Understanding the Evolution of World Business Cycles

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Globalization: Increasing Trade Links and more integrated Financial Markets

Has globalization changed the nature of World Business Cycles?

"... the spillover from America's downturn to the rest of the world has been more powerful than in the past. As the world economy has become more integrated, a downturn in one economy spreads faster to another.."
(The Economist, August 25, 2001)

"Mr. Rubin (former Treasury Secretary Robert Rubin) of Citigroup agrees that economic interdependence might have greased the spread of the American downturn…"
(NY Times, August 20, 2001).

Evidence of Globalization

- ## Financial Linkages
  - US holding of foreign stocks has grown from 24.1% to 45% since 1985 (Heathcote and Perri, 2001)

- ## Trade Linkages
  - changes in the volume of merchandise trade
  - changes in world GDP
  - changes in tariff rates
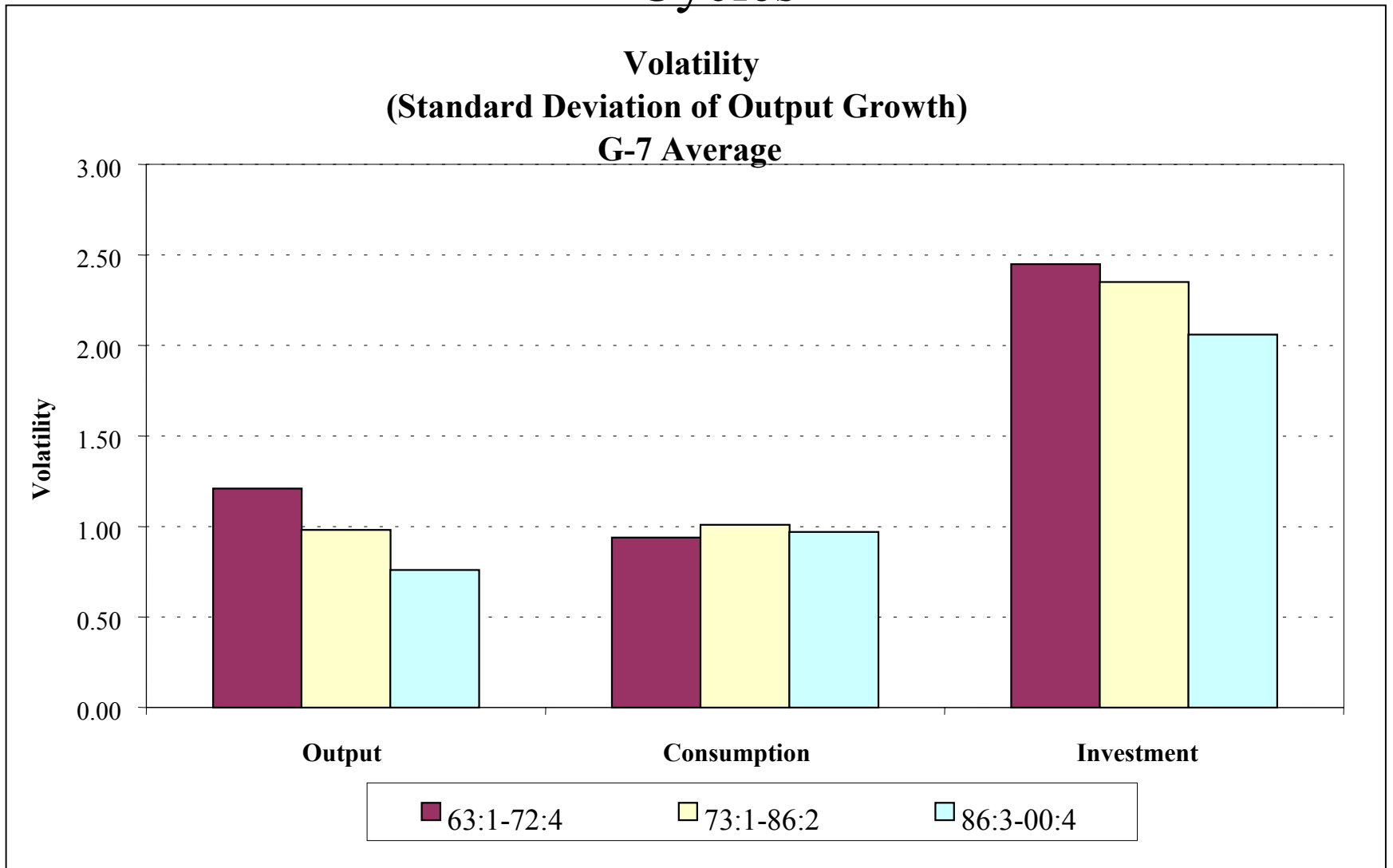 - changes in the number of regional trade agreements

Table 1
Growth of World Trade
(1960-2000)

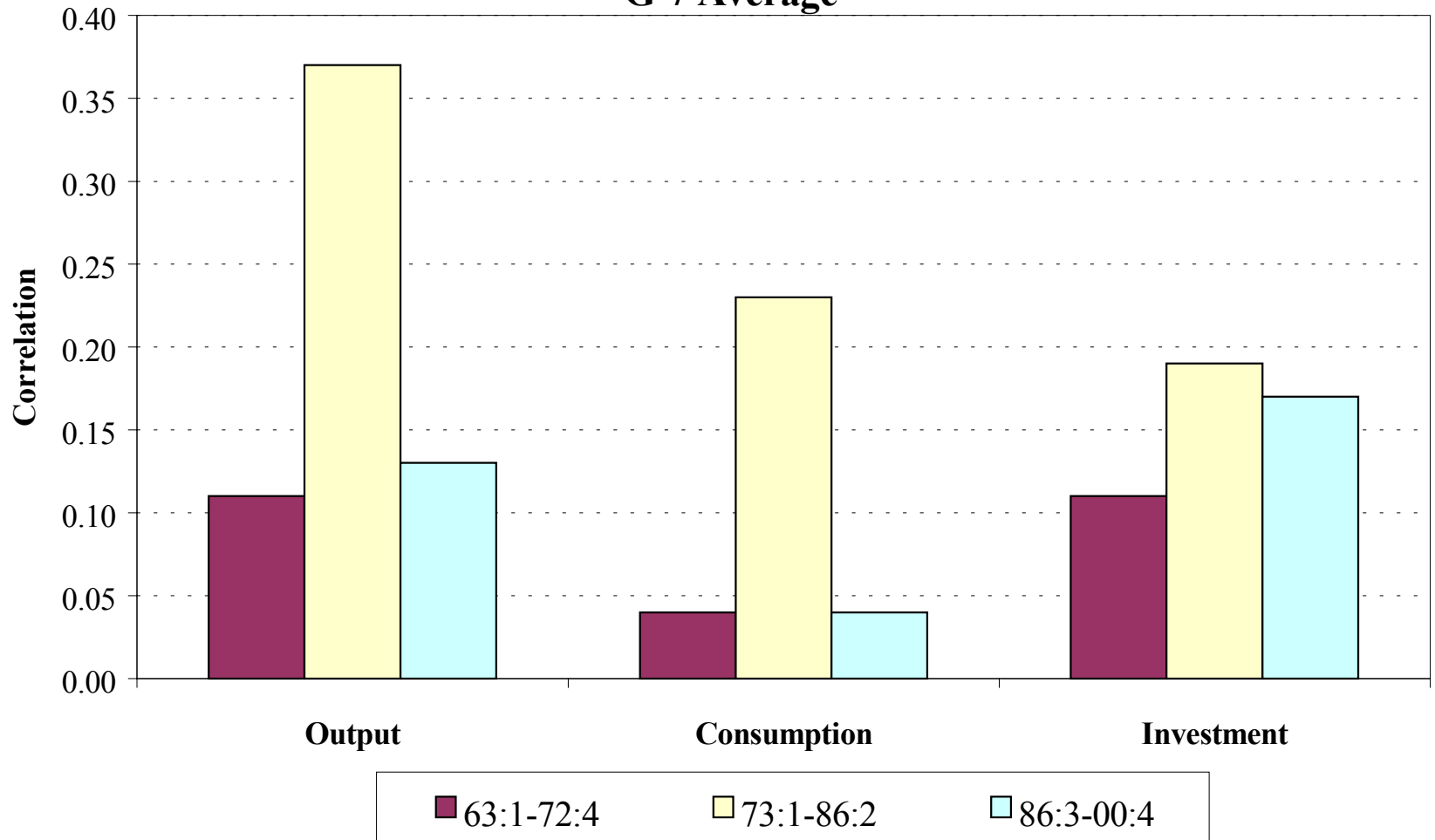|	1960	1970	1980	1990	2000
World Real GDP	30	50	73	100	125
World Export Volume	18	41	68	100	196
Average Tariff Rate on Manufactured Goods	14%	11%	6.9%	5%	3%
Number of Regional Trade Agreements Notified to the GATT/WTO	3	7	23	32	150

Why Do We Need to Understand Changes in World Business Cycles?

- If there are changes in world and national business cycle theoretical models of business cycles should be able to explain these changes

- The changes can be used to improve existing business cycle models (moments and shocks)

- These changes might have important policy implications (i.e. policy coordination issues)

Empirical Evidence on the Changing Nature of Business Cycles

Volatility
(Standard Deviation of Output Growth)
G-7 Average

Comovement
(Cross-Country Output Correlations)
G-7 Average

Legend: 63:1-72:4, 73:1-86:2, 86:3-00:4

Categories: Output, Consumption, Investment

Y-axis: Correlation (0.00 to 0.40)

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- Some additional facts

  - Average output volatility has gone down.

  - Average investment volatility has gone down.

  - Average consumption volatility has not changed much.

  - Cross-country output, consumption, and investment correlations were lower in the third period than that in the second period.

  - We observe only marginal increases in average correlations moving from the first period to the third period.

Our Contribution: To understand the evolution of world business cycles over time by estimating common dynamic components in main macroeconomic aggregates

– Are there changes in the characteristics of world business cycles over time?

– Has globalization changed the nature of world business cycles?

– How do changes in the world business cycles affect different macroeconomic aggregates?

– What are the sources for these changes?

Methodology: A Dynamic Factor Model

- Unobservable Index Model
  - Index of Common Economic Activity
  - A few 'factors' drive many time series (Sargent and Sims 1977)

- Generalization of 'Variance-Components' Model
  - Components account for spectral density matrix of observable variables, not just the contemporaneous covariance matrix

Single Factor Model

- n observable variables, denoted y_i, i = 1,...,n,

- a single common factor, y_0, accounts for all comovement among the n variables.

$$y_{it} = a_i + b_i y_{0t} + \varepsilon_{it} \qquad E\varepsilon_{it}\varepsilon_{jt-s} = 0 \text{ for } i \neq j.$$

- The idiosyncratic errors $\varepsilon_{it,}$ are modeled as p_i-order autoregressions:

$$\varepsilon_{i,t} = \phi_{i,1}\varepsilon_{i,t-1} + \phi_{i,2}\varepsilon_{i,t-2} + \ldots + \phi_{i,p_i}\varepsilon_{i,t-p_i} + u_{i,t}$$

$$Eu_{it}u_{jt-s} = \sigma_i^2 \text{ for } i = j, \ s=0, \ 0 \text{ otherwise.}$$
$$u_{it} \sim N(0, \sigma_i^2).$$

$$O_t^{US} = b_{US,O}^{world} f_t^{world} + b_{US,O}^{Country} f_t^{US} + \varepsilon_{US,O,t}$$

$$C_t^{US} = b_{US,C}^{world} f_t^{world} + b_{US,C}^{Country} f_t^{US} + \varepsilon_{US,C,t}$$

$$I_t^{US} = b_{US,I}^{world} f_t^{world} + b_{US,I}^{Country} f_t^{US} + \varepsilon_{US,I,t}$$

$$\vdots$$

$$O_t^{Japan} = b_{Japan,O}^{world} f_t^{world} + b_{Japan,O}^{Country} f_t^{Can} + \varepsilon_{Japan,O,t}$$

$$C_t^{Japan} = b_{Japan,C}^{world} f_t^{world} + b_{Japan,C}^{Country} f_t^{Can} + \varepsilon_{Japan,C,t}$$

$$I_t^{Japan} = b_{Japan,I}^{world} f_t^{world} + b_{Japan,I}^{Country} f_t^{Can} + \varepsilon_{Japan,I,t}$$

Contributions

- **Systematic examination of the three different time periods**
  - 1960s: Bretton Woods period
  - 1970s-mid 1980's: Common Shock Period
  - Mid 1980's on- Globalization Period

- **Multiple factors: World and Country Specific Factors (understanding global and national business cycles)**

- **The impact of globalization on different macroeconomic variables (Output, Consumption , and Investment)**

- **Establishing a link between the changes in world business cycles and changes in exogenous variables that are thought to be the source of economic fluctuations**
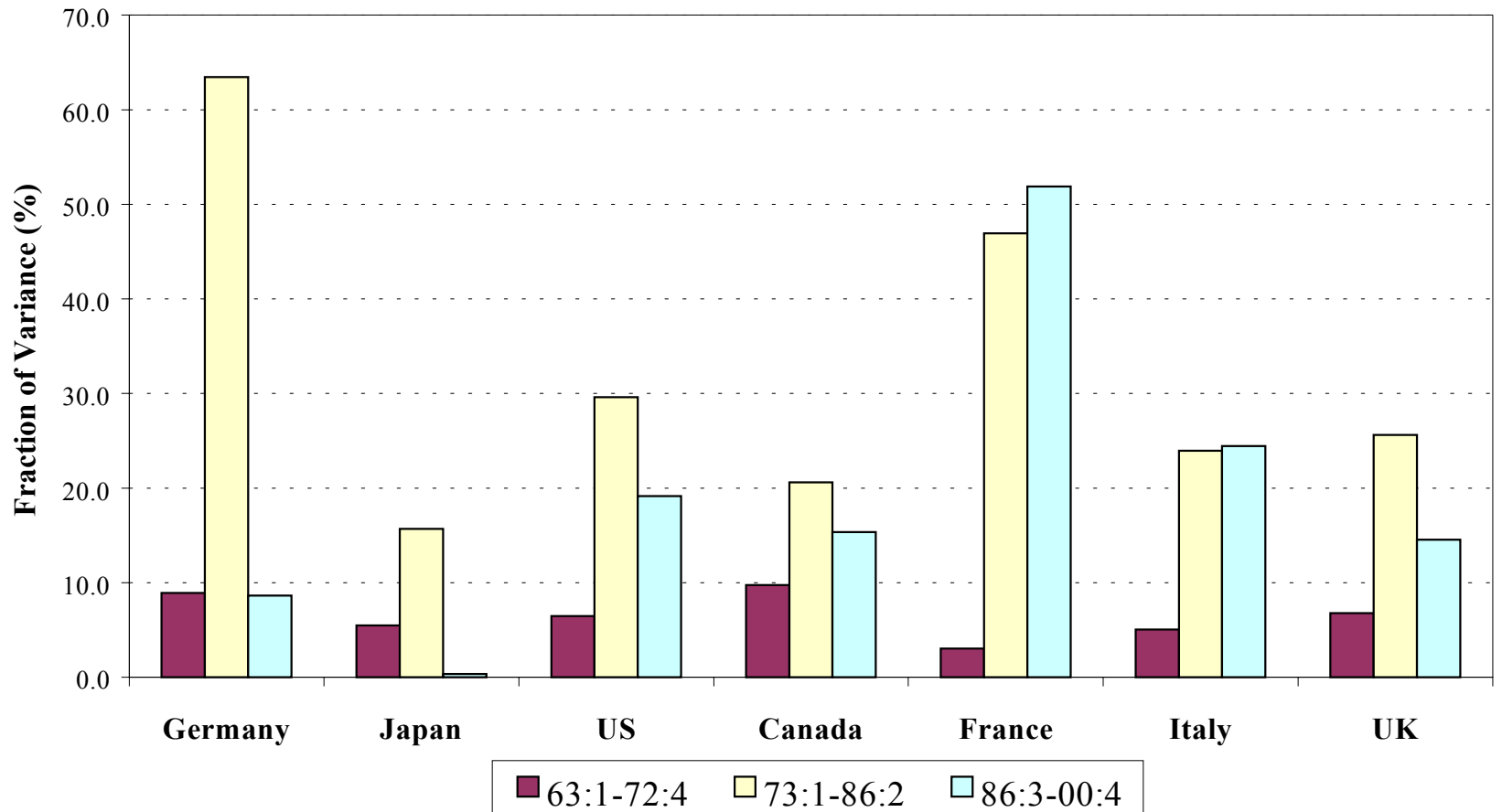
Preliminary Results

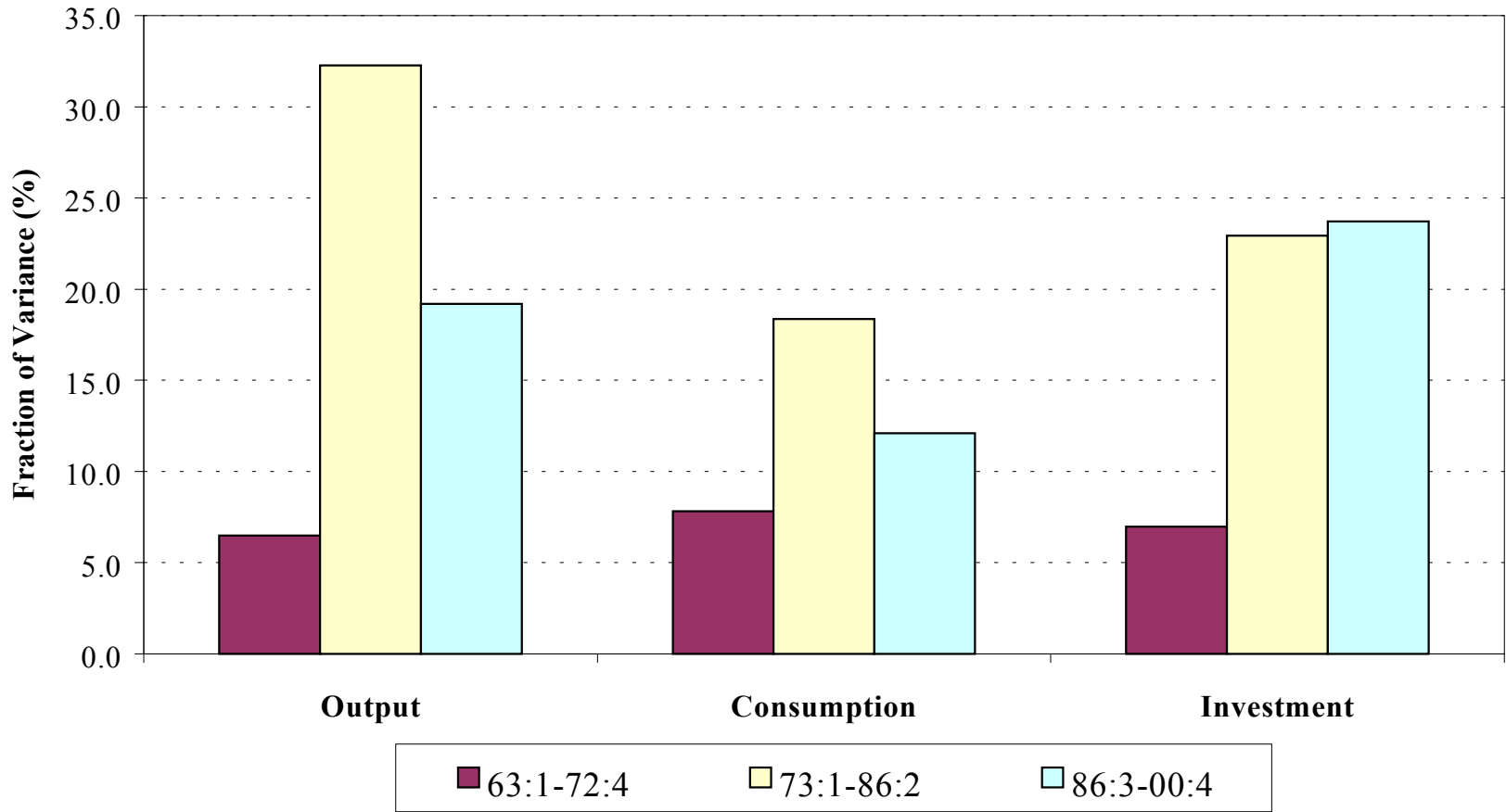**World Factor (Y, C, I)**
(73:1-00:4)
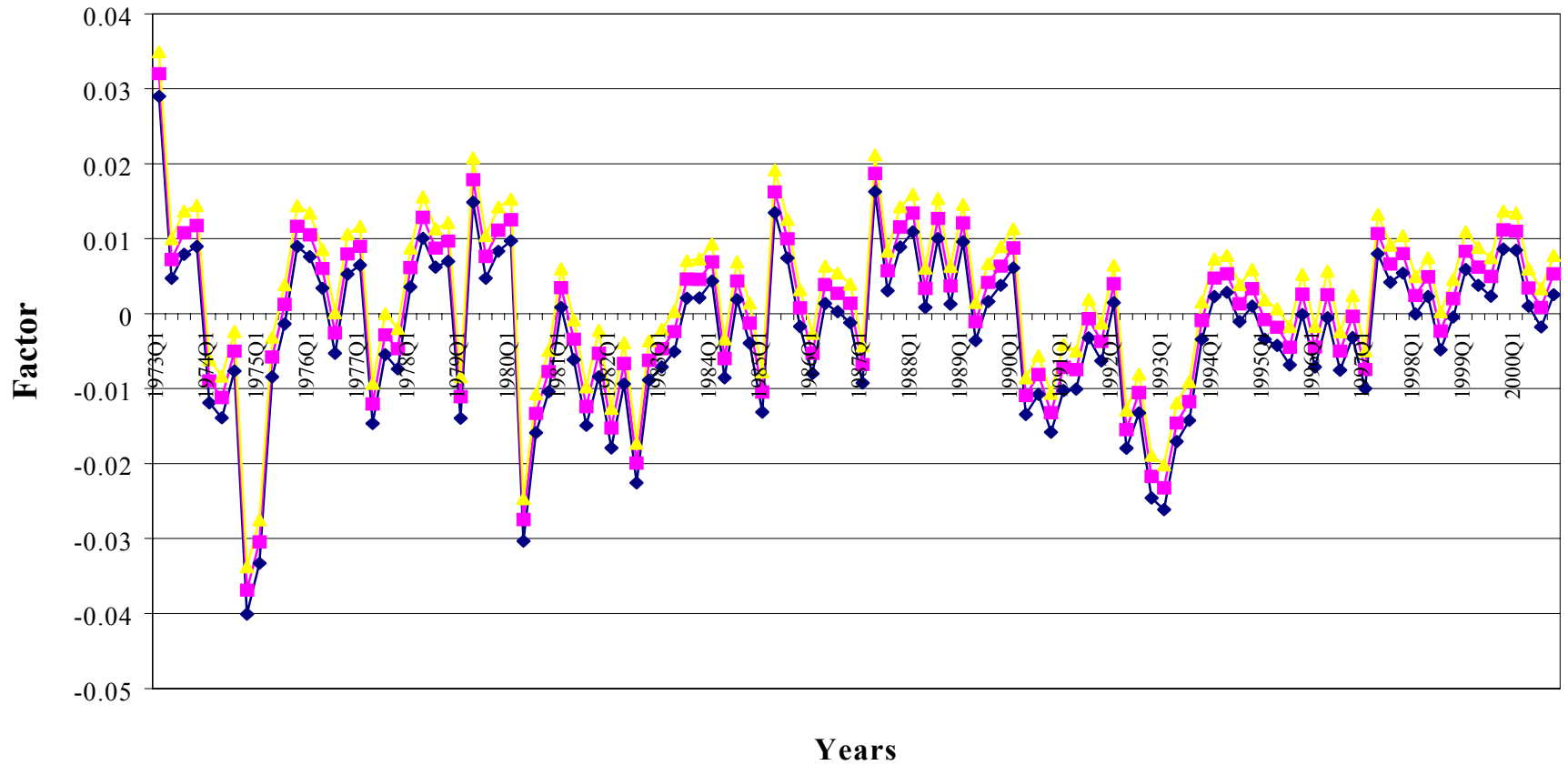
Preliminary Results

**Variance of Output Explained
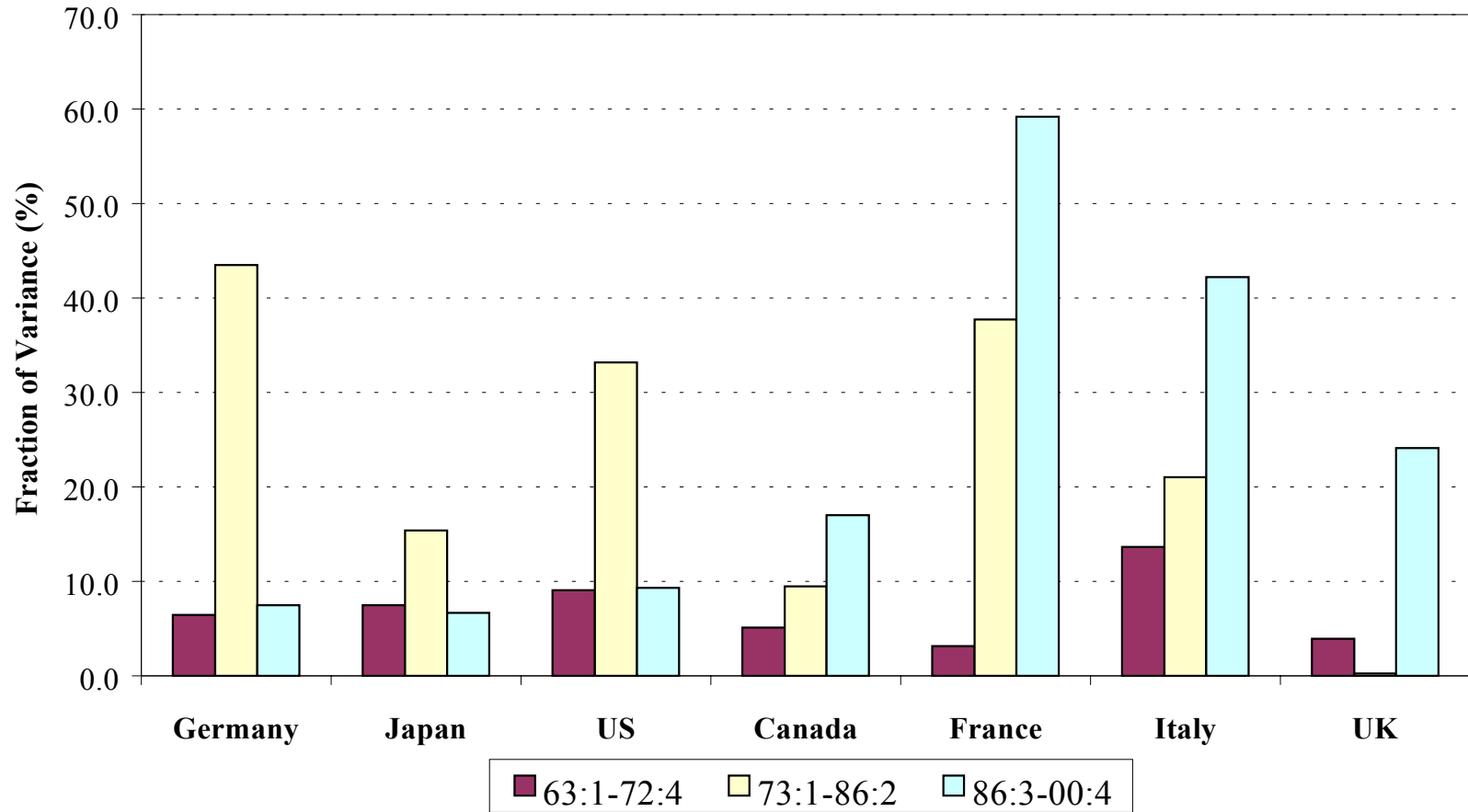by the World Factor (%)**

Preliminary Results

**Average Variance
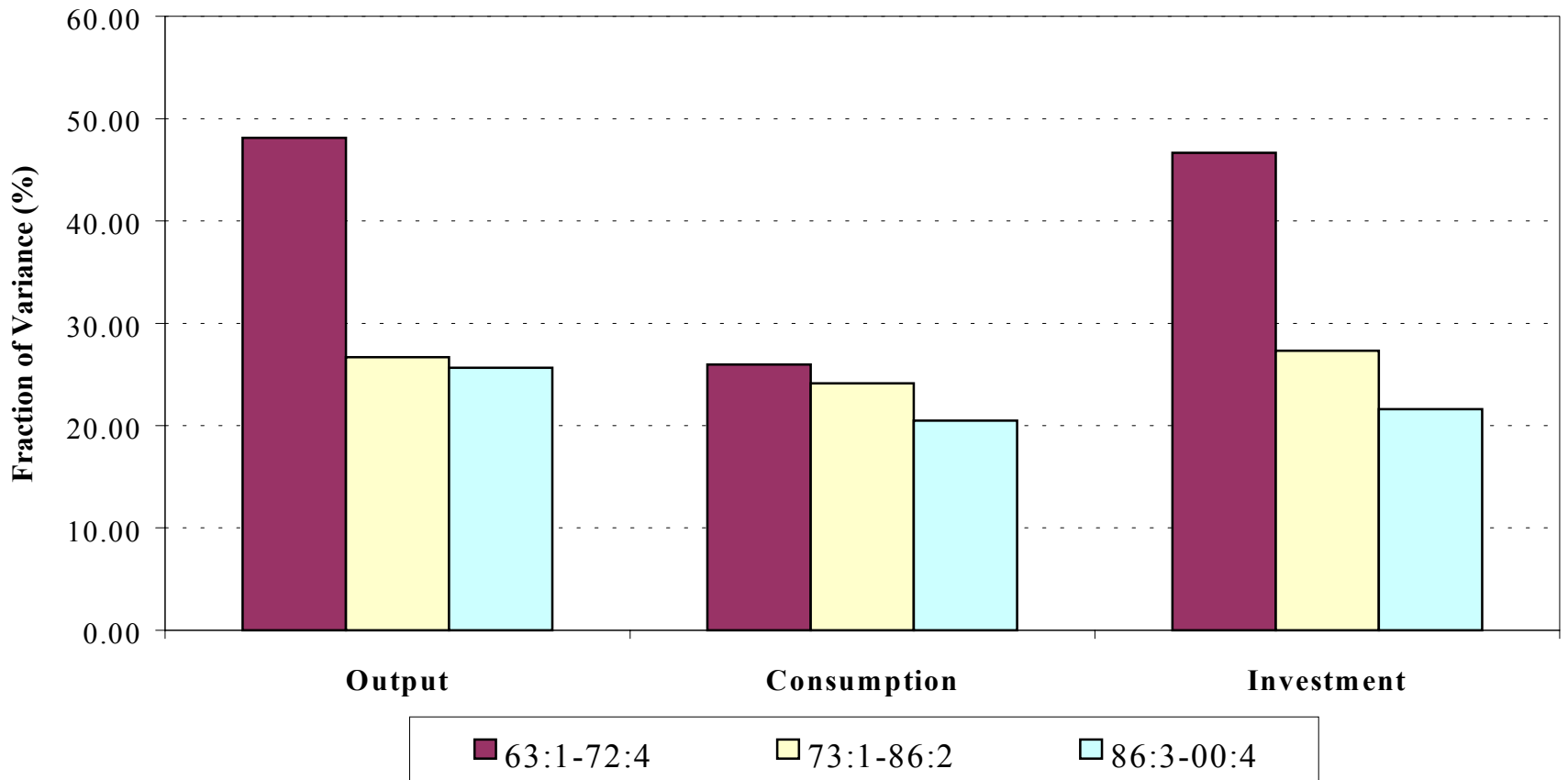Explained by the World Factor (%)**

Preliminary Results

Variance of Investment Explained by the World Factor (%)

Preliminary Results

**Average Variance
Explained by the Country Factor (%)**

Additional Issues

- Complete the data series and re-estimate the models with the complete series (extension to a set of industrialized OECD countries)

- Identify the sources of these changes. Prime candidates include changes in monetary or fiscal policy, changes in the productivity shocks, oil prices and the term-of-trade.

- Compare the early globalization period (late 19th century) with the late globalization period (late 20th century). We have annual data Y, C, I, M, G covering these periods.