The Costs and Benefits of Informalization in a Two-Sector New Keynesian Model

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Informality: Some General Issues

- Lack of consensus on common definition of informality
  - definition change by authors, period of time and countries
  - all authors agree that in general informality is related to unregistered (and so unobservable) activities;
- Disagreement on the size of the informal sector due to:
  - different definition of informality used (see previous point);
  - lack of robust estimation technique able to capture all the dimensions of the informal economy
  - so, given the limits of current measurement methods, can we measure the size informal economy with a DSGE model?
- Open question addressed in paper: **is informality good or bad?**

Changes in the Informal economy as a percentage of GDP

	Unweighted Average*		
	1989-1991	**1994/1995**	**1999-2000**
Africa (24)	33.9	37.4	41.2
Asia (25)	20.9	23.4	26.3
C and S America (17)	34.2	37.7	41.5
Transitional (23)	31.5	34.6	37.9
OECD (21)	13.2	15.7	16.7

See [Schneider(2005)]: estimated by DYMIMIC (Dynamic Multiple Indicators, Multiple Causes)

Modelling Informality in a DSGE Context

- Aspects of Informality
  - **Goods Market**
  - Credit Market
  - **Labour Market**
- General Equilibrium Analysis: from RBC to NK Models
- Characteristics of the Informal Economy
  - Unregulated and untaxed
  - **Low Productivity**
  - **Hidden or poorly observed**
  - Small firms
  - **Flexible wages (no frictions)**
  - Credit Constrained, low income households
- Treatment of Agriculture? - part of the informal sector, present in both or model a third sector?

A Two-Sector NK Model

- A RBC core with a NK nominal shell (as in all DSGE Models!)
- RBC Core: Supply Side (see [Marjit and Kar(2008)])
  - Classical informal (I) labour market - flexible wage
  - Formal Sector: **Fixed Real Wage Norm** $>$ Real Wage in I sector.
  - Hours are chosen to equate the MRS with the real wage in both sectors
  - Hours higher in the F sector and households prefer employment in the F sector
  - Government spending out of formal output financed by an employment tax in the formal sector only - balanced budget
  - Capital mobility and no investment costs
- RBC Core: Demand Side
  - Euler equation $\Rightarrow$ Aggregate Consumption
  - Choice of F and I consumptions depend on relative price

The NK Nominal Shell

- The RBC Core Supply-Side describes the **Wholesale Sector**
- Introduce **Nominal Price Rigidities** through monopolistic retailers who set Calvo prices
- F and I retailers buy wholesale goods and convert them into differentiated goods sold at a mark-up over the marginal cost= price of the wholesale good.
- Leads to two NK Phillips curves and two price dispersions that lead to welfare costs of inflation
- Monetary Policy conducted in terms of the nominal interest rate

Policy Issues

- Three sources of **welfare costs** of informalization:
  (1) Long-term costs of restricting taxes to the formal sector
  (2) Short-term fluctuation costs of restricting changes in taxes (to finance fluctuations in government spending) to the formal sector and
  (3) The costs associated with lack of observability of the informal sector.
- The benefit is wage flexibility

Calibration using the Steady State: Example

A utility function consistent with balanced growth g

$$U_t(C_t, L_{i,t}) = \frac{[C_t^{1-\varrho} L_{i,t}^{\varrho}]^{1-\sigma} - 1}{1-\sigma}; \quad \sigma > 1$$

Equating the MRS and the real wage in the F-sector:

$$\frac{\varrho \bar{C}_t}{(1-\varrho)(1-h_F)} = \bar{W}_{F,t}$$

Thus if we observe $\frac{\bar{W}_{F,t}}{\bar{C}_{F,t}}$ and h_F we can deduce ρ.

Results of Calibration

- **Impose Parameters ('Priors')** :
  $\delta = 0.025$, $\sigma = 2.0$, $\xi_F = \xi_I = 0.75$
  $\zeta_F = \zeta_I = 7.0$, $\mu = 1.5$
  $\rho_{aF} = \rho_{aI} = \rho_g = \rho_{uI} = \rho_{uF} = 0.7$
  $\text{sd}(\varepsilon_{aF})$=$\text{sd}(\varepsilon_{aI})$= $\text{sd}(\varepsilon_g)$=$\text{sd}(\varepsilon_{uF})$= $\text{sd}(\varepsilon_{uI}) = 2.0$

- **Observe Outcomes**:
  $g^{obs} = 0.01$, $n_F^{obs} = 0.25$, $h_F^{obs} = 0.5$, $rel^{obs} = 2.0$
  $ws_F^{obs} = 0.5$, $rw^{obs} = 0.4$, $g_{yF}^{obs} = 0.2$, $R^{obs} = 0.015$

- **Use steady state to deduce:**
  $\alpha_I = 0.80$, $\alpha_F = 0.60$, $\beta = 0.998$, $w = 0.37$, $\varrho = 0.69$

Steady State Equilibrium Values: $k = 0, 1$

Variable	$k = 0$	$k = 1$
$\frac{P_F}{P}$	1.00	0.8194
$\frac{P_I}{P}$	1.00	1.1333
n_F	0.25	0.3264
h_F	0.5	0.4882
h_I	0.25	0.2323
τ_F	0.50	0.1520
τ_I	0.0	0.1520
KY_I	5.00	6.9158
KY_F	10.00	10.00
i_{yF}	0.51	0.5470
c_{yF}	0.29	0.2961
Λ	-1.8001	-1.7595 ($c_e = 0.81\%$)

The Size of Formal Sector and Tax Burden

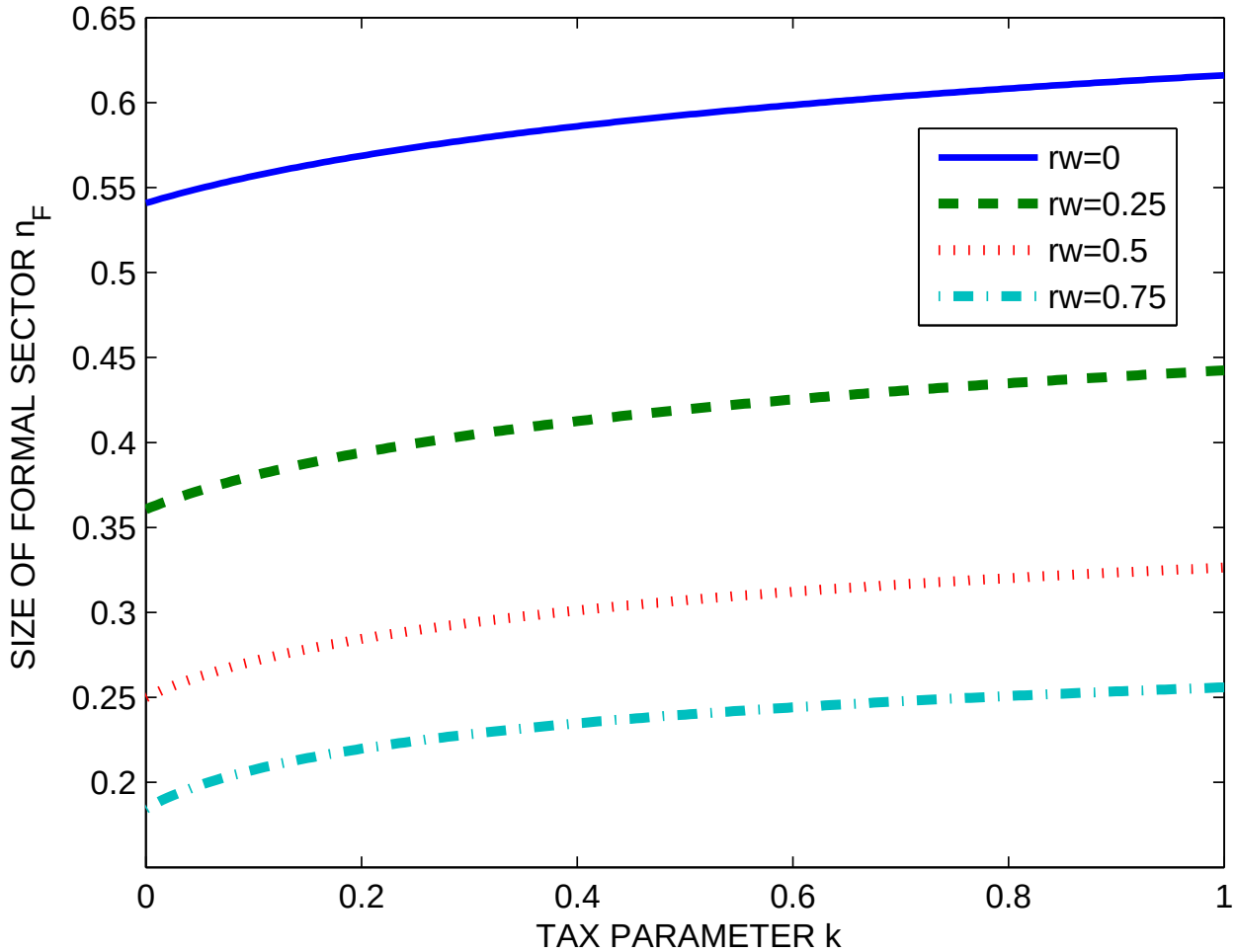

Figure: **The Size of Formal Sector and Tax Burden: k = Ratio of Informal-Formal Tax Rates. rw =wage mark-up in the formal sector.**

Welfare and Tax Burden

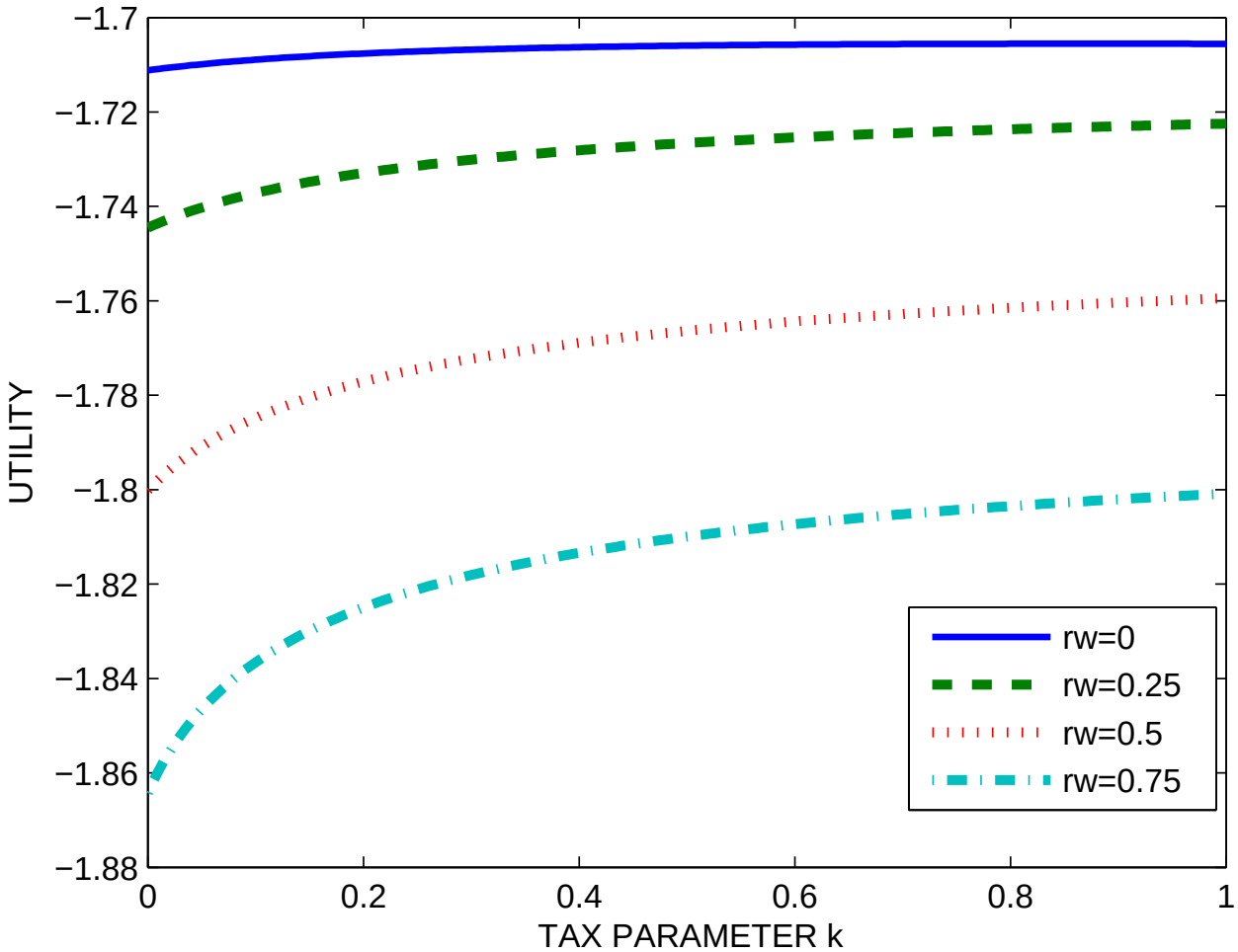

Figure: **Welfare and Tax Burden: $k =$ Ratio of Informal-Formal Tax Rates. $rw =$wage mark-up in the formal sector.**

Inflation Targeting Rules

- **Symmetrical Rule**

$$r_{n,t} = \rho r_{n,t-1} + \theta_{\pi}\pi_t + \theta_{Fy}(y_{F,t} - y^*_{F,t}) + \theta_{Iy}(y_{I,t} - y^*_{I,t})$$

- **Asymmetrical Rule**. If the informal sector is largely unobserved directly this will be impossible to implement. We therefore treat the symmetrical rule as a benchmark and compare it with an asymmetrical rule that responds only to changes in the observable formal sector

$$r_{n,t} = r_{n,t} = \rho r_{n,t-1} + \theta_{F\pi}\pi_{F,t} + \theta_{y}(y_{F,t} - y^*_{F,t})$$

Optimal Rules

n_F	Rule	$[\rho,\ \theta_{\pi F},\ \theta_{\pi I},\ \theta_{yF},\ \theta_{yI}]$	Ω_0	σ_r^2	c_e
0.25	Sym	[0.98, 0.00, 0.05, 0.00, 0.00]	30.96	0.029	0.20
0.25	Asy	[1.00, 0.01, 0, 0.02, 0]	31.61	0.011	0.20
0.25	Opt	complex	25.08	0.095	0.13
0.36	Sym	[1.00, 0.02, 1.38, 0.06, 0.05]	39.31	0.055	0.27
0.36	Asym	[0.91, 0.30, 0, 0.02, 0]	46.30	0.110	0.34
0.36	Opt	complex	12.00	0.037	0

Table 3. Optimal Rules

The Cost (and Benefit) of Informalization

Source of Cost	Consumption Equiv c_e (%)
Tax Smoothing at Steady State	0.81
Stabilization: Optimal Rule	0.13
Stabilization: Symmetric Taylor Rule	−0.07
Stabilization: Asymmetric Taylor Rule	−0.14

Table 4. The Cost (and Benefit) of Informalization.

How big do shocks need to be for Benefit $>$ Cost?

Let sd of shocks (2%) be scaled by a factor κ. Then stabilization gains from informalization with an asymmetric Taylor rule will outweigh the tax smoothing at the steady state iff $0.14\kappa^2 > 0.81$ which occurs iff $\kappa > 2.41$; i.e., $sd > 4.82\%$.

Conclusion and Future Directions

- Conclude that Informalization seems to be a bad thing. But there are caveats:
- The model ignores investment costs so that capital changes instantly
- The model assumes a balanced budget constraint which therefore exaggerates the costs of distortionary taxes
- We have used a 'small distortions' quadratic approximation to the utility
- The RE solution assumes full information - imperfect information is appropriate
- Informal Credit in important in India and Pakistan

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