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Financial Liberalization and Inflationary Dynamics: An Open Economy Analysis

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Abstract

The paper analyzes the effects of financial liberalization on inflation. We develop a monetary and endogenous growth, dynamic general equilibrium model of a small open semi-industrialized economy, with financial intermediaries subjected to obligatory ”high” reserve ratio, serving as the source of financial repression. When calibrated to four Southern European semi-industrialized countries, namely Greece, Italy, Spain and Portugal, that typically had high reserve requirements, the model indicates a positive inflation-financial repression relationship irrespective of the the specification of preferences. But the strength of the relationship obtained from the model is found to be much smaller in size than the corresponding empirical estimates.

Journal of Economic Literature Classification: E31, E44

Keywords: Inflation; Financial Markets and the Macroeconomy

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1 Introduction

The primary objective of this paper is to analyze the effect of financial liberalization on the rate of inflation using an open economy monetary endogenous growth model. Secondly, in order to quantify the effects of financial liberalization on inflation, we calibrate the dynamic general equilibrium model to four southern European economies — Greece, Italy, Portugal and Spain, over the period of 1980–1998.[1] Financial repression can be broadly defined as a set of government legal restrictions, like interest rate ceilings, compulsory credit allocation and high reserve requirements, that generally prevent the financial intermediaries from functioning at their full capacity level.

The motivation for developing an model of a financially repressed small open economy is basically twofold: Firstly, the paper tries to fill up the dearth, in the literature, of comprehensive microfounded models that can be calibrated. And secondly, the paper stresses on the importance of including import of intermediate goods in an open economy model aimed at analyzing macroeconomic implications following a change in domestic policy.

In regard to lack of models analyzing financial repression in an open economic environment, the Nag and Mukhopadhyay (1998) and the Kang and Sawada (2000) studies are notable exceptions. Nag and Mukhopadhyay (1998) indicated that, financial liberalization brings down the inflation rate and improves the performance of the real sector once one allows for exchange rate flexibility in the current account and import penetration in the production structure. While, Kang and Sawada (2000) presented an endogenous growth model which simultaneously incorporated the role of financial development, human capital investment, and external openness. The study indicated that financial development and trade liberalization increases the growth rate of the economy by enhancing the marginal benefits of human capital investment and vice-versa. Further, an expansionist government is found to be likely to increase the growth rate of money supply, repress the financial sector, close the economy, and impose a high income tax rate to obtain increases in the seigniorage revenue. Unfortunately, the fall out of such repressive policies are higher inflation rate and a lower economic growth rate that will not be sustainable. The paper, thus, advocate openness and financial

[1] The choice of the sample period is to maintain uniformity with respect to definitions of data. Note while, Italy, Portugal and Spain joined the the European Monetary Union in 1998, Greece got included in 2002.

development as the basic requirements of sustainable economic development.

However, the studies have their own limitations. The study by Nag and Mukhopadhyay (1998), lacks any microfoundations and cannot be calibrated to any economy due to the restrictive assumptions of the model. The Kang and Sawada (2000) model, though has properly laid out microfoundations, is purely theoretical with a structure that is not conducive to calibration. We emphasize on the role of calibration to not only sign the relationship between financial repression and inflation but, also to measure the "strength" of the relationship. Moreover, the "strength", when compared to the simple regression coefficients between inflation and financial repression, would also tell us about the performance of the dynamic general equilibrium model in their ability to replicate the data. The results, in turn, would help us realize the modifications, if at all, we need to make to our existing general equilibrium model for making better policy prescriptions.

Another notable concern with the Kang and Sawada (2000) study, is that they ignore the importance of the import of intermediate goods, while making their conclusions. Serven (1995) indicates that the ignorance of intermediate and capital goods import is bound to provide an "incomplete – and potentially misleading" – assessment of macroeconomic implications of domestic policy changes. Carmichael, Kéita and Samson (1999) also emphasizes the importance of intermediate good imports in the production process, when analyzing business cycles with liquidity constraints for a small open economy. And more recently, Nag and Mukhopadhyay (1998) and Nag (2000), stresses on the role of imported intermediate inputs, while discussing issues of stabilization. In addition to these studies, Boileu (1999, 2002), using two-country dynamic general equilibrium models, discusses the role of import of equipments and machineries when analyzing the volatility of net-exports and terms of trade.. Hence, in order to prevent any misleading macroeconomic assessment of financial liberalization, we model intermediate goods explicitly in the production process.

The paper is structured as follows: Besides the introduction and the conclusion, Section 2, outlines the rationale behind the choice of economies for our calibration and how we measure the severity of financial repression. Section 3 and 4 discusses the basic structure, equilibrium and balanced growth path of the model. Section 5 lays out the process of calibration. And, Section 6 deals with the inflationary dynamics of liberalizing the domestic financial sector, which in our case, is portrayed in the form of a relaxation of the reserve–deposit ratio.

2 The Metric for Financial Repression and the Choice of Sample Economies

This section is devoted for rationalizing our choice of the sample economies, the metric for financial repression, and also to point out the importance of intermediate good imports in the production process. We follow Bacchetta and Caminal (1992), Haslag and Hein (1995), Espinosa and Yip (1996), Haslag (1998) and Haslag and Koo (1999) in using the "size" of obligatory reserve requirements held by commercial banks as the metric for the degree of financial repression. It must be realized that nothing should prevent our existing general equilibrium analysis to be used in studying other developing economies subjected to a repressed financial structure, mainly through the imposition of"high" reserve requirements. The four European economies chosen are,hence, merely examples of countries that matches the assumptions of our model. Our choice of the sample is vindicated by observations that can be made from Tables 1 and 2.

Table 1, along with sizes of reserve requirements and annual rate of inflation, outlines the periods over which major interest rates were deregulated and credit ceilings were relaxed in some important European economies. Clearly, economies with higher average reserve requirements are observed to experience higher average rate of inflation. Besides this, an interesting feature stands out, while on one hand, the capital markets were being deregulated, the required bank reserves were much higher in Greece, Italy, Portugal and Spain, when compared to Belgium, France, Germany and the U.K. Moreover, as Table-2 indicates, while financial liberalization was in process, with interest rates being determined by the market, the bank reserve ratios increased significantly in the late 1980s, in three out of the four Southern European countries of our concern.

[INSERT TABLE 1 HERE]

[INSERT TABLE 2 HERE]

[INSERT TABLE 3 HERE]

In order to evaluate the relationship between inflation and financial repression for our economies we run a simple two-variable regressional analysis between inflation and the reserve–deposit ratio. The results

are reported in Table-3. Note that except for Greece the data indicates a positive relationship between inflation and financial repression. Further, except for Spain the positive relationship between inflation and the financial repression parameter is significant. The negative relationship in Greece is an exception, especially when one realizes that the positive relationship between the reserve requirements and inflation has been well documented in the empirical literature.[2]

[INSERT TABLE 4 HERE]

Table 4 indicates that, even though size of the FDI as a percentage of GDP is quite small, intermediate goods as a percentage of both total trade and GDP are quite sizeable, and hence, cannot be ignored. The percentage of of intermediate goods lies between 12.44 percent (Greece) and 17.03 percent (Italy). Besides, as can be observed from Table 4 the figures are comparable to other developed European economies as well. On the other hand, the percentage of intermediate goods is found to be between 6.21 percent (Italy) and 13.09 percent (Greece). As with the figures of intermediate goods to total trade, the percentages of intermediate good imports to GDP are quite comparable to four industrialized economies in Europe.

So in summary, there are two essential features in our economic environment. First, financial repression is modeled through banks having to hold "high" levels of obligatory reserve requirements. And, we model the intermediate goods explicitly in the production process, given their importance in the trade structure. Following Karapatakis (1992), we assume that import of intermediate goods are constrained by loan availability. The rationale is as follows: Given that, foreign suppliers usually require prepayment for the foreign inputs, firms may not be willing to tie-up all their retained earnings trying to finance the imports.

3 Economic Environment

We modify and extend the theoretical framework of Chari, Jones and Manuelli (1995), used to analyze inflation-growth correlations in the context of developed economies to suit the requirements of a financially repressed small open semi-industrialized economic structure. Given that we are trying to analyze the importance of financial sector distortions on inflation and exchange rate movements, it is essential to model

[2] See, for example, Haslag (1998), and Haslag and Koo (1999).

the banking system explicitly. Besides, realizing the importance of import of intermediate goods we allow for the co-existence of an intermediated input (imported intermediate goods) and the un-intermediated input in the production structure. In this regard the banking system plays a crucial role since the imported intermediate goods requirement are assumed to be completely financed through bank loans. Thus for the imported input to be used in the production process, consumers must place deposit in the banking system and firms must borrow these deposits in the form of loans to meet the cash requirements of the foreign suppliers. Assumptions of small open economy allows us to treat the foreign price as parametric. The domestic un-intermediated capital will be assumed to be rented directly from the households. We will denote the domestic capital by k and the intermediated foreign input by k^*.

Financial repression is modeled through the banks being obligated to hold a "high" fraction of their deposits as fiat currency, serving as an easy source of seigniorage revenue for the government. We consider an infinitely-lived representative agent model with no uncertainty and complete markets. The economy is populated by four types of decision makers: households, banks, firms, and the government. In this model the home-produced consumption good will be assumed to be a credit good.[3]. Note that money is valued in this economy simply because the banks are obligated to hold a fraction of the deposits as cash reserves. The domestic consumption and investment goods are produced by the same technology. Since all goods in the domestic economy are perfect substitutes in the production side, they sell for the same nominal price.

The resource constraint in the model economy is given by

$$c_t + i_{kt} + i_{ht} + x_t \leqslant F(k_t, k_t^*, n_t h_t), \tag{1}$$

where p_t is the domestic price level; c_t is the consumption of domestic credit good ; i_{kt} and i_{ht} are the domestic investment purchases in physical and human capital respectively; x_t denotes the exports of the small-open economy; k_t is the stock of domestic physical capital; k_t^* is the purchase of imported intermediate good; $n_t h_t$ denotes effective labor, given that n_t is the hours of labor and h_t is the stock of human capital; and F is the production function. Physical and human capital evolve according to the following processes, respectively $k_{t+1} \leqslant (1-\delta_k)k_t + i_{kt}$ and $h_{t+1} \leqslant (1-\delta_h)h_t + i_{ht}$, where δ_k and δ_h are the depreciation rates.

[3]Including an imported consumption good in the utility function of the individual does not alter the essence of the results obtained.

Trading in the economy can be captured by the following sequence: At the beginning of each period, a securities market opens. The households receive their factor earnings (capital and labor) from the previous period, the net of tax principal and interest from their past savings, and any lump-sum transfers from the government. At this time, households make payments for the credit (consumption) goods and make savings decisions for the future. Note the only source of savings for the households are in the form of deposit contracts maturing in one period offered by the financial intermediaries. The deposits are used to make loans and acquire fiat money. The banks hold fiat money to satisfy a reserve requirement. We assume that no resources are required to operate the banking system.

On the production side, firms rent the domestic capital directly from the households but they must borrow cash from the financial intermediaries to purchase the imported intermediate good. This is because they start the period with no cash, since the free entry and exit in the perfectly competitive product market washes out all profits. The firm produces units of the domestic consumption and exportable good using a constant returns to scale production technology involving the un-intermediated domestic physical capital, human capital and the imported intermediate good as the three inputs.

The government taxes income and makes lump-sum transfer payments to the households. The government can finance the deficit in any period through seigniorage and issuing external debt. For the sake of simplicity and technical reasons outlined below, we assume that there are no domestic government bonds.

3.1 Consumers

We assume that there are large number of identical households that solves the following dynamic problem:

$$V = \max_{c_{1t}, n_t^s, d_t, h_{t+1}, k_{t+1}} \sum_{t=0}^{\infty} \beta^t u(c_{1t}, 1 - n_t) \tag{2}$$

$$s.t. : d_t \leqslant \left\{ \begin{array}{c} [p_t w_t n_t h_t](1-\tau_t) + (1-\tau_t) p_t r_t k_t \\ +[1 + (1-\tau_t) R_{dt}] d_{t-1} - p_t c_t - \\ +T_t - p_t i_{ht} - p_t i_{kt} \end{array} \right\} \tag{3}$$

$$k_{t+1} \leqslant (1-\delta_k)k_t + i_{kt} \tag{4}$$

$$h_{t+1} \leqslant (1-\delta_h)h_t + i_{ht} \tag{5}$$

with d_{t-1}, τ_t, h_t, k_t, R_{dt}, w_t, r_t and p_t as given. Note β is the discount factor; u is the consumer's utility; d_{t-1} is the deposits in the banking system; h_t is the stock of human capital at the beginning of period t; R_{dt} is the nominal interest rate paid on deposits at the end of period t; τ_t is the tax rate on income; T_t is the size of the transfer to the household delivered for use in period t; w_t is the real wage rate and; r_t is the real rental of domestic capital. So consumers maximize their lifetime utility (equation (2)) subject to equations (3), (4) and (5), to determine a contingency plan for $\{c_{1t}, d_t, n_t^s, h_{t+1}, k_{t+1}\}_{t=0}^{\infty}$.

The consumer's optimization problem can be written in the following recursive formulation.

$$J(d_{t-1}, h_t, k_t) = \max_{n_t^s, d_t, h_{t+1}, k_{t+1}} \left\{ \begin{array}{c} u(\frac{a_t}{p_t} - \frac{d_t}{p_t} - i_{ht} - i_{kt}, 1-n_t) \\ +\beta J(d_t, h_{t+1}, k_{t+1}) \end{array} \right\} \tag{6}$$

where $a_t = [p_t w_t n_t h_t](1-\tau_t) + (1-\tau_t)p_t r_t k_{1t} + [1 + (1-\tau_t)R_{dt}]d_{t-1} + T_t$. The upshot of the dynamic programming problem are the following first order conditions:

$$d_t \quad : \quad \frac{u_1(c_t, 1-n_t)}{p_t} - \beta J_1(d_t, h_{t+1}, k_{t+1}) = 0 \tag{7}$$

$$n_t^s \quad : \quad u_1(c_t, 1-n_t)[w_t h_t(1-\tau_t)] - u_2(c_t, 1-n_t) = 0 \tag{8}$$

$$h_{t+1} \quad : \quad -u_1(c_t, 1-n_t) + \beta J_2(d_t, h_{t+1}, k_{t+1}) = 0 \tag{9}$$

$$k_{t+1} \quad : \quad -u_1(c_t, 1-n_t) + \beta J_3(d_t, h_{t+1}, k_{t+1}) = 0 \tag{10}$$

Along with the following envelope conditions

$$J_1(d_{t-1}, h_t, k_t) = \frac{u_1(c_t, 1-n_t)[1 + (1-\tau_t)R_{dt}]}{p_t} \tag{11}$$

$$J_2(d_{t-1}, h_t, k_t) = u_1(c_t, 1-n_t)[w_t n_t(1-\tau_t) + (1-\delta_h)] \tag{12}$$

$$J_3(d_t, h_t, k_t) = u_1(c_t, 1-n_t)[r_t(1-\tau_t) + (1-\delta_k)] \tag{13}$$

In addition, a transversality condition is necessary to ensure the existence of the household's present-value budget constraint. This terminal constraint can be interpreted as a "non-ponzi" condition in which the household cannot borrow against the sum of future deposits and domestic capital, at a rate higher than

that can be repaid. Mathematically, the transversality condition is represented as

$$\lim_{T\to\infty}\left[\frac{d_T+k_T}{\prod_{s=0}^{T-1}[\frac{1+(1-\tau_s)R_s}{\pi_s}]}\right] \tag{14}$$

where π is the gross rate of inflation. As such the date-t budget constraint of the household can be written in the form of an infinite horizon, present-value budget constraint.

Using the first order conditions along with the envelope conditions, the consumer's problem yields the following set of efficiency conditions.

$$\frac{u_1(c_t,1-n_t)}{p_t} = \beta\frac{u_1(c_{t+1},1-n_{t+1})[1+(1-\tau_{t+1})R_{dt+1}]}{p_{t+1}} \tag{15}$$

$$\frac{u_1(c_t,1-n_t)}{u_2(c_t,1-n_t)} = \frac{1}{[w_t h_t(1-\tau_t)]} \tag{16}$$

$$u_1(c_t,1-n_t) = \beta u_1(c_{t+1},1-n_{t+1})[w_{t+1}n_{t+1}(1-\tau_{t+1})+(1-\delta_h)] \tag{17}$$

$$u_1(c_t,1-n_t) = \beta u_1(c_{t+1},1-n_{t+1})[r_{t+1}(1-\tau_{t+1})+(1-\delta_k)] \tag{18}$$

Equation (16) is the efficiency condition for consumption. On the left hand side is the marginal cost of consuming one less unit of the consumption good and on the right-hand side is the marginal benefit obtained from future savings. Equation (17) indicates that the marginal rate of substitution between consumption and leisure must be equal to the ratio of their prices. Equation (18) is the efficiency condition for human capital. The left hand side of the equation is the marginal cost while the right hand side indicates the stream of future benefit adjusted for the depreciation from the investment in human capital. Equation (19) is the efficiency condition for domestic physical capital. The left hand side of the equation is the marginal cost while the right hand side indicates the stream of future benefit adjusted for the depreciation from the investment in physical capital.

Moreover, from the above set of conditions, specifically (16), (18) and (19) it is easy to derive that arbitrage leads to equivalent real rates of return for the alternative investment choices available to the consumer.

$$\left[\frac{p_t(1+(1-\tau_{t+1})R_{dt+1})}{p_{t+1}}\right] = [w_{t+1}n_{t+1}(1-\tau_{t+1})+(1-\delta_h)] = [r_{t+1}(1-\tau_{t+1})+(1-\delta_k)] \tag{19}$$

3.2 Financial Intermediaries

At the start of the period the financial intermediaries accept deposits and make their portfolio decision, loans and cash reserves choices, with a goal of maximizing profits. At the end of the period they receive their interest income from the loans made and meets the interest obligations on the deposits. Note the intermediaries are constrained by legal requirements on the choice of their portfolio (that is, reserve requirements), as well as by feasibility. Given such a structure, the intermediaries obtains the optimal choice for L_t by solving the following problem:

$$\max_{L,d} \pi_{bt} = R_{Lt}L_t - R_{dt}d_t \tag{20}$$

$$s.t. \quad : \quad \gamma_t d_t + L_t \leqslant d_t \tag{21}$$

where π_{bt} is the profit function for the financial intermediary at time t, and $m_t \geqslant \gamma_t d_t$ defines the legal reserve requirement. m_t is the cash reserves held by the bank, L_t is the loans, and γ_t is the reserve requirement ratio. The reserve requirement ratio is the ratio of required reserves (which must be held in form of currency) to deposits.

To gain some economic intuition of the role of reserve requirements, let us consider the solution of the problem for a typical intermediary. Free entry, drives profits to zero and we have

$$R_{Lt}(1-\gamma_t) - R_{dt} = 0 \tag{22}$$

Simplifying, in equilibrium, the following condition must hold

$$R_{Lt} = \frac{R_{dt}}{1-\gamma_t} \tag{23}$$

Reserve requirements thus tend to induce a wedge between the interest rate on savings and lending rates for the financial intermediary.

3.3 Firms

The firms rent the domestic un-intermediated capital, k, directly from the households and purchases the foreign intermediate good, k^*, using financing from the banks. Formally, the firms face the following problem:

$$W = \max_{k_t, k_t^*, (n_t h_t)} \sum_{i=0}^{\infty} \rho_t \left\{ \begin{array}{c} (1-\tau_t)\left[p_t F(k_t, k_t^*, n_t h_t) - p_t w_t n_t h_t - p_t r_t k_{1t} - R_{Lt-1} L_{t-1}\right] \\ +L_t - e_t p_t^* i_{k_t^*} - L_{t-1} \end{array} \right\} \tag{24}$$

$$s.t. \quad : (i) \quad e_{t-1} p_{t-1}^* k_t^* \leqslant L_{t-1} \tag{25}$$

$$(ii) \quad k_{t+1}^* \leqslant i_{k_t^*} \tag{26}$$

where ρ_t is the subjective discount factor used by the firms; e_t is the nominal exchange rate at date-t and; p_t^* is the world price at date-t. Note that the loan constraint, equation (25), implies that from the firm's point of view, it may as well be renting the imported capital or intermediate goods from the bank itself, which in turn obtains them from the foreign suppliers on behalf of the firms. Moreover, the loans are strictly one period loans. Because of these assumptions, as pointed out by Chari, Jones and Manuelli (1995), the firm can be seen as facing a static problem; hence, one of the implications of the equilibrium conditions of this version of the model is that the choice of ρ_t is immaterial. Moreover, given that intermediate goods are goods which are used up in the production of other goods by the end of the period, we have the second constraint. Formally, implying that the depreciation rate is 100 percent.

The up-shot of the above static problem of the firm yields the following efficiency conditions:

$$k_t \quad : \quad F_1(t) = r_t \tag{27}$$

$$k_t^* \quad : \quad (1-\tau) F_2(t) = \left(\frac{e_{t-1} p_{t-1}^*}{p_{t-1}}\right)\left(\frac{p_{t-1}(1+(1-\tau_t) R_{Lt})}{p_t}\right) \tag{28}$$

$$(n_t h_t) \quad : \quad F_3(t) = w_t \tag{29}$$

where $F_i(t)$, i= 1, 2, 3: denotes the marginal product the domestic capital, imported intermediate good and effective labor. As given by equations (27) and (28) respectively, the production firm set their after-tax marginal products of the un-intermediated domestic capital and the intermediated imported good equal to their respective after-tax real rentals. And equation (29) simply states that the firm hires effective labor up to the point where the marginal product of effective labor equates the real wage.

Note combining (19), (23), (27) and (28), we obtain the following relation between the marginal products

of the domestic capital and the imported capital good:

$$[1+(1-\gamma_t)\left((1-\tau_t)\frac{F_2(t)p_t}{e_{t-1}p^*_{t-1}}-1\right)]=\frac{p_t}{p_{t-1}}\left[F_1(t)(1-\tau_t)+(1-\delta_k)\right] \tag{30}$$

A close analysis of equation (30) reveals that increases in the financial repression parameter, γ raises F_2 relative to F_1. So higher reserve requirements tend to distort the mix of domestic capital and intermediate goods. The reason for this distortion is the financial repression that exists in the economy in the form of non-interest bearing assets (cash reserves) in the portfolio of the financial intermediaries. This requirement causes a wedge between the rental rates of the two type of assets, which in turn distorts the input mix.

3.4 Government

The government commits to a sequence $\{T_t\}_{t=0}^{\infty}$ of transfers which are financed by a combination of taxes, seigniorage and issuance of external debt. The government's budget constraint, in nominal terms, is

$$T_t = m_t - m_{t-1} + \tau_t p_t F(k_t, k^*_t, n_t h_t) + e_t\left[b^*_{t+1} - (1+r^*_t)b^*_t\right] \tag{31}$$

where b^*_t is the size of the domestic bond holding by foreigners at time t; and r^*_t is the exogenously given world nominal interest rate paid on the domestic bonds. The government has at its disposal two tools of monetary policy, the reserve requirement and the rate of money growth, and the income-tax rate, the transfers and foreign public debt as the three tools of fiscal policy. We will assume that money evolves according to the policy rule $m_t = \mu_t m_{t-1}$, where μ is the money growth rate.

Note a transversality condition is necessary to ensure the existence of the government's present-value budget constraint. The government's terminal constraint is interpreted as a non-ponzi condition in which the government cannot go on borrowing from the foreigners for ever. Formally, the transversality condition is represented as

$$\lim_{T\to\infty}\left[\frac{b^*_T}{\prod_{s=0}^{T-1}[1+r^*_s]}\right] \tag{32}$$

A notable exception from the government budget constraint is the domestic government bonds. Besides, being a simplification, bonds are ignored for a technical reason. In a world of no uncertainty incorporating government bonds in either the consumer or bank problem would imply plausible multiplicity of optimal

allocations of deposits or loans and government bonds, since the arbitrage conditions would imply a relative price of one between deposits or loans and government debt. One way to incorporate government bonds is to have the financial intermediaries hold government bonds as part of obligatory reserve requirements. Or alternatively, assume that there exists a fixed ratio of government bonds to money. The conclusions of our analysis remains unchanged following such alternative specifications with the former merely inflating the repression parameter.

3.5 Balance of Payments

By definition, the Balance of Payments (BP) comprises of the Current and the Capital Accounts, denoted respectively by, CA and KA. The CA includes the Trade Balance (TB) and the net debt service payments abroad, herein the services due to the foreign debt position of the model economy. The KA in turn captures the net foreign savings inflow into the economy. Formally, the BP, CA, TB and the KA at any time period t is given by the following expressions:

$$BP_t = CA_t + KA_t \tag{33}$$

$$CA_t = TB_t - r_t^* \frac{b_t^*}{p_t^*} \tag{34}$$

$$TB_t = x_t - \frac{e_t p_t^*}{p_t} k_{t+1}^* \tag{35}$$

$$KA_t = \frac{(b_{t+1}^* - b_t^*)}{p_t^*} \tag{36}$$

The nominal exchange rate will be determined according to the Purchasing Power Parity (PPP) condition, $P = eP^*$, and the net position of the foreign assets at steady state, b^*, will be deduced from the balance of payment equilibrium condition, $BP = 0$.

$$x_t - \frac{e_t p_t^*}{p_t} k_{t+1}^* + \frac{\left[b_{t+1}^* - (1 + r_t^*) b_t^*\right]}{p_t^*} = 0 \tag{37}$$

Without any loss of generality and maintaining consistency with perpetual growth, the exports of the economy, x_t, will be assumed to be a fixed fraction φ of the domestic output. Further given that p^* is parametrically given to the small-open economy, we set it to unitary without any loss of generality. Hence

implying that the domestic price level and the nominal exchange rates are synonymous for the model economy with the PPP condition satisfied, i.e., $p_t = e_t$.

4 Equilibrium and Balanced–Growth Equations

An equilibrium in this model economy is a sequence of prices $\{p_t, e_t, w_t, r_t, R_{Lt}, R_{dt}\}_{t=0}^{\infty}$, real allocations $\{c_t, n_t, k_t, h_t, i_{k_t}, k_t^*, i_{k_t^*}, i_{ht}\}_{t=0}^{\infty}$, stocks of financial assets $\{m_t, d_t\}_{t=0}^{\infty}$, exogenous sequences of $\{p_t^*, r_t^*\}_{t=0}^{\infty}$, and policy variables $\{\gamma_t, \mu_t, \tau_t, T_t, b_t^*\}_{t=0}^{\infty}$ such that:

1. The allocations and stocks of financial assets solve the household's date–t maximization problem, (2), given prices, exogenous and policy variables.

2. The stock of financial assets solve the bank's date–t profit maximization problem, (20), given prices, exogenous and policy variables.

3. The real allocations solve the firm's date–t profit maximization problem, (24), given prices, exogenous and policy variables.

4. The money market equilibrium condition: $m_t = \gamma_t d_t$ is satisfied for all $t \geqslant 0$.

5. The loanable funds market equilibrium condition: $e_{t-1} p_{t-1}^* k_t^* = (1 - \gamma_{t-1}) d_{t-1}$ where the total supply of loans $L_t = (1 - \gamma_t) d_t$ is satisfied for all $t \geqslant 0$.

6. The equilibrium condition in the external sector: $BP = 0$ holds, along with the PPP condition being satisfied.

7. The labor market equilibrium condition: $n_t^s h_t = (n_t h_t)^d$ for all $t \geqslant 0$.

8. The goods market equilibrium condition require: (1), $c_t + i_{kt} + i_{ht} + x_t = F(k_t, k_t^*, n_t h_t)$. is satisfied for all $t \geqslant 0$.

9. The Government budget is balanced on a period-by-period basis.

To study the long–run behavior of the model, we use the solutions to the maximization problems of the consumer, financial intermediary and the firm together with the equilibrium conditions to calculate the balanced growth equations. Along a balanced growth path output grows at a constant rate. In general for the economy to follow such a path, both the preference and the production functions must take on special forms. On the preference side, the consumer, when faced with a stationary path of interest rates must generate a demand for constant growth in consumption. The requirement is

$$u(c_t, 1-n_t) = \begin{cases} \frac{[c_t(1-n_t)^{\psi}]^{1-\sigma}}{1-\sigma} & \text{for } \sigma \neq 1, \\ \log c_t + \psi \log(1-n_t) & \text{for } \sigma = 1. \end{cases} \tag{38}$$

where ψ and σ are preference parameters

On the production side, a sufficient condition is that $F(k, k^*, nh)$ is of Cobb-Douglas type. Specifically of the following form

$$Y = F(k_t, k_t^*, n_t h_t) = A(k_t)^{\alpha_1}(k_t^*)^{\alpha_2}(n_t h_t)^{1-\alpha_1-\alpha_2} \tag{39}$$

where A is a positive scalar, and α_1, α_2 and $(1-\alpha_1-\alpha_2)$ are the elasticities of output with respect to domestic capital, imported capital or the intermediate good, and labor, respectively.

For the sake of tractability, we assume that the government has time invariant policy rules, which means the reserve–ratio, γ_t, the money supply growth–rate, μ_t, and the tax–rate, τ_t, are constant over time. Given this, the economy is characterized by the following system of balanced growth equations:

$$g^{\sigma}\pi\left(\frac{n^{(\alpha_1+\alpha_2)}}{1-n}\right)\frac{\theta}{(1-\tau)(1-\alpha_1-\alpha_2)} = \beta\frac{k}{c}A\left(\frac{k^*}{k}\right)^{\alpha_2}\left(\frac{h^*}{k}\right)^{(1-\alpha_1-\alpha_2)} \tag{40}$$

$$g^{\sigma}\pi = \beta[1+(1-\tau)R_d] \tag{41}$$

$$g^{\sigma} = \beta[wn(1-\tau)+(1-\delta_h)] \tag{42}$$

$$g^{\sigma} = \beta[r(1-\tau)+(1-\delta_k)] \tag{43}$$

$$R_L = \frac{R_d}{1-\gamma} \tag{44}$$

$$w = (1-\alpha_1-\alpha_2)A\left(\frac{k^*}{k}\right)^{\alpha_2} n^{(-\alpha_1-\alpha_2)}\left(\frac{h}{k}\right)^{(-\alpha_1-\alpha_2)} \tag{45}$$

$$r = \alpha_1 A\left(\frac{k^*}{k}\right)^{\alpha_2} n^{(1-\alpha_1-\alpha_2)}\left(\frac{h}{k}\right)^{(1-\alpha_1-\alpha_2)} \tag{46}$$

$$\frac{(1+(1-\tau)R_L)}{\pi} = \alpha_2(1-\tau)A\left(\frac{k^*}{k}\right)^{(\alpha_2-1)} n^{(1-\alpha_1-\alpha_2)}\left(\frac{h}{k}\right)^{(1-\alpha_1-\alpha_2)} \tag{47}$$

$$(g+\delta_k-1) = \frac{i_k}{k} \tag{48}$$

$$(g+\delta_h-1) = \frac{i_h}{k}\frac{k}{h} \tag{49}$$

$$g\frac{k^*}{k} = \frac{\hat{L}}{k} \tag{50}$$

$$g = \frac{i_{k^*}}{k}\frac{k}{k^*} \tag{51}$$

$$\frac{\hat{L}}{k} = (1-\gamma)\frac{\hat{d}}{k} \tag{52}$$

$$\pi g = \mu \tag{53}$$

$$\pi = \varepsilon \tag{54}$$

$$\frac{\hat{m}}{k} = \gamma\frac{\hat{d}}{k} \tag{55}$$

$$\frac{c}{k}+\frac{i_k}{k}+\frac{i_h}{k} = (1-\varphi)A\left(\frac{k^*}{k}\right)^{\alpha_2} n^{(1-\alpha_1-\alpha_2)}\left(\frac{h}{k}\right)^{(1-\alpha_1-\alpha_2)} \tag{56}$$

where $\pi = \frac{p_{t+1}}{p_t}$ is the steady-state level of inflation; $\varepsilon = \frac{e_{t+1}}{e_t}$ is the steady-state level of exchange rate depreciation of domestic currency; $g = \frac{c_{t+1}}{c_t} = \frac{i_{k_{t+1}}}{i_{k_t}} = \frac{i_{ht+1}}{i_{ht}} = \frac{i_{k^*_{t+1}}}{i_{k^*_t}} = \frac{k_{t+1}}{k_t} = \frac{k^*_{t+1}}{k^*_t} = \frac{h_{t+1}}{h_t} = \frac{\hat{d}_{t+1}}{\hat{d}_t} = \frac{\hat{L}_{t+1}}{\hat{L}_t} = \frac{\hat{m}_{t+1}}{\hat{m}_t} = \frac{(w_{t+1}h_{t+1})}{(w_t h_t)}$ is the balanced growth rate of the economy; $\frac{c}{k}$, $\frac{i_k}{k}$, $\frac{i_h}{k}$, $\frac{x}{k}$, and $\frac{k^*}{k}$ are the long-run ratios of the respective parts of output relative to the size of the capital stock;[4] $\hat{d}$ $(= \frac{d}{p})$ is size of real deposit; $\hat{L}$ $(= \frac{L}{p})$ is size of real loans; $\hat{m}$ is the real money holdings by the banks to meet the cash reserve requirements; and n is the balanced growth level of labor supply. This a non-linear system of seventeen equations in seventeen variables, g, π, ε, R_d, R_L, $\frac{c}{k}$, $\frac{i_k}{k}$, $\frac{i_h}{k}$, $\frac{h}{k}$, $\frac{k^*}{k}$, $\frac{i_{k^*}}{k}$, $\frac{\hat{d}}{k}$, $\frac{\hat{L}}{k}$, $\frac{\hat{m}}{k}$, w, r and n and can be solved given the values of the policy variables μ, τ and γ, to trace the long-run reaction of the system to a change in policy.

5 Calibration

The next step in the analysis is to choose values for the parameters of the model. The values come from either *a priori* information or so that various endogenous variables, along the models balanced growth path, match the long run values observed in the data for Greece, Italy, Portugal and Spain. The parameters that needs to be calibrated can be grouped under the following three categories:

[4] Recall $x = \varphi A^{\alpha_1}(k^*)^{\alpha_2}(nh)^{(1-\alpha_1-\alpha_2)}$

Preference: β, θ, *and* σ.

Production: A, α_1, α_2 *and* δ_k, δ_k.

Policy: γ, μ, τ.

Export-GDP ratio: φ

The country–specific calibrations are reported in Table 5. Note unless otherwise stated, the source for all data is the IMF – International Financial Statistics (IFS). A first set of parameter values is given by numbers usually found in the literature. These are:

- n: following Zimmermann (1997) the share of time devoted to market activities, is set to 0.3, except for Portugal, for which n is set to 0.18 using the findings of Correia, Neves and Rebelo (1995). As Zimmermann (1997) points out, the value used here, for Italy Spain and Greece, is, "based on the observation that about one–third of waking time (less personal care) is used for market labor by American households";

- σ: the relative risk aversion parameter is set to 1 and then to 2, to show that the inflation–repression relationship is qualitatively unaffected for the choice of different values to the risk aversion parameter;

- $(1 - \alpha_1 - \alpha_2)$=$\alpha_3$: since the production function is Cobb-Douglas, this corresponds to the share of effective labor in income. α_3 for Spain, Italy and Greece is derived from Zimmermann (1997) and the value for Portugal is obtained from Correia, Neves and Rebelo (1995). The values are 62.7 percent (Spain), 61.7 percent (Italy), 59.8 percent (Greece), and 53.0 percent (Portugal);

- δ_k: the depreciation rate of physical capital for Spain, Italy and Greece is derived from Zimmermann (1997) and the value for Portugal is obtained from Correia, Neves and Rebelo (1995). The values range between .032 (Greece) and .052 (Italy); δ_h: the depreciation rate of human capital. And without any loss of generality is assumed to be equal to δ_k;

- β: the discount factor is set at 0.98.[5]

[5] For details see Chari, Christiano and Kehoe (1994).

A second set of parameters is determined individually for each country. Here, we use averages over the whole sample period to find values that do not depend on the current business cycle. These parameters, which are also listed in Table 5, are:

- $\frac{i_k}{Y}$: is the physical capital investment output ratio and ranges between 0.214 (Greece) and 0.275 (Portugal);
- g: the annual gross growth rate in per capita Gross Domestic Product (GDP) ranges between 1.0186, i.e., 1.86 percent (Greece) to 1.0295, i.e., 2.95 percent (Portugal);
- π: the annual gross rate of inflation lies between 1.0752, i.e., 7.52 percent (Spain) and 1.1516 , i.e., 15.16 percent (Greece);
- γ: the annual reserve–deposit ratio lies between 0.137 (Italy) and 0.235 (Greece);
- τ: the tax rate, calculated as the ratio of tax–receipts to GDP, lies between 0.2274 (Greece) and 0.3625 (Italy);
- $\frac{k^*}{Y}$: the ratio of the imported intermediate input to output ranges between 0.067 (Italy) and 0.146 (Greece).
- φ: the ratio of exports to output ranges between 0.191 (Portugal) and 0.264 (Greece).

The following parameters are determined from the balanced growth paths to match long-run averages of the endogenous variables of the model. The parameters have been reported in Table 5.

- α_2: is the share of foreign intermediate good in domestic output and is calibrated using equations (42), (43), (45), (46) and (47). Given that we have two alternative values for the interest rate on loans, corresponding to two different values of the risk-preference parameter, we also have two different values for the share of imported intermediate input in output. For $\sigma = 1$, the share ranges between 7.0 percent (Spain and Italy) and 14.0 percent (Portugal), and between 6.0 percent (Spain and Italy) and 12.0 percent (Portugal) when $\sigma = 2$. Note given α_2 and $(1 - \alpha_1 - \alpha_2)$, we can easily calculate α_1, the share of domestic physical capital in output. For $\sigma = 1$, the share ranges between 27.2 percent

(Greece) and 33.0 percent (Portugal), and between 29.2 percent (Greece) and 35.0 percent (Portugal) when $\sigma = 2$;

- A: the technology parameter, is calibrated from equations (43) and (46) and have two alternative values corresponding to the two alternative values of the risk preference parameter. For $\sigma = 1$, the A ranges between 0.69 (Greece) and 1.28 (Portugal), and between 0.79 (Greece) and 1.67 (Portugal) when $\sigma = 2$;

- θ: the value of θ, the preference parameter for is obtained from equation (40). We obtain two values of the preference parameter for each country corresponding to two alternative values of the relative risk aversion parameter σ. For $\sigma = 1$, the parameter lies between 2.52 (Italy) and 6.01 (Portugal) and between 2.0 (Italy) and 3.70 (Portugal) when $\sigma = 2.$;

- μ: the annual money growth rate for the four economies, is calibrated using equation (53). The money growth rate parameter lies between 1.103, i.e., 10.30 percent (Spain) and 1.173 i.e., 17.3 percent (Greece);

[INSERT TABLE 5 HERE]

It must be noted that to obtain the value for α_2, we need to solve for the R_d, R_L, and $\frac{k^*}{k}$ using equations (41), (44) and, using the $\frac{k}{Y}$ and $\frac{k^*}{Y}$, respectively. Similarly, for A, we need to pin down the values of $\frac{h}{k}$, in addition to the values of the endogenous variables, used to obtain α_2. The value for $\frac{h}{k}$ is obtained from the equations (42), (43), (45) and (46). Finally, to obtain the value of θ, we need the values for $\frac{i_k}{k}$, $\frac{i_h}{k}$ and $\frac{c}{k}$, obtained from equations (48), (49) and (56), respectively. The values of these endogenous variables of the model, obtained from the long-run balanced growth path and used to obtain α_2, A and θ have been reported in Table 6, and are as follows:

[INSERT TABLE 6 HERE]

6 Financial Liberalization and Inflationary Dynamics

We are now ready to analyze the effects of financial liberalization in our benchmark model. Note, financial repression has been modeled as banks being obligated to maintain a "high" reserve requirement, i.e., a high value of γ, in our case. In this sense, financial liberalization would imply a reduction in the size of the obligatory reserve requirement, γ, and hence allowing the financial intermediaries to loan out a larger fraction of their deposits as loans to fulfill the investment requirement of the firms.

Due to the non-linearity of the system of equations, the relationship obtained between the rate inflation and the policy variables, τ, μ, and γ cannot be solved explicitly to obtain a reduced-form solution. Hence, we plot the implicit function, specifying the relationship between inflation and reserve requirements, given the other policy parameters.

Figures 1 through 8, depicts the policy experiment, where we increase the reserve–deposit ratio, γ, in a phase–wise manner in the closed interval of 0 to 0.99. Figure 1 through Figure 4 depicts the relationship between the rate of inflation and the reserve–deposit ratio, when σ =1. And Figures 5 through 8 plots the inflation–repression relationship σ =2. The positive relationship stands out for all the economies for both σ =1 and σ =2. As is evident from the Figures 1 through 8, the effect of the reserve requirement on inflation tend to gather momentum at higher values of the latter, but is otherwise extremely weak and seems non-existent.

[INSERT FIGURES 1 THROUGH 8 HERE]

In Table 7, using the calibrated parameters we report the values of the derivative of steady–state inflation with respect to the repression parameter, γ, evaluated at the long-run values of γ. The values are obtained by using the Implicit-Function Theorem.

[INSERT TABLE 7 HERE]

Note both for σ=1 and σ=2 the value of the derivative always indicates a positive inflation–repression relationship. However, the value of the derivatives indicate values way less than the sizes of the simple regressional coefficient reported in Table 3. Moreover, when the risk aversion parameter, σ =2, a much

weaker inflation–repression relationship is portrayed for all the economies. This is understandable since, the inverse of the degree of relative risk aversion measures the elasticity of savings with respect to interest rate. Given the interest rate on loans, as reserve requirement is reduced, the interest rate on deposits, and the returns on human capital investment and domestic capital investment increases, given (19). Increases in the supply of savings responds more in the case of the lower value of the relative risk aversion parameter. With relatively more investment generated with σ=1 as compared to the case of σ=2, there is comparatively, higher growth and lower inflation, for the former case.[6] The model is thus incapable of explaining the negative inflation-repression relationship observed in the data for Greece.

7 Conclusion and Areas of Further Research

The paper analyzes the effects of removal of financial distortions on the rate of inflation, in the context of four semi–industrialized Southern European economies — Greece, Italy, Portugal and Spain, over the period of 1980 to 1998. The analysis is carried out by developing a microfounded, monetary – endogenous growth dynamic general equilibrium model, for a small open semi-industrialized economy relying on imports of intermediate input. Moreover, financial repression is modeled through the obligation of the commercial banks to maintain a "high" proportion of the deposits as reserves.

In such a framework, we obtain a positive relationship between inflation and financial repression, as observed in the data for three (Spain, Italy, and Portugal) of the four economies. The results are in accordance with the widely available empirical evidence on inflation and reserve-ratio. However, the model fails to explain the negative effects of reserve requirements on inflation for Greece. Moreover, the strength of the relationship derived from the model is way below when compared to the sizes of the regressional coefficient in the two-variable regression between inflation and financial repression. The relationship tends to become even weaker with the increase in the degree of risk aversion. In terms of policy the model proposes liberalization of the domestic financial sector, but indicates that the effect might be marginal on inflation.

Though the paper, to some extent, fills up the dearth of comprehensive microfounded models that can be

[6] Note, given equation (53), growth is negatively related to the financial repression parameter. Moreover, from equation (54), the movement in inflation mirrors that of the nominal exchange rate.

calibrated to small open financially repressed economies, there are certain unanswered issues. For example, future research needs to be targeted to realize if the case of Greece is merely an abberation. Moreover, it might be interesting to analyze whether addition of portfolio and capital adjustment costs can add meat to the strength of the relationship between inflation and reserve requirements. The General Forms are: Books:

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Periodicals: Metwally, M.M. (1975) "Advertising and Competitive Behavior of Selected Australian Firms". The Review of Economics and Statistics, 57, No. 4, Nov. pp. 1-32.

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Table 1: **Financial Facts in European Economies (1980-2002)**

	Reserves/ Deposits (percentage)	Annual Inflation rate	Interest Rate Liberalization	Credit Ceiling Relaxation
Spain	12.0	6.8	1984	1959-66
Greece	22.9	14.9	1980	1982-87
Italy	11.7	7.5	1980	1973-83
Portugal	17.5	12.2	1984	1978-91
Belgium	1.0	3.2	1986	Until 1978
France	2.0	4.1	1980	1958-85
Germany	5.6	2.5	1980	None
UK	1.7	5.2	1980	1964-71

Source: IFS – IMF International Financial Statistics.

Inflation is the percentage change in the GDP Deflator.

Deposit has been calculated from lines 24 and 25.

Sources: Tables 3.4, 4.1 and 5.1 in Caprio, Honohan and Stiglitz (2001).

Table 2: **Bank Reserve Ratios**

	Spain	Italy	Greece	Portugal
1980-1986	15.8	15.5	22.1	20.5
1986-1991	19.3	17.2	19.6	26.4
1992-1997	9.0	10.6	26.0	15.3
1998-2002	3.0	2.3	23.5	7.1

Source: See Table 1.

Table 3: **Inflation-Repression Correlation Coefficients (1980-1998)**

	c_0	c_1
Spain	0.062	0.097
	(3.25)	(0.82)
Greece	0.30	-0.62**
	(6.53)	(-3.29)
Italy	.013	.53*
	(0.30)	(1.75)
Portugal	0.041	0.45*
	(0.78)	(1.81)

Notes: Data source: IFS-IMF International Financial Statistics.

Regression results emerge from the following equation:

$\pi_t = c_0 + c_1\gamma_t + \epsilon_t$.

where π: Rate of inflation,

γ: Reserve-deposit ratio,

c_i, $i = 0, 1$: regression coefficients,

$\epsilon \sim N(0, \sigma^2)$.

Inflation is the percentage change in the GDP Deflator.

Deposit has been calculated from lines 24 and 25.

Numbers in the parentheses indicates the t-ratios.

** significant at 1 percent level.

* significant at 10 percent level.

Table 4: **FDI and Import of Intermediate Materials in European Economies (1980-2001)**

	FDI/GDP	(Intermediate Materials)/ (Total Trade)	(Intermediate Materials)/ GDP
Spain	2.31	15.95	6.45
Greece	0.74	12.44	13.09
Italy	0.78	17.03	6.21
Portugal	1.81	13.92	11.97
Belgium	7.30	9.71	10.62
France	3.44	10.87	3.69
Germany	7.54	10.87	3.73
UK	14.79	7.58	4.38

Sources: www.worldinfigures.org; www.sourceoecd.org.

Notes: Categorization based on SITC 2 and 3.

Total Trade is sum of trade in goods and trade in services.

Table 5: **Calibration Parameters**

	α_3	$\frac{i_k}{Y}$	g	π	γ	τ	$\frac{k^*}{Y}$	δ_k=δ_h	φ	α_2		A		θ		μ
										$\sigma = 1$	$\sigma = 2$	$\sigma = 1$	$\sigma = 2$	$\sigma = 1$	$\sigma = 2$	
Spain	0.627	0.2210	1.0254	1.0752	0.141	0.2553	0.069	0.050	0.205	0.07	0.06	0.76	0.92	3.78	2.58	1.103
Italy	0.617	0.2176	1.0193	1.0858	0.137	0.3625	0.067	0.052	0.219	0.07	0.06	0.84	0.97	2.52	2.00	1.107
Greece	0.598	0.2135	1.0186	1.1516	0.235	0.2274	0.146	0.032	0.191	0.13	0.11	0.69	0.79	2.69	2.08	1.173
Portugal	0.530	0.2746	1.0295	1.1304	0.198	0.2773	0.132	0.050	0.264	0.14	0.12	1.28	1.67	6.01	3.70	1.164

Note: Parameters defined as above.

Table 6: **Steady-State Values of Endogenous Variables**

	R_d		R_L		$\frac{h}{k}$		$\frac{i_h}{k}$		$\frac{c}{k}$		$\frac{k}{Y}$	$\frac{k^*}{k}$	$\frac{i_k}{k}$
	$\sigma = 1$	$\sigma = 2$	$\sigma = 1$	$\sigma = 2$	$\sigma = 1$	$\sigma = 2$	$\sigma = 1$	$\sigma = 2$	$\sigma = 1$	$\sigma = 2$			
Spain	16.85	20.69	19.62	24.09	2.07	2.00	0.1561	0.1508	0.1093	0.1937	2.93	0.02	0.0754
Italy	20.33	23.75	23.56	27.52	1.97	1.91	0.1405	0.1362	0.1488	0.2174	3.05	0.02	0.0713
Greece	25.49	28.37	33.32	37.08	2.20	2.05	0.1113	0.1037	0.1141	0.1706	4.22	0.03	0.0506
Portugal	25.96	30.83	32.36	38.44	1.61	1.51	0.1280	0.1200	0.1039	0.2193	4.22	0.03	0.0506

Note: Endogenous variables defined as above.

Table 7: **Inflation–Repression Relationship ($\frac{\delta\pi}{\delta\gamma}$)**

	$\sigma = 1$	$\sigma = 2$
Spain	0.001	0.0006
Italy	0.001	0.0006
Greece	0.004	0.002
Portugal	0.005	0.003
Notes: Values evaluated at steady-states.		

Figure 1: Inflation Repression Relationship for Spain

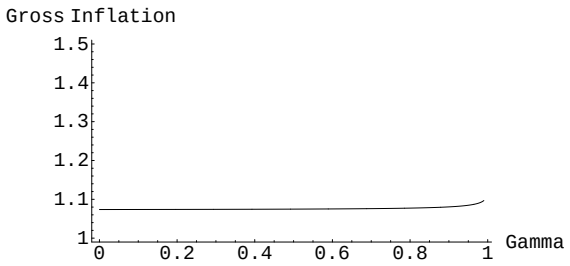

Figure 2: Inflation Repression Relationship for Italy

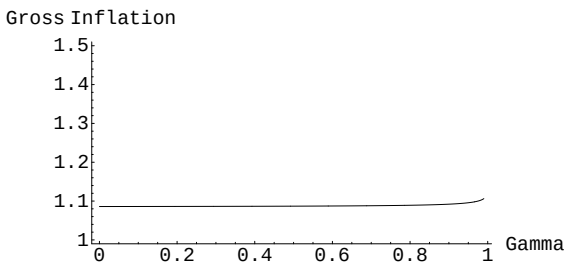

Figure 3: Inflation Repression Relationship for Greece

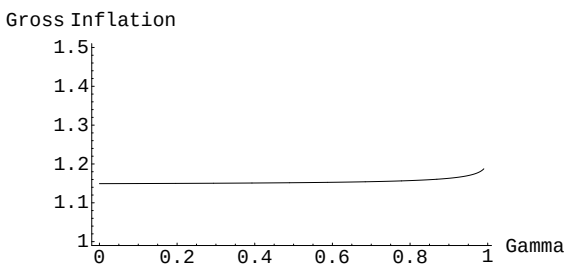

Figure 4: Inflation Repression Relationship for Portugal

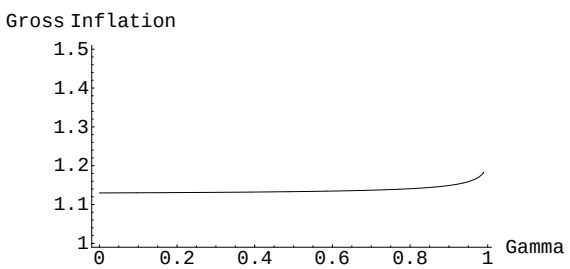

Figure 5: Inflation Repression Relationship for Spain

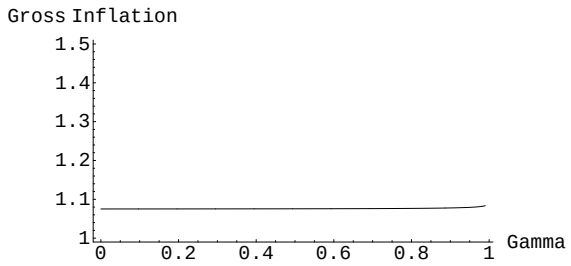

Figure 6: Inflation Repression Relationship for Italy

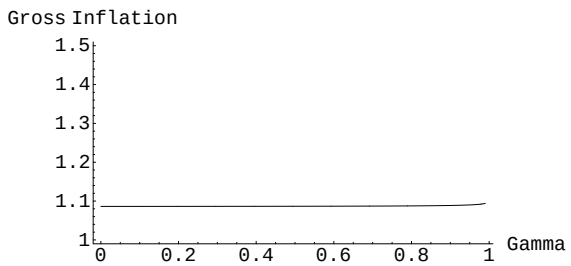

Figure 7: Inflation Repression Relationship for Greece

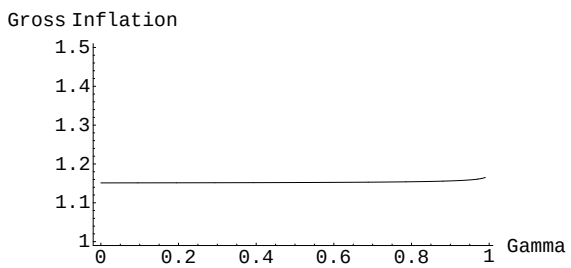
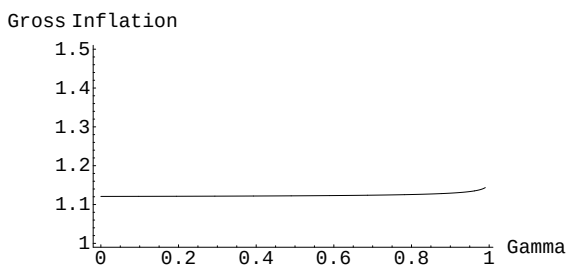
Figure 8: Inflation Repression Relationship for Portugal