Designing Policies in the Presence of Hawala Markets

Kavita Rao and Suranjali Tandon

Working Paper No. 2015-142

January 2015

National Institute of Public Finance and Policy
New Delhi
http://www.nipfp.org.in

Designing Policies in the Presence of Hawala Markets

R. Kavita Rao
and
Suranjali Tandon

Abstract

To deal with rising current account deficits, the government often uses instruments such as increase in customs tariffs. These are expected to induce an appreciation in the currency. In the presence of hawala markets which constitute an alternative payment mechanism, the control exerted by the customs tariffs is diluted, thereby reducing the effectiveness of this policy in controlling depreciation of the currency. The paper explores the impact of the existence of such a mechanism on the effectiveness of various policy instruments in influencing outcomes on the official foreign exchange markets and GDP.

JEL Classification: F31, F32, K42, H26

Keywords: Hawala Market, Exchange Rate, Direct Tax Rate, Tax Administration, Customs Tariff

Designing Policies in the Presence of Hawala Markets

Introduction

In times of rising current account deficit the government responds through various instruments. In India, for example the recent surge in current account deficit and the consequent exchange rate depreciation prompted the government and the central bank to increase the customs tariff on gold and perform open market operations respectively. This is expected to reduce the import of gold and consequently improve the current account deficit. Open market operations (OMO) too would reduce the pressure on exchange rate. However the Indian experience revealed that the increase in gold tariffs reduced formal imports of gold while reports of gold smuggled into India increased. Newspaper reported the value of gold seized during the first quarter of the financial year 2013-14 at INR 270 million which was ten times that reported in 2012[1]. Assuming that the tax departments have not become significantly more efficient, this suggests that smuggling for gold increased. The payment for these forms of gold imports through the foreign exchange flows in the informal channels, often referred to as hawala, is reflected in a surge in hawala margins during the same period. Newspaper reports in India suggest that margins on hawala transactions have gone up from 0.5 per US$ to 3.5 per US$[2]. The existence and functioning of such a parallel market therefore relies on the nature of policy stance in the economy.

The existence of a parallel market for foreign exchange can dilute or vitiate the desired effect. This paper explores the impact of such a parallel market i.e. hawala market, on some key macroeconomic variables. In the process it also explores the effectiveness as well as existence of alternative policy instruments to address the goals such as stable exchange rate and higher level of income. Before exploring the theoretical impact of hawala it is important to ask whether the size of hawala market is large enough to have a bearing on the functioning of the economy.

While there are no firm estimates available, approximately US $ 5 to 7 billion enters Pakistan through the hawala channel[3]. Similarly, World Bank provides an estimate of the size of inflows and outflows through hawala in Afghanistan to be around US $6 billion[4]. In 2013, migrant workers and immigrants sent over $500 billion in remittances to family in their home country[5]. The size of the hawala market in India too is not negligible when compared to the size of the overall economy. As per Qorchi *et al* (2003) the share of unrecorded transactions in total private remittances to India between 1981 and 2000 were 16 per cent. Further, in 2007-08 the "funds transferred through the hawala market are between 30 to 40 per cent of the formal market…..Hawala market could amount to between Rs 650 to 850 cores

[1] Gold Smuggling Takes off in India, July 25th 2013 http://online.wsj.com/news/articles/SB10001424127887323971204578626420651144876

[2] High hawala premiums point to increase in gold smuggling, April 9 2014 http://www.livemint.com/Money/BB3n36U0zLvjzO1balrb6L/High-hawala-premiums-point-to-increase-in-gold-smuggling.html

[3] Faith D. (2011)

[4] Thompson E.A. (2006)

[5] Hawala: the Working Man's Bitcoin, February 7th 2014, available at http://priceonomics.com/hawala-the-working-mans-bitcoin/

(United State Dollars (USD) 13 billion to USD 17 billion)" [6] Therefore, the existence of such a market is bound to have an impact on economic variables.

Pre-empting the results, this exercise suggests that the existence of a hawala market tones down the impact of policy stimuli especially on the exchange rate implying thereby that to achieve a desired goal in foreign exchange rate correction a larger level of stimulus needs to be delivered. This however has a perverse consequence of augmenting the size of the hawala market.

The paper attempts to explore the linkages between the hawala market and the formal economy. The paper is organised as follows:

Section 2 provides a brief discussion of the functioning of the hawala market. In *section 3* a model for interaction of hawala and the official market is presented. Based on the model the impact of changes in policy is analysed in *section 4*. The results are then compared to assess the efficacy of policies in the presence of hawala markets (*section 5*).

2. Functioning of the Hawala Market

The hawala market is a network of agents that facilitate paperless transfer of funds across countries. An individual, who wants to transfer money from one country to another country, seeks out one of the agents and hands over the money to be transferred, as well as the details of the intended recipient. The recipient, in turn, receives the money in her local currency, either at the premises of the delivering agent or at her doorstep, as the case might be. The transaction works through communication between a network of 'hawaladars' and traditionally skips the banking system[7]. The hawaladar offers relatively better rates than those prevailing in the official market and earns a margin for facilitating such transactions. These margins are an indication of the level of activity in the hawala market. Since the flow of funds does not require documentation these are not recorded by national authorities.

Studies have suggested that these routes have predominantly been used by migrants to transfer money from one location to another. In India, for example, the backbone of this structure, in general has been the large transfer of incomes being repatriated by migrant workers to India. The remittances sent through the hawala channel are estimated to be 30-40 per cent of all such transfers. However, in recent times it has evoked a lot of interest as being a vehicle for financing terrorist activities and money laundering (*see* Ballard (2003), Passas(2003), Qorchi *et al* (2003) and Jost and Sandhu (2000) for a more detailed description and evolution of the system).

[6] Hawala money in India linked to terrorist financing: US, February 28th 2009 available at http://indianexpress.com/article/news-archive/print/hawala-money-in-india-linked-to-terrorist-financing-us/
How much cash leaves India, April 29th 2009 available at http://www.livemint.com/Opinion/0p5ikinHDm7Q0SwCdqSe3J/How-much-cash-leaves-India.html

[7] Banking system is also used occasionally, particularly for settlement mechanism (*see* Passas (2003)). However, the present discussion does not incorporate the interactions between the formal banking channel and Hawala.

Given the description of the hawala market we can think of potentially two kinds of users of this mechanism- the first group consisting of those using it for cost-effectiveness, efficiency and reliability. These would include individuals seeking to transfer legitimate or legal incomes, remittance is one example for such users. The second group consists of those using it for absence of bureaucracy and paper trail since they have difficulties revealing the source of funds. These include receipts from illegal sources or incomes that are undeclared to authorities for the purpose of tax evasion. Given that these fund flows are 'invisible' to the government/authorities they can well be illicit[8].

Another way to classify flows through hawala into inflows and outflows. In this paper we assume that the market clears, i.e. inflows are matched by equivalent outflows and that the hawala margins adjust to restore the equilibrium. For instance, the inflows on account of remittances from wage income of migrant labour would be matched by outflows by some agents in the economy.

3. Model for Hawala Market

Based on the discussion in *section 2* it is expected that flows through the hawala channel would respond to margins offered on inflows and outflows over the official rate of exchange. Assuming a certain spot rate for foreign exchange 'e' expressed as the number of units of domestic currency per unit of foreign currency, the official banking system offers a rate lower than the spot rate to inflows and higher than e to outflows. That is, a person moving funds out of the economy will be offered the rate (e+b) and for inflows the rate would be (e-a). Therefore a and b are the margins earned by banks. The price in the hawala market is the margin that the hawaladar offers to the customers over and above the rates offered in the formal markets, say by the banks. Given the rates prevailing in the official market, the hawaladar should be offering a rate slightly higher than the official channel to inflows and a relatively lower rate to outflows so as to ensure that these routes for fund flows are used. These can be represented as: for inflows $(e - a + \varepsilon)$ and $(e + b - \eta)$ for outflows, where ε and η are the margins offered. While ε is always positive η can be positive or negative depending on the market conditions. The flows through the hawala system can be expected to depend on these margins as well as on some other economic variables. For the hawala market to exist, at least one-side inflow or outflow-needs to be incentivised, that is one of ε or η has to be greater than zero. We assume that ε is always positive η can be positive or negative depending on the market conditions. The flows through the hawala system can be expected to depend on these margins as well on some other economic variables.

Every transaction in the hawala market involves the conversion of currency between domestic and foreign. Inflows in the hawala market will represent supply of dollars and demand for rupees while outflows in the hawala market will represent supply of rupees and demand for dollars. For the purpose of this model we call demand for rupees as the demand for hawala (Q_h^i).

Inflows can be divided into two categories a) flows which can come either through the official channels or unofficial market; here the margins would play a role in determining the quantum of flows, and b) flows which can come only through unofficial channels. Here factors other than margins would be determining factors.

[8]Bowers (2009)

It would be expected that, the demand in the hawala market would be increasing in the margin offered (ε). That is, if ε increases the inflows through hawala would also increase. Apart from ε, tax Rates can have a significant bearing on the decision to move money in through hawala. With an increase in the direct tax rate (T), exporters would choose to receive a larger part of their payments through hawala so that the value of exports remains undeclared and the corresponding income can remain beyond taxes. In such a case, the demand for hawala and direct tax rates will be positively related[9]. Another variable of importance could be tax administration (S), measured by an index of variables such as working strength and degree of computerisation of tax department. An increase in the index represents an improvement in tax administration. A more aggressive tax administration would imply an increase in the risk of detection of evaded incomes within the domestic economy thereby reducing the preference for inflows through the hawala, i.e. demand for hawala will decline. People/agents might choose to hold money abroad, or may launder these funds and bring them through official channels.

Lastly, the intervention in the foreign exchange market, through the sale of dollars, could lead to an appreciation of the rupee that could encourage some agents to hold dollars rather than converting them to rupee. In other words the demand for hawala could reduce. If the central bank decides to buy dollars the opposite will hold.

Apart from these there could be some exogenously determined flows which are represented by A_I. For instance, in the discussion on 2G spectrum there were references to money brought into the economy through the hawala to make bribe payments. While the veracity of these comments could be suspect, they do suggest that flows could arise as a result of factors other than those discussed here. These interactions can be summarised in the following manner.

$$Q_h^i = A_I + \beta_0 \varepsilon + \beta_1 T - \beta_2 S - \beta_3 E$$

Where,

A_I : Autonomous inflows through hawala
ε : Hawala margin for inflows
T : Direct tax rate
S : Index of tax administration
E : Foreign exchange intervention by the central bank

The supply of hawala is the supply of rupees in the hawala market that is the total outflows through the unofficial channel (Q_h^o). Some of the variables likely to influence supply of hawala, apart from the hawala margin (η), are level of domestic income (GDP), tariff rate (τ) and index of tax administration (S).

There could be some outflows such as receipts from bribes that will choose to move through hawala route irrespective of other considerations. These autonomous flows have been represented by A_O. Apart from these, outflows will be influenced by the margin offered on outflows. It is expected outflows would be positively related to η. Other than the margin, the state of the economy can also play an important role in determining the quantity of outflows. Further, higher levels of GDP might also support higher levels of "bribes" and other rents which remain beyond the formal accounts. These too might move out of the jurisdiction.

The imposition of tariffs like the recent increase in gold tariff may lead to higher outflows in order to pay for imports that have been under-reported to evade

[9] In countries where the export incomes are exempt the opposite might appear.

higher costs. Under-reporting could take the form of under-valuation or even smuggling in case of high value items such as gold. Therefore higher tariffs (τ) could lead to higher outflows through hawala.

Lastly, we argue that tax administration would positively affect outflows through hawala. With improved tax administration, the threat of detection in the system increases and the risk associated with accumulation of unaccounted incomes also increases. Therefore, individuals would want to move unaccounted incomes out of the domestic economy thereby leading to an increase in outflows. The flows that respond to tax administration are those that do not have the option to move through the official channel. Therefore, when the risk of detection heightens the individuals seeking to conceal their incomes move money through hawala.

In brief, therefore outflows can be written as:

$$Q_h^o = A_O + \gamma_0 \eta + \gamma_1 GDP + \gamma_2 \tau + \gamma_3 S$$

Where,

A_O : Autonomous outflows through hawala
η : Hawala margin for outflows
τ : Tariff rate
S : Index of Tax administration

i. Profit Maximisation by hawaladar

The hawaladar mediates between outflows and inflows and derives an income through margins on both sets of transactions. The hawaladar's profit function can be expressed as follows:

$$P = (\, e + b - \eta) - (e - a + \varepsilon)$$

As mentioned earlier, there are two margins, one is assumed to be determined by the hawaladar (ε) while the market clearing condition would determine the other (η). The total volume of transactions in the hawala market can be expressed either in terms of inflows or outflows since each inflow is matched by a corresponding outflow. The profit (π^h) for the hawaladar can then be written as follows:

$$\pi^h = [(\, e + b - \eta) - (e - a + \varepsilon)](Q_h^i)$$

He maximises his profit by choosing a value of ε

From the first order conditions,

$$\frac{\partial \pi^h}{\partial \varepsilon} = \beta_0(a + b + \eta - \varepsilon) - (\, A_I + \beta_0 \varepsilon + \beta_1 T - \beta_2 S - \beta_3 E)$$

Or

$$\varepsilon = \frac{a+b-\eta}{2} - \frac{(A_I + \beta_1 T - \beta_2 S - \beta_3 E)}{2\beta_0} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(1)}$$

ii. Market Clearing Condition for Hawala

The market clearing condition, i.e, $Q_h^i = Q_h^o$ can be written as follows

$$A_I + \beta_0 \varepsilon + \beta_1 T - \beta_2 S - \beta_3 E = A_O + \gamma_0 \eta + \gamma_1 GDP + \gamma_2 \tau + \gamma_3 S \ \ldots\ldots\ldots\ldots\ldots\ldots \text{(2)}$$

Solving (1) and (2) for ε and η, we get

$$\varepsilon = \left[\frac{a+b}{2\left(1+2\frac{\beta_0}{\gamma_0}\right)} - \frac{A_I - A_O}{2\gamma_0+\beta_0} - \frac{A_I}{2\beta_0\left(1+\frac{\beta_0}{2\gamma_0}\right)}\right] - \left[\frac{1}{\gamma_0}+\frac{1}{\beta_0}\right]\left(\frac{\beta_1}{2+\frac{\beta_0}{\gamma_0}}\right)T + \left[\frac{\beta_2+\gamma_3}{\gamma_0}+\frac{\beta_2}{\beta_0}\right]\left(\frac{1}{2+\frac{\beta_0}{\gamma_0}}\right)\mathrm{S} + \left[\frac{1}{\gamma_0}+\frac{1}{\beta_0}\right]\left(\frac{\beta_3}{2+\frac{\beta_0}{\gamma_0}}\right)\mathrm{E} + \frac{\gamma_1}{2\gamma_0+\beta_0}\mathrm{GDP} + \frac{\gamma_2}{2\gamma_0+\beta_0}\tau \quad \ldots\ldots \quad (3)$$

$$\eta = \frac{A_O}{(\gamma_{0+\frac{\beta_0}{2}})} - \frac{A_I}{2\,(\gamma_{0+\frac{\beta_0}{2}})} - \beta_0\frac{(a+b)}{2\,(\gamma_{0+\frac{\beta_0}{2}})} - \frac{\beta_1 T}{2\,(\gamma_{0+\frac{\beta_0}{2}})} + \left(\frac{\beta_2+2\gamma_3}{2\,(\gamma_{0+\frac{\beta_0}{2}})}\right)S + \frac{\gamma_1}{(\gamma_{0+\frac{\beta_0}{2}})}GDP + \frac{\gamma_2}{(\gamma_{0+\frac{\beta_0}{2}})}\tau + \frac{\beta_3}{2(\gamma_{0+\frac{\beta_0}{2}})}E \quad \ldots\ldots \quad (4)$$

iii. Official Market

a. Market for Foreign Exchange (Dollar)

The demand for foreign exchange (F^d) in the official market depends on the level of imports and capital outflows. On the other hand, foreign exchange supplied (F^s)corresponds to proceeds from exports and capital inflows.

$$F^d = f(Imports, Capital\ Outflows)$$
$$F^s = f(Exports, Capital\ Inflows)$$

The factors determining each of these variables are drawn from existing literature.

In theory, GDP and exchange rate (e) are treated as the two most important determinants of imports and exports. In one of the earliest papers that provide a model for demand and supply of exports and imports, for developing countries, demand for imports has been expressed as a function of relative prices and the domestic level of income whereas that for exports depends on the world income and export prices (Khan(1974)). A formulation similar to that used in Khan (1974) has been adopted by other studies such as Krishnamurthy and Pandit (1997) that have undertaken the estimation of these equations for India and Aydın, Çıplak and Yücel (2004) for Turkey. In addition to exchange rate and income, rate of import tariff is recognised as an important determinant of imports. Studies such as Pandit and Krishnamurthy (1997) and Dutta and Ahmed (2004) find that tariffs are an important determinant of imports. Therefore, tariff (τ) has been introduced in the import equation as an explanatory variable. On the other hand, literature pertaining to trade misinvoicing recognises the role of under-reporting exports to evade taxes on incomes. “Profits earned (that are revealed) are generally subject to domestic taxes (on net earnings), based usually on nonlinear tax schedules. In such a scenario, incentives would exist to under-invoice exports.”[10] To incorporate this impact, we have introduced direct tax rate variable (T) in the export equation[11]. Incorporating these variables, the equations for exports and imports can be written as:

[10] http://www.ifpri.org/sites/default/files/publications/ifpridp01157.pdf

[11] There can be incentives to exports which reduce the parameter of the sensitivity to tax rates. However, as long as the sign of the parameter remains unaltered, the same results hold. Incentivised exports in the form of SEZ account for only 18.22 per cent of the total exports.

i. Export Equation

$$X = \theta_0 GDP^* + \theta_1 e - \theta_2 T$$

ii. Import Equation

$$M = \alpha_0 GDP - \alpha_1 e - \alpha_2 \tau$$

The other two components, i.e., capital inflows and outflows can largely be described as foreign investment flows. Growth has been accepted as a significant determinant of FDI in literature. In fact, growth hypothesis was developed in Lim (1983) that stated rapidly growing economies provide a greater opportunity to make profits[12]. In this paper, we have used difference in the domestic and foreign rates of growth $(r^f - r)$since the decision to invest depends on the growth of domestic economy as compared with the world rate of growth. While capital inflows are expressed as related positively to the differences in rates of growth, capital outflows are expressed as a negative function of the same. The reason for the choice of signs is that if the growth of the foreign economy is higher than that of the domestic economy the inflows will decline due to under- performance perceived as a potential risk to future returns. On the other hand if the domestic rate of growth is lower than the global rate of growth, outflows from the economy will increase. Similarly, the decision to invest depends on the exchange rate- a number of studies have found "positive and negative effects on FDI" of changes in exchange rate (Demirhan and Masca (2008)). In this model, it is proposed that nominal depreciation increases inflows since the same value of foreign exchange buys a larger value of domestic currency or generates a larger presence in the domestic economy. At the same time nominal depreciation of the currency discourages outflows since for the same rupee value of investment the investor will receive lower value of assets denominated in foreign currency. Therefore, the exchange rate is positively related to inflows and negatively to outflows[13].

In addition to these variables, hawala margin (ε) is added to the equation for capital inflows. Higher hawala margins for inflows would encourage routing of inflows through the hawala channel as against the formal channel. It is possible that reported export earnings too could be influenced by hawala margins, with higher margins encouraging more inflows through hawala route, but since the direction of influence is similar to that of capital inflows, for simplicity, ε is included as an explanatory variable only in capital inflows. The equations for capital inflows (KI) and capital outflows (KO) can be written as follows:

i. Capital Inflows

$$KI = -\lambda_0 (r^f - r) + \lambda_1 e - \lambda_2 \varepsilon$$

ii. Capital Outflows

$$KO = \delta_0 (r^f - r) - \delta_1 e$$

Putting together the components of balance of payments we get the functions for the demand (M+ KO) and supply of foreign exchange (X+KI).

[12] The list of studies that have found a positive relationship between the rates of growth and FDI is extensive however for illustration Lunn (1980), Schneider and Frey (1985) and Culem (1988) are few of such studies.

[13] The rate of return is another determinant of financial flows to a country. There is no consistent result in the literature on the impact of interest rate on FDI flows. Since the direction of impact is not known this model does not incorporate interest rates as a variable.

$$F^d = \alpha_0 GDP - \alpha_1 e - \alpha_2 \tau + \delta_0 (r^f - r) - \delta_1 e$$
$$F^s = E + \theta_0 GDP^* + \theta_1 e - \theta_2 T - \lambda_0 (r^f - r) + \lambda_1 e - \lambda_2 \varepsilon$$

Using the market clearing condition, we get

$$\alpha_0 GDP \alpha_1 e - \alpha_2 \tau + \delta_0 (r^f - r) - \delta_1 eE + \theta_0 GDP^* + \theta_1 e - \theta_2 T - \lambda_0 (r^f - r) + \lambda_1 e - \lambda_2 \varepsilon \; .. \quad (5)$$

b. Size of the Economy

GDP[14] is itself a function of exports and imports, therefore the changes in either may lead to changes in GDP. GDP is the sum of household consumption, government spending, investment expenditures and the trade balance.

$$GDP = C + I + G + X - M$$

Considering a simplistic consumption function (C=cY) and assuming I and G are exogenously determined, GDP can be expressed as a function of other variables, as follows:

$$GDP = cGDP + I + G + \theta_0 GDP^* + \theta_1 e - \theta_2 T - \alpha_0 GDP + \alpha_1 e + \alpha_2 \tau$$

Let I+G=B

Then,

$$GDP = \frac{B + \theta_0 GDP^* + (\theta_1 + \alpha_1) e - \theta_2 T + \alpha_2 \tau}{(1 - c + \alpha_0)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

Combining (5) and (6) above, we get

$$\alpha_0 \left(\frac{B + \theta_0 GDP^* + (\theta_1 + \alpha_1) e - \theta_2 T + \alpha_2 \tau}{(1 - c + \alpha_0)} \right) - \alpha_1 e - \alpha_2 \tau + \delta_0 (r^f - r) - \delta_1 e$$
$$= E + \theta_0 GDP^* + \theta_1 e - \theta_2 T - \lambda_0 (r^f - r) + \lambda_1 e - \lambda_2 \varepsilon$$

Let μ=($[\lambda_1 + \delta_1 + \theta_1 + \alpha_1] - \frac{\alpha_0}{1 - c + \alpha_0} (\theta_1 + \alpha_1)$) , where μ >0.

Then,

$$e = \frac{1}{\mu} \Big[\frac{\alpha_0}{1 - c + \alpha_0} B - \theta_0 \left(\frac{1 - c}{1 - c + \alpha_0} \right) GDP^* + \theta_2 \left(\frac{1 - c}{1 - c + \alpha_0} \right) T - \alpha_2 \left(\frac{1 - c}{1 - c + \alpha_0} \right) \tau$$
$$+ (\lambda_{0+} \delta_0)(r^f - r) + \lambda_2 \varepsilon - E \Big]$$

Let,

i. $\frac{\alpha_0}{\mu(1 - c + \alpha_0)} = \mathbb{B} > 0$

ii. $\theta_0 \left(\frac{1 - c}{\mu(1 - c + \alpha_0)} \right) = \pi_1 > 0$

iii. $\theta_2 \left(\frac{1 - c}{\mu(1 - c + \alpha_0)} \right) = \pi_2 > 0$

iv. $\alpha_2 \left(\frac{1 - c}{\mu(1 - c + \alpha_0)} \right) = \pi_3 > 0$

[14] In this paper all references to GDP pertain to its reported value. However, the actual size of the activity can be different from what is being reported.

v. $\frac{(\lambda_0+\delta_0)}{\mu} = \pi_4 > 0$

vi. $\frac{\lambda_2}{\mu} = \pi_5 > 0$

vii. $\frac{1}{\mu} = \pi_6 > 0$

The equation for 'e' can be written as:

$$e = \mathbb{B} - \pi_1 GDP^* + \pi_2 T - \pi_3 \tau + \pi_4(r^f - r) + \pi_5 \varepsilon - \pi_6 E \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (7)$$

The equation captures the likely impact of changes in tax rate, customs tariff, difference in the rates of growth, foreign exchange intervention, Hawala margin and foreign GDP on the exchange rate. The direction of impact of E, GDP* and τ is negative while that of T, $(r^f - r)$ and ε is positive.

Using *equations (3*) and *(6)* we can solve for 'ε' as follows:

$$\begin{aligned}\varepsilon = &\left[\frac{a+b}{2\left(1+2\frac{\beta_0}{\gamma_0}\right)} - \frac{A_I - A_o}{2\gamma_0+\beta_0} - \frac{A_I}{2\beta_0\left(1+\frac{\beta_0}{2\gamma_0}\right)} + \frac{\gamma_1}{2\gamma_0+\beta_0}\cdot\frac{B}{(1-c+\alpha_0)}\right] \\ &- \left\{\left[\frac{1}{\gamma_0}+\frac{1}{\beta_0}\right]\left(\frac{\beta_1}{2+\frac{\beta_0}{\gamma_0}}\right) + \frac{\gamma_1}{2\gamma_0+\beta_0}\cdot\frac{\theta_2}{(1-c+\alpha_0)}\right\} T \\ &+ \left[\frac{\beta_2+\gamma_3}{\gamma_0}+\frac{\beta_2}{\beta_0}\right]\left(\frac{1}{2+\frac{\beta_0}{\gamma_0}}\right) \mathrm{S} + \left(\frac{\gamma_1\alpha_2}{2\gamma_0+\beta_0(1-c+\alpha_0)} + \frac{\gamma_2}{2\gamma_0+\beta_0}\right)\tau \\ &+ \left(\frac{\gamma_1}{2\gamma_0+\beta_0}\cdot\frac{(\theta_1+\alpha_1)}{(1-c+\alpha_0)}\right) e + \left[\frac{1}{\gamma_0}+\frac{1}{\beta_0}\right]\left(\frac{\beta_3}{2+\frac{\beta_0}{\gamma_0}}\right) \mathrm{E} \\ &+ \left(\frac{\gamma_1}{2\gamma_0+\beta_0}\cdot\frac{\theta_0}{(1-c+\alpha_0)}\right) GDP^*\end{aligned}$$

Let ,

i. $\left[\frac{a+b}{2\left(1+2\frac{\beta_0}{\gamma_0}\right)} - \frac{A_I-A_o}{2\gamma_0+\beta_0} - \frac{A_I}{2\beta_0\left(1+\frac{\beta_0}{2\gamma_0}\right)} + \frac{\gamma_1}{2\gamma_0+\beta_0}\cdot\frac{B}{(1-c+\alpha_0)}\right] = \mathbb{A}$

ii. $\left\{\left[\frac{1}{\gamma_0}+\frac{1}{\beta_0}\right]\left(\frac{\beta_1}{2+\frac{\beta_0}{\gamma_0}}\right) + \frac{\gamma_1}{2\gamma_0+\beta_0}\cdot\frac{\theta_2}{(1-c+\alpha_0)}\right\} = \omega_1$

iii. $\left[\frac{\beta_2+\gamma_3}{\gamma_0}+\frac{\beta_2}{\beta_0}\right]\left(\frac{1}{2+\frac{\beta_0}{\gamma_0}}\right) = \omega_2$

iv. $\left(\frac{\gamma_1\alpha_2}{2\gamma_0+\beta_0(1-c+\alpha_0)} + \frac{\gamma_2}{2\gamma_0+\beta_0}\right) = \omega_3$

v. $\left(\frac{\gamma_1}{2\gamma_0+\beta_0}\cdot\frac{(\theta_1+\alpha_1)}{(1-c+\alpha_0)}\right) = \omega_4$

vi. $\left[\frac{1}{\gamma_0}+\frac{1}{\beta_0}\right]\left(\frac{\beta_3}{2+\frac{\beta_0}{\gamma_0}}\right) = \omega_5$ and

vii. $\left(\frac{\gamma_1}{2\gamma_0+\beta_0}\cdot\frac{\theta_0}{(1-c+\alpha_0)}\right) = \omega_6$

where ω_1, ω_2, ω_3, ω_4, ω_5 and ω_6 are greater than zero. Then 'ε' can be written as

$$\varepsilon = \mathbb{A} - \omega_1 T + \omega_2 S + \omega_3 \tau + \omega_4 e + \omega_5 E + \omega_6 GDP^* \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (8)$$

Using *equations (7*) and *(8),* we can solve for 'e' and 'ε'. Further the expression for 'e' can be substituted in (6) to get an expression for GDP. These are presented below-

i. $$e = \frac{(\mathbb{B}+\pi_5\mathbb{A})}{1-\pi_5\omega_4} - \frac{(\pi_1-\pi_5\omega_6)}{1-\pi_5\omega_4} GDP^* + \frac{(\pi_2-\pi_5\omega_1)}{1-\pi_5\omega_4} T - \frac{(\pi_3-\pi_5\omega_3)}{1-\pi_5\omega_4} \tau + \frac{\pi_4}{1-\pi_5\omega_4}(r^f - r) + \frac{\pi_5\omega_2}{1-\pi_5\omega_4} S - \frac{(\pi_6-\pi_5\omega_5)}{1-\pi_5\omega_4} E$$

ii. $$\varepsilon = \frac{\mathbb{A}+\omega_4\mathbb{B}}{1-\pi_5\omega_4} - \frac{(\omega_1-\omega_4\pi_2)}{1-\pi_5\omega_4} T + \frac{\omega_2}{1-\pi_5\omega_4} S + \frac{(\omega_3-\pi_3\omega_4)}{1-\pi_5\omega_4}\tau + \frac{\omega_4\pi_4}{1-\pi_5\omega_4}(r^f - r) + \frac{(\omega_5-\omega_4\pi_6)}{1-\pi_5\omega_4} E + \frac{(\omega_6-\omega_4\pi_1)}{1-\pi_5\omega_4} GDP^*$$

iii. $$GDP = \left(1 + \frac{(\theta_1+\alpha_1)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\mathbb{B}\right) + \frac{[(\theta_1+\alpha_1)]}{(1-c+\alpha_0)}\frac{\pi_5}{(1-\pi_5\omega_4)}\mathbb{A} + \left[\frac{\theta_0}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_1-\pi_5\omega_6)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right] GDP^* - \left[\frac{\theta_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_2-\pi_5\omega_1)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right] T + \left[\frac{\alpha_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_3-\pi_5\omega_3)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right] \tau + \frac{\pi_4}{1-\pi_5\omega_4}.\frac{(\theta_1+\alpha_1)}{(1-c+\alpha_0)}(r^f - r) - \frac{(\theta_1+\alpha_1)(\pi_6-\pi_5\omega_5)}{(1-c+\alpha_0)(1-\pi_5\omega_4)} E + \frac{(\theta_1+\alpha_1)\pi_5\omega_2}{(1-c+\alpha_0)(1-\pi_5\omega_4)} S$$

An important condition for the stability of the system is that $(1 - \pi_5\omega_4)$ be greater than zero. $\pi_5\omega_4$ measures the indirect effect of hawala on the official market. For all values where $\pi_5\omega_4$ is less than one, the overall impact of changes in each of the policy variables produces expected results.[15] From the three *equations* it is possible to see that changes in any policy variable will impact the exchange rate, hawala margin on inflows and GDP simultaneously. The individual effect of each of the policies on exchange rate and GDP is discussed in the following section.

4. Impact of Various Policy Changes and Exogenous Shocks

a. Change in Customs Tariff

As discussed earlier, when the government raises the customs rates on import of gold both hawala and Official market will adjust with these changes. That is, an increase in tariff will not only lead to a direct impact on 'e', it will also affect 'e' through its impact on the hawala margin on inflows.

$$\frac{de}{d\tau} = \frac{1}{1-\pi_5\omega_4}(-\pi_3 + \pi_5\omega_3) < 0$$

Had there been no hawala market the nominal exchange rate would have appreciated in response to the higher customs tariff as shown by the first term in the expression above. Instead, the hawala market provides an alternative medium to pay for under-invoiced imports and therefore the full impact of such policy is not realised. The first and the second component of $\frac{de}{d\tau}$ bear opposite signs highlighting this aspect. Assuming that the indirect effect of hawala does not exceed the direct effect, the exchange rate is expected to appreciate with an increase in the customs tariff.

[15] There can be a perverse case where the indirect impact of the hawala market outweighs the direct effect. In that case value of $\pi_5\omega_4$ will be greater than one. The results will then be counter-intuitive.

The impact of the import tariff on the level of income can also be computed.

$$\frac{dGDP}{d\tau} = \frac{\partial GDP}{\partial \tau} + \frac{\partial GDP}{\partial \varepsilon} \times \frac{\partial \varepsilon}{\partial \tau}$$

$$\frac{dGDP}{d\tau} = \frac{[\alpha_2 - (\theta_1 + \alpha_1)(\pi_3 - \pi_5\omega_3)]}{(1 - c + \alpha_0)(1 - \pi_5\omega_4)} > 0$$

The level of GDP increases with an increase in tariff, as is expected, due to the decline in the leakages through imports. However, the exchange rate appreciation that follows also reduces the GDP due to the reduced competitiveness of exports. The two taken together measure the net impact of changes in official market. The presence of the hawala market tones down the impact of exchange rate changes on the GDP. The impact of the hawala market is through the exchange rate channel. Since the impact of 'τ' on 'e' is smaller in the presence of hawala, the impact of 'τ' on GDP will be re-inforced by that of hawala market.

b. Changes in Direct Tax Rate

The government in an effort to improve its revenues may decide to step up the prevailing direct tax rates. The direct response of an increase in the tax rate will be lower reported value of exports which in turn will result in a depreciation of the exchange rate. If this change is in the form of export under-invoicing, part of the foreign exchange receipts for these exports could move through the hawala channel and bring down the margin on inflows The overall impact of tax rate on exchange rate therefore would be as follows:

$$\frac{de}{dT} = \frac{1}{1 - \pi_5\omega_4}(\pi_2 - \pi_5\omega_1) > 0$$

The extent of depreciation of the exchange rate would be lower in the presence of the hawala market. In other words, hawala market tones down the impact of increase in Ton 'e'.

The GDP adjusts to these changes in the following manner:

$$\frac{dGDP}{dT} = \frac{\partial GDP}{\partial T} + \frac{\partial GDP}{\partial \varepsilon} . \frac{\partial \varepsilon}{\partial T}$$

$$\frac{dGDP}{dT} = -\left[\frac{\theta_2}{(1 - c + \alpha_0)} - \frac{(\theta_1 + \alpha_1)(\pi_2 - \pi_5\omega_1)}{(1 - c + \alpha_0)(1 - \pi_5\omega_4)}\right] < 0$$

The direct impact of an increase in 'T' is a decline in the reported exports, which in turn would lead to a decline in GDP and an increase in 'e'. To the extent that the increase in 'e' is muted by the presence of hawala market, the correction in GDP as a result of an increase in 'e' too will be muted. In other words, the decline in GDP resulting from an increase in T is larger in the presence of hawala. This discussion also suggests that a reduction in T can stimulate the economy, the stimulus being larger in the presence of hawala. The impact on 'e' too would be smaller.

In the present model we have assumed that an increase in the direct tax rate induces exporters to report lower value of exports. However in a system where exports are incentivised through exemptions the opposite would hold true. In such a case an increase in T will lead to an exchange rate appreciation and an increase in GDP.

c. Change in Tax Administration

Improvements in tax administration initiated through measures such as increase in work strength of the tax department, computerisation of information tends to heighten the risk of detection of incomes that evade taxes. Therefore, from this model it follows that when such improvements are introduced the depreciation in the official exchange rate will come through the hawala channel.

$$\frac{de}{dS} = \frac{\pi_5 \omega_2}{1 - \pi_5 \omega_4} > 0$$

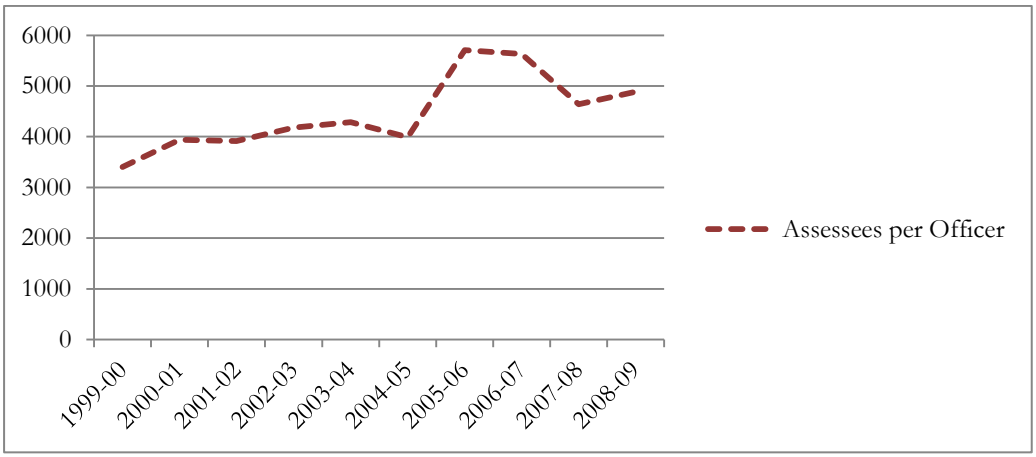
The improvement in tax administration measured by an increase in the index 'S' leads to lower inflows through the hawala channel and higher outflows. Since the individuals with undeclared incomes would want to move these out of the country. The increase in outflows and a simultaneous reduction in inflows will lead to a rise in 'ε' and a lower 'η'. With higher margins being offered to inflows on the hawala channel some of the official flows will move through this channel. The decline in flows through official channel would then result in a depreciation of the official exchange rate. The impact on GDP of this change is as follows:

$$\frac{(\theta_1 + \alpha_1)\pi_5 \omega_2}{(1 - c + \alpha_0)(1 - \pi_5 \omega_4)} S > 0$$

An improvement in the tax administration leads to an increase in GDP.

While on the face of it, deterioration in tax administration does not seem to be a policy tool, the announcement of GAAR regime followed by an announcement of its postponement could well be read as signal in toning down tax administration. If there is a freeze in employment as a part of fiscal restructuring, this too will have an impact on the efficiency of the tax department over time. However, with an expansion of level of activity the number of assessees will increase. Therefore, the workload per officer will increase. While measures such as computerisation are taken to reduce workload, since these are sporadic efforts the continuous increase in assessees is expected to increase the workload. *Figure 1* shows that there are periods when it worsens and periods when it improves, i.e., scan both an increase and decrease.

Figure 1: Number of Assesses per Officer in India



Source: *Union compliance audit report for direct taxes, CAG*

Therefore, with the possibility of worsening of tax administration as shown for the years 2007-08 in *figure 1*, the opposite results i.e. exchange rate appreciation and decline in GDP are expected.

d. Foreign Exchange Intervention

Central banks often intervene in the foreign exchange market to manage the value of their currency. This could be to maintain the value within the band specified for a managed float or curtail volatility. Recently, there have been instances where central banks have stepped in. The United States in 2008 and 2010 performed an open market operation to increase the supply of dollars. Other central banks, also intervene to reduce volatility, for example the Reserve Bank of Australia[16] on several occasions intervened to stabilise the value of Australian dollar. Further, the recent decline in value of the rupee was followed by an intervention by Reserve Bank of India to maintain the value of rupee versus the US dollar. In 2013 the RBI bought and sold $10.3 billion[17].

The cumulative impact of OMO's on the official exchange rate will be:

$$\frac{de}{dE} = -\frac{1}{1-\pi_5\omega_4}(\pi_6 - \pi_5\omega_5) < 0$$

The response of the official market to an increase in 'E' is the appreciation of currency. The intended response of the central bank's sale of dollars) in times of depreciation is muted to the extent that individuals put off their decisions to move through hawala, that in turn raises 'ε' and therefore shifts some of the flows to the unofficial channel. In a situation where $\pi_5\omega_5 > \pi_6$, i.e. the indirect impact through the hawala market exceeds the direct response of exchange rate to OMO, an increase in 'E' could lead to further depreciation. However, assuming that the hawala market's response to changes in 'E' does not more than offset the impact through the official market, increase in 'E' will result in a muted appreciation. The impact of these changes on GDP is as follows:

$$\frac{dGDP}{dE} = -\frac{(\theta_1 + \alpha_1)(\pi_6 - \pi_5\omega_5)}{(1 - c + \alpha_0)(1 - \pi_5\omega_4)} < 0$$

While an exchange rate appreciation on account of an increase in 'E' would have reduced the GDP through a reduction in exports, it is now countered by the reduction in the realised appreciation due to hawala. Therefore, the contraction in GDP too like the exchange rate is lower because of the impact of the hawala market. The more sensitive the hawala market, more muted will be the reduction in GDP.

e. Change in Autonomous Capital Flows through Hawala

An increase in the outflows through the hawala channel could be the result of factors such as- rise in corruption or if FDI is incentivised, domestic investors might choose to move funds abroad through hawala and bring them back through the official channel, change in ceilings on the FDI in sectors could encourage such round-tripping as well. This will lead to an exchange rate depreciation and increase in GDP.

[16] Newman, Potter and Wright (2011)

[17] Rajan plays middleman with currency intervention: India Credit, November 13th 2013 available at http://www.bloomberg.com/news/2013-11-12/rajan-plays-middleman-with-currency-intervention-india-credit.html

$$\frac{de}{dA_O} = \frac{\pi_5}{1-\pi_5\omega_4}.\frac{1}{2\gamma_0+\beta_0} > 0$$

An increase in A_O leads to higher 'ε' that moves some of the official flows to hawala channel therefore leading to an exchange rate depreciation. The change in GDP on account of such an increase in outflows is as follows:

$$\frac{dGDP}{dA_O} = \frac{[(\theta_1+\alpha_1)]}{(1-c+\alpha_0)}\frac{\pi_5}{(1-\pi_5\omega_4)}.\frac{1}{2\gamma_0+\beta_0} > 0$$

The depreciation of the exchange rate will encourage exports that in turn will lead to an increase in GDP.

Similarly, there could be system is which there are incentives for inflows to move through the hawala channel. The recent example in India's case is that of the 2G spectrum. In such a case the inflows through the hawala would lead to an appreciation of the exchange rate and a decline in GDP

$$\frac{de}{dA_I} = -\frac{\pi_5}{1-\pi_5\omega_4}.\frac{1}{2\gamma_0+\beta_0} < 0$$

$$\frac{dGDP}{dA_I} = -\frac{[(\theta_1+\alpha_1)]}{(1-c+\alpha_0)}\frac{\pi_5}{(1-\pi_5\omega_4)}.\frac{1}{2\gamma_0+\beta_0} < 0$$

5. Conclusion

In the previous section the impact on 'e' and 'GDP' of various policy changes as well as exogenous shocks have been summarised. From the results it is possible to isolate the impact owed specifically to the hawala channel. *Table 1* provides a comparison of the impact on 'e' and 'GDP' with and without the hawala market.

Table 1: Comparison of impact of policy changes on exchange rate and GDP

	Policy Change	Change in 'e'		Change in GDP	
		With Hawala	Without Hawala	With Hawala	Without Hawala
1.	Increase in Customs tariff	$-\frac{(\pi_3-\pi_5\omega_3)}{1-\pi_5\omega_4} < 0$	$-\pi_3$	$\left[\frac{\alpha_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_3-\pi_5\omega_3)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right] > 0$	$\frac{\alpha_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)\pi_3}{(1-c+\alpha_0)} > 0$
2.	Improvement in Tax Administration	$\frac{\pi_5\omega_2}{1-\pi_5\omega_4}>0$	–	$\frac{(\theta_1+\alpha_1)\pi_5\omega_2}{(1-c+\alpha_0)(1-\pi_5\omega_4)} > 0$	–
3.	Increase in supply of foreign exchange	$-\frac{(\pi_6-\pi_5\omega_5)}{1-\pi_5\omega_4}<0$	$-\pi_6$	$-\frac{(\theta_1+\alpha_1)(\pi_6-\pi_5\omega_5)}{(1-c+\alpha_0)(1-\pi_5\omega_4)} < 0$	$-\frac{(\theta_1+\alpha_1)\pi_6}{(1-c+\alpha_0)} < 0$
4.	Increase in Direct Tax Rate	$\frac{(\pi_2-\pi_5\omega_1)}{1-\pi_5\omega_4} > 0$	π_2	$-\left[\frac{\theta_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_2-\pi_5\omega_1)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right] < 0$	$-\left(\frac{\theta_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)\pi_2}{(1-c+\alpha_0)}\right) < 0$

It is interesting to note that, from this model, tax administration becomes available as a policy instrument only upon the introduction of the hawala market.

Two important results emerge from the model. First that for achieving the given target 'e' the central bank and the government have more than one policy instrument to choose from. This is helpful if the foreign exchange reserves are scarce or in short supply. In such a case an increase in the customs tariff or a reduction in direct tax rates could be a better option. Further, they both would be preferable if the intended result is also an increase in GDP.

Second, with an increase in tariff, an increase in the tax rates and a sale of dollars, the change in 'e' is toned down by the presence of hawala. Therefore to achieve a specific target, the quantum of intervention will have to be larger in the presence of hawala.

If the central bank wishes to achieve a predetermined impact on 'e' it will have to perform a higher value of intervention in the presence of hawala. From the model it follows that change in 'E' of one unit, in the absence of hawala , would have caused 'e' to appreciate by π_6. Therefore to achieve the change in, 'E' will have to be increased by

$$dE = \frac{de}{\left(\frac{de}{dE}\right)} = \frac{\pi_6((1-\pi_5\omega_4)}{(\pi_6-\pi_5\omega_5)} > 1$$

This change in 'E' will generate a change in GDP that is equivalent of what would have been in the case of absence of hawala, i.e.

$$-\frac{(\theta_1+\alpha_1)\pi_6}{(1-c+\alpha_0)} < 0$$

However, the higher value of intervention will also change the level of activity in the hawala market. To analyse the impact on the formal market would provide a partial picture. The hawala margin would respond simultaneously to a change in 'E'. Since the open market operation lowers the supply of domestic currency thereby leading to an appreciation, some individuals using the hawala channel would put off the decision to bring in money through this channel. Therefore 'ε' will have to adjust upwards to incentivise such inflows. The change in ε would be larger than that would have otherwise resulted $d\varepsilon|_{E^*} > d\varepsilon|_E$. This implies that the size of the hawala market increases with an OMO that incorporates the impact of hawala.

Further, the impact on GDP is less consistent than that on 'e'. With an increase in the customs tariff and an increase in direct tax the change in GDP is amplified by the existence of hawala. Conversely, in case of the sale of dollars by the central bank the decline in the GDP is lower in the presence of hawala market.

So if the government wants to increase the income while leaving the exchange rate unchanged it can lower the direct tax rate while improving the tax administration. While a combination of the two will leave 'e' unchanged[18], the impact on GDP will be positive. The simultaneous implementation of these two measures created incentives in the system to declare more incomes.

For the reduction in the direct tax rate to be an effective policy tool to achieve higher level of income, it is important to know if the tax revenue of the government will

[18] Such a change would be realised if the condition $\pi_5(\omega_1+\omega_2) = \pi_2$

be affected. The total revenue of the government in our model would be the sum of customs and direct taxes.

$$Tax\ Revenue(TR) = T.GDP + \tau.Imports$$

Therefore the change in the tax revenue with a reduction in direct tax rate can be expressed as:

$$\frac{\partial TR}{\partial T} = GDP + T.\frac{\partial GDP}{\partial T} + \tau.\frac{\partial M}{\partial GDP}\frac{\partial GDP}{\partial T}$$

Or

$$\begin{aligned}\frac{\partial TR}{\partial T} = \Bigg[\Bigg(1 + \frac{(\theta_1+\alpha_1)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\mathbb{B}\Bigg) + \frac{[(\theta_1+\alpha_1)]}{(1-c+\alpha_0)}\frac{\pi_5}{(1-\pi_5\omega_4)}\mathbb{A} \\ + \left[\frac{\theta_0}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_1-\pi_5\omega_6)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right]GDP^* \\ - \left[\frac{\theta_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_2-\pi_5\omega_1)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right]T \\ + \left[\frac{\alpha_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_3-\pi_5\omega_3)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right]\tau \\ + \frac{\pi_4}{1-\pi_5\omega_4}.\frac{(\theta_1+\alpha_1)}{(1-c+\alpha_0)}(r^f - r) - \frac{(\theta_1+\alpha_1)(\pi_6-\pi_5\omega_5)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}E \\ + \frac{(\theta_1+\alpha_1)\pi_5\omega_2}{(1-c+\alpha_0)(1-\pi_5\omega_4)}S\Bigg] \\ - \left[\frac{\theta_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_2-\pi_5\omega_1)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right]T \\ - \left[\frac{\theta_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_2-\pi_5\omega_1)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right].\alpha_0\tau\end{aligned}$$

The sign is indeterminate for certain levels of T $\frac{\partial TR}{\partial T}>0$ and $\frac{\partial TR}{\partial T}<0$. Further, $\frac{\partial^2 TR}{\partial T^2} = -2\left[\frac{\theta_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_2-\pi_5\omega_1)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right] < 0$, this implies that the equation for TR is concave in T and the maxima is achieved at $T = \frac{1}{2\left[\frac{\theta_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_2-\pi_5\omega_1)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right]}\Big[\Big[\Big(1 + \frac{(\theta_1+\alpha_1)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\mathbb{B}\Big) + \frac{[(\theta_1+\alpha_1)]}{(1-c+\alpha_0)}\frac{\pi_5}{(1-\pi_5\omega_4)}\mathbb{A} + \left[\frac{\theta_0}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_1-\pi_5\omega_6)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right]GDP^* + \Big\{\left[\frac{\alpha_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_3-\pi_5\omega_3)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right] - \left[\frac{\theta_2}{(1-c+\alpha_0)} - \frac{(\theta_1+\alpha_1)(\pi_2-\pi_5\omega_1)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}\right].\alpha_0\Big\}\tau + \frac{\pi_4}{1-\pi_5\omega_4}.\frac{(\theta_1+\alpha_1)}{(1-c+\alpha_0)}(r^f - r) - \frac{(\theta_1+\alpha_1)(\pi_6-\pi_5\omega_5)}{(1-c+\alpha_0)(1-\pi_5\omega_4)}E + \frac{(\theta_1+\alpha_1)\pi_5\omega_2}{(1-c+\alpha_0)(1-\pi_5\omega_4)}S\Big]$

From the expression it follows that the government can stimulate the economy with a reduction in rate of direct taxes. However, this increase in GDP will be accompanied by an increase in revenues for a T greater than the value specified above. Below this value, any reduction in T will only produce a decline in revenue.

Bibliography

Afram Gabi G., 2012. The Remittance Market in India Opportunities, Challenges and Policy Options, World Bank, available at http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2012/01/08/000333037_20120108235200/Rendered/PDF/662350PUB0EPI000India09780821389720.pdf

Ballard R., 2003. Hawala Transformed: Remittance-driven Transnational Networks in the post-Imperial economic order, available at http://archiv.ub.uni-heidelberg.de/savifadok/268/1/transformed.pdf

Bowers C. B. 2009. Hawala, Money Laundering, and Terrorism Finance: Micro-Lending as an end to illicit remittance available at http://www.law.du.edu/documents/djilp/37No3/Hawala-Money-Laundering-Terrorism-Finance-Micro-Lending-End-Illicit-Remittance-Charles-B-Bowers.pdf

Çevis I. and B. Camurdan, 2007. The Economic Determinants of Foreign Direct Investment in Developing Countries and Transition Economies, Pakistan Development Review, 46(3); 285-299 available at http://pide.org.pk/pdr/index.php/pdr/article/viewFile/2557/2529http://pide.org.pk/pdr/index.php/pdr/article/viewFile/2557/2529

Culem, C. G., 1988. "The Locational Determinants of Direct Investment among Industrialized Countries." *European Economic Review*, 32; 885-904.

Dabla-Norris E., Honda J., Lahreche A. and G. Verdier 2010. FDI Flows to Low-Income Countries: Global Drivers and Growth Implications, IMF Working Paper WP/10/132 available at https://www.imf.org/external/pubs/ft/wp/2010/wp10132.pdf

Demirhan, E. & M. Masca, 2008. "Determinants of Foreign Direct Investment Flows to Developing Countries: A Cross-sectional Analysis", Prague Economic Papers, 4; 356-369.

Dutta D. and N. Ahmed 2004. An aggregate import demand function for India: a cointegration analysis, *Applied Economics Letters*, Volume 11(10).

Faith D., 2011. The Hawala System, Global Security Studies, *Winter 2011*, 2(1) available at http://globalsecuritystudies.com/Faith%20Hawala%20FINAL.pdf

Jost, P. & H. Sandhu, 2000. The Hawala Alternative Remittance System and its Role in Money Laundering. Available at http://www.treasury.gov/resource-center/terrorist-illicit-finance/documents/fincen-hawala-rpt.pdf

Khan, M.S. 1974. Import and Export Demand in Developing Countries, *IMF Staff Papers,* 21(3*).*

Krishnamurty, K. and V. Pandit, 1997. Exchange Rate, Tariff and Trade Flows: Alternative Policy Scenarios for India*, Journal of Asian Economics*, 8(3).

Lim, D., 1983. "Fiscal Incentive and Direct Foreign Investment in Less Developed Countries." *The Journal of Development Studies*, 19; 207- 212.

Lunn, J., 1980. "Determinants of U.S. Direct Investment in the E. E. C.: Further Evidence." *European Economic Review*, 13; 93-101.

Newman V., Potter C. and M. Wright, 2011, Foreign Exchange Market Intervention, Reserve Bank of Australia Bulletin, December Quarter 2011, available at http://www.rba.gov.au/publications/bulletin/2011/dec/7.html

Mohammed El-Qorchi, S.M. Maimbo, and J.E. Wilson, 2003. "Informal Funds Transfer Systems: An Analysis of the Informal Hawala System", Washington D.C.: International Monetary Fund. available at http://www.johnfwilson.net/resources/Hawala+Occasional+Paper+_3.24.03_.pdf

Mohsin S. Khan, 1974, Import and Export Demand in Developing Countries, IMF Staff Papers, Palgrave Macmillan, 21(3); 678-693 (November).

M. Faruk Aydin, Ugur Ciplak & Eray M. Yucel, 2004. "Export Supply and Import Demand Models for the Turkish Economy", Working Papers 0409, Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

Passas, Nikos, 2003. "Hawala and Other Informal Value Transfer Systems: How to regulate Them", *Journal of Risk Management*, 5(3).

Schneider, F., B. Frey, 1985, "Economic and Political Determinants of Foreign Direct Investment". World Development, 13(2); 161-175.

Sharma, A., Vasudevan, A., Sabapathy, K. and M. Roy, 1992. "Gold Mobilisation Instrument as an External Adjustment", Reserve Bank of India Discussion Paper, DRG Studies, RBI.

Singh D., 2009. Severing the Hawala Trail to and from India, *Journal of Defence Studies*, 3(4), available at http://idsa.in/system/files/jds_3_4_dsingh.pdf

Thompson E.A, 2006. "The Nexus of Drug Trafficking and Hawala in Afghanistan" in (*ed*.) Buddenberg Davis and A. William Byrd *Afghanistan's Drug Industry: Structure, Functioning, Dynamics and Implications for Counter-narcotics Policy*, World Bank and UNODC available at
http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/Publications/448813-1164651372704/UNDC_Ch6.pdf