



Tips on Computing & Interpreting Chain-Type NIPA Aggregates

Using Federal Statistics in the Workplace:
NABE & The Bureau of Labor Statistics

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Reflections on Chain-Type GDP

- Its been what . . .4 + years?
- More complex but unquestionably superior
 - Growth, inflation not subject to “substitution bias”
 - And independent of base (reference) year
 - So not subject to revision on that score
 - Empirical models fit better & are more stable
 - Stimulate new ways of thinking about economy

Reflections on Chain-Type GDP

- Public education . . .remember the hoopla?
 - Would (did) the press understand?
 - Would practicing economists?
- Two most common mistakes
 - Adding and subtracting real variables
 - Interpreting ratios of real variables as “shares”

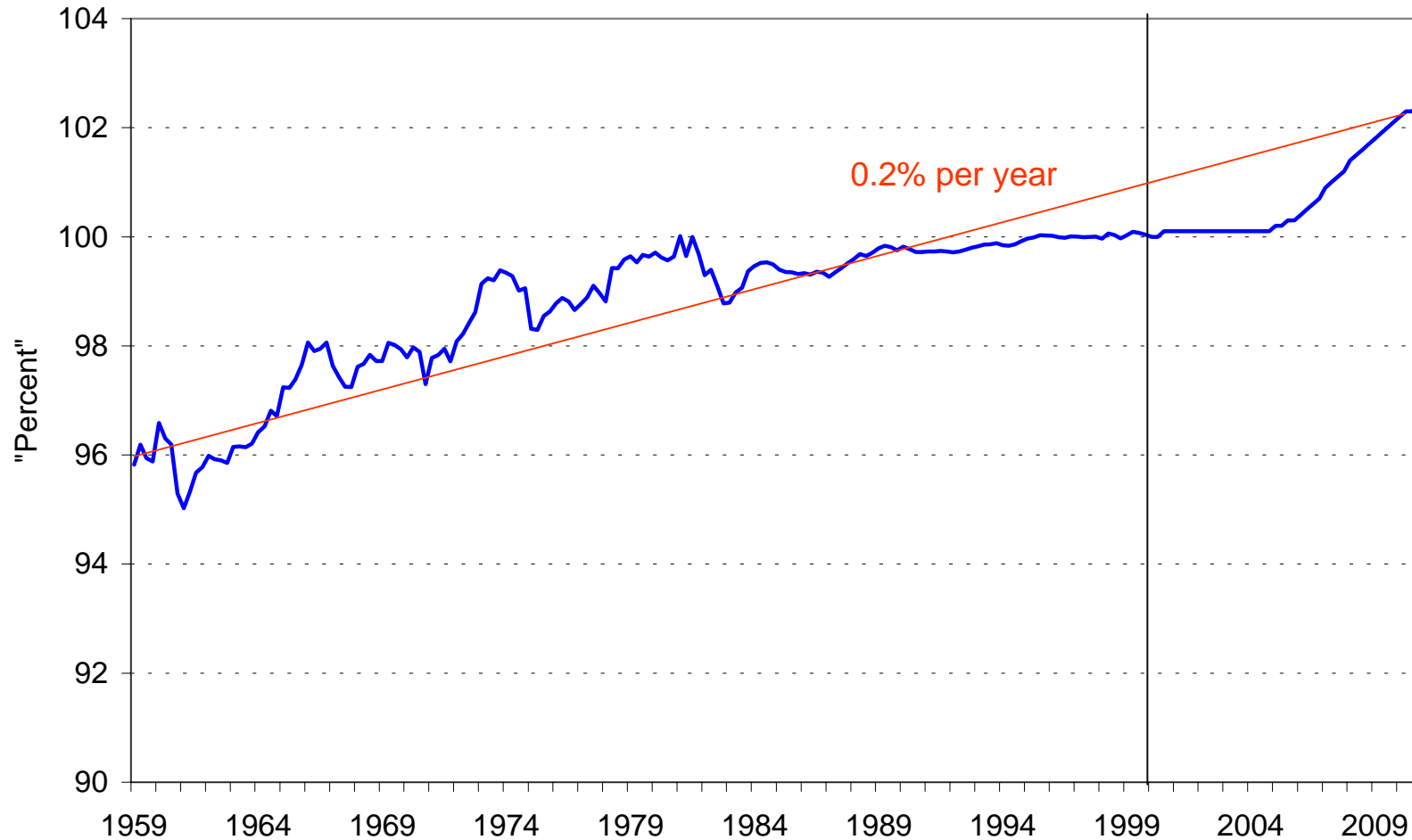
What's Wrong with This Picture?

Chart 64
Acme & Co., Inc - Long-Term Forecast of Real GDP Shares

	<u>1988</u>	<u>1998</u>	<u>2008</u>
Gross Domestic Product	100.0	100.0	100.0
Personal Consumption Expenditures	67.1	66.9	66.3
Durable Goods	7.6	8.6	7.5
Nondurable Goods	20.7	19.8	20.0
Services	38.8	38.6	38.7
Nonresidential Fixed Investment	9.5	13.2	11.1
Structures	3.6	3.0	3.0
Equipment & Software	6.1	10.2	8.1
Residential Fixed investment	4.6	4.1	3.9
Change in Business Inventories	0.3	0.9	0.3
Government Purchases	20.6	17.4	19.0
Federal	9.2	6.2	7.6
Defense	7.0	4.0	5.3
Non-defense	2.2	2.2	2.3
State & Local	11.3	11.2	11.4
Net Exports	-1.8	-2.5	0.7
Exports	7.4	11.8	10.4
Imports	-9.2	14.4	-11.0

Compute "Real" Shares At Your Own Risk!

Sum of Real GDP "Shares"



Fisher “Sum” of Two Reals : $Y = X + Z$

(1) Compute Laspayres growth: $G_t^L = \frac{P_{x,t-1} X_t + P_{z,t-1} Z_t}{P_{x,t-1} X_{t-1} + P_{z,t-1} Z_{t-1}}$

(2) Compute Paasche growth: $G_t^P = \frac{P_{x,t} X_t + P_{z,t} Z_t}{P_{x,t} X_{t-1} + P_{z,t} Z_{t-1}}$

(3) Compute Fisher growth: $G_t^F = \sqrt{G_t^L G_t^P}$

(4) Pick initial value for Y

(6) Grow Y using Fisher growth: $Y_t = G_t^F Y_{t-1}$

(7) Scale Y to $Y\$$ in reference year

(8) Compute chain-type price index: $P_{Y,t} = \frac{P_{x,t} X_t + P_{z,t} Z_t}{Y_t}$

Fisher “Difference” of Two Reals: $Z = Y - X$

$$G_{z,t}^F = \frac{Z_t}{Z_{t-1}} = \frac{-b_t + \sqrt{b_t^2 - 4a_t f_t}}{2a_t}$$

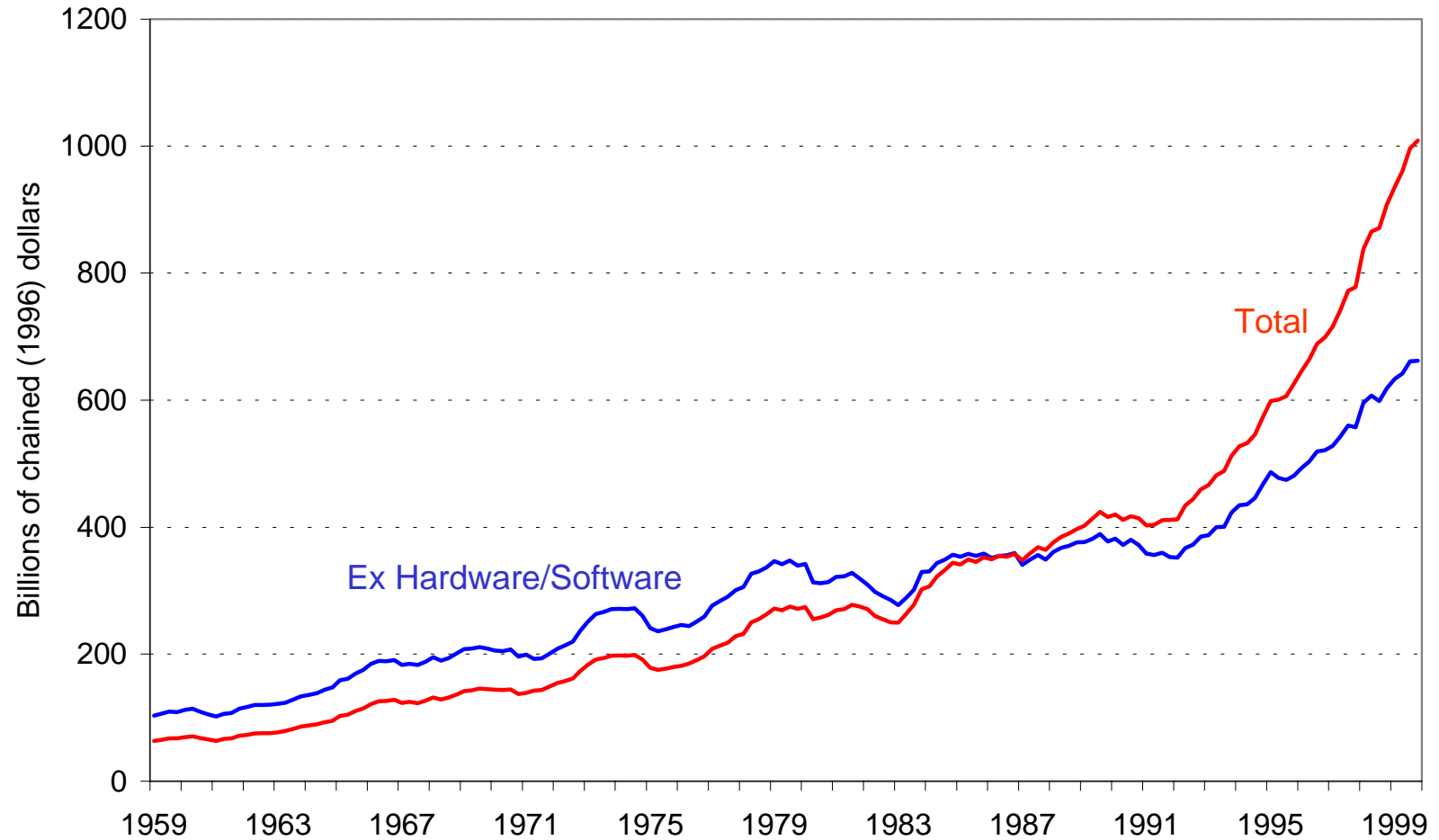
$$h_t = \beta_{x,t} \frac{X_t}{X_{t-1}} \quad j_t = \beta_{x,t} \frac{X_{t-1}}{X_t} \quad a_t = 1 - \beta_{x,t-1}$$

$$f_t = (1 - \beta_{x,t}) \left(\frac{Y_t}{Y_{t-1}} \right)^2 \quad b_t = h_t - j_t \left(\frac{Y_t}{Y_{t-1}} \right)^2$$

$$\beta_{x,t} = \frac{P_{x,t} X_t}{P_{x,t} X_t + P_{z,t} Z_t}$$

Hard to Get Used to, But . . .

Fisher Decomposition of Equipment & Software



Contributions to (“Shares of”) Growth of Y

$$C_{x,t} = \frac{\left(P_{x,t-1} + \frac{P_{x,t} P_{y,t-1}}{P_{y,t}} \right) \Delta X_t}{\left(P_{x,t-1} + \frac{P_{x,t} P_{y,t-1}}{P_{y,t}} \right) X_{t-1} + \left(P_{z,t-1} + \frac{P_{z,t} P_{y,t-1}}{P_{y,t}} \right) Z_{t-1}}$$

$$C_{z,t} = \frac{\left(P_{z,t-1} + \frac{P_{z,t} P_{y,t-1}}{P_{y,t}} \right) \Delta Z_t}{\left(P_{x,t-1} + \frac{P_{x,t} P_{y,t-1}}{P_{y,t}} \right) X_{t-1} + \left(P_{z,t-1} + \frac{P_{z,t} P_{y,t-1}}{P_{y,t}} \right) Z_{t-1}}$$

$$\frac{\Delta Y_t}{Y_{t-1}} = C_{x,t} + C_{z,t}$$

Shortcuts

- Formulatic $G_t = \beta_x \frac{X_t}{X_{t-1}} + \beta_z \frac{Z_t}{Z_{t-1}}$
 - Lagged nominal share (Laspayres)
 - 2-period average of nominal share (Tornqvist)
- Programmatic: *EViews* subroutine
 - Enter, X, Z, reference year, Y\$
 - Returns aggregate quantity, price & contributions
 - Generalized to n variable case

Changing Our Understanding of “Sustainable”

$$Y_t = C_t + I_t$$

$$\frac{\Delta Y_t}{Y_{t-1}} = \left(\frac{C}{Y} \right)_{t-1} \frac{\Delta C_t}{C_{t-1}} + \left(\frac{I}{Y} \right)_{t-1} \frac{\Delta I_t}{I_{t-1}}$$

Real Shares

$$\frac{\Delta I_t}{I_{t-1}} - \frac{\Delta Y_t}{Y_{t-1}} = - \left(\frac{\Delta P_{I,t}}{P_{I,t-1}} - \frac{\Delta P_{Y,t}}{P_{Y,t-1}} \right)$$

Changing Our Understanding of “Sustainable”

$$\cancel{Y_t = C_t + I_t}$$

$$\frac{\Delta Y_t}{Y_{t-1}} = \left(\frac{C\$}{Y\$} \right)_{t-1} \frac{\Delta C_t}{C_{t-1}} + \left(\frac{I\$}{Y\$} \right)_{t-1} \frac{\Delta I_t}{I_{t-1}}$$

Nominal Shares

$$\left(\frac{\Delta I_t}{I_{t-1}} - \frac{\Delta Y_t}{Y_{t-1}} \right) + \left(\frac{\Delta P_{I,t}}{P_{I,t-1}} - \frac{\Delta P_{Y,t}}{P_{Y,t-1}} \right) = 0$$