Productivity versus Participation: Divergent Growth Paths in North America and East Asia

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Introduction

Our study examines how labour-force utilization, income levels and short-run growth interact in two North-American economies—the United States and Canada—and two large East-Asian economies—China and Japan—during the period 1990 to 2023.

Data Description

Introduction of Dataset and Context

The study draws on a World-Bank panel that tracks four economies—Canada, the United States, China and Japan—from 1990 through 2023. Each country-year record combines three harmonised indicators downloaded on 15 April 2025 from the World Development Indicators: real GDP per capita in constant-2015 dollars, its annual growth rate and the employment-to-population ratio for adults aged 15 plus.

Data cleaning, merging, and preprocessing

Summary of Key Variables

	Country Name	GDP_count	GDP_mean	GDP_std	GDP_min	\
0	Canada	34	39357.078405	4856.836357	30563.378820	
1	China	34	5073.229508	3583.630683	905.032457	
2	Japan	34	32770.738504	2371.821778	28422.213120	
3	United Kingdom	34	40583.327987	5456.617589	30441.481350	
4	United States	34	51521.551093	7640.364126	38637.839810	

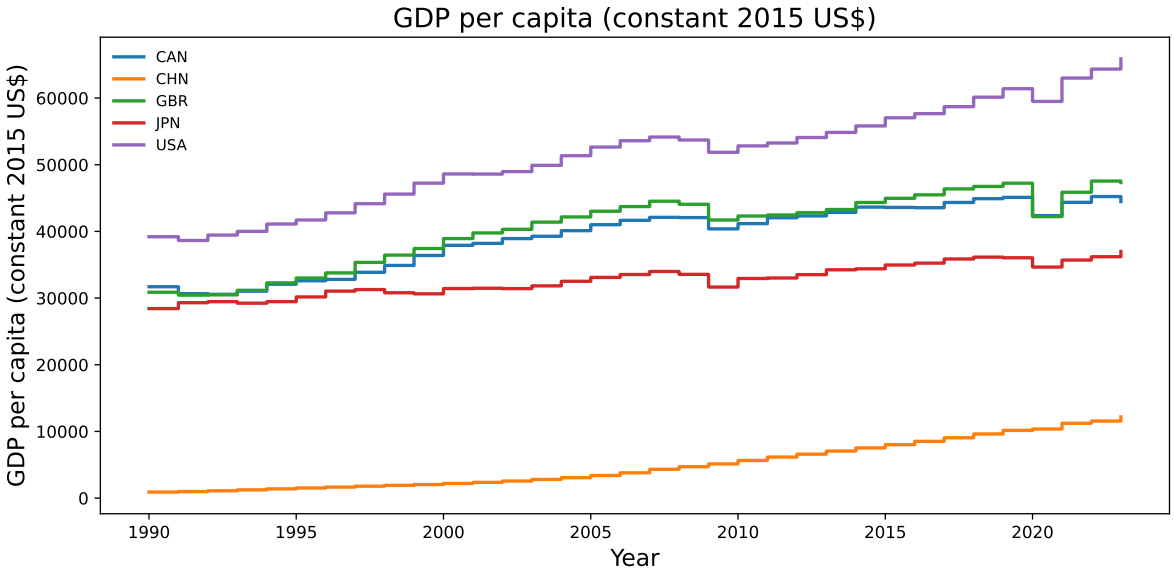
	GDP_max	Employment_count	Employment_mean	Employment_std	\
0	45227.14474	33	60.712303	1.629455	
1	12175.19611	33	69.123242	4.132756	
2	36990.33011	33	59.238939	1.957756	
3	47551.22966	33	57.831939	1.511241	
4	65875.17788	33	60.468424	1.872493	

	Employment_min	Employment_max	GDP_Growth_count	GDP_Growth_mean	\
0	57.548	63.041	34	2.135410	
1	62.523	76.840	34	8.797740	
2	56.440	62.608	34	0.963596	
3	54.713	60.335	34	1.859416	
4	56.598	63.506	34	2.491121	

	GDP_Growth_std	GDP_Growth_min	GDP_Growth_max
0	2.185206	-5.038233	5.286957
1	2.924949	2.238638	14.230861
2	2.050458	-5.693236	4.840929
3	2.990588	-10.296919	8.575951
4	1.757601	-2.576500	6.055053

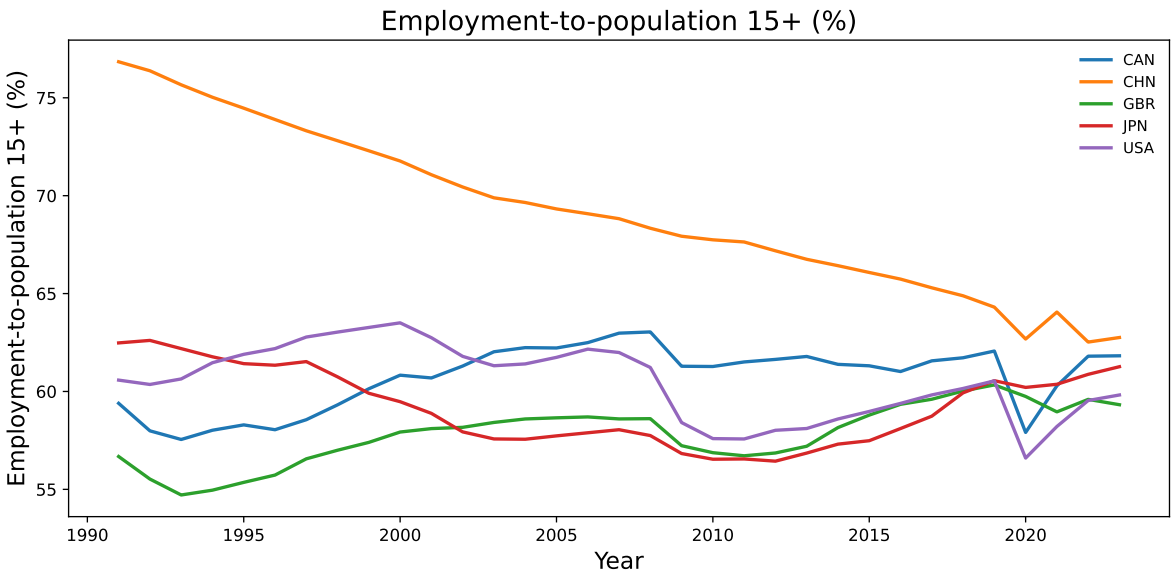
Data Analysis

Income levels and their growth paths Income levels and their growth paths



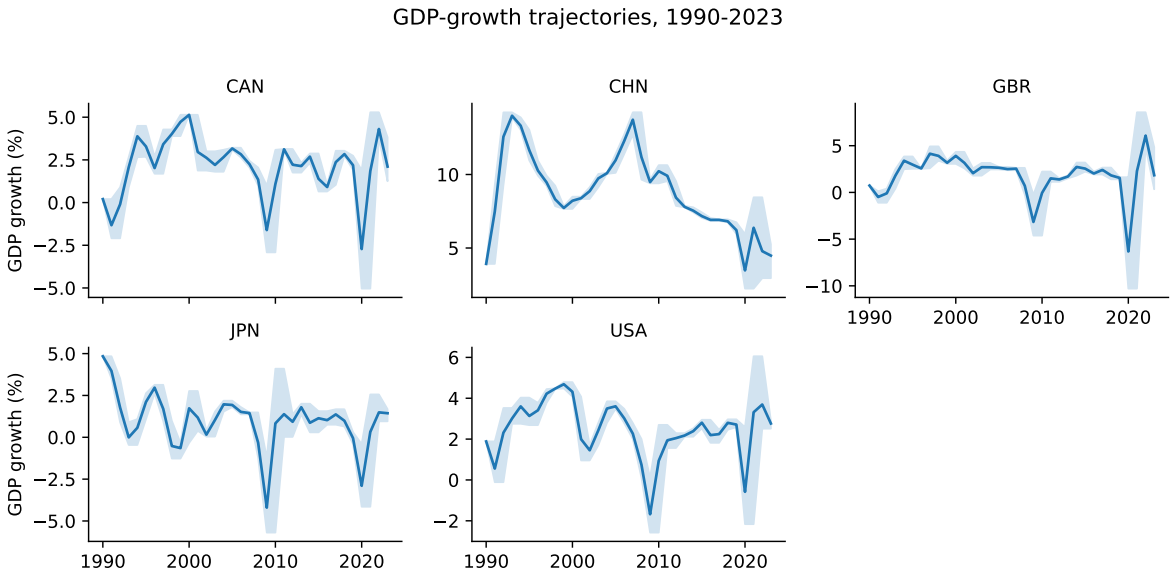
The GDP-per-capita plot underscores the prosperity gap that separates North America from East Asia. Real income in the United States rises from roughly thirty-nine thousand dollars in 1990 to about sixty-six thousand in 2023, widening its lead over all other cases. Canada mirrors the American path but remains seven to ten thousand dollars lower throughout. China, starting from a base of just over one thousand dollars, multiplies its income almost ten-fold, yet still reaches only about twelve thousand dollars by the end of the sample. Japan's income climbs during the 1990s but plateaus at approximately thirty-six thousand dollars after 2010. The corresponding growth-rate figures reveal that China's rapid expansion, once firmly in double digits, decelerates to mid-single-digit territory in the 2010s. Japan's growth oscillates around zero, reflecting its long struggle with deflation and demographic ageing. The United States and Canada exhibit more moderate booms and busts, rarely exceeding four percent on the upside or falling much below minus two percent except in the global crises of 2009 and 2020, which strike all four economies simultaneously.

Evolution of labor-market participation



The employment-to-population chart reveals markedly different trajectories between the two regions. China begins the 1990s with an exceptionally high participation rate of about seventy-seven percent, but this figure declines steadily to the mid-sixties by 2023. Japan starts near sixty-three percent, drifts downward for a decade, then partially recovers but never regains its early-1990s peak. Canada and the United States instead fluctuate within a relatively narrow band between fifty-eight and sixty-four percent. Both North-American economies share two conspicuous dips—the Great Recession in 2009 and the Covid-19 shock in 2020—yet by 2023 they have largely returned to pre-pandemic levels of around sixty-two to sixty-three percent.

GDP Growth of Countries



Each panel shows annual real-GDP growth for one country (1990-2023). China starts with exceptional double-digit gains, slows steadily after 2010, and dips sharply in 2020. Canada, the UK and the US share the usual rich-economy cycle: steady 2-4 % growth interrupted by recessions in 2009 and 2020, with quick rebounds. Japan hovers near zero for most of the period, illustrating prolonged stagnation, and sees the same two global downturns. The shaded bands mark wider volatility during those recessions and during China's early boom, but are narrow in normal years, signalling more predictable growth paths then.

Indicators' Correlation

	GDP	Employment	GDP Growth
GDP	1.0	-0.72	-0.65
Employment	-0.72	1.0	0.75
GDP Growth	-0.65	0.75	1.0

The correlation matrix for 1990–2023 reveals a clear trade-off between output levels and both labour participation and growth momentum. GDP per capita is strongly negatively correlated with the employment-to-population ratio (–0.72), indicating that higher-income economies tend to rely more on productivity gains than on expanding their workforce. Likewise, GDP per capita exhibits a sizeable negative relationship with GDP growth (–0.65), reflecting the convergence pattern whereby lower-income countries grow faster as they catch up. By contrast,

employment share and GDP growth move strongly in tandem (+0.75), suggesting that when economies do expand rapidly, they often do so by mobilizing additional labor. Together, these coefficients underscore how the balance between labor input and productivity shifts as countries develop.

Discussion

Overall Discussion of Results

Limitations

Conclusion

Further Reading