

Individual Versus Aggregate Collateral Constraints and the Overborrowing Syndrome

by

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“The history of investment in South America throughout the last century has been one of confidence followed by disillusionment, of borrowing cycles followed by widespread default. ”

Royal Institute of International Affairs, 1937, cited in Dornbusch 1983 and McKinnon and Pill, 1993.

A Central Question in Emerging-Market Macroeconomics: What factors lead countries to accumulate excessive levels of external debt?

Relevance of the Question: Overborrowing countries may be prone to balance-of-payments crises and sudden stops.

Overborrowing: Theories

- Deposit Guarantees (McKinnon, 1973; McKinnon and Pill, 1993)
- Temporariness Hypothesis (Calvo, 1986, 1987; Mussa, 1986; Daveri, 1991)
- Aggregate Credit Constraints: Emerging markets tend to overborrow when the lending decisions of foreign investors are guided by macroeconomic indicators and not by careful assessment of individual borrowers' abilities to repay.

Focus of this Paper:

Investigate whether lending practices based on aggregate indicators of solvency can lead emerging countries to overborrow.

- **An Aggregate Borrowing Constraint**

$$A_{t+1} \leq \kappa$$

- Households do not internalize the constraint.
- Credit rationing (i.e., clearing of the domestic financial market) is brought about by adjustments in the interest rate.

- **An Individual Borrowing Constraint**

$$a_{t+1} \leq \kappa$$

- Households internalize the constraint.
- The interest rate equals the world interest rate at all times.
- In equilibrium, $A_t = a_t$.

Main Finding: No Overborrowing

The economy with the aggregate borrowing limit does not generate higher levels of debt than the economy with the individual borrowing limit.

An Economy with an Aggregate Debt Limit

Households

$$\max E_0 \sum_{t=0}^{\infty} \theta_t U(c_t, h_t),$$

subject to

$$\frac{a_{t+1}}{R_t} = a_t + c_t - e^{z_t} F(h_t)$$

and a no-Ponzi-game constraint.

Optimality Conditions

$$U_c(c_t, h_t) = R_t \beta_t E_t U_c(c_{t+1}, h_{t+1})$$

$$-\frac{U_h(c_t, h_t)}{U_c(c_t, h_t)} = e^{z_t} F'(h_t)$$

Clearing of the Domestic Financial Market

$$R_t \geq R^*$$

$$A_{t+1} \leq \kappa$$

$$(R_t - R^*)(A_{t+1} - \kappa) = 0$$

Rents from Financial Rationing and the Aggregate Resource Constraint

- Rents Accrue Domestically

$$\frac{A_{t+1}}{R^*} = A_t + C_t - e^{z_t} F(H_t)$$

- Rents Accrue to Foreign Lenders

$$\frac{A_{t+1}}{R_t} = A_t + C_t - e^{z_t} F(H_t)$$

Individual Debt Limit

$$\max E_0 \sum_{t=0}^{\infty} \theta_t U(c_t, h_t)$$

subject to

$$\frac{a_{t+1}}{R^*} = a_t + c_t - e^{z_t} F(h_t)$$

$$a_{t+1} \leq \kappa$$

Optimality Conditions

$$U_c(c_t, h_t) = \frac{R^*}{1 - R^* \xi_t} \beta_t E_t U_c(c_{t+1}, h_{t+1})$$

$$-\frac{U_h(c_t, h_t)}{U_c(c_t, h_t)} = e^{z_t} F'(h_t),$$

$$\xi_t \geq 0$$

$$(a_{t+1} - \kappa) \xi_t = 0$$

Define

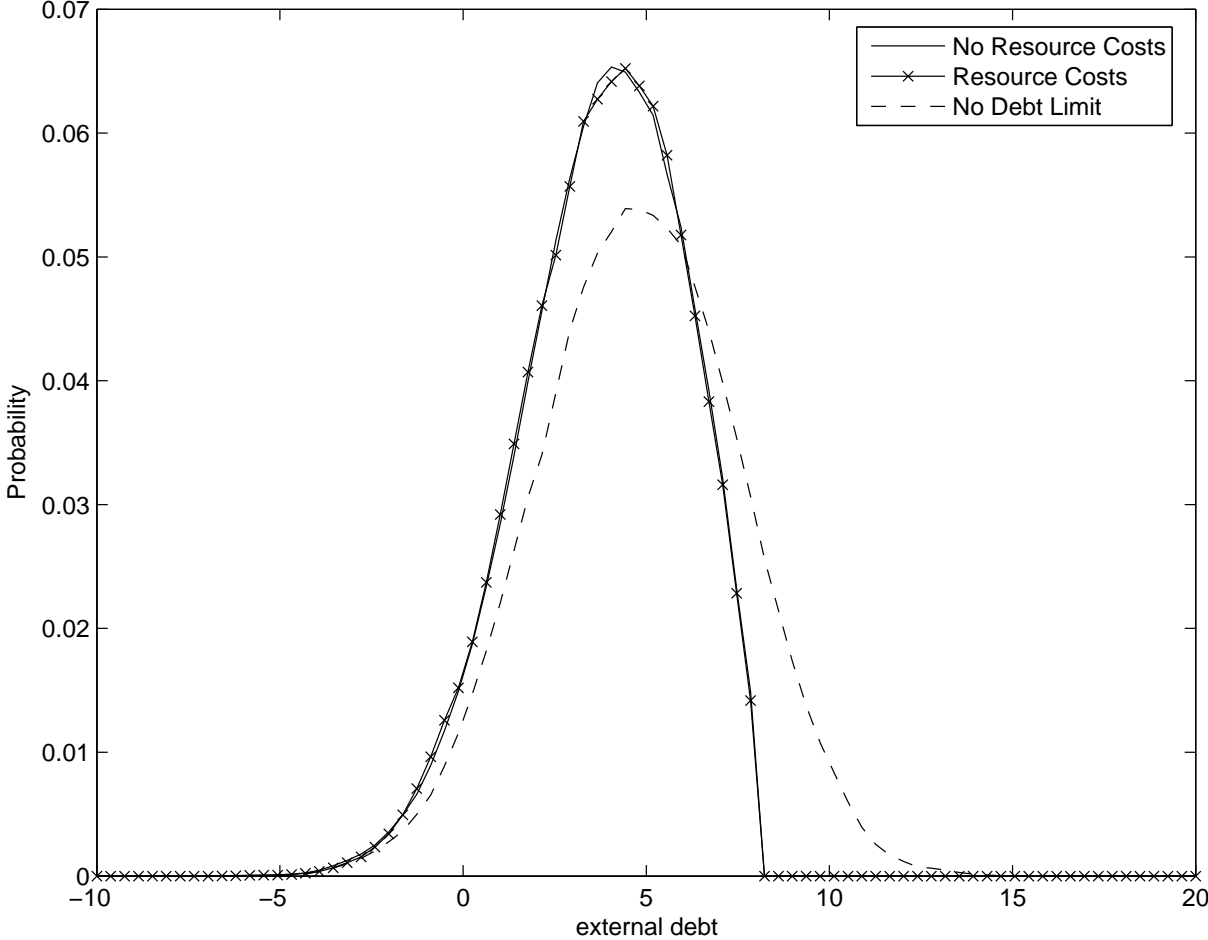
$$R_t = \frac{R^*}{1 - R^* \xi_t}$$

No Overborrowing: The equilibrium dynamics of c_t , h_t , y_t , and a_t are identical in the economy with an individual debt limit and in the economy with an aggregate debt limit with rents from financial rationing accruing to domestic households.

Robustness: The no-overborrowing result continues to hold when the model is modified to allow for:

- Capital accumulation
- A larger battery of shocks, such as random disturbances to preferences, endowments, or the world interest rate.
- Alternative specifications of the discount factor (e.g., $\beta(c_t, h_t)$ instead of $\beta(C_t, H_t)$).
- Rents from financial rationing accruing to foreign lenders.

Debt Distribution When Financial Rents Accrue Abroad



The Role of Stock Prices

Technology:

$$y_t = e^{z_t} F(k_t, h_t)$$

k_t = stock of land, in fixed aggregate supply
 k^*

Aggregate Debt Limit:

$$A_{t+1} \leq \kappa q_t k^*$$

Individual Debt Limit:

$$a_{t+1} \leq \kappa q_t k_{t+1}$$

$q_t \equiv$ price of land

Price of Land with an Aggregate Debt Limit

$$q_t = E_t \sum_{j=1}^{\infty} \Lambda_{t,t+j} e^{z_{t+j}} F_k(k^*, h_{t+j})$$

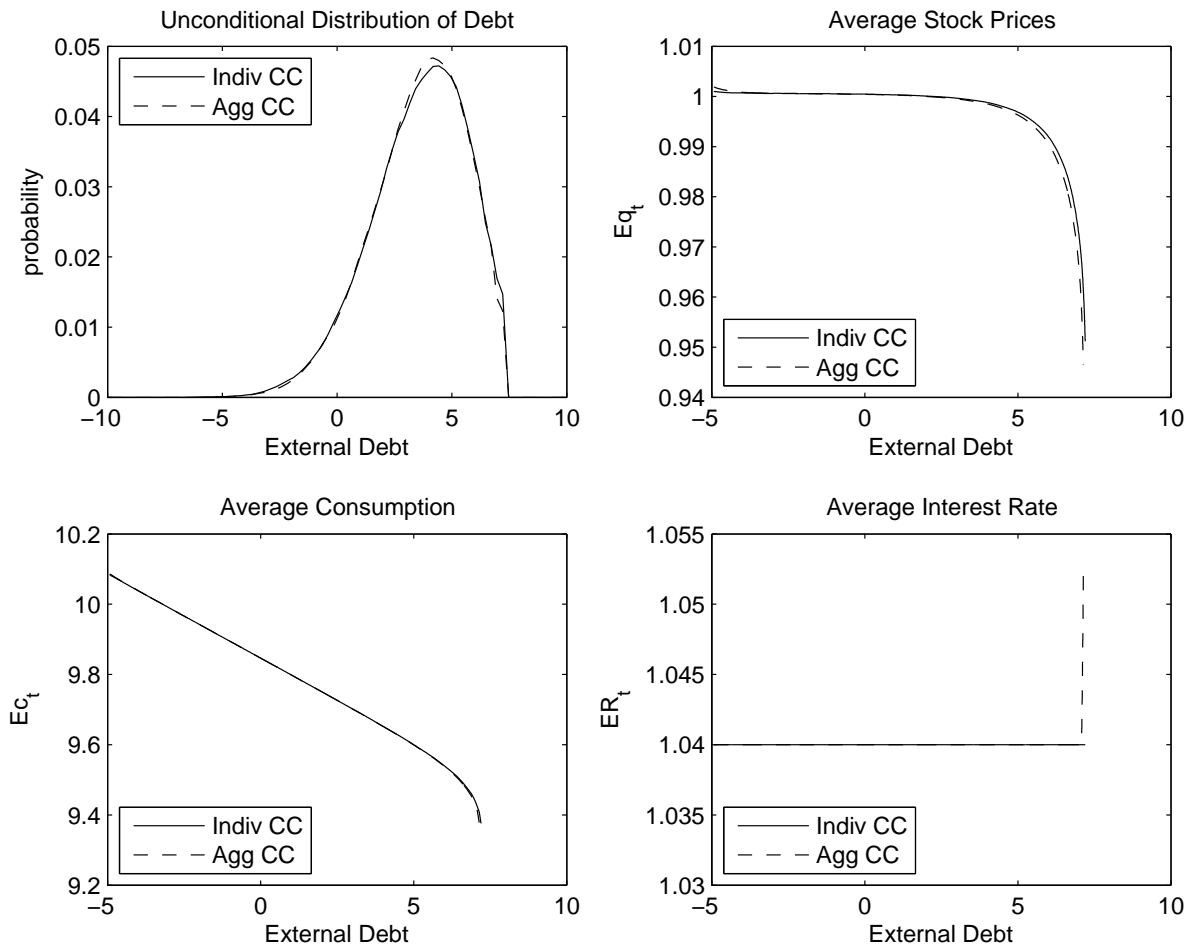
Price of Land with an Individual Debt Limit

$$q_t = E_t \sum_{j=1}^{\infty} \Lambda_{t,t+j} \frac{e^{z_{t+j}} F_k(k^*, h_{t+j})}{\prod_{s=0}^{j-1} [1 - \kappa(1/R^* - 1/R_{t+s})]}$$

Interest Rate Under Individual and Aggregate Debt Limits

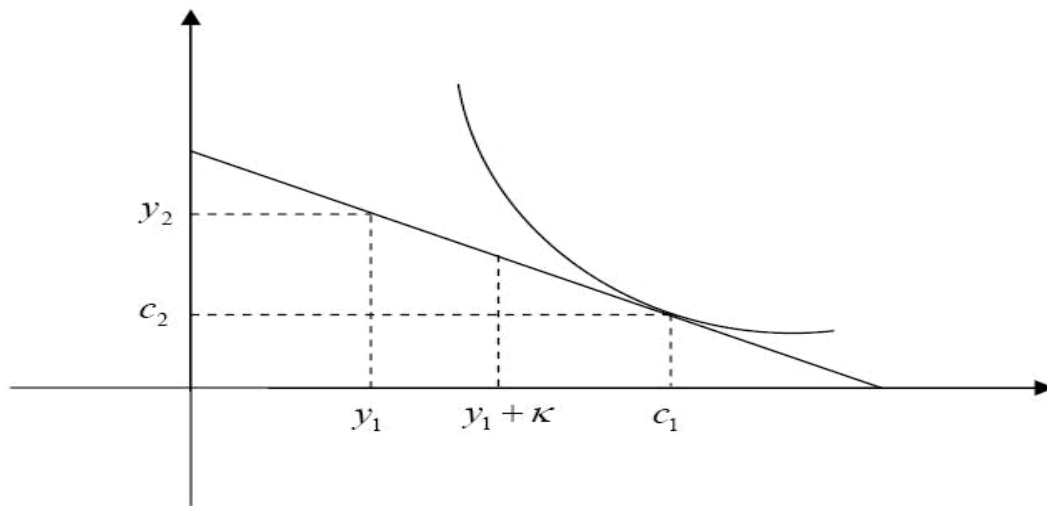
$$1 = R_t E_t \Lambda_{t,t+1}$$

Equilibrium Dynamics with a Time-Varying Debt Limit



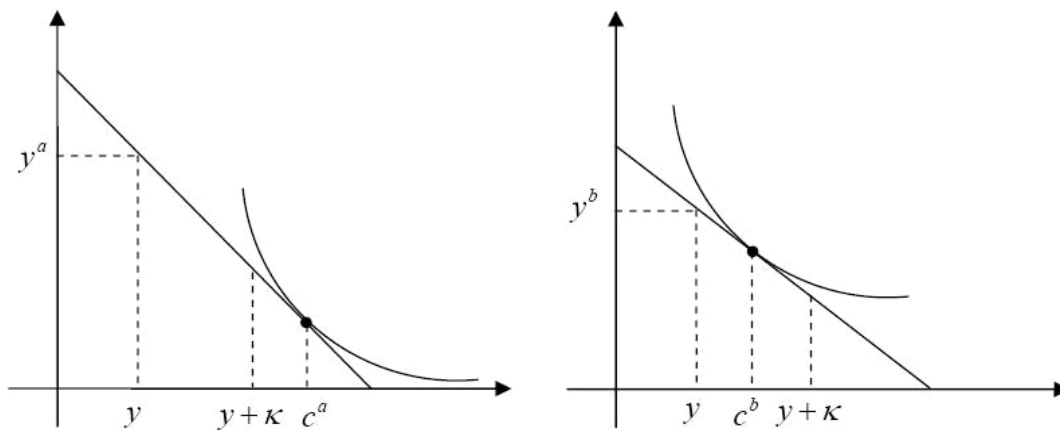
Conclusion: The price of land should be expected to be higher under an individual debt limit than under an aggregate debt limit.

Homogeneous Agents



Result: The economy borrows κ regardless of whether the debt limit is imposed at the individual or aggregate level.

Heterogeneous Agents



Result: The economy borrows more when the debt limit is imposed at the aggregate level.

Debt-Elastic Interest Rate

- **Aggregate Debt Limit**

$$R_t = R(A_{t+1}); \quad R' > 0$$

Steady state

$$1 = R(A^*)\beta$$

Individual Debt Limit

$$R_t = R(a_{t+1}); \quad R' > 0$$

Steady State

$$1 - \frac{A^{**} R'(A^{**})}{R(A^{**})} = R(A^{**})\beta$$

Implication

$$A^{**} < A^* \Rightarrow \text{Overborrowing}$$

Conclusion

- Lending practices based on aggregate indicators of solvency per se do not lead emerging countries to overborrow.
- Additional theoretical elements must be added capable of generating a market price of foreign funds lower than the social price.
- Two avenues for generating this price discrepancy are suggested:
 - Debt-elastic country premiums (possibly due to default risk).
 - Heterogeneous agents.