth and the higher elasticity of modern share with respect to income, the share of the modern food sector reaches 39% in 2025. Under these assumptions, urban food demand grows at 14% per year for modern retailers and at 6.1% per year for traditional retailers.

4. Implications for small farmers and policy

The results presented above have several implications for the future of small-scale farmers in Indonesia and the traditional market channel. First, small-scale vegetable growers in Indonesia are barely affected by the growth of supermarkets and other modern food retailers. This is because urban consumers still prefer to buy fresh vegetables from traditional wet markets and peddlers. These two sources account for almost 80% of the vegetable purchases in larger cities. Small shops (warung) and semi-permanent stands account for most of the

remainder, leaving hypermarkets, supermarkets, and minimarts with a combined market share of less than 2%. When combined with the vegetable demand in smaller urban settlements and rural areas, where the share of modern retailers is even smaller, it appears that the modern retailers play a negligible role in vegetable marketing.

This pattern is confirmed by the results of two farm surveys carried out by the authors. One survey covered 596 chili farmers in the main chili surplus zone in the highlands of Java. Just 3% of the farmers interviewed reported that their chilies were being sold in a supermarket (Sahara et al., 2015). Another survey covered 662 randomly-selected shallot growers in the highly-commercial north coast of Java near Brebes (Wahida, 2015). Among these farmers, just 3% reported that their shallots were eventually sold to a supermarket .

The impact of supermarkets on farmers is sometimes described as a double-edge sword, since it represents an opportunity to sell into a growing and more lucrative market, but also a threat of being excluded from these growing markets if they cannot meet the quality and quantity requirements imposed by supermarkets. In this case, however, it appears that vegetable farmers in Indonesia are not at risk of being squeezed out of growing modern channels any time soon. At the same time, very few of them are likely to benefit from the opportunity to upgrade quality and earn a better price by selling into the modern channel.

Second, the story for fruit growers is similar, but with some differences. As discussed above, about 30% of the fruit in urban areas is purchased from modern retailers. However, the two fruits with the highest share purchased at modern retailers are apples, almost all of which are imported, and citrus fruit, which are both imported and locally produced. On the other hand, more than 90% of the urban demand for tropical fruit (including bananas, mangos, mangosteen, papaya, and pineapple) is channeled through traditional retailers, particularly traditional wet markets, semi-permanent stands, and peddlers. As in the case of vegetable markets, hardly any local fruit growers have any contact or experience with supermarkets. This does not mean that the fruit sector is static; indeed, there is evidence of technical change and market transformation, but it is driven by competitive forces within the 'traditional' marketing channel rather than by the growth of supermarkets and other modern retailers.

The growth of supermarkets may pose a threat to Indonesian fruit growers, not by taking over domestic supply chains, but rather by developing and expanding international supply chains that bring imported fruit into the country. In the case of citrus fruit, supermarkets facilitate consumer access to high-quality imports, thus challenging domestic

producers. In the case of apples, there are virtually no local producers, but increased access to imported apples may replace some of the demand for locally-grown tropical fruits.

Third, there is concern that the growth of supermarkets and other modern retailers in Indonesia could squeeze out traditional retailers, including shop-owners, vendors at the traditional wet markets, peddlers, and others. This could result in hardships for vendors in the short- to medium-term until they find new employment. To the extent that supermarkets are less capital-intensive than traditional market channels, this trend could result in a long-term reduction in demand for labor.

However, these concerns are based on the assumption that the modern channel is large enough and growing fast enough to result in a contraction in the traditional food marketing channel. Our analysis suggests that the traditional marketing channel will continue to expand, albeit at a slower rate than the modern retail channel. More specifically, we expect urban food expenditure at supermarkets and other modern retailers to expand 8.6% per year over 2010-2025. Over the same period, we project that urban food expenditure at traditional retailers will grow 5.3% per year. In other words, although the traditional food channel is declining in market share, the sector continues to grow at a health rate thanks to rising income and an expanding urban population.

5. Conclusions

The effect of the growth of supermarkets on farmers, particularly small-scale growers of fresh fruits and vegetables, has been the topic of some debate. Modern retailers often impose strict quality standards that may be difficult for small farmers to meet, or favor larger growers to reduce transactions costs, thus squeezing small farmers out of these growing modern supply chains. At the same time, supermarkets provide an opportunity for small farmers to raise their income if they are able to supply the modern channel, particularly if they can get assistance with inputs, credit, and technical assistance to meet the higher quality standards. Another concern is that the rapid growth of supermarkets will displace vendors in the traditional retail channel such as small shop owners and vendors in traditional wet markets (Chowdhury et al., 2006).

This paper address these issues, focusing on three objectives. The first is to examine the importance of modern retail outlets in urban areas of Indonesia. The second is to use this information to make projections about the growth of the modern food sector relative to the

traditional sector. And the third is to explore the implications of the patterns of growth in the modern retail sector on traditional food retailer and small-scale farmers.

According to our survey of 1180 randomly-selected urban households in three large cities of Indonesia, urban consumers spend about 31% of their food budget at warung, 24% at traditional markets, and 19% at the three types of modern outlet. This pattern varies strongly with income level: poor households spend little at modern outlets (3% for the poorest decile) while high-income households spend a larger share (30% among the top deciles).

A Cragg double-hurdle regression analysis indicates that the share of food purchased at modern outlets is affected by income, household size, age, education, and ownership of a refrigerator. Surprisingly, distance and travel time from the house to a modern outlet do not have any statistically significant effect on retailer choice.

These results have three important implications. First, the share of vegetables purchased at modern retail outlets is very small (less than 5%), suggesting any supermarket standards or efforts to organize supply chains currently have a negligible effect on vegetable farmers.

Second, the share of fruit bought at modern retail outlets is somewhat higher (30%), though it is concentrated on a few imported fruit. The impact of supermarkets on local fruit growers occurs through the facilitation of fruit imports rather than by forcing quality requirements on local farmers. In general, local fruit and vegetable growers are not at risk of being squeezed out of the market by the growth of supermarkets and other modern retailers, but at the same time, few of them are likely to benefit from this growth in the medium term.

Third, urban food demand at modern retail outlets is growing rapidly, but not rapidly enough to result in an absolute decline in food demand at traditional retail outlets. Based on the results of the survey and plausible assumptions, the urban food demand at modern retailers will grow at 8-14% per year, while the traditional retailers will expand at 4-6% per year. This suggests that the transition from traditional to modern food retailing may be less disruptive than expected.

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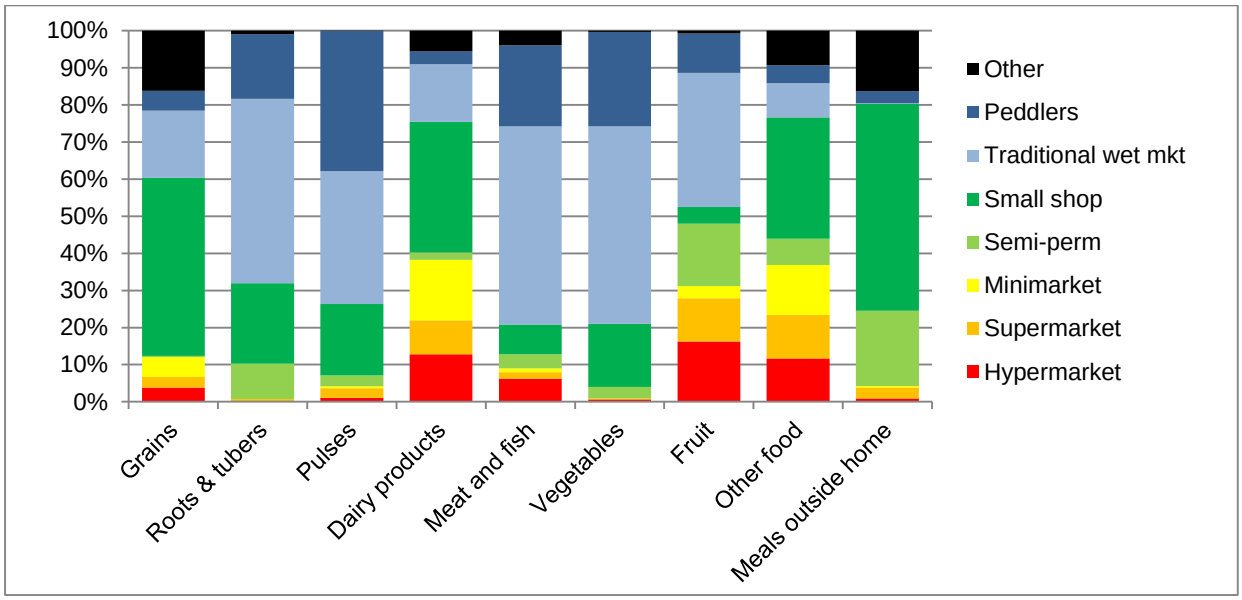
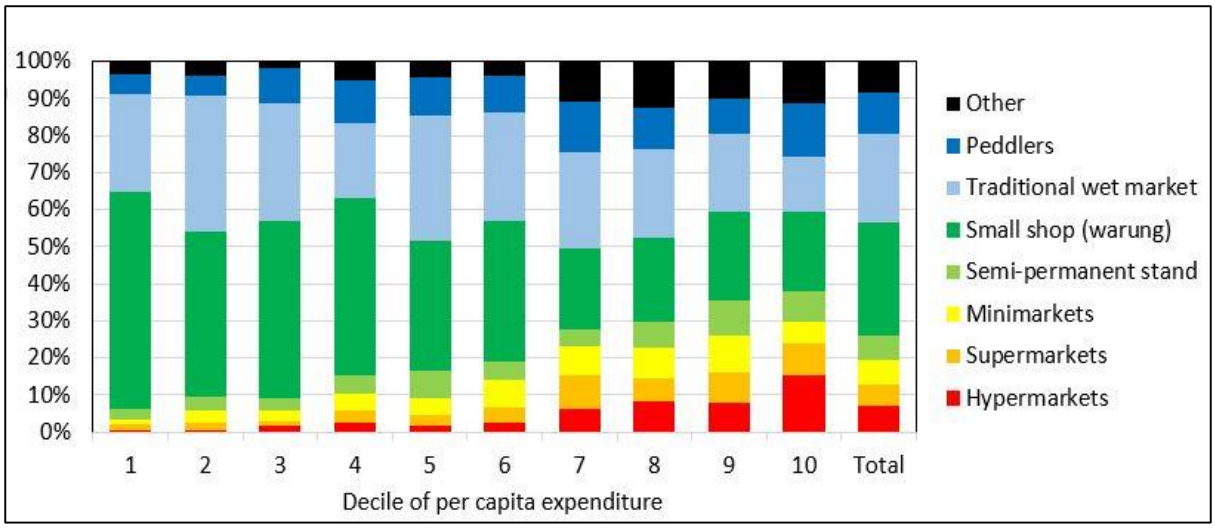
Figure 1. Share of spending at each type of food retailer by food category



Source: Analysis of data from the 2010 Indonesia Survey of Urban Consumers.

Figure 2. Share of spending at each type of food retailer by expenditure category



Source: Analysis of data from the 2010 Indonesia Survey of Urban Consumers.

Table 1. Descriptive statistics of dependent and independent variables

Variable	Weighted mean	Unweighted mean	Standard deviation
Dummy for shops at modern outlet	0.71	0.77	0.42
Pct food bought at modern outlet	0.13	0.16	0.17
Log of per capita expenditure	15.89	16.12	0.80
(Log of per capita expenditure)^2	252.88	260.60	26.09
Household size	4.49	4.41	1.76
Age of head of household	48.57	49.80	13.24
Female-headed household	0.12	0.14	0.34
Education of head of household	9.94	11.05	4.55
Wife works outside the house	0.10	0.07	0.26
Time spent by wife on work outside house (hours)	2.02	1.38	5.44
Owns refrigerator	0.63	0.72	0.45
Owns motorbike, car, or truck	0.72	0.77	0.42
Time to nearest modern retailer (min.)	7.94	7.65	4.94
Lives in Surabaya	0.60	0.51	0.50
Lives in Bogor	0.22	0.24	0.43

Source: Analysis of data from the 2010 Indonesia Survey of Urban Consumers

Table 2. Determinants of the share of food spending allocated to modern retailers

Independent variables	Coefficients (t statistics)	
	Dependent variable = Share of households shopping at modern outlet	Dependent variable = Share of food budget spent at modern outlet among those shopping at modern outlet
Log of per capita expenditure	4.686	1.686
	(2.27)**	(2.99)***
(Log of per capita expenditure)^2	-0.127	-0.048
	(2.00)**	(2.83)***
Household size	0.185	0.029
	(4.96)***	(4.85)***
Age of head of household	-0.002	-0.003
	(0.40)	(3.21)***
Female-headed household	0.118	0.014
	(0.80)	(0.41)
Education of head of household	0.084	0.016
	(5.75)***	(5.09)***
Wife works outside the house	0.208	0.136
	(0.37)	(1.28)
Hours/week worked among working wives	-0.004	-0.007
	(0.13)	(1.46)
Owns refrigerator	0.441	0.121
	(3.87)***	(2.77)***
Owns motorbike, car, or truck	0.320	0.032
	(2.69)***	(0.74)
Time to nearest modern retailer (min.)	0.005	-0.002
	(0.46)	(0.71)
Lives in Surabaya	0.179	0.063
	(1.47)	(2.45)**
Lives in Bogor	0.146	0.076
	(1.03)	(2.50)**
Constant	-43.744	-15.107
	(2.62)***	(3.20)***
Sigma	0.200	
	(20.72)***	
N	1,117	

Source: Analysis of data from the 2012 Indonesia Survey of Urban Consumers.

Table 3. Projections of urban food spending at traditional and modern retail outlets

Year	Share of urban food spending at modern outlets (%)	Total urban food spending (trillion IDR)	Urban food spending at modern outlets (trillion IDR)	Urban food spending at traditional outlets (trillion IDR)
2010 (estimated)	18%	457	81	376
2015	21%	617	125	492
2020	23%	823	186	637
2025	25%	1083	267	816
Sensitivity analysis				
2025 with 10% income growth	28%	1494	423	1071
2025 with double the modern share elasticity	33%	1083	354	729
2025 with 10% income growth & double the modern share elasticity	39%	1494	583	911

Source: Assumptions about income growth and urban population growth and analysis of data from the 2012 Indonesia Survey of Urban Consumers.