Using the Food-Dollar Method to Assess the Food Value Chain's Impact on the Achievement of Sustainable Development Goals in Mexico

Araceli Ortega Díaz, Victor Hugo Hernández García, Steven Zahniser, and José Valentín Solis y Arias

Selected presentation for the International Agricultural Trade Research Consortium's (IATRC's) 2022 Annual Meeting: Transforming Global Value Chains, December 11-13, 2022, Clearwater Beach, FL.

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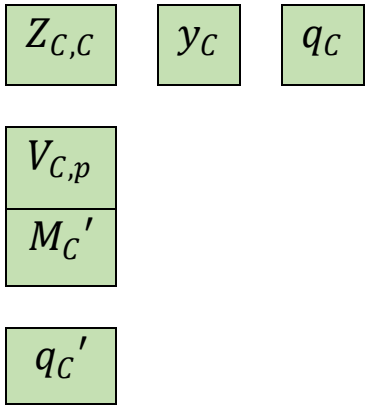
Summary

- We apply the food-dollar methodology to Mexico for the period 2003-18 and use the resulting calculations to assess the many relationships between the farm share of Mexican food expenditures and Mexico's progress toward some the United Nations' Sustainable Development Goals (SDGs): poverty (SDG1), food security (SDG2), gender inequality (SDG5), decent work (SDG8), and income inequality (SDG10).
- We find that
  - the **farm share of food expenditures** was stable for the period analyzed (21.2%),
  - **subsidies** to food production and the share of food expenditures that went to employees' **wages** both decreased,
  - **food imports**' share increased.
  - These three factors (falling production subsidies, falling wages, and rising imports) have a negative effect on household welfare by increasing the price of food and decreasing the income available to spend on food.
- When the shares for food at home and food away from home are decomposed, the first share relies mainly on retail services (36%), and processed food products (26%), while the second depends heavily on food services (73%).

Methodology and data Sources

The organization of the IOT data is illustrated in Figure 1:

Figure 1: Organization of Input-Output Table Data



Source: Prepared by authors.

The SUT-RAS method (Temurshoev & Timmer, 2011) is used by INEGI (2020) to estimate the SUTs for the period 2003-18. This work is based on the benchmark table for 2013, the most recent available for Mexico. The database contains 260 activities under the NAICS classification.

Special treatment in national accounts

1. Accounting for electricity outlays in food trade margins

Following Canning (2011), additional information from the Economic Census was incorporated to account for the higher use of energy in food trade establishments.

2. Food away accounting

Special treatment was given to the consumption of food outside the home, in order to decouple the food services from the actual food consumed.

3. Trade and transport margins for food consumed at home

Additional steps were taken to properly account trade and transport margins integrated in the food expenditure of the households, since the IO tables are valued at basic prices.

Special treatment in national accounts (cont)

- 4. Farm share estimation

$$farm\ share = \frac{\iota_A'\left[q_A^{net} - \overline{s_{m_A}} \cdot y\_fd_A\right]}{\iota_C'\left[(I_{C,C} - \overline{s\_m_C}) \cdot y\_fd_C\right]}$$

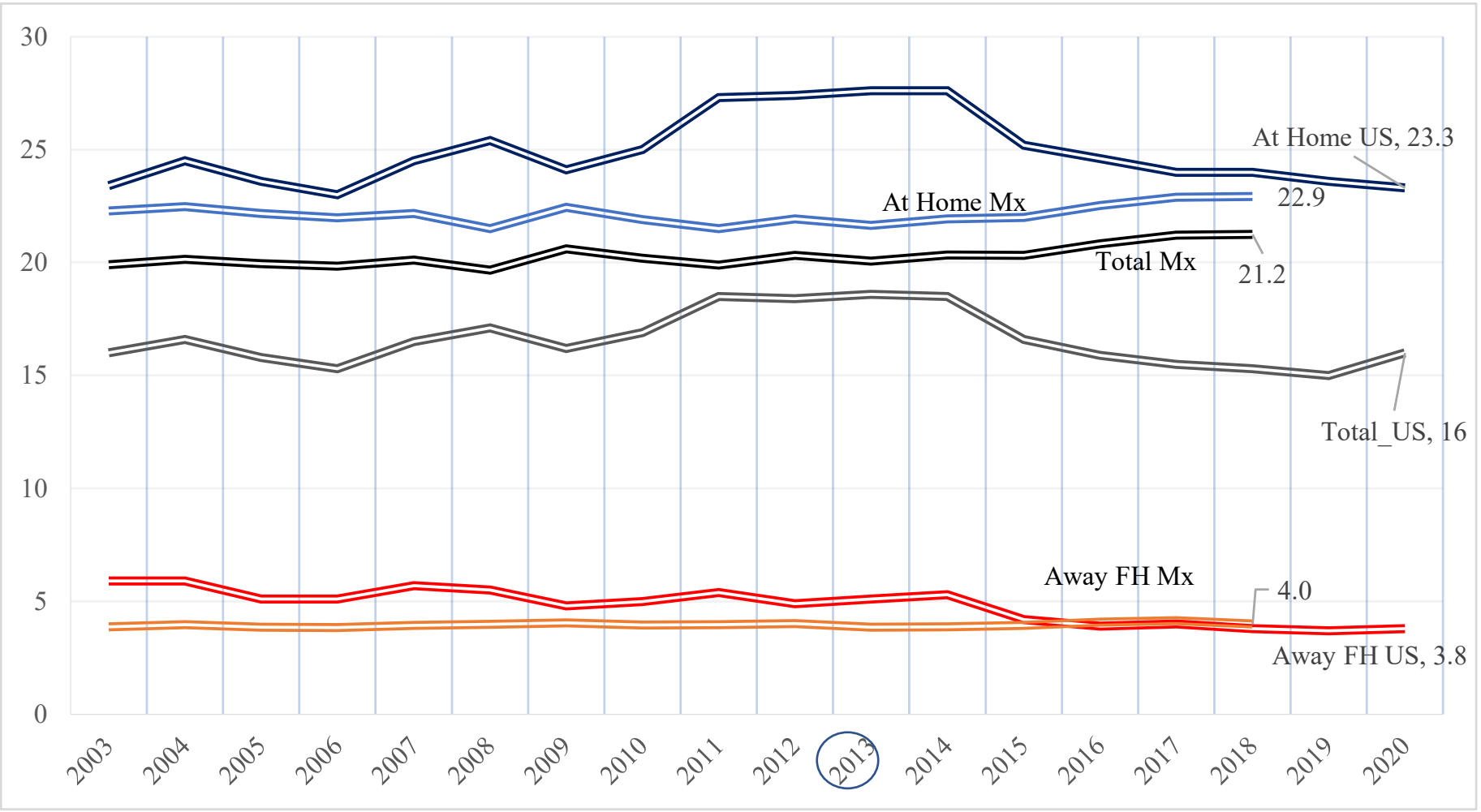
- 5. Supply chain estimation

The *matrix reduction procedure* restrains the results to the food supply chain, which is presented in the final results in 11 aggregated activities.

- Primary factor share estimation

The same procedure was followed for the estimation of primary factor shares, which for Mexico include: Compensation of the employees, Operating surplus, Taxes on products and production, and Imports of intermediate goods.

Food Dollar Estimations: US vs Mex



Farm shares of food at home are similar before 2006 and after 2017, the rest of the period they increase for US

Farm shares of food away from home look very similar for both countries

Base year for RAS in Mex data

Food expenditure shares among primary factors

US **Mex**

Property income (35%) vs Operational surplus (64%)
(↗↘=) (property + mixed income)
(44%) (20%)
(=)

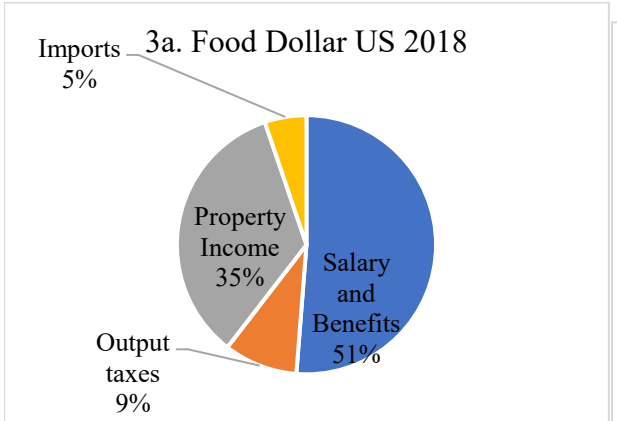
Output taxes (9%) ↑ vs net taxes on production and on products 0.4% +0.2%
(=) ↑

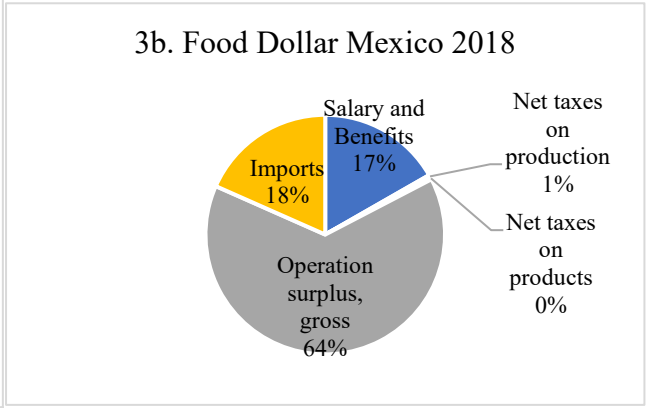
Salaries and benefits: 51% (↘↗=) vs 17% (↓)

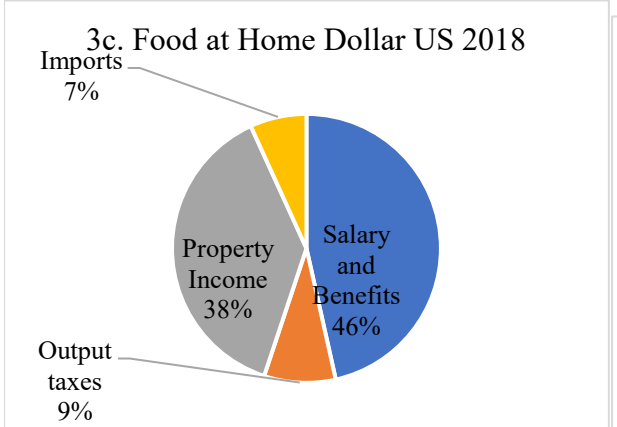
Imports : 5.2% (↗↘) vs 18% (↑)

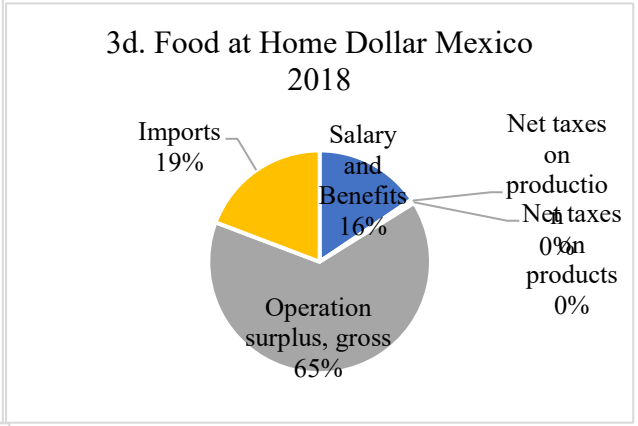
For Mexico, the small share of wages is positively related with higher percentages of people in the agricultural sector having a non-decent work (SDG8) and higher poverty (SDG1).

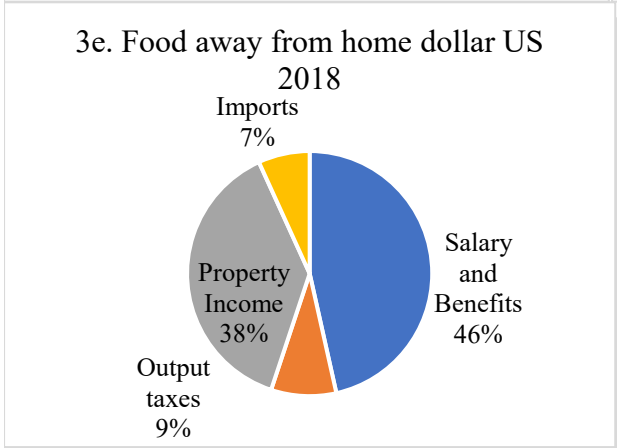
Figures 3. Food expenditure shares distributed among primary factors

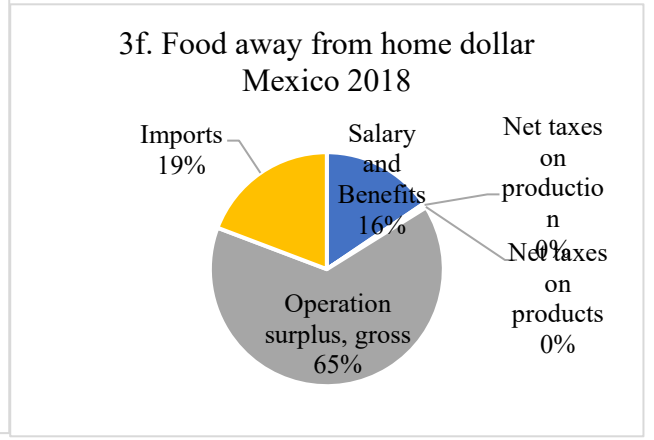






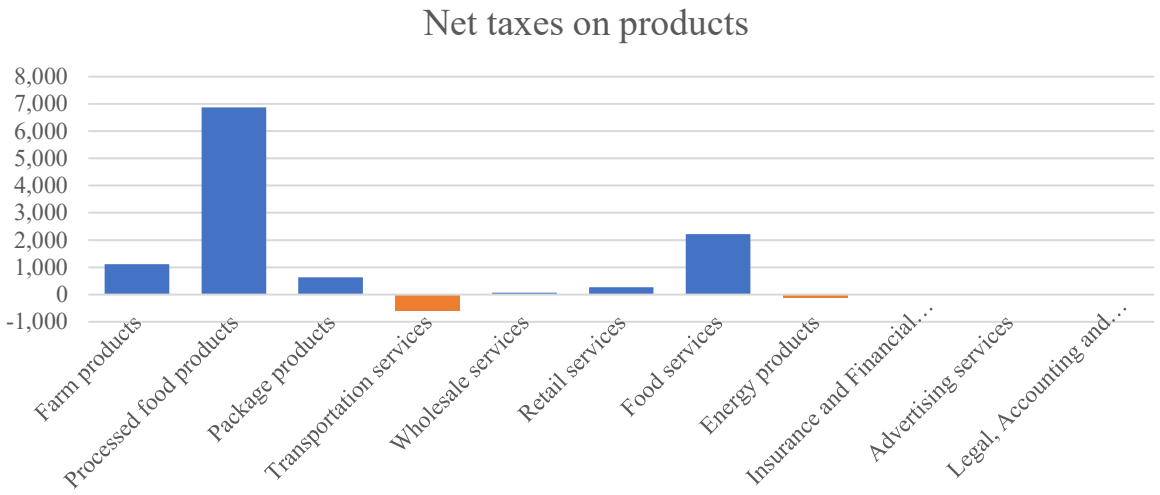


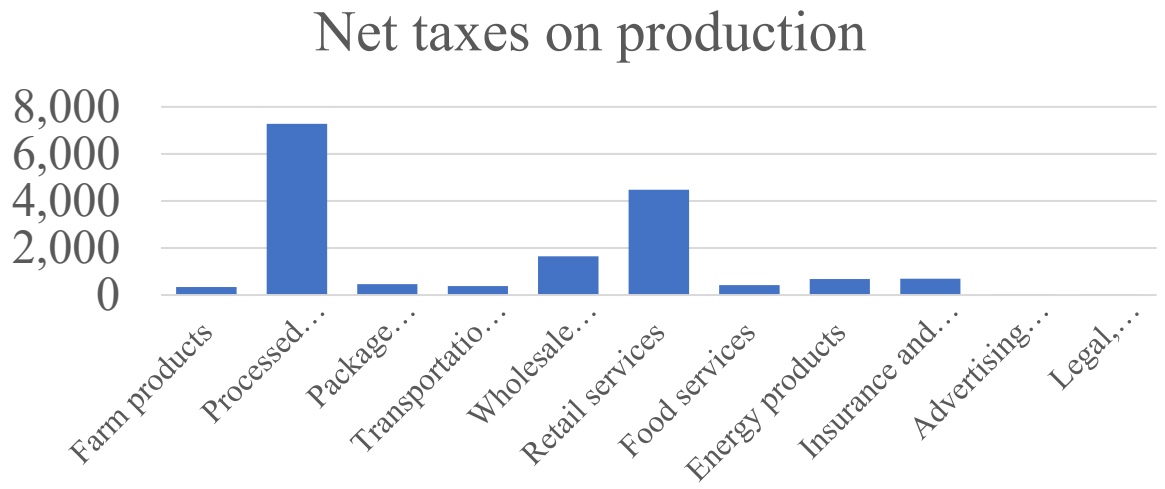


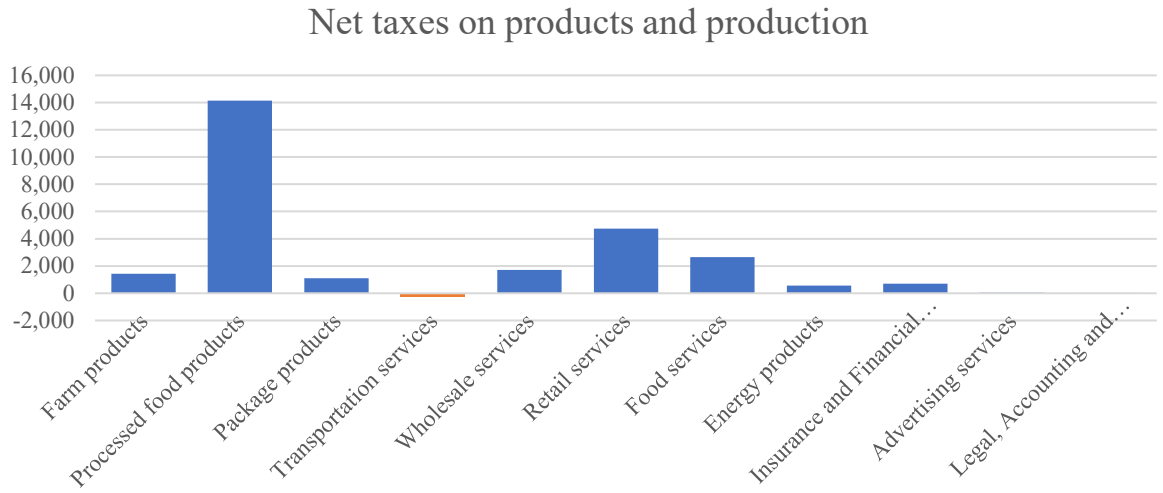


Source: Author´s own elaboration.

Taxes in the food Value Chain 2018

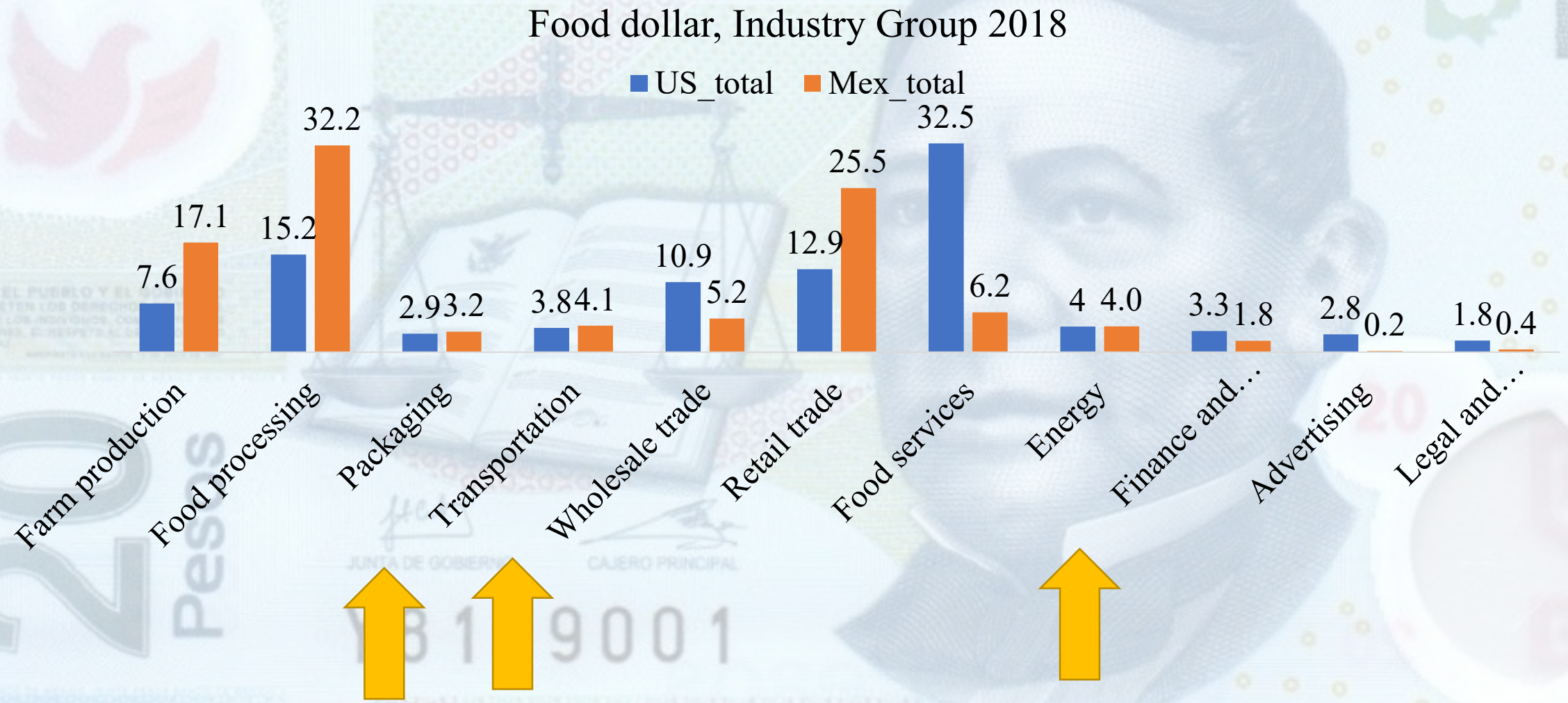




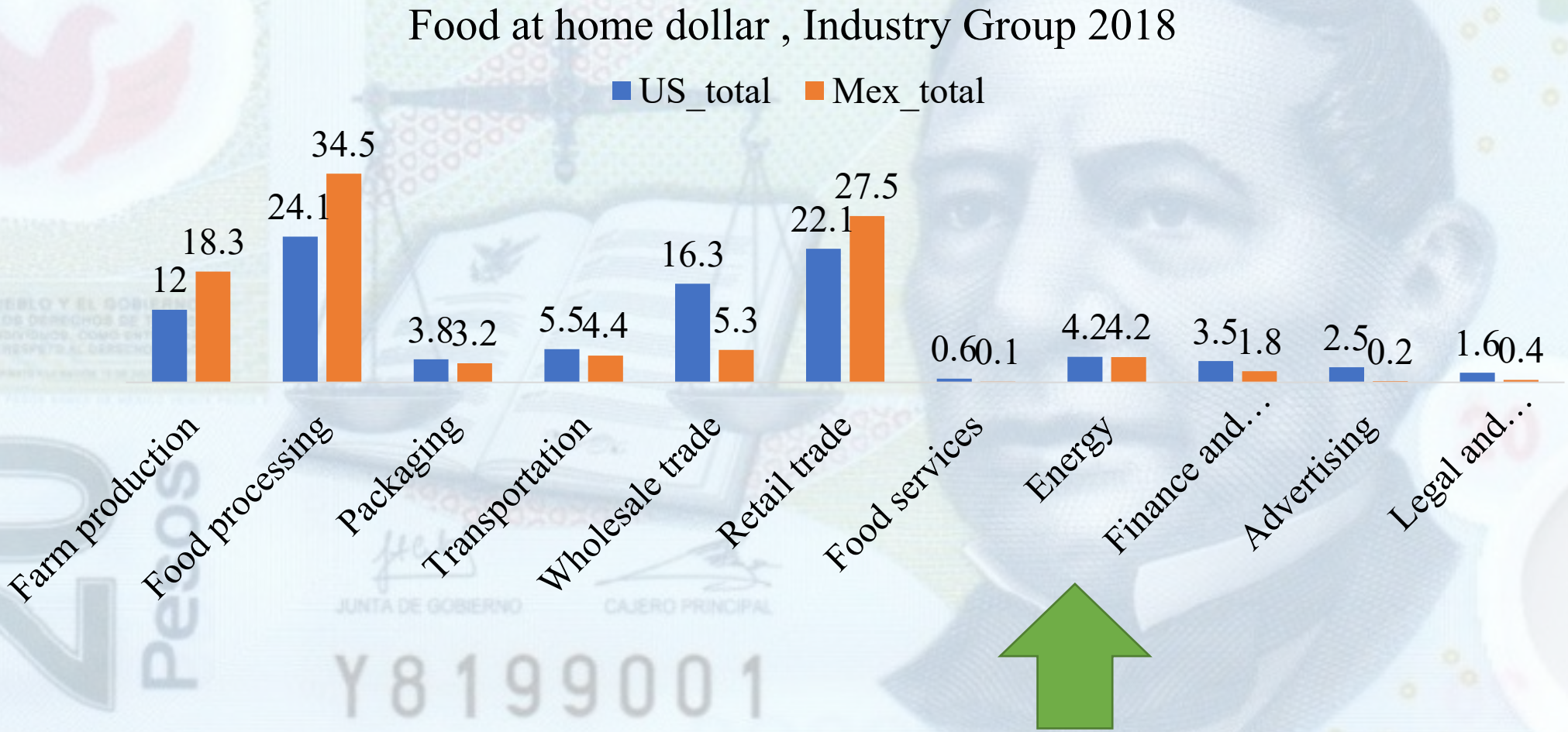


Tax collection is low and there are subsidies for food production.

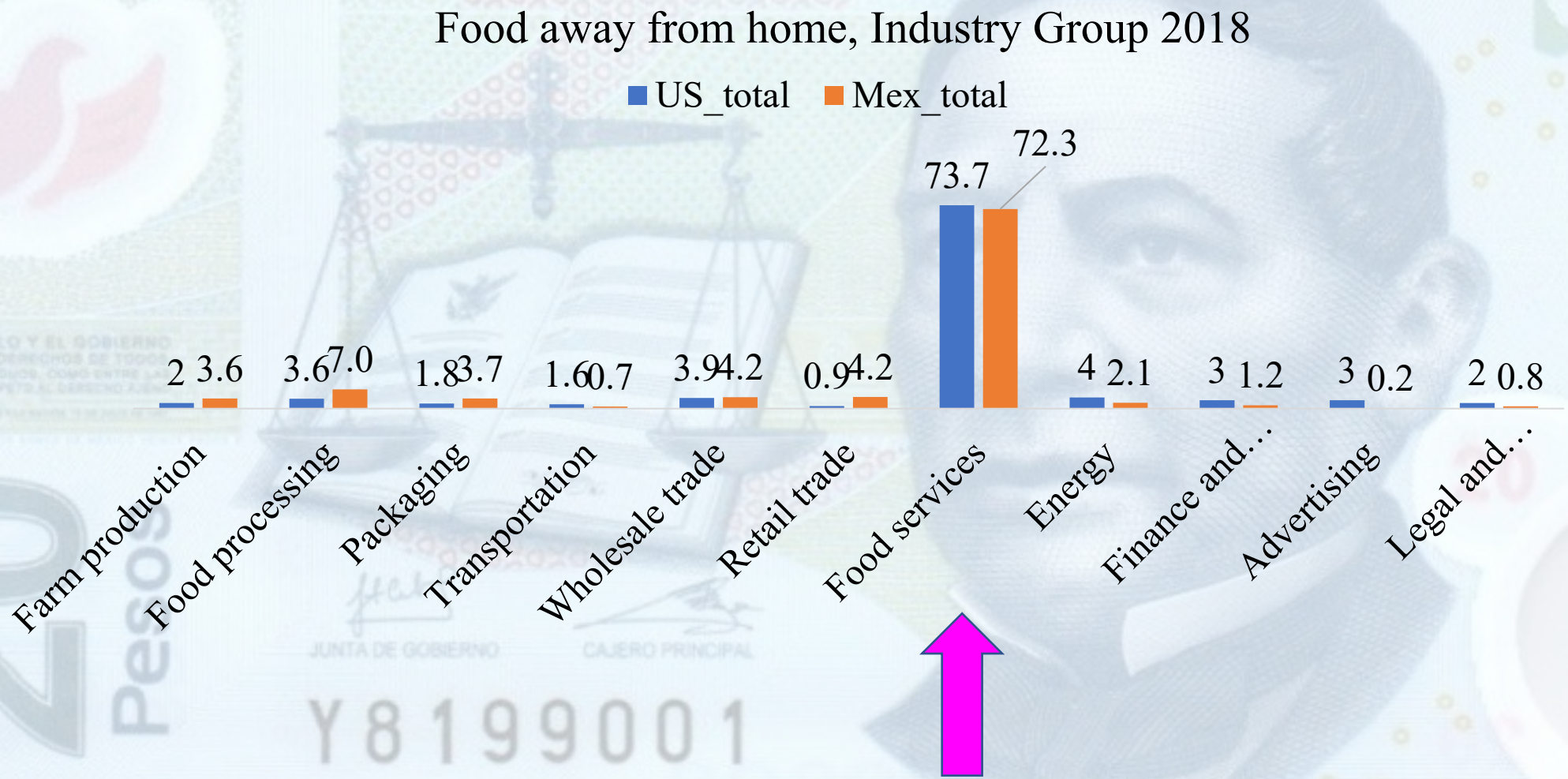
The estimated shares for Mexico and the United States in 2018 are quite different for most industry groups—except energy, packaging, and transportation



Food energy' shares for the two countries are remarkably similar for food at from home



Food services' shares for the two countries are remarkably similar for food away from home



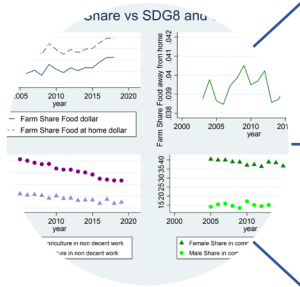
Relationship with SDGs

SDG1: Poverty

Farm Share

SDG2: Food Security

Farm Share



SDG5

- Gender Inequality

SDG8

- Decent work

SDG10

- Income Inequality

SDG8: Non-decent work

Wage share

Relationship with SDG1: Poverty

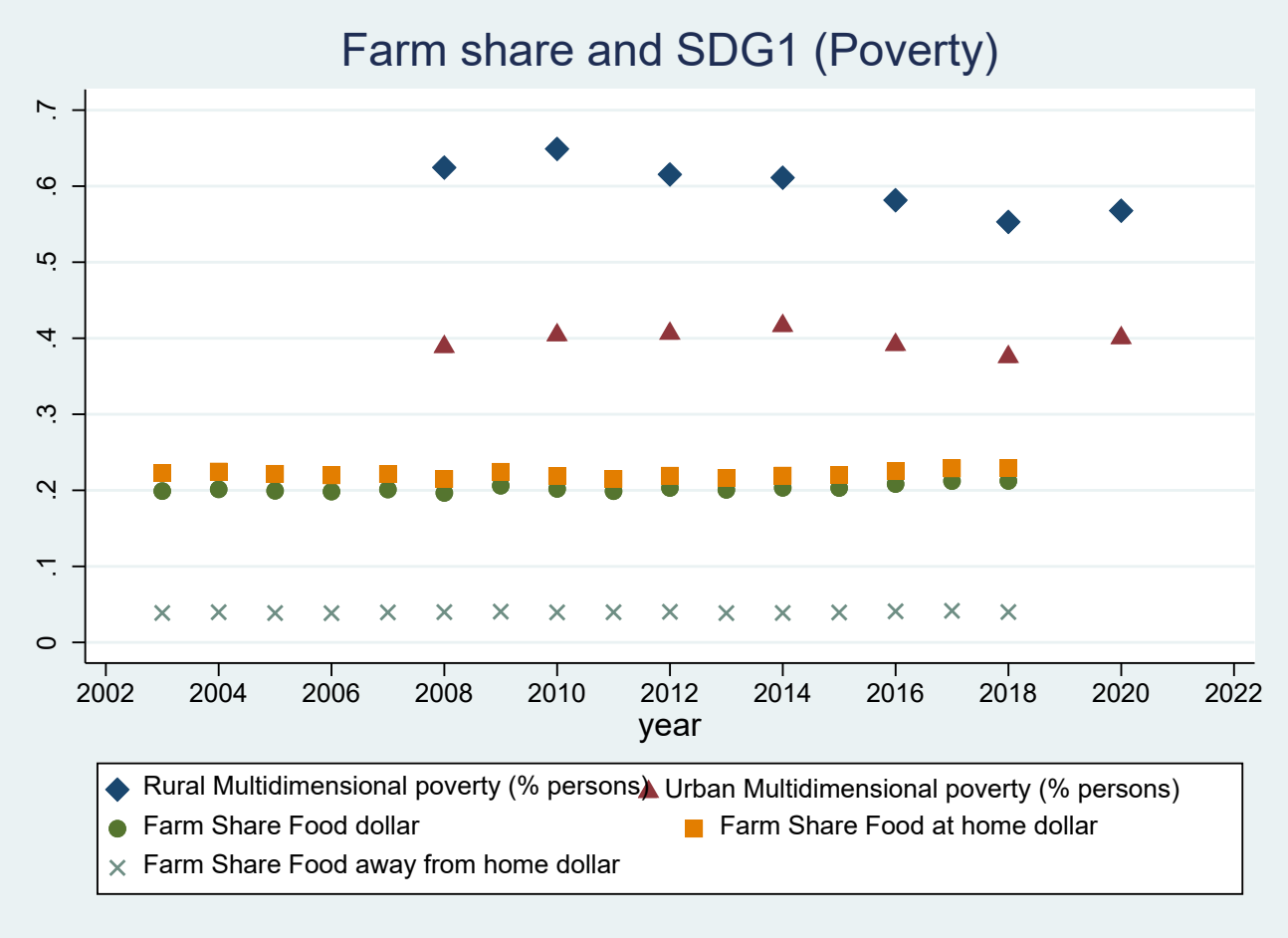


Table 2. Correlation between poverty and food expenditure shares

Pairwise correlation	pob_mul_rur	pob_mul_urb	fs_fd	fs_fah	fs_faway
pob_mul_rur	1				
pob_mul_urb	0.5504	1			
fs_fd	-0.8545*	-0.4483	1		
fs_fah	-0.8762*	-0.5628	0.8093*	1	
fs_faway	-0.3941	-0.5455	0.6945*	0.5171*	1

Source: Authors' own elaboration. *Coefficient significant at the 5% level.

Relationship with SDG2: Hunger

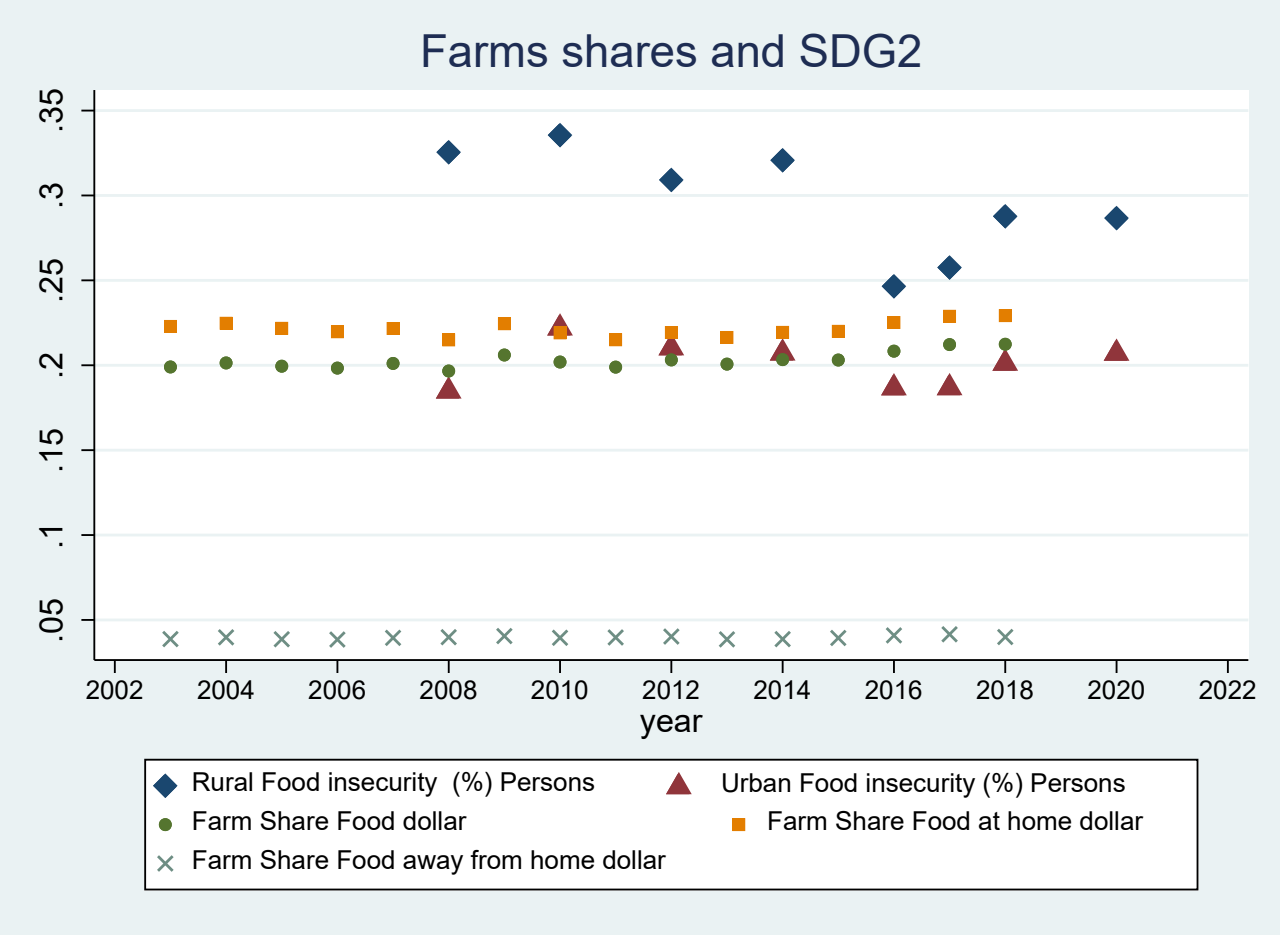


Table 4. Correlation between SDG2 and Food shares

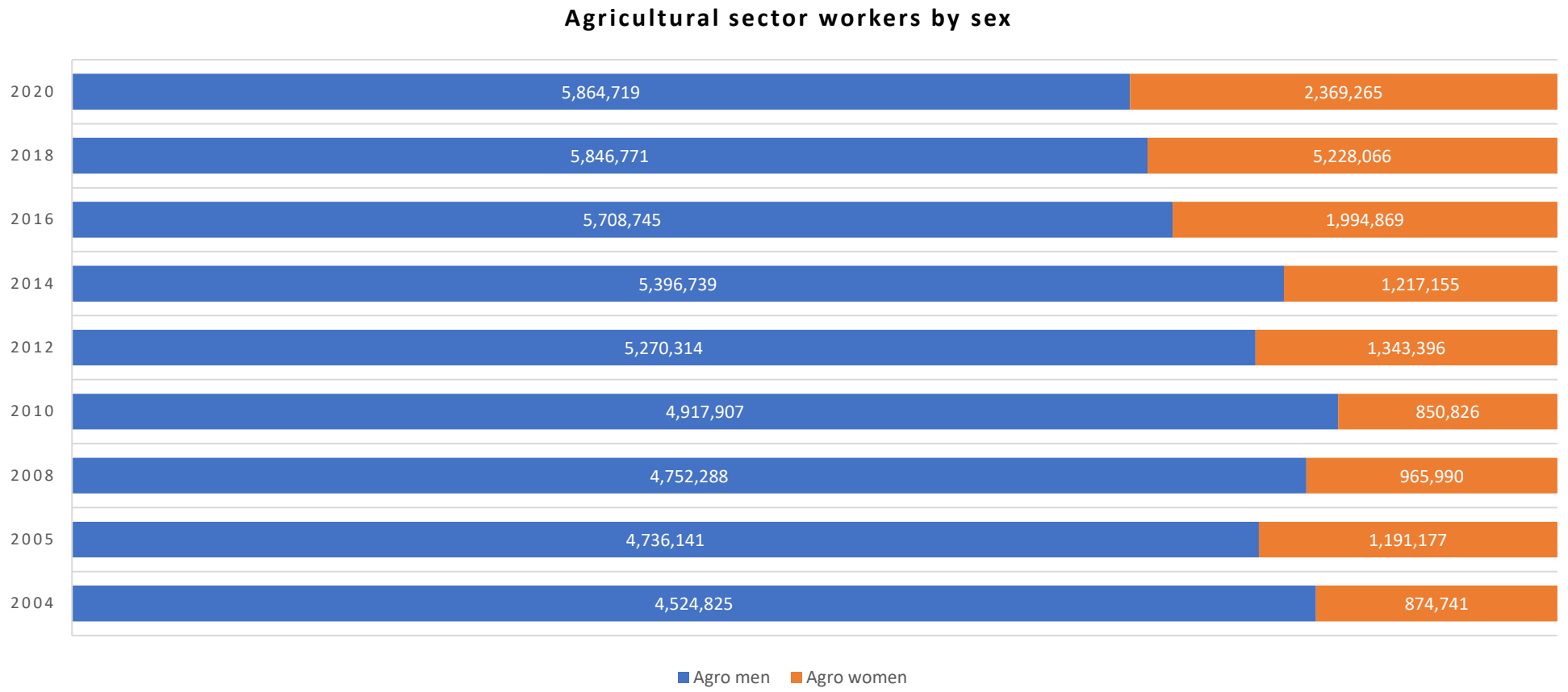
Correlation	c_ali_rur	c_ali_urb	fs_fd	fs_fah	fs_faway
c_ali_rur	1				
c_ali_urb	0.599	1			
fs_fd	-0.7796*	-0.2027	1		
fs_fah	-0.7947*	-0.2718	0.8093*	1	
fs_faway	-0.8216*	-0.6071	0.6945*	0.5171*	1

Source: Authors' own elaboration. *Coefficient significant at the 5% level.

SDG2: Food Security

Farm Share

Relationship with SDGs: Labor and Gender



Relationship with SDG8: Decent Work

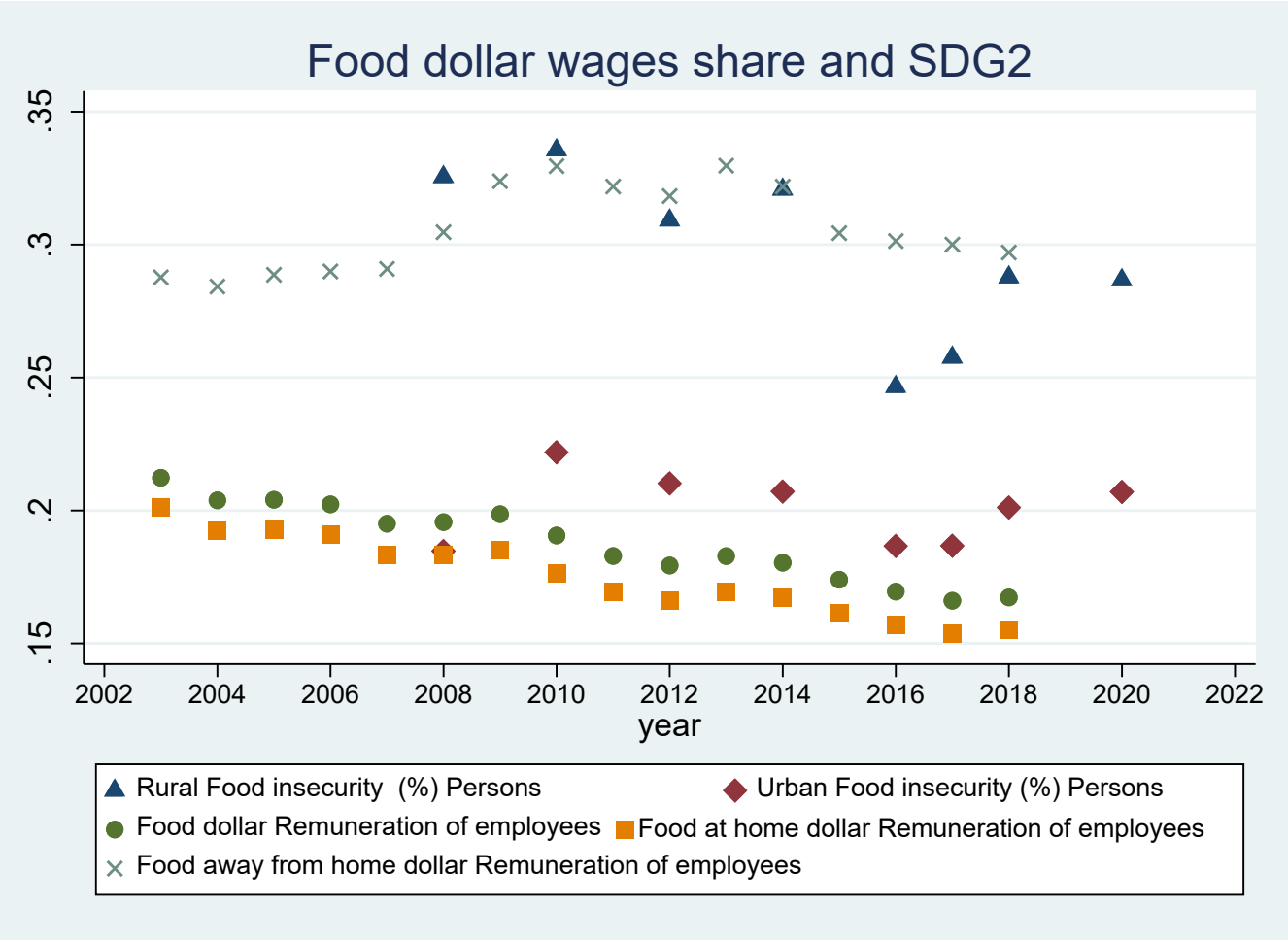


Table 5. Correlation between SDG2 and Food-dollar Wages Shares

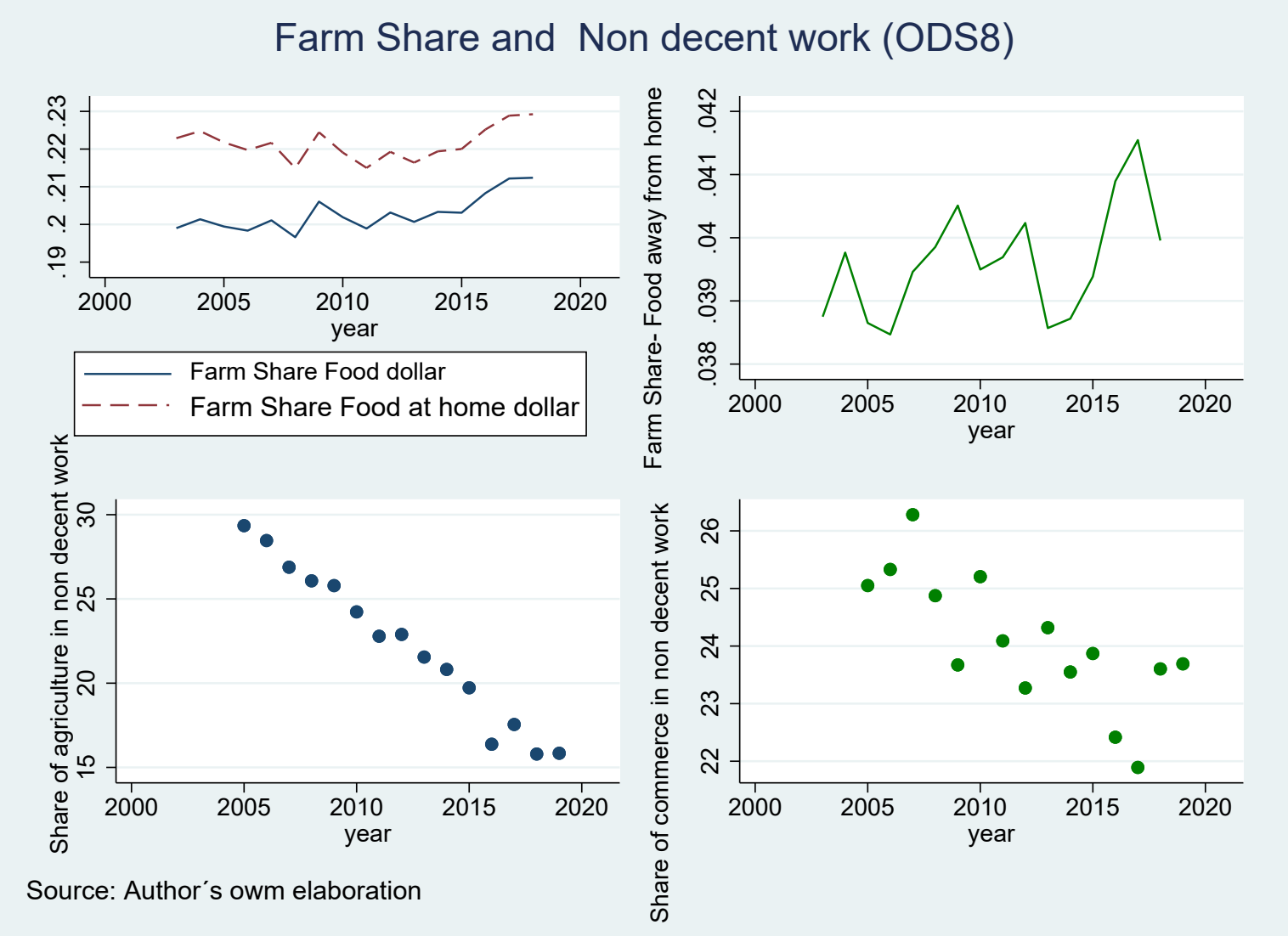
	c_ali_rur	c_ali_urb	fd_wage	fah_wage	faway_wage
c_ali_rur	1				
c_ali_urb	0.599	1			
fd_wage	0.8548*	0.3002	1		
fah_wage	0.8444*	0.2562	0.9983*	1	
faway_wage	0.7354	0.8417*	-0.3353	-0.388	1

Source: Authors own elaboration. *Coefficient significant at the 5% level.

SDG8: Non-decent work

Wage share

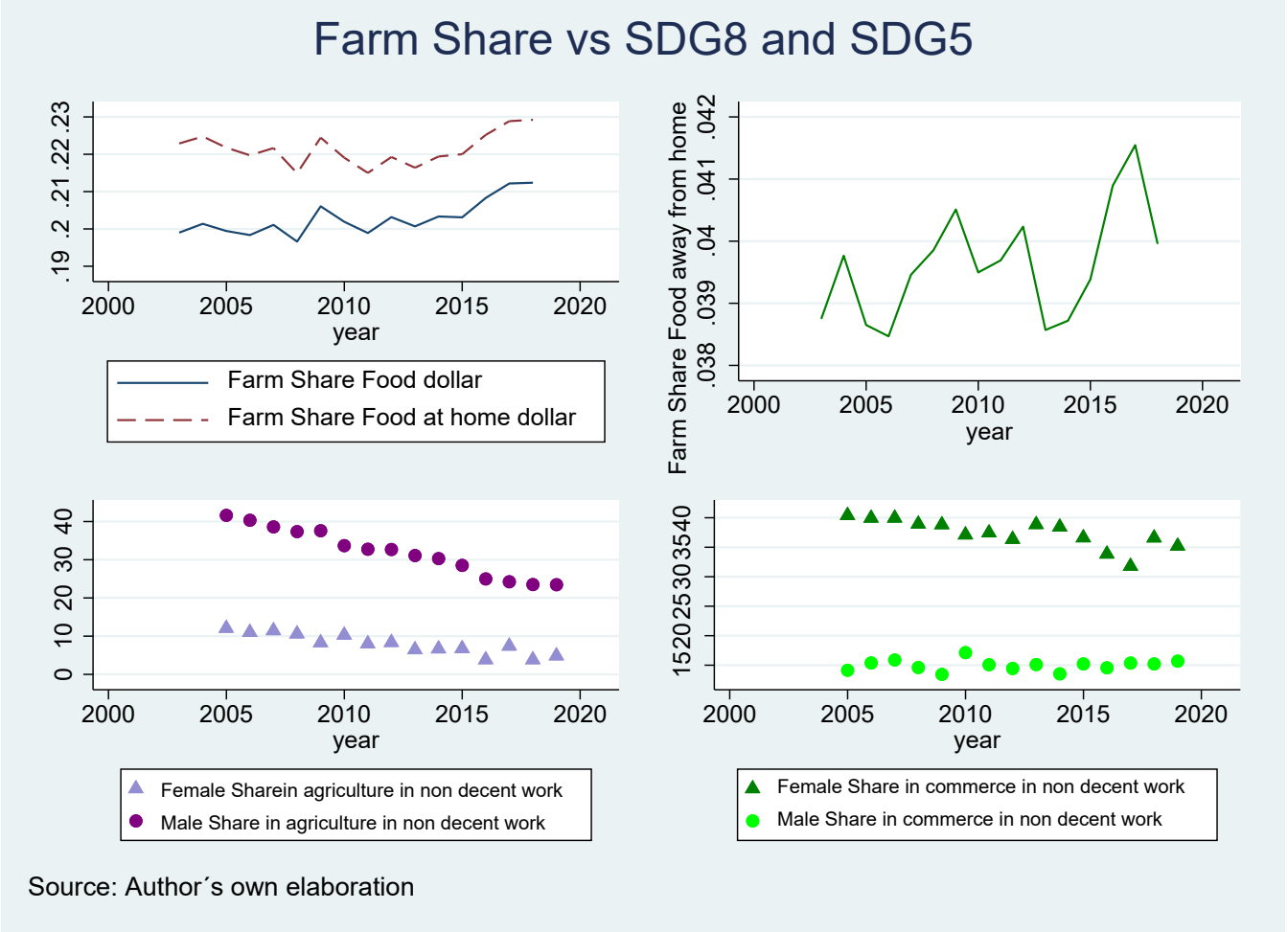
Relationship with SDG8: Decent Work



Source: Author´s owm elaboration

Relationship with SDG5: Gender & Work

Comparing decent work in two sectors, by sex: agricultural and commerce



Source: Author´s own elaboration

Relationship with SDG10: Income Inequality

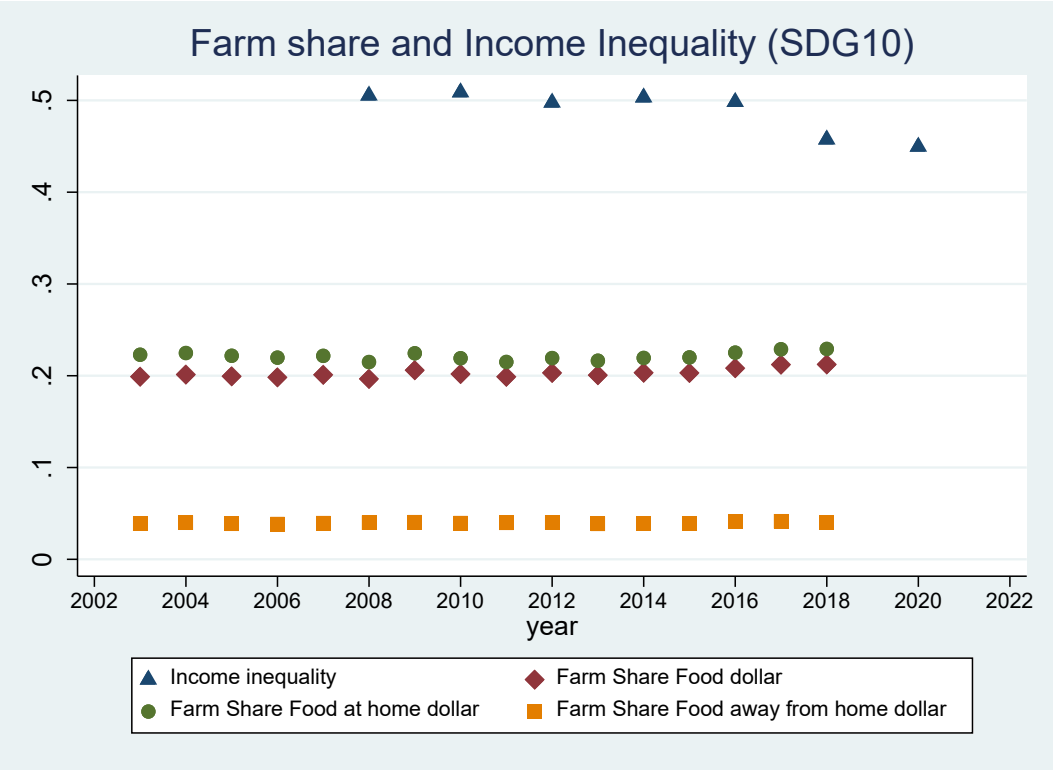
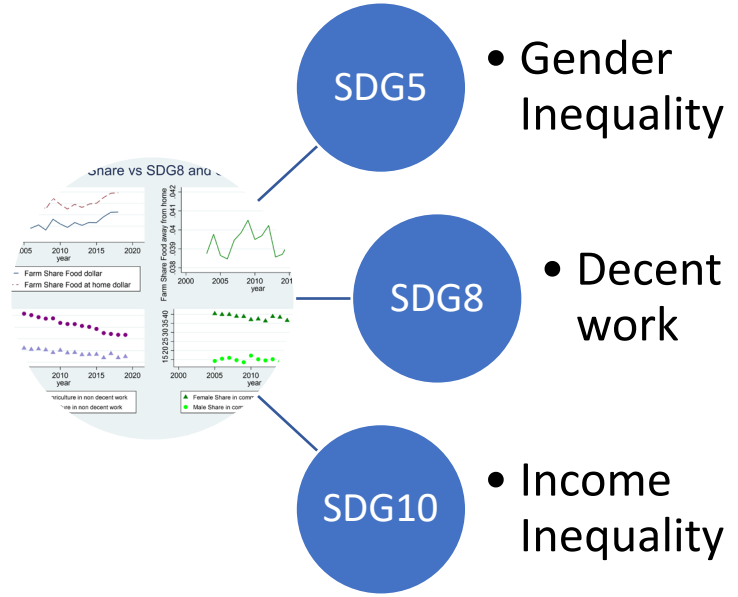


Table 8 Correlation between SDG10 and Food-dollar

	Gini	fs_fd	fs_fah	fs_faway
Gini	1			
fs_fd	-0.8009	1		
fs_fah	-0.8292*	0.8093*	1	
fs_faway	-0.1983	0.6945*	0.5171*	1

Source: Authors own elaboration. *Coefficient significant at the 5% level.



Conclusions

- Applying USDA's food dollar methodology to Mexico generates results in the **distribution of shares** similar to those for the United States, especially with respect to indicators for food away from home, but not for the farm shares home and food at home.
- Mexican consumers spend a larger share of their income on **food at home** than U.S. consumers.
- **Services' share** of food expenditures is much smaller in Mexico than in the United States, pointing at the differences between developed and developing countries.
- The **low share of taxes** may be related with the high rates of informality in the Mexican economy.
- The lower the farm share, the higher **the poverty** (SDG1) and **food insecurity** (SDG2);
- The lower the **share of wages** in the food expenditure, the higher the percentage of **non-decent work** in the agricultural sector, with no clear correlation in urban areas.
- Further analysis is needed to disentangle the income **inequality** and inequality among food share expenditures and gender inequality.
- An industrial policy that maintains or improves the economic status of current farmworkers, in tandem with existing social programs, could ease the impacts of such economic restructuring on farmworkers and their families.

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Thank you

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The findings and conclusions in this presentation are those of the authors and should not be construed to represent any official determination of policy of the Autonomous University of Nuevo León (UANL—Universidad Autónoma de Nuevo León), the National Institute of Statistics and Geography (INEGI—Instituto Nacional de Estadística y Geografia), the Mexican Government, the U.S. Department of Agriculture (USDA), or the U.S. Government. This paper was supported by an Agri-food Systems Targeted Applied Research (ASTAR) Grant from Colorado State University to UANL and by the intramural research program of USDA's Economic Research Service (ERS).

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