E C O N O M I C S B U L L E T I N

A short note on business cycles of underground output: are they asymmetric?

Yoke-Kee Eng
Universiti Tunku Abdul Rahman

Chin-Yoong Wong
Universiti Tunku Abdul Rahman

Abstract

This short note as the first study investigates the symmetry of fluctuations of underground output around trend for four selected Southeast Asian countries, that is, Malaysia, Indonesia, Thailand, and Philippines, over the time horizon of 1970-2006. In particular, we test if the underground output falls below trend more drastically and severely at shorter time span than when rising above trend. We find no evidence that supports this hypothesis. We thus conclude that asymmetry in fluctuations around trend is not a primary concern in understanding the nature of underground economy. We suggest that the symmetry of fluctuation of underground output, in conjunction with the potential complementary effect on market consumption, may account for the widely documented expansionary fiscal contraction in developing countries.

The authors are grateful to the comments of an anonymous referee. All remaining errors and omissions are those of the authors.
Citation: Eng, Yoke-Kee and Chin-Yoong Wong, (2008) "A short note on business cycles of underground output: are they asymmetric?." *Economics Bulletin*, Vol. 3, No. 58 pp. 1-10
Submitted: July 2, 2008. **Accepted:** September 17, 2008.
URL: http://economicsbulletin.vanderbilt.edu/2008/volume3/EB-08C20049A.pdf

1. Introduction

Identifying the pattern of business cycle has long been an issue of interest in macroeconomic research. It is even not unreasonable to make a statement that macroeconomic study prior to the Second World War was all about dating and finding out mechanism involved in the enduring cyclical expansions and contractions (for instance, Mitchell 1927, Hayek 1933). One of the substantial issues that have received relatively less attention is the symmetry of business cycle. Mitchell (1927) and Keynes (1936), among the prominent studies, claimed that the peak tends to be followed by nose-diving contraction – sharp, deep but short-lived, while trough is substituted by a crawling expansion – gradual, shallow yet prolonged. The implications of asymmetric fluctuations, if yes, are far reaching. For instance, most of modern macroeconomic quantitative works are based on the linearized stochastic dynamical system with symmetric fluctuations around trend. One could imagine what it means to the profession if fluctuations around the steady state are not symmetric: revamp all the received studies, please. However, the issue of symmetry remains unsolved and is opened for further disputes (see, for example, Delong and Summers 1984, Sichel 1993, Kiani 2005, Razzak 2001).

This note is intended to extend the boundary of the study on business cycle symmetry to underground economy. The term *underground economy*, be it underground production or underground labor market, is intended in this paper to mean an alternative way to provide the goods and service which could otherwise be offered in officially registered markets, which we coin as *market economy* throughout the text. This said, official data on market output is exclusive of underground activities. We consider thus those unrecorded and unreported legal activities that would generally be taxable were they reported to the tax authorities (see Eng, Wong, and Habibullah 2008, and Scheneider and Enste 2000).

We hold the view that this exercise is important at least from two perspectives. On one hand, detecting if the fluctuations of underground real output around trend are also asymmetric is certainly noteworthy for the sake of understanding the nature of the least understood underground economy *per se*. On the other hand, more important, the presence of asymmetric fluctuations of underground output around trend may undermine the effectiveness of macroeconomic policy on market economy, while leaving undesired impacts on the size of underground economy.

To see this, consider, for instance, a case of overheating market economy, in which the government responds by tightening the fiscal stance by raising market income tax rate permanently. Also, suppose that the underground economy as an alternative mode of production is present, and the fluctuations of underground output around trend are asymmetric. Expectedly, the permanent rise of market income tax rate will provoke an exodus of firms and labors who intend to circumvent the loading tax compliance into underground sector. Seeing that the income earned in underground activities could be spent on market goods, the resultant rise in the absolute size of underground economy in fact implies a complementary demand for market goods (Chiarini and Marzano 2006).

Here comes the role of asymmetric fluctuations. If the underground activities tend to nose dive more piercingly and brutally compared to when it is rising, the complementary effect of underground income and consumption will be relatively moderate, and thus, the contractionary effect of fiscal tightening remains intact. To the contrary, if the underground economy rises more rapidly and to greater extent than when it is falling below trend, unsurprisingly then the fiscal

contraction can be overwhelmingly offset, or even overturned, by the strong complementary effect of larger underground income. The absolute and relative size of underground economy will certainly arise, with faster speed for the second scenario.

For this reason, we believe that investigating the symmetry of fluctuations of underground output should be the prior effort to comprehend the characteristics of underground economy, and the likely implications on the market economy. By using data spanning the periods from 1970 to 2006 on four selected Southeast Asian countries, namely, Malaysia, Indonesia, Thailand, and Philippines, this note thus tests for the hypothesis of deepness and steepness in the fluctuations of underground output around trend. We show that there is little evidence on the asymmetric fluctuations of underground output around trend. The expansions are neither shorter nor sharper than contractions, or vice versa. We conclude that asymmetry is not a phenomenon of first order concern, at least for our sampled countries, in understanding the characteristics of underground economy.

We organize this note as follows: Section 2 descriptively draws attention to the possibility of asymmetry. Section 3 describes our methods to extract the size of underground economy, and to investigate the skewness of the fluctuations, followed by the discussion on the results. Section 4 briefly concludes by suggesting the role of symmetric underground output fluctuation to account for the well documented phenomenon of expansionary fiscal contraction in developing countries.

2. Are the fluctuations of underground output around trend asymmetric?

For a symmetric distribution, the coefficient of skewness is zero, and the mean equals the median. However, if the contractions are short-lived but more severe than the expansions, the distribution should be negatively skewed. In other words, the distribution should have significantly fewer observations below its mean than above its mean, and the average deviation from the mean of the observations below the mean should be significantly greater than the average deviation from the mean of the observations above the mean. The median should exceed the mean by a significant amount. In line with the works of Sichel (1993) and Giles (1997), we term it as *deepness* hypothesis.

Besides, if the underground real output falls from trend more drastically, the "slope" of the negative deviation from trend should be steepened. That is, the distribution of the first difference should also be negatively skewed. Likely, the number of observations below its mean must also be fewer than those above mean, though the average deviation from the mean of the former must be more than the latter. This is what we characterize as *steepness* hypothesis.

Table 1 presents some sketchy evidence on the deepness in distribution of the yearly underground output fluctuation for the selected countries over the period of 1970 to 2006. The estimation of the size of underground output for these countries will be discussed momentarily. Of interest now is whether the contractions of underground output are more spontaneous and severe over a shorter time horizon than expansions. The answer seems to be a "yes" for Malaysia and Indonesia, but a "no" for Philippines and Thailand at first glance.

Note that the coefficient of skewness for each and every sampled country is negative. Together with the median that obviously exceeds the mean value, Malaysia and Indonesia seem to exhibit deepness in underground output. This is further confirmed if one looks at the relative number of observations below mean and the relative average deviation below mean. For Malaysia and Indonesia, the number of observations below mean is almost less than half of those above mean, with the average deviation of the former more than the latter. To the contrary,

Philippines and Thailand show no sign of asymmetry: both mean and median are inframarginally closed to zero, the number of observation below mean, and its average deviation are almost identical to those above mean.

Table 2 illustrates the lack of steepness in the series typically. Philippines and Indonesia depict a positive coefficient of skewness, indicating that the rise of underground output over trend could be more rapid. Also, the number of observations and the associated average deviation from trend are almost similar for the rise and slump of underground output for all the countries.

Table 1. The deepness hypothesis

	Malaysia	*Philippines*	*Thailand*	*Indonesia*
Skewness	-0.8135	-0.2116	-0.2445	-0.8243
Mean μ	-1.16E-14	-6.35E-14	-7.61E-14	-4.95E-14
Median	0.0398	-0.0091	0.0015	0.0196
Obs I. ($x-\mu<0$)	14	19	18	14
Obs II. ($x-\mu>0$)	23	18	19	23
Ratio A (Obs I/Obs II)	0.61	1.06	0.95	0.61
Mean I. ($\lvert x-\mu<0\rvert$)	0.129	0.100	0.116	0.121
Mean II. ($x-\mu>0$)	0.078	0.106	0.109	0.074
Ratio B (Obs I/Obs II)	1.64	0.95	1.06	1.64

Note: Obs. I and II, respectively, is the numbers of log deviation of underground output below and above a constant mean. Mean I and II, correspondingly, indicates the average log deviation of underground output below and above mean. That Ratio A is smaller than one implies a short-lived contraction, and that Ratio B is greater than one means a deep contraction. Deepness hypothesis requires that Ratio A < 1 and Ratio B > 1.

Table 2. The steepness hypothesis

	Malaysia	*Philippines*	*Thailand*	*Indonesia*
Skewness	-0.1210	0.4550	-0.9872	0.5033
Mean μ	-0.00282	0.001698	0.002475	0.006582
Median	-0.0084	0.0137	0.0125	-0.0026
Obs I. ($x-\mu<0$)	19	16	16	21
Obs II. ($x-\mu>0$)	17	20	20	15
Ratio A (Obs I/Obs II)	1.12	0.80	0.80	1.40
Mean I. ($\lvert x-\mu<0\rvert$)	0.088	0.103	0.091	0.077
Mean II. ($x-\mu>0$)	0.098	0.082	0.073	0.108
Ratio B (Obs I/Obs II)	0.89	1.25	1.24	0.71

Note: Obs. I and II, respectively, is the numbers of deviation of underground output growth rate below and above a constant mean. Mean I and II, correspondingly, indicates the average deviation of underground output growth rate below and above mean. That Ratio A is smaller than one implies a short-lived contraction, and that Ratio B is greater than one means a sharp contraction. Steepness hypothesis requires that Ratio A < 1 and Ratio B > 1.

3. Empirical strategies and results

In this section we investigate the hypothesis of asymmetry more formally. Our procedure is simple, and works along the lines of Sichel (1993), Holly and Stannett (1995), and Giles (1997). To our knowledge, however, this note is the very first study on the asymmetry of business cycles of underground economy in Southeast Asia. Our steps can be briefly summarized as follows:

Step 1: We lay out a dynamic stochastic general equilibrium model to derive an operational underground money demand function. The model economy consists of optimizing household and firm. Household solves the problem of

$$\max \quad E_t \sum_{t=0}^{\infty} \theta^t u(c_t, l_t, m_t) \tag{1}$$

s.t.

$$u(c,l,m) = k(\ln c_{m,t} + \ln m_{m,t}) + (1-k)(\ln c_{u,t} + \ln m_{u,t}) + \ln(1 - h_{m,t} - h_{u,t}) \tag{2}$$

$$Q_t B_t P_t^{-1} + M_t P_t^{-1} + c_{m,t} + c_{u,t} \le (1-\tau_{h,t}) w_{m,t} h_{m,t} + w_{u,t} h_{u,t} + (B_{t-1} + M_{t-1}) P_t^{-1} + \Omega_t \tag{3}$$

where $c_m, c_u, h_m, h_u, m_m, m_u, w_m, w_u$, respectively, denotes the consumption, hours worked, money demand, and real wage income in market and underground economy. $\theta \in (0,1)$ is the subjective discount factor. l refers to the leisure with total time normalized to one. $Q = (1+i)^{-1}$ is the price of noncontigent one-period bond B. Ω is the lump-sum government transfer financed by distorting wage income tax τ_h and sales tax τ_y. k refers to the share of consumption on market goods and of real cash balance allocated for market economy.

Firm solves

$$\min \; w_{m,t} h_{m,t} + w_{u,t} h_{u,t} + \tau_{y,t} y_{m,t} + \rho s \tau_{y,t} y_{u,t} \tag{4}$$

s.t.

$$y_{m,t} = z_{m,t} h_{m,t} \tag{5}$$

$$y_{u,t} = z_{u,t} h_{u,t} \tag{6}$$

$$z_{m,t} = (1-\psi_m)\bar{z}_m + \psi_m z_{m,t-1} + e_{m,t} \qquad e_{m,t} \sim i.i.d(0, \sigma_{em}) \tag{7}$$

$$z_{u,t} = (1-\psi_u)\bar{z}_u + \psi_u z_{u,t-1} + e_{u,t} \qquad e_{u,t} \sim i.i.d(0, \sigma_{eu}) \tag{8}$$

where y_m, y_u, z_m, z_u respectively denotes real output and productivity of market and underground economy. ρ is the odds of being caught for operating in underground economy, and $s > 1$ is the surcharge factor once being caught.

The first order conditions are given by

$$\frac{u_{c_m}(c,l,m)}{u_{c_u}(c,l,m)} = \frac{1-\kappa}{\kappa} \tag{9}$$

$$\frac{u_{h_m}(c,l,m)}{u_{h_u}(c,l,m)} = \frac{w_{m,t}(1-\tau_{h,t})}{w_{u,t}} \tag{10}$$

$$\theta^t m_{j,t} = \frac{1}{\lambda_t}\left[\frac{1+i_t}{i_t}\right], \; j = m,u \tag{11}$$

$$m_{u,t} = \left[\frac{1-\kappa}{\kappa}\right]^{\kappa} m_t \tag{12}$$

$$m_{m,t} = \left[\frac{\kappa}{1-\kappa}\right]^{1-\kappa} m_t \tag{13}$$

$$w_{m,t} = (1-\tau_{y,t}) z_{m,t} \tag{14}$$

$$w_{u,t} = (1-\rho s \tau_{y,t}) z_{u,t} \tag{15}$$

where $m_j = M_j \big/ P$ and $m_t = m_{m,t}^{\kappa}, m_{u,t}^{1-\kappa}$. Eq. (9) is the relative marginal utility of consumption on market goods and underground goods. As the underground goods is assumed to be unit substitutable with market goods, which implies that the marginal utility of consumption on both goods is similar, k is controlled at 0.5. Eq. (10) shows that the allocation of hours worked between market and underground labor market is determined by the relative wage. It is shown in Eq. (11) that demand for money is affected by the marginal utility of wealth and the opportunity cost. Eq.(12) – (13) give the optimal allocation of money for underground and market economy. Eq. (14) – (15) are the marginal product of market and underground labor, respectively.

By rearranging the derived first order conditions, we obtain the money demand in the form

$$m_{m,t} = (1-\boldsymbol{\tau}_t)\mathbf{y}_{m,t}\left[\frac{1+i_t}{i_t}\right] \tag{16}$$

$$m_{u,t} = (1-\rho s \boldsymbol{\tau}_t)\mathbf{y}_{u,t}\left[\frac{1+i_t}{i_t}\right] \tag{17}$$

where, $\boldsymbol{\tau} = \tau_h + \tau_y$, $\mathbf{y}_m$ and $\mathbf{y}_u$ respectively denotes the per worker per hours worked real market and underground output. Note that the underground money demand function of (17) is not operational due to the fact that m_u and $\mathbf{y}_u$ are unobservable. Nevertheless, if we rewrite Eq. (16) in the form

$$m_{m,t} = \mathbf{y}_{m,t}\left[\frac{1+i_t}{i_t}\right] - \tau_t \mathbf{y}_{m,t}\left[\frac{1+i_t}{i_t}\right] \tag{18}$$

the first item of the right hand side of Eq. (18) turns out to be the money demand for market economy when tax distortion is absent. Recall that, burdened by the imposition of tax obligation, firms and household exit the officially registered market to participate in the underground sector. The money demand allocated for officially registered market has thus declined to the extent exhibited by the second item of Eq. (18), which, in turn, has been reshuffled to the use in

underground economy. Having this said means that we can model the underground real money demand as a residue between holding real cash balance in nontax-distorted economy and tax-distorted economy (see Eng *et al*. 2008 for detailed discussion). Formally, with the use of Eq. (12), m_u can be written in alternative form as

$$m_t = \left[\frac{1-\kappa}{\kappa}\right]^{-\kappa} \boldsymbol{\tau}_t \mathbf{y}_{m,t} \left[\frac{1+i_t}{i_t}\right] \tag{19}$$

We term Eq.(19) as operational underground real money demand function as it is quantifiable. We carry out the OLS estimation on the semi-logged Eq. (19) as shown below:

$$\ln m_t = \alpha_0 + \alpha\boldsymbol{\tau}_t + \beta \ln \mathbf{y}_{m,t} + \chi \ln\left[\frac{1+i_t}{i_t}\right] \tag{20}$$

Table 3 shows the estimation results with diagnostic checking for four selected ASEAN countries, namely, Malaysia, Indonesia, Thailand, and Philippines with annual data over a span of 37 years from 1970 throughout 2006, sourced from IMF's International Financial Statistics (IFS) database.

Note that logged aggregate demand for money for nontax-distorted economy can in fact be presented in the form

$$\ln m_t = \alpha_0 + \beta \ln \mathbf{y}_t + \chi \ln\left[\frac{1+i_t}{i_t}\right] \tag{21}$$

where $\mathbf{y} - \mathbf{y}_m = \mathbf{y}_u$. Equalizing Eq.(20) and (21) yields

$$\mathbf{y}_{u,t} = \left(\frac{\alpha}{\beta}\right)\boldsymbol{\tau}\mathbf{y}_{m,t} \tag{22}$$

The parameter α and β, correspondingly, is the estimated elasticity of real money demand on average tax rates and real market income. We dub this procedure of gauging the size of underground economy as *microfounded monetary method*. Contrary to the monetary method in the tradition of Gutman-Feige-Tanzi, the microfounded monetary method needs not surrender to any of the heavily criticized assumptions, i.e., constant currency-demand deposit ratio, and identical velocity of currency circulation in market and underground economy, in order to compute the size of underground economy[1].

[1] Readers who are interested in the microfounded monetary method may refer to Eng *et al.* (2008). One may refer to Gutman (1977) and Feige (1979) for fixed currency-demand deposit ratio approach, and to Thomas (1999) for critics. Besides, one could read Tanzi (1980, 1983) for the exposition of different sort of monetary method that relies on the assumption of identical velocity of currency circulation in both economies. One could read Breush (2005) for criticism on this procedure. The often-cited Schneider and Enste (2000) provide an excellent survey on different received estimation methods in the received literature.

Table 3. OLS estimations of microfounded currency demand model, 1970-2006

Variables	Indonesia	Malaysia	Philippines[1]	Thailand
Constant (α_0)	-1.7194	-2.0209	-2.4928	-0.4316
	(-8.6464)***	(-13.2005)***	(-7.7554)***	(-0.5232)
Avgtax (α)	0.8281	0.9379	0.7654	0.8029
	(29.3819)***	(39.7322)***	(7.6545)***	(8.5052)***
Percapita GDP (β)	-0.0058	-0.0133	-0.0070	-0.0374
	(-2.6469)**	(-2.5392)**	(-1.2363)	(-9.5100)***
DEP12 (χ)	6.9459	1.7219	8.5123	9.8549
	(4.4397)***	(2.4373)**	(6.5503)***	(3.2204)***
DUM1	0.2136	-0.1418	-0.1966	-0.1518
	(3.2628)***	(-2.4070)**	(-3.8969)**	(-2.0905)***
DUM2	0.2241	-0.1277	0.2725	0.2903
	(3.4292)***	(-2.0862)**	(14.9555)***	(3.6528)***
Diagnostic tests				
R^2	0.9945	0.9926	0.9415	0.9909
Adj. R^2	0.9937	0.991456	0.9320	0.9895
[a]F	1136.272	836.5230	99.72014	679.6827
	[0.0000]***	[0.0000]***	[0.0000]***	[0.0000]***
[b]Jarque-Bera	1.0000	2.1890	0.3763	0.6049
	[0.6065]	[0.3347]	[0.8285]	[0.7390]
[c]ARCH (1)	0.6175	1.1050	1.1448	0.5319
	[0.4374]	[0.3006]	[0.2921]	[0.4708]
[d] LM(1)	2.7405	1.8587	8.1789	0.7558
	[0.1083]	[0.1829]	[0.0076]***	[0.3915]
RESET	1.6259	2.6267	0.2887	2.4570
	[0.2120]	[0.1155]	[0.5950]	[0.1275]

[1] We use average income tax, per capita real GDP, and 12-month deposit rate as proxy of tax burden, per worker per hours worked real output, and interest rate, respectively. Newey-West correction is used for the case of Philippines. The dummy variables are used to deal with the problem of non-normality of residual. For Indonesia: DUM1= 1999 DUM2 = 00; Malaysia: DUM1= 1985 DUM2 = 98; Philippines: DUM1= 1975 DUM2 = 99; and Thailand: DUM1= 1986 DUM2 = 99.

Step 2: We calculate the skewness statistics for Holdrick-Prescott (HP) filtered real underground output $\mathbf{y}_{u,t}^{C}$ and her first difference $\Delta\mathbf{y}_{u,t}^{C}$ as empirical measures of the hypothesis of deepness and steepness, respectively:

$$D(\mathbf{y}_{u}^{C}) = \frac{\sum_{t=1}^{T}\left(\mathbf{y}_{u,t}^{C} - \tilde{\mathbf{y}}_{u}^{C}\right)^{3}}{N\sigma(\mathbf{y}_{u,t}^{C})^{3}} \tag{23}$$

$$S(\Delta \mathbf{y}_u^C) = \frac{\sum_{t=2}^{T} \left(\Delta \mathbf{y}_{u,t}^C - \tilde{\Delta} \mathbf{y}_u^C\right)^3}{N\sigma(\mathbf{y}_{u,t}^C)^3} \tag{24}$$

where N is the sample size, $\tilde{\mathbf{y}}_u^C$ and $\tilde{\Delta}\mathbf{y}_u^C$ represent respective mean value, and $\sigma(\mathbf{y}_u^C)$ and $\sigma(\Delta \mathbf{y}_u^C)$ are the associated sample standard deviations.

Step 3: In order to test the significance of the point estimates of Eq. (23) and (24), we next find an asymptotically valid standard error for (23) and (24) by constructing a series where t'th element is

$$x_t^* = \frac{\left(x_t - \tilde{x}\right)^3}{\sigma(x_t)^3} \tag{25}$$

where $x^* = \mathbf{y}_u^C, \Delta \mathbf{y}_u^C$. Lastly, we regress x^* against a constant vector, and compute the Newey-West standard error for the regression coefficient.

Table 4 presents the empirical results of the test on the null hypothesis that the fluctuations around trend of underground output are symmetry. For the purpose of comparison, we also test the deepness and steepness hypothesis for market output and aggregate output – the sum of market and underground output. Clearly, there is no evidence to suggest the presence of asymmetric fluctuations around trend of underground output, market output, and aggregate output. The contractions show no sign of steeper and deeper magnitude over short time horizon than the expansions. We conclude that asymmetry is not a phenomenon of first order concern in understanding the characteristics of underground economy.

Table 4. Asymmetric fluctuations around trend: an empirical result

Deepness	$\mathbf{y}_u$			$\mathbf{y}_m$			$\mathbf{y}$		
	Skewness	*a.s.e*	*p-value*	*Skewness*	*a.s.e*	*p-value*	*Skewness*	*a.s.e*	*p-value*
Malaysia	-0.8135	0.7432	0.281	-0.4766	0.8304	0.5696	-0.2464	0.7985	0.7594
Indonesia	-0.8243	0.7963	0.3075	-0.0297	0.6962	0.9662	0.0151	0.4945	0.9757
Thailand	-0.2445	0.6465	0.7075	-0.2445	0.6413	0.8045	0.0436	0.6904	0.95
Philippines	-0.2116	0.4997	0.6744	-0.828	1.1408	0.4726	-0.4508	0.8575	0.6023
Steepness	$\mathbf{y}_u$			$\mathbf{y}_m$			$\mathbf{y}$		
	Skewness	*a.s.e*	*p-value*	*Skewness*	*a.s.e*	*p-value*	*Skewness*	*a.s.e*	*p-value*
Malaysia	-0.121	0.7075	0.8652	-0.7243	0.4869	0.1458	-0.7765	0.5671	0.1797
Indonesia	0.5033	0.4845	0.306	-0.0076	0.476	0.9874	-0.1914	0.4304	0.6593
Thailand	-0.9872	1.2179	0.4231	-0.9942	1.1418	0.3898	-1.5464	1.7163	0.3737
Philippines	0.455	0.7109	0.5263	-1.0954	0.8843	0.2237	0.164	0.514	0.7516

Note: a.s.e denotes asymptotical standard error.

4. Policy implication

In the presence of underground activities with strong complementary demand, high tax policy can turn out to be expansionary, and vice versa. Having this said means that the policymaker could lower the tax rate during economic boom while raising the tax rate during economic recession. Technically speaking, tax policy or fiscal policy in general is procyclical. In fact, Gavin and Perotti (1997), Ilzetzki and Vegh (2008), and Talvi and Vegh (2005), for instance, claim that procyclical fiscal policy seems to be the norm than exception in all of the developing countries. Why would developing countries pursue a procyclical fiscal policy that would only exacerbate the business cycle? Perhaps the significant existence of underground economy in the developing world offers a convincing explanation: the non-trivial presence of underground sector permits the authority to consolidate the fiscal mess, which is very much needed to restore confidence of world community, with easing off pains during the recession. Notably, high-tax induced expansion of underground economy could moderate the pain of loosing jobs in market economy, and the subsequent underground income earned could complements the declining market consumption.

This underground-enabled expansionary fiscal contraction depends very much on the symmetry of fluctuations around trend of underground sector, the presence of complementary effect, the lead-lag relationship between market and underground sector, and the procyclicality of underground output. While leaving the last three issues for future exploration, this short note has examined the issue of symmetry of fluctuations for four selected Southeast Asian countries, that is, Malaysia, Indonesia, Thailand, and Philippines. We find no evidence that supports the deepness and steepness hypothesis in business cycle.

We view this finding, that underground output fluctuations around trend are symmetric, as a very important prerequisite if one intends to further investigate the interaction between fiscal policy and market economy in developing countries with sizeable underground sector. The intuition is simple once we think the otherwise: if underground output rises above trend at lesser magnitude and speed than when it is falling, as argued in deepness and steepness hypothesis, high tax policy will remain contractionary. One could thus no longer resort to underground economy as the rationale to account for the real-world fiscal policy making.

Reference

Breusch, T. (2005) “Australia’s Cash Economy: Are the Estimates Credible?” *Economic Record* **81**, 394-403.

Chiarini, B., and E. Marzano (2006) “Market Consumption and Hidden Consumption. A Test for Substitutability” *Applied Economics* **38**(6), 707-716.

DeLong, J. B., and L. H. Summers (1986) "Are Business Cycles Symmetrical?" In R. J. Gordon (ed.), *The American Business Cycle: Continuity and Change*. Chicago, IL: University of Chicago Press, 166-179.

Eng Y.K., C.Y. Wong, and M.S., Habibullah (2008) *Healing the Achilles Heel of Monetary Method on the Size of Underground Economy in DSGE Model*. Unpublished manuscript, Universiti Tunku Abdul Rahman, Malaysia.

Feige, E. (1979) “How Big is the Irregular Economy?” *Challenge* **22**(1), 5-13.

Gavin, M., and R. Perotti (1997) “Fiscal Policy in Latin America” *NBER Macroeconomics Annual* **12**, 11-61.

Giles, D.E.A (1997) "Testing for Asymmetry in the Measured and Underground Business Cycles in New Zealand" *Economic Record* **73**(222), 225-232.

Gutmann, P. M. (1977) "The Subterranean Economy" *Financial Analysts Journal* **34** (1), 24-27.

Hayek, F. (1933) *Monetary Theory and the Trade Cycle*. London: Jonathan Cape.

Holly and Stannett (1995) "Are There Asymmetries in UK Consumption? A Time Series Analysis" *Applied Economics* **27**, 767-772.

Ilzetzki, E., and C.A. Vegh (2008) "Procyclical Fiscal Policy in Developing Countries: Truth or Fiction?" *NBER* Working Paper No. 14191.

Keynes, J.M. (1936) *The General Theory of Employment, Interest and Money*. London: McGraw-Hill.

Kiani, K.M. (2005) "Detecting Business Cycle Asymmetries Using Artificial Neural Networks and Time Series Models" *Computational Economics* **26**(1), 65-89.

Mitchell, W.C. (1927) *Business Cycles: The Problem and Its Setting*. New York: NBER.

Razzak, W.A. (2001) "Business Cycle Asymmetries: International Evidence" *Review of Economic Dynamics* **4**(1), 230-243.

Sichel, D.E. (1993) "Business Cycle Asymmetry: A Deeper Look" *Economic Inquiry* **31**(2), 224-236.

Schneider, F., and D., Enste (2000) "Shadow Economies: Size, Causes, and Consequences" *Journal of Economic Literature* **38**, 77–114.

Talvi, E., and C.A. Vegh (2005) "Tax Base Variability and Procyclical Fiscal Policy in Developing Countries" *Journal of Development Economics* **78**(1), 156-190.

Tanzi, V. (1980) "The Underground Economy in the United States: Estimates and Implications" *BancaNazionale del Lavoro* **135** (4), 427-453.

_____ (1983) "The Underground Economy in the United States: Annual Estimates, 1930–1980" *IMF Staff Papers* **30**(2), 283–305.

Thomas, J. (1999) "Quantifying the Black Economy: 'Measurement without Theory' Yet Again?" *Economic Journal* **109**, 381-389.