Corporate Assets as Capital: An Institutional Approach to the Cambridge Capital Controversies

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Abstract

The Cambridge Capital Controversies established three results — Robinson's circularity, Sraffa's interdependence, reswitching — without an alternative to incoherent K. This paper proposes corporate assets (ca) as that alternative, answering a sharper objection: does fair-value accounting reintroduce circularity? The objection fails: ca is never measured using ca's own endogenous rate of return. Grounded in Fisher's identity, ca is measured independently of the theorist's r, disciplined by governance, market, and audit mechanisms the paper calls the Corporate Governance Aggregation Mechanism (CGAM). Building on the author's General Theory of Economic Development (GTED), the institutional choice of Economic Differentiation (ED) rewarding performance or Economic Egalitarianism (EE) disregarding it governs ca's accumulation, which in turn drives growth and distribution within a single mechanism: this addresses Sraffa's interdependence as a testable two-equation simultaneous system, reframes reswitching as regime change rather than anomaly, and suggests why capital's distributional effect reverses between regimes, extending the paper's measurement result to accumulation, growth, and distribution. An empirical illustration using firm-level data for Japan and the United States across seven historically documented regime break structures finds ca respects the constant-returns bound in all 40 estimated phase-coefficients, while theorists' conventional K exceeds it in 9.

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JEL Classification: B12; D24; O43

1. Introduction

The Cambridge Capital Controversies of the 1950s–1970s remain the most fundamental unresolved challenge to neoclassical theory. Robinson (1953–1954) showed abstract capital K cannot be measured independently of the profit rate, making the production function logically circular. Sraffa (1960) showed reswitching undermines the monotonic rate-intensity relationship. Samuelson (1966) conceded reswitching's logical validity — an effective acknowledgment that the Cambridge UK critique had succeeded on its own terms.

Yet the mainstream response was not resolution but circumvention. Growth theory continued using aggregate production functions while acknowledging their theoretical fragility. The controversies faded from mainstream discourse not because they were answered but because practitioners found them inconvenient. The new generation of economists — Lucas (1988) and Romer (1990) — built elaborate growth theories on aggregate production function foundations without addressing the Cambridge critique.

Yet the critique itself has not gone silent. Bellino and Brondino (2026) show that recent attempts to close capital-theoretic models from within still require prior knowledge of the very magnitudes they are meant to determine. Seventy years after Robinson's original challenge, model-internal resolutions continue to reproduce the circularity rather than escape it.

This paper locates the shared flaw: both neoclassicals and Cambridge critics assumed capital must be constructed from heterogeneous goods valued at prices that presuppose the very rate of return capital is meant to explain. Neoclassicals assumed this unproblematic; Robinson and Sraffa showed it circular. Neither asked whether capital could be read from a source where valuation is already performed independently — audited balance sheets, where governance, markets, and accounting standards jointly assign value without reference to a theoretical rate of return. Capital theory took shape before the institutional apparatus for reading it existed.

This paper proposes a shift in analytical perspective: from the factory manager, optimizing within a given system, to the corporate economy manager, building and transforming productive capacity through institutional design. She asks what institutional conditions let corporate assets accumulate, and how Economic Differentiation (ED) and Economic Egalitarianism (EE) institutions shape the corporate economy's capacity to grow — questions the factory manager cannot formulate.

This paper, based on GTED (Jwa, 2017), presents the corporate production function $y = ca^{\alpha}$, where ca is per capita corporate assets and α its output elasticity — sharing Solow's $y = k^{\alpha}$ form but derived from Fisher's (1906) principle that any asset equals the present value of its income stream: $ca \equiv y/r$. The full derivation is in Section 3.

The remainder proceeds as follows. Section 2 reviews the Cambridge Capital Controversies and traces the shared construction premise to primary texts. Section 3 introduces GTED and proposes ca as the operational capital concept, establishing the Fisherian foundation and formalizing the Corporate Governance Aggregation Mechanism (CGAM; the governance/market/audit discipline validating ca's valuation). Section 4 demonstrates how ca addresses Robinson's circularity, Sraffa's interdependence, and reswitching, and reconciles micro-level decreasing returns with macro-level increasing returns.

Section 5 discusses broader implications: a shift in perspective from the factory manager to the corporate economy manager, GTED as the formal structure underlying Schumpeterian growth theory, and ca as an alternative to perpetual-inventory capital measurement with a same-specification empirical illustration for Japan and the United States. Section 6 concludes.

2. The Cambridge Capital Controversies: History, Arguments, and Unresolved Issues

Capital theory connects two major areas of economics: the theory of production and the theory of distribution. The Cambridge Capital Controversies brought the tensions between them to a head, exposing logical flaws at the foundation of neoclassical economics that have never been satisfactorily resolved.

2.1. Origins and Background

The controversy originated in the mid-1950s after Harrod-Domar showed capitalist economies have no automatic mechanism equating the warranted and natural growth rates. Solow (1956) and Swan (1956) proposed the neoclassical model as an answer, built around $Y = F(K, L)$ with diminishing returns and each factor earning its marginal product. Robinson (1953–1954) launched the Cambridge Capital Controversies into this setting.

2.2. The Cambridge UK Critique: Three Lines of Attack

2.2.1. Robinson's Aggregation Problem

Robinson's central challenge: capital goods are heterogeneous, cannot be added physically. The neoclassical solution — aggregate at value prices, $K = \Sigma p_i \cdot q_i$ — is circular: p_i depends on r, which is determined by K's marginal product. Robinson (1953–1954) described this as requiring 'a knowledge of the rate of profit before it can be constructed.'

2.2.2. Sraffa's Interdependence

Sraffa's (1960) Production of Commodities deepened Robinson's critique: prices of production and income distribution are simultaneously determined, so as the profit rate changes, all prices change nonlinearly. There is no invariant unit in which capital can be measured across profit rates — a frontal challenge to marginal productivity theory itself.

2.2.3. Reswitching and Reverse Capital Deepening

Reswitching (Pasinetti, 1966; Garegnani, 1966) showed the same technique can be optimal at two different profit rates, with a different technique preferred in between; reverse capital deepening means a fall in the profit rate may induce a switch to a less capital-intensive technique, the opposite of neoclassical prediction. Samuelson (1966) conceded the logical validity of reswitching; Garegnani (1970) provided a general proof of neoclassical capital aggregation's inconsistency.

2.3. The Cambridge MA Defense and Its Limits

2.3.1. Samuelson's Surrogate Production Function

Samuelson's (1962) principal response was the 'surrogate production function' — showing that, under the assumption of equal capital intensity across all sectors, heterogeneous capital behaves as if homogeneous. But equal capital intensity across sectors is equivalent to assuming a one-commodity world — assuming away the very heterogeneity that makes the problem interesting.

Samuelson's 1966 concession on reswitching effectively abandoned this defense.

2.3.2. The Pragmatic Defense and Its Refutation

Ferguson (1969) argued aggregate production functions work empirically even if theoretically imperfect. Shaikh (1974) undermined this: estimated Cobb-Douglas functions fit well not because they capture production laws but because they are mathematical transformations of the accounting identity $Y \equiv wL + rK$. Good statistical fit proves nothing about production technology.

2.3.3. Bliss's Retreat

Bliss (1975) acknowledged Cambridge UK's logical correctness but argued that general equilibrium theory — where capital goods are treated as dated commodities without aggregation — is the proper neoclassical domain. This intellectual honesty came at a cost: general equilibrium is not operational for empirical work. The retreat to general equilibrium was a theoretical escape, not a practical resolution.

2.4. The Aftermath: Circumvention Rather Than Resolution

The debate ended in the mid-1970s through exhaustion, not resolution: Cambridge UK won the logical argument, yet mainstream economics kept using aggregate production functions as if nothing happened. Cohen and Harcourt (2003), revisiting Harcourt's (1972) earlier survey, documented this paradox; Shaikh's (1974) accounting-identity critique means K is not only theoretically incoherent — the empirical success claimed for aggregate production functions is itself an artifact.

Nunes-Pereira and Graça Moura (2024) trace this indifference to an implicit commitment to instrumentalism, arguing that the methodological justification for retaining aggregate capital is itself weak.

2.5. Four Unresolved Issues

Cohen and Harcourt (2003) identified three deep issues left unresolved; a fourth has gained prominence since their survey.

- Return to capital: What determines r in a theoretically coherent and empirically measurable way? Robinson's circle remains unbroken within the neoclassical framework.

- Equilibrium vs. disequilibrium: Robinson argued that path dependence makes equilibrium an inadequate tool for analyzing accumulation and growth. Endogenous growth and Dynamic Stochastic General Equilibrium (DSGE) models inherit this problem.
- Ideology and vision: Capital theory is not ideologically neutral. The choice of capital concept embeds distributional assumptions that are treated as technical but are not.
- Accounting identity problem: Estimated production functions have no genuine empirical content beyond the national income identity. Growth accounting results — Total Factor Productivity (TFP) decompositions — may reflect distributional changes rather than technological progress.

2.6. What Was Established and What Was Not

Three conclusions are secure: (i) abstract K cannot be coherently aggregated without circularity; (ii) Sraffa's interdependence rules out treating income distribution as residual to an independently determined capital aggregate; (iii) reswitching and reverse capital deepening are logically possible. A related methodological point (Section 2.4): the empirical success of aggregate production functions is itself an artifact of the accounting identity, not independent evidence for K. What was not established: Cambridge UK destroyed K but offered no operational alternative capital concept that is simultaneously theoretically coherent, directly measurable, and empirically tractable. This is the gap GTED addresses.

2.7. The Shared Unexamined Premise: GTED's Starting Point

Both sides accepted without question the stock-flow architecture: a capital stock generates an income flow, and this relationship can be formalized mathematically. The dispute was entirely about what K is, not whether the stock-flow structure is valid. GTED proposes that this structure is correct, and that corporate assets on the balance sheet are the right capital concept to fill it — theoretically coherent, directly measurable, and institutionally grounded in the corporate organization of modern capitalist production.

2.8. Textual Evidence for the Shared Construction Premise

This is not merely interpretive; it rests on the primary texts. Robinson (1953–1954) opens her critique not by denying that capital could be measured, but by asking how a single aggregate quantity of K could be built up at all without already knowing the rate of profit needed to price its

heterogeneous components. Her target was the construction procedure, not construction itself.

The neoclassical side responded in kind. Samuelson's (1962) surrogate production function constructs a composite capital measure from heterogeneous machines, calibrated so the aggregate behaves as a single homogeneous good — construction by approximation rather than direct physical counting, but construction nonetheless: built from the model's own technical data, not read from any independent valuation.

Sraffa's own alternative, the standard commodity, is no exception: an internally constructed invariant, not an externally observed one. Even Sraffa replaced physical-capital construction with a different construction rather than reading capital from outside the system — coherent within its own terms, but without the direct measurability GTED seeks.

Three positions — the neoclassical aggregate, Robinson's critique, Sraffa's standard commodity — share this paper's identified premise: each treats capital as built from data internal to the production system. None considers that a modern economy already contains an institution — the audited corporation — whose balance sheet performs this valuation independently (Section 3.2 addresses the obvious objection about fair-value accounting).

This same objection is not new: Veblen (1908) raised it against Fisher forty-five years before Robinson did (Section 3.4). What addresses the objection is not a cleverer argument. It is a real institution — CGAM, described below — that simply did not exist yet when Veblen and Robinson were writing.

3. GTED and Corporate Assets as an Institutional Measure

The Cambridge Capital Controversies identified the right problem but could not provide an operational alternative. This section proposes that corporate assets provide that alternative. Embedded within the General Theory of Economic Development (GTED; Jwa, 2017, 2024), the corporate-asset concept supplies both a measurable capital variable and an institutional mechanism through which the circularity identified by the Cambridge critique can be addressed.

3.1. The Trinitarian Framework and the ED–EE Mechanism

GTED organizes the institutional carriers of economic development into a trinitarian framework of

the market, the corporation, and the government. Sustained development requires all three to operate simultaneously under a single governing principle: Economic Differentiation (ED) — the systematic conditioning of rewards on performance. Conversely, if any one of the three deviates from ED and adopts the EE principle instead — rewarding regardless of performance — economic stagnation becomes inevitable.

The market exercises ED through competitive selection — Alchian's (1950) insight made institutional. But markets alone cannot internalize knowledge investments driving long-run growth. The corporation addresses this: hierarchical organization solves incentive problems markets cannot (Alchian and Demsetz, 1972; Chandler, 1977). Government completes the trinity; when it shifts from ED-amplifying to EE-distributing, it cancels what markets and corporations built.

ED is performance-based allocation: rewards proportional to productive contribution, coordinated through markets, corporations, and enabling government regulation. Economic Egalitarianism (EE) allocates rewards independently of contribution, severing the performance-reward link. ED sustains investment and innovation; EE erodes it. θ measures the ED/EE balance; giniratio (=Mgini/Dgini) proxies EE intensity empirically — as it rises, θ tends to fall. Corporate assets ca operationalize ED in measurable form.

3.2. Definition and Properties of Corporate Assets

The GTED interprets per capita corporate assets ca in corporations' balance sheets as follows,

$ca = k \cdot A^{\gamma}$, $0 < \gamma < 1$, by construct.

Per capita physical capital k is combined nonlinearly with organizational technology A. γ — the organizational elasticity — captures the rate at which organizational sophistication multiplies the productive value of physical capital.

A is a broad container for organizational capital: knowledge, intellectual property, brand, and organizational routines all belong to it conceptually. But A enters ca only as far as they are market-priced — captured where governance, market, and audit validation has occurred (financial assets fair-valued under International Financial Reporting Standards (IFRS) 9, or organizational technology revalued at acquisition under IFRS 3), not as a full inventory of the firm's intangible

endowment.

Corporate assets therefore represent organized productive capacity rather than a simple aggregation of heterogeneous capital goods.

ca has three critical properties:

(i) it is directly measurable from corporate balance sheets without prior knowledge of the profit rate.

(ii) it is theoretically coherent as organized productive capacity, reflecting the actual structure of corporate production.

(iii) it is logically prior to income determination, since ca is a stock variable measured independently of income flows.

These three properties together establish ca as the operational capital concept the Cambridge debate could not produce.

What actually appears on a balance sheet, and on what basis is it valued? Physical assets are treated conservatively: Property, Plant, and Equipment (PP&E) is carried at historical cost under International Accounting Standard (IAS) 16's default, and US Generally Accepted Accounting Principles (GAAP) (Accounting Standards Codification (ASC) 360) prohibits upward revaluation. Fair value applies only where required, not universally: IFRS 13/ASC 820 specify how to calculate fair value when required, not which assets are fair-valued (IASB Post-Implementation Review, 2018). Two components of ca meet that requirement — financial assets under IFRS 9, and organizational technology A when CGAM's governance acts on it, since acquisition remeasures every asset under IFRS 3, with the residual booked as goodwill and tested annually under IAS 36. ca is therefore mixed-basis: physical capital mostly at historical cost, organizational technology fair-valued only at discrete, audited moments.

This mixed basis sharpens the circularity question rather than dissolving it: does the accountant need a discount rate in advance? Not one supplied by the theorist. The market approach relocates the rate to the market itself: an observed transaction price embeds a return discovered — in Hayek's (1968/2002) sense of the market's discovery function — through the entry, exit, and

acquisition of comparable firms (Manne, 1965), not presupposed by the researcher. Only the income approach requires a discount rate estimated from outside the firm, in advance — and GTED does not rely on that approach. GTED's rate, $r \equiv y/ca$, is not estimated in advance at all: it is computed only after ca is already measured, as the ratio between what the firm actually earns (y) and what it actually holds (ca). What ca's construction avoids is Robinson's circle, not the need for a rate at all.

3.3. The Corporate Governance Aggregation Mechanism (CGAM)

Why is balance-sheet valuation disciplined rather than arbitrary? Three forces aggregate continuously to enforce it: management metering (fiduciary duty, and the market for corporate control removing underperformers; Manne, 1965); market validation (equity prices, Tobin's q, M&A); and audit and regulatory verification (IAS 36 impairment forces write-downs). PIM does none of this.

Together these three legs constitute what this paper calls the Corporate Governance Aggregation Mechanism (CGAM): a disciplinary system, external to the theorist's model, that continuously validates ca against actual productive performance and eliminates the unproductive. CGAM is precisely the aggregation mechanism the Cambridge critics showed was missing from Solow's aggregate K — a corporate disciplinary system (Jwa, 2002) that has operated in corporate economies since double-entry bookkeeping was systematized in fifteenth-century Venice.

CGAM's transparency, however, is not the kind a critic has in mind when demanding a theorist-reconstructible valuation: it is market-validated — through equity prices, the market for corporate control, and independent audit — not reconstructible from a theorist's desk. That is by design. The corporation exists (Alchian and Demsetz, 1972; Chandler, 1977; Simon, 1991) precisely to internalize valuations markets cannot price transparently at reasonable cost. Demanding that ca's valuation also be theorist-reproducible — rather than accepted as already disciplined by CGAM — simply reintroduces, one level down, the same construction problem Section 2 identified: an independent rate of return after all.

This opacity is not a defect to be argued away; it is the condition under which the corporation, and profit itself, exist. Knight (1921) located profit in genuine uncertainty — a residual that vanishes under complete, transparent markets. A fully theorist-reconstructible ca would leave r

indistinguishable from the riskless rate. Because the corporation's judgment cannot be fully replicated from outside, ca's value cannot be known in advance. r ≡ y/ca, computed only after that judgment plays out, therefore reflects genuine profit — not a tautology that would hold no matter what happened.

The world firms operate in is imperfect and opaque, not perfectly transparent — this is precisely why the corporation exists (Coase, 1937), and precisely why profit exists (Knight, 1921). A theory of capital that demanded full theorist-side transparency would be a theory fitted to a world without firms and without profit. GTED's capital concept is fitted to the world that actually generates both.

3.4. The GTED Corporate Production Function

GTED derives its production function from a logically prior foundation: Fisher's (1906) principle that any asset equals the present value of the income stream it generates. This derivation addresses the Cambridge circularity, identifies the rate of return without prior knowledge of the elusive theoretical concepts of profit rate, and unifies production theory with asset-pricing theory.

3.4.1. The Fisherian Identity: ca ≡ y/r Turns into Production Theory

Fisher's perpetuity formula states the identity: ca ≡ y/r, therefore r ≡ y/ca. In finance, y/ca is return on assets (ROA). Since Fisher's discount rate and ROA both equal y/ca by definition, r ≡ y/ca ≡ ROA — requiring no prior knowledge of r: ca is measured independently of the theorist's own r, the reverse of Robinson's circle.

From ca ≡ y/r, the corporate production function follows in two forms serving different purposes. The level form y = r·ca is the natural primary derivation. Setting α = r yields y = α·ca, under which marginal productivity = average productivity = y/ca = α = r = ROA — all coincide exactly under linearity, requiring no separate calculation of r.

The power form $y = ca^{\alpha}$ is adopted for estimation, where α is ca's output elasticity, recovered via r = α·ROA. This matters: the theory-free reading of r as ROA holds for the level form's average product, but it is the power form's marginal product, α·ROA, that corresponds to the return that concerned Cambridge, since the critique targeted marginal product, not an accounting ratio.

In general, thereby, regardless of specific forms of production function, measured (ROA ≡ y/ca) or

estimated (α·ROA), ca's marginal productivity replaces all contested theoretical definitions of the profit rate — Marxian (surplus value (s) over constant capital (c) plus variable capital (v), s/(c+v)), neoclassical (marginal product of K), or Sraffian (simultaneously determined with prices of production) — with a directly observable accounting identity. Capital and its return are facts before they are theories.

The Gordon Growth Model (Gordon and Shapiro, 1956) applies the same formula: V (asset price) = D (income flow)/(r−g), which under zero growth gives r = D/V = y/ca — exactly GTED's identity. Tobin's q (Tobin, 1969), the ratio of market value to replacement cost, equals 1 precisely when the income stream capitalized at r equals asset value — Fisher's identity r ≡ y/ca again.

Fair value accounting standards, set by the International Accounting Standards Board and the US Financial Accounting Standards Board (IASB/FASB), are constructed on Fisherian principles — balance-sheet asset values represent capitalized income streams (Cardao-Pito and Ferreira, 2018). The principle operates, as Cardao-Pito (2023) observes, with 'taken-for-granted-knowledge status' in mainstream economics. GTED makes the heritage explicit and draws out its implications for production theory.

3.4.2. From Identity to Production Theory: The MV ≡ Py Analogy

Methodologically, deriving $y = ca^{\alpha}$ has precedent: just as Fisher's (1911) MV ≡ Py became the money demand function M = f(Y, i) under Keynesian interpretation, an identity acquires behavioral content when embedded in an institutional framework — velocity becomes a function of income and interest rate, and ca's output elasticity α becomes a function of θ, rising under ED dominance and falling under EE dominance.

3.4.3. Real and Financial Theories United

Veblen (1908) raised two objections to Fisher: circularity (ca = y/r requires r, which depends on ca — Robinson's circle), and that Fisher's concept was purely pecuniary. Both dissolve in GTED: the circularity dissolves because $ca = k \cdot A^{\gamma}$ is measured directly from balance sheets; the pecuniary objection dissolves because ca is organized productive capacity, not a purely financial abstraction.

Robinson herself later acknowledged this priority, remarking that Veblen made her point 'much better than I did' in 1908. Neither generation had an answer to the follow-up question: if not

physical counting, what disciplines a balance-sheet valuation and keeps it from being arbitrary? Section 3.3 above develops the answer as CGAM — governance, market, and audit disciplines that did not exist in mature form when Veblen and Fisher debated.

The neoclassical production function was always treated as purely real-side; Cambridge critics attacked it on those terms. The dual interpretation reveals it as also an asset-pricing relationship: ca ≡ y/r equates a stock with a capitalized flow, performing the stock-flow integration neither school formalized. α is the bridge: ca's marginal productivity equals r = α = ROA exactly under the level form, recovered as r = α·ROA under the power form.

This dual interpretation carries three implications: α is cross-validated (estimated α should match the implied yield y/ca); it grounds valuation in fundamentals (rising ca without rising y implies falling α, signaling overvaluation); and it connects capital income to institutional regime — high α under ED reflects genuine productivity, low α under EE reflects suppressed dynamism, both governed by θ.

3.5. The GTED Dynamic Model of Corporate Economy: Institutional Determination of Corporate Asset Accumulation

The Fisherian identity ca ≡ y/r and the corporate production function $y = ca^{\alpha}$ are static: they characterize the stock-flow connection at a given institutional state. But Cambridge raises dynamic issues too, including Robinson's path dependence and Sraffa's temporal production-distribution interdependence. GTED addresses both by modeling how organizational technology A — the non-physical component of $ca = k \cdot A^{\gamma}$ — evolves under institutional pressure.

The core dynamic equation is: $dA/dt = \theta \cdot y - A$, θ: institutional parameter (higher θ → stronger ED; lower θ → stronger EE).

The augmentation force θ·y captures the institutional feedback: output y, weighted by the institutional parameter θ, feeds back into organizational technology. Under ED dominance (high θ), high-performing corporations generate output that reinforces and deepens A — a self-amplifying dynamic. The erosion force −A captures depreciation absent institutional support: without sustained performance incentives, capability decays. The net dynamic — whether A grows or decays — depends entirely on the institutional balance θ.

The full four-equation system integrates the static Fisherian identity with the dynamic institutional mechanism:

(1) $ca = k \cdot A^{\gamma}$, $\gamma \in (0,1)$

(2) $y = ca^{\alpha}$, $\alpha \in (0,1)$

(3) $dA/dt = \theta \cdot y - A$, θ = institutional parameter

(4) Mgini = g(ca, giniratio)

Two properties connect the dynamic model to Cambridge Capital Controversies. First, micro-level DRS, macro-level amplification: $y = ca^{\alpha}$ with $\alpha < 1$ preserves micro decreasing returns at the firm level, while $dA/dt = \theta \cdot y - A$ raises the economy's steady-state technology, assets, and output substantially under ED relative to EE, through institutional amplification rather than technological spillovers (Lucas, 1988; Romer, 1990) — a level effect operating through incentive-driven accumulation, not a change in returns to scale. Second, endogenous distribution: under ED, rising ca reduces inequality; under EE the mechanism reverses — distribution is endogenous to θ, not a residual of factor market clearing.

4. How Corporate Assets Address the Cambridge Capital Controversies

4.1. Breaking Robinson's Circle

Robinson's circle is a foundational logical trap: to measure the aggregate capital stock K, neoclassical economics aggregates heterogeneous capital goods at their market prices — but those prices depend on the rate of profit r, which is itself supposed to be determined by the marginal product of K. Measuring K requires r, and determining r requires K.

GTED escapes the circle by sidestepping it: ca is observed from audited balance sheets first, before any theory of the profit rate; output y follows second; and r follows third as the derived quantity — an empirical fact, not an assumption. The causal arrow runs ca → y → r, the reverse of Robinson's circle (r → K → y).

Why does ca avoid the aggregation problem that defeated K? It is not a physical aggregate but a value aggregate grounded in present-value capitalization (Fisher, 1906): a balance sheet capitalizes

income streams, not machine counts. Robinson's circle dissolves because ca is logically prior to r; $ca = k \cdot A^{\gamma}$ is a separate, subsequent step attributing that value to its sources.

4.2. Addressing Sraffa's Interdependence

Sraffa's critique is deeper than Robinson's. Where Robinson identified a circularity in measuring K, Sraffa showed that in a multi-commodity system all prices — including capital goods prices — change simultaneously as income distribution shifts. There is no invariant unit of value in which to express capital across profit rates; capital's value and income distribution are mutually constituted — a structural indeterminacy, not a data problem.

GTED makes Sraffa's insight the centerpiece: distribution is endogenous to the same institutional mechanism governing ca accumulation. Identification rests on measuring ca at prevailing market prices, with no claim of distributional independence. The central claim is structural: through the ED/EE balance θ, GTED dynamically models Sraffa's interdependence itself. As θ shifts, ca and its distributional consequences (Mgini) move together within a single mechanism ($dA/dt = \theta \cdot y - A$) — two effects of the same underlying cause, not independently determined relationships. The dynamic model represents Sraffa's simultaneity directly; it does not merely control it away.

4.3. Accommodating Reswitching

Reswitching — the demonstration that the same production technique can be optimal at two different profit rates with a different technique preferred at intermediate rates — destroys the monotonic relationship between profit rates and capital intensity that underpins the neoclassical demand curve for capital. Samuelson's (1966) concession that reswitching is logically valid was the decisive moment of the Cambridge controversy, because it meant the neoclassical account of how the profit rate determines investment was fundamentally broken.

GTED does not require the monotonic capital-profit relationship reswitching destroys: $ca = k \cdot A^{\gamma}$ lets different k/A combinations yield the same ca at different states. GTED reframes reswitching as institutional prediction: as θ declines under EE, A decays through $dA/dt = \theta \cdot y - A$, making previously suboptimal techniques optimal — reversals are regime change, not anomaly. This directly explains the switching phenomenon: because a shift in θ propagates through $A \rightarrow ca \rightarrow y$, the dynamic model does not merely permit reswitching-type reversals as a special case — it

generates them as the ordinary consequence of institutional change. GTED's dynamic structure accommodates reswitching naturally, rather than needing to prove reswitching cannot occur.

4.4. The Simultaneous System: Structural Response to Circularity

4.4.1. The System

The theoretical construction translates into an estimable empirical structure: a two-equation simultaneous system in which a GDP equation (Y) and a market-inequality equation (G) are jointly determined by lagged corporate assets (ca) and lagged giniratio (= Mgini/Dgini), with regime dummies capturing institutional-phase shifts. The full specification, with y and ca in log scale, is as follows:

$$(Y)\ \ln y_t = \beta_0 + \Sigma_j \beta_{0j} \cdot D_j + \beta_1 \ln ca_{t-1} + \Sigma_j \beta_{1j} (D_j \cdot \ln ca_{t-1}) + \beta_2\ giniratio_{t-1} + \Sigma_j \beta_{2j} (D_j \cdot giniratio_{t-1}) + \Sigma_i a_i X_i + u_t;$$

$$(G)\ Mgini_t = \beta_3 + \Sigma_j \beta_{3j} \cdot D_j + \beta_4 \ln ca_{t-1} + \Sigma_j \beta_{4j} (D_j \cdot \ln ca_{t-1}) + \beta_5\ giniratio_{t-1} + \Sigma_j \beta_{5j} (D_j \cdot giniratio_{t-1}) + \Sigma_i a_i X_i + v_t.$$

y and ca are in logarithmic scale. ca is a substitute for capital as well as the ED proxy, and giniratio is the EE intensity proxy — as the former (latter) rises, θ tends to rise (fall). D_j (j=1, 2,…) is a regime dummy and each interaction and intercept-shift term expands into j coefficients, giving both equations their own slope and intercept across all j phases. X_i are controls with coefficients a_i, notationally distinct from the β coefficients on ca and giniratio.

4.4.2. Why This Addresses Cambridge Simultaneity

The Cambridge problem, compressed to its logical core, is K ↔ r: capital value and the profit rate are mutually constituted and cannot be independently identified. Every attempt to estimate a production function using K as the capital variable runs into this problem — the estimated coefficient conflates the production relationship with the distributional relationship, precisely as Shaikh (1974) showed by demonstrating that Cobb-Douglas regressions are mathematical transformations of the national income accounting identity.

GTED dissolves this mutual constitution through temporal ordering the neoclassical framework lacked. ca_{t-1} is accumulated before the current period; y_t and $Mgini_t$ are outcomes given ca_{t-1} and θ.

$r = \alpha \cdot ROA$ is derived only after (ca, y) are observed — a consequence, not a premise. GTED measures ca independently of that r; Robinson's circle no longer exists.

4.4.3. The Distribution Equation and the Endogenous Shared Growth Mechanism

Equation (G) is GTED's most distinctive contribution: Sraffa showed production and distribution are simultaneously determined, but post-Keynesians could not construct an operational, tested model of this simultaneity. Equation (G) specifies Mgini and y as companion equations sharing the institutional driver θ, operating through ca — distribution endogenous to the same institutional balance governing growth.

The economic logic is the corporate shared growth mechanism. Under ED dominance, ca accumulation creates broadly distributed opportunities: performance-based reward draws workers into productive activity on merit, captured by the negative ca coefficient on the inequality measured by market income Gini. Under EE dominance, redistribution severs the performance-reward linkage and the engine stalls. This sign reversal is the empirical fingerprint of the ED/EE regime shift.

4.5. Micro-Level DRS, Macro-Level Amplification: Reconciling Competitive Equilibrium with Institutional Growth

A deep tension runs through growth theory since the Cambridge Capital Controversies: micro-level competitive equilibrium demands non-increasing returns, while explaining large, sustained differences in development outcomes across institutional regimes seems to call for something more than a diminishing-returns production function alone can deliver. Romer (1990) and Lucas (1988) addressed this through non-rival knowledge spillovers — but non-rivalry implies a public good breaking competitive equilibrium, an incentive problem neither theory resolved. GTED addresses it differently: not through a change in returns to scale, but through an incentive-driven amplification of the economy's steady-state equilibrium under ED-based institutions.

At the firm level, $y = ca^{\alpha}$ with $\alpha < 1$ preserves micro decreasing returns throughout. At the macro level, the feedback $dA/dt = \theta \cdot y - A$ determines how high the system's steady state settles: output feeds back into A, raising its equilibrium value. Under ED dominance this loop is self-reinforcing and the system converges to a substantially higher equilibrium; under EE dominance it reverses,

pulling the system toward a markedly lower equilibrium or, in the limit, collapse. This is a stability and level result, not literal increasing returns to scale — the system remains bounded at every point, which is what keeps ED-driven growth from the explosive dynamics a true increasing-returns specification would produce. The source of this amplification is an ED-incentive phenomenon to overcome a knowledge externality.

4.6. From Agrarian to Corporate Production Theory: The Historical Reconceptualization

The aggregate production function $Y = F(K, L)$ emerged when the dominant production unit was the owner-operated farm or workshop, where ownership, management, and risk-bearing coincided. Aggregating heterogeneous capital into K was a natural, if incoherent, simplification — but it left unanswered what the correct production theory is for the corporate economy that has dominated capitalism since the late nineteenth century.

The corporate economy is organized around a fundamentally different unit: the modern corporation, where ownership and management are separated and productive capacity extends to organizational knowledge and institutional relationships (Chandler, 1977; Alchian and Demsetz, 1972; Simon, 1991). The correct capital concept is a measure of organized productive capacity, not an aggregate of physical goods — precisely what $ca = k \cdot A^{\gamma}$ captures.

The production function $y = ca^{\alpha}$ therefore represents a reconceptualization of production theory from factor endowments to corporate-organized capacity — away from the ahistorical abstraction of technologically determined factor payments, toward the institutional concreteness of performance-based differentiation. The Cambridge economists asked the right question about what was wrong with the old theory. GTED answers it by constructing the new one.

5. Broader Implications

The framework proposed here is not a technical patch on neoclassical theory but a significant shift in perspective — in the productive unit analyzed, the capital concept employed, and the role of institutions in determining capital's return. This section draws out the implications for growth theory, capital measurement, and distribution.

5.1. A Shift in Perspective: From Factory Manager to Corporate Economy Manager

The factory manager operates within a closed, technologically given system: K and L are inputs, the profit rate is K's marginal product, institutions are invisible. This is internally coherent as static optimization, but cannot ask under what institutional conditions corporations accumulate the organizational depth constituting ca, or why some economies grow sustainably while others stagnate.

The corporate economy manager designs the institutional conditions — the ED/EE balance, θ — under which $ca = k \cdot A^{\gamma}$ accumulates. The predicted gradient (α declining as θ falls) is her operational data, an institutional outcome rather than a technological constraint: the Soviet Union had physical capital k, but with $\theta \to 0$, $A^{\gamma} \approx 0$ and $ca \approx 0$ despite substantial physical investment — a case the factory manager's framework cannot diagnose.

5.2. For Growth Theory: GTED as the Formal Structure of Schumpeterian Development

GTED is Schumpeterian in the precise sense that existing endogenous growth models are not: its dynamic is genuinely disequilibrium, its mechanism is institutional rather than technological, and its engine is the nonlinear amplification of organizational capability enabling qualitative transformation — wagon to railroad to spaceship — rather than smooth optimization (Schumpeter, 1934, 1942).

Solow (1956) cannot generate sustained growth without exogenous technology as a residual. Romer (1990) and Lucas (1988) endogenize innovation as equilibrium optimization, departing from Schumpeter's disequilibrium engine. Acemoglu and Robinson (2012) identify institutions as fundamental, consistent with GTED, but their 'inclusive institutions' emphasize redistribution — an EE-leaning mechanism that suppresses the performance differentiation Schumpeterian transformation requires.

GTED's dynamic $dA/dt = \theta \cdot y - A$ delivers what these models cannot: under ED dominance, organizational technology accumulates nonlinearly through $ca = k \cdot A^{\gamma}$, enabling each next qualitative leap toward a substantially higher equilibrium; under EE dominance the loop reverses and A decays toward a markedly lower one. This institutional amplification of the system's equilibrium level is the mechanism Schumpeter identified as capitalism's engine of creative destruction (1942), now formalized empirically.

5.3. For Capital Measurement: ca vs. Perpetual Inventory

The claim that ca addresses a measurement problem the perpetual inventory method (PIM) does not solve is comparative, and should be defended comparatively across several dimensions rather than asserted on one.

The prior question. Before comparing construction, does the measure test whether resources have been organized into productive capacity by a governed institution, or does it simply tag a purchase by sector, regardless of whether it was organized into productive capacity? System of National Accounts (SNA) assigns gross fixed capital formation to the 'corporate' sector purely by legal form (SNA, 2008, ch. 4); the formula $K_t = (1-\delta) \cdot K_{t-1} + I_t$ applies uniformly, with no governance content. ca exists only where board approval, market-priced transactions, and audit have occurred (CGAM). This coincides with the line GTED draws between an 'agrarian' and a 'corporate' economy (Jwa, 2024).

Construction stages. PIM's initial value follows a steady-state formula ($K_0 = I_0/(\delta+g)$) that can turn negative (Berlemann and Wesselhöft, 2014); ca inherits each firm's history. PIM's depreciation uses only two or three fixed percentages per broad category (Kamps, 2006); ca_i's depreciation is audited and asset-specific — unlike PIM's formula, the underlying register preserves vintage information, though this paper's regressions do not yet exploit it.

Revaluation. Neither historical-cost PP&E nor PIM's deflated stock is ordinarily revalued. ca's revaluation channel operates at discrete, market-disciplined moments PIM has no analog for: acquisition (IFRS 3) and exit. M&A accounts for roughly 80 percent of large-firm capital reallocation in the US (David, 2021); fire-sale discounts on bankrupt firms' assets (8-14 percent; Pulvino, 1998) show exit is the same kind of test. This advantage is conditional: it applies only where control changes, so a firm growing purely through retained earnings gets no balance-sheet revaluation — though it remains subject to the same market for corporate control (Manne, 1965), since underperformance invites takeover.

Aggregation. PIM's aggregation rule is imposed uniformly by the researcher; ca's is CGAM itself — each constituent ca_i has already been validated by governance, market, and audit before entering the sum. Janser, Lehmer and Zierahn-Weilage (2024) find PIM-style capital stocks explain only 40 percent of the variance in Bureau van Dijk's audited firm-level data, evidence the two are

measuring substantially different things.

Table 1 summarizes these comparisons across the dimensions above.

Table 1. Comparison of ca and the Perpetual Inventory Method (PIM) Across Construction Stages

Stage	PIM	ca
Tests institutional aggregation (Section III.3)	No — sector tag only, no governance/market/audit test	Yes — existence presupposes CGAM validation
Scope boundary	Undifferentiated — mixes ED-organized and non-organized resources	Coincides with GTED's own agrarian/corporate-economy boundary (Jwa, 2024)
Starting point	Aggregate (macro investment flow)	Firm-level, then summed
Initial value	Steady-state formula; can turn negative	Firm's own historical record; no analogous problem
Depreciation	Assumed, depreciation rates of 2–3% per asset class	Audited, firm- and asset-specific
Vintage information	Destroyed by the recursive formula	Preserved in the fixed-asset register (not yet exploited empirically here)
Revaluation event	None, ever	M&A (IFRS 3): roughly 80 percent of large-firm capital reallocation, but conditional on change of control
Physical capital absent revaluation	Cost-based	Cost-based on the books — symmetric with PIM — but the firm remains under continuous market-for-corporate-control discipline
Aggregation discipline	Researcher-imposed, uniform rule	CGAM: governance, market, audit — internal to each unit
Discount rate required to construct the aggregate	No	No (market approach); externally-sourced only where the income approach applies

Note: Summarizes the stage-by-stage comparison developed in Section 5.3. CGAM = Corporate Governance Aggregation Mechanism (governance, market, and audit validation; Section 3.3).

5.4. An Empirical Illustration: ca vs. PIM K, Same Specification

This is tested directly: an identical ca-vs-K specification within each country, substituting only the capital variable: ca (Japan: MOF Financial Statements Statistics of Corporations; US: S&P Capital IQ, cross-validated against Compustat, correlation 0.989) vs. K (PIM, PWT 11.0, rkna), 1962–2021 for Japan and 1961–2016 for the US. Both equations control for lagged giniratio and union density; the Japan specification additionally controls for trade openness, for which no comparable series was available for the US. Seven break structures per country are tested, chosen from historically documented dates rather than statistical search.

GDP equation. Table 2 reports phase-total elasticities across all seven structures and both countries. Under constant-returns theory, a single factor's elasticity cannot exceed one. Across 40

phase-coefficients, ca never exceeds this bound; K exceeds it in 9 (22.5 percent), concentrated in the 1980s and post-2008 — harder to reconcile with the framework PIM itself presupposes.

Table 2. GDP Equation: Phase-Total Elasticities of ca and K, Japan and United States, Seven Break Structures

Spec	Break year(s)	ca phase-totals	K phase-totals	ca >1	K >1
US-A	1973	0.665*** / 0.176***	0.888*** / 0.793***	0/2	0/2
US-B	1981	0.371*** / 0.192***	1.026*** / 0.544***	0/2	1/2
US-C	1973,1981	0.665*** / -0.300** / 0.192***	0.888*** / 0.888*** / 0.544***	0/3	0/3
US-D	1973,1991	0.665*** / 0.111* / 0.149***	0.888*** / 0.316n.s. / 0.223*	0/3	0/3
US-E	1981,2001	0.371*** / 0.213*** / 0.007n.s.	1.026*** / 1.737*** / 0.140n.s.	0/3	2/3
US-F	1973,1981,2001	0.665*** / -0.300** / 0.213*** / 0.007n.s.	0.888*** / 0.888*** / 1.737*** / 0.140n.s.	0/4	1/4
US-G	1981,2009	0.371*** / 0.202*** / -0.316***	1.026*** / 0.759*** / 1.726***	0/3	2/3
JP-A	1973	0.865*** / 0.421***	0.790*** / 0.618***	0/2	0/2
JP-B	1985	0.705*** / 0.221***	0.631*** / 0.496***	0/2	0/2
JP-C	1973,1991	0.865*** / -0.087n.s. / 0.120***	0.790*** / 0.418*** / 0.372***	0/3	0/3
JP-D	1973,1985	0.865*** / -0.891*** / 0.221***	0.790*** / 0.517*** / 0.496***	0/3	0/3
JP-E	1985,2009	0.705*** / 0.295*** / 0.282n.s.	0.631*** / 0.633*** / 1.584*	0/3	1/3
JP-F	1973,1985,1991	0.865*** / -0.891*** / 0.921*** / 0.120***	0.790*** / 0.517*** / 1.750*** / 0.372***	0/4	1/4
JP-G	1985,1991	0.705*** / 0.921*** / 0.120***	0.631*** / 1.750*** / 0.372***	0/3	1/3

*Note: Log-log, one-period lags, HAC (5 lags) errors. Cells report phase-total elasticities for successive regimes, separated by '/'. ca = corporate assets (Japan: MOF; US: S&P Capital IQ); K = PIM capital stock (PWT 11.0, series rkna; Feenstra, Inklaar and Timmer, 2015). 'ca >1'/'K >1' report phases exceeding the constant-returns bound of one. *** p<0.01, ** p<0.05, * p<0.10, n.s. = not significant.*

Gini equation. No comparable benchmark was found for magnitude in the distribution equation. Table 3 reports the full phase-coefficients without an evaluative benchmark; readers should judge sign stability, significance, and magnitude directly.

Table 3. Gini (Market Inequality) Equation: Phase-Total Elasticities of ca and K, Japan and United States, Seven Break Structures

Spec	Break year(s)	ca phase-totals	K phase-totals
US-A	1973	-0.016n.s. / -0.021n.s.	-0.004n.s. / 0.006n.s.
US-B	1981	-0.037*** / -0.021n.s.	-0.075*** / 0.080n.s.
US-C	1973,1981	-0.016n.s. / -0.010n.s. / -0.021n.s.	-0.004n.s. / 0.122*** / 0.080n.s.
US-D	1973,1991	-0.016n.s. / -0.102*** / -0.021n.s.	-0.004n.s. / 0.084n.s. / 0.194***
US-E	1981,2001	-0.037*** / -0.040* / -0.084***	-0.075*** / 0.129n.s. / 0.274***
US-F	1973,1981,2001	-0.016n.s. / -0.010n.s. / -0.040* / -0.084***	-0.004n.s. / 0.122*** / 0.129n.s. / 0.274***
US-G	1981,2009	-0.037*** / -0.022n.s. / 0.035**	-0.075*** / 0.056n.s. / 0.037n.s.
JP-A	1973	0.018*** / 0.146***	0.016*** / 0.105***
JP-B	1985	0.020*** / 0.142***	0.020*** / 0.332***
JP-C	1973,1991	0.018*** / 0.053*** / 0.219***	0.016*** / 0.064*** / 0.376***
JP-D	1973,1985	0.018*** / -0.037n.s. / 0.142***	0.016*** / 0.089*** / 0.332***
JP-E	1985,2009	0.020*** / 0.101*** / 0.209***	0.020*** / 0.306*** / 0.787***
JP-F	1973,1985,1991	0.018*** / -0.037n.s. / 0.091** / 0.219***	0.016*** / 0.089*** / 0.347*** / 0.376***
JP-G	1985,1991	0.020*** / 0.091** / 0.219***	0.020*** / 0.347*** / 0.376***

*Note: Same specification as Table 2, with ln(Gini market) as dependent variable. ca's elasticities are predominantly negative for the US and positive for Japan; the shared-growth channel predicts this sign only under ED-dominant conditions, so the contrast is consistent with a difference in the two countries' average θ over this sample. *** p<0.01, ** p<0.05, * p<0.10, n.s. = not significant.*

5.5. Reinterpreting Piketty's r > g

Piketty's (2014) r > g thesis rests on a capital concept that inherits the Cambridge aggregation problems: his 'capital' is a theorist-constructed aggregate requiring an assumed rate of return to value and sum heterogeneous assets, subject to exactly Robinson's circularity. In GTED, r = α = ROA (r = α·ROA under the power form), where α — the capital yield — is institutionally determined by θ: high α under ED dominance reflects genuine productivity, low α under EE dominance reflects suppressed dynamism. The r > g relationship is therefore regime-dependent, not universal: Piketty's concern is most valid under EE-dominant regimes, where it increasingly reflects rent-seeking rather than productive contribution — but the solution is restoring ED, not redistribution, which severs the performance-reward linkage the shared-growth mechanism depends on (Section 4.4) and is, for that reason, self-defeating (Jwa, 2024).

5.6. Explaining the Lucas Paradox

Capital does not flow from rich to poor countries as factor-scarcity theory predicts (Lucas, 1990). GTED suggests why: a poor country's aggregate K may be scarce while containing few CGAM-validated corporate assets, so capital arriving there finds few validated structures to absorb and convert it into productive ca — capital follows corporations, not countries. The Cambridge economists asked the right question; Lucas asked the right empirical one. GTED offers the capital concept both lacked.

6. Conclusion

The Cambridge Capital Controversies established, with logical rigor, that abstract capital K cannot be coherently aggregated without circularity, that reswitching makes the neoclassical demand curve for capital unsound, and that production and distribution are simultaneously determined. These conclusions stand. What the controversy failed to provide was an operational alternative — theoretically coherent, directly measurable, empirically tractable. That failure is what GTED addresses.

Corporate assets ($ca = k \cdot A^{\gamma}$) provide the operational alternative the Cambridge debate demanded: theoretically coherent as organized productive capacity, directly measurable without prior

knowledge of the profit rate, institutionally grounded in the modern corporation. Robinson's circularity dissolves because ca is measured independently of the theorist's own endogenous r. Sraffa's interdependence is operationalized through the simultaneous system (Y, G). Reswitching becomes a prediction about regime change, not a refutation of capital theory.

A further, speculative point: PIM evades Robinson's circularity by using no rate of return at all — but the burden resurfaces when PIM's K enters a production function and its coefficient is read as capital's marginal product, reintroducing the very rate PIM avoided at construction. ca uses the market's perceived rate on comparable assets, escaping the circle without dodging the valuation problem. This rate is discovered, in Hayek's (1968/2002) sense, by the market for corporate control (Manne, 1965); PIM has no firm-level analog for entry, exit, or acquisition. Section 5.4 is consistent with this: PIM exceeds the constant-returns bound in 9 of 40 phase-coefficients — the empirical signature of that same burden — ca never does.

The GTED production function $y = ca^{\alpha}$ generalizes the neoclassical tradition, recovering what was sound in the stock-flow architecture both Cambridge schools accepted while replacing what was incoherent with Fisher's (1906) identity. α bridges real and financial sides: output elasticity of ca, equal to r = ROA under the level form, recovered via $r = \alpha \cdot ROA$ under the power form. GTED builds on the facts.

The theoretical construction holds on both fronts. The capital yield $\alpha \approx r$ is institutionally determined rather than technologically fixed: it rises where ED institutions strengthen and declines where EE dominance takes hold. Income distribution is equally endogenous to θ through ca, not a residual of factor market clearing.

At a deeper level, GTED is an endogenous shared growth mechanism: under ED, the same accumulation driving output growth improves distribution through ED → ca → shared growth — what Cambridge demanded but could not construct. Table 3 offers indirect evidence: ca's Gini coefficient is predominantly negative for the US but positive for Japan; since the channel is θ-dependent, this is consistent with Japan spending more of the sample under EE-leaning conditions (giniratio 1.462 vs. 1.345), not mechanism failure.

Corporate assets deliver what fifty years of controversy could not: a capital concept that is theoretically coherent, directly measurable, and empirically tractable — disciplined by the market,

not by the theorist.

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References

Acemoglu, D., & Robinson, J. A. (2012). *Why nations fail: The origins of power, prosperity, and poverty*. Crown Publishers.

Alchian, A. A. (1950). Uncertainty, evolution, and economic theory. *Journal of Political Economy, 58*(3), 211–221.

Alchian, A. A., & Demsetz, H. (1972). Production, information costs, and economic organization. *American Economic Review, 62*(5), 777–795.

Bellino, E., & Brondino, G. (2026). Rate of interest and intertemporal preferences in multisectoral frameworks: A critical view. *Metroeconomica, 77*(3), 243–250.

Berlemann, M., & Wesselhöft, J.-E. (2014). Estimating aggregate capital stocks using the perpetual inventory method: A survey of previous implementations and new empirical evidence for 103 countries. *Review of Economics*, *65*(1), 1–34.

Bliss, C. (1975). *Capital theory and the distribution of income*. North-Holland.

Cardao-Pito, T., & Ferreira, J. (2018). Fair value accounting as the normative Fisherian phase of accounting. *Accounting History Review*, *28*(3), 149–179.

Cardao-Pito, T. (2023). Prevalence of Fisher's theory in mainstream accounting and economic research. *Accounting History, 28*(2), 312–337.

Chandler, A. D. (1977). *The visible hand: The managerial revolution in American business*. Harvard University Press.

Coase, R. H. (1937). The nature of the firm. *Economica*, *4*(16), 386–405.

Cohen, A. J., & Harcourt, G. C. (2003). Whatever happened to the Cambridge capital theory controversies? *Journal of Economic Perspectives*, *17*(1), 199–214.

David, J. M. (2021). The aggregate implications of mergers and acquisitions. *Review of Economic Studies, 88*(4), 1796–1830.

Feenstra, R. C., Inklaar, R., & Timmer, M. P. (2015). The next generation of the Penn World Table. *American Economic Review, 105*(10), 3150–3182.

Ferguson, C. E. (1969). *The neoclassical theory of production and distribution*. Cambridge University Press.

Fisher, I. (1906). *The nature of capital and income*. Macmillan.

Fisher, I. (1911). *The purchasing power of money: Its determination and relation to credit, interest and prices*. Macmillan.

Garegnani, P. (1966). Switching of techniques. *Quarterly Journal of Economics*, *80*(4), 554–567.

Garegnani, P. (1970). Heterogeneous capital, the production function and the theory of distribution. *Review of Economic Studies, 37*(3), 407–436.

Gordon, M. J., & Shapiro, E. (1956). Capital equipment analysis: The required rate of profit. *Management Science, 3*(1), 102–110.

Harcourt, G. C. (1972). *Some Cambridge controversies in the theory of capital*. Cambridge University Press.

Hayek, F. A. (1968/2002). Competition as a discovery procedure (M. S. Snow, Trans.). *The Quarterly Journal of Austrian Economics, 5*(3), 9–23.

International Accounting Standards Board. (2018). *Post-implementation review of IFRS 13 fair value measurement*. IFRS Foundation.

Janser, M., Lehmer, F., & Zierahn-Weilage, U. (2024). Computing capital stocks in the German social security records and quantifying their role for wage inequality. *CESifo Economic Studies, 70*(4), 370–393.

Jwa, S.-H. (2002). *The evolution of large corporations in Korea*. Edward Elgar.

Jwa, S.-H. (2017). *A general theory of economic development: Towards a capitalist manifesto*. Edward Elgar.

Jwa, S.-H. (2024). What causes polarized stagnation, corporate economy, or welfare state? Insights from new development economics. *Economics & Politics, 37*(1), 271–303.

Kamps, C. (2006). New estimates of government net capital stocks for 22 OECD countries, 1960–2001. *IMF Staff Papers, 53*(1), 120–150.

Knight, F. H. (1921). *Risk, uncertainty and profit*. Houghton Mifflin.

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22*(1), 3–42.

Lucas, R. E. (1990). Why doesn't capital flow from rich to poor countries? *American Economic Review, 80*(2), 92–96.

Manne, H. G. (1965). Mergers and the market for corporate control. *Journal of Political Economy, 73*(2), 110–120.

Nunes-Pereira, F., & Graça Moura, M. (2024). On the survival of a flawed theory of capital: Mainstream economics and the Cambridge capital controversies. *Cambridge Journal of Economics, 48*(2), 169–186.

Pasinetti, L. (1966). Changes in the rate of profit and switches of techniques. *Quarterly Journal of Economics, 80*(4), 503–517.

Piketty, T. (2014). *Capital in the twenty-first century*. Harvard University Press.

Pulvino, T. C. (1998). Do asset fire sales exist? An empirical investigation of commercial aircraft transactions. *Journal of Finance, 53*(3), 939–978.

Robinson, J. (1953–1954). The production function and the theory of capital. *Review of Economic Studies, 21*(2), 81–106.

Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy, 98*(5), S71–S102.

Samuelson, P. A. (1962). Parable and realism in capital theory: The surrogate production function. *Review of Economic Studies, 29*(3), 193–206.

Samuelson, P. A. (1966). A summing up. *Quarterly Journal of Economics, 80*(4), 568–583.

Schumpeter, J. A. (1934). *The theory of economic development* (R. Opie, Trans.). Harvard University Press.

Schumpeter, J. A. (1942). *Capitalism, socialism and democracy*. Harper and Brothers.

Shaikh, A. (1974). Laws of production and laws of algebra: The humbug production function. *Review of Economics and Statistics, 56*(1), 115–120.

Simon, H. A. (1991). Organizations and markets. *Journal of Economic Perspectives, 5*(2), 25–44.

Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics, 70*(1), 65–94.

Sraffa, P. (1960). *Production of commodities by means of commodities*. Cambridge University Press.

Swan, T. W. (1956). Economic growth and capital accumulation. *Economic Record, 32*(63), 334–361.

System of National Accounts (SNA). (2008). *System of National Accounts 2008*. United Nations, European Commission, International Monetary Fund, OECD, and World Bank.

Tobin, J. (1969). A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking, 1*(1), 15–29.

Veblen, T. (1908). Fisher's capital and income. *Political Science Quarterly, 23*(1), 112–128.