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Preferences, government investment, and disbursement sudden stops

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Motivated by a recent fiscal episode in the Philippines, during which a major policy initiative was launched to counter poor fiscal spending performance, this note explores the properties of a neoclassical model when a structure that introduces shocks to authorized spending alongside unanticipated government investment shocks is integrated into the model. With the possibility of disbursement flow stops as a backdrop, it investigates the role of preference structures using the model of Leeper, Walker, and Yang [2010], augmented with some useful features from the fiscal-centric dynamic stochastic general equilibrium (DSGE) model of Coenen, Straub, and Trabandt [2013]. We argue that the two shocks are orthogonal, with the former deemed more related to persistent shocks arising from budgetary reforms given trends in disbursement rates. Unlike government consumption, government investments add up to a country's capital stock, which can predictably improve the efficacy of future government investments and consumption. Results indicate that shocks to government investment have systemic effects on output, labor supply, government investment, and government consumption. More importantly, preference structures do matter in evaluating the impact of various shocks.

JEL classification: E62, E32
Keywords: fiscal policy, preferences, disbursement sudden stops

1. Introduction

In an interesting and seminal research, Leeper, Walker, and Yang [2010] (henceforth LWY) have shown that fiscal policy is not all about tax instruments and public consumption spending programs. Though such tools of fiscal policy have attracted considerable interest within policy and academic circles, an important component of public spending programs is spending on investment

goods. Government investments are flows that accumulate to form part of public capital stock, which can be used in the production of final goods. However, such investments may be subject to implementation delays.

In this note, we integrate some closed economy features of Coenen, Straub, and Trabandt [2013] (henceforth CST), which provide a comprehensive treatment of fiscal policy, into the neoclassical model of LWY. The model is still notably neoclassical, as monopolistically competitive nature of firms and other forms of nominal rigidities are assumed away.

We offer two innovations. First, we examine the dynamics that are demonstrated not only by implementation delays but consider the possibility of having setbacks that totally or partially stop investment project disbursement flows. Second, we also introduce separate shocks to authorized spending processes and implemented government investments. In CST, the shock to authorizations of government investment come from unanticipated implemented investment spending shocks. Differentiating may yield useful insights given that such shocks may not be qualitatively similar and may be justified since authorized spending or disbursement processes may be made more efficient by reforms in budgetary processes or systems. Such reforms may propagate persistent effects despite delays in the construction of projects. Both shocks are assumed to be orthogonal to perturbations that hike government investments independently.

This theoretical note is motivated by a recent Philippine government experience highlighting the impact of disbursements on government spending performance, which predictably led to slowdown in output growth and overall government spending. This problem was solved by a reform measure known as the Disbursement Acceleration Program, which, among other measures, mandated the transfer of savings from one department to another. Mimicking a stimulus package and largely unknown to economic actors until it was divulged, the program contributed to robust public spending and promoted economic growth from its inception in 2011 to its eventual suspension in 2013.[1]

The note is structured as follows. Section 2 lays down the model's structure. Built largely on LWY and CST platforms, it explains why a separate authorized budget shock may be plausible and integrates the problem of disbursement flow stops into the model structure. Section 3 presents simulation results, followed by a brief discussion. Finally, the last section concludes this note.

[1] This paper is only intended to provide a plausible theoretical framework needed to analyze the impact of the Disbursement Acceleration Program. (Using Bayesian methods, the effects of said program will be evaluated in another paper.) At this point, this paper will rely on stochastic simulations to understand model dynamics. It is also useful to inform the reader that said program was deemed unconstitutional by the country's Supreme Court which ruled adversely against the cross-border disbursement flows, rendered questionable the adopted definition of savings, and precluded further implementation of program components not included in the appropriations law.

2. The model

The model platform follows LWY, which is neoclassical in the sense that markets do not exhibit traces of monopolistic competition leading to nominal rigidities. This economy consists of a continuum of households and firms. Households are not skill-differentiated, and individual members do not have market power to bargain for higher wages when they offer labor services to firms. Firms hire labor and capital services at market rates and are assumed to produce final goods.

The model was chosen due to its emphasis on the macroeconomic effects of delays in the implementation of fiscal spending programs and the consideration of debt dynamics which clearly depend on the timing of debt stabilization policies.[2] It also adopts a time to build feature, which is critical in modeling both the timing of benefit flows and the expenditure or disbursement process that is associated with government investments. These features may be deemed useful in providing a preliminary modeling perspective on a recent Philippine fiscal policy experience, which became the basis for budgetary intervention using the Disbursement Acceleration Program.

We expand the model by introducing two features: the inclusion of partial or complete disbursement flow stops, which affect the model by reducing government investment, leading to lower public capital accumulation and output stagnation or loss; and the introduction of authorized spending process shocks that are explicably orthogonal to unanticipated government investment shocks.

2.1. Households

Because of the importance of transfers to poor households in developing countries, we will appeal to CST's model structure by introducing Ricardian and non-Ricardian households. Both types of households have the same preference structure and labor supply behavior, but they differ with respect to the specification of their respective budget constraints. Non-Ricardian households are limited to consumption and labor market activities. Such households also choose consumption on the basis of their nominal constraint. The relative share in government transfers are determined using a transfer rule based on CST.

Ricardian households maximize utility that integrates external habit formation in consumption c_{t+k} defined below.[3]

[2] A more comprehensive New Keynesian model, which embeds a lot of fiscal policy tools and measures and, at the same time, considers time to build technology, implementation lags, and stabilization policies, was written by Coenen, Straub, and Trabandt [2013].

[3] As mentioned in Leith, Moldovan, and Rossi [2015], there is an extensive branch in the fiscal literature where the dominant preference specification reflects deep habits, the reference of which pertains to individual, not aggregate consumption goods. Using deep habits can lead to robust fiscal multipliers.

$$E_t\left[\sum_{k=0}^{\infty}\beta^{t+k}\epsilon^{C}_{t+k}\left(\frac{\left(c_{t+k}-hc_{t+k-1}\right)^{1-\zeta}}{1-\zeta}-\frac{l^{\,1+\xi}_{t+k}}{1+\xi}\right)\right] \tag{1}$$

Where β represents the discount rate; $l_{(t+k)}$ is labor supply; ζ is the inverse of the relative risk aversion parameter; and ξ is the inverse of the Frisch substitution elasticity. ϵ^{C}_{t+k} represents a preference shock.

The above specification does not include public consumption and assumes that habits are externally formed. Noticeably, preferences are represented by subutility functions that follow the constant relative risk aversion specification.

While maintaining the role of habits, an alternative specification is to maintain the above but, this time, include public consumption.

$$E_t\left[\sum_{k=0}^{\infty}\beta^{t+k}\epsilon^{C}_{t+k}\left(\frac{\left(c_{t+k}-hc_{t+k-1}+\omega g_{t+k}\right)^{1-\zeta}}{1-\zeta}-\frac{l^{\,1+\xi}_{t+k}}{1+\xi}\right)\right] \tag{1.1}$$

where g_{t+k} represents public consumption and h is the habit persistence parameter. Following Ganelli and Tervala [2009], preferences are specificed such that private and public consumption are complementary, the degree of which depends on the sign and magnitude of the parameter ω.[4] The subutility functions still follow the constant relative risk aversion specification.

Relying on the logic of Linnermann and Schabert [2004] and following CST, we can specify the constant elasticity of substitution functional form.[5] Based on their theoretical model, private consumption is predicted to rise after a fiscal spending shock as long as the elasticity of substitution between public and private spending is sufficiently low. The specification also highlights the role of public consumption in determining optimal private consumption.

$$E_t\left[\sum_{k=0}^{\infty}\beta^{t+k}\epsilon^{C}_{t+k}\left(\frac{\left(\tilde{c}_{t+k}-h\tilde{c}_{t+k-1}\right)^{1-\zeta}}{1-\zeta}-\frac{l^{\,1+\xi}_{t+k}}{1+\xi}\right)\right] \tag{1.2}$$

where $\tilde{c}_{t+k}=\left(\vartheta_G^{1/\upsilon_G}\,c_{t+k}^{(\upsilon_G-1)/\upsilon_G}\,1-\upsilon_G\,g_{t+k}^{(\upsilon_G-1)/\upsilon_G}\right)^{\upsilon_G/(\upsilon_G-1)}$.

ϑ_G is the weight of private consumption and the parameter υ_G represents the elasticity of substitution between public and private consumption.

[4] Note that the specification does not include output and the elasticity parameter. In Ganelli and Tervala, a sufficient condition for the positive response of private consumption to fiscal spending shocks is that ω<0. In this paper, we assume that it is equal to unity

[5] Cantore, Levine, and Melina [2014] uses also a constant elasticity of substitution aggregator function to form the consumption composite embedded in a multiplicative utility function.

The budget constraint of the Ricardian household is given by

$$(1 + \tau_t^C)c_t + i_t + B_t = (1 + \tau_t^K)r_t^k u_t k_{t-1} + (1 - \tau_t^l)w_t l_t + r_{t-1} B_{t-1} + TR_t^R \quad (2)$$

In the budget, households are levied consumption taxes τ_t^C, pay labor earnings taxes ($\tau_t^l w_t l_t$) and pay capital taxes ($\tau_t^K r_t^k u_t k_{t-1}$) as well. They also receive transfers TR_t^R. The utilization rate of capital, u_t with $u_t = \rho_u u_{t-1} + \epsilon_t^u$ matters. Households use part of their budget to purchase domestic bonds. Previous earnings from said bonds ($r_{t-1}B_{t-1}$), however, are not subject to tax.

On the other hand, non-Ricardian household's nominal consumption is given by

$$c_t^{NR} = \frac{(1 - \tau_t^l)w_t l_t + TR_t^{NR}}{1 + \tau_t^C} \quad (3)$$

It is explicit that the amount of labor supplied by both types of households supply the same amount of labor but receive different amounts of transfers based on the following transfer rule.

Without considering capital adjustment costs, we follow the simple law of motion of private capital given by

$$k_t = [1 - \delta]\, k_{t-1} + i_t \quad (4)$$

2.2. Firms

Firms' production processes are assumed to benefit from government capital . Integrating government capital into the firm's production function, we have

$$y_t = z_t [u_t k_{t-1}]^{\alpha} [l_t]^{1-\alpha} (K_{t-1}^G)^{\alpha^G} \quad (5)$$

where z_t is a productivity shock specified using an autoregressive processes $z_t = \rho_z z_{t-1} + \epsilon_t^z$ and $u_t = \rho_u u_{t-1} + \epsilon_t^u$. and are the utilization and technology shocks, respectively. Output now depends on private capital, labor supply, and government capital. The responsiveness of output to government capital is given by α^G.[6]

Returns in capital and labor markets are given by equations (6) and (7), respectively.

$$r_t^k = (\alpha Y_t) / (K_{t-1}) \quad (6)$$

$$w_t = [(1 - \alpha)\, Y_t] / (L_t) \quad (7)$$

[6] LWY admit that estimating the parameter is difficult.

2.3. Government

Expenditures on government consumption and investment and payment for bond issuances and transfers should be matched by tax collections.

$$\tau_t^C C_t + \tau_t^K r_t^k u_t K_{t-1} + \tau_t^l w_t l_t + B_t = G_t^C + G_t^I + r_{t-1} B_{t-1} + TR_t \tag{8}$$

where

$$TR_t = \theta TR_t^R + (1 - \theta) TR_t^{NR}$$

In terms of feasibility, we have

$$G_t^C + G_t^I + C_t + I_t = Y_t \tag{9}$$

where G_t^c represents government consumption and G_t^I and implemented investment, respectively. Government capital evolves on the basis of capital replacement rate and authorized spending process given by A_{t-N}, where N denotes the period of time needed to finish the project. As LWY mentioned, A_t can be interpreted as the flow of investment from the budget stock, meaning that when a project is officially funded, it will not be built right away. Instead, it will take years before the project starts generating social benefits. Government's capital accumulation is thus given by the following process:

$$K_t^G = (1 - \delta) K_{t-1}^C + A_{t-N+1} \tag{10}$$

where $A_t = \rho_A A_{t-1} + \mu_t^A$, $\mu_t^A \sim N(0,1)$.

Public investments evolve based on the following dynamics:

$$G_t \left[\sum_{n=0}^{N-1} \phi_n A_{t-n} + (1 - \varrho_{G^I}) \xi_t^{GI} + \varrho_{G^I} \xi_{t-1}^{GI} \right] \tag{11}$$

Where $\xi_t^{GI} = \rho_{\xi, G^I} \xi_t^{GI} + \epsilon_{t,}^{\xi, GI} \varrho_{G^I}$, represents the weight associated with pre-announcement effects and the sequence of disbursement rates $\{\phi\}_{i=0}^{N-1}$ sum up to 1[7]. The impact of authorized spending shocks depends on the values of the outlay or disbursement parameters ϕn. Given smaller values of the parameters for initial periods after project commencement, it is possible that impact multipliers start out smaller initially, followed by increasing impact as horizons become longer.

[7] Agents tend to have prior information that a major fiscal policy initiative may be implemented in the future. Definitely, this kind of advanced information may condition responses to fiscal policy shocks.

In the model, there are two shocks that may matter for government investment. One is initiated by sudden unanticipated changes in implemented government investment $\xi_t^{G^I}$. The other one has to do with authorized spending shocks μ_t^A, which may expedite the flow of investments to government capital. The dynamics emanating from the respective shocks are expected to differ from each other. Despite their expected dissimilarities, they may provide insights, thereby enabling us to understand which one yields better dynamics.

We offer two probable scenarios to the above base model. First, there is a possibility that disbursements may suddenly stop as a result of a rare legal setback that abrogates the basis of the project.[8] This may mean than parameter values may be small and become zero after the initial period/s of commencement.

$$G_t^I = \phi_0 A_t + \phi_1 A_{t-1} + \sum_{n=2}^{N} 0.A_{t-n} + \phi_{N-1} A_{t-N+1} + (1 - \varrho_{G^I})\xi_t^{G^I} + \varrho_{G^I}\xi_t^{G^I}, \qquad (12)$$
$$\phi_{N-1} > 0,\ \phi_0 = 0;\ \phi_1 = 0$$

The effect will be transmitted to output because authorized spending affect the stock of public capital, which is used in firm's production. Since other variables like private consumption depend on output, it means that a permanent stop to disbursement flow will affect them as well. Because of automatic stabilizers on fiscal tools, a dramatic stop in disbursement flows would also reduce government consumption.

Second, it is possible that the legal setback is temporary, which implies that authorized spending or disbursements will flow for a period and then stop, pending the resolution of the legal issue in question. The high resolution rate means that disbursement flows will then resume until the completion of the project.

$$G_t^I = \phi_0 A_t + \phi_1 A_{t-1} + \sum_{n=2}^{k} 0.A_{t-n} + \sum_{n=k+1}^{N-1} \phi_n A_{t-n} + (1 - \varrho_{G^I})\xi_t^{G^I} + \varrho_{G^I}\xi_t^{G^I}, \qquad (13)$$
$$\phi_0 > 0;\ \phi_1 > 0$$

Finally, we integrate automatic stabilization policies following LWY and CST.[9] The main characterization is the following: $\hat{s}_{t-s}^B$ is the ratio of government debt to output s periods ago. Had it been contemporaneous to the fiscal instrument, it would mean that fiscal adjustments, in reaction to debt expansions, would occur one period after spending spikes. But this may be counterproductive and infeasible considering the lags of government expenditures. Legislative provisions may simply reflect this.

[8] This is more pronounced in developing countries where the incidence of corruption is quite high, leading to procurement issues as well as bidding irregularities.

[9] The fiscal rules follow those in LWY. In contrast, CST include the respective lags of tax instruments and government consumption spending. We included the lag only for government consumption spending.

Transfers will have to be reduced in reaction to an increase in debt-output ratio. $\xi_t^{TR} = \rho_{\xi,\,TR}\xi_{t-1}^{TR} + \epsilon_t^{\xi,\,TR}$ is an unanticipated shock to transfers, representing discretionary fiscal policy. is given by an autoregressive process.

$$TR_t = -\psi_{TR}y_t - \gamma_{TR}s_{t-s}^{B} + (1 - \varrho_{TR})\xi_t^{TR} + \varrho_{TR}\xi_t^{TR} \tag{14}$$

Tax rates will eventually adjust upwards in order to stabilize the budget. The process for tax instrument l is given by the following:

$$\begin{aligned}\tau_t^l &= \psi_{\tau^l}y_t + \gamma_{\tau^l}\hat{s}_{t-s}^{B} + (1 - \varrho_{\tau^l})\xi_t^{\tau^l} + \varrho_{\tau^l}\xi_t^{\tau^l},\ l \\ &= \{\text{consumption, labor earnings, capital}\}\end{aligned} \tag{15}$$

where $\tau_t^l = \rho_{\xi,\,\tau^l}\xi_{t-1}^{\tau^l} + \epsilon_t^{\xi,\,\tau^l}$ and $\epsilon_t^{\xi,\,\tau^l} = \rho_{\xi,\,\tau^l}\xi_t^{\xi,\,\tau^l} + \mu_t^i$.

Finally, government spending needs to be reined in to generate surplus needed to stabilize the budget.

$$G_t^C = -\gamma_G s_{t-s}^{B} + (1 - \varrho_G)\xi_t^G + \varrho_G\xi_t^G \tag{16}$$

where $\xi_t^G = \rho_{\xi,\,G}\xi_{t-1}^G + \epsilon_t^{\xi,\,G}$ and $\epsilon_t^G = \rho_G\epsilon_t^G + \mu_t^G$. ϱ_{TR}, ϱ_{τ^l}, and ϱ_G represent weights associated with pre-announcement effects.

3. Simulation results[10]

We now look into the model's dynamics by first assuming that implementation delays reach N = 4 quarters, and the vector of disbursement rates is given by $\phi = (\phi_0,\phi_1,\phi_2,\phi_3)' = (0,1/3,1/3,1/3)'$. This indicates that disbursements are uniformly distributed throughout the entire period, and that there are no stops. In another simulation experiment given the same period of delays, we hypothesize that after one quarter from implementation, disbursement flows suddenly stop. This is given by the following: $\phi = (\phi_0,\phi_1,\phi_2,\phi_3)' = (0,0,0,1/3)'$. Calibrated parameter values are found in Appendix A.

We start by examining the dynamics of output given a government consumption shock. Figure 1 shows that the choice of preference structure does matter. As shown, such form of fiscal stimulus may not be automatically expansionary.[11] The incorporation of government consumption in utility functions results in markedly lower impact of government consumption shocks.

[10] All simulation results are based on a .mod file written in the Dynare environment that is integrated into Matlab. The code reflects the neoclassical model of LWY and some elements from CST's Matlab code. The code is available upon request.

[11] This is also the conclusion arrived at by Dacuycuy [2016] in the sense that output expansion depends on whether public consumption is included as part of the utility specification.

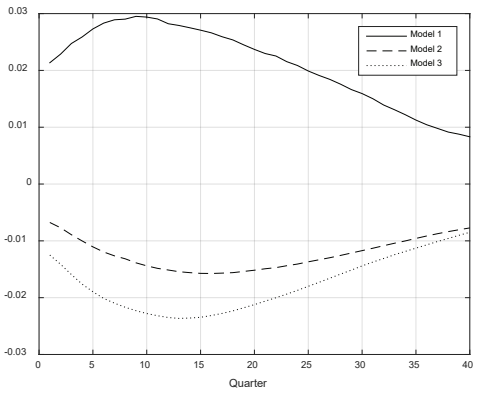

FIGURE 1. Impulse response functions of output to government consumption shocks

The model also allows us to examine whether or not government investment and authorized spending shocks have similar effects on ouput. Similar to the earlier result on output effects, it turns out that the response depends on the preference structure. The inclusion of public consumption in utility appears to yield relatively better results. LWY note that it is a usual neoclassical response for output to increase after a government investment shock. Given the fact that investment projects are completed with significant lags or delays, output does not increase immediately after said shock as shown in panel A of Figure 2. When disbursement flow stops, output remains flatter and lower than it was, compared with the case of no stops. The loss in output is evident when specification 1 is used instead. Thus, the impacts of disbursement flow stops on output are two-fold: to shift the respective impulse response functions (IRFs) downward and to lengthen the period of time before the IRFs breach the zero-line or achieve positive effects.

Given that authorized spending shocks are orthogonal to unanticipated government investment shocks, Figure 3 shows that the economy is better off when unanticipated increases in government investment are realized. This is attributable to the absence of implementation lags. Again, it is remarkably clear that the preference structure exerts considerable influence on the dynamic impact of government investment shocks. The respective IRFs of specifications that admit government consumption converge at rates faster than the specification without government consumption.

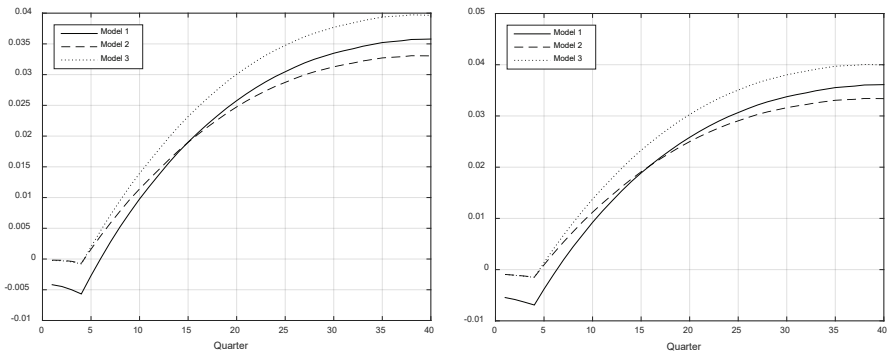

FIGURE 2. Impulse response functions of output to unanticipated authorized spending shocks (left panel - without stops; right panel - with stops)

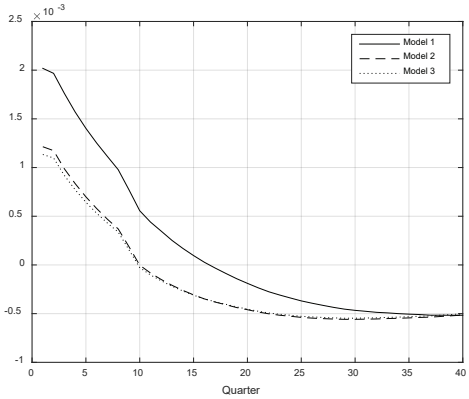

FIGURE 3. Impulse response functions of output to government investment shocks (with and without stops)

In terms of the reaction of government investments to its shock components, Figure 4 reveals that preference specifications do not matter. However, what's clear is that sudden stops result in a much lower level of government investment. Because of implementation lags, positive effects emanating from unanticipated government investment shocks are realized much earlier than authorized spending shocks. This is one key advantage. The reason why authorized spending shocks yield relatively higher impact after the period of implementation is that investment shocks are subject to pre-announcement effects, with equal weights given to contemporaneous and lag components.

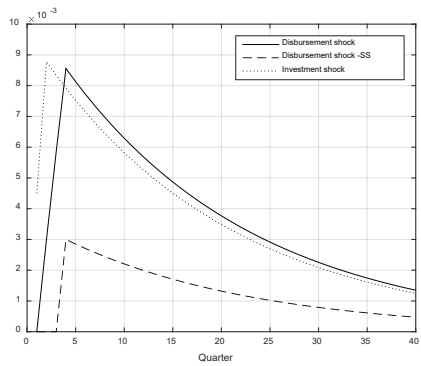

FIGURE 4. Impulse response functions of government investment to disbursement and investment shocks (all specifications)

Given that there is household heterogeneity, it is also important to investigate how private consumption reacts to authorized spending shocks. There are also differences in private consumption among Ricardian households across preference structures. The behavior of private consumption, when specifications admit public consumption, is quite different when disbursement flow stops. The initial impact of shocks in the event of spending stops is actually increased compared to a situation wherein the project is completed.

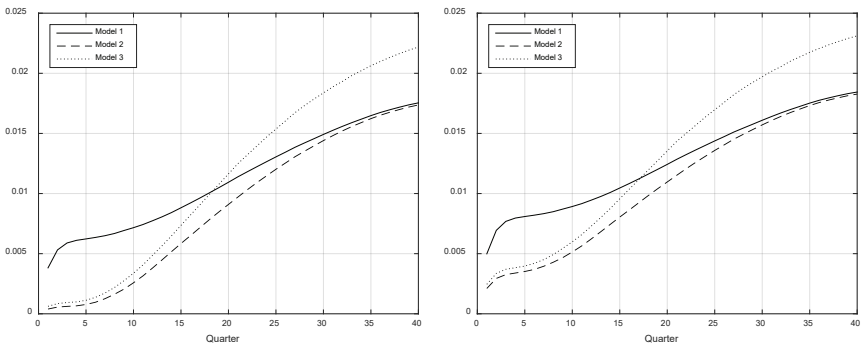

FIGURE 5. Impulse response functions of private consumption to authorized spending shocks: Ricardian households (left panel – without stops; right panel – with stops)

While Ricardian households appear to be better off having preferences that do not admit government consumption, the opposite holds for non-Ricardian households given a disbursement shock. Clearly, when public consumption is valued, utility gains will be realized as government decides to increase government investment budget.

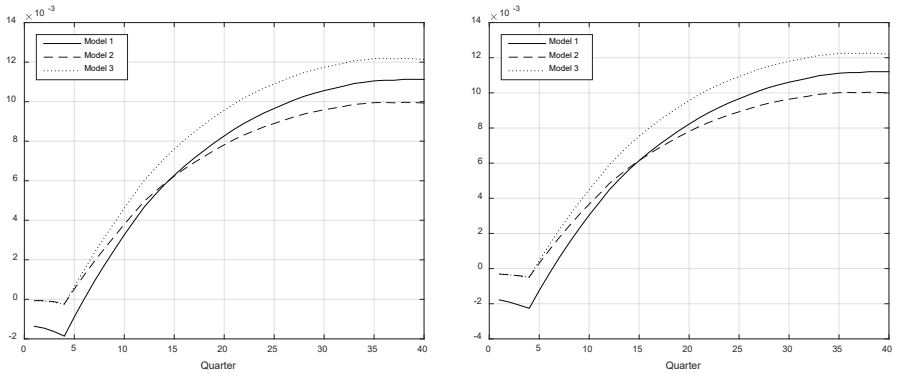

FIGURE 6. Impulse response functions of private consumption to authorized spending shocks: non-Ricardian households (left panel – without stops; right panel – with stops)

Aside from government investment shocks, another source of shocks to households comes from government consumption. Government consumption shocks induce different responses across households. For Ricardian households, the initial impact of such a shock is positive but short-lived, nosediving after 3 quarters. All IRFs are negative after 3 quarters. In contrast, non-Ricardian households register increases in private consumption as long as their preference structure is not constant elasticity of substitution, reflecting that complementarity may contribute to negative private consumption.

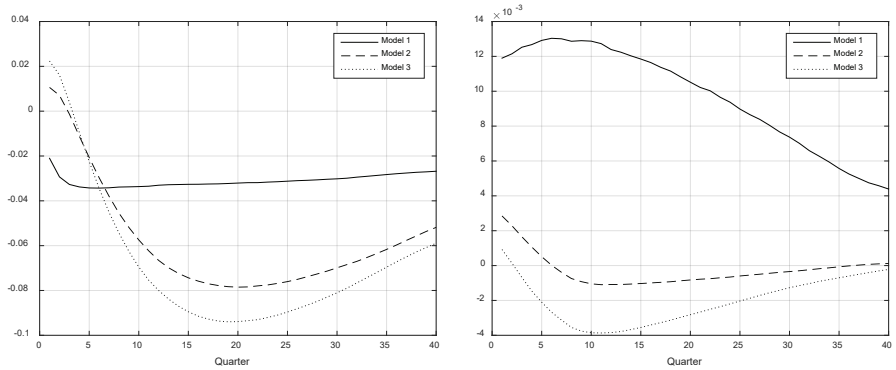

FIGURE 7. Impulse response functions of private consumption to government consumption shocks: Ricardian and non-Ricardian households (left panel – without stops; right panel – with stops)

Now, we focus on some labor market-related responses. Across preference structures, labor supply reacts differently to authorized spending shocks. As shown in Figure 8, the effect of sudden stops in disbursement flow is to exacerbate the initial negative impact. Preferences that do not admit government consumption will have persistent negative effects on labor supply.

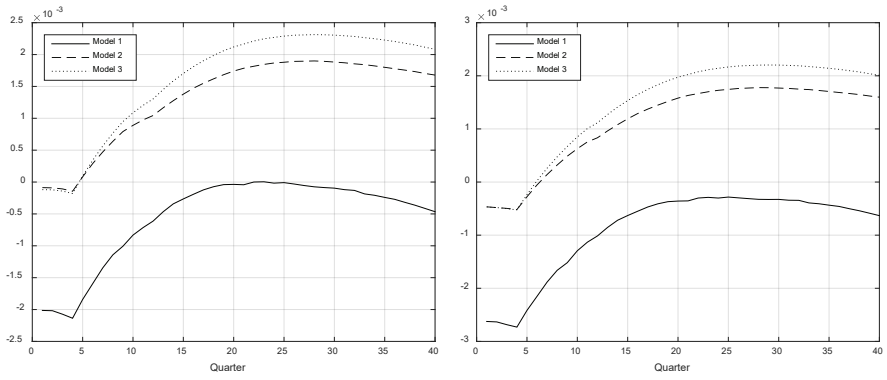

FIGURE 8. Impulse response functions of labor supply to authorized spending shocks (left panel – without stops; right panel – with stops)

In terms of the implications of tax policies, labor and capital tax shocks result in output contraction. Again, the dynamic behavior of shocks is clearly dependent on the preference structure. Consumption tax shocks on output quickly return to steady state only for models that integrate public consumption. This is due to the structure of the said shock which only includes an autoregressive shock. In contrast, for the other tax instruments, their structure contains components that will address pre-announcement effects which work to prolong the adverse impact of said shocks on output. It is also noteworthy that labor earnings, not capital taxes, remain the most distortionary among all tax instruments, regardless of preference structure. The results highlight the trade-offs that policy makers would face when it's time to stabilize the budget after initializing debt-financed increases in fiscal spending.

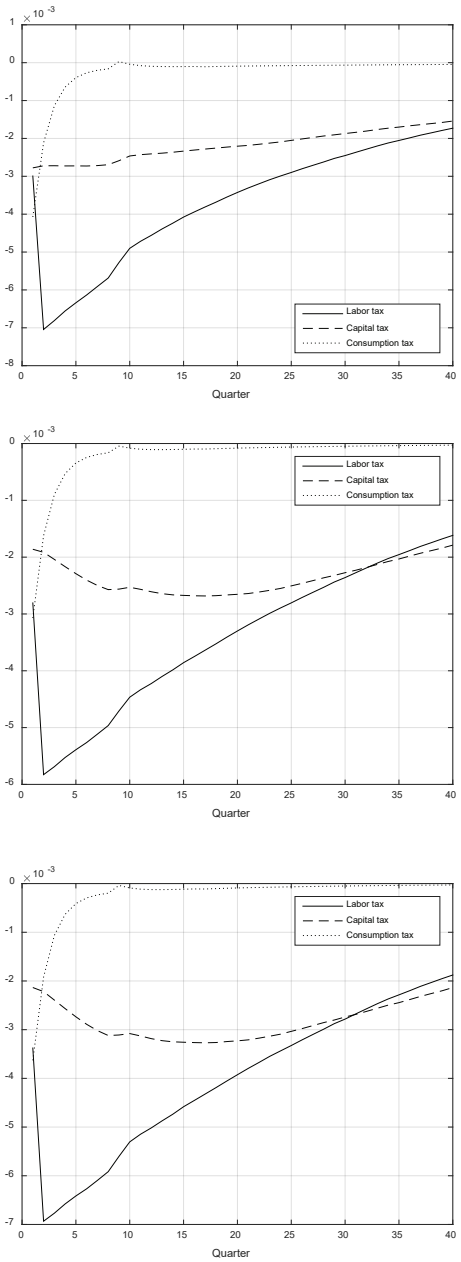

FIGURE 9. Impulse response functions of output in response to tax shocks: top panel - Model 1; middle panel - Model 2; and bottom panel - Model 3

It also appears that the respective impacts of tax shocks on Ricardian and non-Ricardian households diverge. For instance, labor tax shocks tend to reduce private consumption in Ricardian households while the same shocks stimulate higher private consumption on the part of non-Ricardian households.

4. Discussion

Implementation delays in government investment projects remains an important source of model dynamics in developing countries.[12] To be a bit more integrative, the study sought to introduce separate shocks to the implemented investment budget process. Big public infrastructure projects take time to build and the efficacy of disbursement proceses and adequacy of authorized budgets play critical roles in ensuring timely completion. There is also reason to believe that investment spending also benefits from unanticipated public investment spending. Model-wise, results show that indeed they are informative.

While the usual treatment of the authorized budget process is to specify a stochastic process, perturbations may be determined within budget preparation and spending systems. For instance, an important initiative in the budget process is the mandated early submission of the budget proposal to Congress. Implemented in 2014, this initiative sought to speed up the budget deliberation process by asking concerned units to start the process in January rather than April to definitize plans and programs. Some of the benefits can be realized over time. A longer period yields benefits in terms of minimal deviations from projected project costs. Implementation delays arising from sub-optimal preparation and planning always result in unanticipated cost overruns. In some instances, there were project cost overruns which resulted in the suspension of implementation. This initiative also prevented previous budgets to be reenacted.

Identifying factors that speed up disbursements (or an increase in disbursement parameters) is relatively easy. Even if a budget is authorized, disbursements may be slowed down by legal processes that mandate scrutiny. For instance, guidelines for bidding and the procurement act as binding constraints duly mandated by law. Projects that are deemed to have circumvented regular bidding procedures are nullified, and disbursements are suddenly stopped or disallowed, pending case resolution. This will certainly result in a sudden stop of disbursement flow and more heightened project scrutiny.

[12] Even without disbursement flow stops, implementation delays can seriously spawn systemic effects. A case in point is the ongoing construction of key infrastructure projects in Metro Manila. Securing right of way deals, which is critical for such projects, does not appear to be completed prior to the implementation of the project. Instead, finalization of such deals notably occur after project commencement. Thus, if no strategy to expedite such transactions is institutionalized, the project will enter a phase of chronic delays, thereby potentially resulting in cost overruns and affecting outcomes related to fiscal adjustments, time allocation among households, and timing of new investments.

While we focused on sudden stops, it is also possible to appreciate budgetary reforms that have been implemented for the Philippines. Some initiatives include the introduction of national procurement systems, modernization and streamlining of payment systems and harmonizing accounts, and using the appropriations law as the allocation document.

5. Concluding remarks

Motivated by a recent fiscal experience of the Philippines, this simple note explores a neoclassical model's properties when a structure that introduces shocks to authorized spending alongside unanticipated government investment shocks is integrated into the model. We argue that the two shocks are orthogonal, with the former deemed more related to persistent shocks arising from budgetary reforms given trends in disbursement rates. Unlike government consumption, government investments add up to a country's capital stock which may increase the efficacy of future government investments and consumption. Results indicate that shocks to government investment have systemic effects on output, labor supply, government investment, and government consumption.

We then pay close attention to the effects emanating from a household's preference structure. Based on the results, preference structures do matter in evaluating the impact of various shocks.

Sudden stops in disbursement flows are rare events, considering the experience and expertise of legislative departments in formulating fiscal measures based on transparent protocols. Thus, it can be remarked that quite rarely do large-scale government spending programs suffer from legal setbacks due to strict adherence to constitutional processes. Experiencing sudden stops in disbursement flows may alter government investment dynamics, and results show that preference structures cannot be ignored. Though sudden stops in disbursement flows are not modelled probabilistically, which is admittedly difficult, results indicate that there are indeed macroeconomic consequences.

Because of implementation delays, authorized spending shocks are not immediately expansionary, but they still may provide additional sources of growth in output and private consumption. What is clear is that even with disbursement shocks, a sudden stop to disbursement flows will yield lower government investments. Given that stops are ruled out, government investment shocks also have the advantage of increasing investment much earlier than when implementation delays are present.

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APPENDIX: Calibrated parameters

Parameter	Description	Value	Specifications applied to
Preference structures			
β	Discount factor	0.99	All
hc	Habit persistence parameter		
ζ	Inverse of the relative risk aversion	1	All
ξ	Inverse Frisch elasticity	2.0	All
θ	Share of non-Ricardian households	0.5	All
ω	Coefficient of government consumption in utility function	1.0	(1.1)
Production technology			
υ_G	Elasticity of substitution in constant elasticity of substitution aggregate	3.0	(1.2)
ϑ_G	Private consumption share in constant elasticity of substitution aggregate	0.9	(1.2)
δ	Depreciation rate for both public and private capital	0.025	All

Parameter	Description	Value	Specifications applied to
α	Share of capital in output	0.33	All
α^G	Efficiency parameter for government capital in production fuction	0.1	All
ρ_u	Persistence parameter in utilization rate shocks	0.95	All
ρ_z	Persistence parameter in productivity process	0.95	All
Pre-announcement effect coefficients			
ϱ_{G^I}	government investments	0.5	All
ϱ_G	Government consumption	0.5	All
ϱ_{τ^I}	Earnings tax	0.5	All
Output feedback coefficients			
ψ_{τ^I}	Earnings tax	0.01	All
ψ_{τ^k}	Capital tax	0.01	All
ψ_{τ^c}	Consumption tax	0.01	All
Debt feedback coefficients			
γ_{τ^I}	Earnings tax	0.05	All
γ_{τ^k}	Capital tax	0.05	All
γ_c	Consumption tax	0.05	All
γ_{TR}	Transfer	0.05	All
γ_G	Government consumption	-0.01	All
Persistence parameters			
ρ_{ξ,τ^I}	Earnings tax	0.95	All
$\rho_{\xi,TR}$	Transfers	0.95	All
ρ_{ξ,τ^k}	Capital tax	0.95	All
ρ_{ξ,τ^c}	Consumption tax	0.95	All
$\rho_{\xi,G}$	Government spending	0.95	All
$\rho_{\xi,A}$	Authorized government budget	0.95	All
ρ_{ξ,G^I}	Government investments	0.95	All