

Why is Japan's Engel Coefficient the Highest in the World?

~An International Comparison of Food Prices Using Price-to-Income Data~

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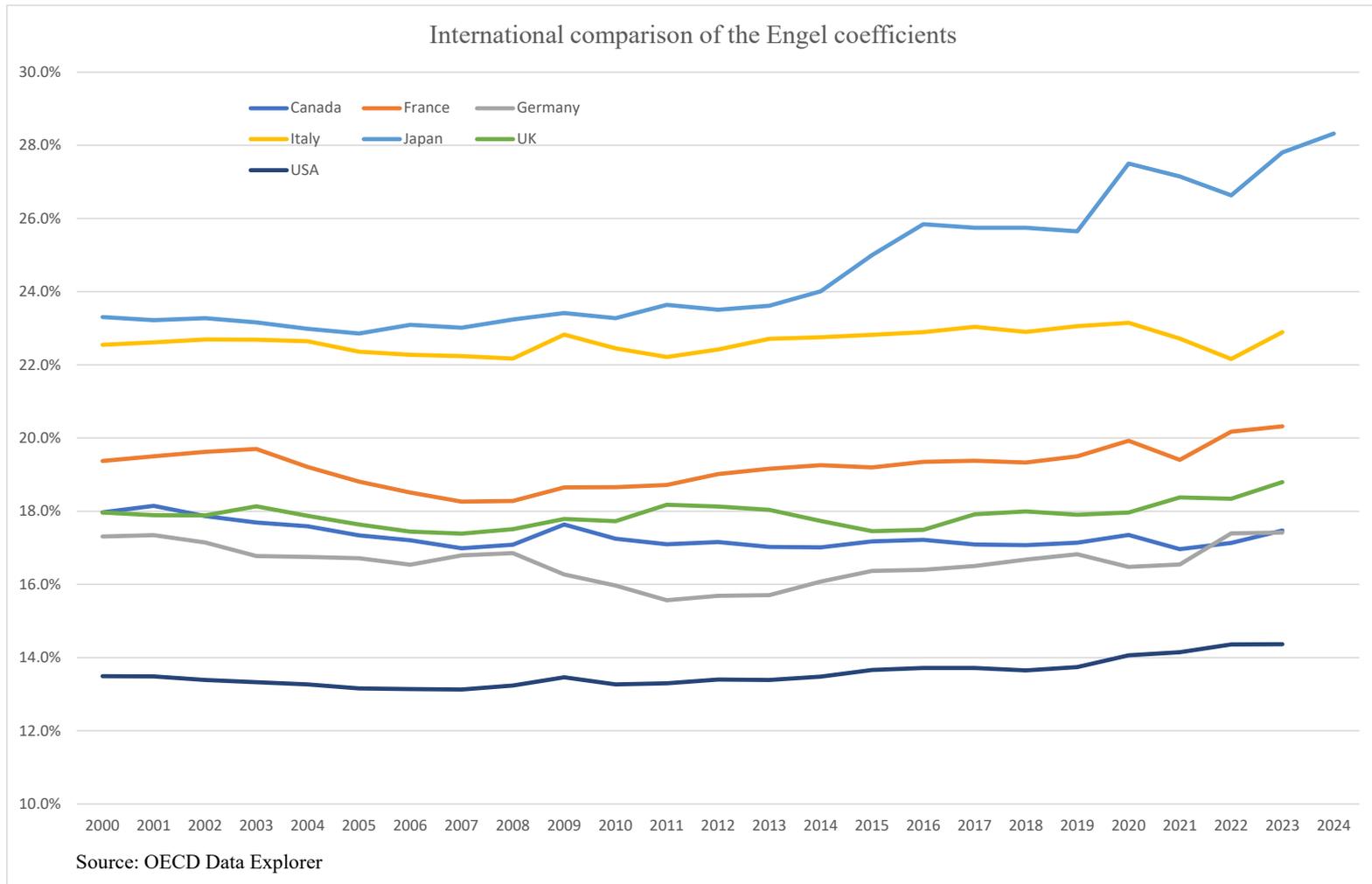
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4. Why Is Japan's Engel Coefficient So High?
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1 Motivation

Motivation for This Analysis

- Japan's Engel coefficient has been among the highest for a long time
- In particular, this coefficient has risen significantly since 2013



1 Motivation

1. *We want to confirm whether this observation is correct, while staying in the UK.*

- ① We find that food prices in UK supermarkets are much cheaper than in Japan.
- ② Japan has been in deflation since 1999. However, aren't the level of food prices high compared to other countries?

2. *We compare food prices in Japan and other countries based on the price-to-income ratio (PTI).*

- ① The CPI is fixed at 100 in the base year and price changes are measured, but the level of the price index does not indicate the price level for consumers.
- ② In addition, the level of the price index makes it impossible to make international comparisons. CPI **cannot express whether a country's price level is expensive (cheap).**

1 Motivation: *simple example*

- McDonald's Big Mac in the UK was £4.99 as of Feb, 2025. Using the exchange rate (¥190.13 on Feb, 2025), this converts to ¥949.
- This reflects the yen's purchasing power abroad, but whether a British consumer perceives a hamburger as being worth nearly ¥1,000 is debatable.
- The average monthly income in the UK in 2024 is £3,155.97, so the hamburger's value is 0.158% of monthly income, while in Japan it is 0.152%; thus, there is little difference..

		Feb-25
Big Mac Price	UK(£)	4.99
(Actual on Feb 2025)	JPN(yen)	530
Foreign Exchange Rate		190.13
(Market rate on Feb 2025)		
Conversion to Yen	JPN(yen)	948.75
Income	UK(£)	3155.97
(Published by the Statistics Bureau)	JPN(yen)	348,182
the price-to-income ratio (PTI)	UK	0.158%
	JPN	0.152%

2 Measuring Prices with CPI and PPP (1)

CPI measurement faces two approaches:

1. measuring the minimal expenditure required for a set level of utility (COLI)
2. measuring a fixed-weight index of goods and services prices (COGI).

- **Japan's CPI is classified as COGI.** “CPI measures **price changes** in goods and services purchased by households nationwide over time.”(Ministry of Internal Affairs and Communications, 2006, 2011.)

- Even if CPI indicates 100, the price level is truly high or low for households.
- **The CPI cannot indicate whether a country's price level is high or low relative to income.**

- For international comparisons, PPP is used.
- PPP is calculated using prices compiled by the International Comparison Program (ICP) and each country's Consumer Price Index.

2 Measuring Prices with CPI and PPP (3) Simple Example

(Assumption)

- Item A price at 2023 is 900 yen in Japan and 3.00 pounds in UK
- 20% price increase in both countries
- Income levels change in 2024 on average (UK: +6.0%, Japan: +2.8%).

(Calculating the CPI)

- 2023:100.0, 2024 :120.0 for both,

(Calculating the PTI and PPP)

PPP: Un Change (No effect on the calculation of PPP)

PTI: JPN : 0.23% → 0.27% (+0.04%) , UK : 0.10% → 0.11% (+0.01%)

- **This could lead to an overestimation of Japan's purchasing power.**

		2023	2024	Change rate
Item A	UK(£)	3.00	3.60	20.0%
(Estimated example)	JPN(yen)	900	1080	20.0%
CPI (2023 = 100)	UK	100.0	120.0	20.0%
(Estimated example)	JPN	100.0	120.0	20.0%
Income	UK(£)	2977.00	3155.97	6.0%
(Published by the Statistics Bureau)	JPN(yen)	386,982	397,789	2.8%
Purchasing Power Parity	£ - ¥	130.00	130.00	0.0%
(Estimated by OECD)				
the price-to-income ratio (PTI)	UK	0.10%	0.11%	0.01%
	JPN	0.23%	0.27%	0.04%

Note:

1. Item A is sold in both countries with the same quality and quantity, and its price rises by 20% in both countries.
2. Income is an actual figure. In both countries, it shows the monthly wage (including tax) of a full-time worker.
3. The OECD compiles monthly statistics on price levels in member countries using purchasing power parity, which takes into account household final consumption expenditures and exchange rates. The table above shows relative purchasing power parity, calculated with Japan as 100 as of December 2023.

Source: UK ONS "UK Family Spending", Japanese Ministry of Internal Affairs and Communications Statistics Bureau "Family Income and Expenditure Survey."

3 Data

	Wage (Full-Time Worker)	
	disposable income	nominal income
UK	Calculated from nominal wages using the ratio of gorss to disposables in ONS, "The Effects of Taxes and Benefits on Household Income, UK, 2022/23 - Reference Tables"	Weekly wages in ONS "Employee earnings in the UK: 2024" are annualized (52 weeks) and then monthly.
Italy	Calculated from nominal wages using the ratio of Gorss to Disposable from Istat, "National Account"	Istat, "Structure of earnings in Italy" Gross hourly wage per hour paid of employee jobs in euros (median) for full-time jobs is calculated as a monthly figure (multiplied by 30) assuming a daily working time of 8 hours.
France	INSEE, "Average annual net full-time equivalent salary in the private sector - All salaried workers" (Annual wages)	Calculated from disposable income based on the ratio of "Gross wages and salaries" to "Current taxes on income and wealth, etc." from the Households' income account at current prices (WDA-SA data) in the INSEE "National Account."
USA	BEA, "Personal Income and Its Disposition" calculated from nominal wages using the ratio of Gorss to Disposable	BLS, "Weekly and hourly earnings data from the Current Population Survey" for employed full-time workers, annualized (52 weeks) and then monthly.
Japan	Calculated from nominal wages based on the ratio of real income to disposable income for two or more person households nationwide (working households) from the Ministry of Internal Affairs and Communications' "Family Income and Expenditure Survey."	Actual total cash wages of full-time workers in the Ministry of Health, Labor and Welfare's "Monthly Labor Statistics" survey of industries covered (1970-2024)

Source: Compiled from data published by national statistical offices

3 Data

	Retail price	Consumption Weight
UK	Price data from the ONS "Shopping prices comparison tool", 2018-2024	ONS, "CPI" weights by item (Ecoicop classification (5 digit))
Italy	stat, "Average consumer prices of some food products - Years 1861-2015 (Current Euros)" is used. From 2016 onwards, the growth rate of the relevant CPI for each individual item is used to postpone the calculation.	Istat, "CPI" weights by item (Ecoicop classification (5 digit))
France	Using data from INSEE, "Average retail prices" from 1992 to 2024	INSEE, "CPI" weights by item (Ecoicop classification (5 digit))
USA	Uses BLS, "CPI" Average Price Data (1999-2024)	BLS, "CPI" CPI-U Cost Weight used
Japan	Price data for Tokyo's special wards from the Ministry of Internal Affairs and Communications' Retail Price Survey (Trends)	Weights for each year from 1970 to 2024 are calculated from the "average monthly consumption expenditure per household (all households)" for two or more person households nationwide in the Ministry of Internal Affairs and Communications' "Family Income and Expenditure Survey."

3 Data

	Japan		UK		France		Italy		USA	
	Brand/ Items	Wight	Brand/ Items	Wight	Brand/ Items	Wight	Brand/ Items	Wight	Brand/ Items	Wight
Rice	Rice Japonica	5kg	Basmati rice	1kg	Rice Japonica	1kg	Long-grain rice	1kg	Rice, white, long grain, uncooked, per	453.6g
Bread	White sliced bread	1kg	White sliced bread	800g	Parisian bread	1kg	White bread, loaf	1kg	Bread, white, pan, per lb	453.6g
Pasta	spaghetti or pasta	600g	Dry spaghetti or pasta	500g	Superior pasta	500g	Pasta, without eggs	1kg	Spaghetti and macaroni, per lb	453.6g
Wheat flour	Wheat flour	1kg	Self-raising flour	1.5kg			Wheat flour	1kg	Flour, white, all purpose, per lb	453.6g
Tuna	Red tuna	100g			Red tuna	1kg				
Salmon	Fresh salmon fillets	100g	Fresh salmon fillets	1kg	Farmed salmon	1kg	Salmon, steak	1kg		
Shrimps	Frozen prawns	100g	Frozen prawns	1kg	Shrimps	1kg		1kg		
Beef	Beef	100g	Beef steak	1kg	Beef: sirloin steak	1kg	Beef, minced	1kg	Steak, round, USDA Choice, boneless	453.6g
Pork	Pork	100g	Oven ready gammon/pork joint	900g	Pig: chine with bone	1kg	Pork, cutlet ("escalope")	1kg	All Pork Chops, per lb	453.6g
Chicken	Fresh chicken	100g	Fresh/chilled whole chicken	1kg	Industrial off-label chicken	1kg	Whole chicken	1kg	Chicken, fresh, whole, per lb	453.6g
Milk	Whole milk	1000mL	Whole milk	2272ml	Pasteurised full fat milk	1000mL	Milk, fresh, unskimmed	1000mL	Milk, fresh, whole, fortified, per gal	3800mL
Butter	Butter	200g	Butter	250g	Extra fine butter	250g	Butter, unsalted	250g	Butter, salted, grade AA, stick, per lb	453.6g
Cheese	Spreadable processed cheese	112g	Cheddar cheese	1kg	Spreadable processed cheese	170g	Cheese, Gouda type (1 kg)	1kg	American processed cheese, per lb	453.6g
Yoghurt	Plain yoghurt	400g	Small yoghurt	500g	Plain yoghurt	500g	Natural yoghurt	1kg	Yogurt, per 8 oz. in U.S. city average,	226.8
Eggs	Wggs	10個	Eggs	12個		10個	Chicken eggs	10個	Eggs, grade A, large, per doz.	12個
Lettuce	Iceberg lettuce	1kg	Iceberg lettuce	1個		1kg		1kg	Lettuce, iceberg, per lb	453.6g
Broccoli		1kg	Broccoli	1kg		1kg		1kg	Broccoli, per lb	453.6g
Potatoes		1kg	Baking potatoes	1kg	Ware potatoes	1kg	Potatoes	1kg	Potatoes, white, per lb	453.6g
Carrots		1kg	Carrots	1kg	Carrots	1kg		1kg	Carrots, short trimmed and topped, pe	453.6g
Onions	Onions	1kg	Onions	1kg	Onions	1kg		1kg		
Cucumber		1kg	Cucumber	1本		1kg		1kg		
Tomatoes	Tomatoes	1kg	Tomatoes	1kg	Tomatoes	1kg	Fresh tomatoes, round	1kg	Tomatoes, field grown, per lb	453.6g
Peppers		1kg	Peppers	1kg	Peppers	1kg		1kg	Peppers, sweet, per lb	453.6g
Apples	Apples	200g	Dessert apple	1個	Apples	1kg	Apples	1kg	Apples, Red Delicious, per lb	453.6g
Oranges	Oranges	1kg	Orange	1個	Oranges	1kg		1kg	Oranges, Navel, per lb	453.6g
Grapes	Grapes	1kg	Grapes	1kg		1kg		1kg		
Bananas	Bananas	1kg	Bananas	1kg	Bananas	1kg	Fresh bananas	1kg	Bananas, per lb	453.6g
Kiwi fruit		1個	Kiwi fruit	1個	Kiwi	1個		1個		
Avocados	Avocado	1個	Avocados	1個	Avocado	1個		1個		
Oil	Sunflower oil	900mL	Olive oil	500ml	Sunflower oil	1000mL	Vegetable oil	1000mL		
Sugar	Sugar cubes	1kg	Granulated white sugar	1kg	Sugar cubes	1kg	White sugar	1kg	Sugar, white, all sizes, per lb	453.6
Mayonnaise	Mayonnaise	1kg	Mayonnaise	500g						
Jam	Jam	150g	Jam	340g			Jam	1kg		
Crisps	Crisps	100g	Crisps	50g			Potato crisps, single pack	200g	Potato chips, per 16 oz.	453.6g
Tea	Small box of tea bags	20袋	Small box of tea bags	80袋			Black tea	25袋	Tea	
Coffee Beans	Coffee sachets pack	300g	Coffee sachets pack	120g			Coffee	1kg	Coffee, 100%, ground roast, all sizes, p	453.6g
Cola	Regular cola drink	1000ml	Regular cola drink	2000ml					Cola	
Mineral water	Still mineral water	2000ml	Still mineral water	2000ml			Mineral water, still (1 l)	1000ml		
Beer	Premium lager	6缶	Premium lager	4缶	Draft beer	2640	Beer	1000ml	Malt beverages, all types, all sizes, any	473.2 ml
Wine	Bottle of wine	750ml	Bottle of wine	750ml	Red table wine,	1000mL	Red wine	750ml	Wine, red and white table, all sizes, ar	1000mL

Source: Compiled from retail price surveys conducted by national statistical bureaus

4 Food Prices Based on Price-to-Income Data

	2018					2024				
	Japan	UK	France	Italy	USA	Japan	UK	France	Italy	USA
Average consumption weight	0.13%	0.04%	0.06%	0.06%	0.02%	0.15%	0.04%	0.06%	0.07%	0.02%
Average consumption weight (excluding rice)	0.09%	0.04%	0.06%	0.05%	0.02%	0.10%	0.04%	0.06%	0.06%	0.02%
Cereals (equivalent to staple foods)	0.23%	0.11%	0.07%	0.15%	0.06%	0.27%	0.11%	0.10%	0.20%	0.07%
Rice	0.60%	0.33%	0.09%	0.45%	0.14%	0.72%	0.33%	0.17%	0.60%	0.16%
Bread	0.12%	0.05%	0.08%	0.10%	0.05%	0.13%	0.05%	0.09%	0.12%	0.06%
Pasta	0.15%	0.03%	0.03%	0.03%	0.02%	0.17%	0.04%	0.03%	0.04%	0.02%
Wheat flour	0.07%	0.02%		0.03%	0.02%	0.09%	0.02%		0.03%	0.02%
Tuna	0.12%		0.09%			0.13%		0.11%		
Salmon	0.09%	0.07%	0.04%	0.05%		0.13%	0.06%	0.05%	0.05%	
Shrimps	0.08%	0.07%	0.08%			0.09%	0.05%	0.09%		
Beef	0.24%	0.06%	0.08%	0.06%	0.02%	0.23%	0.06%	0.08%	0.07%	0.03%
Pork	0.06%	0.02%	0.03%	0.03%	0.01%	0.07%	0.02%	0.03%	0.03%	0.01%
Chicken	0.04%	0.01%	0.01%	0.02%	0.01%	0.04%	0.01%	0.01%	0.02%	0.01%
Milk	0.06%	0.02%	0.03%	0.05%	0.01%	0.06%	0.02%	0.04%	0.05%	0.01%
Butter	0.12%	0.06%	0.05%	0.07%		0.13%	0.06%	0.06%	0.09%	
Cheese	0.05%	0.03%	0.03%	0.04%	0.03%	0.07%	0.03%	0.03%	0.05%	0.03%
Yoghurt	0.04%	0.02%	0.02%	0.06%		0.05%	0.02%	0.02%	0.06%	

4 Food Prices Based on Price-to-Income Data

	2018					2024				
	Japan	UK	France	Italy	USA	Japan	UK	France	Italy	USA
Eggs	0.06%				0.03%	0.07%				0.04%
Lettuce	0.14%	0.06%			0.04%	0.14%	0.07%			0.05%
Broccoli	0.20%	0.07%			0.08%	0.19%	0.08%			
Potatoes	0.09%	0.04%	0.04%	0.04%	0.03%	0.11%	0.03%	0.06%	0.05%	0.03%
Carrots	0.11%	0.03%	0.05%			0.13%	0.03%	0.06%		
Onions	0.07%	0.03%	0.07%			0.09%	0.03%	0.08%		
Cucumber	0.16%	0.06%				0.20%	0.07%			
Tomatoes	0.19%	0.11%	0.09%	0.11%	0.08%	0.23%	0.10%	0.10%	0.14%	0.06%
Peppers	0.26%	0.04%			0.10%	0.30%	0.03%			
Apples	0.15%		0.09%	0.02%		0.21%		0.09%	0.01%	
Oranges	0.14%	0.06%	0.07%		0.06%	0.17%	0.05%	0.07%		0.05%
Grapes	0.40%	0.15%				0.50%	0.13%			
Bananas	0.07%	0.04%	0.06%	0.06%	0.02%	0.08%	0.03%	0.06%	0.06%	0.02%
Kiwi fruit	0.25%	0.01%	0.02%			0.31%	0.01%	0.02%		
Avocados		0.04%	0.04%				0.03%	0.04%		
Oil	0.08%	0.07%	0.06%	0.06%		0.11%	0.12%	0.07%	0.07%	
Sugar	0.05%	0.03%	0.03%	0.04%	0.03%	0.07%	0.04%	0.04%	0.05%	0.03%
Mayonnaise	0.07%	0.12%				0.21%	0.13%			
Jam	0.06%	0.02%		0.03%		0.06%	0.02%		0.03%	
Crisps	0.04%	0.06%		0.02%	0.02%	0.05%	0.07%		0.03%	0.02%
Tea	0.03%	0.02%		0.04%		0.03%	0.02%		0.04%	
Coffee Beans	0.04%			0.12%	0.05%	0.05%			0.13%	0.06%
Cola	0.03%					0.07%				
Mineral water	0.02%	0.03%		0.02%		0.03%	0.03%		0.02%	
Beer	0.32%	0.15%	0.07%	0.13%	0.12%	0.29%	0.14%	0.08%	0.14%	0.12%
Wine	0.13%	0.20%	0.05%	0.06%	0.17%	0.14%	0.22%	0.06%	0.06%	0.15%

Note: Figures indicate prices relative to income based on disposable income.

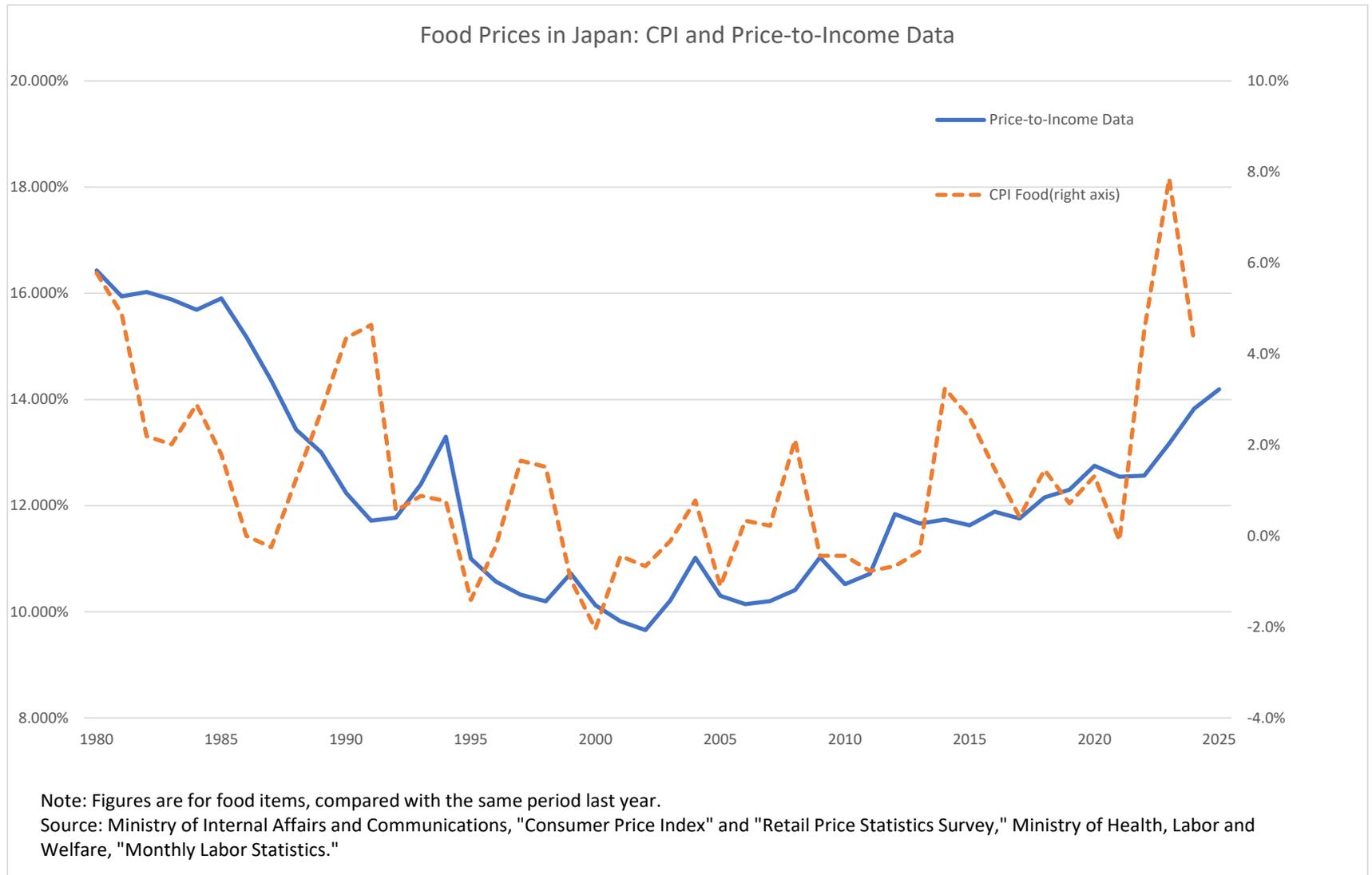
4 Food Prices Based on Price-to-Income Data

	Average PTI with consumption weight				Average PTI (excluding rice)				PTI Cereals (equivalent to staple foods)			
	UK	France	Italy	USA	UK	France	Italy	USA	UK	France	Italy	USA
2018	33.40	41.75	46.82	17.62	44.94	60.00	58.25	24.02	46.66	28.73	65.55	25.51
2019	32.41	42.47	45.93	17.04	43.54	60.59	56.95	23.06	46.05	31.56	64.81	26.05
2020	30.91	39.43	43.82	16.39	42.12	57.98	55.89	22.97	46.80	29.27	62.01	24.33
2021	30.47	42.18	45.98	16.12	44.55	66.79	62.57	24.10	46.53	31.67	65.84	24.73
2022	32.27	44.13	51.40	17.65	41.61	61.27	62.29	23.18	49.50	42.54	76.34	27.15
2023	32.97	45.01	54.86	17.58	42.70	62.31	63.30	23.09	48.79	43.12	86.18	27.62
2024	28.80	40.43	47.79	15.43	40.82	60.56	61.30	21.64	39.73	36.40	71.32	23.87

Note: The figures show the price as a percentage of income based on disposable income, with Japan set at 100 for each year.

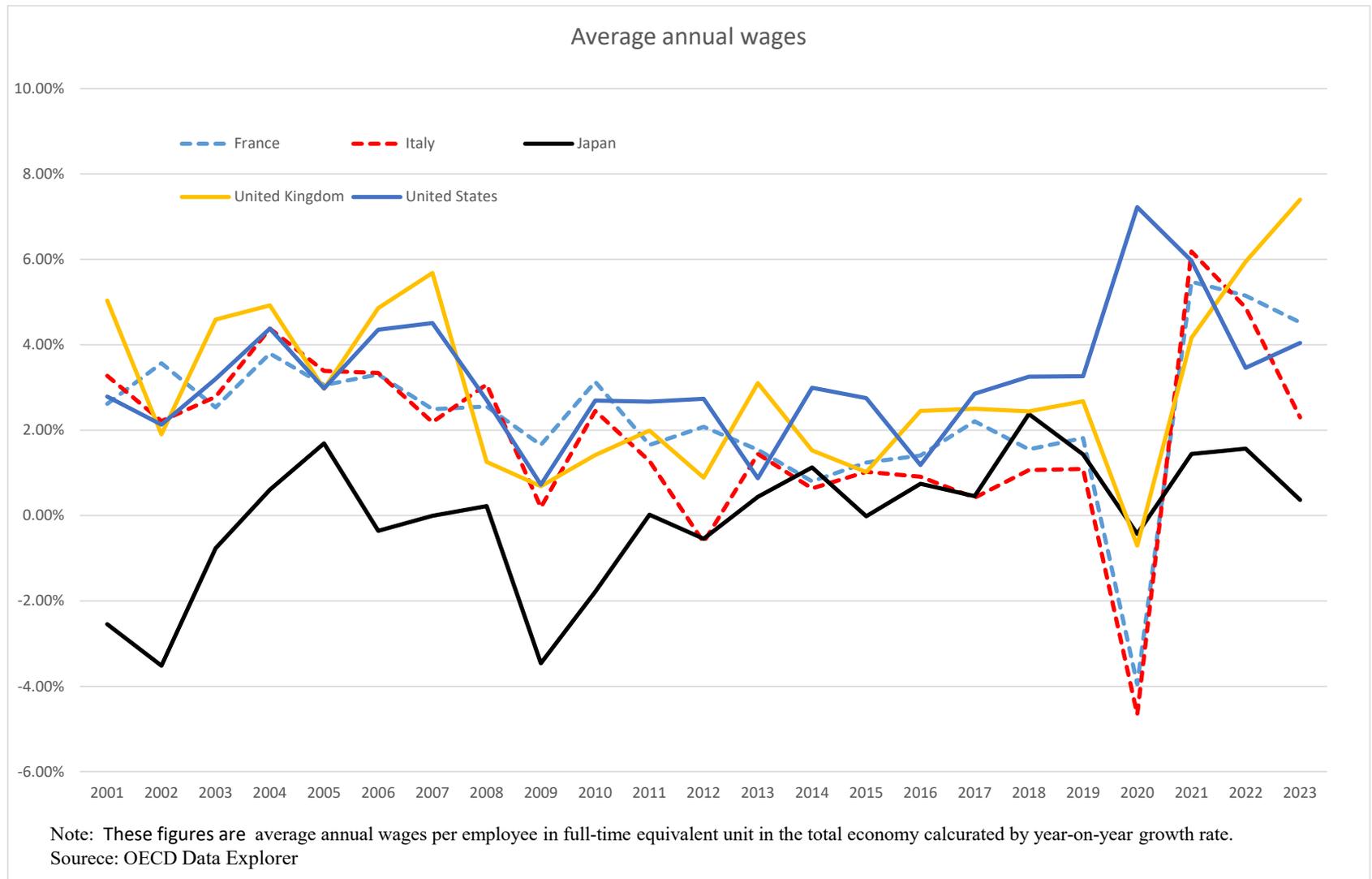
Source: Created from wage and retail price data from each country's statistical bureau, in accordance with Figure 4.

5 Why Is Japan's Engel Coefficient So High?



- Rate of increase in food prices is higher than the overall consumption in every country.

5 Why Is Japan's Engel Coefficient So High?



- Nominal income has barely increased in Japan

6 Concluding Remarks

1. Comparing Engel coefficients for seven countries (the US, UK, France, Germany, Italy, Canada, and Japan) since 2000 shows a recent increase in all. In 2023, Japan's Engel coefficient (27.8%) is 1.5 times that of the UK (18.8%).
2. Food prices in Japan are roughly 2–3 times higher than in other countries. Since global grain prices surged post-2023, Price-to-Income rose for all countries (Japan: 0.27%, UK: 0.11%, France: 0.10%, Italy: 0.20%, US: 0.07%), but the overall gap remains similar.
3. Historically, Price-to-Income food prices in Japan exceeded 20% in the 1970s, declined to the 12%–14% range for the past decades, returned to the 15% range in 2019, and climbed further after 2023. For Q1 2025, the figure is expected to reach the highest since 1986. The impact on household finances is clear.

6 Concluding Remarks

4. In Japan, 90% of vegetable seeds, 87% of feed, and almost 100% of poultry are dependent on overseas sources, making domestic prices highly sensitive to global supply conditions and currency fluctuations.
5. The reasons for the expansion since 2013 compared to other countries are thought to be:
 - 1) the large difference in price increases between food and non-food consumer goods during that period,
 - 2) Japan's nominal wage growth is low compared to rising prices.

	Japan					US					UK				
	All items	All items, less food and energy	Food	Energy	Gap between All items and Food	All items	All items, less food and energy	Food	Energy	Gap between All items and Food	All items	All items, less food and energy	Food	Energy	Gap between All items and Food
Cumulative change rate	8.4%	3.7%	18.9%	21.7%	10.5%	20.2%	17.6%	21.8%	22.3%	1.5%	20.9%	19.7%	29.3%	21.2%	8.4%

	Germany					France					Italy				
	All items	All items, less food and energy	Food	Energy	Gap between All items and Food	All items	All items, less food and energy	Food	Energy	Gap between All items and Food	All items	All items, less food and energy	Food	Energy	Gap between All items and Food
Cumulative change rate	18.3%	17.0%	30.4%	15.6%	12.1%	14.0%	10.7%	21.9%	23.5%	7.9%	17.2%	12.3%	22.7%	44.8%	5.5%

Note: 1. Food includes non-alcoholic beverages. Energy means "Housing, Water, Electricity, Gas and Other Fuels."

2. The cumulative change rate is the sum of the change rates from 2021 to 2024.

Source: IMF "CPI, Country Indexes And Weight"

Thank you for listening.

I would appreciate any comments you might have.

However, I may not be able to respond adequately here.

I would be very grateful if you could also send me your comments by email.

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