An Unconventional Way to Support Health Expenditure And A Gain In Output As By-product

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Abstract

Using 2011-2015 data, here we have shown empirically that a $0.42\% - 0.52\%$ levy on every non-bank, non-cash transaction using payment instruments is enough to meet up the annual healthcare expenditure in the representative countries of the EU (European Union) region. For Emerging Asia (EA), Mature Asia and the Pacific (MAP) and North America (NA) this value is found to be $0.14\% - 0.28\%$, $0.59\% - 0.67\%$ and $1.64\% - 1.83\%$ respectively. Moreover, the total out of pocket expenses can be supported by a $0.06\% - 0.07\%$, $0.05\% - 0.12\%$, $0.15\% - 0.17\%$ and $0.19\% - 0.21\%$ levy on each non-bank, non-cash transaction using payment instruments in EU, EA, MAP, and NA region respectively. Here, we also analyze the implication of the aforementioned levy on aggregate output in one representative country in the NA region and it suggests a substantial gain in output would follow the implementation of the proposed scheme. Although, not reported here, a similar gain in output would have been obtained for the other countries in the list as well stemming from the fact that government spending multipliers are theoretically and empirically higher than its tax counterparts.

1 Introduction

Attaining universal healthcare through out the world by 2030 is one of the UN's Sustainable Development Goals (SDG) which aims to provide healthcare facilities to all the individuals of a nation without incurring formidable financial crisis to the patients. Although, SDGs are only proclaimed in 2015, healthcare has always been a piece of great concern for humankind. The first attempt to ensure healthcare for the underprivileged through legislation was taken by the conservative Prussian statesman Otto Von Bismarck through Sickness Insurance Law of 1883 (Tulchinsky and Varavikova (2014)). The above bill was intended to protect the German industrial workers against ill-health at an affordable cost. Under this law, the medical cost of German industrial workers were shared between the employers and employees. However, Bismarck's attempt to establish a welfare state was not confined only to the passage of Sickness Insurance Law. Accident Insurance Law of 1884 and Old Age and Disability Insurance Law of 1889 were passed with a view to implement a welfare state and also to wean workers away from joining pro-worker, leftist, socialist alliances. Activities in Germany regarding health insurance infused huge interest in its european peers and David Lloyd George, the Liberal Chancellor of the Exchequer of the United Kingdom, after visiting Germany in 1908, vowed to establish a similar system in Britain. His attempt eventually resulted into the passage of The National Insurance Act 1911 which provided the British workers and their dependents the first contributory system of insurance against illness and unemployment (Grigg (1978)). Other european countries soon followed the trail of Germany and England and started building over their medical systems with a view to provide healthcare benefits to their citizens at an affordable cost. However, healthcare system in Europe before the ending of the second world war was not truly universal in nature. Most of them were aimed to protect certain specific groups, predominantly, the workers. The idea of affordable healthcare for people of all sects and even for the unemployed tended to evolve after the ending of the second world war and many countries started to embrace the idea of universal healthcare. As a result, universal healthcare system was enacted in Britain in 1948 through National Health Service Act 1946. Universal healthcare was then introduced in Sweden by 1955 (Serner (1980)), Iceland by 1956 (Kuhnle and Hort (2004)), Norway by 1956 (Evang (1970)), Denmark by 1961 (Gannik, Holst and Wagner (1976)), Finland by 1964 (Alestalo and Uusitalo (1987)), Canada through 1962-1972 (Maioni (1998), Taylor (1990)) and the list continues to grow till today. However, waves in Europe fail to cross the Atlantic, even now in the twenty first century: USA, unlike its European peers, still do not have universal health coverage for all of its citizens. Although, most of the developed nations have already implemented universal healthcare, the implementation differs widely across the countries and the countries follow different funding models tailored to their own unique need. Some are funded directly from the tax revenue while some others heavily use health insurance as means to regulate healthcare access. Using the tax-based single payer model of healthcare financing, here, we have shown empirically that a small levy on all non-bank, non-cash transaction using payment instruments taken place in a country within one calendar year is sufficient to cover the entire annual national healthcare expenditure. The rest of the article is organized as follows: Section: 2 describes different funding models used worldwide for healthcare financing. Section: 3 briefly narrates various types of payment instruments in use today. Section: 4 illustrates our model of financing healthcare through taxation and government spending. Section: 5 compiles healthcare and payment system data across different regions. Section: 6 analyzes the impact of tax-spending duo on aggregate output. Section: 7 describes the methodology used for empirical estimation of the impact of proposed healthcare financing scheme. Section: 8 describes the data and results regarding empirical estimation of the perceived impact of the proposed scheme and finally, Section: 9 finishes the article with some concluding remarks.

2 Funding Models

healthcare system around the globe has been primarily financed by the public revenue which is often supplemented by individual contribution through purchasing an insurance policy or by direct, out of pocket expense during times of service delivery. Depending upon the funding choice, healthcare system across the world can be classified into four distinct models (Reid (2009)), namely, I) Bismarck Model II) Beveridge Model III) National health Insurance Model and IV) Out of Pocket Model. A brief sketch of the funding models are presented below.

2.1 Bismarck Model

Bismarck model, named after Prussian conservative statesman Otto Von Bismarck, is the precursor of modern universal healthcare system. Although, it was intended for the low-waged, German industrial workers of the nineteenth century, it eventually laid the foundation of today's inclusive healthcare system across the globe. Today, Bismarck type of healthcare system is achieved through the formation of non-profit health insurance companies which are mandated to sign up all citizens of a country irrespective of any medical condition. At the same time, all the citizens are also bound to sign up for one of the health insurance companies or other and pay the premium thereon. In this model, the government plays a vital role in determining the price of different health services and thereby costs are kept at an affordable level. Today, Bismarck type of healthcare model is found in its birth place Germany as well as France, Belgium, the Netherlands, Japan, Switzerland and some other countires around the globe. This model of funding universal healthcare program is also known as social insurance model.

2.2 Beveridge Model

If the Bismarck type of healthcare system is considered as a German Model of healthcare, the Beveridge model, established through the adoptation of Beverdige Report (Beveridge (1942)) into an act by the British parliament, can be considered as its British peer. In this model, entire healthcare expenditure is born to the government and the government funds it through taxation. One striking difference between Bismarck model and Beveridge model is that in Beveridge model, there is no health insurance. Although, in Beveridge model, there may exist some private hospitals, most of the hospitals are usually owned and controlled by the government and the majority of doctors are government employees. Here, the government excercises absolute control over what the doctors can charge. As it is a single payer model, this model results into low healthcare expenditure per capita. Today, Beveridge model is followed in its birth place Britain along with Spain, all of Scandinavia, New Zealand, Hongkong, Cuba among others. This approach to universal healthcare is also known as single payer national health services model.

2.3 National health Insurance Model

In national health insurance model, the government runs a non-profit, publicly funded health insurance program where each citizens are mandated to subscribe at a fixed predefined rate. Some features of Beveridge Model and Bismarck model are blended together to design this approach. Like the Bismarck model, this model relies upon a health insurance program. However, unlike the Bismarck model, the insurance program is run and administered solely by the government which negotiates with the healthcare service providers in order to set up the prices of different healthcare services. Most of the health service providers run as private enterprises and as the government has considerable bargaining power over the private enterprises, a decent price is set which results into a reasonable, affordable amount of premiums. This model resembles Beveridge model in a sense that it is also a single payer model where government pays for the overall healthcare expenditure through a publicly funded health insurance program. This type of healthcare system is found in Canada, South Korea, Taiwan among other countries.

2.4 Out of Pocket Model

Under this framework, the health expenditures are born absolutely to the patients and the expenditures, once incurred, are not reimbursed either by the government or by any of the health insurance programs. In this model, one can only see a doctor if he affords to pay the medical bills all by himself. Unlike other models mentioned above, this model of financing healthcare expenses runs in total contrary to the main propositions of universal healthcare scheme. Like all other goods and services, healthcare services are sold at hospitals with minimum or no intervention at all from the government. Thus healthcare, instead of becoming a basic human right, becomes a luxury product which only the rich can afford. Most of the underdeveloped countries across the globe follow this kind of healthcare financing model.

3 Different Types of Payment Methods

Each year trillions of non-bank (not between two banks), non-cash (not involving physical transfer of cash) transactions take place through the banking channel using different payment instruments. Depending upon the nature, each such transaction may be categorized into any of the following types.

- Credit transfer: Credit transfer is a type of transaction in which the originator of the transaction instructs his/her bank to transfer a certain sum of money from his/her account to the account of the beneficiary. In case of credit transfer, the beneficiary's account is usually kept with another bank. In case, the originator and the beneficiary have accounts in the same bank and they intend to transact through their respective accounts then a simple account payee cheque from the originator to beneficiary will suffice eliminating the need of a credit transfer. As the transactions are processed through a clearing house, a time lag between the initiation and eventual execution of the transaction exists.

- Direct debit: Direct debit or direct withdrawal is a type of financial transaction in which the payer authorizes the payee/beneficiary to withdraw fund from his/her account at a specified date. Unlike credit transfer where the transaction is initiated by the payer, direct debit is initiated by the payee and the payer gives authorization to do so. This type of transaction is usually used for recurring payments like utility bill or credit card payments where the payment amount may vary from one period to another.

- Card payments: Payment cards are parts of the payment system which enable its owner to access funds in his/her bank account (in case of debit card) or in a pre-approved credit line (in case of credit card). Payment cards may be used to make payment for goods and services purchased electronically or withdraw cash from an ATM machine.

- E-wallet: E-wallet is a type of pre-paid account in which a customer can store his/her money for future transactions. Functionally, there is very little to no difference between an e-wallet and a debit card apart from the fact that a debit card is issued by a bank against a customer account while for e-wallet there is no such restrictions i.e., it is not necessarily linked to any bank account.

- Cheque: The oldest and the most common form of payment instrument is perhaps the cheque. Technically, a cheque is a negotiable instrument in which the drawer (account holder) instructs the drawee (the bank) to give/transfer a certain sum of money from his/her account to the beneficiary/payee. With the advent of information technology era in the banking system, chques are

Country	Year	Health Expenditure (USD Billion)	Out of Pocket Health Expenditure (USD Billion)	Volume of Financial Transactions (USD Billion)
France	2015	280.43	27.37	27755.79
Germany	2015	372.32	47.25	62803.55
Italy	2015	164.96	38.17	9522.25
United kingdom	2015	286.79	42.83	113792.61
United States	2015	3063.69	341.16	170802.30
Canada	2015	161.14	23.31	5378.86
Australia	2015	126.11	23.89	13425.58
Korea	2015	97.47	33.14	21400.09
Singapore	2015	12.90	4.13	836.18
China	2015	538.52	188.96	434069.69
India	2015	75.68	48.94	15618.89

Table 1: Health Expenditure and Volume of Transaction Using Payment Instruments

gradually loosing grounds to multifarious and multifaceted electronic payment methods.

4 Our Model of Financing Healthcare

In the previous section we have briefly described different kinds of payment instruments used to conduct financial trasactions around the globe. Each year trillions of such transactions take place worldwide and the money involved in those transactions is enormous. For example, according the BIS Red Book 2015 (Bank for International Settlement (2016)), a total of 135.45 billion transaction take place in USA during 2015 using the aforementioned payment instruments and the money involved with them was USD 170.80 trillion. However, total health expenditure for United States during 2015 was found to be USD 3.06 trillion (WHO (2019)) which is only 1.79% of the total volume of trasaction using payment instruments. On the other hand, total out of pocket health expenditure of United States during 2015 is found to be USD 341.16 billion which is only 0.19% of the total volume of instrumented financial transactions. Comparative positions of different countries in this regard are furnished in table: 1.

From table: 1, it is evident that both the overall health expenditure and out of pocket health expenditure are only some small fractions of non-bank transactions using payment instruments. And here comes the main spirit of this article: A small fraction of health tax on the value of the transaction may not mean much for the beneficiary but when combined together, such small taxes may be big enough to cover up the massive intimidating health expenditure of an entire nation. Infact, in our quest of sorting out an easy-to-implement, sustainable way of financing universal healthcare scheme using single payer model, we propose the imposition of a small health tax on each non-bank financial transaction using payment instruments including transactions through debit and credit card, direct debit, credit transfer, payment through cheque and other instrumented payments. The next step is to determine the extent of health tax to be imposed on every non-bank transaction using payment instruments. To do so, we divide the total annual healthcare expenditure of a geographic region by the total volume of annual non-bank transaction using payment instruments that have taken taken place in the same time in the same region. As we intend to impose tax on non-bank transaction using payment instruments only, it can be easily collected electronically with little or no additional logistic support. Thus the overhead of collecting tax would be minimal and the revenue earned this way can be fully deployed to cover up the entire healthcare expenditure.

5 Compiled Data

Annual data from 2011 to 2015 regarding number and volume of non-bank financial transactions using different payment instruments are collected from BIS Redbook 2015 (Bank for International Settlement (2016)). On the other hand, nominal GDP in LCU (Local Currency Unit), health expenditure as percentage of GDP and out of pocket health expenditure as percentage of total health expenditure data are collected from World Bank Data Warehouse (World Bank (2019)) and World Health Organization (WHO) Global Health Database (WHO (2019)). Conversion rate of any currency to USD is obtained by dividing the corresponding country's GDP in current USD by the GDP in current LCU. GDP in current USD and GDP in current LCU are obtained from World Bank Data Warehouse (World Bank (2019)). In our analysis, we consider some representative countries in four different geographic regions. Regions include EU (European Union), EA (Emerging Asia), MAP (Mature Asia and the Pacific) and NA (North America). Representative countries in EU region include France, Germany, Italy and United Kingdom while in EA region countries include India and China, in MAP region countries include Australia, South Korea and Singapore and in NA region countries include United States and Canada. Region wise health expenditure and payment system data are presented in table: 2, 3, 4 and 5.

From table: 2, it is evident that $0.42\% - 0.52\%$ tax on each non-bank financial transaction using payment instruments is sufficient to cover up the entire health expenditure in the representative countries in EU region (N.B. last 5 rows of column 7 of table: 2). However, if we want to cover the out of pocket health expenditure only then $0.06\% - 0.07\%$ tax will be sufficient (as can be seen from the last 5 rows of column 10 of table: 2). If instead, the taxes are imposed on a flat rate on each transactions irrespective of the size of the individual transaction, it can be seen that a $16.28 - 20.06$ USD tax on each transaction will suffice to meet up the annual health expenditure in the representative countries in the EU region for the time span of 2011-2015 inclusive (N.B. last 5 rows of column 6 of table: 2). To cover out of pocket health expenditures only, a levy of $2.29 - 2.75$ USD on each transaction will be enough (N.B. last 5 rows of column 9 of table: 2).

Table: 3 shows health expenditure and payment system data of the Emerging Asia (EA) region. Representative countries in EA include China and India. However, volume and number of direct debit transactions during the designated period for China is not available (Bank for International Settlement (2016)). Hence, tax rate and amount of taxation on each transaction reported here will be an exaggeration of the reality. As a result, corresponding tax rates would be substantially lower than the one actually reported here if the Chinese data regarding direct debit transactions would have been available. However, only considering the publicly available data, the amount of taxation required to cover total and out of pocket health expenditures in the EA region is found to be $0.14\% - 0.28\%$ and $0.05\% - 0.12\%$ respectively (N.B. last 5 rows of column 7 and column 10 of table: 3). Meanwhile, if taxes were imposed in a flat rate on each transaction then $12.45 - 23.94$ and $4.82 - 10.44$ USD levy on every transaction would suffice to cover entire and out of pocket health expenditure respectively (as can be seen from the last 5 rows of column 6 and column 9 of table: 3).

Table: 4 reports health expenditure and payment system data of the Mature Asia and the Pacific (MAP) region. Countries in the region included in this analysis are Australia, Korea and Singapore. From column 7 of table: 4, it is evident that $0.59\% - 0.67\%$ tax on each transaction is enough to cover annual consolidated healthcare expense of the representative countries in the designated time span. However, to cover only the out of pocket healthcare expense, a tax rate of $0.15\% - 0.17\%$ will be sufficient (N.B. last 5 rows of column 10 of table: 4). Moreover, if the taxes are imposed on a flat rate on each transaction, it is found that $6.74 - 8.54$ and $1.74 - 2.20$ USD tax will be able to support total and out of pocket health expenditure in the respective region (N.B. last 5 rows of column 6 and column 9 of table: 4).

Table: 5 presents the health expenditure and payment system data for two representative countries in the North American (NA) region. Countries considered in this analysis is United States and Canada. However, volume of credit transfer, direct debit and e-money payment transaction data for the United States during 2011 are not available (Bank for International Settlement (2016)). Missing data and corresponding calculations are marked by NAV in table: 5. Moreover, the number of e-money payment transaction data during 2011-2015 is also unavailable. If the number and volume e-money payment transaction data for United States would be available then the required tax rates reported in table: 5 would have been considerably lower. Considering what is available, required tax rates to support annual total and out of pocket health expenditure in the representative countries of the NA region are found to be $1.64\% - 1.83\%$ and $0.19\% - 0.21\%$ respectively (N.B. last 5 rows of column 7 and column 10 of table: 5). Meanwhile, if taxes were imposed in a flat rate on each transaction then $21.86 - 22.22$ and $2.47 - 2.73$ USD levy on every transaction would suffice to cover entire and out of pocket health expenditure respectively (as can be seen from the last 5 rows of column 6 and column 9 of table: 5).

6 Impact of tax-spending duo on output

Imposing tax on financial transactions will reduce the total disposable income of the consumers which shrink their consumption behavior for a short while. Once the government starts to reimburse the health expenditure from tax revenue, consumption behavior of the consumers rejuvenates. So, how taxation and spending duo will influence consumption (and output in turn) will depend upon the extent of the fiscal shock along with the value tax and government spending multipliers as well and we know from the Keynesian theory of fiscal multipliers, government spending multiplier is theoretically higher than its tax counterpart. In fact, this theoretical reasoning is supported by many empirical studies as mentioned in Mineshima et al. (2014). Mineshima et al. (2014) reported that the average value of first-year fiscal multipliers amount to 0.75 for government spending and 0.25 for government taxations in Advanced Economies (AE). So, an equal amount of stimulus in government spending and taxation may have a net positive impact on aggregate output. So, imposing taxes on financial transactions and spending the same to meet up public health expenditure may have a non-zero effect on output and consumption in an economy. To quantify its impact on output we resort to the VAR analysis which has been predominantly used in the estimation of the fiscal multipliers, see for example, Blanchard and Perotti (2002), Fatas and Mihov (2001), Ilzetzki et al. (2013) among others. In fact, multiplier theory has been extensively used to analyze the implication of any new stimulus package in the form of tax or outlays. For example, American Reinvestment and Recovery Act (ARRA) of 2009 was analyzed extensively using multiplier theories and White House Council of Economic Advisers (CEA) estimated that the stimulus package provided within the framework of ARRA 2009 was supposed to create between 2.5 and 3.6 million new jobs as of the second quarter of 2010 and at that point outlays and tax cuts would be totaled to USD 257 and 223 billion respectively (See for example, Council of Economic Advisers (2010)). Here in the first place, we try to estimate the government spending and tax multipliers by using impulse response analysis under VAR framework. Once the multipliers are estimated, they are then used to quantify the impact of tax and spending stimuli on output.

7 Methodology

7.1 Constructing VAR Models

Following Ilzetzki et al. (2013), our baseline VAR model takes the following form:

$$AY_t = \sum_{k=1}^{K} C_k \times Y_{t-k} + Bu_t$$

where Y_t is a vector of endogenous variables comprising government spending (or tax) and output. The matrix A represents the contemporaneous interaction among the endogenous variables and it is assumed to be a lower triangular matrix. C_k is the coefficient matrix of the k-th lag of Y_t. The matrix B is diagonal so that vector u_t is a vector of orthogonal, independent and identically distributed shocks in endogenous variables such that $E[u_t] = 0$.

Here, we estimate two different VAR models: One is to determine the cumulative impact of government spending on output and the other is meant to measure the accumulated response of output with restpect to changes in the level of taxation. A brief description and implication of the two VAR models are as follows.

- In the first VAR model, GDP and total government expenditure in suitable logged differenced form are modeled as endogenous variables with appropriate number of lags. This model is intended to capture cumulative response of GDP in response to change in government spending. Or in other words, this model is used to estimate how GDP will respond to unit changes in government spending. Cumulative government spending multiplier for output over forecasting horizon n is usually defined as follows:

  $$SM = \frac{\sum_{i=1}^{n} \Delta GDP_i}{\sum_{i=1}^{n} \Delta GS_i}$$

  where SM denotes cumulative government spending multipliers for output, ΔGS_i and ΔGDP_i represent changes in government spending and corresponding changes in output respectively at time period i.

- In the second VAR model, GDP and government tax revenue in suitable logged differenced form are modeled as endogenous variables with appropriate number of lags. This model is intended to capture cumulative response of GDP in response to changes in government tax revenue. Or in other words, this model is used to estimate how GDP will respond to unit changes in tax revenue. Cumulative tax multiplier for output over forecasting horizon n is usually defined as follows:

$$TM = \frac{\sum_{i=1}^{n} \Delta GDP_i}{\sum_{i=1}^{n} \Delta TR_i}$$

where TM denotes cumulative tax multipliers for output, ΔTR_i and ΔGDP_i represent changes in tax revenue and corresponding changes in output respectively at time period i.

7.2 Performing Impulse Response Analysis and Estimating the multiplier

Once the VAR models are built, we provide one standard deviation Choleski shock to the fiscal variables in order to capture the cumulative responses of GDP to shocks in government spending and taxation on a forecasting horizon sprawling over 20 periods. To model impetus in government spending and taxation, we follow recursive formulation approach (Choleski Decomposition) proposed by Sims (1992). In this method, ordering of the variables plays a crucial role: Variables appearing later in the list will respond contemporaneously to any change in any of the variables appearing earlier. Thus for our first VAR mode, the ordering is chosen to be government spending and GDP. It signifies that GDP responds contemporaneously to any change in government spending but not the vice versa. For our second VAR model, the ordering of the variables is chosen to be GDP and tax revenue. The ordering is backed by the theoretical underpinning that government tax revenue will eventually depend on output and responds instantaneously to any change in it but not necessarily the vice versa.

Once the cumulative responses of GDP to shocks in government spending and taxes are noted, we are in the position to calculate the corresponding multiplier values. Government spending multipliers for GDP in different forecasting periods are calculated by dividing the accumulated response of GDP to shocks in government spending by the cumulative response of government spending to its own shock. Similarly, tax multipliers for output are calculated by dividing the accumulated responses of GDP to shocks in tax revenue by the cumulative response of tax revenue to its own shocks.

Variables used in the VAR analysis are in their natural logarithmic form. Hence, government spending and tax multipliers thus calculated are also in the same unit. It is necessary to correct the multipliers calculated directly from the impulse-response functions in order to get them back into their original multiplier units. Necessary correction to the multpliers can be obtained from dividing the government spending and tax multipliers calculated directly from IR analysis by the average government spending to output and average tax revenue to output ratio during the sampling period respectively (Gonzalez-Garcia et al. (2013)). Thus in the modified setup, government spending and tax multipliers are estimated by using the following equations:

$$SM = \left(\frac{\sum_{i=1}^{n} \Delta GDP_i}{\sum_{i=1}^{n} \Delta GS_i} \right) / \left(\frac{\overline{GS}}{\overline{GDP}} \right) \tag{1}$$

$$TM = \left(\frac{\sum_{i=1}^{n} \Delta GDP_i}{\sum_{i=1}^{n} \Delta TR_i} \right) / \left(\frac{\overline{TR}}{\overline{GDP}} \right) \tag{2}$$

7.3 Estimating the Impact of tax-spending duo on output

Once all the multipliers are estimated, we are now in a position to quantify the impact of tax-spending duo on output. Let, $\forall k, 1 \leq k \leq n$, $M_{1,k}$ and $M_{2,k}$ denote cumulative governemtn spending and tax multipliers respectively for period k over an n period long forecasting horizon.

Then the cumulative impact of a sequence of fiscal stimulus in government spending gradually given over an n horizon period on output is given by the following:

1	2	3		n
$M_{1,1} \times S_1$	$M_{1,2} \times S_1$	$M_{1,3} \times S_1$	....	$M_{1,n} \times S_1$
....	$M_{1,2} \times S_2$	$M_{1,3} \times S_2$	....	$M_{1,n} \times S_2$
....	....	$M_{1,3} \times S_3$	....	$M_{1,n} \times S_3$
....	....	....	....	....
....	....	....	....	$M_{1,n} \times S_n$
$M_{1,1} \times \sum_{i=1}^{1} S_i$	$M_{1,2} \times \sum_{i=1}^{2} S_i$	$M_{1,3} \times \sum_{i=1}^{3} S_i$		$M_{1,n} \times \sum_{i=1}^{n} S_i$

where $S_k, \forall k, 1 \leq k \leq n$ denotes stimulus provided in government spending at period k.

Proceeding in the same manner, cumulative impact of a sequence of tax shocks on output can be estimated. Unlike the government spending multiplier which nudges output positively, tax shocks are meant to push output and consumption downward. Thus the cumulative impacts of tax shocks on output are supposed to be some negative quantities which are given by the following expressions:

1	2	3		n
$(M_{2,1} \times T_1)$	$(M_{2,2} \times T_1)$	$(M_{2,3} \times T_1)$	....	$(M_{2,n}) \times T_1$
....	$(M_{2,2} \times T_2)$	$(M_{2,3} \times T_2)$	....	$(M_{2,n} \times T_2)$
....	....	$(M_{2,3} \times T_3)$	....	$(M_{2,n} \times T_3)$
....	....	....	....	....
....	....	....	....	$(M_{2,n} \times T_n)$
$(M_{2,1} \times \sum_{i=1}^{1} T_i)$	$(M_{2,2} \times \sum_{i=1}^{2} T_i)$	$(M_{2,3} \times \sum_{i=1}^{3} T_i)$		$(M_{2,n} \times \sum_{i=1}^{n} T_i)$

where $T_k, \forall k, 1 \leq k \leq n$ denotes innovation in tax revenue at period k.

Thus the cumulative impacts of simultaneous series of shocks in government spending and taxation on GDP over an n horizon period are given by the following:

1	2	3		n
$M_{1,1} \times S_1$	$M_{1,2} \times S_1$	$M_{1,3} \times S_1$	....	$M_{1,n} \times S_1$
....	$M_{1,2} \times S_2$	$M_{1,3} \times S_2$	....	$M_{1,n} \times S_2$
....	....	$M_{1,3} \times S_3$	....	$M_{1,n} \times S_3$
....	....	....	....	....
....	....	....	....	$M_{1,n} \times S_n$
$(M_{2,1} \times T_1)$	$(M_{2,2} \times T_1)$	$(M_{2,3} \times T_1)$	....	$(M_{2,n}) \times T_1$
....	$(M_{2,2} \times T_2)$	$(M_{2,3} \times T_2)$	....	$(M_{2,n} \times T_2)$
....	....	$(M_{2,3} \times T_3)$	....	$(M_{2,n} \times T_3)$
....	....	....	....	....
....	....	....	....	$(M_{2,n} \times T_n)$
$M_{1,1} \times \sum_{i=1}^{1} S_i +$ $(M_{2,1} \times \sum_{i=1}^{1} T_i)$	$M_{1,2} \times \sum_{i=1}^{2} S_i +$ $(M_{2,2} \times \sum_{i=1}^{2} T_i)$	$M_{1,3} \times \sum_{i=1}^{3} S_i +$ $(M_{2,3} \times \sum_{i=1}^{3} T_i)$		$M_{1,n} \times \sum_{i=1}^{n} S_i +$ $(M_{2,n} \times \sum_{i=1}^{n} T_i)$

8 Data and Results

We collect seasonally adjusted quarterly data of total government expenditure, federal government tax receipt and GDP of United States during the period 1960Q1-2017Q4 from the economic database prepared and maintained by the Federal Reserve Bank of St. Louis (St. Louis FED (2020)). These data are then used to estimate the value of government spending and tax multipliers for United States which in turn are used to quantify the impact of tax-spending duo on output following the methodology described in the previous section. Annual US data regarding total health expenditure, out of pocket health expenditure and the total volume of annual financial transaction using payment instruments are compiled and described in section: 5.

To begin our analysis, we construct a VAR model using GDP and government spending as endogenous variables and consider 5 lags for each of them. The dynamic stability of the VAR model is analyzed by plotting all the inverse roots of the AR characteristic polynomial and as can be seen from figure: 1 all the roots are lying within the unit circle which confers the dynamic stability of the selected VAR model. In the next step, we provide one standard deviation Choleski shock in government expenditure and note down the cumulative responses of the endogenous variables. Cumulative response of GDP to shock in government expenditure and cumulative response of government expenditure to its own shock are presented in figure: 3 and 4 respectively. Cumulative response of GDP to shock in government spending is positive as anticipated which results into a positive multiplier values. To estimate the government spending multiplier in different time period, we then divide the cumulative responses of GDP to shock in government expenditure by the cumulative response of government spending to its own shock. To convert the multipliers into their original unit, we divide the multipliers thus calculated by the average government spending to GDP ratio in the sampling period (see equation: 1 for explanation). Cumulative government spending multiplier values from period 1 to 20 range from 0.26 to 0.99 as can be seen from table: 6.

In the next phase, we construct a VAR model using GDP and tax revenue as endogenous variables and consider 5 lags for each of them. The dynamic stability of the VAR model is analyzed by plotting all the inverse roots of the AR characteristic polynomial and as can be seen from figure: 2, all the roots are lying within the unit circle which confers the dynamic stability of the selected VAR model. In the next step, we provide one standard deviation Choleski shock in tax revenue and note down the cumulative responses of different endogenous variables. Cumulative response of GDP to shock in taxation and cumulative response of tax revenue to its own shock are presented in figure: 5 and 6 respectively. As evident from table: 7, cumulative response of GDP to shock in tax revenue for the first three period is positive while for the rest of the periods, it is found to be negative. To estimate tax multipliers in different time period, we then divide the cumulative responses of GDP to shock in tax revenue by the cumulative response of tax revenue to its own shock. To convert the multipliers into their original unit, we divide the multipliers thus calculated by the average tax revenue to GDP ratio in the sampling period (see equation: 2 for explanation).Cumulative government tax multiplier values from period 1 to 20 are noted down in table: 7.

As we used quarterly data to estimate multiplier values, periods in the impulse response analysis corresponds to different quarters. Hence, multipliers at period 1, 5, 9, 13 and 17 represent cumulative multipliers at year 1, 2, 3, 4 and 5 respectively.

The combined impact of simultaneous tax and spending shocks of equal proportion on output are then computed using the procedure described in section: 7.3. Two different scenarios are analyzed: One in which entire health expenditure is covered and in the other case, only out of pocket health expenditure is covered. Impacts on output in case where entire health expenditure is covered are presented in table: 8. It is evident from table: 8, USD 652.82, 1138.17, 1333.21, 1343.71 and 1265.58 billion boost in output are achieved from 2011-2015 due to the implementation of the proposed scheme. However, if only out of pocket health expenditures are intended to cover through the proposed tax-spending duo then USD 79.67, 137.78, 159.99, 156.96 and 141.89 billion boost in output is achieved (as can be seen from table: 9). These boosts in output resulting from an equal increase in government spending and taxation are due to the fact that the values of cumulative government spending multipliers are theoretically and empirically greater than its tax counterpart.

9 Conclusion

Here, we propose a scheme to finance health expenditure in which a small amount of health tax is imposed on each and every financial transaction using payment instruments. We only consider transactions that use some types of payment instruments or the other. Other types of financial transactions also exist and in fact they are more numerous than the one actually reported here. For example, transactions may include but not limited to regular deposit to the chequing account, encashment of term deposits, transfer and charge of profit on deposit and loan accounts, payment and disbursement of loans and advances, collection of source tax, excise duties, VATs among others. If all of these transactions would be included in the analysis then the percentage of taxes imposed on every transaction would have been much lower. In this case, the small amount of taxes imposed on every transaction may mean even less to the beneficiary. However, when aggregated across the economy over an year, this small amount of taxes will be so substantial as to cover the entire health expenditure of a nation. Indeed, this small sacrifice from the beneficiary's perspective would have been one great milestone to delivering healthcare everyone everywhere. Moreover, as the government spending multipliers are found to be higher than its tax counterparts as reported in numerous papers (see for example, Batini et al. (2014), Mineshima et al. (2014)), a boost in output and welfare (measured through personal consumption) would follow the implementation of the proposed scheme.

10 Acknowledgement

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11 Tables

Country	Year	Health Expenditure (USD Billion)	Number of Non-Cash Transaction in million	Total Volume of Transaction in USD Billion	Levy per transaction in USD to Cover total HE	Percentage	OOP HE in Current USD Billion	Levy per transaction to cover OOP health expenditure in USD	Percentage
Column-1	Column-2	Column-3	Column-4	Column-5	Column-6	Column-7	Column-8	Column-9	Column-10
France	2011	320.31	17538.26	39513.76	18.26	0.81%	32.69	1.86	0.08%
	2012	303.83	18068.32	35760.60	16.82	0.85%	30.79	1.70	0.09%
	2013	321.64	18086.10	35432.85	17.78	0.91%	32.06	1.77	0.09%
	2014	330.71	18957.98	36115.68	17.44	0.92%	32.66	1.72	0.09%
	2015	280.43	19789.41	27755.79	14.17	1.01%	27.37	1.38	0.10%
Germany	2011	401.22	17738.73	98432.69	22.62	0.41%	55.69	3.14	0.06%
	2012	379.80	18210.69	92114.99	20.86	0.41%	52.79	2.90	0.06%
	2013	407.43	19589.73	93946.34	20.80	0.43%	53.15	2.71	0.06%
	2014	425.58	18066.34	70419.30	23.56	0.60%	53.65	2.97	0.08%
	2015	372.32	19643.46	62803.55	18.95	0.59%	47.25	2.41	0.08%
Italy	2011	202.49	4159.58	13965.06	48.68	1.45%	44.60	10.72	0.32%
	2012	186.92	4263.02	12545.06	43.85	1.49%	40.52	9.51	0.32%
	2013	191.70	4487.12	12964.07	42.72	1.48%	41.72	9.30	0.32%
	2014	194.57	4792.76	11825.93	40.60	1.65%	43.07	8.99	0.36%
	2015	164.96	5288.13	9522.25	31.19	1.73%	38.17	7.22	0.40%
UK	2011	223.97	17794.90	112199.84	12.59	0.20%	22.15	1.24	0.02%
	2012	225.57	18503.80	122427.20	12.19	0.18%	21.90	1.18	0.02%
	2013	272.26	19722.00	118748.63	13.80	0.23%	40.24	2.04	0.03%
	2014	297.92	21265.70	121739.24	14.01	0.24%	43.90	2.06	0.04%
	2015	286.79	23119.10	113792.61	12.40	0.25%	42.83	1.85	0.04%
Total	2011	1147.99	57231.47	264111.34	20.06	0.43%	155.14	2.71	0.06%
	2012	1096.12	59045.83	262847.86	18.56	0.42%	146.00	2.47	0.06%
	2013	1193.03	61884.95	261091.90	19.28	0.46%	167.17	2.70	0.06%
	2014	1248.78	63082.78	240100.15	19.80	0.52%	173.28	2.75	0.07%
	2015	1104.50	67840.10	213874.20	16.28	0.52%	155.62	2.29	0.07%

Table 2: Health Expenditure and Payment System Data for EU region

Country	Year	Health Expenditure (USD Billion)	Number of Non-Cash Transaction in million	Total Volume of Transaction in USD Billion	Levy per transaction in USD to Cover total HE	Percentage	OOP HE in Current USD Billion	Levy per transaction in USD to Cover OOP HE in USD	Percentage
Column-1	Column-2	Column-3	Column-4	Column-5	Column-6	Column-7	Column-8	Column-9	Column-10
China	2011	326.64	8432.29	121079.32	38.74	0.27%	131.5238268	15.60	0.11%
	2012	388.17	11202.74	149897.66	34.65	0.26%	152.2950248	13.59	0.10%
	2013	450.77	15501.56	193670.87	29.08	0.23%	172.010987	11.10	0.09%
	2014	498.25	22901.65	226436.01	21.76	0.22%	182.1860071	7.96	0.08%
	2015	538.52	35789.72	434069.69	15.05	0.12%	188.9625854	5.28	0.04%
India	2011	59.18	7685.8	17857.55	7.70	0.33%	36.82622303	4.79	0.21%
	2012	60.85	8556.6	15213.34	7.11	0.40%	38.33464799	4.48	0.25%
	2013	69.62	9735.5	14838.18	7.15	0.47%	48.0863782	4.94	0.32%
	2014	73.81	11382.5	15193.48	6.48	0.49%	49.4613934	4.35	0.33%
	2015	75.68	13527.1	15618.89	5.59	0.48%	48.93860411	3.62	0.31%
Total	2011	385.82	16118.09	138936.86	23.94	0.28%	168.3500498	10.44	0.12%
	2012	449.01	19759.34	165111.00	22.72	0.27%	190.6296727	9.65	0.12%
	2013	520.38	25237.06	208509.06	20.62	0.25%	220.0973652	8.72	0.11%
	2014	572.06	34284.15	241629.49	16.69	0.24%	231.6474005	6.76	0.10%
	2015	614.20	49316.82	449688.58	12.45	0.14%	237.9011896	4.82	0.05%

Table 3: Health Expenditure and Payment System Data for EA region

Country	Year	Health Expenditure in USD Billion	Number of Non-Cash Transaction in million	Total Volume of Transaction in USD Billion	Levy per transaction in USD to Cover total HE	Percentage	OOP HE in Current USD Billion	Levy per transaction in USD to Cover OOP HE in USD	Percentage
Column-1	Column-2	Column-3	Column-4	Column-5	Column-6	Column-7	Column-8	Column-9	Column-10
Australia	2011	119.51	7129.30	14273.88	16.76	0.84%	22.91	3.21	0.16%
	2012	134.35	7706.50	15331.82	17.43	0.88%	26.78	3.48	0.17%
	2013	138.29	8395.70	15998.87	16.47	0.86%	27.26	3.25	0.17%
	2014	132.88	9060.40	14285.78	14.67	0.93%	25.99	2.87	0.18%
	2015	126.11	9936.30	13425.58	12.69	0.94%	23.89	2.40	0.18%
Korea	2011	75.78	13493.80	19253.95	5.62	0.39%	26.25	1.95	0.14%
	2012	78.71	15241.88	18810.66	5.16	0.42%	27.52	1.81	0.15%
	2013	85.88	17027.15	19266.67	5.04	0.45%	29.74	1.75	0.15%
	2014	96.26	18896.00	20994.34	5.09	0.46%	33.00	1.75	0.16%
	2015	97.47	21131.47	21400.09	4.61	0.46%	33.14	1.57	0.15%
Singapore	2011	8.84	3279.39	810.94	2.70	1.09%	3.45	1.05	0.43%
	2012	9.89	3421.32	844.92	2.89	1.17%	3.68	1.08	0.44%
	2013	11.37	3766.65	892.90	3.02	1.27%	4.06	1.08	0.46%
	2014	12.20	3886.35	880.65	3.14	1.38%	3.96	1.02	0.45%
	2015	12.90	4029.86	836.18	3.20	1.54%	4.13	1.02	0.49%
Total	2011	204.13	23902.49	34338.77	8.54	0.59%	52.61	2.20	0.15%
	2012	222.96	26369.70	34987.41	8.45	0.64%	57.98	2.20	0.17%
	2013	235.54	29189.50	36158.44	8.07	0.65%	61.07	2.09	0.17%
	2014	241.33	31842.75	36160.77	7.58	0.67%	62.95	1.98	0.17%
	2015	236.49	35097.63	35661.85	6.74	0.66%	61.16	1.74	0.17%

Table 4: Health Expenditure and Payment System Data for MAP region

Country	Year	Health Expenditure USD Billion	Number of Non-Cash Transaction in million	Total Volume of Transaction in USD Billion	Levy per transaction in USD to Cover total HE	Percentage	OOP HE in Current USD Billion	Levy per transaction to cover OOP health expenditure in USD	Percentage
Column-1	Column-2	Column-3	Column-4	Column-5	Column-6	Column-7	Column-8	Column-9	Column-10
Canada	2011	183.03	9815.59	5866.34	18.65	3.12%	26.89	2.74	0.46%
	2012	186.78	10126.26	6160.62	18.45	3.03%	27.22	2.69	0.44%
	2013	186.65	10814.82	6174.53	17.26	3.02%	27.03	2.50	0.44%
	2014	179.60	11530.92	6025.09	15.58	2.98%	26.10	2.26	0.43%
	2015	161.14	11999.53	5378.86	13.43	3.00%	23.31	1.94	0.43%
USA	2011	2543.91	113881.9	NAV	22.34	NAV	310.47	2.73	NAV
	2012	2650.86	117588.4	161648.20	22.54	1.64%	319.15	2.71	0.20%
	2013	2741.11	123141.3	166462.50	22.26	1.65%	327.01	2.66	0.20%
	2014	2891.98	128305.2	181283.20	22.54	1.60%	331.85	2.59	0.18%
	2015	3063.69	135446.3	170802.30	22.62	1.79%	341.16	2.52	0.20%
Total	2011	2726.95	123697.49	NAV	22.05	NAV	337.36	2.73	NAV
	2012	2837.65	127714.66	167808.82	22.22	1.69%	346.37	2.71	0.21%
	2013	2927.75	133956.12	172637.03	21.86	1.70%	354.03	2.64	0.21%
	2014	3071.59	139836.12	187308.29	21.97	1.64%	357.95	2.56	0.19%
	2015	3224.83	147445.83	176181.16	21.87	1.83%	364.47	2.47	0.21%

Table 5: Health Expenditure and Payment System Data for NA region

Period	Cumulative Response of GDP	Cumulative Response of GE	Average GE to GDP	Cumulative Multiplier
1	0.001022	0.011679		0.26
2	0.001005	0.010491		0.28
3	0.001434	0.013243		0.32
4	0.001817	0.015124		0.35
5	0.002949	0.01721		0.50
6	0.003645	0.018738		0.57
7	0.004363	0.019878		0.64
8	0.005032	0.021099		0.70
9	0.005761	0.022288		0.76
10	0.006356	0.023364	0.34	0.80
11	0.006909	0.0243		0.83
12	0.007407	0.025194		0.86
13	0.007887	0.026051		0.89
14	0.008315	0.026833		0.91
15	0.008712	0.027547		0.93
16	0.009074	0.02821		0.94
17	0.009414	0.028828		0.96
18	0.009726	0.029398		0.97
19	0.010014	0.029922		0.98
20	0.01028	0.030406		0.99

Table 6: Cumulative government spending multiplier for US data

Period	Cumulative Response of GDP	Cumulative Response of TR	Average TR to GDP	Cumulative Multiplier
1	0	0.03771		0.00
2	0.000377	0.030737		0.12
3	0.000249	0.036934		0.06
4	-0.000939	0.035238		-0.25
5	-0.001259	0.036955		-0.32
6	-0.001649	0.03678		-0.43
7	-0.001958	0.036581		-0.51
8	-0.002409	0.036417		-0.63
9	-0.002648	0.036238		-0.70
10	-0.002889	0.036069	0.11	-0.76
11	-0.003079	0.035883		-0.82
12	-0.003269	0.035739		-0.87
13	-0.003401	0.035619		-0.91
14	-0.003523	0.035508		-0.94
15	-0.003621	0.035417		-0.97
16	-0.003709	0.035339		-1.00
17	-0.003777	0.035276		-1.02
18	-0.003836	0.03522		-1.04
19	-0.003885	0.035175		-1.05
20	-0.003927	0.035136		-1.06

Table 7: Cumulative tax multiplier for US data

2011	2012	2013	2014	2015
652.82	1271.96	1933.37	2264.08	2442.16
	680.27	1325.43	2014.66	2359.27
		703.42	1370.55	2083.24
			742.14	1445.99
				786.21
0.00	-814.05	-1780.74	-2314.96	-2594.79
	0.00	-848.28	-1855.60	-2412.29
		0.00	-877.15	-1918.77
			0.00	-925.43
				0.00
652.82	1138.17	1333.21	1343.71	1265.58

Table 8: Cumulative impact of government spending and taxation on output when total health expenditure is covered

2011	2012	2013	2014	2015
79.67	155.23	235.95	276.31	298.05
	81.90	159.58	242.56	284.05
		83.92	163.50	248.53
			85.16	165.93
				87.55
0.00	-99.35	-217.33	-282.52	-316.67
	0.00	-102.13	-223.41	-290.43
		0.00	-104.64	-228.91
			0.00	-106.19
				0.00
79.67	137.78	159.99	156.96	141.89

Table 9: Cumulative impact of government spending and taxation on output when only out of pocket health expenditure is covered

12 Figures

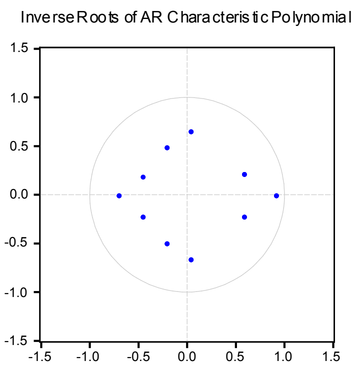

Figure 1: Inverse roots of the AR characteristic polynomial for expenditure-GDP VAR

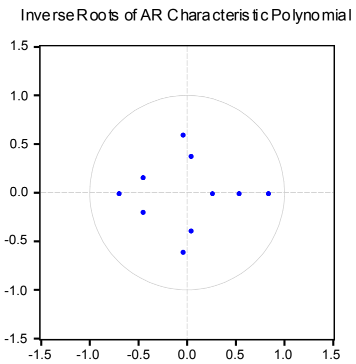

Figure 2: Inverse roots of the AR characteristic polynomial for GDP-tax revenue VAR

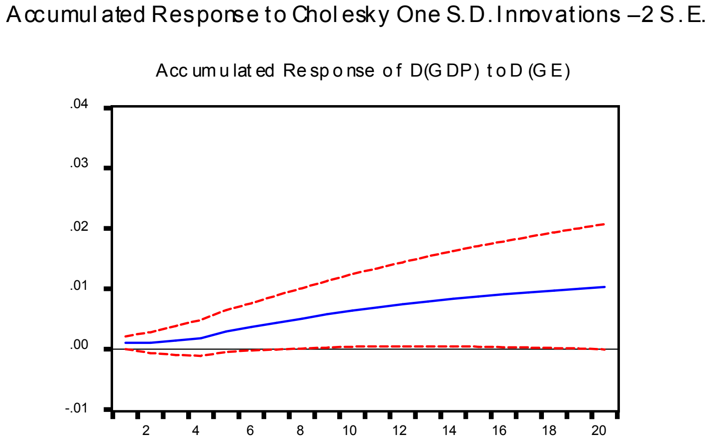

Figure 3: Cumulative response of GDP to shocks in government expenditure

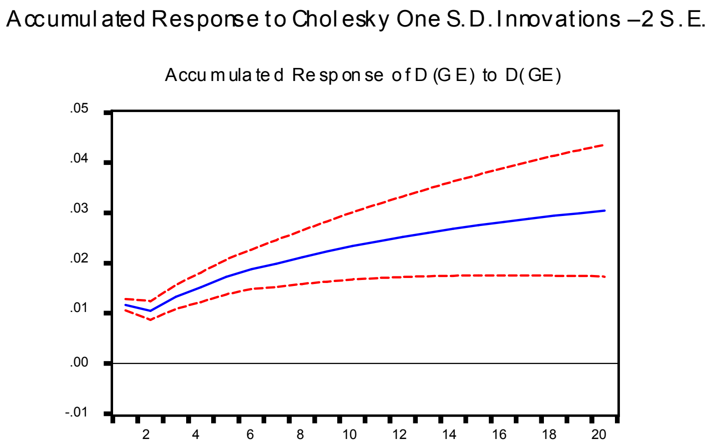

Figure 4: Cumulative response of government expenditure to its own shock

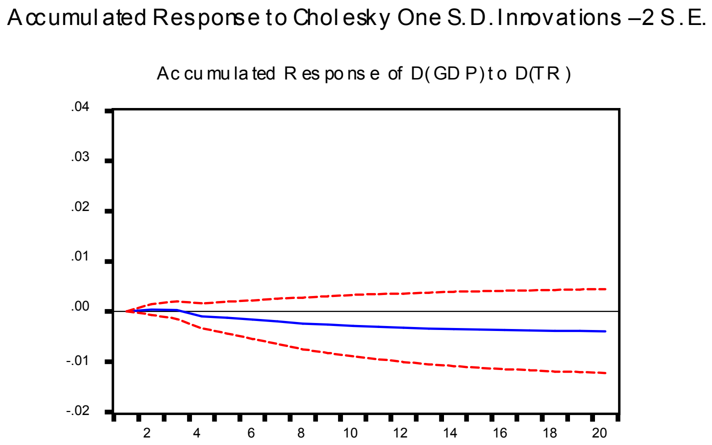

Figure 5: Cumulative response of GDP to shocks in tax revenue

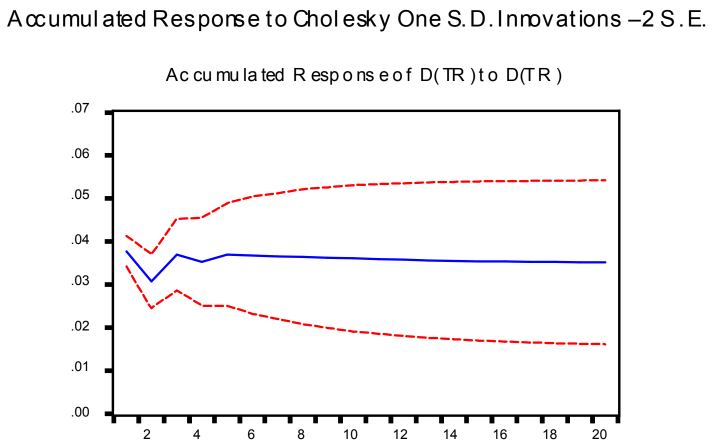

Figure 6: Cumulative response of tax revenue to its own shock