

LOCAL FOOD IN SUPERMARKETS: MULTINATIONAL VIS-À-VIS DOMESTIC CHAINS

José Caraballo-Cueto, PhD

University of Puerto Rico

Abstract

There is growing demand to offer more local food in supermarkets. However, there is insufficient information on the availability of raw and processed local food in supermarkets or the difference between domestic and multinational supermarket chains. Aggregate data are suboptimal to shed light on these gaps. We use Puerto Rico as a case study where the average income is relatively high, both multinational and domestic supermarket chains compete, where most of the food is bought in these retailers, and where the agriculture sector has been relegated in the macroeconomic growth plan. We conducted censuses of food in domestic and multinational supermarket chains and found that, in general, 13% of the food is local, and this share varied by food category. The share of local food was higher in domestic supermarket chains. This situation exacerbates food security in small islands such as Puerto Rico. [**Keywords:** food imports, supermarkets, local food, self-sufficiency, multinational chains, domestic chains].

Resumen

Existe una creciente demanda de alimentos locales en los supermercados. Sin embargo, no hay suficiente información sobre la disponibilidad de alimentos locales crudos y procesados en los supermercados, ni sobre la diferencia entre las cadenas de supermercados nacionales y las multinacionales. Los datos agregados no son óptimos para arrojar luz sobre estas brechas. Usamos a Puerto Rico como caso de estudio, donde el ingreso promedio es relativamente alto, donde compiten cadenas de supermercados multinacionales y nacionales, donde la mayor parte de los alimentos se compran en estos minoristas y donde el sector agrícola ha sido relegado en el plan de

crecimiento macroeconómico. Realizamos censos de alimentos en cadenas de supermercados nacionales y multinacionales y encontramos que, en general, el 13% de los alimentos son locales, y esta proporción varió según las categorías de alimentos. La proporción de alimentos locales fue mayor en las cadenas nacionales de supermercados. Esta situación agrava la seguridad alimentaria en islas pequeñas como Puerto Rico. **[Palabras clave:** importaciones de alimentos, supermercados, alimentos locales, autosuficiencia, cadenas multinacionales, cadenas nacionales].

Introduction

Local food is a relevant consumer concern (Perito et al., 2019). It is associated with fresh produce (Rummo et al., 2019), sustainability practices (Chambers et al., 2007), economic activity in local economies (Chambers et al., 2007; Taylor et al., 2005), and food security (Burnett & Murphy, 2014; Clapp, 2017). Small islands such as Puerto Rico, isolated from large countries with large food production, are more prone to food insecurity in case of global crises or problems with access to local ports. By raising local food production, residents of small islands can reduce the risk associated with those external shocks to food security.

These and other reasons have led both domestic and multinational supermarket chains to offer more local food, even though they have sophisticated methods of buying from global suppliers (Barret et al., 2020; Bloom & Hinrichs, 2017). However, it is unclear who is more connected to the local food economy, whether domestic or multinational chains of supermarkets. In addition, there is scarce information on the extent of local food in supermarkets in mid- to high-income islands, which are more vulnerable to external shocks in their food supply (Barlagne et al. 2015) and where the agriculture sector is relatively smaller than in low- to mid-income countries. Thus, we ask: who offers more local food to their customers, domestic or multinational chains of supermarkets? Are multinational supermarkets more connected to domestic value chains (DVCs), where food supply chains occur in a single territory, or to global value chains (GVCs)? Are there “markets” (e.g., raw versus processed food) within supermarkets where local food has higher representation? We sought to empirically answer these questions by conducting censuses in supermarkets in Puerto Rico, an upper middle-income island where both domestic and multinational supermarket chains operate.

How can one measure the share of local food? We propose counting the number of local food items vis-à-vis the total number

of items available to residents in supermarkets, where most food consumption in mid- and high-income countries occurs (Traill, 2006). Some investigators, such as Ghose (2014), have measured local food by comparing total domestic production with total consumption. If these computations are solely based on physical units of raw food, then it would be discarding the consumption of processed goods (e.g., bread, snacks, and beverages) whose value-added exceeds the value of raw food and are common in mid to high-income economies.

If such computations include processed food, one must rely on aggregate trade data. However, aggregate trade data may be inadequate to evaluate food imports because they are measured in monetary value. If local products are more expensive than imported goods, then the share of local food would be overestimated. For example, four organic local bananas may cost more than ten non-organic imported bananas. On the other hand, if one calculates the share of local food as one minus the division of food imports by total food consumption, one will overestimate that share because consumer prices are higher than import prices. One can attribute a markup over import prices, but that might be subject to speculation. Thus, our methodology has the advantage of not relying on monetary units. We found that 13% of the available food in the supermarkets in our case study was local and that this percentage varied by food categories and type of supermarket.

Our analysis helps to identify some of the niches where local production is competitive relative to imports, informing policymakers about the areas with the potential to increase local food and categories where local producers are falling behind and may need intervention. An articulated project, where the government creates conditions allowing farmers and food manufacturers to produce at competitive prices, can reduce the dependency on food imports.

In the next section, we introduce our case study. After that, we describe our survey methodology. In the third section, we show our results; conclusions are stated in the fourth part.

The Case of Puerto Rico

Puerto Rico, like many other islands subject to foreign control (Barlagne et al. 2015), had an agriculture sector inserted on an export-led orientation during the first half of the twentieth century. It then transitioned from a low-income traditional agricultural economy to a manufacturing and services society in less than 50 years (Dietz, 1986; Economic Commission for Latin America and the Caribbean, 2005), and now it is considered a high-income economy by the World Bank since 2020. Since

1898, Puerto Rico has been a possession of the United States, and since 1917, Puerto Ricans have been U.S. citizens. During the second half of the 20th century, a strategy of “industrialization by invitation” (or “Operation Bootstrap”) succeeded in populating the local economy with U.S.-owned factories producing for the U.S. market, whose owners were attracted by low wages and tax breaks in the context of a U.S. territory (Caraballo-Cueto & Lara, 2018). As in other economies transitioning from a low-income status to a high-income level, Puerto Rico dismissed the agriculture sector from the economic growth strategy. In 2021, it represented only 0.6% of the GDP and 1.5% of the total employment.

Typically, economies with a high-income status have a higher penetration of supermarkets in food distribution and a lower dependency on informal or small food markets (Barret et al., 2020; Traill, 2006). In 2017, supermarkets probably sold around 71% of the total food in Puerto Rico. The combined sales from meat markets, seafood markets, fruit and vegetable markets, other specialty food stores, and convenience stores added up to \$256.5 million, or 6% of the total supermarket sales (U.S. Census Bureau, 2017). In the same economic census, the total sales of restaurants were \$3.023 billion, including services such as mixing drinks and cooking. Given that operating expenditures in restaurants represented 50% of the total sales, one could roughly attribute that the other \$1.5 billion included the price of food and other expenses in restaurants.

Another interesting aspect of Puerto Rico is that multinational supermarkets have one of the largest market penetrations in the world, while domestic supermarket chains are also competitive (Caraballo-Cueto, 2019). This setting allows us to compare the roles of both multinational and domestic supermarket chains in a local food economy.

The multinational supermarket in our census was represented by Walmart and Amigo, a smaller retailer that was bought by Walmart in 2003.¹ The domestic chains of supermarkets included Ralph’s Food Warehouse (founded in 1988, with 12 stores), Econo (founded in 1971, with 64 stores), and Selectos (founded in 1978, with 37 stores). As a chain, Ralph’s has a single owner, while Econo and Selectos are owned by “buying groups”—independent owners buying together. Statistical agencies cannot disclose the specific level of sales of these private corporations, but Econo (2022) reported that they sold \$1.5 billion in 2019, and Diaz (2021) stated that Selectos sold around \$700

million, holding together about 40% of the market share in the supermarkets sector. This is because, according to the latest economic census, supermarkets sold \$4.27 billion in 2017 (U.S. Census Bureau, 2017). This market share is close to the trend in Latin America, where 52% of the food sold in supermarkets occurred in local supermarkets and 41% in multinational retailers (Barret et al., 2020).

In addition, in the case of Puerto Rico, food prices are relatively high, which, in theory, should increase the substitutability between local food and imports. In a cost-of-living index, grocery items in the metropolitan area of Puerto Rico ranked as the 19th most expensive among 289 metropolitan areas in the United States in the third quarter of 2020 (Institute of Statistics, 2020). Thus, we would expect that when the market price of food is relatively high, with other factors held constant, the concentration of imported food should not be too high because it is easier for domestic producers to compete with imported food.

However, imported food is not limited to imported fruits, vegetables, meat, and seafood, which we call “raw food”, but should include manufactured food. One may hypothesize that domestic producers in economies with this income level are more competitive with manufactured food because of its higher value-added relative to raw food. Therefore, in this research, we counted raw and manufactured or processed food items. The latter included items such as bread, baked goods, and alcoholic and bottled beverages; snacks, non-refrigerated candies, cereals, and canned food and beverages; all refrigerated products, except for meat and seafood; and grains, seasoning, spices, vinegar, soups, and flour, as discussed below.

Method

Twenty-four research assistants participated in our census. The research assistants took on different food categories within five supermarkets in two municipalities, Cayey and Caguas, in the central area of Puerto Rico. These municipalities have urban and rural populations living in relatively close proximity. According to the 2019 American Community Survey, the median personal income in Caguas was \$15,174, and in Cayey, it was \$13,988, close to the average family income in Puerto Rico (\$13,547). These counties have a population size not too different from the average county in the United States: Caguas had 127,244 inhabitants in the 2020 census and Cayey had 41,652, and both had a relatively high population density greater than 800 inhabitants per square mile.

The selected Walmart store is located in the municipality of Cayey, and the Amigo supermarket is based in the municipality of Caguas. The local supermarkets under investigation in our census were Ralph's Food Warehouse and Econo supermarkets located in Cayey and Selectos supermarkets in Caguas.

The food census consisted of counting total and local items per food category. The categories were meat and seafood; fruits and vegetables; bread, baked goods, and alcoholic and bottled beverages; snacks, non-refrigerated candies, cereals, and canned food and beverages; all refrigerated products, except for meat and seafood; grains, seasoning, spices, vinegar, soups, and flour. We did not count the available quantity of each item because that would be a rather lengthy and cumbersome census, and we were only interested in the availability of local products. We assumed that the supermarket efficiently adjusts the quantity of products per item, contingent on its demand.

To cross-check our data, two research assistants were assigned to conduct the census for each food category at different times, and all the researchers were required to take pictures of the local items. They were supposed to determine whether the product was locally made by reading the product label. Most local food items had labels with stickers reading "Hecho en Puerto Rico" (Made in Puerto Rico), used by the Puerto Rico Products Association, and "Del Pais" (From the Country), used by the Puerto Rico Department of Agriculture. We verified that the censuses independently performed by two different research assistants were identical. Data that could not be validated in this cross-check was discarded.

To evaluate the dispersion around the proportions of local food found in each store, we computed 95% confidence intervals. If the proportions did not have overlapping confidence intervals, then the differences between proportions were statistically significant. If the proportions between stores did have overlapping intervals, we calculated the following z statistics to test the null hypothesis that the proportions were equal:

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\frac{x_1 + x_2}{n_1 + n_2} \left(1 - \frac{x_1 + x_2}{n_1 + n_2}\right) \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \quad (1)$$

We acknowledged that not all food can be produced in Puerto Rico, either because of limitations in terms of economies of scale (i.e., the ability to reduce the average cost of goods with mass production) for certain goods or because of the weather (e.g., inappropriate for apples). However, while we focused on the local food ratio for illustration purposes, one could easily calculate the imported food ratio as one minus the local food ratio.

Results

Puerto Rico has 44 coastal municipalities out of 78 municipalities in total. Thus, one could expect that there is a vibrant fishing industry holding a relatively large share of local seafood in the supermarkets. However, we found only one local item in the seafood section of Ralph’s and zero items in the rest of the stores. Local items shown in Table 1 were almost all related to meat rather than seafood. This category included only refrigerated meat, such as whole chicken, ground meat, and steak, and refrigerated seafood, such as mahi-mahi and shrimp.

Table 1. Census of Meat and Seafood Items by Supermarket, 2019

Supermarket	Local Items	Total Items	Shares of local food	Local Food 95% intervals	confidence
All supermarkets	266	1,758	15%	13.3%	16.7%
Ralph’s	73	303	24.1%	19.3%	28.9%
Walmart	50	597	8.4%	6.2%	10.6%
Econo	57	342	16.7%	12.7%	20.7%
Amigo	18	226	8.0%	4.5%	11.5%
Selectos	68	290	23.4%	18.5%	28.3%

Source: Author’s calculation on collected data (2021)

In general, 85% of the meat and seafood items available in supermarkets in Puerto Rico were found to be imported. This share does not differ from the self-sufficiency ratio proposed by the Food and Agriculture Organization (FAO) used in Comas (2009), who found the same percentage of meat and seafood imported by considering physical units produced and internationally traded.

There are other points worth noting. First, the number of items available under the refrigerated meat and seafood category was larger in Walmart and Econo than in the rest of the stores, which are the largest retailers in terms of cubic feet. However, the proportion of local items for this food category was larger in Ralph’s (24%) and in Selectos (23%), which are smaller stores than Walmart and Econo.

The proportion of local food in Ralph's and Selectos was higher than in Walmart, and these differences had a high statistical significance because the 95% confidence intervals did not overlap. The differences between Walmart and Econo also had a high statistical significance ($z = 3.85$). Thus, there was a correlation between the type of store, the cubic feet of the store, and the proportion of local food items within the total supply: Local and smaller supermarkets had higher shares of local food than multinational stores.

Table 2. Census of Snacks, non-refrigerated Candies, Cereals, and canned Food and Beverages Items by Supermarket, 2019

Supermarket	Local Items	Total Items	Shares of local food	Local Food 95% confidence intervals
All super-markets	198	3011	6.6%	5.7% 7.5%
Walmart	63	897	7.0%	5.3% 8.7%
Econo	104	1129	9.2%	7.5% 10.9%
Amigo	31	985	3.1%	2.0% 4.2%

Source: Author's calculation on collected data (2021)

In the case of the processed food shown in Table 2, we found that the proportion of local food was smaller than in the case of seafood and meat. Specifically, 7% of the snacks, non-refrigerated candies, cereals, and canned food and beverages were local, mainly using intermediate inputs from abroad. It would appear that local producers prefer to sell raw food rather than add value by processing food or that these supermarket chains have decided to rely almost entirely on GVCs to acquire processed food. Because this category is composed of processed goods only, it does not have a similar counterpart measurement in the FAO's self-sufficiency ratio that relies on internationally traded quantities of raw food.

A similarity between this food category and the seafood and meat group is that the locally-owned supermarket Econo has a lower share of imports (91%) than Walmart (93%) and Amigo (97%), as shown in Table 2. Differences between Amigo and Econo were statistically significant (i.e., no overlapping confidence intervals) at the 95% confidence level, but the differences between Econo and Walmart were not significant.

Table 3. Census of Bread and Baked goods, Alcoholic Beverages, and Bottled Beverages Items by Supermarket, 2019

	Food Categories	Bread and Baked goods	Alcoholic Beverages	Bottled and Canned Beverages
All supermarkets	Local Items	241	241	22
	Total Items	469	2455	429
	Shares of local food	51.4%	9.8%	5%
	Local Food 95% confidence intervals	(46.9-55.9)	(8.6-11)	(2.9-7.1)
Ralph's	Local Items	110	43	-
	Total Items	224	490	-
	Shares of local food	49%	9%	-
	Local Food 95% confidence intervals	(42.5-55.5)	(6.5-11.5)	
Econo	Local Items	131	68	22
	Total Items	245	908	429
	Shares of local food	53%	7%	5%
	Local Food 95% confidence intervals	(46.8-59.2)	(5.3-8.7)	(2.9-7.1)
Walmart	Local Items	-	40	-
	Total Items	-	277	-
	Shares of local food	-	14%	-
	Local Food 95% confidence intervals		(9.9-18.1)	
Amigo	Local Items	-	90	-
	Total Items	-	780	-
	Shares of local food	-	12%	-
	Local Food 95% confidence intervals		(9.7-14.3)	

Note: 95% confidence intervals are shown in shares under parentheses.

Source: Author's calculation on collected data (2021)

The bread and baked goods category represents the only classification where local items predominated over imported items, as shown in Table 3. This may correspond to a “home bias” (Wolf, 2000) or to consumer preferences for local types of bread and baked goods (e.g., “sobao” bread, which looks like French bread but is sweet and soft) that multinational companies do not make. Similarly, this finding may show that local producers can be more competitive in processed goods than in raw food, thus, we saw relevance in measuring the share of local food in processed goods as well.

Regarding the type of supermarket, Econo had a proportion of 53% of local bread and bakery goods. Ralph’s had almost equal shares of imported and local food in this category. We did not find consistent information in the case of multinational stores.

In the case of bottled and canned beverages, excluding alcoholic beverage products, we could only measure these items in Econo, where just 5% of the total items comprised local items. There were some local manufacturers of non-alcoholic beverages, such as sodas (e.g., Old Colony and Piña Buena). Still, their production appeared limited or had relatively low competitive advantages over imports.

Because Puerto Rico exports a significant number of rum brands to the United States (Maguire & Teefy, 2010), one would expect local distilleries to dominate the local market in the category of alcoholic beverages. However, only 10% of alcoholic beverage items were found to be local. This category was the only one where multinational supermarkets held a higher share (between 12% and 14%) of local items than Puerto Rican supermarkets (between 7% and 9%). In these shares of local alcoholic beverages, multinational stores had a statistically significant difference at the 95% confidence level with Econo. There was a relatively high statistically significant difference between Walmart and Ralph’s ($z = 2.14$). The differences between Amigo and Ralph’s were statistically significant at the 90% confidence level ($z = 1.69$).

Table 4. Census of Grains, Seasoning, Spices, Vinegar, Soups, and Flour Items by Supermarket, 2019

Supermarket	Local Items	Total Items	Shares of local food	Local Food 95% confidence intervals	
All supermarkets	199	713	27.9%	24.6%	31.2%
Ralph's	121	425	28.5%	24.2%	32.8%
Amigo	78	288	27.1%	22.0%	32.2%

Source: Author's calculation on collected data (2021)

Table 4 shows the results of our census of grains, seasoning, spices, vinegar, soups, and flour items. Here, we validated our data in one locally owned supermarket (Ralph's) and one multinational store (Amigo). In general, there was a share of local food of 28% in this group of items. The outcome of this ratio differs significantly from the self-sufficiency ratio proposed by the FAO and used in Comas (2009), who found that the percentage of soups and spices locally produced was 6% by considering physical units produced and internationally traded.

In Ralph's supermarket, the percentage of local grains, seasoning, spices, vinegar, soups, and flour items was 29%. This share was larger by 1.4 percentage points than in Amigo, showing that multinational supermarkets stock a lower share of local food. However, this difference was not statistically significant ($z = -0.41$).

Table 5. Census of Fruit and Vegetable Items by Supermarket, 2019

Supermarket	Local Items	Total Items	Shares of local food	Local Food 95% confidence intervals	
All supermarkets	162	894	18.1%	15.6%	20.6%
Ralph	19	103	18.4%	10.9%	25.9%
Walmart	36	217	16.6%	11.6%	21.6%
Econo	45	216	20.8%	15.4%	26.2%
Amigo	22	156	14.1%	8.6%	19.6%
Selectos	40	202	19.8%	14.3%	25.3%

Source: Author's calculation on collected data (2021)

As discussed above, local agricultural production declined after the industrialization policies pursued by many Puerto Rican governments during the 20th century (Dietz, 1986). But even before industrialization, when labor costs were similar to neighboring economies, Puerto Rico imported a relatively large number of agricultural products from the United States (Carro-Figueroa, 2002). Del Mar López et al. (2001) argued that urban expansion further exacerbated the agricultural inputs needed for a vigorous agrarian sector.

Consistent with the related literature, we found that supermarkets had, on average, 18% of local fruit and vegetable items in their stores, as shown in Table 5. The share of local food in Puerto Rico does not differ significantly from the self-sufficiency ratio proposed by the FAO: For local produce, Comas (2009) found a value of 19% by considering physical units produced and internationally traded.

This share was higher in the local store Econo (21%) and lower in the multinational store Amigo (14%). The difference between these two stores was statistically significant at the 90% confidence level. The differences between the rest of the stores were not statistically significant.

Table 6. Census of all Refrigerated Items (excluding Meat and Seafood) by Supermarket, 2019

Supermarket	Local Items	Total Items	Shares of local food	Local Food 95% confidence intervals	
All supermarkets	348	3728	9.3%	8.4%	10.2%
Ralph's	200	1746	11.5%	10.0%	13.0%
Walmart	56	764	7.3%	5.5%	9.1%
Econo	92	1218	7.6%	6.1%	9.1%

Source: Author's calculation on collected data (2021)

On average, nine out of every ten refrigerated items (excluding meat and seafood) were found to be imported to Puerto Rico. However, local supermarkets held a lower share of imported refrigerated items than multinational stores. The percentages of local food in Econo (8%) and Ralph's (12%) showed a statistically significant difference at the 95% confidence level (no overlapping intervals) with the multinational store Walmart (7%). This finding may respond to the considerable sunk costs associated with distributing refrigerated items that only multinational supermarkets can afford, the fact that multinational stores appeared to be more connected to global suppliers than to local producers, or both. What is certain is that this high import dependency on multinational supermarkets is consistent with other food categories.

Table 7. Summary of Local Food by Department, 2019

	Meat and Seafood Items	Fruit and Vegetable	Bread and Baked goods, Alcoholic Beverages, and Bottled Beverages	Snacks, non-refrigerated Cereals, canned Food & Beverages	All Refrigerated Items (excluding Meat and Seafood)	Grains, Seasoning, Spices, Vinegar, Soups, and Flour Items	Total
Local	266	162	504	198	348	199	1,677
Total	1,758	894	3,353	3,011	3,728	713	13,457
Local Food % by department	15%	18%	15%	7%	9%	28%	12.5%
Local Food 95% confidence intervals	(13-15)	(15-21)	(14-16)	(6-8)	(8-10)	(25-31)	(12-13)

Note: 95% confidence intervals are shown in shares under parentheses.
 Source: Author's calculation on collected data (2021)

In general, 13% of the items in the surveyed supermarkets were locally made or manufactured, as shown in Table 7. This result may be surprising in light of the relatively high food prices in Puerto Rico, which should encourage more import substitution. Either local producers are not taking full advantage of the relatively high prices or there are limitations for them to compete that outweigh this advantage, such as the Jones Act, which requires that cargo between U.S. ports (including Puerto Rico ports) can only be made by U.S.-owned, U.S.-crewed, U.S.-registered, and U.S.-built vessels, effectively increasing the price of food intermediates to local producers (Suárez-Gómez & Ayala-Cruz, 2016). This regulation may also isolate Puerto Rico from international logistics, reducing local producers' ability to reach economies of scale through international trade.²

The highest dependency on GVCs was observed in the category of snacks, non-refrigerated candies, cereals, and canned food and beverages. Many of these ultra-processed food items were found to be made in the United States, where wages (a significant production cost) are relatively higher than in Puerto Rico. Thus, other factors held constant; production cost is probably not one of the main problems for this category's relatively high food import dependency.

On the other hand, the group that showed the highest share of local food available in supermarkets was grains, seasoning, spices, vinegar, soups, and flour items. It seems that Puerto Rican entrepreneurs have discovered a relatively better opportunity in this minimally processed food, where value-added options (e.g., packaging, processing, and marketing of food) are more important than in the other sectors.

Discussion and Conclusions

The number of local units of raw food, such as meat and seafood, can indicate the degree of participation of a given supermarket in DVCs (Barret et al., 2020). The amount of locally processed food can come entirely from DVCs or partially from GVCs, where imports of intermediate goods are used in locally processed final goods (Johnson & Noguera, 2012).

Regarding raw food, our methodological approach compares relatively well with the self-sufficiency method of the FAO, which is based on physical units produced and internationally traded, except for grains, seasoning, spices, vinegar, soups, and flour items. However, contrary to the FAO method, our method can also shed light on the local food participation in processed foods.

Several conclusions can be derived from our food censuses. First,

supermarkets are highly connected to the GVCs by importing 87% of the food items available for consumers. Because most of the intermediate inputs are imported, 13% of local food is not entirely derived from the DVCs. The reliance on imports, either for final or intermediate foods, may correspond to this economy's relatively small agricultural sector, a characteristic shared with other islands' economies of similar or higher income.

Second, the local food availability varies by category. The smallest share of local food was found in seafood (1%), and the highest was in bread and baked goods (51%). It appears that local producers can compete better or prefer to compete in minimally processed goods (e.g., spices and bread) than in raw food or ultra-processed foods (e.g., canned food).

Third, multinational supermarkets had, on average, a higher percentage of imported food in stock than did domestic supermarket chains. Perhaps domestic chains have better knowledge of the DVCs, while multinational chains are more connected with the GVCs.

Fourth, even though Amigo and Walmart share the same ownership, they do not sell the same share of local food. It appears that the size of these stores influences the marketing and distribution of the food they offer. Amigo is a smaller store and may only offer fast-moving consumer goods, while Walmart may have larger space to accommodate a more extensive variety of food, including those locally produced.

There are opportunities for policymakers to enhance local capabilities for both farmers and food manufacturers. The federal government can repeal the 1920 Jones Act and other trade barriers to help local producers buy intermediate products at competitive prices. The local government could train farmers in the different stages of the supply chain where they can substitute imports (e.g., by selling directly to retailers). In the case of food manufacturers, the local government could help them identify the niches where they can compete with imports. For example, instead of selling whole avocados that compete with imported avocados, local producers may find it profitable to add value to their output by manufacturing guacamole. Coordination problems between retailers, farmers, or food manufacturers can be eased if the government promotes sharing information (e.g., price dashboards published and disseminated by a government agency).

This reveals another interesting research question for future research: in a price analysis, what agricultural products can be competitively substituted? Future studies can also replicate our methodology in supermarkets in economies with different

income levels and compare their results to ours.

Conflict of Interest Statement

None declared.

Manuscript Data Statement

This manuscript contains data that will be made available on reasonable request.

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Notes

1. <https://progressivegrocer.com/wal-mart-puerto-rico-acquires-supermercados-amigo>

2. If a vessel departs from, say, Colombia to Puerto Rico, it cannot take cargo from Puerto Rico and continue to the largest market in the region (the US): either the vessel goes to the US without Puerto Rico exports or goes to a small economy in the region.

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