Convergence in Food Demand:
Do Low and Middle-income Countries Follow High-income Countries?

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Introduction

With the globalized modern food processing, marketing, and distribution techniques, consumers' tastes and diets are being shaped by the expansion of modern food retailing, thereby increasing the similarity in food preference and demand across countries.

Literature has highlighted the impact of globalization on food consumption behaviors in some high-income countries. However, little work to date has focused on whether food consumption patterns (i.e., a bundle of various goods and services) in low and middle-income countries follow the same trend as high-income countries.

Objectives

This study uses selected low and middle-income countries across the continents as well as high-income countries classified by the World Bank and tries to answer two questions:

- Whether the consumption of 12 main food categories in low and middle-income countries follows the growth path of high-income countries and estimate the speed of convergence if it exists.
- If these countries do not follow the same growth path, explore the impact factors of growth rates.

Methods

For the first objective:

- We borrow the concept of "Convergence" from neoclassical growth models to study the food consumption pattern.
- A log t-regression test proposed by Phillips and Sul (2007, 2009) is applied to investigate whether the food consumption pattern in low and middle-income countries follows high-income countries.

$$\mathrm{Log}\left(\frac{H_1}{H_t}\right) - 2\log L(t) = \hat{a} + \hat{b}\log t + \hat{u}_t, \ \ for\ t = [rT], [rT]+1, \dots, T$$

- where H_t is the cross-sectional variance of relative food consumption (food consumption of country i / average food consumption across countries at time t), $L(t)$ is a slowly varying function, r indicates the initiating sample fraction, and the coefficient b equals doubled convergence rate.

For the second objective:

- An ordered regression model is employed.

Data

We collect the per capita food expenditure on 12 categories in 99 countries from Euromonitor, covering an extended period from 1990 to 2022.

- Food categories: Bread and cereals; Meat; Fish and seafood; Milk, cheese, and eggs; Oils and fats; Fruit; Vegetable; Sugar and confectionery; Coffee, tea, and cocoa; Mineral waters and soft drinks; Alcoholic drinks; Tobacco
- Countries: High-income countries (44); Low-income countries (2); Lower middle-income countries (27); Upper middle-income countries (26)

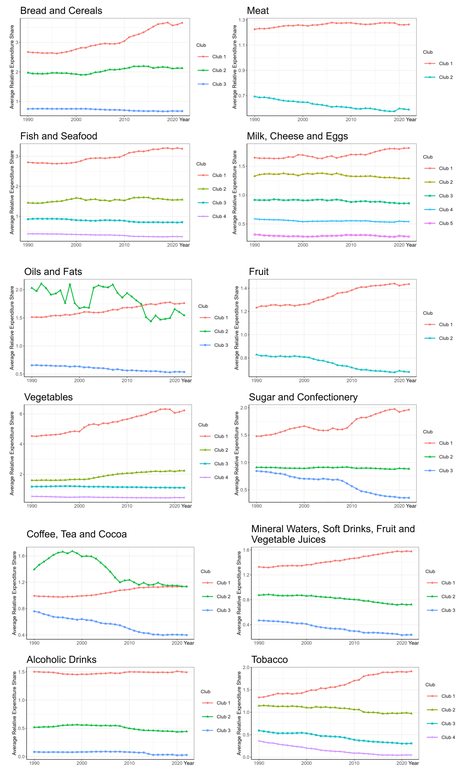
Results

- The log t tests indicate that for all 12 food categories, the countries in our sample do not converge to the same consumption steady states.

Table 1. Results of full sample convergence test

Category	Num.	$\hat{b}$	SE	t-stat of $\hat{b}$
Bread and cereals	99	-.0778	0.031	-24.911
Meat	99	-0.634	0.021	-30.478
Fish and seafood	99	-0.705	0.015	-47.257
Milk, cheese, and eggs	99	-0.706	0.031	-22.589
Oils and fats	99	-0.510	0.020	-26.004
Fruit	99	-0.602	0.019	-31.100
Vegetable	99	-0.823	0.043	-18.941
Sugar and confectionery	99	-0.777	0.074	-10.521
Coffee, tea, and cocoa	99	-0.429	0.088	-4.890
Mineral waters and soft drinks	99	-0.681	0.047	-14.631
Alcoholic drinks	99	-0.960	0.063	-15.196
Tobacco	99	-0.991	0.049	-20.260

- Although global convergence does not exist, the club convergence tests indicate there are sub-groups that follow the same consumption trend for each food category.

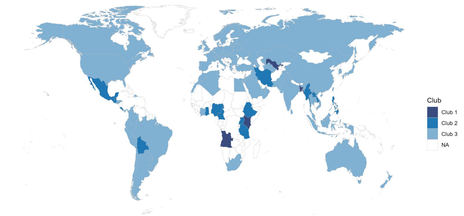


- For example, the consumption of Bread and cereals can be categorized into three sub-groups based on log-run consumption growth rate.

Table A1. Bread and cereals convergence clubs and convergence rate

Club	Number of nations/regions	Convergence rate
Club 1	4	0.260
Club 2	14	-0.045
Club 3	81	-0.010

Bread and cereals clubs distribution



Results

- The results of ordered logit analysis show that the urbanization and food production growth rates are key impact factors in determining the sub-group formation.
- Deflator growth rate positively impacts the growth rate of essential food categories.
- GDP growth rate negatively impacts the growth rate of unhealthy food categories.

Table 6. Results of ordered logit analysis

Variable	Bread and cereals	Meat	Fish and seafood	Milk, cheese, and eggs	Oils and fats	Fruit
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Trade openness	4.339	7.699	10.776	-7.233	-19.815	7.375
	(13.717)	(12.507)	(10.786)	(10.537)	(12.970)	(11.859)
Urbanization rate	151.464***	71.316*	90.310**	8.130	31.247	37.889
	(53.150)	(39.508)	(35.962)	(30.970)	(36.257)	(37.066)
Food import	12.344	2.594	0.950	10.338	-8.571	-4.187
	(12.010)	(9.288)	(6.110)	(6.472)	(10.399)	(9.704)
Food production index	62.946***	19.568	42.788***	9.185	20.000	15.504
	(23.592)	(15.286)	(14.427)	(12.177)	(14.335)	(14.571)
GDP	-17.100	-22.886	3.990	-18.209	2.270	6.509
	(26.028)	(17.481)	(15.857)	(14.201)	(16.668)	(16.657)
Deflator	2.873*	3.612**	1.847	5.131***	0.977	2.891**
	(1.673)	(1.822)	(1.153)	(1.388)	(1.279)	(1.382)
Chi-square	37.478	14.339	37.845	23.244	14.233	12.542
Prob > chi2	0.000	0.026	0.000	0.001	0.027	0.051
Pseudo r-squared	0.333	0.108	0.156	0.078	0.094	0.094
Obs.	98	96	98	96	98	98
Parallel lines assumption satisfied	Yes	Yes	Yes	Yes	Yes	Yes

Table 7. Results of ordered logit and marginal effects on probabilities

Variable	Vegetable	Sugar and confectionery	Coffee, tea, and cocoa	Mineral waters and soft drinks	Alcoholic drinks	Tobacco
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Trade openness	-2.791	-21.845*	20.491	3.382	11.372	-22.926**
	(12.849)	(11.971)	(12.665)	(10.902)	(11.57)	(11.546)
Urbanization rate	138.282***	-11.003	1.707	16.247	-27.753	-14.794
	(39.941)	(38.809)	(37.226)	(35.937)	(39.424)	(35.922)
Food import	-3.765	4.262	-16.455*	-0.652	4.96	1.267
	(7.557)	(7.482)	(9.626)	(7.316)	(7.765)	(6.832)
Food production index	27.365*	20.879	-2.794	41.088***	-24.033	-61.52***
	(14.822)	(15.23)	(15.31)	(13.844)	(14.664)	(15.18)
GDP	-13.334	-33.855**	-41.596**	-44.137***	-39.27**	-4.777
	(16.836)	(16.759)	(19.135)	(16.234)	(16.863)	(15.296)
Deflator	1.257	-21.845	-0.751	1.151	-0.699	1.898
	(1.155)	(11.971)	(1.251)	(1.265)	(1.149)	(1.288)
Chi-square	31.192	15.547	16.107	16.088	27.971	32.469
Prob > chi2	0.000	0.016	0.013	0.013	0.000	0.000
Pseudo r-squared	0.165	0.096	0.107	0.083	0.172	0.143
Obs.	98	98	97	98	97	95
Parallel lines assumption satisfied	Yes	Yes	Yes	No	Yes	Yes

Note: Standard errors are reported in parentheses. *** p<.01, ** p<.05, * p<.1.

Conclusion

- Food consumptions worldwide follow different growth patterns rather than the same growth pattern.
- The urbanization rate, food production growth rate, deflator growth rate, and GDP growth rate are key factors in determining the food consumption growth path.

References

1. Phillips, P. C., & Sul, D. (2007). Transition modeling and econometric convergence tests. Econometrica, 75(6), 1771-1855.
2. Phillips, P. C., & Sul, D. (2009). Economic transition and growth. Journal of Applied Econometrics, 24(7), 1153-1185.

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