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12 May 2026

Online at https://mpra.ub.uni-muenchen.de/129078/
MPRA Paper No. 129078, posted 05 Jun 2026 14:54 UTC

Demand Iteration Speed as a Driver of Economic Growth in Saturated Economies

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Working Paper

This version: May 2026

Abstract

When population growth stalls and per capita consumption of physical goods approaches saturation, traditional supply-side growth models fail to explain the persistent slowdown in advanced economies. This paper introduces the concept of demand iteration speed, defined as the frequency with which a given product or service is repurchased per unit time, and embeds it into a national-accounting decomposition of consumption expenditure. The growth rate of consumption is shown to equal the sum of population growth, growth in per-transaction consumption volume, and growth in average iteration speed. This decomposition reveals that in the post-growth era, iteration speed becomes the decisive structural variable for economic growth, providing a unified lens to interpret the historical succession of growth engines from durable infrastructure to high-frequency digital services. We apply this framework to Hong Kong, a mature small open economy, and identify four high-iteration sectors that can support its long-term growth.

Keywords: consumption frequency; demand iteration; economic growth; structural change; post-growth economy; Hong Kong

JEL Classification: E21, O41, O11

1. Introduction

Modern growth theory, from Solow (1956) to endogenous innovation models (Romer, 1990; Aghion and Howitt, 1992), has focused overwhelmingly on the supply side: capital accumulation, technological progress, and human capital. Yet these models struggle to explain a striking paradox of advanced economies: why does growth steadily decelerate despite unprecedented technological abundance? Japan, the

European Union, and many high-income regions have experienced secular stagnation (Summers, 2014) even as their innovation frontiers continue to advance.

A missing piece, we argue, lies on the demand side. The ultimate purpose of all economic activity is consumption. Investment, government spending, and net exports derive their value from the final consumption they enable. If consumption cannot regenerate rapidly enough, sustained growth becomes unachievable. In mature economies, population growth has fallen toward zero, and per capita consumption of basic physical goods has approached saturation. Consequently, the only remaining sustainable driver of aggregate consumption growth is the frequency with which consumption acts are repeated—the demand iteration speed.

The relevance of consumption frequency has been explored in microeconomic studies of purchasing behavior (Liu et al., 2011). In environmental economics, the notion of consumption velocity has been used to describe material throughput, though with a focus on sustainability rather than growth mechanisms. On the macro side, demand-driven structural change has been modeled by Lorentz et al. (2016), who show how heterogeneous preferences can shift sectoral composition endogenously. However, no existing literature has isolated iteration frequency as a core structural variable and linked it directly to GDP growth through a transparent accounting decomposition. This paper fills that gap.

We make three contributions: (1) We formally define demand iteration speed and derive its role in consumption growth from national accounting identities. (2) We show that structural change toward high-iteration sectors is a necessary condition for sustained growth in saturated economies. (3) We apply the framework to Hong Kong and derive concrete sectoral policy implications.

2. The Decomposition of Consumption Growth

Let aggregate real consumption expenditure C be defined as:

$$C = P \times q \times f$$

where: P = population, q = average real consumption per transaction (intensity), f = average number of consumption transactions per capita per period (demand iteration speed).

Taking logs and differentiating with respect to time yields the growth rate decomposition:

$$g_C = g_P + g_q + g_f$$

where g_x denotes the continuous-time growth rate of variable x. A discrete-time approximation holds for empirical applications.

Equation (2) carries strong implications. In mature economies, $g_P \approx 0$. Per-transaction consumption q is bounded by physiological and psychological limits: food, housing, and durable goods cannot expand indefinitely. Once saturation is reached,

$g_q \to 0$. Asymptotically, therefore, consumption growth is determined by g_f—the growth rate of demand iteration speed.

This is not a tautology. It identifies a structural channel missing from standard growth accounting. Supply-side productivity determines potential output, but realized growth depends on how quickly demand renews. Innovation that raises durability or permanently satiates demand may reduce future growth, even if it improves efficiency. An economy dominated by long-lived durables will grow slowly despite high productivity; one oriented toward ephemeral services and digital goods can sustain stronger growth.

Total consumption is a weighted sum across sectors: $C = \sum_i \quad C_i = P \sum_i \quad q_i f_i$. The economy-wide average iteration speed is $\overline{f} = \sum_i \quad (C_i/C) f_i$. Growth in C thus includes a compositional effect: a shift from low-f to high-f sectors raises $\overline{f}$ and boosts g_C, even if within-sector iteration speeds are constant.

3. Sectoral Heterogeneity and Historical Growth Engines

Sectors differ dramatically in demand iteration speed. Table 1 classifies industries by typical replacement cycles and annual frequency.

Table 1: Demand Iteration Speeds by Sector

Iteration Category	Average Cycle	Typical Products	Annual Frequency f
Very Low	50–100 years	Housing, bridges, infrastructure	0.01–0.02
Low	5–15 years	Automobiles, major appliances	0.07–0.2
Medium	1–3 years	Clothing, smartphones, electronics	0.3–1
High	1 day–3 months	Food, pharmaceuticals, online content	4–365
Very High	1 second–1 hour	Financial transactions, digital assets, cloud compute	>8760

Source: Author's estimates based on product life cycles and industry data.

Historical growth engines have systematically shifted from low to high iteration. The post-war boom relied on construction and durables (very low to low iteration). The

late 20th century shifted to electronics and fashion (medium iteration). In the 21st century, the most dynamic sectors are high–very high iteration: digital platforms, healthcare, streaming, and financial markets. This progression is not accidental; it is the structural adjustment required to sustain growth under population and material saturation.

4. Discussion and Implications

The demand iteration framework provides a new diagnostic for secular stagnation. Infrastructure investment (very low iteration) delivers a one-time demand boost with rapidly decaying multipliers once the capital stock is sufficient. By contrast, investments that enable high-iteration consumption—digital payment systems, healthcare, lifelong learning, content platforms—support continuous, recurring final consumption and thus sustained growth.

This is not an argument for waste or planned obsolescence, which entail ethical and environmental costs (Dillon, 2025). Rather, it recognizes that in materially saturated economies, dynamism increasingly depends on inherently ephemeral services and experiences: a consultation, a transaction, a streamed performance. These are consumed immediately and must be repurchased, generating high iteration without proportional physical resource depletion.

The framework has limitations. We do not explicitly model the supply side or feedback from innovation to iteration speed. We also do not address income distribution: concentrated access to high-frequency services could raise aggregate iteration without broad welfare gains. These remain avenues for future research.

Nevertheless, the decomposition is simple, empirically grounded, and policy-relevant. It shows that sectoral demand composition matters for growth above and beyond aggregate demand levels. Policies that lift the economy-wide average iteration speed—via structural transformation, not artificial product failure—can complement supply-side reforms.

5. Application to a Mature Small Open Economy: Hong Kong

Hong Kong represents a paradigmatic case of a fully saturated, high-income small open economy. According to the Hong Kong Census and Statistics Department (2025), population growth has fallen to approximately 0.1% per year, and per capita physical consumption has stagnated since 2015.

Historically, growth relied on very low–low iteration sectors: real estate, infrastructure, and traditional re-export trade. By 2025, real estate and related activities accounted for 28% of GDP, while high-iteration sectors including information and communications (7.2%) and healthcare (5.8%) remained comparatively small. The average annual GDP growth rate from 2020 to 2025 was just 1.8%. *Author's calculations based on Hong Kong Census and Statistics Department (2025).*

Using the demand iteration framework, Hong Kong's future growth should prioritize four high-iteration sectors that leverage its institutional and comparative advantages:

Financial trading and compliant digital assets. The highest-iteration sector, with continuous intraday transactions. As the world's third-largest international financial center (GFCI 39, 2026), Hong Kong's common law system and aligned regulation make it a natural hub for digital asset trading, derivatives, and global wealth management.

Healthcare and biomedicine. High iteration, rigid demand, and low satiability. Hong Kong's world-class medical system and research capacity, combined with Asia's aging population, support sustained growth in clinical services, biomedical R&D, and cross-border healthcare.

Cultural content and digital creativity. Content is inherently ephemeral and requires continuous renewal. Hong Kong's cultural legacy, entertainment industry expertise, and access to the Greater Bay Area market create a scalable high-iteration cluster.

International education and lifelong learning. Technological change shortens knowledge cycles, transforming education from a one-time investment into recurring high-frequency consumption. Hong Kong's globally ranked universities position it to serve regional demand for professional upskilling and international programs.

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