"The Roles of Comovement and Inventory Investment in the Reduction of Output Volatility"

by Owen Irvine and Scott Schuh

Discussion by

Valerie A. Ramey

Summary of Variance Decompositions of Output (Table 3)

	Early	Late
Var(y)	5.12	0.92
ΣVar(y_j)	1.01	0.26
2 Σcov(y_j,y_k)	4.11	0.66

Since ↓ covariance terms accounts for 82% of ↓ Var(y), Irvine-Schuh conclude there has been a “Great Uncoupling”

Not necessarily …

Consider the following simple counter-example:

$$y_{1t} = \alpha \cdot \mu_t + \varepsilon_{1t}$$ μ, ε_1, and ε_2 i.i.d, mutually uncorrelated.

$$y_{2t} = \beta \cdot \mu_t + \varepsilon_{2t}$$ The variances are $\sigma_\mu^2, \sigma_1^2, \sigma_2^2$

$$y_t = y_{1t} + y_{2t}$$

$$Var(y) = \underbrace{(\alpha^2 + \beta^2)\sigma_\mu^2 + \sigma_1^2 + \sigma_2^2}_{\text{variance terms}} + \underbrace{2\alpha\beta\sigma_\mu^2}_{\text{covariance}}$$

Assume initially the covariance term accounts for 80% of Var(y).

Suppose by "Good Luck," the variance of all shocks falls 50%. We would not think of this as an uncoupling of sectors.

Yet the Irvine-Schuh analysis would attribute 80% of the decline in Var(y) to the covariance terms.

Thus, let's look at the Table 3 numbers a different way:

% of Var(y) accounted for by:	Early	Late
$\Sigma Var(y_j)$	20	28
$2\ \Sigma cov(y_j, y_k)$	80	72

Thus, I don't interpret the numbers as supporting a "Great Uncoupling." If anything, these numbers suggest a slightly diminished importance of the covariance terms.

The following plot of correlations between sales growth among 2-digit manufacturing industries does not indicate uncoupling.

HAVAR Methodology

- Allows feedbacks between macro variables and 2 or 3 sectors: manufacturing, retail trade, and wholesale trade.

- Identification comes from assumptions on the contemporaneous matrix as well as some assumptions about timing

Question:

How is the present implementation of HAVAR different from a structural VAR allowing feedbacks between sectors and aggregates?

HAVAR Results Summary

- Counterfactual simulations: when late period parameters are substituted into early period model, results suggest that up to 73% of Great Moderation can be explained by structural change.
- Changes in contemporaneous relationships among output, inventory and sales account for up to 58% of variance decline.
- No evidence of a decline in sales persistence once lags of other variables, such as the fed funds rate, are included.
- Conclude that changes in inventory management must be at play

Not necessarily …

One should not be too quick to leap from these reduced form empirical results to conclusions about the source of the decline in volatility.

We really need a theory to interpret the data.

Consider the following counterexample:

Early papers in the Great Moderation literature had argued that since the variance of production had fallen more than the variance of sales and the covariance of inventory investment and sales had switched from positive to negative, improved inventory management must be at play.

Ramey-Vine (AER 2006) show in a rational expectations model that a simple decline in the persistence of sales shocks can account for all of the following observed changes in the auto industry:

- ↓ Variance(Production) > ↓ Variance(Sales)
- ↓ Covariance [Δ Inventories, Sales]
- ↑ use of low adjustment cost margins (hours per worker) and ↓ use of high adjustment cost margins (the number of workers)

Why Irvine-Schuh Test Does not Rule out Persistence Changes

1. They show that changes in contemporaneous relationships matter most.

   Does this rule out persistence changes as the source?

   No

Consider the Ramey-Vine (2006) Model Special Case #1:

A cost minimizing firm schedules production to minimize the its discounted cost given by:

Ramey-Vine (2006) Model: Special Case # 1

$$C_t = \gamma_2 Y_t^2 + \alpha_1 (I_{t-1} - \alpha_2 S_t)^2 \qquad\qquad S_t = \rho S_{t-1} + \varepsilon_t$$

Optimal decision rule:

$$(7) \qquad Y_t = -(1-\lambda) I_{t-1} + \phi S_t,$$

$$\text{where } \lambda = \frac{1}{2}\left\{\frac{1}{\beta} + 1 + \frac{\alpha_1}{\gamma_2} - \sqrt{\left[\frac{1}{\beta} + 1 + \frac{\alpha_1}{\gamma_2}\right]^2 - \frac{4}{\beta}}\right\}$$

$$\text{and} \qquad \phi = \frac{1 - \lambda + \beta\lambda\rho \dfrac{\alpha_1 \alpha_2}{\gamma_2}}{1 - \beta\lambda\rho}.$$

Now suppose monetary policy is the source of the persistence in sales shocks.

Then including the monetary policy variables in the sales equation would capture the persistence that was evident in the univariate sales equation.

This fact explains Irvine-Schuh’s failure to find a persistence change, once they include macro variables such as the federal funds rate.

In fact, Ramey-Vine (2004, NBER working paper) use this same argument to show that monetary policy is a prime suspect in the decline in persistence of automobile sales.

But what of the lack of evidence for a persistence change in the aggregate (Blanchard-Simon (2001)?

Ramey-Vine (NBER WP 2004) show that even in the auto industry, ↓ persistence can only be detected in physical unit data because the trends in the increase in the real value per unit in BEA chain-weighted data swamps the changes in the physical unit data.

Change in AR(1) parameter for cars from 1967-83 versus 1984-03

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	Change in AR(1) parameter
Physical unit data, monthly	-0.315 (0.115)
Quarterly, chain-weighted data	-0.077 (0.120)

Herrera, Murtazashvili, and Pesavento (2007) provide evidence that changes in persistence are important even outside the automobile industry.

They consider the simple model:

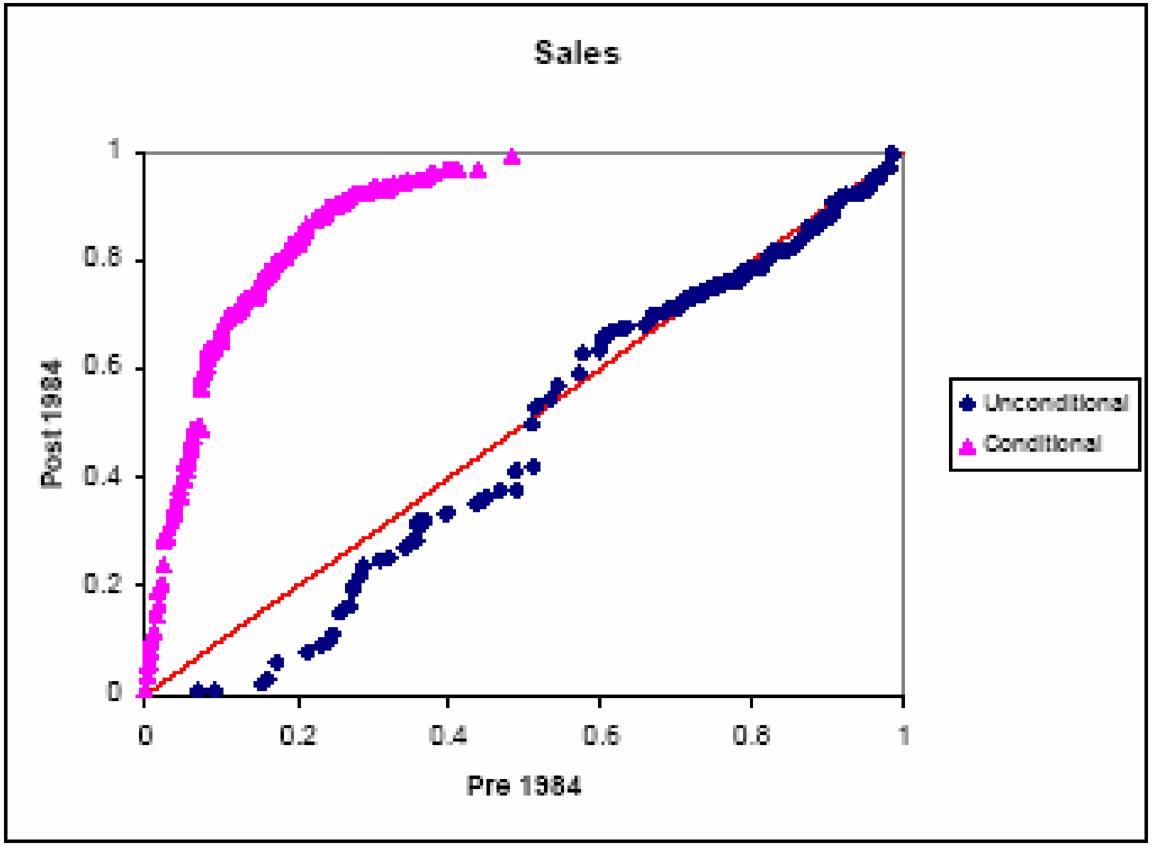
$y_{1t} = \rho_1\, y_{1t-1} + \varepsilon_{it}$ $\qquad$ $y_{2t} = \rho_2\, y_{2t-1} + \varepsilon_{2t}$

ε's are white noise with covariance σ_{12}

Then, $Cov(y_{1t}, y_{2t}) = \sigma_{12}/(1-\rho_1\, \rho_2)$

$\downarrow \rho \rightarrow \downarrow$ Cov

Herrera, Murtazashvili, and Pesavento (2007) show that conditional correlations of growth rates have increased among 2-digit manufacturing industries.



What about Net Imports?

Output + net imports = inventory investment + sales

Percent of goods output

	1967	1983	2006
Exports	8.6%	20.3	35.9
Imports	7.4	20.0	45.9
Net imports	-1.2	-0.3	10.0

Conclusions

- Irvine and Schuh have undertaken an ambitious project to provide a fascinating set of reduced form empirical results.

- Interpreting the results, however, can be very complicated.

- The results don't point to improved inventory management because there are equally compelling competing explanations.

- We really need more theory to guide us.