Effect of Financial Markets Distortions on Growth and Capital Accumulation in Open Economies

Term paper - Econ 594

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November 6, 2019

Abstract

Motivated by puzzling phenomena in open economies, as the global imbalances, we attempt to include a financial development friction in a reference endogenous growth model. The approach in this paper consists on the inclusion of a financial cost distortion in the effective return of world assets. We study the effect on capital accumulation and growth under different assumptions on the elasticity of labor. Our findings suggest that convex transaction costs in adquiring assets exert a negative effect in growth and capital accumulation. Such effect increases with a larger steady state asset position and, in the elastic labor case, is explained by adjustments in the labor-leisure ratio that equalize the equilibrium return of capital with that of foreign assets.

Key words: Financial Development, Open economies, Endogenous Growht, International Capital Flows.
JEL Codes: F21, F43, O16.

1 Introduction

The economic literature has documented extensively about the challenges and spillover mechanisms arising in an open economy setup in contrast to closed economy models. In particular, new arbitrage opportunities, for example, of risk diversification, or of higher returns on investments, lead to welfare improving outcomes like full consumption insurance, parity of purchasing power or interest parities. However, a puzzling result is that these features are hardly ever seen in practice. The economists argue that the presence of these puzzles in the theory are the result of too strong assumptions, as complete markets, that arise from abstracting from market distortions, such as, trade and asset flow barriers that prevent agents to behave as predicted theoretically (Obstfeld and Rogoff [2001]).

In particular, on capital flows, Lucas [1990] indicates the existence of what later would be called global imbalances, i.e., the pattern of capitals to flow disproportionately towards developed countries, despite having lower interest rates and productivity growth than the emerging ones. Lucas poses some candidate explanaitions to explain that phenomenon, for example, differences in human capital or market imperfections. With such idea in mind, we attempt to reconcile a benchmark endogenous growth model with a set-up that considers distortions associated with financial development.

A usual route taken on this topic, as surveyed by Gourinchas and Rey [2014], consists on allowing for a financial distortion penalty on the autarky return to capital, that if large enough, can reverse the international capital flows with respect to what indicated by the raw factor productivities. We, however, consider a different path, i.e., the inclusion of costs of adjustment in the net foreign assets. We make such inclusion in the small open economy endogenous growth model of Turnovsky [2009] and explore the implications in the growth rate of the economy and capital accumulation.

We consider the inclusion of convex adjustment costs a relevant alternative to the proportional return penalty (or tax)[1]. First, because the effect of a convex cost may imply additional incentives to smooth the bonds accumulation across time, and second, it allows to assess if the net foreign asset position itself have any role on the growth rate and dynamics of an economy.

The addition of convex costs of bond holdings adjustments in open economies is first explored in Turnovsky [1985], although there, the cost reflected imperfect substitability between assets, rather than inefficiencies in asset management, or lack of development in the financial markets as in this document. However, the perfect substitability is a key feature of standard microfounded growth models. Such result comes from an Euler equation argument that is expected to hold between all assets in equilibrium, implying they all yield the same expected return and agents are indifferent between them in the optimal allocation. A practical, inconvenient outcome is that the bond holdings will not appear in the Euler Equations and then any asset position will be compatible with the equilibrium, that is, it is mostly undetermined.

[1] 1The case of taxes on returns and optimal fiscal policy determination is explored in detail in Turnovsky [2009]

Such result represents a problem since it de-emphasizes the role of net foreign assets in the equilibrium dynamics and make impossible to obtain a steady state assets position. To address this issue, Benigno [2009] re-takes the convex cost approach making possible to obtain the equilibrium asset position endogenously from the euler equations.

Here, we will follow a similar route with particular focus on a open economy endogenous growth model in continuous time, where we make the corresponding adjustments to allow for the proposed cost structure, we do this in both the fixed and elastic labor versions of the model proposed by Turnovsky [2009], where it was found that the structure of the economy, as well as the adjustment mechanisms upon shocks is strikingly different under each setup.

Our results, however, are similar under both frameworks, suggesting that by including convex adjustment costs in the bond holdings, the model stops being compatible with a time-varying bond position, impliying that as other variables characterizing the dynamics of the model, the bonds will jump inmediatly to their steady state values and then, preventing the bonds dynamics to allow consumption to grow at a different rate than the rest of the economy. We later compare the results of the main model to those of a discrete-time open economy setup, with productivy aggregate shocks as in Obstfeld and Rogoff [1996], and find similarities in the role and determination of the bond holdings.

Afterwards, we discuss how different structures in the adjustment cost function may reconcile the cost-adjusted return of foreign assets model to the original one, where costs were omitted, but instead, taxes on the foreign returns were allowed and explored. Additionally, we briefly mention possible future routes of research on this topic. Finally, we conclude.

2 Small open economy endogenous growth model

The departure model is that of Turnovsky [2009], that is, a single good, endogenous growth model of the AK type. The economy is open to capital flows but small then international asset returns as given. Our modification, consists on the inclusion of transaction costs of managing the bond holdings position. We do this to explore the role of the foreign asset position and related cost structure on growth and equilibrium dynamics when there are inefficiencies in the financial markets of a country and then, in the financial transaction costs setup, we can think of the cost function to play a more relevant role for financially underdeveloped countries.

The economy consists of N households, all with the same preferences and labor endowments, the initial asset holdings are symmetric and then a representative agent model is feasible. In addition, there are growth spillovers that allow for endogenous growth rate, however, the externalities come from aggregate capital and not from externalities between agents, therefore, the second welfare theorem applies and we can focus on solving a Social Planner Problem to characterize the equilibrium of the model.

We assume there is no population growth or depreciation so we can focus only on endogenous sources of growth. The technology will be given by a Cobb Douglas function with capital externalities coming from government expenditure, which in turn, is given by a fixed proportion of the output. Such structure is convenient since it allows us to consider a production function with constant returns to scale on capital, a feature that is necessary for the model to generate ongoing growth endogenously. The individual firm production function is,

$$Y_i = aG^{\eta}(1-l)^{1-\sigma}K_i^{\sigma}$$

where $1-l$ corresponds to the labor input (and l is the leisure of the agent), K_i to the capital stock and G to the aggregate expenditure. Also $\eta + \sigma = 1$ so that the output follows an AK form with constant returns to scale.

Aggregating over the N households we get the total output of the economy as $NY_i = Y$:

$$Y = aG^{\eta}N^{1-\sigma}(1-l)^{1-\sigma}K^{\sigma}$$

and we substitute the government expenditure $G = gY$ and obtain the output as,

$$Y = [aN^{\eta}g^{\eta}(1-l)^{\eta}]^{1/(1-\eta)}K \tag{1}$$

The prefences of the households will have a CRRA form, with utility derived from consumption and leisure. Then, the lifetime utility is given by,

$$\Omega = \int_0^\infty \frac{1}{\gamma}(C_i l^\theta)^\gamma e^{-\rho t} dt \tag{2}$$

with $-\infty < \gamma < 1,\ \theta > 0, \rho > 0,\ 1 > \gamma\theta$

The resource feasibility for the whole economy is given by:

$$\dot{B} = Y + rB - C - I\left(1 - \frac{h}{2}\frac{I}{K}\right) - \frac{h_b}{2}B^2 - G \tag{3}$$

and the capital dynamics will be,

$$\dot{K} = I \tag{4}$$

Then, the output of the economy will be used for consumption, government expenditure and assets adquisitions, which can be physical capital or foreign bonds. The capital accumulation will be equal to the investment given there is no depreciation, at the same time, the investment is subject to convex adjustment costs.

Finally, the foreign bonds will yield a return r, determined by the world economy, and as the investment, there will be a transaction cost of managing the assets which is represented by the convex cost function $\frac{hb}{2}B^2$. The inclusion of such cost on bond holdings represents the main modification that we explore in this document and will denote the efficiency of the access to the foreign financial market, which means that financially developed countries are expected to deal with lower costs of adjustment.[2]

With this setup we can proceed to find the equilibrium and growth rates of the economy. For that we will solve a social planner problem, that consists on maximizing (2), subject to (3) and (4). In addition, we consider both, the fixed and flexible labor cases in the following sections.

2.1 Fixed labor case

As the usual practice in growth models that focus mainly on capital accumulation, we initially assume that the labor supply is fixed. Then, the output can be expressed as:

[2]in discrete general equilibrium models the costs are included in the future bond holding B_{t+1} however, such practice is not feasible here since the future bond is comprised in $\dot{B}$, then we follow Turnovsky [1985] by including it in B instead.

$Y = (Ag^{\eta})^{1/(1-\eta)}K,$ with $A = aN^{\eta}(1-l)^{\eta}$

The corresponding hamiltonian is given by:

$$H = \frac{1}{\gamma}\left(\frac{C}{N}l^{\theta}\right)^{\gamma} e^{-\rho t} + \lambda e^{-\rho t}\left[(1-g)Y - C - rB - \frac{h_b}{2}B^2 - I\left(1 + \frac{h}{2}\frac{I}{K}\right)\right] + q' e^{-\rho t}\left[I - \dot{K}\right]$$

We will normalize the shadow value multiplier for capital accumulation by that of the budget constraint, that is, $q = q'/\lambda$, which will denote the relative utility valuation or price of an additional unit of capital, i.e., the Tobin-q. We will express the optimality conditions in term of q for convenience[3].

The optimality conditions with respect to C, I, B are:

$$N^{-\gamma}C^{\gamma-1}l^{\theta\gamma} = \lambda \tag{5}$$
$$1 + h\frac{I}{K} = q \tag{6}$$
$$r - h_b B = \rho - \frac{\dot{\lambda}}{\lambda} \tag{7}$$

also, the optimality condition for K is,

$$\lambda(1-g)(Ag^{\eta})^{1/(1-\eta)} - \lambda\frac{h}{2}\left(\frac{I}{K}\right) = -\dot{q}' - q'\rho$$

It is convenient to express this equation in terms of q and replace the left hand side of the optimality condition of bonds (7), as well as the investment-capital ratio from (6):

$$\frac{(1-g)(Ag^{\eta})^{1/(1-\eta)}}{q} + \frac{(q-1)^2}{2qh} + \frac{\dot{q}}{q} = r - h_b B \tag{8}$$

this equation is the Keynes-Ramsey condition that equals the effective (net of cost) return of capital with that of the bonds.

Also we need to consider transversality conditions for each cumulative variable:

[3]for that end we have used the fact that $q = \frac{\dot{q}'}{\lambda} - \frac{q'}{\lambda}\frac{\dot{\lambda}}{\lambda}$

$$\lim_{t\to\infty} \lambda B e^{-\rho t} = \lim_{t\to\infty} q\lambda K e^{-\rho t} = 0 \tag{9}$$

Notice that in this case, there is no optimality condition with respect to l because the labor supply is constant.

We can obtain the growth rate of capital from (6),

$$\frac{\dot{K}}{K} = \frac{q-1}{h} = \phi \tag{10}$$

from (8), we can determine the dynamics of q, i.e., an equation for $\dot{q}$. It will follow, as in Turnovsky [2009] that the stable solution will not satisfy the transversality condition (9) with respect to the capital.

Such result comes assuming that in the steady state, $r - h_b B > 0$ and therefore, the only stable solution corresponds to the positive root of the equation for $\dot{q} = 0$ which is,

$$q = 1 + h(r - h_b B) + \sqrt{(1 + h(r - h_b B))^2 - (1 - 2(1-g)h(Ag^{\eta})^{1/(1-\eta)})}$$

however, since the solution for q is larger than $r - h_b B$, it violates the transversality condition for the capital in (9). Where it was used that $\lambda(t) = \lambda(0)e^{-\rho(r-h_b B)t}$. [4]

Therefore, it will follow that q will not have transition dynamics, and instead will jump instantaneously to its steady state level, i.e., ϕ is constant for all t.

Furthermore, with fixed labor, we will obtain from the production function that $\frac{\dot{Y}}{Y} = \frac{\dot{K}}{K} = \phi$.

Finally, for consumption, we time differentiate (5) and divide the resulting equation by the initial optimality condition:

$$\frac{\dot{C}}{C} = -\frac{1}{1-\gamma}\frac{\dot{\lambda}}{\lambda}$$

we use (7) to substitute for $\dot{\lambda}/\lambda$:

[4] By replacing the proposed solution for q in the transversality condition we get that $\lim_{t\to\infty} q\lambda(0)K_0 e^{\int_0^t ([q(s)-1]/h)ds - rt + h_b \int_0^t B(s)ds} \neq 0$ with $q(s) = q + (q(0) - q)e^{\mu s}$ and where μ represents the negative (stable) eigenvalue of the system represented by the dynamic equation for $\dot{q}$.

$$\frac{\dot{C}}{C} = \frac{1}{1-\gamma}(r - h_b B - \rho) = \psi \tag{11}$$

Implying that the growth rate of consumption is the intertemporal elasticity of substitution times the difference between the effective return on foreign bonds (gross return minus marginal cost of adjustment) minus the discount rate.

2.1.1 Role of bond holdings in the equilibrium dynamics and grow rates

In a model without convex adjustment costs, we would have that in the inelastic labor case, the bonds will move according to the grow rate of capital and consumption and its grow rate will eventually converge to the larger of those. However, in this case, when allowing for convex transaction costs of the bonds, we will have that according to (8), with q constant, B is not allowed to move, otherwise such optimality condition would not hold at all times.

Then, in contrast with a model without cost of adjustments, the bonds will not vary in time, instead will remain at its steady state level.

In that case, regarding the model with no convex costs, the bonds will not have an adjustment role in smoothing consumption.

2.2 Endogenous Labor

In this case, labor is allowed to adjust and therefore we can use the optimality condition with respect to l which is given as follows,

$$\theta N^{-\gamma} C^{-\gamma} l^{\gamma\theta - 1} = \lambda(1-g)\frac{\eta}{1-\eta}\frac{Y}{1-l} \tag{12}$$

the conditions for consumption (5), investment (6) and bonds (7) will remain the same, whereas the optimality condition for capital is sligthly re-expressed by taking the labor terms (now flexible) out of the constant term:

$$\frac{(1-g)(Ag^{\eta})^{1/(1-\eta)}(1-l)^{\eta/(1-\eta)}}{q} + \frac{(q-1)^2}{2qh} + \frac{\dot{q}}{q} = r - h_b B \tag{13}$$

The same transversality conditions (9) will apply as well.

With mobile labor, the equilibrium dynamics will be different. For that end it is convenient to obtain an expression for the consumption-ouput ratio which we can get by substituting (5) in the new optimality condition (12):

$$\frac{C}{Y} = \theta(1-g)\frac{\eta}{1-\eta}\frac{l}{1-l} \tag{14}$$

here with l bounded, it must be the case that $\frac{\dot{C}}{C} = \frac{\dot{Y}}{Y}$.

Also, we can use the same method as in the fixed labor case to characterize the growth rate of consumption. However, unlike before we cannot obtain the growth rate of consumption directly since we have to account for labor dynamics.

$$(\gamma - 1)\frac{\dot{C}}{C} - \theta\gamma\frac{\dot{l}}{l} = \frac{\dot{\lambda}}{\lambda} = \rho - r - h_b B \tag{15}$$

we time differentiate the consumption-output ratio (14),

$$\frac{\dot{C}}{C} - \frac{\dot{Y}}{Y} = \frac{\dot{l}}{l} + \frac{\dot{l}}{1-l} \tag{16}$$

and the production function,

$$\frac{\dot{Y}}{Y} = \frac{\dot{K}}{K} - \frac{\eta}{1-\eta}\frac{\dot{l}}{1-l}$$

By substituting $\frac{\dot{K}}{K} = \frac{q-1}{h}$:

$$\frac{\dot{Y}}{Y} = \frac{q-1}{h} - \frac{\eta}{1-\eta}\frac{\dot{l}}{1-l} \tag{17}$$

From (15), (16) and (17) we solve for $\dot{l}$ as:

$$\dot{l} = \left(\frac{1-\gamma(1+\theta)}{l} + \frac{(1-\gamma)}{1-l}\frac{1-2\eta}{1-\eta}\right)^{-1}\left(r - \rho - h_b B - (1-\gamma)\frac{q-1}{h}\right) \tag{18}$$

From (18) we obtain an expression for $\dot{q}$:

$$\dot{q} = (r - h_b B)q - \frac{(q-1)^2}{2h} - (1-g)(Ag^{\eta})^{1/(1-\eta)}(1-l)^{\eta/(1-\eta)} \tag{19}$$

We have that the steady state of the economy can be fully characterized by $q,\ l$ after setting $\dot{l} = \dot{q} = 0$, the result of this substitution yields that q and l will be constant, that is, the variables will jump to their steady states instantaneously.

To obtain such result we assume that $r - h_b B > 0$ in the steady state solution, otherwise it would not be optimal to hold any assets. In such case, the solution for q when $\dot{q} = 0$ will yield two positive eigenvalues, i.e., no stable solutions (q, l are constant).

2.2.1 Role of the asset position on the dynamic equations

As before, we have that $\frac{\dot{K}}{K} = \frac{\bar{q}-1}{h}$ (with $\bar{q}$ denoting it is constant) but additionally, since the optimality condition for labor is working, then we also have that the leisure-labor ratio will adjust in such way that we also have:

$$\frac{\dot{K}}{K} = \frac{r - h_b B - \rho}{1-\gamma} = \psi \tag{20}$$

A consequence of that is that the common growth rate of the variables of the economy ψ now is also determined by the margin of the effective return of foreign capital overthe discount rate times the intertemporal elasticity of substitution.

The implication is that labor will adjust to equilibrate the net return of capital and bonds, so that the Ramsey-Keynes condition holds at all periods, that is,

$$r - h_b B = \frac{(\bar{q}-1)^2}{2h\bar{q}} - \frac{(1-g)(Ag^{\eta})^{1/(1-\eta)}(1-l)^{\eta/(1-\eta)}}{\bar{q}} \tag{21}$$

It is important to notice that (20) is obtained by rearranging (18) in equilibrium. That implies that the force driving the equalization of all rates of growth in the economy is the adjustment of the labor-leisure ratio to ensure that (21) holds. This feature is critical and is not present in the fixed labor economy model.

Finally, with regards to the effect of the bond position and marginal cost of holding assets on the growth rates, it can be said that, remaining costant, the bond position would have a penalty effect on the return that will decrease the rate of growth of the economy as seen in (20). The reason for this is that, in the way that the costs where included, they will affect negatively the incentives to accumulate bonds and the corresponding wedge in returns, when compared to those of capital will be adjusted by a labor-leisure ratio movement instead that with higher physical capital holdings.

The exception to these results would be when the steady-state bond position is zero or if, instead, the cost structure is linear. In the first case, the growth rate would be the same as in the model without cost, whereas in the second it would be decreased too but in the fixed labor setup we would have a time varying bond position, that without leisure adjustments, would allow consumption to grow at a different rate than the rest of the economy. In such case we would have only a constant return penalty, similar to a tax on foreign returns, as discussed in Turnovsky [2009].

It is important to mention that although the inclusion of the convex cost limits dramatically the dynamics of the bond position across time, in the case of having different bonds position, or more efficient asset management structures (different h_b here, implying different degrees of financial development), differences in the accumulation rate of capital across countries could arise.

Therefore, countries with higher developed financial markets (or less costly access to the capital markets) would be able to experience a relative increase in their capital accumulation. This is consistent with the phenomenon of global imbalances in the flows of capital, arising because of distortions in the return of assets as in Caballero et al. [2008] and Gourinchas and Rey [2014].

3 Comparison of the results with a discrete time International RBC

Incompatibility with net foreign asset movements can also appear in models with aggregate uncertainty of the DSGE type. Here, we describe a one bond, two economies model similar to the model of the previous sections, we aim to determine the role of the bond holdings in the equilibrium. The model follows the structure laid out by Obstfeld and Rogoff [1996] but we include adjustment costs as Benigno [2009].

Consider a two country world with population in $[0,1]$, with with home households having a relative size of n and foreign $1-n$.

as in the model before, preferences in each period will be given be represented by a CRRA function:

$$U_t = E_t \sum_{s=t}^{\infty} \beta^{s-t} \frac{C_s^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} \tag{22}$$

For simplicity we abstract of capital, and then the technology for home firms is linear in labor as:

$$Y_{it} = Z_t L_{it}$$

where Z_t is an aggregate productivity shock with $Z_t \sim AR(1)$. Although aggregate, the shock is country specific so that firms in the foreign country will have the same structure but will depend on Z_t.

The period-wise budget constraint of the household is:

$$B_{t+1} + \frac{h}{2}(B_{t+1} - \bar{B})^2 + C_t = (1+r_t)B_t + w_t + T_t$$

As before, the households can trade a non-contingent world bond that yields a risk free rate r_t in period t. The household also earns a wage and given that we are not considering disutility of labor, supplies all his time endowment to the labor market. On the demand side, the household will divide his resources between consumption and asset purchases.

Additionally, the asset purchases are subject to adjustment costs with respect to a reference level, in the former section such reference level was zero. For simplicity, assume the cost is paid to a competitive financial intermediary that rebates a transfer each period. In equilibrium, given the zero profit condition of the intermediates, $T_t = \frac{h}{2}(B_{t+1} - \bar{B})^2$, however, this is not internalized by the households when taking their optimal decisions, therefore, Tt will be taken as given.

The resulting Euler equations for home and foreign household are:

$$C_t^{-1/\sigma}[1 + h(B_{t+1} - \bar{B})] = \beta(1 + r_{t+1})\mathbb{E}[C_{t+1}^{-1/\sigma}]$$
$$C_t^{*\ -1/\sigma}[1 + h(B_{t+1}^{*} - \bar{B}^{*})] = \beta(1 + r_{t+1})\mathbb{E}[C_{t+1}^{*\ -1/\sigma}]$$

in the steady state equilibrium: $C_t = C_{t+1},\ C_t^* = C_{t+1}^*$, then

$$\begin{aligned} 1 + h(B^{ss} - \bar{B}) &= \beta(1 + r^{ss}) \\ 1 + h(B^{*\ ss} - \bar{B}^*) &= \beta(1 + r^{*\ ss}) \end{aligned} \tag{23}$$

Aggregating these two equations:

$$1 + h(nB^{ss} + (1 + n)B^{*\ ss} - (n\bar{B} + (1 - n)\bar{B}^*)) = \beta(1 + r^{ss})$$

and by the assets market clearing condition $nB_t + (1 - n)B_t^* = 0$,

$$1 = \beta(1 + r^{ss})$$

substituting this result in (23) yields:

$$B^{ss} = \bar{B},\ B^{*\ ss} = \bar{B}^*$$

Which implies that the steady state in each case is the reference level to which cost adjusts. If we assume that this level is zero as before and departing from, an initial zero net foreign asset position (as usually supposed in the literature), then we would obtain a constant asset position.

Such result is similar to the one obtained in the endogenous growth model. In this case the steady state asset position is undeterminate without an adjustment cost function. In our main model of endogenous growth we will have that we may have a steady state bond holding position too but given the transversality conditions of the model it will not be allowed to adjust over time.

4 The role of the cost function structure

An important caveat in the model exposed in the last section is that we assume symmetry in almost every feature across countries, with the only difference being the country shocks that play no role in the very long run. Even the cost functions are the the same, implying that we are talking about equally financially developed countries. We did not change that since our objective was to show similarities between the result of that model and that of our main endogenous growth model considered in the section 2.

Benigno [2009], on the other hand, considers an extended case in which there are home and foreign bonds as well as a general cost function, he discusses in more depth the role of different structures of the bond adjustment cost function, as well as the role of the assumptions on symmetry across country in terms of initial asset position, among other features of the model.

In terms of our model, it is also clear that the structure of the cost function itself plays an important role in the results. In the case of non-zero initial or steady state asset position, we have, that, given that B will not change through time, the marginal cost of adjustment will act as a fixed penalty on the return of foreign bonds, working in a similar way as a linear cost function or as a proportional tax on the bond return. In practical terms, such result is analogous to having a fixed penalty on the return, or a tax of the form: $(1-\tau_b)r$ and we would be, at least in terms of pace of capital accumulation and growth, in case similar to the benchmark in Turnovsky [2009].

In such case, it could be possible to design a tax distorted equilibrium that compensates such distortion. In Turnovsky [2009], there was no ex-ante distortion on the foreign returns, which explains why the optimal tax on foreign returns was zero.

5 Future research on this topic

The present document constitutes a very preliminar exploration on the effect of inefficiencies in the access to world capital markets and management of net foreign asset positions. We intently wanted to explore the consequences of such variable in a very simple framework such as a benchmark endogenous growth model for a small open economy.

Nevertheless, there are various features of the economies that can exploit better the inclusion of financial asset holdings in a model, to name some, the role of the exchange rate, valuation effects of assets or different sources of aggregate and idiosyncratic risks that motivate agents to demand different assets with hedge motives. Accordingly, there is a number of post-financial crisis economic models that incorporate some of these characteristics (see for example Ghironi et al. [2015], Benigno [2009]).

In addition, the inclusion of distortions of different natures, as those implying departures from the PPP paradigm, or monopolistic power by firms and financial intermediaries can enrich the analysis of the role of differences in the financial market structure across countries in shaping the business cycles of the economies. In that sense, a possible route for future research, is to explore the effect of differences in financial development across countries in a more complete asset environment, and with a clear specification of the role played by financial intermediaries, as an alternative to either stating a given penalty to the returns or assuming a given adjustment cost.

6 Conclusions

Motivated by puzzling phenomena in international economics as the global imbalances or the home bias in investment, we modify the small open economy model in Turnovsky [2009] to account for convex adjustment costs in the net foreign asset position of the economy. Our initial hypothesis is that cross-countries market differentials in the ability to manage the foreign assets would be reflected in their costs of transactions, and could be relevant for the long term growth rate and dynamics of the economy.

The specific cost function explored, is taken from Turnovsky [1985], and as mentioned by Ghironi [2006] and Benigno [2009] is included so that the bonds position remains in the Euler equations of the agents, in a way that it plays a role in the steady state allocation and equilibrium dynamics, instead of being abstracted and undetermined. They however, explore the subject in new-keynesian models that are based in the RBC benchmark with frictions.

We, instead, go a step backwards and explore what is the effect in an endogenous model of the AK type. In particular, another the reason why this is thought worth exploring, is the fact the only other asset in the model, capital, is subject to such shocks when accumulated, and, then, we consider plausible to think of an analogous situation for the other asset available.

The results indicate that the steady state bond position, when included through a convex cost function, has a negative effect on the accumulation rate of capital and growth rate of the economy. Furthermore, a surprising result, is that with such inclusion, we impose that the bond position is not allowed to vary over time. That constrasts with the original model in which the bonds position play an important adjusting role in the fixed labor case.

As a comparison, we lay out a simple one bond model of the IRBC type following Obstfeld and Rogoff [1996] and adding the same cost function. We obtain a similar result, we are able to determine the equilibrium asset position endogenously, but it is given merely by whatever level of reference we use in the adjustment cost function. Finally, we discuss about the effect of the assumptions implied, and the implications of different cost structures. Our main conclusion is that, with a non zero steady state net foreign assets or even with a linear cost function, we would be able to think of policy responses as those explored in Turnovsky [2009] to revert the negative effect of the penalty in the returns of bonds due to asset management transaction costs. In particular, it may be feasible to adjust the after cost return, i.e., offset the effect of the cost, in a way that modifies the labor-leisure ratio of the economy and higher capital accumulation growth is achieved.

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