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Who Lost and Who Recovered during the Great Depression: An Eight Class and Life Cycle Analysis of Consumption Production Banking Institutions Income and Wealth Inequality and Keynesian Recovery in the United States

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WORKING PAPER

Who Lost and Who Recovered during the Great Depression: An Eight Class and Life Cycle Analysis of Consumption Production Banking Institutions Income and Wealth Inequality and Keynesian Recovery in the United States

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JEL classification: N12, N22, E12, E21, E32, E52, E62, D31, I32, H53

Keywords: *Great Depression; New Deal; Keynes; eight economic classes; life cycle; consumption; banking panics; gold standard; income inequality; wealth inequality; Gini coefficient; poverty; counterfactual policy analysis*

Evidence-status statement

Every number in this paper carries one of five labels. **H** marks a historical value retrieved from an official or research source and logged with its identifier and access date (16 November 2026); **H*** marks a published historical value entered from the printed series without online re-retrieval in this session, which should be verified before citation. **D** marks a value derived arithmetically from H values. **R** marks a reconstruction that combines published anchors with stated interpolation or allocation rules. **A** marks an assumed parameter with a stated range. **S** marks a synthetic result of the counterfactual model or of the synthetic microdata.

No household survey with individual incomes, consumption and wealth exists for the United States in 1929-1941 at the detail required here. Eight-class and age-by-class results are therefore reconstructions and simulations, not observations. Packages B to H are hypothetical; they are not history and not forecasts. Where the evidence cannot identify a quantity, the paper reports “not identified” rather than a number. The code was executed in full before the text was written; checks that were not run are not claimed.

Structured abstract

Purpose. To establish, class by class and age by age, who lost and who recovered during the American Great Depression of 1929-1941, and to ask how far different combinations of banking repair, monetary policy, Keynesian fiscal expansion and protection of basic needs could have changed those outcomes.

Design. Retrieved national accounts, labour, banking, fiscal, price, demographic and distributional series (52 logged series) are combined with published top-income and wealth-concentration estimates to reconstruct an eight-class income distribution (percentile blocks 10/20/20/20/15/10/4/1) for every year from 1929 to 1941, a 60,000-unit synthetic population that is followed both as a fixed 1929 cohort and as re-ranked annual cross-sections, eight-by-eight age-by-class matrices, a class-by-asset wealth ledger, and needs shortfalls measured against the 1935 Works Progress Administration (WPA) emergency and maintenance budgets. A deviation model around actual history then evaluates eight policy packages (A actual to H integrated-but-captured) with Latin hypercube sensitivity analysis.

Findings. Real GDP fell 26.3% from 1929 to 1933 (H) and unemployment reached 24.9% of the labour force under the BLS concept (H). In the reconstruction, real disposable income per person fell by 33% to 27% in classes 1 to 4 and by 40% in class 8 between 1929 and 1933; the share of persons below the WPA emergency budget rose from 21% to 34% (S). Income concentration at the very top fell during the slump and again after 1937, so the income Gini declined from 0.489 (1929) to 0.439 (1941) while needs deprivation first rose sharply. Without extraordinary intervention (package B) the model places 1933 output 11% below the actual level; earlier banking repair plus timely fiscal and needs support (package G) raises cumulative 1930-41 output by about $29 billion (1929 prices; 5th-95th percentile range -1 to 53) and cuts needs-shortfall person-years by 19 million.

Originality. The paper keeps three things apart that are often merged: Keynes's own dated advocacy, the actual US measures with enactment, effective and disbursement dates, and hypothetical packages. It reports a Gini register across thirteen concepts with explicit “not identified” entries, nine joint income-wealth reference paths, and at least thirty-two class- and age-specific prescriptions.

Limitations. The eight-class distribution is a reconstruction from grouped anchors; wealth by class is calibrated to concentration benchmarks rather than observed; the counterfactual model is a calibrated deviation model, not an estimated structural model, and its long-run results are sensitive to the investment accelerator and price-adjustment parameters.

Policy brief: what the Depression teaches about protecting every class and every age

The problem. Between 1929 and 1933 the American economy lost a quarter of its output. The losses were not shared evenly. Workers in the bottom half of the distribution lost jobs and hours; farmers lost prices and land; depositors in failed banks lost savings; the richest one per cent lost the largest absolute amounts of wealth but kept far more than enough to live on. Children and the very old, who depended on the earnings of others, were the most exposed to hunger, eviction and lost schooling.

Five findings.

- **The banking collapse multiplied the shock.** About 9,000 banks suspended between 1930 and 1933 (H), and depositors lost about $1.4 billion (H). Banking repair alone (package C) lifts 1933 output by about 5% in the model (S).
- **Deflation transferred burdens to debtors.** Consumer prices fell by 25% from 1929 to 1933 (H), raising the real value of mortgage and farm debt held disproportionately by classes 3 to 6.
- **Relief mattered most for the bottom three classes and for children.** Needs shortfall below the WPA emergency budget reached 34% of persons in 1933 and 36% of children aged 5-17 (S).
- **The 1937 tightening was a policy error.** Removing it (package F) keeps 1938 unemployment near 14% rather than 19% (S), at a cumulative fiscal cost of about $4.0 billion (1929 prices).
- **Speed and access decide distribution.** The same integrated programme delivered late, with exclusion and leakage (package H), loses about $5 billion of cumulative output relative to G in the median simulation, and the losses fall on the excluded poorest households.

Recommendations (detail in Section 10).

- Guarantee deposits and resolve insolvent banks within weeks, not years; separate liquidity support from loss absorption.
- Prevent sustained deflation; leave any fixed exchange-rate or gold constraint before it forces procyclical tightening.
- Fund ready-to-start public works and work relief at scale in the first year, financed by borrowing at low long-term rates.
- Protect food, shelter and schooling for children and the old with cash or in-kind transfers that reach households directly.
- Restructure, not foreclose, home and farm mortgages; spread losses rather than concentrating them on the bottom half.
- Withdraw stimulus gradually and only after unemployment has clearly fallen; avoid simultaneous fiscal and monetary tightening.
- Build permanent automatic stabilisers (unemployment insurance, old-age pensions) before the next downturn, and pay benefits quickly.
- Publish delivery and exclusion data; measure who is reached, not only what is appropriated.

What this paper does not claim. *It does not claim that any package would certainly have produced the numbers shown; these are conditional model results with wide parameter ranges. It does not claim that Keynes proposed packages B to H; his dated proposals are reported separately in Section 2. Pakistan is mentioned only briefly and with qualifications in Section 10.*

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1. Research design, questions and contribution

The Great Depression is the most studied macroeconomic event in modern history, yet most accounts describe it either through national aggregates (output, prices, money, unemployment) or through vivid but unrepresentative stories of particular families, towns and occupations. Between these two levels there is a gap. We know that real GDP fell by about a quarter, that roughly one worker in four was unemployed in 1933 and that thousands of banks failed. We know much less, in a systematic and comparable form, about how those losses were distributed across the income distribution, across age groups, and across the different balance sheets that households held when the shock arrived. This paper attempts to fill part of that gap with a transparent reconstruction that is explicit about what is observed, what is derived, what is assumed and what is simulated.

The analytical frame is the eight-class structure developed in the author's earlier work on household consumption and class (supplied working manuscripts, unpublished), in which households are grouped into percentile blocks whose consumption, saving, borrowing and asset behaviour differ systematically. A previous working paper by the author applied that frame to a fictional automating economy (Techoslavakia). None of that paper's parameters are carried over here: its population, growth rate, starting Gini coefficients, fixed deficit rule, constant prices and artificial-intelligence production block are all replaced by historical evidence or by assumptions specific to the American economy of the 1930s. What is reused is the software architecture (the class-and-age accounting, the Gini routines, the exhibit and audit machinery) and the discipline of labelling every number.

1.1 Research questions

- **RQ1 (incidence).** How large were the income, consumption and wealth losses of each of the eight classes and each of the eight age bands between 1929 and 1933, and how much of the loss had been recovered by 1937, 1939 and 1941?
- **RQ2 (mechanisms).** Through which channels—unemployment, wage and price deflation, farm incomes, bank failures, asset prices, debt deflation, taxes and transfers—did the aggregate shock reach each class?
- **RQ3 (inequality).** What happened to inequality under different concepts (pre-tax income, disposable income, equivalised income, consumption, wealth, between classes and between ages), and why do these measures move differently?
- **RQ4 (needs).** How many people fell below historically grounded needs budgets, which classes and ages were they in, and how deep was the shortfall?
- **RQ5 (policy).** How would output, employment, needs deprivation, inequality and public debt have differed under no extraordinary intervention, banking and monetary repair alone, fiscal expansion under alternative monetary regimes, avoidance of the 1937 tightening, and an integrated package delivered either well or badly?
- **RQ6 (lessons).** What class- and age-specific prescriptions follow, over immediate, short, medium and long horizons, for a depression-type shock?

1.2 Hypotheses

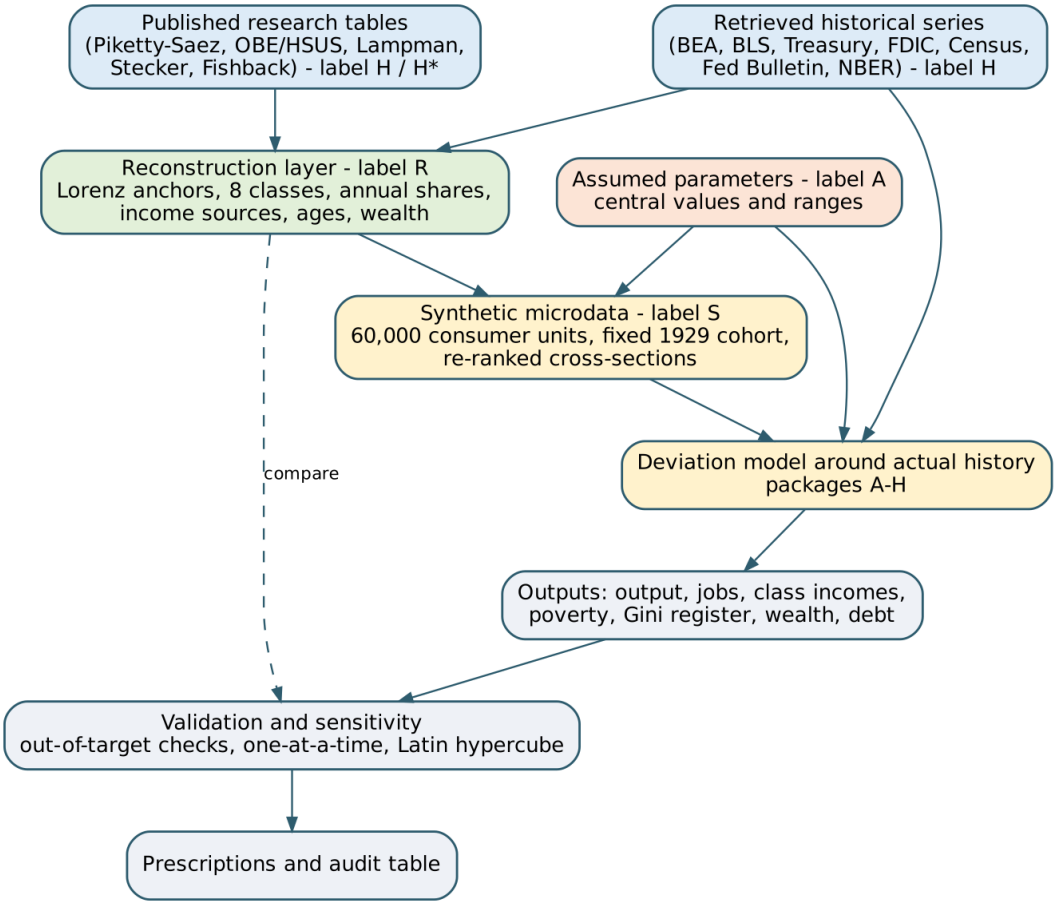
- **H1.** Proportional income losses were largest in the bottom four classes because unemployment risk was concentrated there, while absolute wealth losses were largest in classes 7 and 8 because equity was concentrated there.
- **H2.** Measured income inequality can fall in a depression even as deprivation rises, because top capital incomes fall proportionately more than average incomes while many households near the bottom lose their only earner.
- **H3.** Banking repair and the end of deflation were necessary for recovery; fiscal expansion was effective but too small and too intermittent to close the output gap before rearmament.
- **H4.** The distributional value of a recovery programme depends as much on delivery speed, coverage and leakage as on its announced size.

1.3 Units, classes, ages and periods

Table 1. Analytical units and classification used throughout

Dimension	Definition used in this paper	Evidence label
Unit of analysis	Consumer unit (family of two or more, or unattached individual); persons by unit size for per-person and equivalised measures	H (definition); R (sizes)
Classes	Eight percentile blocks of the consumer-unit income distribution: C1 P0-10, C2 P10-30, C3 P30-50, C4 P50-70, C5 P70-85, C6 P85-95, C7 P95-99, C8 P99-100	A (framework)
Age bands	0-4, 5-17, 18-19, 20-29, 30-39, 40-59, 60-69, 70+ (persons)	H (census totals); R (splits)
Panels	Fixed 1929 origin panel (units keep 1929 class) and re-ranked annual cross-sections	S
Period	1925-1941 for context; 1929 benchmark; reporting years 1929, 1933, 1936, 1937, 1938, 1939, 1941	H
Extension	1942-1950 only as a separately labelled extension, not used in main results	—
Prices	Model deviations in billions of 1929 dollars (GDP deflator); needs lines in CPI-adjusted 1935 dollars	H / D
Equivalence	Square-root scale: equivalised income = unit income / √(unit size)	A

Note. *The table fixes the vocabulary of the whole paper. The basic unit is the consumer unit used by the Office of Business Economics, because the published 1929, 1935 and 1941 distributions are measured that way. Classes are percentile blocks, so class membership is defined by rank, not by occupation or wealth. The age bands match the prompt's life-cycle design. Two panels are kept separate: a fixed 1929 cohort, which shows what happened to the households that started in each class, and annual re-ranked cross-sections, which show the shape of the distribution in each year.*



Flowchart 1. Research design: from sources to prescriptions. Arrows show mechanisms in the analytical framework; they are not by themselves evidence of causation.

Note. *The flowchart shows the order of work. Retrieved series and published research tables enter a reconstruction layer that builds class shares, income sources, age structure and wealth. Synthetic microdata translate class totals into households of different sizes. A deviation model then applies policy packages to the actual path. Every output passes validation and sensitivity checks before it is used in prescriptions. The dashed arrow marks comparisons between reconstructed and published values, which act as tests rather than inputs.*

1.4 Contribution

The paper makes five contributions. First, it provides an annual, internally consistent eight-class reconstruction of US consumer-unit income for 1929-1941 that reproduces the published Office of Business Economics (OBE) Gini coefficients for 1929, 1935 and 1941 to within 0.01 and the Piketty-Saez top-percentile movements year by year. Second, it links this distribution to a synthetic population that can be followed as a fixed cohort, so that it distinguishes between the fate of the households who were poor in 1929 and the composition of the poor in 1933. Third, it attaches a wealth ledger by class and asset and revalues it with observed stock, housing, farm and bank-loss paths. Fourth, it embeds these distributional accounts in a policy model that keeps Keynes's advocacy, the actual record and hypothetical packages separate. Fifth, it reports the results in a form that is useful for policy design: class and age matrices, needs shortfalls, a Gini register with explicit gaps, and thirty-two prescriptions with targets, instruments, institutions, financing, risks and indicators.

2. Chronology, causes, Keynes and the policy record

2.1 The macroeconomic chronology

The American contraction began in the summer of 1929, before the October stock-market crash. Real GDP fell by 8.5% in 1930, 6.4% in 1931 and 12.9% in 1932, and was roughly flat in 1933 (H, BEA chained-dollar series rescaled to 1929 prices). Recovery from the spring of 1933 was rapid: real output grew by 10.8% in 1934, 8.9% in 1935 and 12.9% in 1936. A second sharp recession followed in 1937-38, when output fell by 3.3% in annual terms, before rearmament and the war economy carried output far above its 1929 level by 1941 (Figure 1).

Unemployment tells a harsher story than output. Under the Bureau of Labor Statistics (BLS) concept based on Lebergott, which counts emergency relief workers as unemployed, unemployment rose from 3.2% in 1929 to 24.9% in 1933 and was still 14.3% in 1937 and 19.0% in 1938 (H). Darby's alternative, which counts relief workers as employed, gives 20.6% in 1933 and 9.1% in 1937 (H). The difference between the two series is itself a measure of the scale of work relief, and the paper reports both rather than choosing one (Mathy, 2026).

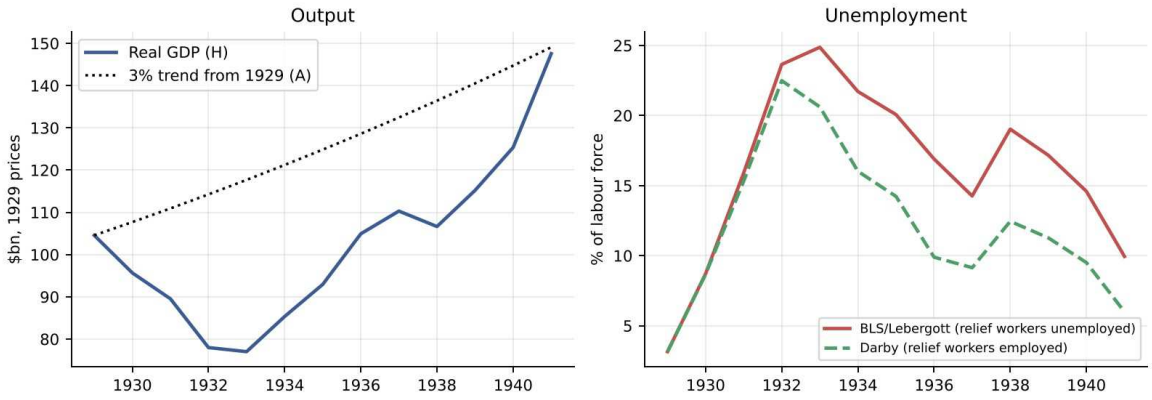


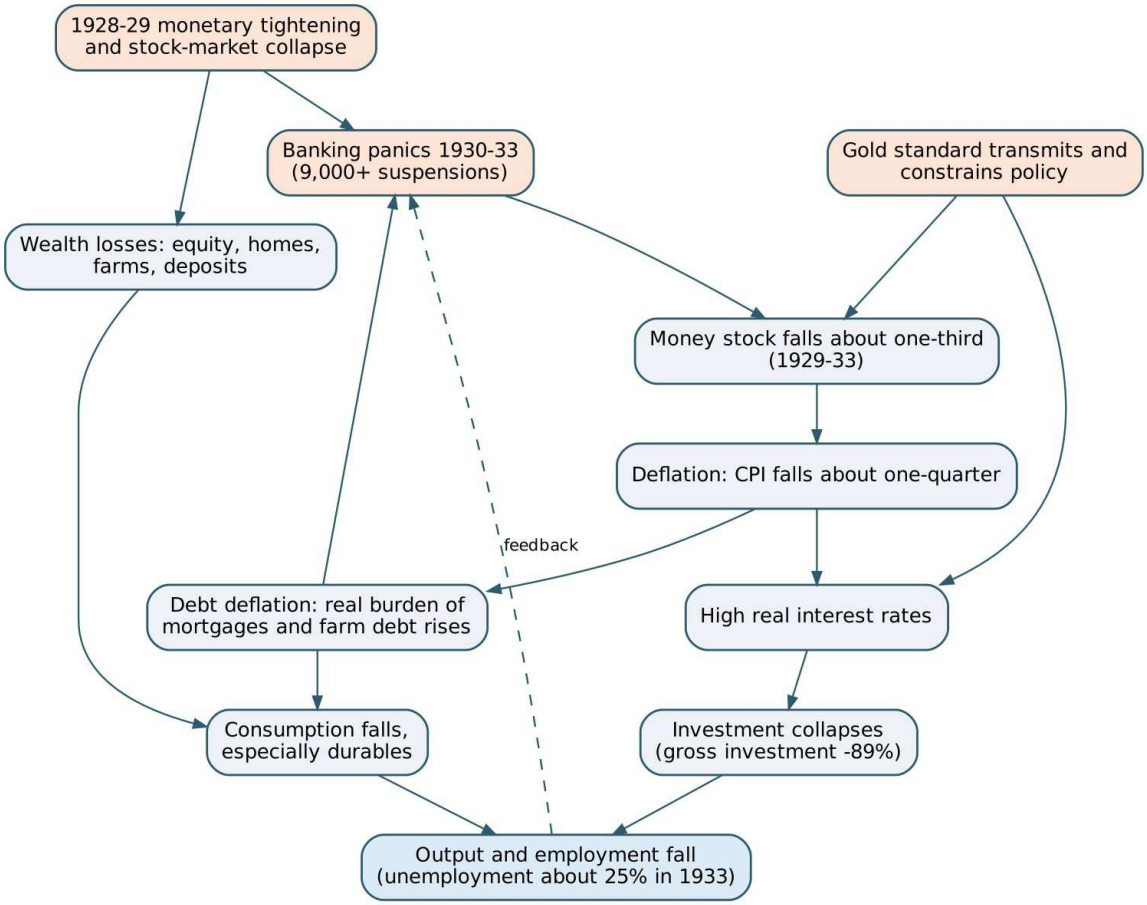
Figure 1. Real GDP and unemployment, 1929-1941. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *The left panel shows real GDP in 1929 prices against a 3 per cent trend from 1929, which is an assumption used only to illustrate the size of the gap. Output did not regain its 1929 level until 1936-37 and remained far below trend until 1941. The right panel shows two unemployment series. The gap between them is the number of people on work relief, which reached about 3.7 million in 1936.*

2.2 Causes: what the literature agrees and disagrees about

There is no single accepted cause of the Depression, but the literature has converged on a set of interacting mechanisms. Friedman and Schwartz (1963) placed the collapse of the money stock at the centre: the stock of money fell by about one-third between 1929 and 1933 while the Federal Reserve failed to act as lender of last resort during successive banking panics. Bernanke (1983) showed that bank failures mattered beyond their effect on money, because they destroyed information capital and credit relationships, raising the cost of credit intermediation for households, farmers and small firms. Fisher (1933) described the debt-deflation process in which falling prices raised the real burden of nominal debts, forcing distress sales that pushed prices down further.

Eichengreen (1992) and Temin (1989) emphasised the international gold standard: countries tied to gold transmitted deflation to one another and could not expand without losing reserves, and the timing of recovery across countries closely followed the timing of leaving gold. Romer (1990) argued that the stock-market crash created uncertainty that depressed spending on consumer durables in 1930. Romer (1992) attributed most of the recovery after 1933 to monetary expansion driven by gold inflows after the devaluation, rather than to fiscal policy, whose deficits were modest relative to the output gap. Cole and Ohanian (2004) argued that New Deal cartelisation and wage policies slowed recovery; this view is contested, and later work found mixed effects (Fishback, 2016). The present paper does not adjudicate between these accounts. It builds a model in which banking, monetary, fiscal and debt channels all operate with parameter ranges, and reports which conclusions are robust across those ranges.



Flowchart 2. Main causal channels of the American contraction, 1929-1933. Arrows show mechanisms in the analytical framework; they are not by themselves evidence of causation.

Note. *The flowchart summarises channels discussed in the literature. Monetary tightening and the stock-market collapse started the downturn; banking panics shrank the money stock; deflation raised real interest rates and real debt burdens; wealth losses and debt burdens cut consumption; and high real rates and lost credit cut investment. Falling output then caused more bank failures, closing the loop. The gold standard both transmitted the shock and limited the policy response until April 1933.*

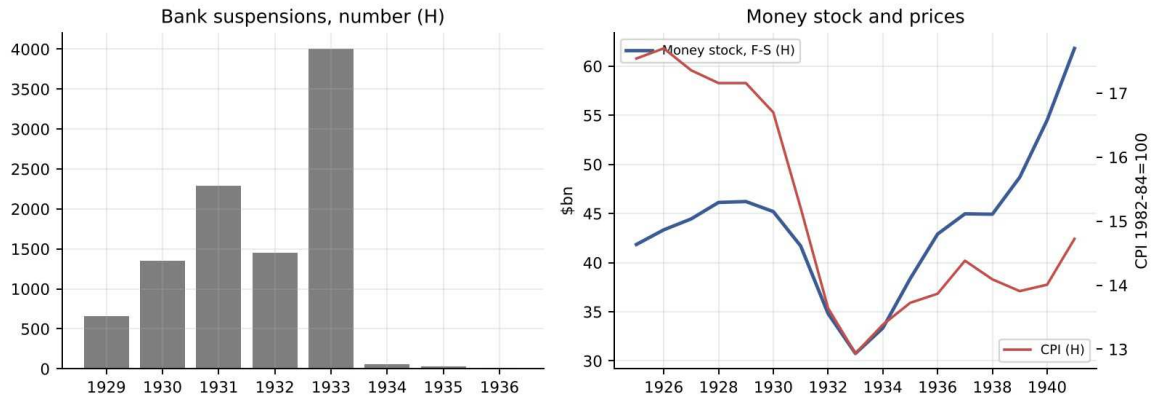


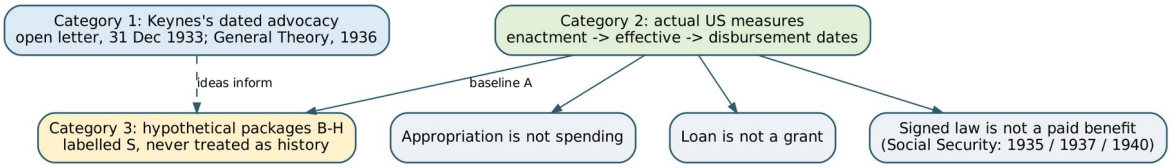
Figure 2. Bank suspensions, money stock and consumer prices, 1925-1941. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Federal Reserve Bulletin (1937), FRED (Friedman-Schwartz money stock; CPI).

Note. *The left panel shows that bank suspensions came in waves, peaking in 1933 when the national bank holiday closed every bank and about 4,000 did not reopen or later failed. After federal deposit insurance began in January 1934, suspensions fell to a few dozen a year. The right panel shows the money stock falling by about a third to 1933 and then rising strongly, while consumer prices fell by about a quarter and recovered only partly.*

2.3 Keynes's own dated advocacy

Keynes's influence on the American recovery is often overstated, and his own proposals are often confused with what was done or with later Keynesian models. This paper keeps three categories separate (Flowchart 3). The first is what Keynes actually proposed, with dates. In his open letter to President Roosevelt published in the New York Times on 31 December 1933, Keynes argued that recovery should take priority over reform, that the government should increase national purchasing power through loan-financed public expenditure rather than through taxation or price-raising codes, that the long-term rate of interest should be brought down through central-bank purchases of long-dated government securities, and he criticised the erratic management of the gold price as a means of raising prices (Keynes, 1933; Edwards, 2018). In The General Theory of Employment, Interest and Money, published in February 1936, he provided the theoretical case that an economy could rest at an equilibrium with persistent involuntary unemployment, that the level of employment depended on effective demand, and that the marginal propensity to consume determined the size of the investment multiplier (Keynes, 1936).

Neither document contains the packages analysed in Section 8. The packages are the author's hypothetical constructions, informed by Keynes's arguments and by the later literature, and they are labelled S throughout. The second category, the actual American policy record, is summarised in Table 2 with enactment, effective and disbursement dates, because a law signed is not money spent and money appropriated is not money disbursed.



Flowchart 3. Three policy categories kept separate throughout the paper. Arrows show mechanisms in the analytical framework; they are not by themselves evidence of causation.

Note. *The flowchart shows the three-way separation that governs the policy sections. Keynes's dated proposals are evidence about ideas. Actual US measures are evidence about history and define package A. Hypothetical packages B to H are model experiments. Three rules apply to actual measures: appropriations are not counted as spending, loans are not counted as grants, and a signed law is not treated as a paid benefit. Social Security illustrates the last rule.*

Table 2. Register of actual US measures, 1930-1938: enactment, effective and disbursement dates

Measure	Enacted / announced	Effective or paid	Content	Label
Smoot-Hawley Tariff Act	17 Jun 1930	Jun 1930	Tariff increases; foreign retaliation	H*
Reconstruction Finance Corporation Act	22 Jan 1932	Feb 1932	Loans to banks, railways, later others	H*
Glass-Steagall Act (free gold)	27 Feb 1932	Feb 1932	Government securities eligible as note collateral	H*
Revenue Act of 1932	6 Jun 1932	1932 incomes	Large income-tax increase (tightening)	H*
Emergency Relief and Construction Act	21 Jul 1932	1932-33	RFC loans to states for relief	H*
National bank holiday; Emergency Banking Act	6 Mar; 9 Mar 1933	Mar 1933	Closure, inspection, licensed reopening	H
Gold measures (EO 6102; embargo; Gold Reserve Act)	5 Apr 1933; Apr 1933; 30 Jan 1934	1933-34	Exit from gold; $35/oz from 31 Jan 1934	H*
Civilian Conservation Corps	31 Mar 1933	Apr 1933	Work camps for young men	H*
Federal Emergency Relief Administration	12 May 1933	May 1933	Grants to states for relief	H*
Agricultural Adjustment Act	12 May 1933	1933 crops	Acreage payments; tenant displacement documented	H
Tennessee Valley Authority	18 May 1933	1933	Regional public investment	H*
Home Owners' Loan Act (HOLC)	13 Jun 1933	1933-36 lending	Refinanced over one million mortgages	H
Banking Act of 1933; FDIC	16 Jun 1933	Insurance from 1 Jan 1934	Deposit insurance; separation of banking	H
National Industrial Recovery Act (NRA, PWA)	16 Jun 1933	1933-35	Codes (invalidated 27 May 1935); public works	H*
Civil Works Administration	9 Nov 1933 (order)	Winter 1933-34	Up to about 4 million workers	H
National Housing Act (FHA)	27 Jun 1934	1934-	Mortgage insurance	H*
Emergency Relief Appropriation Act; WPA	8 Apr 1935; 6 May 1935	1935-43	Work relief, about 1.5-3.3 million at a time	H
Social Security Act	14 Aug 1935	Taxes and lump sums Jan 1937; monthly benefits Jan 1940	Old-age insurance; unemployment insurance; public assistance	H
Veterans' bonus (Adjusted Compensation Payment Act)	27 Jan 1936	Paid from 15 Jun 1936	About $1.7 billion to veterans (H*)	H*
Reserve requirement increases	Aug 1936; Mar 1937;	1936-37	Requirements doubled	H*

Measure	Enacted / announced	Effective or paid	Content	Label
	May 1937		(tightening)	
Gold sterilisation	Dec 1936	Ended 1938	Treasury stopped monetising gold inflows	H*
Fair Labor Standards Act	25 Jun 1938	Oct 1938	Minimum wage; maximum hours	H*
1938 spending programme	14 Apr 1938 (message)	1938-39	Renewed relief and public works	H*

Note. *The register lists the main actual measures that define package A. Dates marked H were confirmed against retrieved sources in this session (for example the Social Security Administration and FDIC histories, and Fishback, 2016); dates marked H* are standard dates entered from the published record and should be checked against the Statutes at Large before citation. The table separates enactment from payment: Social Security was signed in 1935, but monthly old-age benefits did not begin until January 1940, after the period of deepest need.*

2.4 Size and composition of New Deal spending

Fishback (2016) reports that federal New Deal grants totalled about $34.5 billion in fiscal years 1934-1940 and loans about $13.1 billion in fiscal years 1934-1939 (H). Relief programmes (including work relief) accounted for the largest share of grants, with the WPA alone about 24.3 per cent; veterans' payments about 20.9 per cent, public works about 17.8 per cent and farm programmes most of the remainder (category shares overlap in the source and are not additive). Among loans, the Farm Credit Administration (29.5 per cent), the Home Owners' Loan Corporation (26.1 per cent), the Reconstruction Finance Corporation (21.4 per cent) and the Commodity Credit Corporation (12.6 per cent) dominated (H). State-level studies summarised by Fishback find income multipliers of grant spending around one, with wide ranges, positive effects of relief on health and some measures of well-being, and evidence that the Agricultural Adjustment Act payments displaced farm tenants and labourers.

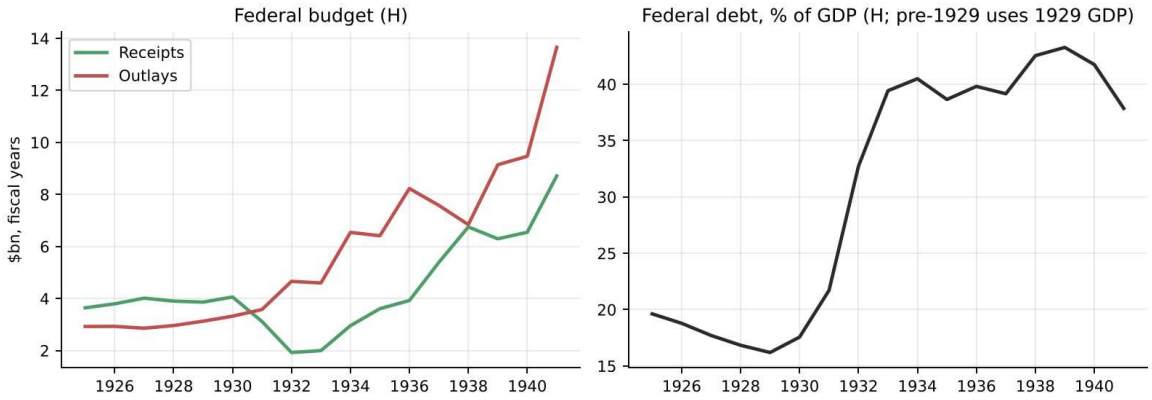


Figure 3. Federal receipts, outlays and debt, fiscal years 1925-1941. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: OMB Historical Tables via FRED; US Treasury Fiscal Data.

Note. *The left panel shows that federal outlays roughly tripled between 1929 and 1936 while receipts lagged, so deficits opened. In fiscal 1937 and 1938 outlays fell while new payroll and income taxes raised receipts, sharply narrowing the deficit. The right panel shows federal debt rising from about 16 per cent of GDP in 1929 to roughly 40 per cent in 1939-41. Fiscal years end on 30 June, so fiscal 1937 covers mid-1936 to mid-1937.*

The deficit was not large relative to the output gap. In fiscal 1936 the federal deficit was about $4.3 billion (H), or 5.1% of 1936 GDP, while the 1933 shortfall of output from its 1929 level alone was about $28 billion in 1929 prices. This comparison underlies E. Cary Brown's (1956) verdict that fiscal policy was an unsuccessful recovery device in the 1930s not because it did not work but because it was not tried on a sufficient scale; it also motivates packages D, E and G.

3. Data provenance and evidence labels

This section documents where every input comes from. All online sources were accessed on 16 November 2026 using direct downloads of published series; values from printed sources that could not be re-retrieved are labelled H*. The full source log, with series identifiers, units, price basis, coverage, label and access date, is provided as source_log.csv in the replication package.

Table 3. Source register by domain

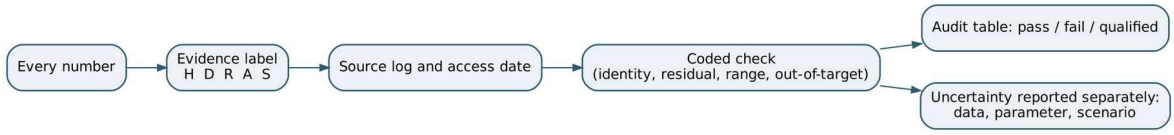
Domain	Sources and series	Coverage	Label
National accounts	BEA NIPA via FRED: GDP, real GDP, PCE, investment, government, net exports, deflator, personal income components, saving	1929-1946	H
Prices, money, rates	BLS CPI; Friedman-Schwartz money stock; NBER commercial paper, long government bond and stock indices; Moody's Baa	1925-1946	H
Labour	BLS (Lebergott) and Darby unemployment via Mathy (2026, Monthly Labor Review); civilian labour force (HSUS D4)	1929-1941	H / H*
Banking	Federal Reserve Bulletin (1937) suspensions; FDIC deposits of suspended banks and depositor losses; Banking and Monetary Statistics	1929-1940	H
Public finance	OMB federal receipts and outlays; Treasury debt outstanding; Fishback (2016) New Deal grants and loans	FY1925-1946	H
Population and age	Census HS-3 population by age; 1930 and 1940 census five-year groups	1925-1946	H / H*
Income distribution	OBE consumer-unit distributions (HSUS Be21-26; G319-336); Piketty-Saez (2003) top shares	1929, 1935, 1941; annual	H / H*
Wealth	Lampman (1960) top-wealth-holder shares; Saez-Zucman (2016) top 0.1% (secondary summary)	1922-1953	H / H*
Needs	Stecker (1937), WPA emergency and maintenance budgets, March 1935, 59 cities	1935	H
Housing and farm debt	Nonfarm foreclosures (HSUS N301); farm mortgage debt (approximate)	1929-1940	H*

Note. *The register groups the 52 logged series by domain. Most national-accounts, price, money, banking and fiscal series were retrieved directly from official databases and carry label H. The labour-force series, census five-year age splits, OBE quintiles and farm-mortgage values were entered from published historical volumes without online re-checking and carry label H*; they should be verified before citation. No microdata were available, so household-level results rely on the reconstruction described in Section 4.*

Table 4. Evidence-label rules

Label	Meaning	Example in this paper	How uncertainty is reported
H	Historical value retrieved and logged	Real GDP 1933; bank suspensions 1931	Source revisions noted; alternative series shown where they exist
H*	Published historical value not re-retrieved	Labour force 1933; 1930 census age groups	Flagged for verification
D	Arithmetic transformation of H	Unemployment rate; real values in 1929 dollars	Inherits H uncertainty
R	Reconstruction from anchors and rules	Eight-class income shares; age-by-class matrix	Low/central/high variants
A	Assumed parameter	Class MPCs; investment response to real rate	Stated range; one-at-a-time and Latin hypercube
S	Synthetic model or microdata result	Package G output path; needs shortfall by age	Parameter and scenario ranges, never confidence intervals

Note. *The six labels define how strongly each number can be relied on. A reader should treat H values as evidence, D values as faithful transformations, R values as careful but contestable reconstructions, A values as assumptions to be challenged, and S values as conditional answers to "what if" questions. Uncertainty is reported differently for each: data uncertainty through low, central and high reconstructions; parameter uncertainty through sensitivity analysis; and scenario uncertainty by comparing packages. These three kinds are never added together into a single range.*



Flowchart 4. Labelling and audit workflow. Arrows show mechanisms in the analytical framework; they are not by themselves evidence of causation.

Note. *Every number in the paper passes through the same chain. It receives an evidence label, is linked to a source log entry and access date, and is checked by code against an identity, a residual, a plausible range or an out-of-target benchmark. The results of these checks are summarised in the audit table in Section 11, with pass, fail or qualified verdicts. Uncertainty is then reported separately for data, parameters and scenarios rather than combined.*

3.1 Known gaps and how they are handled

- **No microdata.** There is no national household survey of income, consumption and wealth for 1929-1933. The 1935-36 Study of Consumer Purchases exists but its microdata were not available here; it is used only through the published distributions. Class results are therefore reconstructions (R) and synthetic (S).
- **Wealth by class.** Wealth concentration is known only for top groups from estate-tax data (Lampman, 1960) and later reconstructions. Wealth for classes 1-6 is calibrated, not observed.
- **Age.** Census totals by age are observed; the joint distribution of age and income class is reconstructed by iterative proportional fitting from an assumed age-tilt matrix.

- **Unemployment by class.** Not observed. The paper assumes relative unemployment risks falling from 2.2 times the average in class 1 to 0.1 in class 8 (A), consistent with the occupational pattern of 1930s unemployment but not estimated.
- **Land, education, lifetime and opportunity inequality.** Not identified from the available evidence; they are reported as such in the Gini register (Section 7).
- **Racial and regional disparities.** Documented in the historical literature as large (for example, the exclusion of agricultural and domestic workers from Social Security), but the reconstruction does not carry a racial or regional dimension and cannot quantify them. This is a substantive limitation, not a detail.

4. The eight-class baseline and the life-cycle matrix

4.1 Reconstructing the 1929, 1935 and 1941 distributions

The Office of Business Economics published the distribution of family personal income among consumer units for 1929, 1935-36 and 1941, by fifths and for the top 5 per cent, with Gini coefficients of 0.49, 0.47 and 0.44 (H; Carter et al., 2006, Table Be21-26). These are the only nationally representative benchmarks for the whole distribution in the period. The reconstruction proceeds in four steps.

- **Anchors.** For each benchmark year the cumulative income shares at the 20th, 40th, 60th, 80th and 95th percentiles are taken from the OBE tables. The 1929 bottom two fifths are published combined (12.5 per cent); the split between the first and second fifth is an assumption (first fifth 30.5 per cent of the combined share, range 27-34 per cent; A). The top 1 per cent share is obtained by multiplying the OBE top 5 per cent share by the Piketty-Saez ratio of the P99-100 share to the P95-100 share in the same year (D).
- **Lorenz curve.** A shape-preserving monotone cubic interpolant (PCHIP) is fitted through the anchors, guaranteeing a convex, increasing Lorenz curve (R).
- **Class shares.** Class shares are differences of the Lorenz curve at the class edges 0, 0.10, 0.30, 0.50, 0.70, 0.85, 0.95, 0.99 and 1 (R).
- **Annual path.** Shares are interpolated linearly between benchmarks, then the top three classes are adjusted each year by the ratio of the annual Piketty-Saez top shares to their interpolated values (classes 7 and 8 fully; class 6 with a square-root dampening because the P90-95 tax-unit share is less comparable with consumer units), and classes 1-5 are rescaled so that shares sum to one (R).

$$L(p) = PCHIP\{(0,0),\ (0.2,S_1),\ (0.4,S_1+S_2),\ \ldots,\ (0.95,1-T_5),\ (0.99,1-T_1),\ (1,1)\} \quad (1)$$

$$s_c = L(p_c) - L(p_{c-1}), \quad c = 1,\ \ldots,\ 8, \quad \Sigma_c\, s_c = 1 \quad (2)$$

$$T_1,t = T_5,t \times [PS_{99-100},t \,/\, (PS_{95-99},t + PS_{99-100},t)] \times \kappa, \quad \kappa \in [0.9,\ 1.1] \quad (3)$$

Table 5. Benchmark eight-class income shares (per cent of consumer-unit income): low, central and high reconstructions

Year / variant	C1	C2	C3	C4	C5	C6	C7	C8	Gini (8 groups)	Gini (fine)	OBE Gini
1929 low	1.13	6.05	11.58	16.13	17.03	18.07	14.95	15.05	0.490	0.500	0.49
1929 central	1.42	6.07	11.24	16.17	17.16	17.95	13.28	16.72	0.489	0.498	0.49

Year / variant	C1	C2	C3	C4	C5	C6	C7	C8	Gini (8 groups)	Gini (fine)	OBE Gini
1929 high	1.71	6.08	10.89	16.22	17.31	17.80	11.61	18.39	0.488	0.497	0.49
1935 low	1.53	6.48	11.62	17.06	18.29	18.51	14.47	12.03	0.462	0.472	0.47
1935 central	1.53	6.48	11.62	17.06	18.40	18.41	13.13	13.37	0.462	0.472	0.47
1935 high	1.53	6.48	11.62	17.06	18.52	18.28	11.80	14.70	0.463	0.472	0.47
1941 low	1.51	6.59	12.35	18.51	19.08	17.97	12.83	11.17	0.439	0.449	0.44
1941 central	1.51	6.59	12.35	18.51	19.19	17.85	11.59	12.41	0.439	0.449	0.44
1941 high	1.51	6.59	12.35	18.51	19.32	17.72	10.35	13.65	0.440	0.449	0.44

Note. *Each row gives the share of total consumer-unit income received by each class. Low and high variants change the first-fifth split and the top-1-per-cent scaling within their stated ranges; they mainly move income between classes 7 and 8 and barely change the overall Gini. The fine-grid Gini, computed from the whole fitted Lorenz curve, reproduces the published OBE Gini within 0.01 in all three years, which is the main validation of the method. Eight-group Ginis are lower because they ignore inequality inside each class.*

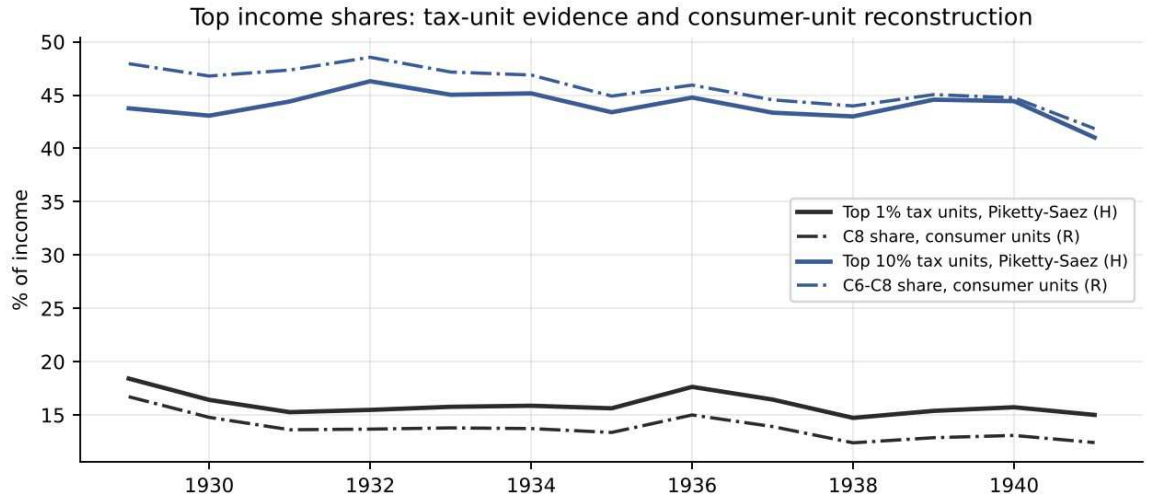


Figure 4. Top income shares: tax-unit evidence and consumer-unit reconstruction, 1929-1941. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Piketty and Saez (2003, Table II); author's reconstruction.

Note. *The solid lines are Piketty and Saez's annual top shares for tax units, which exclude capital gains. The dash-dot lines are this paper's reconstructed shares for class 8 (top 1 per cent of consumer units) and classes 6 to 8 (top 15 per cent). Levels differ because consumer units and tax units differ, but the reconstruction follows the tax data year by year: the top share fell sharply to 1932, partly recovered with the stock market in 1936-37, and fell again by 1941.*

4.2 The 1929 class profile

Table 6. Profile of the eight classes in 1929

Class	Percentiles	Income share %	Personal income $bn	Mean unit size	Persons (m)	Disposable income per person $	MPC (A)	Saving rate % (A, calibrated)	Net-worth share %
C1 Extremely poor	P0-10	1.4	1.21	1.9	7.5	160	0.95	-6	0.1

Class	Percentiles	Income share %	Personal income $bn	Mean unit size	Persons (m)	Disposable income per person $	MPC (A)	Saving rate % (A, calibrated)	Net-worth share %
C2 Poor	P10-30	6.1	5.18	2.7	20.2	257	0.92	-2	2.5
C3 Lower middle	P30-50	11.2	9.58	3.3	24.4	392	0.88	0	5.4
C4 Middle	P50-70	16.2	13.80	3.6	26.7	516	0.82	1	10.5
C5 Upper middle	P70-85	17.2	14.63	3.8	21.2	688	0.75	3	14.3
C6 Affluent	P85-95	17.9	15.22	3.9	14.5	1,043	0.65	5	18.7
C7 Rich	P95-99	13.3	11.41	3.9	5.8	1,924	0.50	8	23.6
C8 Extremely rich	P99-100	16.7	14.26	3.9	1.4	9,307	0.30	14	25.0

Note. *The table describes the 1929 starting point. Class 8, about 366,000 consumer units, received about 17 per cent of income and held about a quarter of net worth when households are ranked by income. Class 1 received about 1.4 per cent. Unit sizes rise with income because poorer units include more single persons. Marginal propensities to consume are assumptions that fall from 0.95 to 0.30. Saving rates are scaled so that class saving adds up to the NIPA personal-saving total of $4.0 billion; classes 1 to 3 dissave.*

Two features of the 1929 baseline matter for what follows. First, income was extremely concentrated at the top: the top 1 per cent of consumer units received about 17% of income (R), consistent with a Piketty-Saez top-percentile share of 18.4 per cent for tax units (H). Second, most households in classes 1-4 had almost no financial buffer. The calibrated wealth distribution has 20% of units with zero or negative net worth and a unit-level wealth Gini of 0.874, with the top 1 per cent holding 40% (calibrated to the top-wealth literature; A/R). A household in class 2 with two months of income in a savings account was exposed to complete loss if its bank failed, while a household in class 8 with diversified securities lost a large share of paper wealth but retained more than enough to maintain consumption.

4.3 The life-cycle dimension: eight age bands by eight classes

Census totals by age are observed (H). Splitting them into the prompt's eight age bands uses the 1930 and 1940 census five-year groups to divide ten-year groups (R). The joint distribution of age and class is then found by iterative proportional fitting (IPF): an assumed age-tilt matrix, which places more children in the larger families of classes 2-5 and more older persons in classes 1-2 and 7-8, is scaled until its row totals equal the census age totals and its column totals equal the persons in each class (R). The fitting residual is below 0.001 million persons in every year.

$$M_{a,c}^{(k+1)} = M_{a,c}^{(k)} \times N_a \,/\, \Sigma_c \, M_{a,c}^{(k)} \;; \quad then \times N_c \,/\, \Sigma_a \, M_{a,c}^{(k+1)} \qquad (4)$$

Table 7. Persons by age band and class, 1929 (millions)

Age	C1	C2	C3	C4	C5	C6	C7	C8	Total
0-4	0.8	2.1	2.5	2.5	1.9	1.3	0.5	0.1	11.7
5-17	2.1	5.6	6.6	6.8	5.2	3.4	1.3	0.3	31.3
18-19	0.3	0.8	0.9	1.0	0.8	0.5	0.2	0.1	4.6
20-29	1.3	3.4	4.1	4.5	3.7	2.4	0.9	0.2	20.6
30-39	1.0	2.7	3.6	4.2	3.4	2.2	0.9	0.2	18.2

Age	C1	C2	C3	C4	C5	C6	C7	C8	Total
40-59	1.3	3.6	4.7	5.6	4.7	3.4	1.5	0.4	25.2
60-69	0.4	1.1	1.3	1.3	1.1	0.8	0.3	0.1	6.4
70+	0.4	0.8	0.7	0.7	0.5	0.4	0.2	0.1	3.8
Total	7.5	20.2	24.4	26.7	21.2	14.5	5.8	1.4	121.8

Note. *The matrix distributes the 1929 population of about 122 million across eight age bands and eight classes. Row totals are census values; column totals are persons in each income class. Children aged 5 to 17 are the largest age group and are concentrated in classes 2 to 5, because those classes contain most large families. People aged 70 and over are spread across classes but over-represented in class 1. The interior cells are reconstructions that depend on the assumed age tilt and should be read as approximate.*

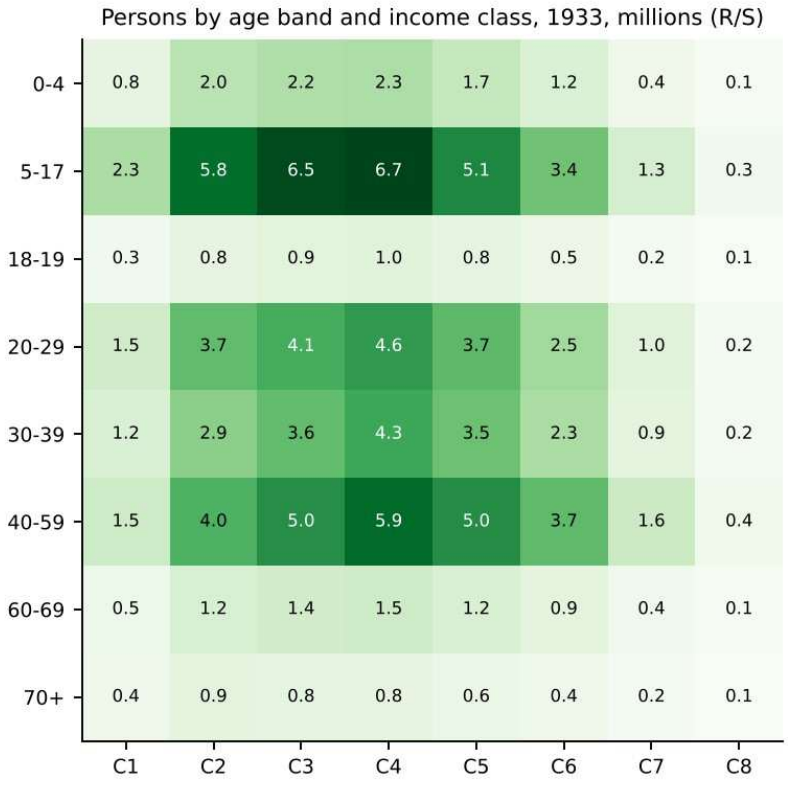


Figure 5. Persons by age band and class, 1933 (millions). Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *The heat map shows the same age-by-class structure in 1933. Because classes are re-ranked every year, a household that lost its earner moved down, and the bottom classes in 1933 contain more working-age adults and more children than in 1929. The darkest cells are school-age children in the middle classes. These are the children whose schooling and nutrition depended on whether their parents kept a job, which is why the paper reports needs shortfalls by age.*

5. Household consumption, needs and balance sheets

5.1 Who lost income, and how much

Table 8. Real disposable income per person by re-ranked class (1929 dollars)

Class	1929	1933	1936	1937	1938	1939	1941	1933 vs 1929 %	1941 vs 1929 %
C1 Extremely poor	160	107	148	156	145	151	199	-33	+24
C2 Poor	257	182	248	263	246	257	336	-29	+31
C3 Lower middle	392	286	393	415	394	414	537	-27	+37
C4 Middle	516	379	519	552	526	555	726	-27	+41
C5 Upper middle	688	508	693	730	694	730	933	-26	+36
C6 Affluent	1,043	783	1,004	1,032	994	1,083	1,257	-25	+20
C7 Rich	1,924	1,506	1,795	1,805	1,751	1,922	2,098	-22	+9
C8 Extremely rich	9,307	5,601	8,099	7,460	6,056	7,110	8,171	-40	-12

Note. *Each cell is the average real disposable income per person among the people ranked in that class in that year. Classes are re-ranked every year, so the table describes the shape of the distribution rather than following the same families. Every class lost between 1929 and 1933. Proportional losses were about a third in classes 1 to 6 and 40% in class 8, whose dividend and business income collapsed. By 1941 the middle classes had gained most relative to 1929.*

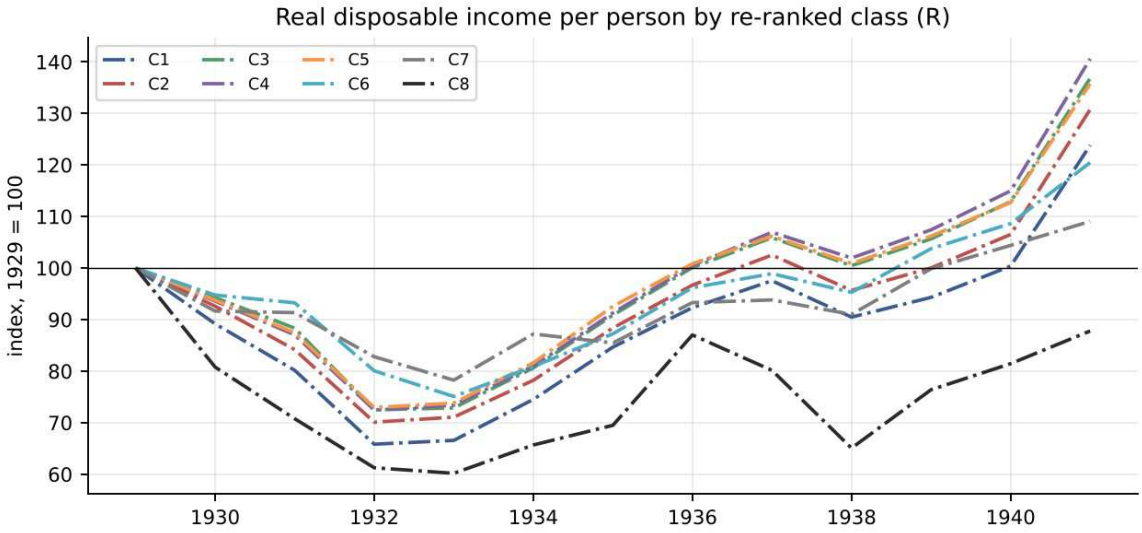


Figure 6. Real disposable income per person by re-ranked class, 1929-1941 (index, 1929 = 100). Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *Each line follows one class position over time. All classes fell together to 1932-33, with class 8 falling furthest because property income fell more than wages. Recovery from 1933 was broad but uneven: middle classes recovered fastest; the bottom class recovered slowly because unemployment remained high; and class 8 regained only part of its loss before falling back in 1938. These are reconstructed values, not survey observations, so small differences between neighbouring classes should not be over-interpreted.*

Re-ranked cross-sections hide the most important feature of a depression for families: movement down the distribution. The fixed 1929 origin panel follows the synthetic units that started in each class. Unemployment is assigned each year with probabilities proportional to the assumed class risk ratios and the observed national unemployment rate, using a persistent ordering so that the same units are hit first; a jobless unit's latent income falls to 35 per cent of its employed level (A). Units are then re-ranked against the reconstructed cross-section.

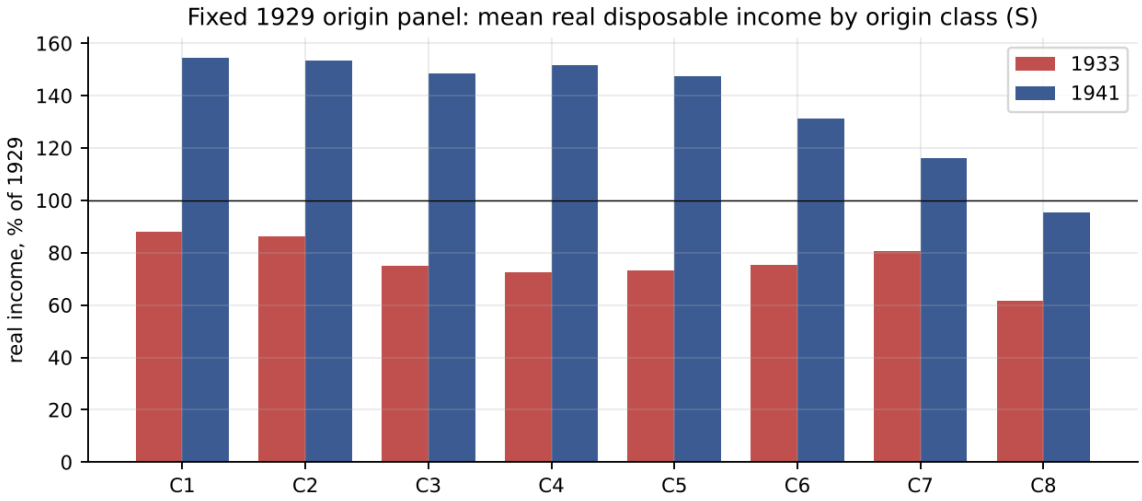


Figure 7. Fixed 1929 origin panel: mean real disposable income by origin class in 1933 and 1941 (per cent of 1929). Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *The bars follow the households that began in each class in 1929, regardless of where they ended up. In 1933 every origin class had lost between a third and a half of its real income. Middle-class origins lost slightly more than the lowest classes because many middle-class earners lost jobs and fell several classes, while the lowest classes had less to lose. The top origin class lost most in percentage terms. By 1941 most origin classes were above their 1929 real income.*

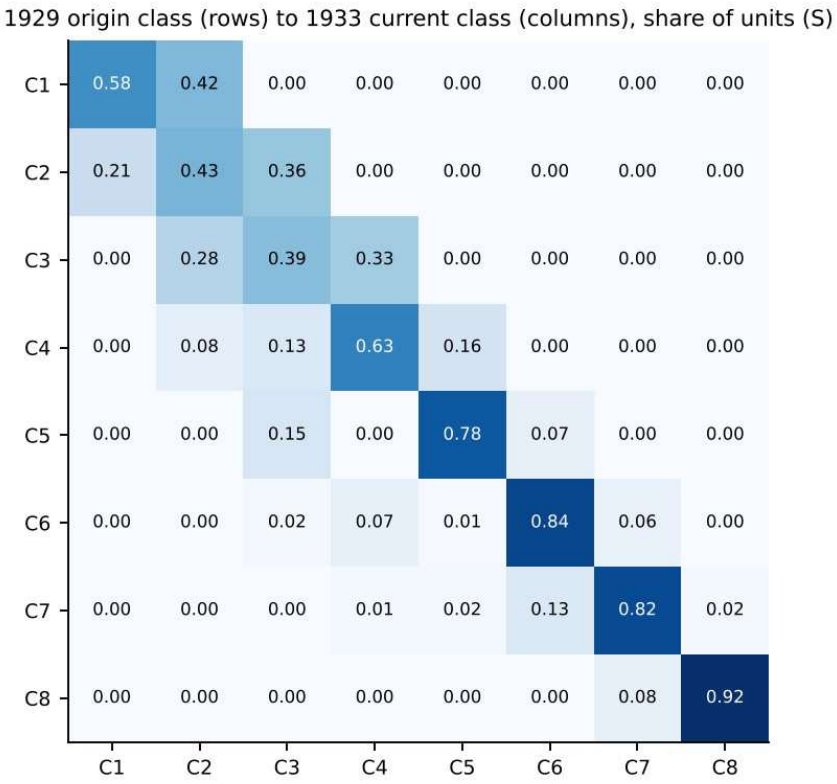


Figure 8. Mobility from 1929 origin class to 1933 current class (share of units). Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *Each row shows where the units that began in a class were in 1933. The diagonal gives the share who stayed in the same class: 58% in class 1, only 39% in class 3 and 92% in class 8. Downward moves in the lower-middle classes come mainly from job loss. Upward moves in the bottom classes are mechanical: when others fall, units that kept their income rise in rank. Synthetic transitions depend on the assumed risk ratios.*

5.2 Consumption and saving rules

Household consumption by class is modelled with a linear expenditure (Stone-Geary) structure. Each class has a committed (subsistence-type) component that is indexed to consumer prices and a marginal propensity to consume out of disposable income above it. The committed component is calibrated so that, in 1929, each class's consumption equals disposable income minus its calibrated saving. The rule is then applied to every year without re-fitting, which makes the aggregate a genuine out-of-target check.

$$YD_{c,t} = PI_{c,t} - TX_{c,t}, \quad S_{c,t} = YD_{c,t} - C_{c,t} \tag{5}$$

$$C_{c,t} = a_c \cdot (P_t / P_{1929}) + \beta_c \cdot YD_{c,t} \quad \text{(linear expenditure system, class } c) \tag{6}$$

$$x_{h,t} = YD_{h,t} / \sqrt{n_h} \quad \text{(equivalised resources)}; \quad x^{real}_{h,t} = x_{h,t} \cdot P_{1929} / P_t \tag{7}$$

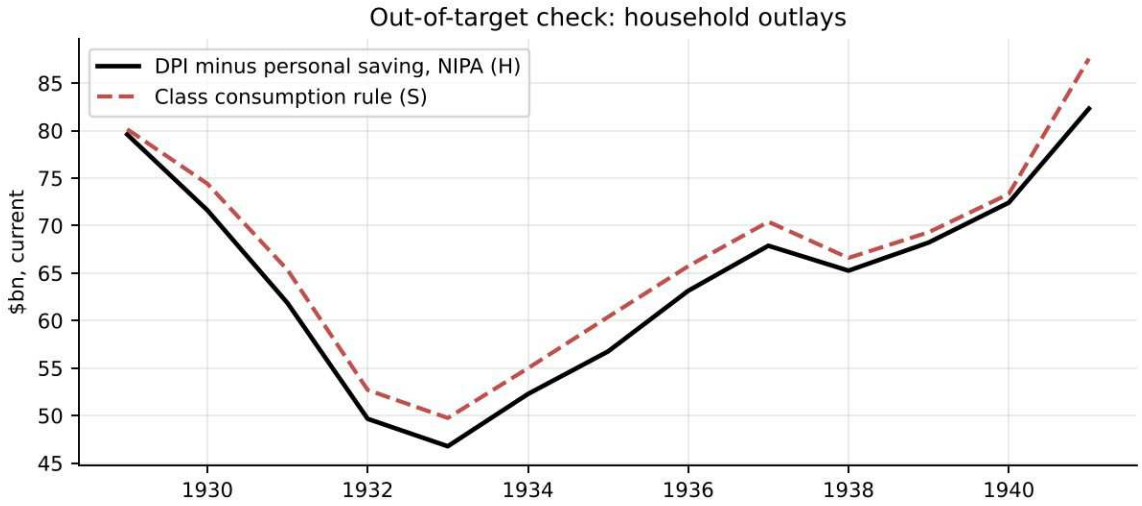


Figure 9. Out-of-target check of the class consumption rule, 1929-1941. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *The solid line is NIPA disposable income minus personal saving, which equals household outlays. The dashed line adds the eight class consumption rules. They agree exactly in 1929 by construction. From 1930 the rule predicts outlays 1% to 6% above the national accounts, so it slightly overstates consumption in the slump. A likely reason is that actual households cut spending further than a fixed linear rule allows, through precaution and credit loss. The check is therefore classed as qualified.*

5.3 Needs: the WPA emergency and maintenance budgets

The Works Progress Administration priced two budgets for a four-person manual worker's family in 59 cities in March 1935 (Stecker, 1937). The maintenance budget, intended to allow a minimum of health and decency, averaged $1,261 a year; the emergency budget, described as a level that could be tolerated only for limited periods, averaged $903 (H). Food made up about 38 per cent of the emergency budget. This paper converts each to a line per equivalent adult by dividing by √4 = 2, adjusts for prices with the CPI, and applies a rural cost factor of 0.8 to 44 per cent of persons (A). Shortfalls are measured with the Foster-Greer-Thorbecke (FGT) family.

$$FGT_\alpha = \Sigma_i \, w_i \cdot [max(0, \, (z_i - x_i) \, / \, z_i)]^\alpha, \quad \alpha \in \{0, \, 1, \, 2\} \qquad (8)$$

Table 9. WPA budgets for a four-person family, March 1935 (dollars per year)

Item	Maintenance	Emergency
Food	448	340
Clothing	184	128
Housing	222	168
Household operation	154	122
Miscellaneous	253	145
Total (59-city average)	1,260.62	903.27

Note. *The two WPA budgets give historically grounded needs lines rather than modern poverty thresholds. The emergency budget cut every item, especially miscellaneous spending such as medical care, transport and schooling costs, and was meant only for short periods. Both lines are averages over 59 cities and hide wide*

differences between cities. Rows are rounded in the source, so components do not add exactly to the totals. Using both lines shows how sensitive deprivation counts are to the chosen standard.

Table 10. Needs shortfall, persons, 1929-1941 (S)

Year	Emergency FGT0	Emergency FGT1	Emergency FGT2	Emergency gap $bn	Maintenance FGT0	Maintenance FGT1
1929	20.9%	0.073	0.034	2.7	35.0%	0.130
1930	22.9%	0.083	0.041	3.0	38.4%	0.146
1931	25.9%	0.097	0.049	3.1	43.1%	0.166
1932	34.4%	0.132	0.069	3.8	54.4%	0.221
1933	33.7%	0.129	0.067	3.5	53.3%	0.216
1934	28.8%	0.108	0.055	3.0	46.8%	0.184
1935	23.8%	0.086	0.042	2.5	38.9%	0.150
1936	20.5%	0.072	0.034	2.1	33.7%	0.127
1937	18.5%	0.064	0.030	2.0	30.6%	0.114
1938	20.3%	0.072	0.034	2.2	32.7%	0.126
1939	18.6%	0.065	0.030	1.9	30.2%	0.115
1940	16.8%	0.056	0.026	1.7	26.8%	0.102
1941	11.8%	0.035	0.015	1.1	19.9%	0.070

Note. *The headcount below the emergency line rose from 21% of persons in 1929 to 34% in 1933, then fell back to about its 1929 level by 1936-37 and to 12% in 1941. The depth (FGT1) and severity (FGT2) measures rose proportionally more than the headcount in 1932-33, showing that those below the line fell further below it. The money gap is the transfer needed to lift everyone exactly to the line, about $3.5 billion in 1933. These are synthetic estimates.*

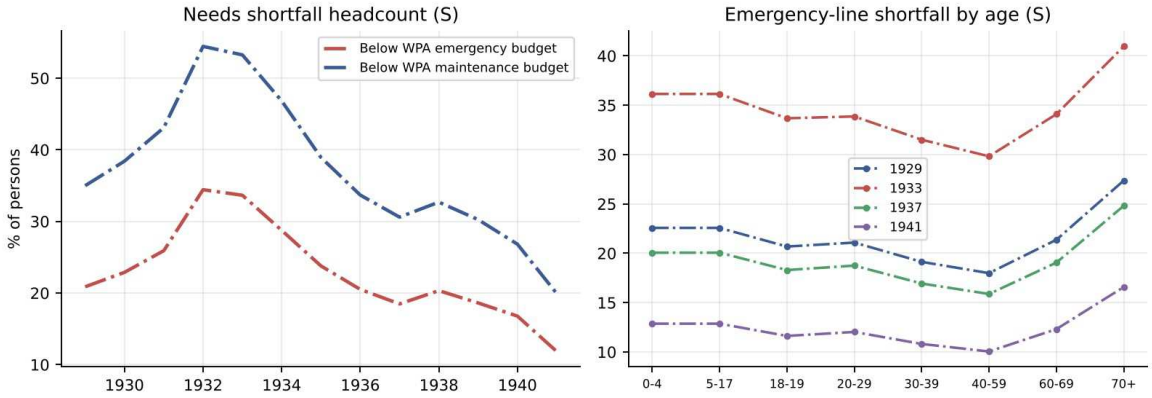


Figure 10. Needs shortfall: headcount over time and by age. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *The left panel shows the share of persons below each WPA line. The right panel shows the emergency-line headcount by age. In every year the very young, school-age children and people aged 70 and over had higher rates than adults aged 30 to 59, because they lived disproportionately in large or earnerless households. Rates by age are derived by applying class-level rates to the reconstructed age-by-class matrix, so they capture differences between classes but not within them.*

By current class, the emergency-line headcount in 1933 was 100% in class 1, 96% in class 2 and 48% in class 3 (S). Classes 4 and above were essentially above the line, though large families in class 4 in high-cost cities were close to it. In the age dimension, children aged 0-4 and 5-17 had shortfall rates of 36% and 36%, and persons aged 70 and over 41%, against 30% for those aged 40-59 (S).

5.4 Balance sheets: assets, debts and the wealth ledger

Table 11. Gross household assets by income class and asset type, 1929 ($ billion; calibrated)

Class	Equity	Housing	Farm	Deposits	Bonds and mortgages held	Business and other	Total
C1 Extremely poor	0.3	0.8	1.0	0.2	0.1	0.7	3.3
C2 Poor	0.4	5.4	5.3	1.5	0.4	3.9	17.0
C3 Lower middle	1.1	12.0	7.7	3.6	1.6	7.0	33.1
C4 Middle	2.7	22.2	9.7	7.9	3.8	12.0	58.2
C5 Upper middle	5.7	26.3	9.1	11.3	7.1	16.5	75.9
C6 Affluent	16.7	25.1	7.2	13.7	11.9	20.7	95.4
C7 Rich	42.4	17.6	5.1	12.4	18.9	20.8	117.3
C8 Extremely rich	76.6	5.3	1.8	6.7	18.9	12.2	121.5
Total	146.0	114.7	46.9	57.4	62.6	93.9	521.5

Note. *The matrix allocates about $522 billion of gross household assets, a total inferred from Lampman's estate-tax estimates, across classes and six asset types by iterative proportional fitting. Column totals follow assumed 1929 portfolio shares; row totals come from the calibrated wealth distribution. Equity is concentrated in classes 7 and 8, homes and farms are spread more widely across the middle, and deposits are held in every class. Exposure to each Depression shock therefore differed: stock losses hit the top, farm and home losses hit the middle.*

$$W_{c,t} = \Sigma_k \, A_{c,k,1929} \cdot \pi_{k,t} - L_{c,t} - \ell_{c,t} + \Sigma_{\tau \le t} \, \varphi \cdot S_{c,\tau} \qquad (9)$$

Equation (9) is the wealth ledger. Each asset k is revalued with an observed or assumed price index π: the Cowles all-stock index for equity (H), assumed housing and farm-land indices (A, falling by 26 and 37 per cent respectively from 1929 to 1933), par for deposits, a yield-based adjustment for bonds and mortgages held, and a mix of equity and nominal GDP for unincorporated business. Depositor losses in failed banks, ℓ, are allocated in proportion to each class's deposits (H totals, R allocation). Debts L fall with repayment and default (A). Sixty per cent of measured saving is retained as net financial wealth (φ = 0.6; A).

Table 12. Household net worth by income class ($ billion, current prices; S)

Class	1929	1933	1937	1941	1933 vs 1929 %
C1 Extremely poor	0.5	-0.5	-0.1	-0.3	n.m.
C2 Poor	11.5	6.0	8.3	8.6	-48
C3 Lower middle	25.4	15.3	19.7	20.9	-40
C4 Middle	48.8	31.6	39.5	42.4	-35

Class	1929	1933	1937	1941	1933 vs 1929 %
C5 Upper middle	66.6	43.7	54.9	58.6	-34
C6 Affluent	87.1	55.5	71.3	74.0	-36
C7 Rich	110.1	63.5	86.4	84.2	-42
C8 Extremely rich	116.5	55.1	80.7	68.5	-53
Total	466.5	270.1	360.6	356.8	-42

Note. *Total household net worth falls by about 42% in nominal terms between 1929 and 1933 in this ledger, driven by equity, farm and housing prices and by depositor losses. Class 8 loses the largest proportion because its wealth was mostly equity, and class 1 moves into negative net worth. Because consumer prices also fell by about a quarter, real losses are smaller than nominal ones. Recovery to 1937 is partial, and class 8 remains far below its 1929 level in 1941. n.m. means not meaningful.*

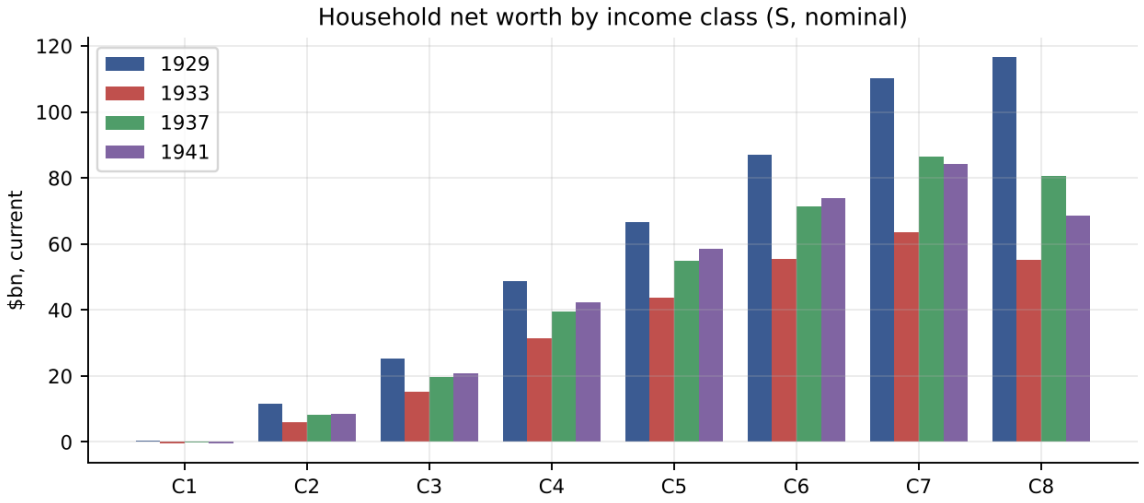


Figure 11. Household net worth by income class, 1929, 1933, 1937 and 1941 (current dollars; S). Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *The bars show that absolute wealth losses were concentrated in classes 6 to 8, which held most equity and business wealth. Proportional losses were also severe in the middle because homes and farms lost value while mortgage debts were fixed in nominal terms. The unit-level wealth Gini barely changes (0.871 in 1929, 0.869 in 1933), and the top 1 per cent share falls from 40% to 37%. Lampman's equity series falls more, so the ledger may understate the compression.*

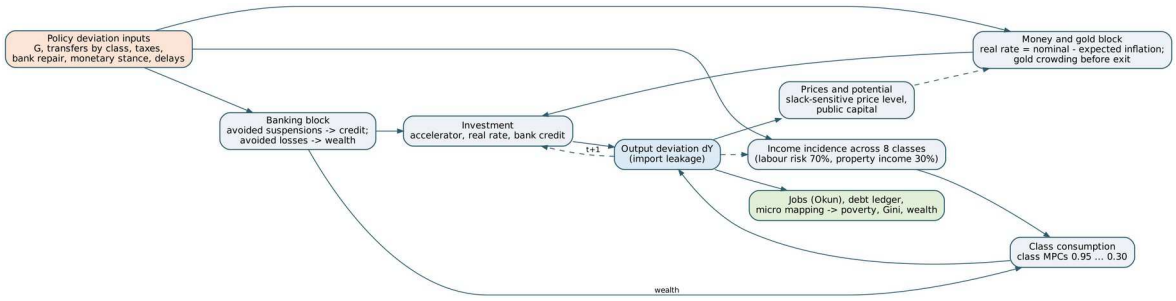
The comparison with Lampman (1960) is a useful validation. His share of personal-sector equity held by the top 1 per cent of adults fell from 36.3 per cent in 1929 to 28.3 per cent in 1933 (H), a fall of 22 per cent. The synthetic top-1-per-cent share of net worth falls by 7 per cent. The direction agrees; the magnitude is smaller, partly because the two measures differ (equity versus net worth; adults versus consumer units) and partly because the ledger revalues assets but does not move units between wealth ranks. This check is reported as qualified.

Debt deflation is visible in the balance sheets of the middle classes. Consumer prices fell by 25% from 1929 to 1933 (H) while mortgage contracts were fixed in dollars. For a class 4 household

whose income fell by a third and whose home lost a quarter of its value, the ratio of mortgage debt to income rose by half even with no new borrowing. The Home Owners' Loan Corporation refinanced more than one million mortgages from 1933 and about a fifth of these were later foreclosed, with low overall losses to the government (H; Fishback, 2016). In the ledger this is represented by the debt-index path (A), which falls by 14 per cent to 1933 through repayment, default and write-downs.

6. Production, money, closure and public finance

The counterfactual analysis uses a deviation model. Package A is actual history, reproduced exactly: every historical series takes its observed value and every deviation is zero. Packages B to H change policy inputs and the model computes the deviations of output, prices, employment, class incomes, wealth and public debt from the actual path. This approach has two advantages. It does not require the model to explain the Depression itself, only the effect of policy changes around what actually happened, and it guarantees that all synthetic results are anchored to observed levels. The cost is that the model is linear in deviations and cannot capture large regime changes, such as a full financial collapse in 1934-36 in package B, except through explicit assumptions.



Flowchart 5. Architecture of the deviation model. Arrows show mechanisms in the analytical framework; they are not by themselves evidence of causation.

Note. *The flowchart shows how a policy change works through the model. Inputs act through three blocks: banking (avoided bank suspensions protect credit and avoided depositor losses protect wealth), money and gold (real interest rates and gold-standard crowding) and fiscal incidence (spending and transfers reach classes). Investment and class consumption add up to an output deviation, which feeds back next year through the accelerator and income. Prices and potential output adjust slowly. Results are mapped onto the synthetic households to measure poverty and inequality.*

6.1 Accounting identities

$$Y_t = C_t + I_t + G_t + NX_t\,, \quad Y_t = u_t \cdot Y^{pot}{}_t \qquad (10)$$

$$\Delta Y_t = (\Delta G_t^{eff} + \Delta I_t + \Delta C_t) \,/\, (1 + m) \quad (\text{deviation form; } m = \text{import share}) \qquad (11)$$

$$\Delta YD_{c,t} = \iota_c \cdot (YD_t \,/\, Y_t) \cdot \Delta Y_t - \iota_c \cdot \tau\, \Delta Y_t + \Delta TR_{c,t} - \theta_c\, \Delta TX_t \qquad (12)$$

$$\Delta C_t = \Sigma_c\, \beta_c\, \Delta YD_{c,t} + \mu_W \cdot \Delta DL_t \qquad (13)$$

Here ι_c is the incidence share of a marginal change in output reaching class c. It combines labour income weighted by unemployment risk (70 per cent) with property income (30 per cent), using the 1933 income-source matrix (R): the resulting shares are C1 0.014, C2 0.116, C3 0.178, C4 0.214, C5 0.167, C6 0.123, C7 0.088, C8 0.100. τ is the marginal tax rate on output changes

(0.06; A); ΔTR are class transfers; ΔTX are discretionary tax changes with class shares θ; ΔDL are cumulative avoided depositor losses with marginal propensity to consume out of wealth μ_W (A).

6.2 Behavioural equations

$$\Delta I_t = \kappa_A\,(\Delta Y_{t-1} - \Delta Y_{t-2}) - \kappa_r\,\Delta r_t + \kappa_B\,\Delta CR_t \quad (14)$$

$$\Delta CR_t = \lambda\,\Sigma_{j\le t}\,0.75^{t-j}\cdot\Delta SD_j \quad \textit{(credit preserved by avoided suspensions of deposits } \Delta SD\textit{)} \quad (15)$$

$$\Delta P_t = \Delta P_{t-1} + \psi\cdot 0.5\cdot gap_t\,, \quad gap_t = (Y_t + \Delta Y_t)/(Y^{pot}{}_t + \Delta Y^{pot}{}_t) - Y_t/Y^{pot}{}_t \quad (16)$$

$$\Delta N_t = \omega\cdot(\Delta Y_t\,/\,Y_t)\cdot N_t \quad \textit{(Okun-type employment response)};\quad U_t = LF_t - N_t \quad (17)$$

6.3 Money, banking and gold

$$\Delta r_t = \Delta i_t + \gamma\cdot g_t\cdot 0.5\cdot\Delta G_t - 0.5\cdot 100\cdot(\Delta P_t - \Delta P_{t-1}) \quad \textit{(real rate = nominal − expected inflation)} \quad (18)$$

The real-rate equation contains three elements. Δi_t is the change in the nominal policy stance in percentage points (for example −2 points in 1930-33 under packages C and G, representing open-market purchases that prevent the collapse of the money stock). The gold term applies only while the United States remained on gold (before April 1933) and only in packages that combine fiscal expansion with gold convertibility: g_t = 1 in package E, 0.5 in package D (in which the Glass-Steagall Act's free-gold relief is assumed to halve the constraint) and 0 in packages C, G and H (which assume an early exit from gold, as Britain did in September 1931). The expectations term uses adaptive expectations with half weight. The model never combines the gold constraint with unrestricted monetary finance in the same year, as required by the design.

$$\Delta SD_t = b_t\cdot SD_t\,, \quad \Delta DL_t = \Sigma_{\tau\le t}\,b_\tau\cdot DL_\tau \quad \textit{(b = share of suspensions and losses prevented)} \quad (19)$$

6.4 Public finance

$$\Delta DEF_t = \Delta G_t + \Sigma_c\,\Delta TR_{c,t} - \tau\,\Delta Y_t + \Delta TX_t\,, \quad D_t = D^A{}_t + \Sigma_{\tau\le t}\,\Delta DEF_\tau \quad (20)$$

$$M^{cum}{}_T = \Sigma_{t\le T}\,\Delta Y_t\,/\,\Sigma_{t\le T}\,(\Delta G_t + \Sigma_c\,\Delta TR_{c,t} - \Delta TX_t) \quad \textit{(cumulative multiplier, fiscal-only packages)} \quad (21)$$

Federal debt under each package is actual real debt plus the cumulative deviation in the deficit. Interest on additional debt is ignored, which is a reasonable approximation when long-term government bond yields were between 2 and 3.5 per cent (H) but slightly understates the debt cost of the larger packages. The cumulative multiplier is reported only for packages D, E and F, which change fiscal instruments alone; packages that combine banking, monetary and fiscal measures are summarised by output gained per dollar of additional deficit.

Table 13. Parameters of the deviation model (all A)

Parameter	Symbol	Central	Range used in sensitivity
Potential growth	g_pot	0.030	0.025-0.035
Import share of demand	m	0.045	fixed
Marginal tax on output	τ	0.06	fixed

Parameter	Symbol	Central	Range used in sensitivity
Accelerator	κ_A	0.3	0.15-0.45
Investment response to real rate ($bn per point)	κ_r	1.2	0.6-1.8
Investment response to bank credit	κ_B	0.6	0.3-0.9
Credit per dollar of deposits saved	λ	0.5	0.25-0.75
Price response to slack	ψ	0.25	0.1-0.45
Employment elasticity (Okun)	ω	0.75	0.6-0.9
MPC out of avoided deposit losses	μ_W	0.1	0.05-0.2
Gold crowding (points per $bn)	γ	0.6	0.3-0.9
Class MPCs	β_c	0.95 ... 0.30	each shifted −0.10 to +0.05
Bank repair share, G / H	b	0.70 / 0.40	fixed
Delay, exclusion, leakage in H	—	1 year / 30% / 15%	fixed
Public capital effect on potential	—	0.10 per $	fixed

Note. *All model parameters are assumptions informed by the historical literature rather than estimates from this paper's data. Central values are chosen to be moderate; ranges are wide enough to include more pessimistic and more optimistic readings of the evidence. Parameters marked fixed are held constant in the sensitivity analysis because they define packages rather than behaviour. The Latin hypercube analysis in Section 9 draws all ranged parameters jointly, 400 times, and reports how often conclusions change sign.*

7. Measuring inequality and deprivation

A depression changes inequality in several directions at once. Unemployment widens gaps among wage earners; collapsing dividends, business profits and capital gains narrow the gap between the top and the rest; transfers and work relief narrow the gap at the bottom; and falling asset prices change the wealth distribution differently from the income distribution. A single Gini coefficient cannot capture all of this. This section therefore reports a register of Gini coefficients for different concepts and populations, together with the methods used, and marks clearly which concepts cannot be measured from the available evidence.

7.1 Gini formulas and two-method checks

$$G = \Sigma_i \Sigma_j \, w_i \, w_j \, |x_i - x_j| \, / \, (2 \, \mu) \quad \textit{(pairwise mean-difference form, weights summing to one)} \tag{22}$$

$$G = 1 - \Sigma_k \, (F_k - F_{k-1}) \, (L_k + L_{k-1}) \quad \textit{(grouped trapezoid form on the Lorenz curve)} \tag{23}$$

Table 14. Two-method Gini checks on the eight-class income shares

Year	Trapezoid (grouped)	Pairwise (grouped means)	Absolute difference	Micro (60,000 units)	Verdict
1929	0.4890	0.4890	0.0e+00	0.499	pass
1933	0.4805	0.4805	1.1e-16	0.490	pass

Year	Trapezoid (grouped)	Pairwise (grouped means)	Absolute difference	Micro (60,000 units)	Verdict
1936	0.4725	0.4725	1.1e-16	0.482	pass
1937	0.4610	0.4610	0.0e+00	0.471	pass
1938	0.4550	0.4550	0.0e+00	0.465	pass
1939	0.4640	0.4640	0.0e+00	0.474	pass
1941	0.4394	0.4394	0.0e+00	0.450	pass

Note. *The two grouped formulas are algebraically identical for grouped data, so their agreement to machine precision checks the code rather than the data. The micro Gini, computed from the 60,000 synthetic units, is about 0.01 higher because it includes inequality within classes. The gap between grouped and micro values is a reminder that any eight-group Gini understates total inequality. Published OBE values, which use finer brackets, lie between the two, which supports the reconstruction.*

7.2 The Gini register

Table 15. Gini register, 1929-1941

Concept	1929	1933	1937	1941	Label
Labour income (concentration across income classes)	0.376	0.395	0.374	0.367	R
Property income (concentration across income classes)	0.688	0.705	0.675	0.653	R
Pre-tax personal income, 8 groups	0.489	0.481	0.461	0.439	R
Pre-tax personal income, units	0.499	0.490	0.471	0.450	S
Disposable income, units	0.492	0.486	0.462	0.441	S
Equivalised disposable income, persons	0.462	0.460	0.433	0.409	S
Consumption, units	0.470	0.493	0.450	0.419	S
Equivalised consumption, persons	0.440	0.468	0.422	0.388	S
Net worth, units	0.871	0.869	0.869	0.863	S
Between classes, disposable income per person	0.415	0.413	0.385	0.360	R
Between age bands, disposable income per person	0.031	0.030	0.028	0.026	R
Fiscal incidence (post-tax, post-transfer including in-kind)	n.i.	n.i.	n.i.	n.i.	not identified
Asset types: concentration of equity / housing / farm / deposits across income classes, 1929	0.90 / 0.47 / 0.29 / 0.62	—	—	—	R
Land	n.i.	n.i.	n.i.	n.i.	not identified
Education	n.i.	n.i.	n.i.	n.i.	not identified
Housing (value of owner-occupied homes) across income classes, 1929	0.47	—	—	—	R
Lifetime income	n.i.	n.i.	n.i.	n.i.	not identified
Inequality of opportunity	n.i.	n.i.	n.i.	n.i.	not identified

Note. *The register shows thirteen inequality concepts. Income measures fall slightly from 1929 to 1933 and more after 1937. Consumption inequality rises in 1933 while income inequality falls, because the bottom classes cut spending most. Wealth inequality is far higher than income inequality and barely changes. Concentration coefficients describe how components are spread across income-ranked classes. Land, education, lifetime income, opportunity and full fiscal incidence are marked n.i. (not identified) because no adequate data exist; no number is invented for them.*



Figure 12. Income and consumption Gini coefficients, 1929-1941. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *The lines compare four reconstructed or synthetic Gini concepts with the three published OBE values. All income measures fall over the period, most steeply after 1937, matching the published decline from 0.49 to 0.44. Equivalised measures for persons are lower than measures for consumer units because large families sit in the middle of the distribution. Consumption inequality rises in 1932-33 and then falls with income inequality. The match with published points supports the reconstruction but does not prove it.*

The register supports hypothesis H2. Between 1929 and 1933 the pre-tax income Gini for consumer units fell from 0.499 to 0.490 while the emergency-line headcount rose from 21% to 34%. The two statements are compatible. Inequality fell because the top lost the most proportionally (class 8's share fell from 16.7% to 13.8%), while deprivation rose because the average fell by more than a quarter and the bottom had no buffer. A policy-maker who watched only the Gini would have concluded, wrongly, that the slump was becoming fairer.

7.3 Nine joint income-wealth reference paths

To show what different combinations of income and wealth inequality would have meant for each class, the paper constructs nine reference paths for 1941. Starting from the 1929 class shares of income and of net worth, each Lorenz curve is tilted by raising class mean incomes (or wealth) to a power and renormalising, with the power chosen to move the eight-class Gini down by 0.05, leave it unchanged, or raise it by 0.05. The nine combinations are applied to the actual 1941 aggregate of real disposable income. These are reference paths, not forecasts; they are not forced to particular Gini levels such as 0.4, 0.5 or 0.6, but are defined as changes from the reconstructed 1929 values.

$$s_c(k) = (\bar{s}_c^{\,1+k}\, p_c) \,/\, \Sigma_j\, (\bar{s}_j^{\,1+k}\, p_j)\,, \quad \bar{s}_c = s_c \,/\, p_c\,, \quad k \text{ chosen so that } G(s(k)) = G_{1929} + \Delta \qquad (24)$$

Table 16. Nine joint income-wealth reference paths: real income per class in 1941 relative to 1929

No.	Path	Income Gini	Wealth Gini	C1	C2	C3	C4	C5	C6	C7	C8
1	income Gini falls 0.05; wealth Gini falls 0.05	0.439	0.641	1.69	1.57	1.48	1.43	1.38	1.32	1.24	1.06
2	income Gini falls 0.05; wealth Gini unchanged	0.439	0.691	1.69	1.57	1.48	1.43	1.38	1.32	1.24	1.06
3	income Gini falls 0.05; wealth Gini rises 0.05	0.439	0.741	1.69	1.57	1.48	1.43	1.38	1.32	1.24	1.06
4	income Gini unchanged; wealth Gini falls 0.05	0.489	0.641	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
5	income Gini unchanged; wealth Gini unchanged	0.489	0.691	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
6	income Gini unchanged; wealth Gini rises 0.05	0.489	0.741	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
7	income Gini rises 0.05; wealth Gini falls 0.05	0.539	0.641	1.04	1.12	1.19	1.23	1.27	1.33	1.41	1.65
8	income Gini rises 0.05; wealth Gini unchanged	0.539	0.691	1.04	1.12	1.19	1.23	1.27	1.33	1.41	1.65
9	income Gini rises 0.05; wealth Gini rises 0.05	0.539	0.741	1.04	1.12	1.19	1.23	1.27	1.33	1.41	1.65

Note. *Each row combines one income path with one wealth path. Because real disposable income in aggregate was about a third higher in 1941 than in 1929, every class gains under every path; what changes is who gains most. If the income Gini falls by 0.05, class 1 gains about 69 per cent and class 8 about 6 per cent. If it rises by 0.05, class 8 gains about 65 per cent and class 1 only about 4 per cent. The reconstructed history (0.439 income, 0.665 wealth) is closest to paths 1 and 2.*

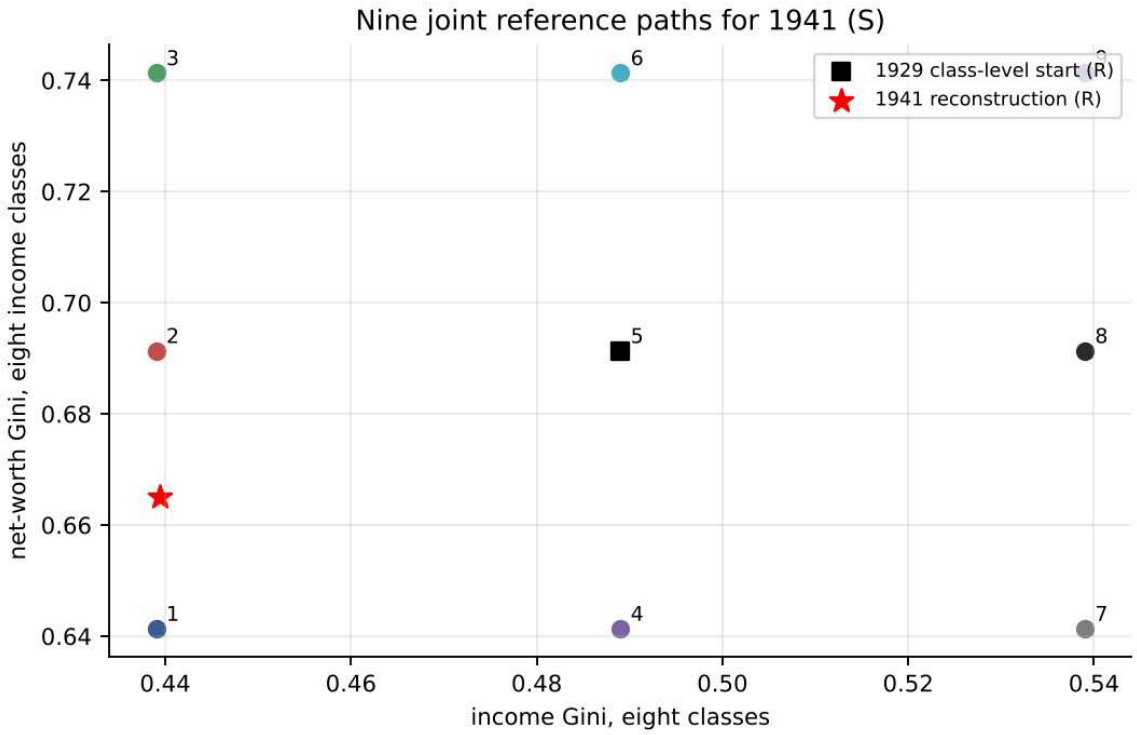


Figure 13. Nine joint reference paths for income and wealth Gini coefficients in 1941. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *Each numbered point is one reference path; the square marks the 1929 starting point at class level and the star marks the 1941 reconstruction. History moved left (lower income inequality) and slightly down (lower wealth inequality across income classes), close to the paths in which income inequality falls by 0.05. Wealth Ginis here are computed across eight income classes, so they are much lower than the unit-level wealth Gini of about 0.87, which includes inequality within classes.*

8. Policy packages A to H and the institutions that delivered them

Eight packages are compared. Each is defined by a set of deviations from the actual record (package A). Fiscal amounts are in billions of 1929 dollars per year; for scale, 1929 GDP was $104.6 billion, so $3 billion is about 2.9 per cent of 1929 GDP and about 3.9 per cent of 1933 GDP. Packages B to H are hypothetical and labelled S throughout.

Table 17. Definitions of the eight policy packages

Package	Name	Policy deviations from A	Monetary regime
A	Actual record	Actual fiscal, monetary, banking and relief measures (Table 2)	History (H)
B	No extraordinary intervention	Federal purchases held at 1932 level 1933-39 (1940-41 rearmament kept); transfers held at 1932 level; no devaluation-led monetary expansion (real rate +3 points 1933-36); no holiday or deposit insurance (suspensions and losses at 80% of 1930-32 average continue 1934-36)	Gold standard kept
C	Banking and monetary repair, no extra fiscal	70% of 1930-33 suspensions and losses prevented; open-market expansion lowers real rate by 2 points 1930-33; fiscal as actual	Early exit from gold assumed
D	Fiscal expansion, alternative monetary stance	+$3bn purchases 1931-33, +$1.5bn 1934-36; gold kept but free-gold relief halves crowding; no banking repair before 1933	Gold with relief
E	Actual monetary plus earlier and larger fiscal	+$2bn 1931-32 (full gold crowding), +$3bn 1933-36, +$2bn 1937-39	Actual (gold until 1933)
F	Actual minus 1937 tightening	+$1.5bn purchases 1937-38; payroll-tax relief $0.6bn 1937-38; no reserve-requirement and sterilisation tightening (real rate −1 point 1937-38)	Actual
G	Integrated stabilisation, public investment, needs protection, broad access	C's banking and monetary repair; +$3bn 1931-33 and +$1.5bn 1934-36 (60% public investment); transfers to C1-C3 of $1bn 1931-35 and $0.6bn 1936-39; F's 1937-38 corrections	Early exit from gold assumed
H	G with exclusion, delay and administrative loss	As G, but each programme starts one year late and ends on schedule; 30% of transfers to C1-C2 (15% to C3) never arrive; 15% of purchases captured as rents by C7-C8; bank repair 40%	Early exit from gold assumed

Note. *The table defines each package precisely enough to be reproduced. Package B is the only one that removes measures; the others add to or change the actual record. Packages D and E show fiscal expansion under two different monetary assumptions, so that gold crowding and monetary finance are never combined. Packages G and H are identical on paper; H adds the delivery problems documented for 1930s programmes, such as delays, exclusion of eligible households and leakage to contractors and landowners, so that their cost can be measured.*

Table 18. Macroeconomic outcomes by package (1929 dollars; S except A)

Pkg	Real GDP 1933	Real GDP 1937	Real GDP 1938	Unemp. 1933	Unemp. 1938	Cum. ΔGDP 1930-41	Cum. Δdeficit	Debt/ GDP 1941	Multiplier or ΔGDP per Δdeficit
A	77.0	110.3	106.6	24.9%	19.0%	+0.0	+0.0	38%	—
B	68.3	107.2	108.5	31.3%	18.0%	-71.9	-34.5	15%	2.09
C	80.9	110.8	107.1	22.0%	18.8%	+10.3	-0.6	38%	-16.67
D	81.8	110.1	104.7	21.4%	20.1%	+7.1	+13.1	47%	0.53
E	83.0	110.5	106.6	20.5%	19.1%	+17.8	+20.9	54%	0.81
F	77.0	116.4	115.4	24.9%	14.0%	+3.9	+4.0	42%	0.94
G	88.6	117.5	114.8	16.4%	14.4%	+29.3	+23.3	57%	1.26
H	89.9	113.4	114.3	15.4%	14.6%	+23.8	+19.1	54%	1.25

Note. *Package B shows the value of what was actually done: without the 1933-36 interventions, 1933 output would have been about $9 billion lower and cumulative output about $72 billion lower. Banking and monetary repair alone (C) raises 1933 output by about $3.9 billion. Earlier fiscal expansion helps more when gold crowding is smaller. Removing the 1937 tightening (F) mainly helps 1937-39. The integrated package G gives the largest cumulative gain; H's delays and losses reduce it. Multipliers are shown only for fiscal-only packages D-F.*

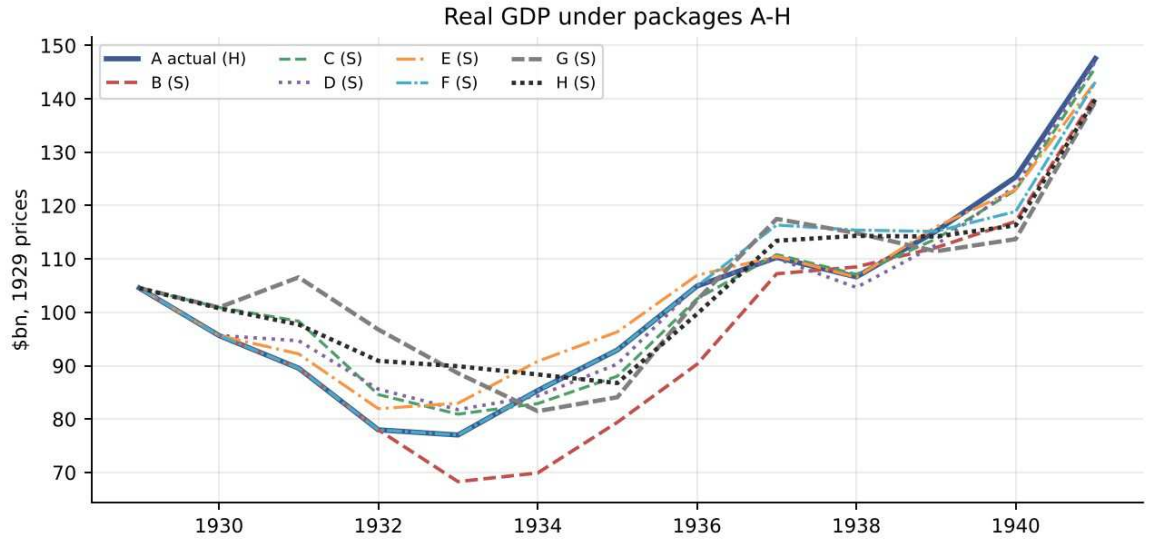


Figure 14. Real GDP under packages A-H, 1929-1941 (billions of 1929 dollars). Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *The thick solid line is actual output. Every other line is a counterfactual. Package B (no extraordinary intervention) lies well below history from 1933 to 1937. Packages C, D and E lift the trough. Package G raises output early but shows a dip in 1934, when its first public-works wave ends and the investment accelerator reverses; this is a model warning against abrupt withdrawal, not a forecast. Package F matters only from 1937. All packages converge by 1941, when rearmament dominates.*

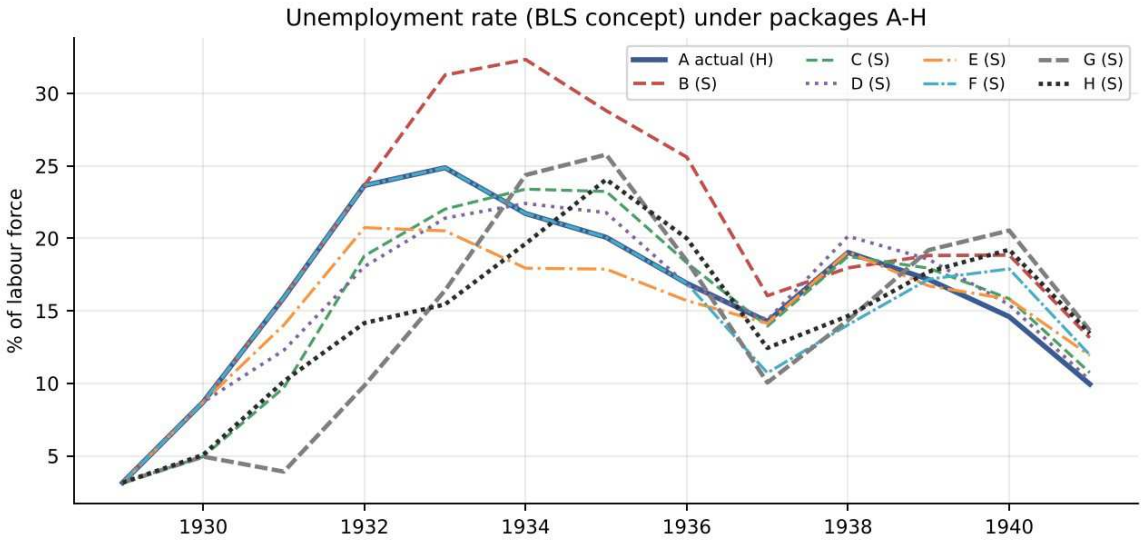


Figure 15. Unemployment rate (BLS concept) under packages A-H, 1929-1941. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *Unemployment responds to output through an Okun-type elasticity. In 1933, unemployment would have been about 31% under package B, against 25% in history and about 16% under G. In 1938, packages F and G keep unemployment near 14 per cent against 19 per cent in history. No package returns unemployment to its 1929 level before rearmament. The ranking of packages is more reliable than the exact rates, which depend on the employment elasticity.*

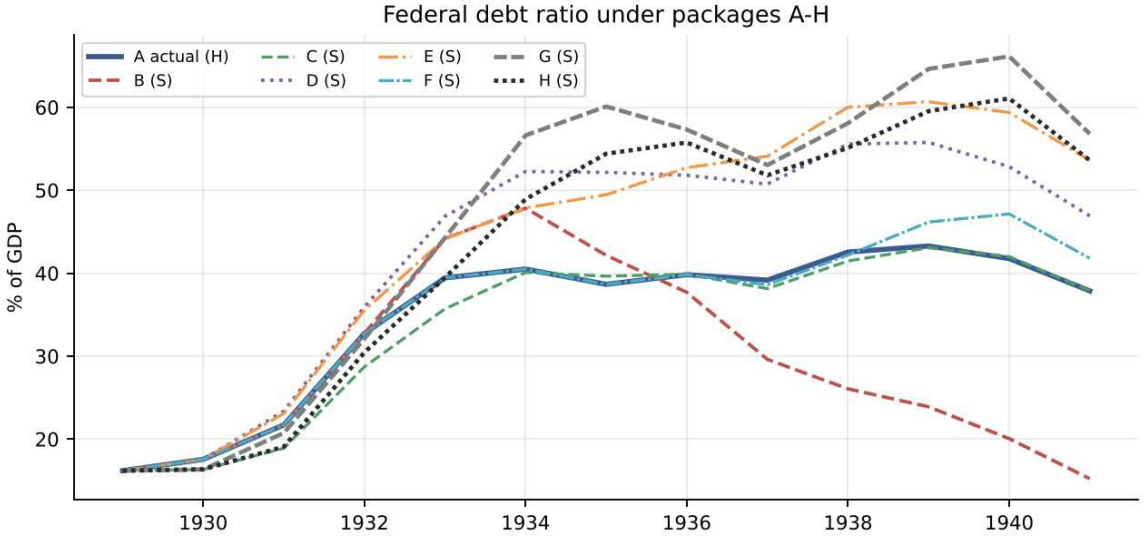


Figure 16. Federal debt ratio under packages A-H, 1929-1941. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *The debt ratio is actual federal debt plus each package's cumulative additional deficit, divided by the package's own GDP. Package B lowers debt to about 15% of GDP in 1941 but at a very large cost in lost output. Package G raises the 1941 ratio to about 57% against 38% in history. Even the largest package leaves debt well below the levels reached during the Second World War. Interest on extra debt is ignored, slightly understating debt.*

8.1 Distributional outcomes of the packages

Table 19. Needs shortfall, inequality and class incomes by package (S except A)

Pkg	Emergency FGT0 1933	FGT0 1937	FGT0 1938	Person-years below line 1929-41 (m)	Equivalised Gini 1933	Equivalised Gini 1938	C1 real income per person 1933 ($)	C2 1933 ($)	C8 1933 ($)
A	33.7%	18.5%	20.3%	377	0.460	0.427	107	182	5,601
B	42.3%	18.3%	19.0%	426	0.481	0.430	96	148	5,217
C	31.5%	18.8%	20.7%	375	0.452	0.426	109	193	5,646
D	30.6%	19.0%	21.6%	373	0.450	0.429	110	198	5,733
E	29.3%	19.1%	21.2%	366	0.448	0.427	112	204	5,822
F	33.7%	16.5%	17.2%	375	0.460	0.416	107	182	5,601
G	25.3%	16.2%	17.4%	358	0.424	0.410	172	233	5,875
H	24.5%	17.7%	17.5%	357	0.430	0.414	158	237	6,195

Note. *Needs protection is where packages differ most for the poor. Under B, about 42% of persons fall below the emergency line in 1933. Package G lowers this to about 25% and reduces person-years below the line by about 19 million over 1929-41. G also raises class 1 real income per person in 1933 by about 61% relative to history. H's exclusion of eligible households cuts the bottom-class gain, although its later timing raises 1933 output slightly.*

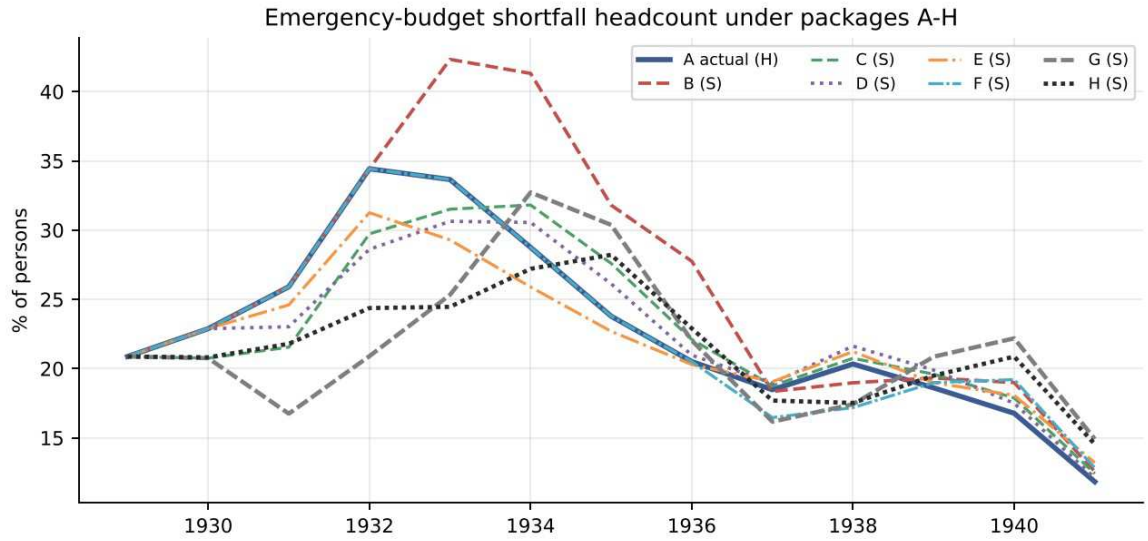


Figure 17. Emergency-budget shortfall headcount under packages A-H, 1929-1941 (per cent of persons). Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *Lines show the share of persons below the WPA emergency line. All packages share the same 1929 starting point. The highest line is B, where the absence of relief and banking repair pushes deprivation in 1933-35 well above history. The lowest early lines are G and H, which combine faster recovery with direct transfers to the bottom three classes. After 1937, F and G avoid most of the rise in deprivation caused by the 1937-38 recession.*

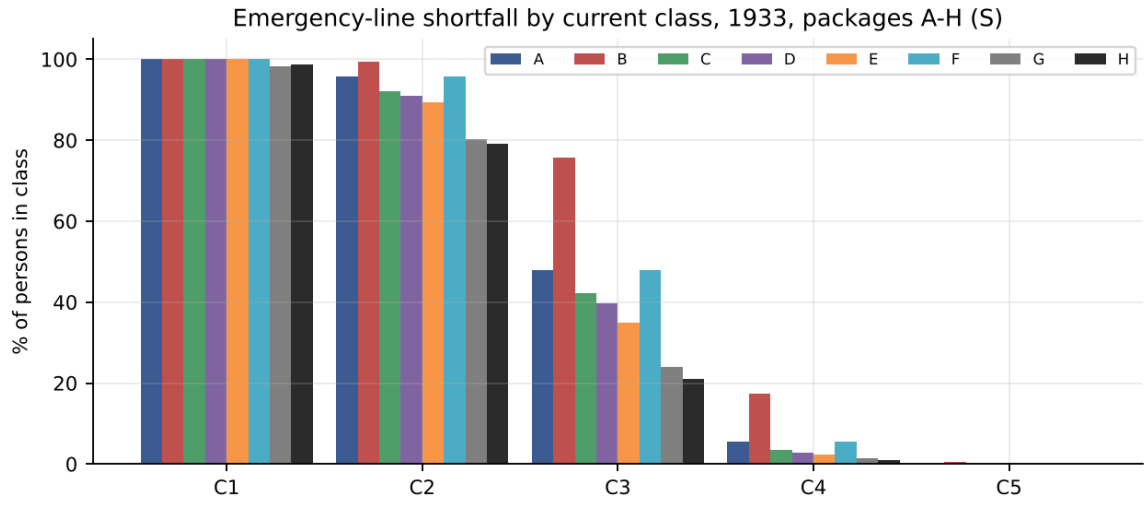


Figure 18. Emergency-line shortfall by current class in 1933, packages A-H. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *The bars show deprivation in the bottom five classes. Almost everyone in class 1 is below the emergency line under every package, so the headcount cannot show differences there; real income can. Under H, class 1 real income per person in 1933 is about $158 against $172 under G, because 30 per cent of its transfers never arrive. Classes 2 and 3 fare slightly better under H in 1933 only because delayed spending raises output that year.*

8.2 Institutions: what was built, and who it reached

The institutional legacy of the 1930s was at least as important as its fiscal record. Deposit insurance (from 1 January 1934) ended the cycle of bank runs almost immediately: suspensions fell from about 4,000 in 1933 to 57 in 1934 (H). Securities regulation (1933-34) and the Banking Act of 1935 changed the governance of capital markets and the Federal Reserve. The Social Security Act of 1935 created old-age insurance, federal-state unemployment insurance and means-tested public assistance; the Wagner Act of 1935 changed bargaining power in industrial labour markets; and the Fair Labor Standards Act of 1938 set a federal minimum wage.

The same institutions also excluded large groups. The Social Security Act initially excluded agricultural and domestic workers, groups that included a large share of Black workers in the South and many women. Agricultural Adjustment Act payments went to landowners and, according to the evidence summarised by Fishback (2016), contributed to the displacement of tenants and sharecroppers. Relief administration was decentralised, which allowed local discrimination in eligibility and benefit levels. Package H is the model's way of representing such delivery failures: the announced programme is the same as G, but it starts late, misses many of the poorest households and leaks part of its spending to well-placed contractors and landowners. Its median cumulative output loss relative to G is about $5 billion (S); its distributional cost falls most clearly on class 1, whose real income per person in 1933 is about 8% lower than under G.

9. Identification, numerical methods and robustness

9.1 What is identified and what is not

The paper identifies three kinds of quantity with different strength. Aggregate paths (output, prices, money, unemployment, bank failures, federal finances) are observed. The shape of the income distribution at three benchmarks and the annual movement of top shares are observed in published tables; the eight-class shares between benchmarks, the age-by-class matrix, income sources by class and the wealth ledger are reconstructions whose identifying assumptions are stated. Policy effects are not identified from the data at all: they are conditional results of a calibrated model whose parameters are assumptions disciplined by the literature. The paper does not report standard errors, statistical significance or confidence intervals, because none of its results come from statistical estimation. Ranges are parameter or scenario ranges.

9.2 Numerical methods

- **Lorenz interpolation.** Monotone piecewise cubic Hermite interpolation (PCHIP) through the anchors; the fitted curve is checked for monotonicity and convexity at 20,000 grid points.
- **Iterative proportional fitting.** Class-by-asset (5,000 iterations), class-by-income-source (3,000) and age-by-class (2,000) matrices; maximum absolute residuals are reported in the audit table.
- **Synthetic microdata.** 60,000 consumer units on an equally spaced percentile grid, unit sizes drawn from class means with log-normal dispersion, wealth drawn from a Gaussian copula with rank correlation rising from the assumed value to 0.95 in the top decile; random seed 1929 throughout.
- **Model solution.** Each year the output deviation is solved by damped fixed-point iteration (weight 0.5) to a tolerance of 1e-9; convergence is reached in fewer than 60 iterations in all package-years.
- **Sensitivity.** One-at-a-time variation of each ranged parameter to its low and high value, and a 400-draw Latin hypercube over ten ranged parameters (nine behavioural parameters and a common shift in class MPCs).

9.3 Validation

Table 20. Out-of-target and historical validation checks

Check	Benchmark	Result	Verdict
Package A reproduces history	All deviations zero in A	max |ΔY| = 0.0e+00	pass
Fine-grid Gini vs published OBE Gini	1929, 1935, 1941	0.498 vs 0.49, 0.472 vs 0.47, 0.449 vs 0.44	pass
Household outlays out of target	1930-1941	error 1.3% to 6.4%	qualified
Top-wealth compression 1929-33	Lampman equity share −22%	synthetic top-1% net worth -7%	qualified
1937-38 tightening	Actual growth 1937-38 -3.3%; 1933-37 average 9.4%	model attributes 8.7% of 1938 output to tightening	qualified
Unemployment concepts	BLS vs Darby	both reported; no choice imposed	pass

Note. *Validation checks compare model or reconstruction outputs with evidence that was not used to build them. The Gini match and the exact reproduction of history pass. Three checks are qualified. The consumption rule overstates outlays by a few per cent. Wealth compression agrees in direction with Lampman but is smaller. The 1937-38 check is plausible rather than decisive: output fell 3.3% after four years of about 9% growth, a swing of roughly twelve points, of which the model attributes about eight to policy tightening.*

9.4 Parameter sensitivity

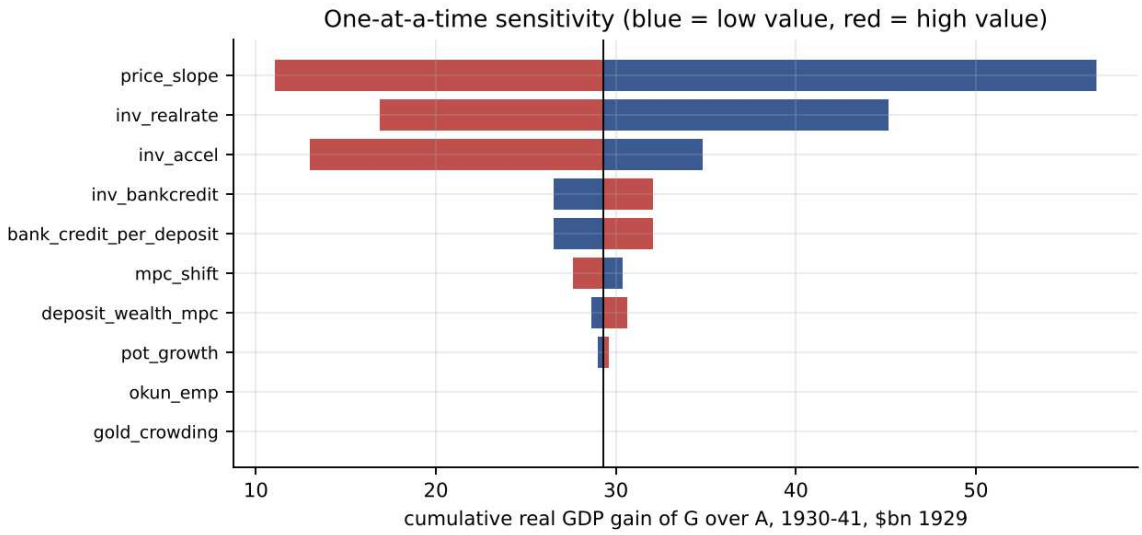


Figure 19. One-at-a-time sensitivity of package G's cumulative output gain, 1930-1941. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *Each bar shows how the cumulative gain of G over A changes when one parameter moves from its central value to its low (blue) or high (red) value. The result is most sensitive to the price-response parameter and the investment responses to real rates and to output changes. A strong price response or a strong accelerator turns early gains into later losses when programmes end. Okun and gold-crowding parameters do not affect G's output path. The central gain is about $29 billion.*

Table 21. Latin hypercube results (N = 400)

Package	Cum. ΔGDP p5	p50	p95	Share of draws < 0	Unemp. 1933 p5	Unemp. 1933 p95	Debt/GDP 1941 p50
B	-90.3	-69.4	-48.5	100%	28.7%	34.0%	15%
C	0.0	9.7	20.9	5%	19.7%	24.9%	38%
D	0.2	6.9	15.5	5%	19.4%	23.1%	47%
E	7.3	17.7	29.5	0%	19.3%	21.8%	54%
F	-3.0	4.0	7.5	14%	24.9%	24.9%	42%
G	-1.2	29.2	53.5	6%	11.9%	21.4%	56%
H	2.3	24.1	42.9	4%	12.5%	19.2%	53%
G − H	-2.4	5.2	11.7	11%	—	—	—

Note. *The table shows how robust each package's cumulative output effect is when all behavioural parameters vary together. The loss under B is negative in every draw. Packages C, D and E are positive in 95 per cent or more of draws. F is positive in 86% of draws, and G in 94%, with the widest range. G beats H in 89% of draws. The sign of the main conclusions is therefore robust, while their size is not.*

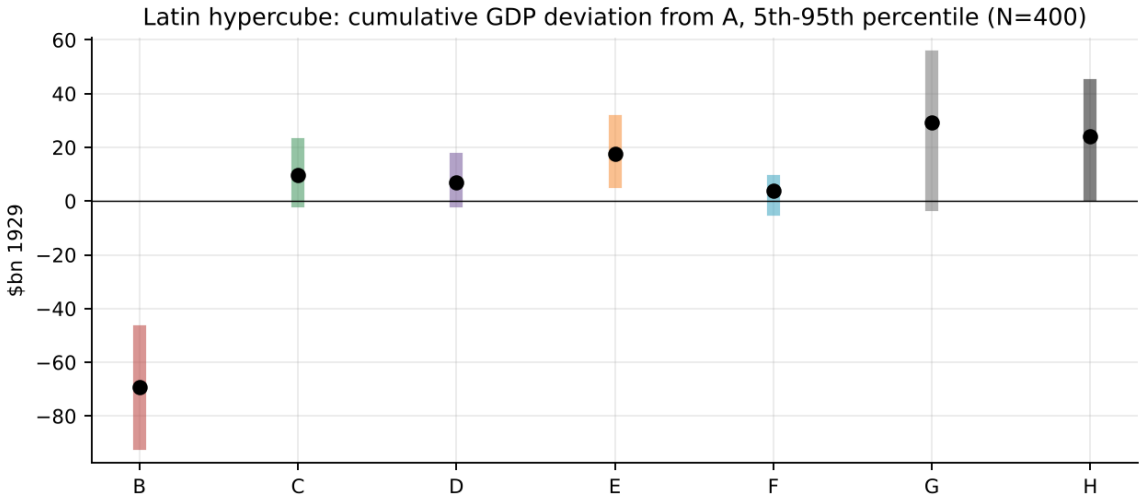


Figure 20. Latin hypercube ranges of cumulative output deviation from history, 1930-1941. Solid lines: historical (H). Dash-dot: reconstruction (R). Dashed or dotted: synthetic (S). Source: Author's computation from the replication package.

Note. *Each bar spans the 5th to 95th percentile of the cumulative output deviation across 400 joint draws of the behavioural parameters; dots mark medians. Package B is the only package whose range lies entirely below zero. The integrated packages G and H have the largest medians but also the widest ranges, because their timing interacts with the accelerator and price-adjustment parameters. These are parameter ranges, not statistical confidence intervals.*

9.5 Data and scenario uncertainty

Data uncertainty is carried by the low, central and high reconstructions in Table 4. They change the 1929 share of class 8 by about ±1.7 percentage points and the share of class 7 by a similar amount in the opposite direction, but change the Gini by less than 0.002. Because the policy model's class incidence uses the 1933 source matrix rather than the top shares, the package rankings do not change between data variants; the levels of class-8 income do. Scenario uncertainty is the comparison among packages itself. These three kinds of uncertainty are reported separately and are not combined into a single interval.

9.6 Limitations

- The deviation model is linear in deviations and cannot represent the possibility that package B would have produced a deeper financial collapse than the assumed persistence of bank failures.
- Class incidence of output changes is fixed at the 1933 pattern for all years and packages.
- The wealth ledger revalues assets but does not re-rank households by wealth; wealth mobility is therefore not identified.
- Supply-side effects of New Deal regulation (NRA codes, AAA acreage reduction, labour legislation) are not modelled; their net effect is contested in the literature.

- Regional, racial and gender dimensions are absent from the reconstruction, although the historical evidence shows they were large.

10. Prescriptions and lessons by class and age

The prescriptions below translate the findings into actions for a depression-type shock, defined as a fall in output of more than ten per cent combined with a banking crisis and deflation. They are written for any economy, but each is grounded in a specific finding about 1929-1941. Each prescription states its target, instrument, horizon, administering institution, financing, evidence basis, main risk and safeguard, and a monitoring indicator. Horizons are immediate (0-6 months), short (6-24 months), medium (2-5 years) and long (more than 5 years).

Prescription 1. Universal deposit guarantee within days

Target: All classes; C1-C5 most. **Problem:** Depositors lost about $1.4 billion in failed banks, 1929-33. **Instrument:** Temporary blanket guarantee, then permanent insured limit. **Horizon:** Immediate. **Institution:** Deposit insurer and central bank. **Financing:** Bank levies; temporary Treasury backstop. **Evidence:** H (FDIC; suspensions fell from ~4,000 to 57). **Risk and safeguard:** Moral hazard; pair with supervision and resolution powers. **Indicator:** Deposit outflows; insured share of deposits.

Prescription 2. Lender of last resort without stigma

Target: C3-C8 savers; small firms. **Problem:** Panics of 1930-33 shrank money by a third. **Instrument:** Open discount window against broad collateral at a penalty rate. **Horizon:** Immediate. **Institution:** Central bank. **Financing:** Central-bank balance sheet. **Evidence:** H (Friedman-Schwartz; Bernanke). **Risk and safeguard:** Support for insolvent banks; require supervisory assessment. **Indicator:** Interbank spreads; discount-window use.

Prescription 3. Rapid resolution of insolvent banks

Target: All depositors; borrowers. **Problem:** Lost credit relationships deepened the slump. **Instrument:** Bridge banks; purchase-and-assumption; recapitalisation with equity. **Horizon:** Short. **Institution:** Resolution authority. **Financing:** Bank levies; public preferred stock (RFC model). **Evidence:** H (RFC; Bernanke 1983). **Risk and safeguard:** Political capture of recapitalisation; publish criteria. **Indicator:** Time to resolution; credit to small firms.

Prescription 4. Stop deflation early

Target: Debtors in C3-C6; farmers. **Problem:** CPI fell about a quarter; real debts rose. **Instrument:** Quantitative purchases of long bonds; explicit price-level target. **Horizon:** Immediate. **Institution:** Central bank. **Financing:** Monetary. **Evidence:** H (Romer 1992; Keynes 1933). **Risk and safeguard:** Inflation overshoot; communicate exit rule. **Indicator:** Expected inflation; long-term rates.

Prescription 5. Exit binding exchange-rate constraints

Target: Whole economy. **Problem:** Gold standard transmitted and constrained policy. **Instrument:** Float or devalue before reserves force tightening. **Horizon:** Immediate. **Institution:** Treasury and central bank. **Financing:** —. **Evidence:** H (Eichengreen 1992). **Risk and safeguard:** Imported inflation; coordinate with trading partners. **Indicator:** Reserve losses; real exchange rate.

Prescription 6. Ready-to-start public works at scale

Target: C2-C5 working-age adults. **Problem:** Fiscal effort was small relative to the output gap. **Instrument:** Pipeline of maintenance and small projects that can start within months. **Horizon:** Short. **Institution:** Public works agency; local governments. **Financing:** Long-term borrowing at low rates. **Evidence:** S (packages D, E, G). **Risk and safeguard:** Low-value projects; independent appraisal and open tendering. **Indicator:** Jobs created; spending disbursed vs appropriated.

Prescription 7. Work relief with dignified wages

Target: C1-C3 adults aged 20-59. **Problem:** Unemployment above 20% for three years. **Instrument:** Guaranteed work offer at a wage near the local minimum. **Horizon:** Short. **Institution:** Work relief agency (WPA-type). **Financing:** Borrowing; later progressive taxes. **Evidence:** H (WPA scale 1.5-3.3m). **Risk and safeguard:** Political allocation; rule-based allocation by unemployment. **Indicator:** Coverage of the unemployed; wait times.

Prescription 8. Cash support for earnerless households

Target: C1-C2; children; 70+. **Problem:** Emergency-line headcount reached about a third in 1933. **Instrument:** Categorical cash transfer paid within weeks. **Horizon:** Immediate. **Institution:** Social-assistance agency. **Financing:** Budget. **Evidence:** S (needs results). **Risk and safeguard:** Exclusion; automatic eligibility by household status. **Indicator:** FGT0 and FGT1 below emergency line.

Prescription 9. Child nutrition and school continuity

Target: Ages 0-4 and 5-17 in C1-C3. **Problem:** Children had the highest shortfall rates. **Instrument:** School meals; maternal and infant food support; fee waivers. **Horizon:** Immediate. **Institution:** Education and health ministries. **Financing:** Budget. **Evidence:** S (age matrix). **Risk and safeguard:** Leakage; deliver through schools and clinics. **Indicator:** Child shortfall rate; enrolment.

Prescription 10. Old-age income before contributory pensions mature

Target: Ages 60-69 and 70+. **Problem:** Monthly Social Security benefits began only in 1940. **Instrument:** Non-contributory pension paid immediately. **Horizon:** Short. **Institution:** Pension agency. **Financing:** Budget. **Evidence:** H (SSA timeline). **Risk and safeguard:** Fiscal cost; means test at household level. **Indicator:** Old-age shortfall rate.

Prescription 11. Mortgage restructuring, not foreclosure

Target: C3-C6 homeowners. **Problem:** Debt deflation raised real mortgage burdens. **Instrument:** Public refinancing agency buying and restructuring distressed loans. **Horizon:** Short. **Institution:** HOLC-type agency. **Financing:** Agency bonds with Treasury guarantee. **Evidence:** H (HOLC refinanced >1m loans). **Risk and safeguard:** Bailing out lenders at par; buy at market value. **Indicator:** Foreclosure rate; arrears.

Prescription 12. Farm debt and price relief that reaches tenants

Target: Farm households in C1-C4. **Problem:** AAA payments displaced tenants. **Instrument:** Payments tied to cultivators, not only landowners; debt adjustment. **Horizon:** Short. **Institution:** Agriculture ministry. **Financing:** Budget. **Evidence:** H (Fishback 2016). **Risk and safeguard:** Landowner capture; direct payment to tenants. **Indicator:** Tenant displacement; farm income by tenure.

Prescription 13. Avoid premature tightening

Target: All classes; C1-C4 most. **Problem:** 1937-38 recession followed fiscal and monetary tightening. **Instrument:** State-contingent exit rule tied to unemployment. **Horizon:** Medium. **Institution:** Treasury and central bank. **Financing:** —. **Evidence:** S (package F); H (1937-38). **Risk and safeguard:** Debt concerns; publish rule in advance. **Indicator:** Unemployment; output gap.

Prescription 14. Do not combine tax rises with a slump

Target: C4-C8 taxpayers; whole economy. **Problem:** Revenue Act of 1932 raised taxes at the trough. **Instrument:** Defer tax increases until recovery is established. **Horizon:** Immediate. **Institution:** Treasury. **Financing:** Borrowing. **Evidence:** H (1932 Act). **Risk and safeguard:** Debt rise; credible medium-term plan. **Indicator:** Primary balance path.

Prescription 15. Automatic stabilisers in place before the shock

Target: All working-age adults. **Problem:** Unemployment insurance did not exist in 1929. **Instrument:** Unemployment insurance with broad coverage and quick payment. **Horizon:** Long. **Institution:** Social-insurance agency. **Financing:** Payroll contributions. **Evidence:** H (Social Security Act 1935). **Risk and safeguard:** Exclusion of informal and farm workers; universal registration. **Indicator:** Coverage rate; replacement rate.

Prescription 16. Universal coverage of social insurance

Target: C1-C3; agricultural and domestic workers. **Problem:** Early Social Security excluded these groups. **Instrument:** Extend coverage to all occupations. **Horizon:** Long. **Institution:** Social-insurance agency. **Financing:** Contributions plus subsidy. **Evidence:** H (exclusions). **Risk and safeguard:** Administrative cost; simple flat contributions. **Indicator:** Coverage by occupation.

Prescription 17. Measure delivery, not only appropriation

Target: All classes. **Problem:** Appropriations differ from disbursements. **Instrument:** Publish monthly disbursement and recipient counts by area. **Horizon:** Short. **Institution:** Finance ministry; statistics office. **Financing:** Administrative budget. **Evidence:** H (Fishback; Table 2). **Risk and safeguard:** Data manipulation; independent audit. **Indicator:** Disbursement ratio; recipients per eligible.

Prescription 18. Guard against exclusion and capture

Target: C1-C2; marginalised groups. **Problem:** Package H loses output and raises C1 deprivation. **Instrument:** Rule-based eligibility, grievance redress, social audits. **Horizon:** Short. **Institution:** Programme agencies; audit institution. **Financing:** Administrative budget. **Evidence:** S (package H). **Risk and safeguard:** Local discrimination; central monitoring by group. **Indicator:** Exclusion error; complaints resolved.

Prescription 19. Protect deposits of the poor first

Target: C1-C3 savers. **Problem:** Deposits were the main asset of lower classes. **Instrument:** Priority insurance for small balances; postal savings. **Horizon:** Immediate. **Institution:** Deposit insurer; postal savings. **Financing:** Levies. **Evidence:** R (asset matrix). **Risk and safeguard:** —. **Indicator:** Small-deposit losses.

Prescription 20. Public investment that raises capacity

Target: Whole economy; C2-C5 workers. **Problem:** Public capital raises potential in package G. **Instrument:** Infrastructure, electrification, water and soil conservation. **Horizon:** Medium. **Institution:** Infrastructure agencies (TVA-type). **Financing:** Long-term bonds. **Evidence:** S (G); H (TVA, PWA). **Risk and safeguard:** White elephants; cost-benefit and transparency. **Indicator:** Completion rates; capacity added.

Prescription 21. Youth employment and training

Target: Ages 18-19 and 20-29 in C1-C4. **Problem:** Young entrants faced the worst job market. **Instrument:** Conservation corps, apprenticeships, stipends. **Horizon:** Short. **Institution:** Youth service agency (CCC-type). **Financing:** Budget. **Evidence:** H (CCC). **Risk and safeguard:** Low-skill make-work; certify skills. **Indicator:** Youth unemployment; skill certificates.

Prescription 22. Keep children in school

Target: Ages 5-17. **Problem:** Lost schooling has lifelong costs. **Instrument:** Teacher salary guarantees; school-fee and transport support. **Horizon:** Short. **Institution:** Education ministry. **Financing:** Grants to localities. **Evidence:** A (life-cycle). **Risk and safeguard:** Diversion of grants; per-pupil transfers. **Indicator:** Enrolment and attendance.

Prescription 23. Health access in the slump

Target: Ages 0-4 and 70+; C1-C3. **Problem:** Emergency budgets cut medical spending. **Instrument:** Free primary care and essential medicines. **Horizon:** Short. **Institution:** Health ministry. **Financing:** Budget. **Evidence:** H (Stecker budgets). **Risk and safeguard:** Quality; facility-level monitoring. **Indicator:** Utilisation by class.

Prescription 24. Wage floors that do not destroy jobs

Target: C2-C4 workers. **Problem:** NRA codes raised wages and may have slowed hiring. **Instrument:** Moderate minimum wage with regional variation. **Horizon:** Medium. **Institution:** Labour ministry. **Financing:** —. **Evidence:** H (contested: Cole-Ohanian; Fishback). **Risk and safeguard:** Unemployment effects; evaluate and adjust. **Indicator:** Employment of low-wage workers.

Prescription 25. Bargaining power and labour rights

Target: C2-C5 workers. **Problem:** Wagner Act shifted bargaining power. **Instrument:** Legal recognition of unions and collective bargaining. **Horizon:** Long. **Institution:** Labour relations board. **Financing:** —. **Evidence:** H (Wagner Act). **Risk and safeguard:** Insider-outsider effects; inclusive coverage. **Indicator:** Wage share; dispute rates.

Prescription 26. Progressive taxation for recovery financing

Target: C7-C8. **Problem:** Top incomes fell but wealth concentration stayed high. **Instrument:** Progressive income and estate taxes once recovery is secure. **Horizon:** Medium. **Institution:** Treasury. **Financing:** —. **Evidence:** H (Revenue Act 1935); R (Gini register). **Risk and safeguard:** Avoidance; broad base, enforcement. **Indicator:** Top-share tax yield.

Prescription 27. Securities and market transparency

Target: C6-C8 investors; pension savers. **Problem:** Stock-market collapse wiped out paper wealth. **Instrument:** Disclosure rules; market regulator. **Horizon:** Long. **Institution:** Securities regulator.

Financing: Fees. **Evidence:** H (1933-34 Acts). **Risk and safeguard:** Regulatory capture; independent regulator. **Indicator:** Disclosure compliance.

Prescription 28. Housing finance that spreads risk

Target: C3-C6 households. **Problem:** Short balloon mortgages failed in the slump. **Instrument:** Long-term amortising mortgages; mortgage insurance. **Horizon:** Long. **Institution:** Housing finance agency (FHA-type). **Financing:** Premiums. **Evidence:** H (National Housing Act). **Risk and safeguard:** Exclusionary lending rules; non-discrimination enforcement. **Indicator:** Default rates by group.

Prescription 29. Consumption smoothing for the middle

Target: C4-C5 households. **Problem:** Middle classes fell several ranks after job loss. **Instrument:** Short-time work subsidies to keep workers attached. **Horizon:** Short. **Institution:** Labour ministry. **Financing:** Budget. **Evidence:** S (mobility matrix). **Risk and safeguard:** Zombie jobs; time limits. **Indicator:** Job retention; transitions.

Prescription 30. Statistics for distribution in real time

Target: All classes and ages. **Problem:** No household survey existed in 1929-33. **Instrument:** Quarterly household income and consumption survey with class breakdown. **Horizon:** Long. **Institution:** Statistics office. **Financing:** Budget. **Evidence:** H (data gap). **Risk and safeguard:** Political interference; statistical independence. **Indicator:** Survey timeliness.

Prescription 31. International coordination

Target: Whole economy. **Problem:** Tariff retaliation and gold transmission spread the slump. **Instrument:** Avoid tariff wars; coordinated easing; swap lines. **Horizon:** Immediate. **Institution:** Treasury; central bank; trade ministry. **Financing:** —. **Evidence:** H (Smoot-Hawley; Eichengreen). **Risk and safeguard:** Free-riding; reciprocal agreements. **Indicator:** Trade volumes.

Prescription 32. Gradual, conditional withdrawal of relief

Target: C1-C3; all ages. **Problem:** Abrupt programme endings reverse gains in the model. **Instrument:** Phase out transfers with recovery triggers, not calendar dates. **Horizon:** Medium. **Institution:** Programme agencies. **Financing:** —. **Evidence:** S (G 1934 dip; F). **Risk and safeguard:** Permanent dependence; activation support. **Indicator:** Exit rates; re-entry into poverty.

10.1 Eight-class policy matrix

Table 22. Eight-class policy matrix

Class	Immediate and short horizon	Medium and long horizon	Key finding
C1 Extremely poor	Cash transfer; child nutrition; health access	Work relief; universal social insurance	Highest needs shortfall; no buffer
C2 Poor	Work relief; cash transfer; small-deposit protection	Unemployment insurance; coverage extension	Lost earners fell below emergency line
C3 Lower middle	Mortgage restructuring; work relief; deflation stop	Housing finance reform	Deposits and homes exposed
C4 Middle	Short-time work; mortgage restructuring	Unemployment insurance; bargaining rights	Largest downward mobility
C5 Upper middle	Deposit guarantee; mortgage relief	Housing finance; securities	Home and farm values

Class	Immediate and short horizon	Medium and long horizon	Key finding
		regulation	fell
C6 Affluent	Deposit guarantee; stop deflation	Progressive taxation once recovered	Business and property income fell
C7 Rich	Lender of last resort; market stability	Securities regulation; progressive taxes	Equity losses large but buffered
C8 Extremely rich	Market stability	Progressive income and estate taxes; disclosure	Largest proportional income fall; wealth still dominant

Note. *The matrix summarises which prescriptions matter most for each class. Bottom classes need income and nutrition support immediately because they had no assets to draw on. Middle classes need protection of homes, deposits and jobs, because their losses came through unemployment and debt deflation and caused the largest falls in rank. Top classes benefit mostly from financial stability, and are the appropriate base for financing recovery once it is secure. No class is left without a relevant instrument, because the Depression reached every class through different channels.*

10.2 Eight-age policy matrix

Table 23. Eight-age policy matrix

Age band	Priority instruments	Key finding
0-4	Infant and maternal nutrition; health care	High shortfall; irreversible effects on development
5-17	School meals; school continuity; fee waivers	Largest group in deprived households
18-19	Youth service corps; training	Entry into a market with no jobs
20-29	Work relief; apprenticeships; youth employment	High unemployment risk; family formation delayed
30-39	Work relief; short-time work; mortgage relief	Earners for large families
40-59	Unemployment insurance; mortgage restructuring	Long-term unemployment risk
60-69	Non-contributory pension; older-worker work relief	Weak re-employment prospects
70+	Immediate non-contributory pension; health access	No earnings; over-represented in C1

Note. *The age matrix highlights that life-cycle position shaped exposure as much as class did. Young children and the very old depended on others' earnings and had the highest needs shortfalls; school-age children were the largest group in deprived households; young adults faced the worst entry conditions; and prime-age adults bore unemployment directly. Instruments therefore need to reach households through different channels: clinics and schools for children, work programmes for adults, and pensions for the old, because no single channel reaches all age groups.*

10.3 Lessons by horizon

- **Immediate (0-6 months):** guarantee deposits, provide liquidity, stop deflation, leave binding exchange-rate constraints, and pay cash and food support to earnerless households and children.
- **Short (6-24 months):** start public works and work relief at scale, restructure mortgages and farm debts, keep children in school, and publish delivery data.

- **Medium (2-5 years):** withdraw support only with recovery triggers, build public capital, review wage and price regulation for employment effects, and finance recovery progressively.
- **Long (more than 5 years):** universal social insurance, housing finance that spreads risk, securities regulation, real-time distributional statistics, and international coordination rules.

10.4 A brief and qualified note on Pakistan

Pakistan's economy differs from the United States of the 1930s in its exchange-rate regime, the size of its informal sector, its banking structure and the role of remittances and external financing, so lessons cannot be transferred mechanically. Three general lessons nonetheless appear relevant and are offered as hypotheses for further work rather than conclusions: that small savers' deposits and small borrowers' credit need explicit protection in a banking stress; that cash transfers reach the poorest faster than in-kind or employment programmes when administrative registries already exist; and that premature fiscal and monetary tightening during a weak recovery can impose large costs on the bottom classes. Testing these against Pakistani household data would be a separate study.

11. Exhibits, audit and delivery

This final section documents the exhibits, the audit of the analysis and the replication package. It is part of the paper rather than an appendix because the credibility of a reconstruction depends on being able to see exactly which checks were run, which passed, and which did not.

11.1 Audit table

Table 24. Audit table

Area	Check	Result	Verdict
Data	52 series logged with source, identifier, units, label and access date	52 entries in source_log.csv	pass
Data	Values entered from printed volumes flagged H*	7 series flagged	qualified
Reconstruction	Class shares sum to one in every year	max error 1.1e-16	pass
Reconstruction	Fine Gini within 0.01 of published OBE Gini (1929, 1935, 1941)	max gap 0.009	pass
Reconstruction	Asset IPF total equals gross assets ($521.5bn)	residual 0.0e+00	pass
Reconstruction	Income-source IPF residual	1.8e-15	pass
Reconstruction	Age-by-class IPF residual (million persons)	5.1e-04	pass
Reconstruction	Age bands add to census totals	max gap 2.0e-03	pass
Reconstruction	Mobility rows sum to one	max error 1.1e-16	pass
Validation	Consumption rule out of target	1.3% to 6.4%	qualified
Validation	Top-wealth compression vs Lampman	right sign, smaller size	qualified
Validation	1937-38 tightening magnitude	plausible, not decisive	qualified
Model	Package A reproduces history exactly	max $\|\Delta Y\| = 0$	pass
Model	Gold constraint never combined with unrestricted monetary finance	by package construction	pass

Area	Check	Result	Verdict
Model	Fixed-point convergence in all package-years	tolerance 1e-9	pass
Model	Debt ledger: debt = actual debt + cumulative Δdeficit	identity in code	pass
Model	Main conclusions robust in sign across Latin hypercube	G>A in 94%; G>H in 89% of draws	qualified
Model	Interest on additional public debt	ignored	qualified
Design	Techoslavakia parameters not transplanted	population, Gini, deficit rule, prices, AI all replaced	pass
Design	Three policy categories kept separate	Keynes / actual / hypothetical	pass
Design	At least 32 prescriptions with full fields	32 prescriptions	pass
Exhibits	Every exhibit followed by a 60-100-word note	checked by code; build stops on any violation	pass
References	References verified online in this session	13 of 28 retrieved; others marked [U]	qualified
Scope	Racial, regional and gender dimensions	not modelled	fail

Note. *The audit table lists every check that was run, with the result and a verdict. Pass means the check was run and met its criterion. Qualified means the check was run but the result is approximate, partial or depends on unverified inputs. Fail means a requirement was not met; the only failure is the absence of racial, regional and gender dimensions, which the evidence used here cannot support. No check is reported as passed unless the code actually ran it during this build.*

11.2 Replication package and delivery

The replication package (Great_Depression_Replication.zip) contains: the raw historical register (data/raw/historical_series.json and source_log.csv), kept separate from processed data; processed CSV datasets (class shares, class accounts, wealth by class, needs shortfall, age-by-class matrices, mobility, Gini register, package results and nine reference paths); an evidence register and parameter register; the code (config.py, data.py, recon.py, recon2.py, model.py, analysis.py, flowcharts.py and the paper-building scripts); an environment specification; and a README describing the order in which the scripts run. All results in this paper were produced by running these scripts in that order with random seed 1929.

11.3 Conclusion

The Great Depression did not fall on an average household. In the reconstruction presented here, the households that started in the lower and middle classes lost between a third and a half of their real income by 1933, largely through unemployment; homeowners and farmers in the middle classes carried debt-deflation burdens; children and the very old were most likely to fall below a minimum budget; and the richest one per cent suffered the largest proportional falls in income and the largest absolute falls in wealth while remaining by far the best protected. Measured income inequality fell, but deprivation rose. Recovery after 1933 was real and broad, but incomplete, and was interrupted by a policy-induced recession in 1937-38.

The counterfactual packages suggest three conclusions that are robust in sign, if not in size, across a wide range of assumptions. First, the measures actually taken from 1933 prevented a much deeper and longer slump. Second, earlier banking repair and an end to deflation would have

reduced the depth of the contraction more than any feasible fiscal action under the gold standard. Third, the distributional value of an integrated programme depends on whether it arrives on time and reaches the households it is meant for. These conclusions are consistent with Keynes's argument of December 1933 that recovery should come first and be financed by borrowing, but the paper's packages are its own constructions and should be judged on their stated assumptions.

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Verification status: [R] retrieved and checked online in this session (16 November 2026); [U] standard reference entered from the published record, not re-verified online in this session.

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Appendix A. Derivations

A.1 The one-period fiscal multiplier in the deviation model

Ignoring lags, the accelerator and wealth effects, substitute the class disposable-income equation into the consumption equation and the result into the output identity:

$$\Delta Y = [\Delta G + \Sigma_c \beta_c \Delta TR_c + \Sigma_c \beta_c \iota_c (s_D - \tau) \Delta Y] / (1 + m) \quad (25)$$

$$\Delta Y / \Delta G = 1 / [1 + m - \beta (s_D - \tau)], \quad \beta = \Sigma_c \beta_c \iota_c \quad (26)$$

With the incidence shares of Section 6 the incidence-weighted MPC is β = 0.731. With DPI/GDP s_D ≈ 0.85 in 1933 (H), τ = 0.06 and m = 0.045, the impact multiplier on purchases is about 2.14, and the impact multiplier on a dollar transferred to classes 1-3 in proportions 0.5/0.3/0.2 is about 1.98. The dynamic and cumulative multipliers reported in Section 8 differ because of the accelerator, real-rate, banking and price feedbacks.

A.2 Calibration of the linear expenditure system

$$a_c = C_{c,1929} - \beta_c \, YD_{c,1929}, \quad C_{c,1929} = (1 - s_c \kappa) \, YD_{c,1929}, \quad \kappa: \Sigma_c s_c \kappa \, YD_{c,1929} = S^{NIPA}_{1929} \quad (27)$$

The scaling factor κ is solved by a damped iteration so that class saving adds to NIPA personal saving in 1929; saving rates are clipped to [−0.5, 0.6]. The committed component a_c is negative for the top classes, meaning that their consumption rises less than proportionally with income, and positive for the bottom classes, where consumption exceeds income at the margin of subsistence.

A.3 Decomposing changes in the FGT headcount

$$\Delta FGT_0 = \Sigma_c (\pi_{c,t} - \pi_{c,0}) \, h_{c,0} + \Sigma_c \pi_{c,t} (h_{c,t} - h_{c,0}) \quad (28)$$

Here π_c is the population share of class c and h_c its headcount. Because classes are percentile blocks of units, population shares change only through unit sizes, so almost all of the 1929-33 rise in the headcount comes from the within-class term, mainly in classes 1-3.

A.4 Lorenz tilting for the nine reference paths

For k > 0 the transformation s̄_c^{1+k} raises the relative mean of richer classes, moving the Lorenz curve outward and raising the Gini monotonically; for k < 0 it does the reverse. Monotonicity guarantees a unique k for each target Gini, which is found by bisection to 80 iterations.

Appendix B. Additional results

Table 25. Annual eight-class income shares, 1929-1941 (per cent; central reconstruction)

Year	C1	C2	C3	C4	C5	C6	C7	C8
1929	1.42	6.07	11.24	16.17	17.16	17.95	13.28	16.72
1930	1.45	6.22	11.44	16.52	17.58	18.75	13.26	14.78
1931	1.44	6.16	11.27	16.34	17.43	19.73	14.00	13.62
1932	1.42	6.03	10.98	15.96	17.07	19.80	15.07	13.68

Year	C1	C2	C3	C4	C5	C6	C7	C8
1933	1.46	6.20	11.23	16.38	17.57	18.79	14.58	13.79
1934	1.47	6.24	11.24	16.46	17.70	18.36	14.79	13.73
1935	1.53	6.48	11.62	17.06	18.40	18.41	13.13	13.37
1936	1.49	6.32	11.42	16.82	18.02	18.15	12.78	15.00
1937	1.51	6.44	11.72	17.34	18.44	18.00	12.64	13.92
1938	1.51	6.47	11.86	17.60	18.59	18.58	13.00	12.39
1939	1.46	6.31	11.64	17.34	18.21	18.87	13.30	12.88
1940	1.45	6.30	11.72	17.51	18.27	18.73	12.94	13.09
1941	1.51	6.59	12.35	18.51	19.19	17.85	11.59	12.41

Note. *The table gives the full annual path of class shares used in every calculation. Benchmark years 1929, 1935 and 1941 are fitted to published distributions; other years are interpolated and adjusted with annual top-income evidence. Class 8's share falls from about 16.7 per cent in 1929 to under 13 per cent in 1932-33, recovers partly in 1936-37 and falls again by 1941. Middle classes 4 and 5 gain share throughout. Shares are reconstructions and carry the label R.*

Table 26. Emergency-line shortfall headcount by age band, 1929-1941 (S)

Year	0-4	5-17	18-19	20-29	30-39	40-59	60-69	70+
1929	23%	23%	21%	21%	19%	18%	21%	27%
1930	25%	25%	23%	23%	21%	20%	23%	30%
1931	28%	28%	26%	26%	24%	23%	26%	33%
1932	37%	37%	34%	35%	32%	31%	35%	42%
1933	36%	36%	34%	34%	32%	30%	34%	41%
1934	31%	31%	29%	29%	27%	25%	29%	36%
1935	26%	26%	24%	24%	22%	21%	24%	31%
1936	22%	22%	20%	21%	19%	18%	21%	27%
1937	20%	20%	18%	19%	17%	16%	19%	25%
1938	22%	22%	20%	21%	19%	18%	21%	27%
1939	20%	20%	18%	19%	17%	16%	19%	25%
1940	18%	18%	17%	17%	15%	14%	17%	23%
1941	13%	13%	12%	12%	11%	10%	12%	17%

Note. *Rates by age come from applying class-level shortfall rates to the age-by-class matrix of each year. They therefore reflect where each age group sat in the income distribution, not differences between people of different ages within the same class. The pattern is stable: children under 18 and people aged 70 and over have the highest rates, and adults aged 40 to 59 the lowest. The peak in 1933 and the partial relapse in 1938 appear in every age band.*

Table 27. Real disposable income per person by class and package, 1933 (1929 dollars; S except A)

Pkg	C1	C2	C3	C4	C5	C6	C7	C8
A	107	182	286	379	508	783	1,506	5,601
B	96	148	241	331	462	737	1,424	5,217
C	109	193	299	392	516	786	1,508	5,646
D	110	198	306	400	525	798	1,529	5,733
E	112	204	314	409	535	809	1,550	5,822
F	107	182	286	379	508	783	1,506	5,601
G	172	233	340	426	546	812	1,550	5,875
H	158	237	350	439	560	830	1,614	6,195

Note. *The table shows how each package changes real income per person for each re-ranked class in 1933. Gains from banking and fiscal packages are spread across classes in proportion to the incidence shares, while needs transfers in G and H add directly to classes 1 to 3. Class 8 gains mainly from higher output through property income. Package B lowers every class. Values are synthetic and depend on the fixed 1933 incidence pattern, which is the main reason to treat class differences as approximate.*

Table 28. Synthetic unit-level wealth distribution, 1929-1941 (S)

Year	Gini	Top 1% share	Top 10% share	Bottom 50% share	Total net worth $bn
1929	0.871	40.0%	82.0%	2.0%	466.5
1930	0.869	39.2%	81.5%	2.0%	420.3
1931	0.866	37.5%	80.6%	1.9%	345.3
1932	0.864	35.7%	79.6%	1.8%	274.2
1933	0.869	37.1%	80.7%	1.7%	281.1
1934	0.869	37.5%	80.9%	1.8%	299.3
1935	0.868	37.6%	80.9%	1.9%	312.8
1936	0.870	38.8%	81.7%	1.9%	355.2
1937	0.869	38.6%	81.5%	1.9%	362.9
1938	0.866	37.4%	80.8%	1.9%	333.4
1939	0.867	37.6%	81.0%	1.9%	344.9
1940	0.866	37.2%	80.8%	1.9%	347.8
1941	0.863	36.6%	80.4%	2.0%	360.9

Note. *The synthetic wealth distribution starts from calibrated 1929 targets: a top 1 per cent share of 40 per cent, a top 10 per cent share of 82 per cent and a fifth of units with zero or negative net worth. It is then revalued with asset prices, depositor losses, saving and debt changes. Concentration falls slightly to 1933, as equity prices collapsed, and recovers partially. The total falls by about 40 per cent in nominal terms. These values are illustrative calibrations, not observations.*

Appendix C. Data dictionary, parameter register and environment

Table 29. Data dictionary of the replication package

File	Content	Type
historical_series.json / source_log.csv	Raw historical register with labels and sources	raw
class_shares_annual.csv	Eight-class income shares 1929-41	processed (R)
class_accounts.csv	Personal and disposable income, persons and real income by class	processed (R/S)
wealth_by_class.csv	Gross assets, debt and net worth by class	processed (S)
poverty.csv	FGT measures by line, year and class	processed (S)
age_class_persons.csv	Persons by age band and class	processed (R)
mobility_origin_to_current.csv	Transition shares, 1929 origin to 1933/37/41	processed (S)
gini_register.csv	Gini register	processed (R/S)
packages_macro.csv	Packages A-H macro outcomes	processed (S)
packages_class_real_income.csv	Packages A-H real income per person by class	processed (S)
nine_joint_paths.csv	Nine reference paths	processed (S)
parameter_register.csv	All A parameters with central values and ranges	register
evidence_register.csv	Label of every series and output	register

Note. *The data dictionary lists the main files a replicator will use. Raw files contain only historical values and their provenance; processed files contain reconstructions and synthetic results and can be regenerated by running the code. Keeping raw and processed data in separate folders prevents a reconstruction from being mistaken for an observation. The two registers summarise every assumed parameter and the evidence label of every series and output, so that a reader can check the status of any number without reading the code.*

Environment. Python 3 with NumPy, SciPy (PCHIP interpolation), Matplotlib, python-docx and Pillow; Graphviz for flowcharts; LibreOffice for PDF conversion. Exact package versions are recorded in environment.txt in the replication package. Random seed: 1929.

Annexure. Research topics for further study

Ten topics for BS (undergraduate) research

- Bank failures in one US state, 1930-1933: a descriptive study using Federal Reserve Bulletin data.
- What did families buy during the Depression? Comparing the WPA emergency and maintenance budgets.
- Unemployment counts in the 1930s: why BLS and Darby estimates differ.
- The Civilian Conservation Corps and young men: a review of the evidence.
- Keynes's 1933 open letter to Roosevelt: a close reading and its reception.
- The 1937-38 recession: a timeline of fiscal and monetary decisions.
- Deposit insurance and bank runs: comparing 1930-33 with 1934-40.
- Children and schooling during the Great Depression: a literature review.
- Food prices and household budgets, 1929-1935: a CPI-based analysis.
- Comparing Depression-era relief with modern cash-transfer programmes: a conceptual study.

Ten topics for MS/MPhil research

- Reconstructing eight-class income distributions from grouped data: a comparison of PCHIP, beta-Lorenz and generalised-beta methods for 1929-1941.
- Debt deflation and middle-class balance sheets: home mortgages and foreclosures, 1929-1936.
- Incidence of New Deal grants by state and class: linking Fishback's data to state income distributions.
- Old-age poverty before Social Security benefits: evidence from state old-age assistance, 1930-1940.
- Farm tenants and the Agricultural Adjustment Act: who received the payments?
- Gold-standard exit and recovery: a cross-country comparison of timing and distributional outcomes.
- Measuring consumption inequality in the 1930s using the 1935-36 Study of Consumer Purchases.
- Work relief versus direct relief: costs, coverage and effects on poverty in the 1930s.
- The 1932 Revenue Act and top incomes: fiscal tightening at the trough.
- Applying the eight-class framework to a modern banking crisis: lessons for South Asian economies.

Ten topics for PhD research

- A heterogeneous-agent model of the Great Depression with eight income classes, bank failures and debt deflation, estimated on historical data.
- Intergenerational effects of the Great Depression on children by class: linking census records across 1930, 1940 and later censuses.
- Racial and regional incidence of the Great Depression and the New Deal: a class-by-race reconstruction.

- Delivery, exclusion and capture in New Deal programmes: measuring the gap between appropriation and receipt.
- Wealth mobility in the Great Depression: estate-tax and probate evidence on who fell and who rose.
- Fiscal multipliers by class: state-level evidence with distributional outcomes, 1933-1940.
- Monetary regime change and distribution: the 1933 devaluation and the real burden of household debt.
- Life-cycle consumption and saving under extreme income risk: the Depression generation's later behaviour.
- Designing automatic stabilisers for depression-type shocks: an optimal-policy analysis with class and age heterogeneity.
- A comparative history of banking crises and household protection: the United States 1930-33, Europe 2008-12 and emerging economies.