Aid, Remittances, and the Informal Economy

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Introduction

- Developing countries have large informal sectors (Schneider et al., 2010, La Porta and Shleifer, 2014)
  - A significant fraction of the labor force is employed in this sector
  - Informal production: basic, non-traded goods and services, unregistered firms with extremely low productivity
  - Production is very labor intensive, with little or no access to credit and/or capital
  - Labor mobility from informal to formal sector is limited (skill requirements, regulation, entry barriers, etc.)
  - Informality declines with development, but transition is very slow

Introduction

- Developing countries also receive large inflows of foreign transfers: aid (ODA) and remittances
  - ODA and remittances account for almost two-thirds of all international capital flows (Yang, 2011)
  - Aid: official transfer to the government, often with donor-imposed restrictions
  - Remittances: direct transfer to private residents, often working in the informal sector
  - These two sets of recipients operate under different constraints with different objectives
- **This Paper:** dynamic absorption of aid and remittances in the presence of a substantial informal sector.

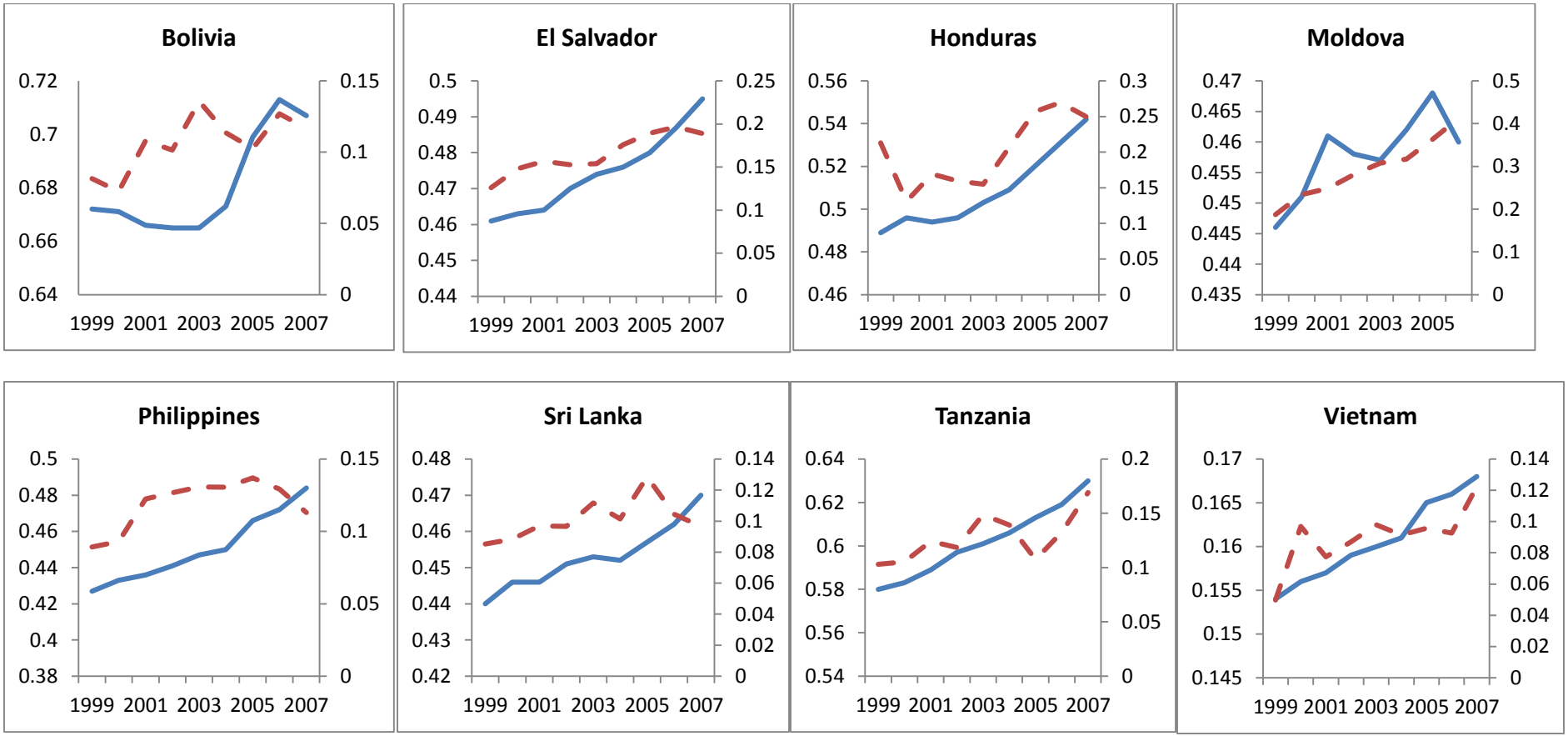
Foreign Transfers and the Informal Economy

Summary Statistics, 40 Developing Countries, 1999-2007

	Mean	**Med**	**Min**	**Max**	**SD**
Foreign Aid (%GDP)	5.69	1.91	0.01	33.63	7.69
Remittances (%GDP)	6.51	3.1	0.01	50.58	9.38
Informal output (%GDP)	41.84	41.64	16.07	68.12	11.43
Informal emp (%total emp)	53.69	59.6	6.1	83.5	20.32
Self emp (%total emp)	48.82	46.03	8.29	91.3	22.79

Data Sources: Schneider et al. (2010), La Porta and Shleifer (2014), WDI, OECD

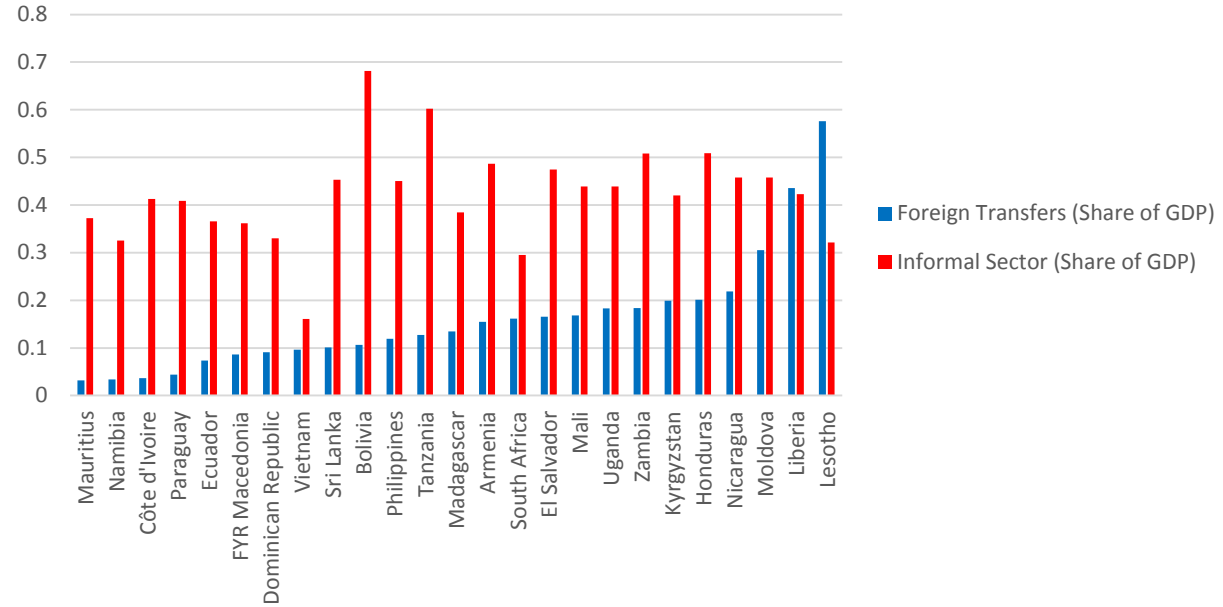
FIGURE 1. Foreign Transfers and the Informal Economy
Selected Countries, 1999-2007



Data Sources: Schneider et al. (2010), OECD, WDI, and authors' calculations

Foreign Transfers and the Informal Sector

Selected Countries, 1999-2007



Related Literature and Value added

- **Literature on informal economy**
  - Measurement of size: Schneider and Enste (2000), La Porta and Shleifer (2008, 2014), Gomis-Porqueras et al. (2014)
  - Tax evasion, enforcement, minimum wages: Rauch (1991), Ihrig and Moe (2004), Basher and Turnovsky (2009), Prado (2011), Ordonez (2014)
  - *No analysis of the implications of foreign capital inflows*
- **Literature on Aid and Remittances**
  - Implications for growth and macroeconomic adjustment of the **formal** economy
  - Burnside and Dollar (2000), Easterly (2003), Chatterjee et al. (2003), Giuliano and Luiz-Arranz (2009), Acosta et al. (2009), Mandelman (2012)
  - *No analysis of the informal or shadow economy*
- By embedding both the informal economy and foreign transfers in a general equilibrium model, we bridge an important gap in the literature

Analytical Framework

- **Two sector open economy model with imperfect labor and capital mobility**
  - *Formal sector*: produces traded goods, using CES technology, labor and capital
  - *Informal sector*: produces a basic non-traded good using only labor
  - Public infrastructure generates productivity spillovers for *both* sectors
  - Labor movement across sectors is **costly**
  - Private capital is traded but **internally immobile**, restricted only to formal sector
- **Households**: consume both goods, allocate sectoral labor, invest in formal sector firms, and receive remittances from abroad
- **Government:** taxes formal income (labor and capital), receives foreign aid, and provides public goods (infrastructure and public consumption)

Production

- Formal sector:

$$\begin{aligned} Y_f &= A_f F(K, L_f), \quad A_f = A_f(\bar{A}_f, K_G) \\ r_K &= \partial Y_f / \partial K, \quad w_f = \partial Y_f / \partial L_f \end{aligned}$$

- Informal sector:

$$\begin{aligned} Y_s &= A_s H(L_s), \quad A_s = A_s(\bar{A}_s, K_G) \\ Y_s &= C_s \end{aligned}$$

Households

- Choose consumption of both formal and informal goods to maxmimize

$$\int_0^\infty U(C_f, C_s) e^{-\beta t} dt$$

- Subject to

$$\dot{N} = r(.)N + C_f + pC_s + \Omega - (1-\tau)(r_K K + w_f L_f) - pY_s + T_f - R$$

$$\dot{K} = I - \delta_K K$$

  - N : stock of household (private) debt
  - R : remittance receipts from abroad
  - r : interest rate on household debt, given by $r = r^* + e^{\omega(V/Y)} - 1$, with r^* : world interst rate and $\omega > 0$
  - V : aggregate economy-wide debt (public + private), and $Y = Y_f + pY_s$ (GDP)
  - p : the real exchange rate (relative price of informal good)

Labor Market

- Let u represent the flow of workers leaving the informal sector:

$$\dot{L}_s = -u$$

- The rate at which the stock of formal employment is changing is:

$$\dot{L}_f = u - \frac{\chi}{2}u^2 - zL_f + \sigma L_U$$

  - χ : intersectoral mobility cost
  - z : rate of job separation
  - σ : rate of job finding
  - L_U : unemployment rate

- Labor market clearing condition:

$$L_f + L_s + L_U = 1$$

Public Sector

- Public debt and infrastructure accumulate according to

$$\begin{aligned} \dot{B} &= r(.)B + G_I^d + G_C^d - \tau(r_K K + w_f L_f) - T_f - (1-\lambda)F \\ \dot{K}_G &= G_I^d + \lambda F, \quad \lambda \in [0,1] \end{aligned}$$

  - λ : aid allocation parameter$\Rightarrow$proxy for institutional quality of recipient or donor intentions

- Current account:

$$\dot{V} = r(.)V + C_f + \Omega(.) + G_I^d + G_C^d - Y_f - R - (1-\lambda)\,F$$

  - $V = N + B$: aggregate stock of debt (private + public)

Equilibrium Dynamics

$$
\begin{aligned}
\dot{K} &= I(q_K) - \delta_K K \\
\dot{L}_f &= \frac{q_f - q_s}{\chi q_f} - \frac{\chi}{2}\left(\frac{q_f - q_s}{\chi q_s}\right)^2 - zL_f + \sigma\left(1 - L_f - L_s\right) \\
\dot{L}_s &= -\left(\frac{q_f - q_s}{\chi q_f}\right) \\
\dot{V} &= r(.)V + C_f + \Omega(.) + G_I^d + G_C^d - Y_f - R - (1-\lambda)F \\
\dot{q}_K &= \left[r(.) + \delta_K\right] q_K + \Omega_K - (1-\tau) r_K \\
\dot{q}_s &= r(.) q_s + \sigma q_f - p\frac{\partial Y_s}{\partial L_s} \\
\dot{q}_f &= \left[r(.) + \sigma + z\right] q_f - (1-\tau) w_f \\
\dot{q}_1 &= (\beta - r)\, q_1
\end{aligned}
$$

Labor Market at the Steady-State

- Long-run unemployment rate

$$\tilde{L}_U = \left(\frac{z}{\sigma + z}\right)(1 - \tilde{L}_s) = \frac{z}{\sigma}\tilde{L}_f$$

- Sectoral returns on employment

$$(1 - \tau)\,\tilde{w}_f = \left(1 + \frac{z}{\beta + \sigma}\right)\tilde{p}\frac{\partial Y_s}{\partial L_s}$$

Functional Forms

Description	**Functional Form**
Utility function	$U = \left(C_f^{\theta} C_s^{1-\theta}\right)^{\gamma} / \gamma$
Production-Formal Sector	$Y_f = A_f \left[\alpha K^{-\rho} + (1-\alpha) L_f^{-\rho}\right]^{-1/\rho}$
	$A_f = \bar{A}_f K_G^{\varepsilon}$
Production-Informal Sector	$Y_s = A_s L_s^{\eta}, \;\; A_s = \bar{A}_s K_G^{\phi}$
Borrowing cost	$r = r^* + e^{\omega V/Y} - 1$
Adjustment cost-Investment	$\Omega = I \left[1 + \frac{h}{2} \frac{I}{K}\right]$

TABLE 3. Parameterization of the Benchmark Model

A. Structural Parameters

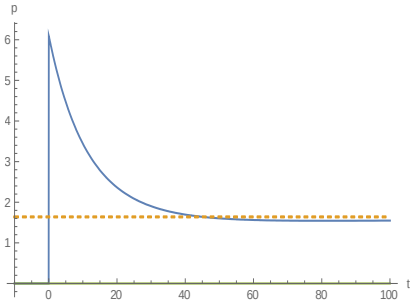
Parameter	Description	Value
γ	Intertemporal elasticity of substitution in consumption	-1.5
β	Rate of time preference	0.06
θ	Relative weight of formal-sector good in utility	0.5
ω	Borrowing premium-Households	0.022
r^*	World interest rate	0.04
$\overline{A}_f$	Productivity level-formal sector	1.5
$\overline{A}_s$	Productivity level-informal sector	1
α	Share of private capital in formal sector	0.4
ε	Output elasticity of public capital-formal sector	0.15
ϕ	Output elasticity of public capital-informal sector	0.15
s_f	Elasticity of substitution in formal sector production	1
h	Adjustment cost for investment	15
δ_K	Depreciation rate for private capital (annual)	0.08
δ_G	Depreciation rate for public capital (annual)	0.07
η	Share of labor in informal sector production	0.75
z	Rate of job separation	0.01
σ	Rate of job finding	0.05
χ	Labor mobility cost	15
λ	Aid allocation to public investment	0.35
τ	Tax rate on formal sector output	0.3

TABLE 4. Benchmark Steady-State Equilibrium

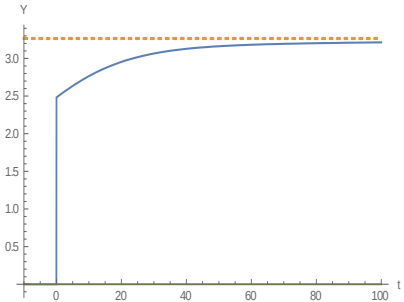
Endogenous Variables	Description	Model	Data*	Data Source
K_G/K	Ratio of pubic to private capital	0.640	0.676	Gupta et al. (2014)
C/Y	Aggregate consumption-output ratio	0.813	0.803	WDI
K/Y	Aggregate capital-output ratio	1.279	1.163	Gupta et al. (2014)
B/Y	Public debt-output ratio	0.605	0.604	WDI
N/Y	Private debt-output ratio	0.295	0.299	WDI
Y_f/Y	Share of formal sector in GDP	0.593	0.582	Schneider et al. (2010)
L_f/L	Share of formal employment (in total employment)**	0.426	0.463	ILO
L_U	Unemployment rate	0.086	0.086	WDI
p	Real exchange rate	0.827	0.973	UNCTAD
Calibrated Variables	**Description**	**Model**	**Data***	**Data Source**
G_I/Y	Share of public investment in GDP	0.026	0.026	GFS
G_C/Y	Share of public consumption in GDP	0.143	0.143	WDI
F/Y	Foreign aid (share of GDP)	0.057	0.057	OECD (DRS)
R/Y	Remittances (share of GDP)	0.065	0.065	WDI

*Sample averages for 40 developing countries for the period 1999-2007.
**Employment share of the formal sector is for the latest year available in the ILO database (between 1999-2007).

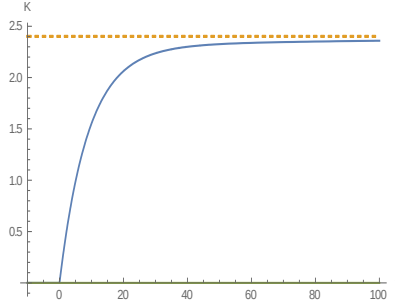
FIGURE 2: Aggregate Foreign Aid Shock



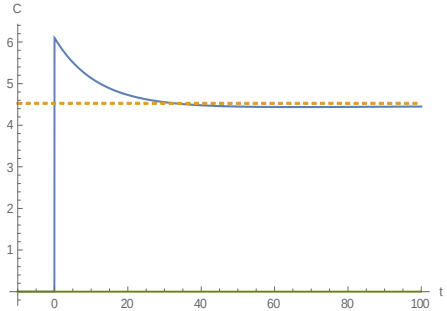
Real Exchange Rate



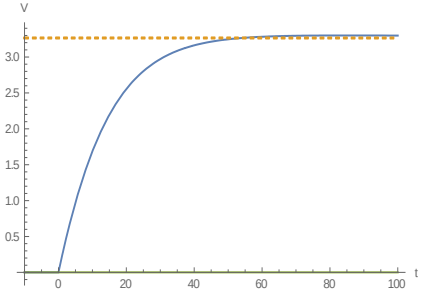
GDP



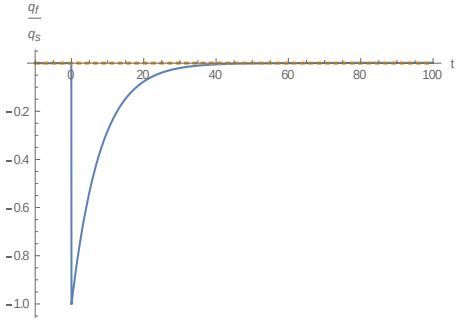
Private Capital



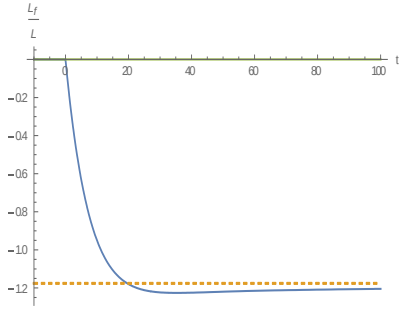
Consumption



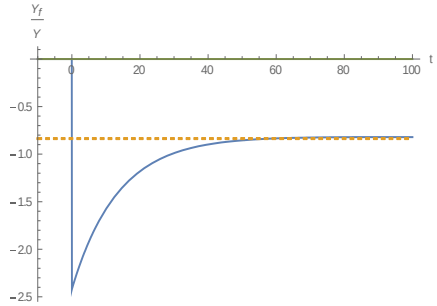
Current Account



Relative Shadow price-Formal Emp.



Employment Share-Formal Sector



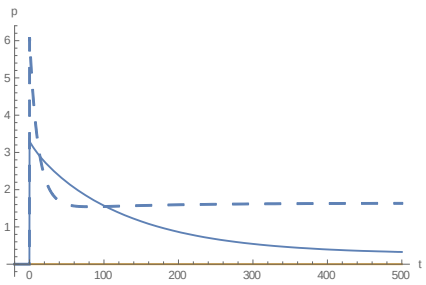
Output Share-Formal Sector

All variables are plotted as percentage deviations from their pre-shock steady state levels

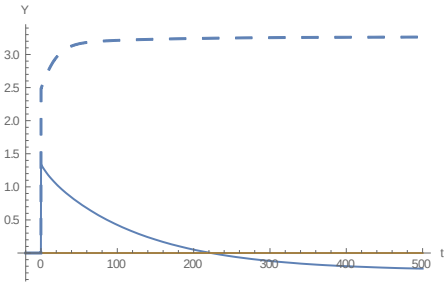
Steady-State Effects

	dY_f/Y	dL_f/L	dL_U	dK	dC	dY	dV	dp	Welfare Change
Foreign aid shock	-0.836	-1.176	-1.076	2.402	4.526	3.265	3.265	1.638	3.375

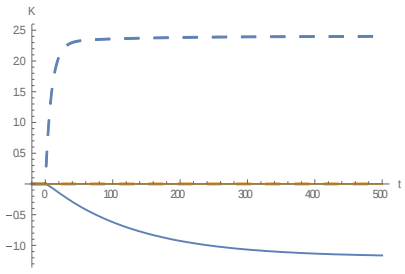
FIGURE 3: Remittance Shock



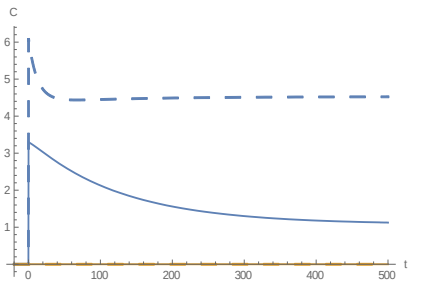
Real Exchange Rate



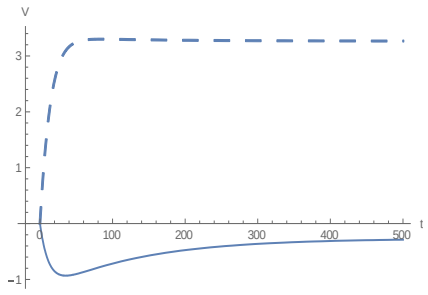
GDP



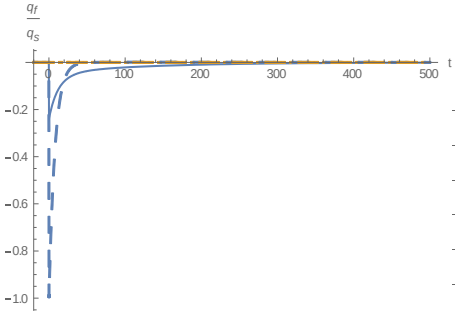
Private Capital



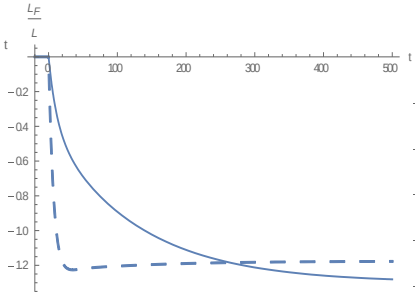
Consumption



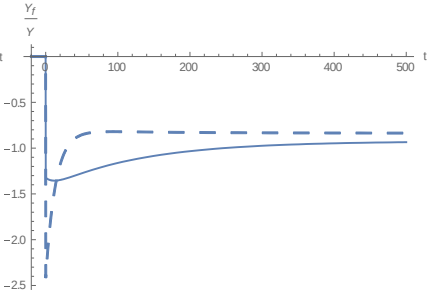
Current Account



Relative Shadow Price-Formal Emp.



Employment Share-Formal Sector



Output Share-Formal Sector

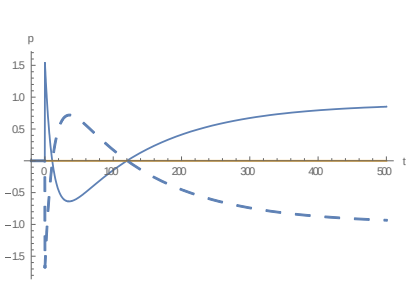
_____ Remittance shock _ _ _ _ _ _ Foreign Aid shock

All variables are plotted as percentage deviations from their pre-shock steady state levels

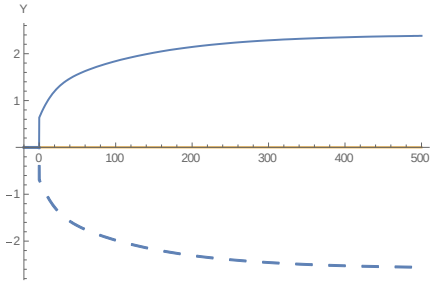
Steady-State Effects

	dY_f/Y	dL_f/L	dL_U	dK	dC	dY	dV	dp	Welfare Change
Foreign aid shock	-0.836	-1.176	-1.076	2.402	4.526	3.265	3.265	1.638	3.375
Remittance Shock	**-0.924**	**-1.299**	**-1.189**	**-1.189**	**1.078**	**-0.267**	**-0.267**	**0.268**	**1.629**

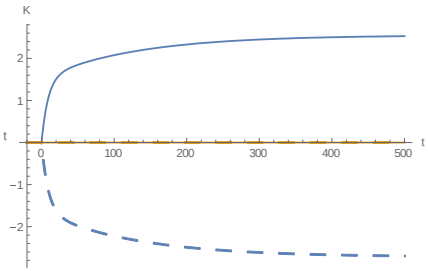
FIGURE 4: Change in the Composition of Foreign Aid



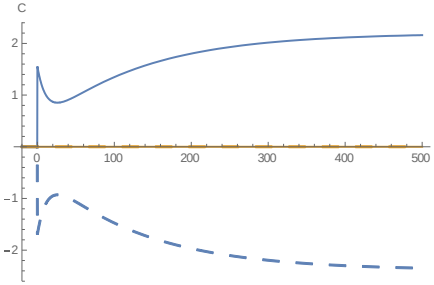
Real Exchange Rate



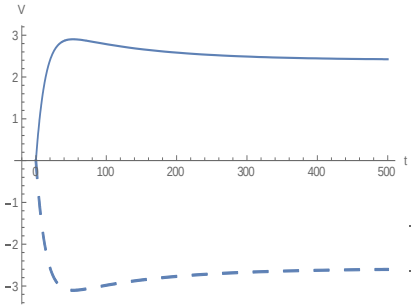
GDP



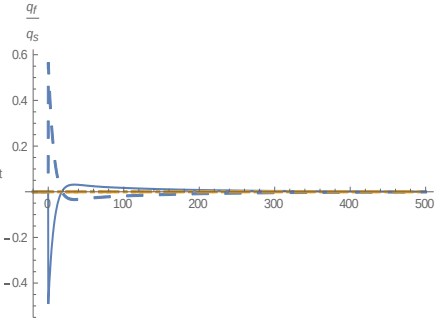
Private Capital



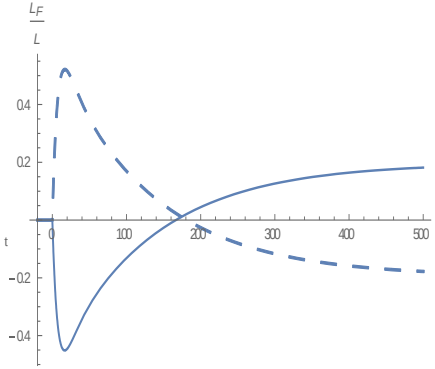
Consumption



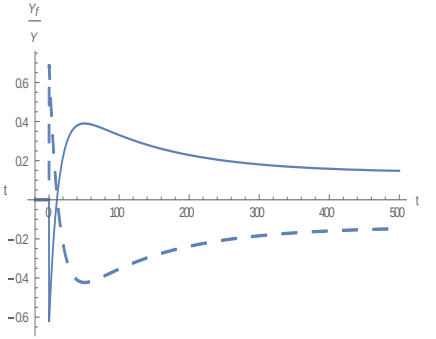
Current Account



Relative Shadow Price-Formal Emp.



Employment Share-Formal Sector



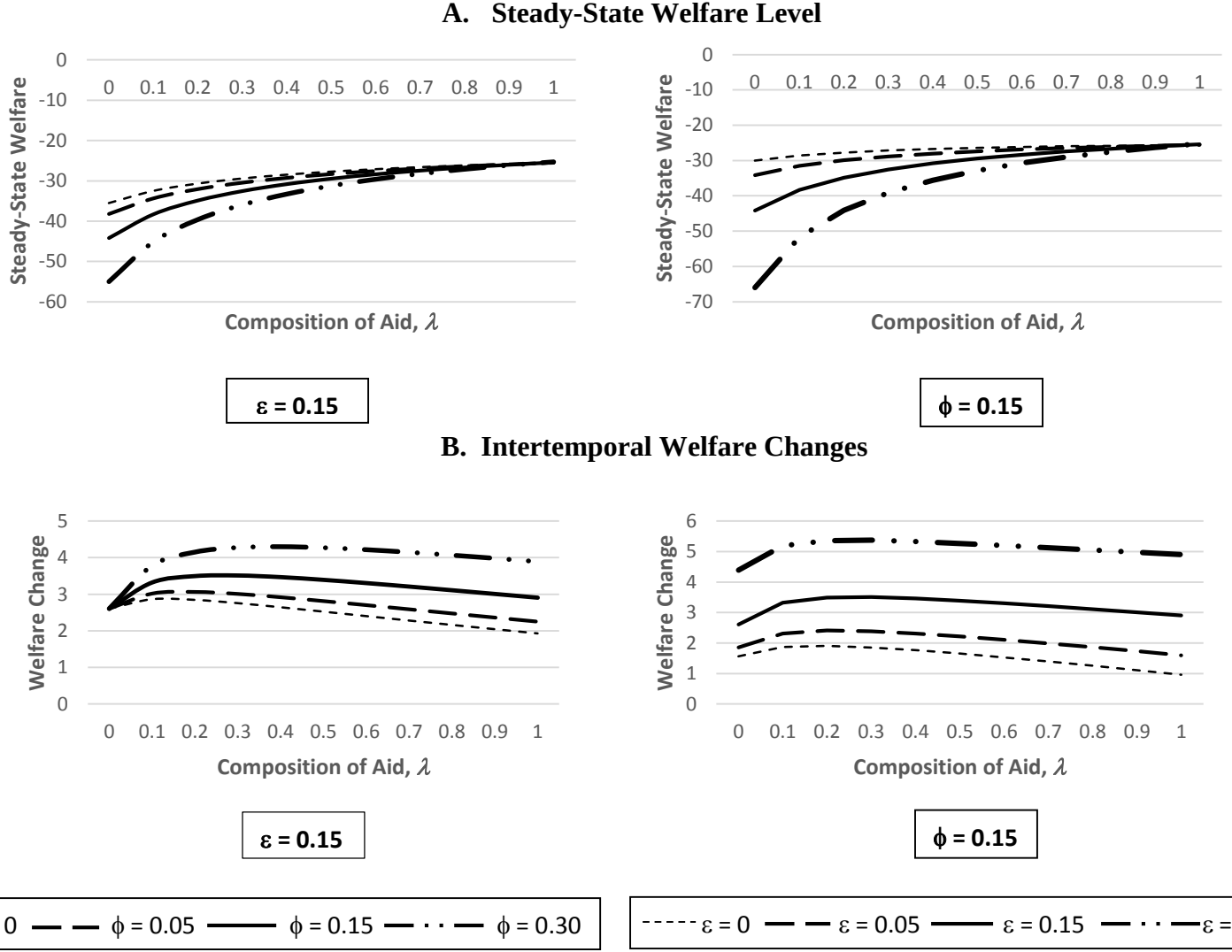
Output Share-Formal Sector

_____ Increase in "tying" (λ = 0.35 to 0.4) _ _ _ _ _ _ "Decrease in "tying" (λ = 0.35 to 0.30)

All variables are plotted as percentage deviations from their pre-shock steady state levels

	dY_f/Y	dL_f/L	dL_U	dK	dC	dY	dV	dp	Welfare Change
More "tying" to public investment	0.139	0.197	0.179	2.549	2.199	2.407	2.407	0.898	1.024
Less "tying" to public investment	-0.138	-0.195	-0.178	-2.719	-2.389	-2.586	-2.586	-0.987	-1.113

FIGURE 5: The Sectoral Elasticity of Public Capital, the Composition of Aid, and Welfare



Sensitivity Analysis

- Sectoral elasticity of public capital (infrastructure) (ε, ϕ)
- Output elasticity of labor in the informal sector (η)
- Elasticity of substitution in formal sector production (ρ)
- Labor mobility costs (χ, σ, and z)

Conclusions

- Effect of foreign transfers on informality, in the presence of imperfect labor and capital mobility
- Both foreign aid and remittances are associated with more informality (output and employment), **but**
  - the composition of aid matters: investment aid reduces informality, but diversion from investment increases informality and leads to economic contraction
  - remittances generate a short-run economic expansion, but a long-run "Dutch Disease" effect
- Real exchange rate dynamics depend on the type of transfer and composition
- Welfare: optimal degree of "tying" exists, around 30-40%, with diminishing returns from tying too much aid to public investment