

Measuring Aggregate Wellbeing through the “Level of Living”

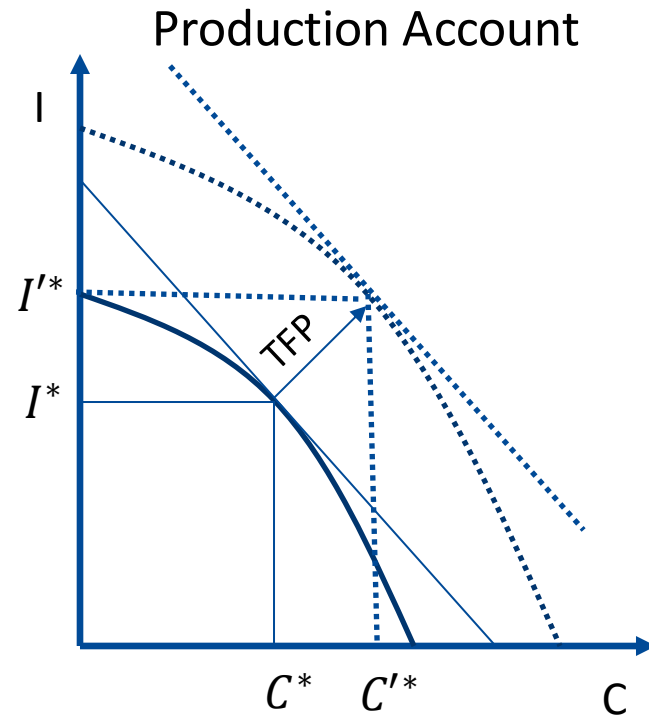
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GDP is a measure of Production, not Welfare

- “The absence of a measure of welfare in the national accounts has led to widespread misuse of the GDP to proxy welfare.” (Jorgenson, 2018)
- Level of Living (LoL) : We can, conceptually, think about welfare within the national accounts
 - “Level of Living, a quantity index of welfare generated from current and future consumption in proportion to the effort required in the form of supply of labor and capital services.” (Jorgenson and Landefeld, 2006)
 - “Productivity growth computed from aggregate data has a natural welfare interpretation.” (Basu and Fernald, 2002)
 - (Samuels, 2018) connects (Basu and Fernald, 2002) to (Jorgenson and Landefeld, 2006) and provides estimates
- Findings: 1) Lens to think about welfare is Income and Expenditure Account; 2) In the U.S., LoL has grown more rapidly than TFP

Differences between TFP and the Level of Living



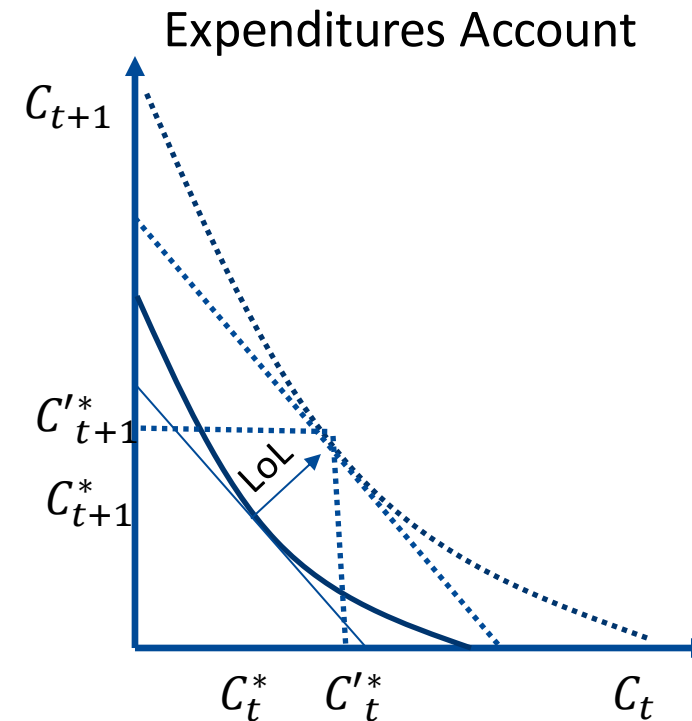
Producers:

$$\text{Max } P_C C + P_I I - P_K K - P_L L$$

TFP: Shift in PPF for **production** holding

inputs fixed: $\frac{\partial(GDP^*)}{\partial T}$

Reference: Jorgenson (1966)



Individuals:

$$\text{Max } U(C_t) + BU(C_{t+1})$$

LoL: Shift in **U(*)** holding income fixed:

$$\frac{\partial(U(C_t^*) + BU(C_{t+1}^*))}{\partial T}$$

Reference: Samuels (2018); Jorgenson and Landefeld (2006)

- TFP derived from $Y(I,C)=A \cdot X(K,L)$
- Production Account includes information on the **production** of Consumption and Investment and inputs
 - In current and constant dollars!
- LoL derived from $Z(C,S)=B \cdot G(W)$
- Expenditure Account includes information on the **spending** on consumption and saving and income
 - In current and constant dollars!
- Differences between **Production** and **Expenditure** accounts drive wedge between TFP and LoL

Income and Expenditure Account: Expenditure

2016

Line	Expenditures	Source	Total
1	+ Personal consumption expenditures		12,247.5
2	PCE nondurable goods (NIPA)	NIPA 2.3.5 line 8	2,710.4
3	PCE services (NIPA)	NIPA 2.3.5 line 13	8,699.3
4	PCE services less space rental value of inst building and nonfarm dwellings	our imputation	7,246.9
5	Services of consumers' durables	our imputation	1,549.3
6	Services of structures and land	our imputation	740.5
7	Services of durables held by institutions	our imputation	0.4
8	+ Government consumption expenditures		2,959.2
9	Government consumption nondurable goods	NIPA 3.10.5 line 8	277.6
10	Government intermediate purchases, durable goods	NIPA 3.10.5 line 7	65.5
11	Government consumption services total		192.5
12	Government consumption services	NIPA 3.10.5 line 9	672.5
13	Less sales to other sectors	NIPA 3.10.5 line 11	480.0
14	Services of durables, structures, land, and inventories held by government	our imputation	817.2
15	Less government enterprise consumption of fixed capital	NIPA 3.1 line 42- 3.10.5 line 5	66.4
16	Less current surplus of government enterprises	NIPA 3.1 line 19	-10.1
17	Government compensation of employees excluding force account labor	NIPA 3.10.5 line 4-10	1,662.7
18	+ Gross national saving and statistical discrepancy	Capital Account	4,617.0
	- Depreciation	our imputation	3,909.7
19	= Net domestic expenditures		15,914.1

Capital Account: Saving

2016

Line	Saving	Source	Total
1	+ Net saving (NIPA)	NIPA 5.1 line 2	436.5
2	Personal saving	NIPA 5.1 line 9	680.6
3	Undistributed corporate profits with IVA and capital consumption adjustments	NIPA 5.1 line 4	620.6
4	Wage accruals less disbursements (private)	NIPA 5.1 line 9	-
5	Net government saving	NIPA 5.1 line 10	-864.7
6	+ Consumption of fixed capital	NIPA 1.7.5 line 5	2,916.7
7	= Gross saving (NIPA)	NIPA 5.1 line 1	3,353.2
8	+ Personal consumption expenditures, durable goods	NIPA 1.1.5 line 4	1,411.0
9	+ Private land investment	our imputation	0.0
10	+ Government investment, land and inventories	our imputation	0.0
11	= Gross saving		4,764.2
12	+ Statistical discrepancy	NIPA 5.1 line 42	-147.2
13	= Gross saving and statistical discrepancy		4,617.0

Capital Account: Investment

2016

Line	Investment	Source	Total
1	+ Private fixed investment, nonresidential structures	NIPA 5.4.5 line 2	516.2
2	+ Private fixed investment, equipment	NIPA 5.5.5 line 1	1,054.0
3	+ Private fixed investment, IPP	NIPA 5.6.5 line 1	756.2
3	+ Change in private inventories, nonfarm	NIPA 5.7.5 line 19	35.7
4	+ Change in private inventories, farm	NIPA 5.7.5 line 2	-0.6
5	+ Private fixed investment, residential structures	NIPA 5.4.5 line 35	695.7
6	+ Personal consumption expenditures, durable goods	NIPA 1.1.5 line 4	1,411.0
7	+ Private land investment	our imputation	0.0
8	= Gross private domestic investment		4,468.2
9	+ Government investment, structures	NIPA 5.9.5 line 6	280.9
10	+ Government investment, equipment	NIPA 5.9.5 line 46	133.3
	Government investment, IPP	NIPA 5.9.5 line 57	195.5
11	+ Government investment, land and inventories	our imputation	0.0
12	= Gross domestic investment		5,077.9
13	+ Net lending or borrowing on rest of world account	NIPA 4.1 line 34	-461.4
14	+ Capital accounts transaction (net)	NIPA 4.1 line 36	0.4
15	= Gross investment		4,616.9

Income and Expenditure Account: Income

2016

Line	Income	Source	Total
1	+ Gross income	Product Account	19,025.5
2	+ Production taxes	Product Account	799.7
3	- Subsidies	NIPA 3.1 line 30	61.8
4	= Gross domestic income at market prices		19,763.4
5	+ Income receipts from the rest of the world	NIPA 1.7.5 line 2	844.3
6	- Income payments to the rest of the world	NIPA 1.7.5 line 3	647.2
7	- Current taxes and transfers to the rest of the world (net)	Foreign Transactions Current Account	136.8
8	= Gross income		19,823.7
9	- Depreciation	our imputation	3,909.7
10	= Net income		15,914.0

Expenditure prices

Line	Expenditures	Source	Price
1	+ Personal consumption expenditures		
2	PCE nondurable goods (NIPA)	NIPA 2.3.5 line 8	NIPA
3	PCE services (NIPA)	NIPA 2.3.5 line 13	
4	PCE services less space rental value of inst building and nonfarm dwellings	our imputation	NIPA
5	Services of consumers' durables	our imputation	user cost
6	Services of structures and land	our imputation	user cost
7	Services of durables held by institutions	our imputation	user cost
8	+ Government consumption expenditures		
9	Government consumption nondurable goods	NIPA 3.10.5 line 8	NIPA
10	Government intermediate purchases, durable goods	NIPA 3.10.5 line 7	NIPA
11	Government consumption services total		
12	Government consumption services	NIPA 3.10.5 line 9	NIPA
13	Less sales to other sectors	NIPA 3.10.5 line 11	
14	Services of durables, structures, land, and inventories held by government	our imputation	user cost
15	Less government enterprise consumption of fixed capital	NIPA 3.1 line 42- 3.10.5 line 5	
16	Less current surplus of government enterprises	NIPA 3.1 line 19	
17	Government compensation of employees excluding force account labor	NIPA 3.10.5 line 4-10	
18	+ Gross national saving and statistical discrepancy	Capital Account	Capital Account
	- Depreciation	our imputation	$\sum \delta * PI \times \text{value share}$
19	= Net domestic expenditures		Reverse Deflation

User cost: opportunity cost+ capital gain + depreciation Jorgenson (1963)

Reverse deflation: Have total and other components; back out missing price

Capital Account prices: Investment

Line	Investment	Source	Price
1	+ Private fixed investment, nonresidential structures	NIPA 5.4.5 line 2	NIPA
2	+ Private fixed investment, equipment	NIPA 5.5.5 line 1	NIPA
3	+ Private fixed investment, IPP	NIPA 5.6.5 line 1	NIPA
3	+ Change in private inventories, nonfarm	NIPA 5.7.5 line 19	NIPA
4	+ Change in private inventories, farm	NIPA 5.7.5 line 2	NIPA
5	+ Private fixed investment, residential structures	NIPA 5.4.5 line 35	NIPA
6	+ Personal consumption expenditures, durable goods	NIPA 1.1.5 line 4	NIPA
7	+ Private land investment	our imputation	FoF Reverse Deflation
8	= Gross private domestic investment		
9	+ Government investment, structures	NIPA 5.9.5 line 6	NIPA
10	+ Government investment, equipment	NIPA 5.9.5 line 46	NIPA
	Government investment, IPP	NIPA 5.9.5 line 57	NIPA
11	+ Government investment, land and inventories	our imputation	FoF Reverse Deflation
12	= Gross domestic investment		
13	+ Net lending or borrowing on rest of world account	NIPA 4.1 line 34	Implicit Price Index NX
14	+ Capital accounts transaction (net)	NIPA 4.1 line 36	Implicit Price Index NX
15	= Gross investment		

Reverse deflation: Have total and other components; back out missing price

Implicit price: Have nominal and real, define price as ratio

Capital Account prices: Saving

Line	Saving	Source	Price
1	+ Net saving (NIPA)	NIPA 5.1 line 2	-
2	Personal saving	NIPA 5.1 line 9	-
3	Undistributed corporate profits with IVA and capital consumption adjustments	NIPA 5.1 line 4	-
4	Wage accruals less disbursements (private)	NIPA 5.1 line 9	-
5	Net government saving	NIPA 5.1 line 10	-
6	+ Consumption of fixed capital	NIPA 1.7.5 line 5	-
7	= Gross saving (NIPA)	NIPA 5.1 line 1	-
8	+ Personal consumption expenditures, durable goods	NIPA 1.1.5 line 4	-
9	+ Private land investment	our imputation	-
10	+ Government investment, land and inventories	our imputation	-
11	= Gross saving		-
12	+ Statistical discrepancy	NIPA 5.1 line 42	-
13	= Gross saving and statistical discrepancy		Gross Investment Deflator
14	- Depreciation	our imputation	$\sum \delta * PI \times \text{value share}$
15	= Net saving		Reverse Deflation

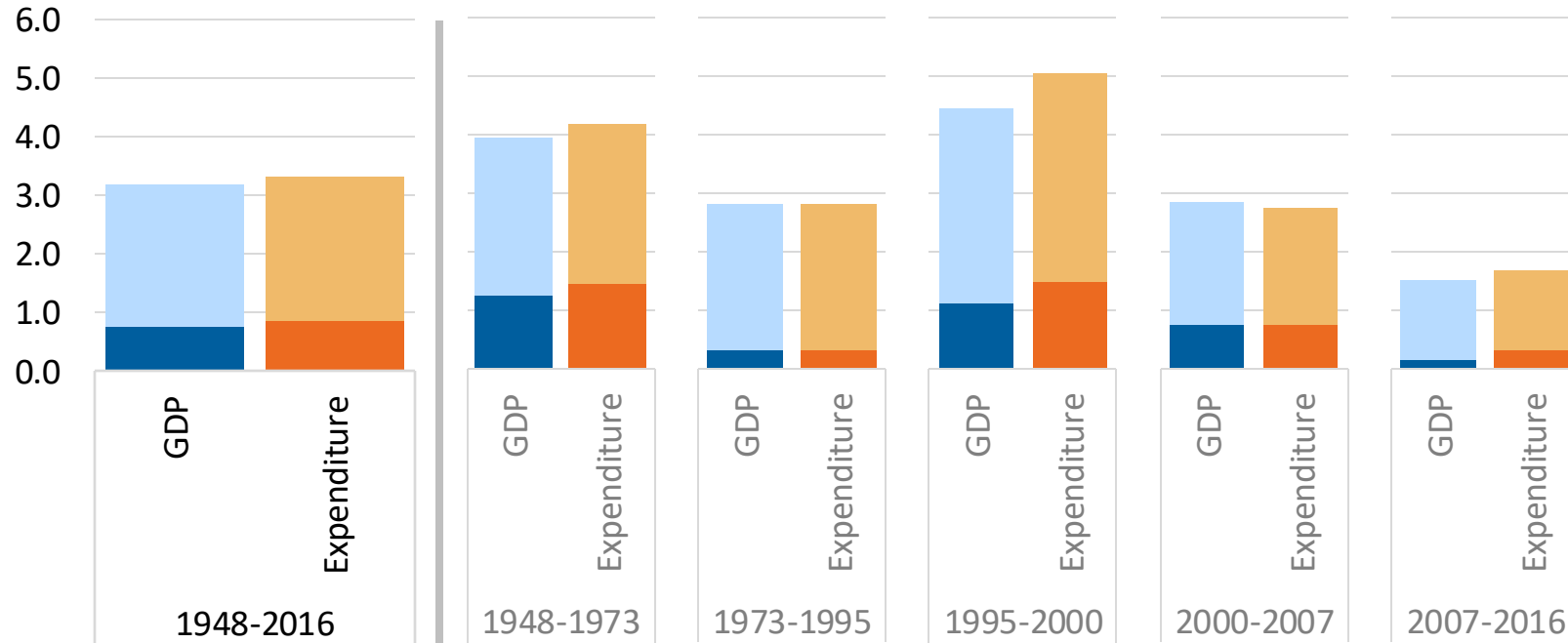
Reverse deflation: Have total and other components; back out missing price

Income Prices

Line	Income	Source	Price
1	Domestic Compensation of Employees		Weighted Compensation per Hour
2	Domestic Compensation of Self Employed		Weighted Compensation per Hour
3	Net Worker Income from ROW		Implicit Price for ROW Hours Adjusted for Composition
4	Domestic Property Income		Price of Capital Income (Weighted Asset Income)
5	ROW Property Income		Implicit Deflator for Net Income Payments from ROW
6	= Gross income		
7	- Depreciation	our imputation	$\sum \delta * PI \times \text{value share}$
8	= Net income		Reverse Deflation

Price of capital income: payments to holders of capital to rent asset weighted by asset share

Growth in GDP & Expenditure, 1948-2016



- Input growth accounted for majority of output growth;
- Income growth accounted for majority of growth in expenditure;
- Growth in the Level of Living exceeded that of TFP
- The post recession slowdown in growth in the LoL was less than the TFP slowdown

- The Production account is the appropriate account to analyze changes in the sources of GDP growth
 - BEA and BLS have been publishing the Integrated Industry-level production account since ~2012
- The Income and Expenditures account is the appropriate account to consider measures of “welfare” and yields LoL
 - The Level of Living has grown a bit faster than TFP growth over the post-war period
 - Publish within a satellite account?
- Still research in progress and open issues: 1) representative consumer; 2) deflators for Net Lending and Borrowing; 3) Consumer durables and non-profits imputation