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What Has Changed in the U.S. Business Cycle?: A Counterfactual Analysis Based on a Structural VAR

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Abstracts

The U.S. economy encountered a new period of volatility reduction since the mid-1980s. The reduced volatility in the U.S. business cycle has been explained in two ways: the change in the structure of the U.S. economy (propagation mechanism) and the volatility reduction of exogenous disturbances (good luck). Based on a structural VAR, we get two findings. First, while the changes in the propagation mechanism played a major role for inflation stabilization, output stabilization is mainly explained by the reduced shock variances. Second, although the reduced AS shock variance seems to be the most important factor of output stabilization, we should not undervalue the role of reduced AD shock variances, especially IS shock variance.

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Ⅰ. Introduction

The U.S. economy encountered a new period of volatility

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reduction since the middle of the 1980's. The reduced volatility in the U.S. business cycle has been explained in various ways in the literature. These explanations fall into two categories. The first category is a change in the structure of the economy (propagation mechanism). To some, the change in the propagation mechanism has resulted from systematic differences in monetary policy between the two periods. Taylor (1999) and Clarida, Gali and Gertler (2000), for example, support the importance of the propagation mechanism change by showing the improved monetary policy during the Volcker-Greenspan era. The second category is "good luck" which is represented by smaller unpredictable exogenous shocks. Simon's (2001) finding supports the good luck hypothesis strongly, in which a three-variable structural VAR approach is employed. The "good luck" literature focuses on aggregate supply shocks, such as energy prices and productivity shocks.[1]

In this paper, we document the nature of the dramatic structural break in the cyclical volatility of real economic activity, especially inflation and real GDP growth. For this purpose, we employ a version of a 4-variable structural VAR model considered by Gali (1992), which identifies four major structural shocks: money demand shocks, money supply shocks, IS shocks, and aggregate supply shocks. Based on the structural VAR, we ask the following two questions: i) How important is the change in the propagation mechanism in explaining the volatility reduction for inflation and real GDP growth? ii) What's the role of each of the four identified structural shocks in explaining the volatility reduction for the two series? We seek answers to these questions by computing counterfactual unconditional variances of inflation and real GDP growth, using the estimates of the structural parameters for the

1) see, e.g., Mankiw (2001) and Gali (1999).

pre-stabilization and stabilization periods.

The outline of the paper is as follows. Section 2 presents the structural VAR model and the estimation results comparing the stabilization period to the pre-stabilization one. Section 3 explains counterfactual analyses methodology. Section 4 discusses the major findings of the paper based on the empirical results of the counterfactual analyses. Section 5 concludes.

Ⅱ. Comparison of Pre-1979 and Post-1984 periods: A Structural VAR Approach

1. A 4-Variable Structural VAR Model

We employ a version of a 4-variable structural VAR model considered by Gali (1992), in which the IS-LM model is augmented with a Phillips curve. With the implementation of real GDP growth, inflation, interest rates, and real money balance in the model, four major structural shocks are identified: money demand shocks, money supply shocks, IS shocks, and aggregate supply shocks.

Model : VAR(p)

$$BX_t = \Gamma_0 + \Gamma_1 X_{t-1} + \Gamma_2 X_{t-2} + \cdots + \Gamma_p X_{t-p} + E_t, \quad (1)$$

$$X_t = [\Delta y\ \Delta i\ \Delta p\ \Delta m - \Delta p]', \quad (2)$$

$$E_t = [e^{AS}\ e^{IS}\ e^{M^s}\ e^{M^d}]', \quad (3)$$

$$E_t \sim (0, I_4), \quad (4)$$

where $[\Delta y\ \Delta i\ \Delta p\ \Delta m - \Delta p]$ denotes output growth, the difference of nominal interest rate, the inflation rate, and the real money growth, respectively, and $[e^{AS}\ e^{IS}\ e^{M^s}\ e^{M^d}]$ denotes aggregate supply, IS, money supply and money demand shocks respectively after decomposing reduced-form disturbances with six theoretical restrictions. The equations (1) through (4) are presented under the normalization in shock variances.

Identifying Restrictions[2)]

We rely on the restrictions in Gali (1992) to identify the four structural shocks. The six restrictions for identifying a 4-variable VAR system are as follows. The first set of restrictions is imposed to sort out the supply shock from three aggregate demand disturbances, (M^s, M^d, IS shocks), by constraining the latter not to have a long-run effect on output. This long-run restriction is originally used as an identifying restriction in Blanchard and Quah (1989). The second set is assumed to distinguish IS shocks from the two monetary disturbances, by constraining the latter not to have contemporaneous effects on output. The last identifying restriction is imposed to disentangle the two types of monetary shocks: money supply and money demand. It is that the demand for real money balances is not affected by contemporaneous changes in prices, given the nominal rate and output- a homogeneity restriction.

2. Estimation of the Model

Data Descriptions[3)]

We use the following four time series that characterize the U.S. economy: real GDP, interest rates, prices, and money:

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2) See Gali (1992) for details.
3) See Gali (1992) for details.

y : log of real GDP, at Chained 1996 prices

i : yield on three-month Treasury bills

p : log of the GDP Chain-type Price Index

m : log of M1

The original data set runs from 1959:Q1 to 2001:Q3. We use seasonally adjusted and annualized quarterly data for all variables. Data for i and m correspond to the first month of the quarter. All data are obtained from the Federal Reserve Bank of St. Louis (FRED, an Economic Time-Series Database). In this paper, the specification $X_t = [\Delta y \ \Delta i \ \Delta p \ \Delta m - \Delta p]'$ is used for stationary series as explained in section 2.1.[4)]

Estimation

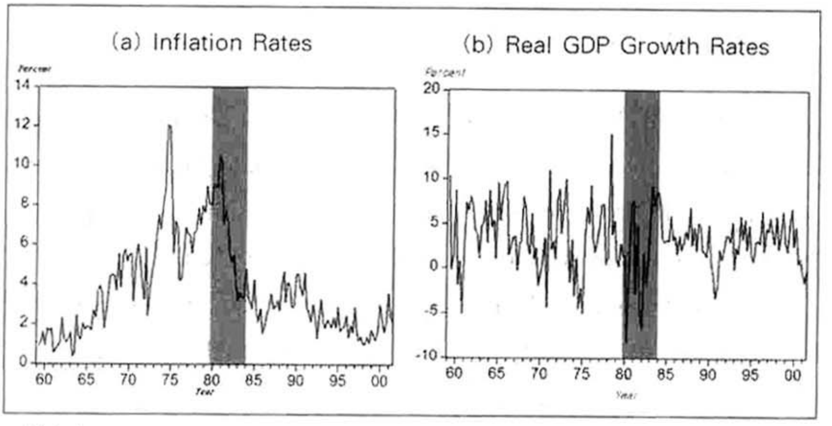
We consider two sub-samples: the first sample corresponds to 1960:Q2-1979:Q3 (Period I), the second one corresponds to 1984:Q1-2001:Q3 (Period II). The end-date of the first sample (1979:Q3) and the start-date of the second sample (1984:Q1) are obtained from the literature.[5)] Figure 1 plots inflation series and output growth over the sample period. We can see the volatility reduction in both series since the mid-1980s. In fact, the standard deviations of quarterly inflation and real GDP growth rates in the later period (1984-2001) are almost one third and one half of the corresponding standard deviations over the first sub-period (1960-1979)

4) The mean growth rates for output are 4.08 percent and 2.86 percent, at an annual rate, over 1959:Q1 through 1973:Q4, and 1974:Q1 through 2001:Q3, respectively. This break point is chosen to coincide with the first OPEC oil shock, the same with Blanchard and Quah (1989). In order to allow a change in the output growth mean, we simply get the sample deviation from its corresponding mean before estimating the VAR. Ignoring possible changes in mean, however, does not change the implication of this paper.

5) See, e.g., Boivin and Giannoni (2002), Stock and Watson (2002), Kim and Nelson (1999) and Watson (1999).

respectively as shown in Table 1.

【Figure 1】 Inflation Rates and Real GDP Growth Rates



Note:
1. Annualized quarterly data are presented.
2. Inflation rates in panel (a) are measured by GDP deflator.
3. The shaded area is the volatile period of 1979:4-1984:1 on interest rates, at which Fed chairman Paul Volcker announced a shift in monetary policy.
It is divided since it can be a different regime in U.S. economy from both the earlier and the later period (see Watson (1999)).

【Table 1】 Volatility of GDP Growth and Inflation Rates

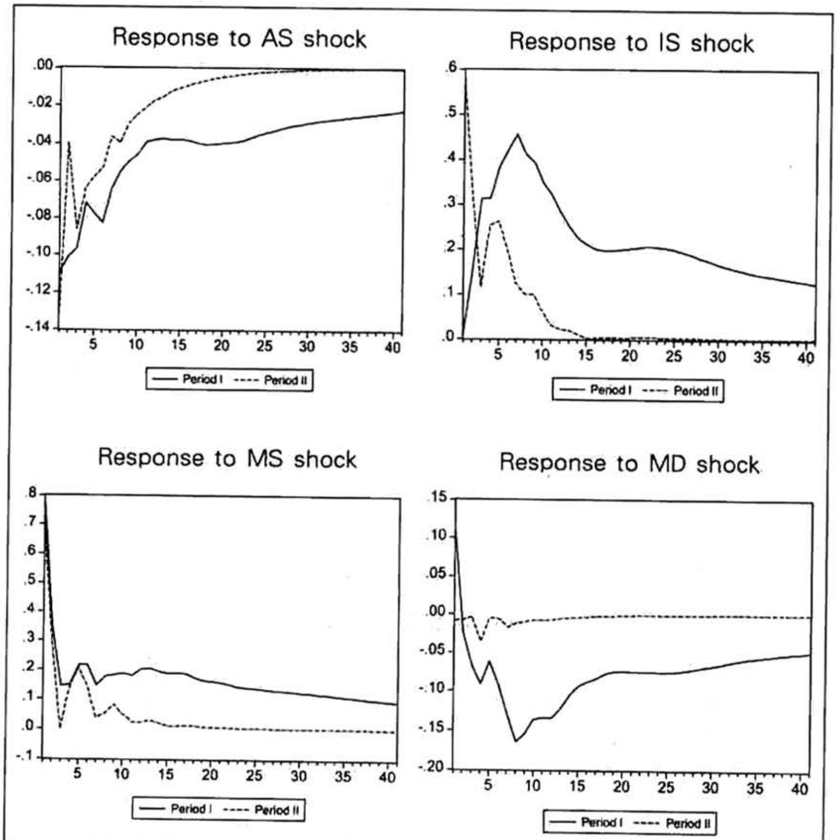
Standard Deviation		
Variable	1960:II-1979:III	1984:I-2001:III
Inflation Rate	2.73	0.98
GDP Growth Rate	4.02	2.25

Note: Annualized Rates are used.

A lag order of 4 is chosen for both samples based on Akaike Information Criterion. The empirical results in this paper are robust to higher-order VARs.

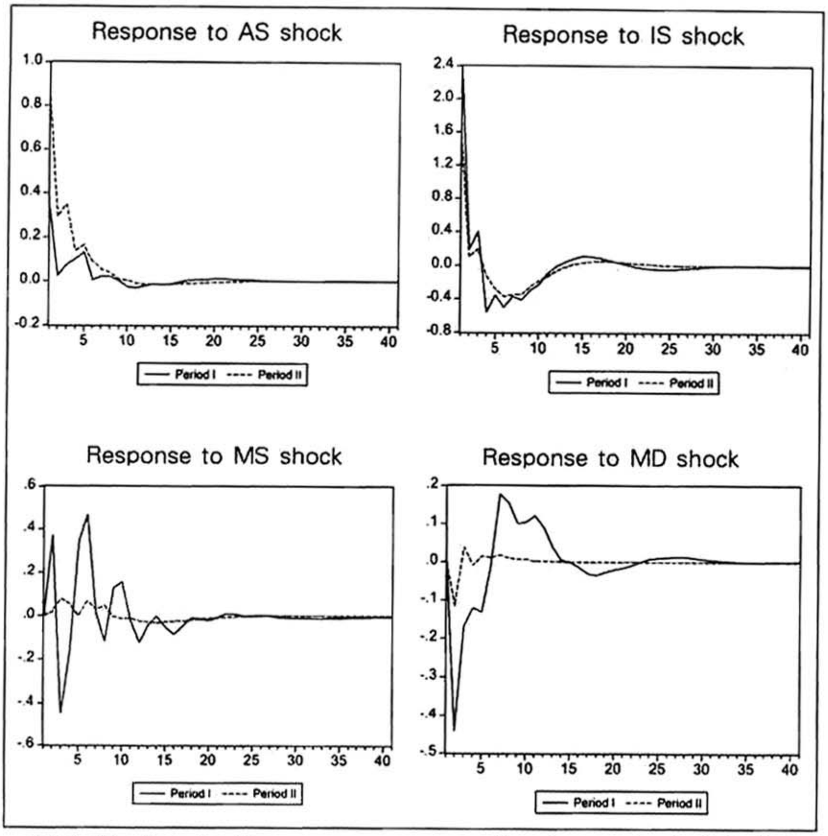
Figure 2 and 3 summarize the impulse responses of inflation and output growth to each structural shock at the selected horizons in our case, 40 horizons. Figure 2 seems evident that the responses of inflation to structural shocks have become much less persistent during Period II than Period I. The general impulse-response patterns for real output in Figure 3, however, seem very similar during the two sub-periods under consideration, even though the responses of real output to money demand shock or money supply shock have become much smaller in magnitude in Period II. In general, we observe the significant change in the persistence in the inflation series while the responses of real output to each structural shock show little change in the persistence.

[Figure 2] Dynamic Response of Inflation to each Structural Shock



Note: The Impulse Responses are corresponding to one-standard deviation structural shocks.

[Figure 3] Dynamic Response of Output Growth to each Structural Shock



Note: The Impulse Responses are corresponding to one-standard deviation structural shocks.

[Table 2] Change in Structural Shock Variances

Standard Deviation		
Structural Shocks	**Period I**	**Period II**
AS Shock	5.50	2.01
IS Shock	1.08	0.51
MS Shock	1.07	0.74
MD Shock	2.37	3.15

Note:

1. Period I is from 1960:Q2 to 1979:Q3; and Period II is from 1984:Q1 to 2001:Q3 as explained in section 2.
2. AS, IS, MS, and MD shock refer to Aggregate Supply, IS, Monetary Supply, and Monetary Demand shock respectively.

Table 2 shows the estimated variances of four different structural shocks (AS, IS, M^s, M^d), during the two sub-periods. The variances in Period II are much smaller than those in Period I with the exception of money demand shock variance. Interestingly, IS shock variance as well as AS shock variance in Period II reduce to less than one half of them over Period I.

The preliminary data analysis, based on the structural VAR model, seems evident that both the change in propagation mechanism and the reduced shock variances can be the source of inflation stabilization while the change in propagation mechanism cannot be the source of output stabilization. Another conjecture we get from the structural VAR analysis is that the aggregate demand shocks (IS, M^s) can also be the source of changes in the economy as the AS shock, which "good luck" literature focuses on.[6)]

Given the possible explanations of economy stabilization described above, we employ counterfactual analyses to investigate the following two questions: i) How important is the change in the propagation mechanism in explaining the volatility reduction in inflation and real GDP growth? ii) What's the role of four structural shocks in explaining the volatility reduction for the two series?

Ⅲ. Design of the Counterfactual Analyses

The counterfactual analyses are performed by computing counterfactual unconditional variances of inflation and real GDP growth. We adopt the analyses from Boivin and Giannoni (2002) and Stock and Watson (2002). One significant improvement in this

6) See, e.g., Mankiw (2001) and Gali (1999).

paper is that the analyses are performed in the context of a structural VAR while existing literature employs the reduced-form VARs.[7)]

Counterfactual Analysis I

The first counterfactual analysis is performed to quantify the relative contribution of changes in propagation mechanism and changes in shock variances for inflation and output stabilization.

Once the structural equations given by (1) through (4) are estimated, they can be converted to the following alternative structural equations:

$$\beta X_t = \Gamma_0^* + \Gamma_1^* X_{t-1} + \Gamma_2^* X_{t-2} + \Gamma_3^* X_{t-3} + \Gamma_4^* X_{t-4} + \epsilon_t, \quad (5)$$

$$X_t = [\Delta y \; \Delta i \; \Delta p \; \Delta m - \Delta p]', \quad (6)$$

$$\epsilon_t = [\epsilon^{AS} \; \epsilon^{IS} \; \epsilon^{M^s} \; \epsilon^{M^d}]', \quad (7)$$

$$\epsilon_t \sim (0, D), \quad (8)$$

where D is diagonal. Equations (5) through (8) are presented under the normalization in contemporaneous VAR variables. That is, the diagonal elements of β are 1's.

The reduced-forms for equations (5) through (8) can be represented as:

$$X_t = f(X_{t-1}, X_{t-2}, X_{t-3}, X_{t-4}; \theta) + U_t, \quad (9)$$

$$U_t \sim (0, \beta^{-1} D_j \beta_i^{-1'}), \quad (10)$$

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7) Stock and Watson (2002) perform the similar counterfactual analyses based on a 4-variable structural VAR as well as a reduced-form VAR. But they rely on a-*priori* knowledge of the three key parameters for which there is considerable disagreement (see Rudebusch (2002) and Stock and Watson (2002)).

where θ denotes a set of $\{\beta^{-1}\Gamma_0^*, \beta^{-1}\Gamma_1^*, \beta^{-1}\Gamma_2^*, \beta^{-1}\Gamma_3^*, \beta^{-1}\Gamma_4^*,\}$. Here, note that θ and β determine the propagation mechanism of the shocks and that the diagonal elements of D are the variances of the structural shocks. We define θ_I and D_I to be the corresponding parameters estimated for Period I (1960:Q2-1979:Q3) and θ_{II} and D_{II} to be the corresponding parameters estimated for Period II (1984:Q1-2001:Q3).

The counterfactual analysis is performed by computing the unconditional variance of the vector X_t based on the following counterfactual VAR model:

$$X_t = f(X_{t-1}, X_{t-2}, X_{t-3}, X_{t-4}; \theta_i) + U_t, \tag{11}$$

$$U_t \sim (0, \beta_i^{-1} D_j \beta_i^{-1'}), \tag{12}$$

where $i = I, II$ and $j = I, II$. The computed unconditional variance can be represented as a function of β_i, θ_i and D_j:

$$\Sigma_{i,j} = \Sigma(\beta_i, \theta_i, D_i) \tag{13}$$

where $i = I, II$ and $j = I, II$. The notations, $\Sigma_{I,I}$ and $\Sigma_{II,II}$, refer to the actual unconditional variances of X_t in Period I and Period II, respectively. Note that $\Sigma_{I,II}$ and $\Sigma_{II,I}$ are the counterfactual unconditional variances. For example, the notation $\Sigma_{I,II}$ refers to the hypothetical variance of X_t obtained with VAR coefficients in Period I $(\beta_I, \theta_I)$and shock variances in Period II (D_{II}).

Counterfactual Analysis II

The second counterfactual analysis is performed to identify which fundamental disturbances play an important role for output stabilization.

We have already defined D_j, $j = I, II$ as the estimated shock variances for Period j in the first counterfactual analysis. Similarly, we newly define $D_{j,k}$, $j = I, II$, $k = AS, IS, MS, MD$ where k means structural shocks in the alternative period of j. For example, the notation $D_{I.AS}$ refers to the mixed shock variances using all shocks except AS in Period I and AS shocks in the alternative period, Period II.

The counterfactual analysis is performed by computing the unconditional variance of the vector X_t based on the following counterfactual VAR model:

$$X_t = f(X_{t-1}, X_{t-2}, X_{t-3}, X_{t-4}; \theta_j) + U_t, \tag{14}$$

$$U_t \sim (0, \beta_j^{-1} D_{j,k} \beta_j^{-1'}), \tag{15}$$

where $j = I, II$ and $k = AS, IS, MS, MD$. The computed unconditional variance can be represented as a function of β_j, θ_j, and $D_{j,k}$:

$$\Sigma_{j,j,k} = \Sigma(\beta_j, \theta_j, D_{j,k}) \tag{16}$$

The notations, $\Sigma_{I,I,AS}$, $\Sigma_{II,II,AS}$, and so on, are the counterfactual unconditional variances. For example, the notation $\Sigma_{I,I,AS}$ refers to the hypothetical variance of X_t obtained with VAR coefficients in Period I (β_I, θ_I) and the mixed shock variances using all shocks except AS in Period I and the AS shocks in Period II $(D_{I.AS})$.

Ⅳ. Empirical Results Based on the Counterfactual Analyses

We consider two possible explanations for post Volcker era stabilization: the change in the structure of the economy (propagation mechanism) and the decreased shocks hitting the economy (good luck). The propagation mechanism is captured by VAR lag coefficients and the decreased exogenous shocks are represented by structural shock variances in the VAR model. Within the explanation based on shocks we focus on the four kinds of shocks that could affect the economy.

We deduce two major findings. The first finding is that the inflation stabilization results from the changed propagation mechanism while the output stabilization is mainly explained by the reduction in the structural shock variances. The second is the further finding for output. Besides aggregate supply shocks, IS shocks among the structural shocks also have an important role for output stabilization. This is a new evidence in the "good luck" literature. The two results are found through the counterfactual analysis on unconditional variance[8] in inflation and output growth variables.

1. Structure or Shocks? (A Result from Counterfactual Analysis I)

Table 3 presents the result of our counterfactual analysis I. Rows 1 and 2 of Table 3 show the unconditional variances of inflation rates using each period's own coefficients and shocks. Similarly, rows 5 and 6 of Table 3 show the unconditional variances of GDP growth rates using each period's own coefficients and shocks. The changes between different periods are fairly similar to the changes in the actual sample standard deviations of both variables as shown in Table 1.

One part of the first counterfactual analysis, shown in rows 3

8) The details of counterfactual analysis are explained in section 3.

and 4 of Table 3, examines what happens to the unconditional variance of inflation rates when we substitute the other period's structural shocks into the model for each period. When the Period I model is subjected to Period II's structural shocks, we get a little reduction in inflation volatility (the standard deviation falls from 3.21 to 2.38). The reduction due to change in shock variances is not enough to explain the actual Period II model's standard deviation of 0.86 (only 35 percent explanation). The rest of the reduction (about 65 percent) is explained by the propagation mechanism. Similarly when the Period II model is subjected to the Period I structural shocks, inflation volatility increased to 1.69, which is a 35 percent increase of the actual unconditional standard deviation over the Period I (3.21). The rest of the increased volatility of inflation from Period II to Period I (about 65 percent) can be explained by the propagation mechanism.

[Table 3] Explaining Stability I

(Counterfactual Unconditional Variances of U.S. Business Cycle Variables: Using coefficients and shocks from the different periods)

Variable	Coefficient	Shocks	Unconditional Standard Deviation
Inflation Rate	Period I	Period I	3.21
	Period II	Period II	0.86
	Period I	Period II	2.38
	Period II	Period I	1.69
GDP Growth Rate	Period I	Period I	3.95
	Period II	Period II	2.21
	Period I	Period II	2.54
	Period II	Period I	5.74

Note:
1. Period I is from 1960:Q2 to 1979:Q3: and Period II is from 1984:Q1 to 2001:Q3 as explained in section 2.2.
2. Annualized Quarterly Rates are used.

The other part of the first counterfactual analysis, shown in rows 7 and 8 of Table 3, examines what happens to the unconditional variance of GDP growth rate when we substitute the other period's structural shocks into the model for each period. When the Period I model is subjected to Period II's structural shocks, we get a reduction in output volatility (the standard deviation falls from 3.95 to 2.54). The reduction due to change in shock variances is enough to explain the actual Period II model's standard deviation of 2.21(more than 80 percent explanation). Similarly when the Period II model is subjected to the Period I structural shocks, output volatility increased to 5.74 and all the way to the actual unconditional standard deviation over the Period I (3.95).

Based on a reduced-form VAR, Boivin and Giannoni (2002) and Stock and Watson (2002) find the similar result with our first one, that the change in the propagation mechanism has an important role for inflation stabilization while not for output stabilization, although the role of propagation mechanism for inflation stabilization is undervalued.

2. Aggregate Supply, Money Supply, Money Demand, or IS shocks? (A Result from Counterfactual Analysis II)

Given the importance of structural shocks in accounting for output stabilization, we identify what is the role of the four identified structural shocks for output stabilization based on the second counterfactual analysis explained in section 3.

The result of switching only one particular shock from the alternative period is shown in Table 4. When only the IS shock variance is switched in computing counterfactual unconditional variance for Period I (the row 2), the computed unconditional variance of output becomes much smaller than the actual unconditional variance of Period I, as when only the supply shock variance is switched (the row 3). In the other way, when only the IS shock variance is switched in computing counterfactual unconditional variance for Period II (the row 7), the computed unconditional variance of output becomes much larger than the actual unconditional variance of Period II, as when only the supply shock variance is switched (the row 8).

[Table 4] Explaining Stability II

(Counterfactual Unconditional Variances of GDP Growth Rates: Switching only one particular shock from the alternative period)

Variable	Coefficient	Shocks	Unconditional Standard Deviation
GDP Growth Rate	Period I	Period I	3.95
	Period I	Period I, AS II	3.42
	Period I	Period I, IS II	3.05
	Period I	Period I, MS II	3.89
	Period I	Period I, MD II	4.14
	Period II	Period II	2.21
	Period II	Period II, AS I	5.50
	Period II	Period II, IS I	2.77
	Period II	Period II, MS I	2.21
	Period II	Period II, MD I	2.19

Note:

1. Period I is from 1960:Q2 to 1979:Q3: and Period II is from 1984:Q1 to 2001:Q3 as explained in section 2.2.
2. Annualized Quarterly Growth Rates are used.
3. Notation: e.g. Shocks (Period I, AS II) - Combined shocks, all structural shocks AS shock in Period I and AS shock in Period II.

To summarize, the decrease in IS shocks has an important role on overall GDP volatility reduction similar to the decrease in aggregate supply shocks. This finding is a new evidence in the "good luck" literature, which suggests not to ignore aggregate demand side in analyzing the U.S. business cycle.

V. Conclusion

In this paper, we assess to what extent the reduced variability in the U.S. business cycle is due to changes in the propagation mechanism, and to what extent it is due to changes in the shock variances. We argue that the propagation mechanism is the major source of inflation stabilization while the decreased shock variances are the major source of the output stabilization. If one believes that the change in the propagation mechanism resulted mainly from systematic differences in monetary policy between the two periods under consideration, the empirical results in the paper lead us to the following conclusion: with a shift in the monetary policy in the post-1979 period, even though it may have played a major role in stabilizing inflation, the real GDP growth would not necessarily have been stabilized. In the absence of "good luck" as represented by smaller unpredictable structural shocks, the real economic activity could have been destabilized.

The literature emphasizing the "good luck" feature of output stabilization mainly focuses on the decreased variance of the aggregate supply shocks, mainly productivity shocks and oil price shocks. In this paper, however, we note that the role of reduced AD shock variances, especially IS shock variance, also should not be undervalued in explaining output stabilization.

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◈ *References* ◈

Ahmed, S., A. Levin and B. Wilson (2002), "Recent U.S. Macroeconomic Stability: Good Policies, Good Practices, or Good Luck?" *The Review of Economics and Statistics*, Vol. 86, No. 3, pp. 824-832.

Blanchard, O.J. and D. Quah (1989), "The Dynamic Effects of Aggregate Demand and Supply Disturbances," *American Economic Review*, Vol. 79, pp. 655-73.

Boivin, J. and M. Giannoni (2002), "Assessing Changes in the Monetary Transmission Mechanism: A VAR Approach," *Federal Reserve Bank of New York Monetary Policy Review*, Vol. 8, No. 1, pp. 97-111.

Clarida, R., J. Gali and M. Gertler (2000), "Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory," *Quarterly Journal of Economics*, Vol. 115, No. 1, pp. 147-80.

Gali, J. (1992), "How Well Does The IS-LM Model Fit Postwar U.S. Data?" *Quarterly Journal of Economics*, Vol. 107, pp. 709-38.

Gali, J. (1999), "Technology, Employment and the Business Cycle: Do Technology Shocks Explain Aggregate Productivity," *American Economic Review*, Vol. 89, pp. 249-271.

Kim, C.-J., and C. Nelson (1999), "Has the U.S. Economy Become More Stable? A Bayesian Approach Based on a Markov-Switching Model of the Business Cycle," *The Review of Economics and Statistics*, Vol. 81, pp. 608-616.

Mankiw, N.G. (2001), "U.S. Monetary Policy During the 1990s," NBER Working Paper 8471.

Rudebusch, G. (2002), "Assessing Nominal Income Rules for Monetary Policy with Model and Data Uncertainty," *The Economic Journal*, Vol. 112, pp. 402-432.

Simon, J. (2001), "The Decline in Australian Output Volatility," Reserve Bank of Australia Working Paper 2001-01.

Stock, J.H. and M.W. Watson (2002), "Has the Business Cycle

Changed and Why?" NBER Working Paper 9127.

Taylor, J. (1999), "An Historical Analysis of Monetary Policy Rules," in Taylor (ed.) Monetary Policy Rules, University of Chicago Press.

Watson M. (1999), "Explaining the Increased Variability in Long Term Interest Rates," *Economic Quarterly*, Vol. 85, pp. 71-96.

미국 거시경제변수들의 변동성 감소: Structural VAR 모형을 통한 원인 분석

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논문초록

본고는 1980년대 중반 이후에 보여지는 미국 거시경제 변수들의 변동성 감소를 살펴보고 있다. Structural VAR 모형을 기반으로 한 counterfactual 기법을 이용하여, 변동성 감소가 파생경로의 변화에 기인하는지, 구조적 충격의 변동성 감소에 기인하는지의 여부를 분석한다. 그 결과, 인플레이션의 변동성 감소는 주로 파생경로의 변화로 설명되는 반면, GDP성장률의 변동성 감소는 주로 구조적 충격의 변동성 감소로 설명될 수 있음을 보이고 있다.

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