*Assessing the Role of Financial Deepening in Business Cycles: The Experience of the United Arab Emirates**

Ali F. Darrat**
Department of Economics and Finance
Louisiana Tech University, USA; and
Department of Accounting and Finance
American University of Sharjah, UAE

Salah S. Abosedra
Department of Economics
Wesley College, USA

Hassan Y. Aly
Department of Economics
Ohio State University, USA; and
College of Business Sciences
Zayed University, UAE

Abstract

We investigate the relation between financial market development and the severity of business cycles in the economy of the United Arab Emirates. We find no evidence of a dampening effect from financial deepening on cyclical fluctuations in the short-run, but strong effects in the long-run. These results extend recent findings on the financial development/economic growth nexus and imply that growth volatility reductions expected from further financial developments are slow to materialize especially in countries with relatively large and well-functioning financial sectors.

Keywords: Cyclical fluctuations, financial sector development, the United Arab Emirates, economic growth, short- and long-run effects

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***Corresponding author*: Department of Accounting and Finance, School of Business and Management, American University of Sharjah, Sharjah, UAE. E-mail: adarrat@ausharjah.edu.

1. Introduction

The role of financial market development in propelling economic growth has been the subject of immense discussion and debate for many years. Theory suggests that the creation and promotion of efficient financial markets (institutions) are necessary for a genuine and enduring economic growth process. Well-functioning financial markets can ameliorate risk, improve corporate governance, mobilize savings, reduce transaction and information costs, and promote specialization [Bencivenga and Smith (1992) and Levine (1997)]. Such theoretical conjectures receive considerable empirical support from numerous studies, and for a large group of countries [e.g., Levine and Zervos (1998), Darrat (1999) and Khan and Senhadji (2000)].

In contrast to the outpouring of research on the impact of financial development on economic growth, empirical work on the relation of financial development to macroeconomic volatility has been relatively scant. This neglect is surprising for at least two reasons. First, the issue of macroeconomic volatility is profoundly important for policy-makers attempting to mitigate the severity of business cycles. Smoothing out business cycles is a key objective of public policy since countries with lower macroeconomic volatility tend to grow faster [Ramey and Ramey (1995)]. Second, theory also suggests a possible linkage between financial development and growth volatility, especially in developing countries [Aghion, Banerjee and Piketty (1999)]. Well-functioning financial markets provide a closer match between savers and investors and help absorb exogenous shocks in the real sector. Financial deepening can also promote diversification which in turn reduces risk and dampens cyclical fluctuations [Acemoglu and Zilibotti (1997)]. In addition, efficient financial markets can mitigate information asymmetries and enable economic agents process information more effectively, resulting in a less volatile economic growth process [Greenwald and Stiglitz (1993)].

In sum, there is a strong theoretical presumption that financial deepening mitigates growth volatility. Although empirical research on the subject is seriously lacking, some empirical studies report evidence consistent with the above hypothesis. In particular, Easterly, Islam and Stiglitz (2000) find that the amount of credit available to the private sector is necessary to reduce economic fluctuations. Using panel data from several countries, Denizer, Iyigun and Owen (2000) also report results generally showing a negative correlation between financial enhancement and growth volatility. Focuses on the experience of Iran and Pakistan, results in Darrat (2002) suggest that transforming banks to equity-based institutions enhances economic stability in both countries. This paper extends empirical research in this area by examining the role of financial deepening in reducing economic volatility.

The UAE government has devoted enormous attention and scarce resources to improving the scope and operation of the financial market on the presumption that financial deepening is a pre-condition for sustained economic growth. Indeed, key international financial institutions, like the World Bank and the International Monetary Fund, also believe that efficient financial markets are a catalyst of economic development. Consequently, several developing countries, including the UAE, have pursued reform programs to improve their financial markets. In this light, we need to investigate whether the promotion of financial markets in the United Arab Emirates is beneficial, not only for achieving high economic growth, but also for maintaining economic stability and for smoothing out business cycles.

The remainder of the paper is organized as follows. Section 2 discusses the data and outlines the methodology used. Section 3 reports and analyzes the empirical results. Section 4 concludes the paper and offers some policy implications.

2. Data and Methodology

2.1. Data

This paper focuses on the role of financial market development in smoothing out business cycles in the UAE. An important preliminary step is to find proper measures of the degree of financial deepening. Note that financial markets outside banks are highly rudimentary in most developing countries. Thus, research on these countries typically uses financial markets and banking sectors interchangeably [Khan (1980) and King and Levine (1993)]. Moreover, studies like De Gregorio and Guidotti (1995) and Lynch (1996) argue that financial market development can be inferred from the behavior of monetary aggregates.

To ensure robustness, we use three different measures of financial deepening. All three measures are positively associated with financial deepening, although each captures a different aspect of the financial deepening process [Denizer, Iyigun and Owen (2000)]. The first proxy (FD1) is the inverse of the broad-money income velocity, i.e., the ratio of M2 to nominal GDP and is often called the monetization ratio. King and Levine (1993) use this monetization ratio which reflects the depth (size) of the financial market relative to the overall economy. Increases in FD1 indicate further expansion in the financial sector relative to the rest of the economy.

The second proxy of financial market development (FD2) is the ratio of demand deposits to the narrow money stock. Vogel and Buser (1976) argue that this measure represents the complexity, or sophistication, of the financial market (primarily banks). An increase in FD2 implies a higher degree of diversification of financial institutions and a greater availability or use of noncurrency balances (bank deposits) in the transaction process. The third measure of financial development (FD3) is credit issued by financial institutions to the non-financial private sector as a share of GDP. FD3 reflects the extent to which financial services are provided to the private sector. Denizer, Syigun and Owen (2000) recommend

the use of FD3 since it is more inclusive than other measures of financial development, and it also captures an important activity of the financial sector; namely, channeling funds from savers to investors in the private sector. As to measuring economic volatility, we follow prior research [e.g., Hau (2002)] and use a moving-average standard-deviation of real GDP growth.

Our data span the annual period 1973-2000, the maximum time period for which consistent data are available for all variables. The start of the sample coincides with the establishment of the statehood of the United Arab Emirates. We obtain the data from the *International Financial Statistics Database CD-ROM* and from the Arab Monetary Fund. We measure all variables in millions of U.S. dollars, and use the GDP deflator to obtain real magnitudes.

The annual growth rate of real GDP registered 4.5% over the estimation period. However, over the pre-1985 period that witnessed high and rising oil prices, the economy was growing at a faster rate of 5.8%. From an average oil price of $26.72 per barrel in the pre-1985 period, the world price of oil plummeted to $17.97 per barrel in the latter period of 1986-2000. Since oil exports are the primary source of government revenues in the UAE, government outlays substantially decreased which adversely affected economic growth. As to the degree of economic growth volatility, the standard deviation of real GDP growth rate is 10.55% over the sample period. This level of economic volatility seems moderate, especially if compared to the extremely higher levels of growth volatility in other oil and non-oil Arab countries.[1]

For financial development, the average scores over the estimation period are 46.45% for FD1 (the relative size of the financial market), 67.97% for FD2 (the degree of diversification of the financial market), and 39.72% for FD3 (the share of financial credit extended to the private sector). Such figures

[1] For example, the standard deviations of output growth are 22.06% in Saudi Arabia and 19.66% in Egypt.

imply a considerable degree of financial development in the country. In particular, the financial (monetary) sector represents almost half (46.45%) of the entire macroeconomy. Also, a high FD2 (= 67.97%) reflects the availability of a sufficient number of financial institutions and a high level of banking habit among the public (that is, substantial portions of transactions are conducted using bank deposits rather than currency).

Note that factors besides financial development might also influence growth volatility. In particular, the UEA is heavily dependent upon oil exports, and fluctuations in the world price of oil could influence domestic economic activities. In addition, theory also suggests that inflation variability represents monetary shocks and, as such, is an important determinant of the level and volatility of economic conditions [see Friedman (1977), and Darrat and Lopez (1989)]. Given the strong theoretical presumptions that shocks in the world oil market and inflation variability exert important influences on domestic business cycles in the UAE, our empirical models incorporate both variables to avoid possible omission-of-variables biases [Lutkepohl (1982)]. As before, we measure variability in the world price of oil and in inflation (percentage change in the GDP deflator) by moving-averages of the standard-deviations over a two-year horizon.

2.2. Methodology

We use multivariate Granger-causality tests in the context of cointegrated systems.[2] Briefly, a stationary time series (x_t) is said to Granger-cause another stationary time series (y_t) if the prediction error from regressing (y_t) on (x_t) significantly declines when using past values of (x_t) in addition to past values of (y_t). Granger-causality tests require stationary variables (e.g., whose stochastic properties are time

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[2] "Granger" is attached to "cause" since controversy still surrounds the Granger concept of causality which may differ from "causality" in the strict philosophical sense.

invariant). Nonstationary time series yield spurious regressions [Phillips (1986)], and invalidate standard diagnostic tests [Stock and Watson (1989)]. Granger (1986) demonstrates that any nonstationary series can be converted to a stationary series if differenced appropriately. To find the proper order of integration, we use the Augmented Dickey-Fuller (ADF), the Perron–Phillips (PP), and the Weighted-Symmetric (WS) testing procedures. We utilize several testing procedures to ensure that our inferences regarding the important stationarity requirement are reasonably robust.

Stationary series, albeit desirable, may also filter out low-frequency (long-run) information if the variables in the model are in fact cointegrated. Under cointegration, equations estimated with stationary variables, but without regards to the underlying cointegratedness, may suffer from an omitted-variable bias. As Granger (1986) shows, the concepts of cointegration and causality are closely related. Specifically, if cointegration exists between two or more variables, then there must be Granger-causality flowing between them in at least one direction. In this paper, we test for possible cointegration among the variables based on the Johansen (1988) efficient test. Evidence in Gonzalo (1994) supports the use of the Johansen approach over several alternative tests.

According to Granger's (1986) Representation Theorem, a given system of cointegrated variables can be expressed by a dynamic error-correction model (ECM). To the model containing stationary variables, we add lagged residuals that are obtained from the underlying cointegrating (long-run) relationship. These residuals (entered with only one lag) are called the error correction (EC) term.[3] The estimated coefficient on the error-correction term reflects the process by which the dependent variable adjusts in the short-run to its long-run equilibrium path.

[3] Additional EC lags are excluded since they are already reflected in the distributed lags of the other explanatory variables. See Miller (1991).

3. Empirical Findings

3.1. Unit Root Test Results

We begin the empirical analysis by investigating nonstationarity (the presence of unit roots) in all variables. Our empirical analysis includes six variables. They are the volatility of real output growth (XGV), the volatility of world price of oil (OPV), the volatility of inflation (NFV), financial-market depth (DF1), financial-market diversification (FD2), and the credit status of the non-financial private sector (FD3). We use the ADF, PP, and WS unit-root tests to check if the variables are stationary, and determine the proper lags in the tests using the Akaike Information Criterion (AIC). The results in Table 1 suggest

Table 1 about here

that all variables are nonstationary in levels, but become stationary if converted to first differences [that is, each variable is integrated of order one, ~ I (1)]. Since each variable in levels contains a unit root, it is possible that some combinations of them share a common root and are thus cointegrated.

3.2. Evidence on Cointegrating (Long-Run) Relationships

We use the Johansen (1988) efficient approach to test for the presence of multivariate cointegrating relations in three alternative groups of variables (the first group uses FD1 to measure financial deepening, the second uses FD2, and the third group uses FD3). Given the brevity of our sample, the cointegration tests incorporate only one annual lag, provided that the errors are also white-noise [Gonzalo (1994)]. Otherwise, we extend the lag by another year. Note that the estimation period spans almost 30 years and, as such, should be sufficiently long for conducting cointegration tests [Hakkio and Rush (1991)].

Table 2 assembles the Johansen test results using alternative measures of financial development.

Table 2 about here

These results suggest that financial deepening (particularly using FD2 and FD3) and economic growth volatility possess a potent cointegrating (long-run) relation. Both the maximal eigenvalue and the trace statistics of the Johansen test are consistent in rejecting the null hypothesis of no cointegration. Thus, in accordance with the underlying theory, there is strong evidence for a reliable long-run relation binding financial market development with growth volatility in the United Arab Emirates. Such an empirical finding supports our theoretical conjecture, as explained earlier in the paper, that improvements in the financial market help reduce the severity of economic fluctuations, at least in the long-run.

3.3. Evidence on Short-Run Relationships

The preceding analysis suggests that financial deepening in the UAE has mitigated economic growth volatility over the long-term horizon. In this sub-section, we investigate if such effects of financial market development on growth volatility are sufficiently quick to be visible in the short-run. To uncover if there are also significant short-run effects, we estimate error-correction models (ECMs) for overall and sector economic growth volatility. Under cointegration, the Granger's Representation Theorem suggests there must be short-run causality among the variables in at least one direction.

Our focus in this paper is on whether financial market development matters for growth volatility. We estimate three different ECMs, depending on how financial deepening is measured (FD1, FD2, and FD3). Given the brevity of our sample, we limit the maximum lag profile in these ECMs to three years and use the Final Prediction Error (FPE) procedure for determining the proper lag length in each model. We also apply the Hendry's General-to-Specific approach to obtain parsimonious estimations. The Hendry approach deletes individual lag coefficients that prove statistically insignificant to conserve on scarce degrees of freedom. Table 3 reports the regression results. The ECM estimates appear statistically adequate

Table 3 about here

with relatively high R-squared values around 60%. Such high R-squares are not spurious since the variables enter the equations in growth rates. Further, the results evince no significant problems of autocorrelation based on the Durbin-h test, nor any misspecification problem based on the RESET test.

The most striking outcome from the ECM estimations is that financial development fails to exert any significant impact on growth volatility irrespective of which measure of financial development is used. This finding implies that financial deepening is a slow process that requires relatively long time to exert any noticeable impact on growth volatility in the UAE. Finally, we should note that the variability of inflation and variability in the world price of oil also fail to exert any significant effect on growth volatility.

4. Conclusion and Policy Implications

This paper explores empirically the hypothesis that financial deepening mitigates the severity of business cycles in the United Arab Emirates. We use three alternative measures of financial market development and take into account the possible impacts of inflation variability and oil-price variability to avoid model misspecification. We use the Johansen efficient approach to test for multivariate cointegration among the variables, and estimate error-correction models (ECMs) to examine short-run dynamics.

Our results provide strong support for the theoretical contention that financial development shares a robust long-run relation with growth volatility. The results suggest that growth volatility in the UAE is strongly related to the development of its financial sector over the long-term. However, the results also indicate that short-run effects on growth volatility from financial development are statistically insignificant.

Are there any institutional factors that may account for these empirical results for the UAE? As our discussion in Section 3 indicates, the UAE has a relatively large and well-developed financial sector. For example, despite its small size (with real GDP of only $66 billion in 2003), the UAE has a total of 47 banks, of which 21 are domestic banks and 26 are foreign banks. Financial projects in the UAE usually win government backing making such projects particularly attractive to foreign participation (*The Economist Intelligence Unit*). By and large, monetary policy in the UAE has been reasonably prudent perhaps due to the fact that the Central Bank enjoys some degree of independence (Azzam, 2003). Indeed, the UAE government imposes minimal restrictions on financial institutions transactions including money transfers, access to foreign exchange, or repatriation of profits. In addition, the UAE has no income or corporate taxes, and very low custom duty. Thus, the UAE financial sector is characterized by several desirable features including relatively low levels of default risk, a high degree of economic openness and market liberalization. In countries with relatively well-developed financial sectors, recent research suggests that the positive effects on the *level* of economic growth expected from further financial improvements will likely be small [De Gregorio and Guidotti (1995) and Rioja and Valev (2004)]. Our results extends this important insight by suggesting that financial reforms in countries with relatively large and efficient financial markets, such as the UAE, will not provide any quick relief from growth *volatility.* Therefore, financial reforms are useful for promoting economic stability but only if these reforms persist over a long period of time.

Our empirical results also imply some difficulty for policy-makers in the UAE in their pursuit for economic stability. The delayed impacts of financial deepening on growth volatility could defuse interest in financial reforms and fuel instead a misguided impression that further financial improvements are irrelevant for economic stability. However, our results unambiguously reject this posture for the long-run

horizon. The empirical finding that financial deepening does not quickly dampen growth volatility in the UAE suggests that reforms of the financial sector should persist over a prolonged period of time.

References

Acemoglu, D. and Zilibotti, F. (1997), "Was Prometheus Unbound by Chance? Risk, Diversification, and Growth," *Journal of Political Economy*, 105: 709-751.

Aghion, P., Banerjee, A., and Piketty, T. (1999), "Dualism and Macroeconomic volatility," *Quarterly Journal of Economics*, 114: 1359-1397.

Azzam, H. (2003), "Vantage View: How Independent are Arab Central Banks?" *Gulf News*, May 20: 5.

Bencivenga, V.R. and Smith, B.D. (1992), "Financial Intermediation and Endogenous Growth," *Review of Economic Studies*, 58: 195-209.

Darrat, A. F. (1999), "Are Financial Deepening and Economic Growth Causally Related? Another Look at the Evidence," *International Economic Journal*, 13: 19-35.

Darrat, A. F. (2002), "The Relative Efficiency of Interest-Free Monetary System: Some Empirical Evidence," *Quarterly Review of Economics and Finance*, 42: 747-764.

Darrat, A. F. and Lopez, F.A. (1989), "Has Inflation Uncertainty Hampered Economic Growth in Latin America?" *International Economic Journal*, 3:1-15.

De Gregorio, J. and Guidotti, G.P. (1995), "Financial Development and Economic Growth," *World Development*, 23: 433-448.

Easterly, W., Islam, R., and Stiglitz, J.E. (2000), "Shaken and Stirred: Explaining Growth and Volatility," *World Bank Economic Review*, forthcoming.

Friedman, M. (1984), "Lessons from the 1979-82 Monetary Policy Experiments," *American Economic Review* 74, 397-400.

Friedman, M. (1977), "Nobel Lecture: Inflation and Unemployment," *Journal of Political Economy*, 451-472.

Gonzalo, J. (1994), "Five Alternative Methods of Estimating Long-Run Equilibrium Relationships," *Journal of Econometrics*, 60: 203-233.

Greenwald, B. and Stiglitz, J. (1993), "Financial Market Imperfections and Business Cycles," *Quarterly Journal of Economics*, 108: 77-114.

Granger, C. W. J. (1986), "Developments in the Study of Cointegrated Economic Variables," *Oxford Bulletin of Economics and Statistics*, 48: 213-228.

Hakkio, C. S. and Rush, M. (1991), "Cointegration: How Short is the Long-Run?" *Journal of International Money and Finance,* 10: 571-581.

Johansen, D. (1988), "Statistical Analysis of Cointegrated Vectors," *Journal of Economic Dynamics and Control*, 12: 231-254.

Khan, M. S. (1980), "Monetary Shocks and the Dynamics of Inflation," *International Monetary Fund Staff Papers,* 27: 250-284.

Khan, M. S. and Senhadji, A.S. (2000), "Financial Development and Economic Growth: An Overview," IMF Working Paper No. WP/00/209.

King, R. G. and Levine, R. (1993), "Finance and Growth: Schumpeter Might Be Right," *Quarterly Journal of Economics*, 108: 715-735.

Levine, R. (1997), "Financial Development and Economic Growth: Views and Agenda," *Journal of Economic Literature*, 35: 688-726.

Levine, R. and Zervos, S. (1998), "Stock Markets, Banks, and Growth," *American Economic Review*, 88: 537-558.

Lutkepohl, H. (1982), "Non-Causality Due to Omitted Variables," *Journal of Econometrics*, 19: 367-378.

Lynch, D. (1996), "Measuring Financial Sector Development: A Study of Selected Asian-Pacific Countries," *Developing Economies*, 34: 3-33.

Miller, S. M. (1991), "Monetary Dynamics: An Application of Cointegration and Error Correction Modeling," *Journal of Money, Credit and Banking*, 23: 139-154.

Phillips, P. C. B. (1986), "Understanding Spurious Regressions in Econometrics," *Journal of Econometrics*, 37: 311-340.

Rioja, F. and Valev, N. (2004), "Does One Size Fit All? A Reexamination of the Finance and Growth Relationship," *Journal of Development Economics*, 74: 429-447.

Stock, J. H. and Watson, M.W. (1989), "Interpreting the Evidence on Money-Income Causality," *Journal of Econometrics*, 40: 161-182.

Vogel, R. and Buser, S. (1976), "Inflation, Financial Repression, and Capital Formation in Latin America," in *Money and Finance in Economic Growth and Development*, edited by R. McKinnon. New York, NY: Marcel Dekker, Inc.

TABLE 1
Unit Roots (Nonstationarity) Test Statistics

Variables	ADF	PP	WS
A - In Levels			
Real Output Growth Volatility (XGV)	-0.96	-2.87	-0.76
Financial Market Depth (FD1)	0.14	0.24	-0.80
Financial Market Diversification (FD2)	-0.19	-0.05	0.82
Financial Credit to Private Sector (FD3)	1.05	0.43	-0.41
Volatility of World Oil Price (OPV)	3.80	-2.08	-0.40
Volatility of Inflation (NFV)	-0.10	-0.38	-0.43
B - In First-Differences (D)			
DXGV	-2.45***	-16.51***	-2.53
DFD1	-1.84***	-23.06***	-1.95***
DFD2	-4.04**	-25.59***	-3.00***
DFD3	-2.70***	-18.92***	-2.82***
DOPV	-2.64***	-13.25***	-2.90
DNFV	-1.19	-22.89***	-2.52

Notes: Volatility is measured by a two-year moving-average standard-deviation of the corresponding variable. ADF is th Augumented Dickey-Fuller test, PP is the Perron-Phillips test, and WS is the Weighted-Symmetric test. The proper lag-truncation is determined by the Akaike final prediction error (FPE) criterion. An * indicates rejection of the null hypothesis of nonstationarity at the 10% level of significance, while an ** indicates rejection at the 5% level, and an *** indicates rejection at the 1% level.

TABLE 2
Multivariate Johansen Cointegration Test Results for Real Output Growth Volatility (XGV) and Various Measures of Financial Market Development (FD1, FD2, FD3)

Null Hypotheses	λ-Max Test: Alternative Hypotheses	λ-Max Test: Test Statistics	λ-Max Test: Critical Values (95%)	λ-Max Test: Critical Values (90%)	Trace Test: Alternative Hypotheses	Trace Test: Test Statistics	Trace Test: Critical Values (95%)	Trace Test: Critical Values (90%)
Cointegrating Vector: XGV; **FD1**, OPN, NFV								
r = 0	r = 1	28.34^	31.79	29.13	r ≥ 1	58.30^	63.00	59.16
r ≤ 1	r = 2	17.66	25.42	23.10	r ≥ 2	29.96	42.34	39.34
r ≤ 2	r = 3	10.11	19.22	17.18	r ≥ 3	12.30	25.77	23.08
r ≤ 3	r = 4	2.19	12.39	10.55	r = 4	2.19	12.39	10.55
Cointegrating Vector: XGV, **FD2**, OPV, NFV								
r = 0	r = 1	42.88**	31.79	29.13	r ≥ 1	75.83**	63.00	59.16
r ≤ 1	r = 2	17.45	25.42	23.10	r ≥ 2	32.95	42.34	39.34
r ≤ 2	r = 3	11.33	19.22	17.18	r ≥ 3	15.50	25.77	23.08
r ≤ 3	r = 4	4.17	12.39	10.55	r = 4	4.17	12.39	10.55
Cointegrating Vector: XGV, **FD3**, OPV, NFV								
r = 0	r = 1	42.03**	31.79	29.13	r ≥ 1	79.26**	63.00	59.16
r ≤ 1	r = 2	20.95	25.42	23.10	r ≥ 2	37.23	42.34	39.34
r ≤ 2	r = 3	12.59	19.22	17.18	r ≥ 3	16.28	25.77	23.08
r ≤ 3	r = 4	3.69	12.39	10.55	r = 4	3.69	12.39	10.55

Notes: See notes to Table 1. All cointegrating vectors include trend but without constant. An ** indicates rejection of the null hypothesis of no cointegration at the 95% level of significance, while an ^ indicates rejection at better than the 80% level.

TABLE 3
Short-Run Causal Effects of Various Measures of Financial Market Developments (FD1, FD2, FD3) on Growth Volatility (DXGV)

Dependent Variable	Independent Variables							Summary Statistics		
	DXGVL	DFD1L	DFD2L	DFD3L	DOPVL	DNFVL	ECL	R^2	D-h	RESET
using FD1:										
DXGV	-3.58 (1.19)	-0.03 (0.37)	--	--	4.08 (0.82)		0.06 (0.01)	0.58	0.60	1.20
using FD2:										
DXGV	-2.35 (0.40)	--	-0.09 (0.01)	--	2.07 (0.33)	-0.20 (0.21)	-0.03 (0.01)	0.61	0.80	0.99
using FD3:										
DXGV	-3.54 (1.17)	--	--	-0.03 (0.11)	4.09 (0.65)		-0.03 (0.02)	0.58	0.96	1.38

Notes: See notes for Table 1. The figures in parentheses beneath the lagged coefficient estimates are the corresponding F-values for joint significance. All variables are defined as before, and "D" refers to the first-difference operator. The variables enter in their first-difference forms as required by unit-root test results. ECL is the error-correction term (lagged once) obtained from the corresponding cointegrating vector. D-h is the Durbin-h test of autocorrelation. RESET is Ramsey's test of specification biases.