ESSAYS ON INFORMAL ECONOMY

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE

FELLOW PROGRAMME IN MANAGEMENT

INDIAN INSTITUTE OF MANAGEMENT

INDORE

By

Suganya Balakumar

February 2021

Thesis Advisory Committee

Prof. Subhasankar Chattopadhyay [Chairman]

Prof. Indrajit Thakurata [Member] **Prof. Debasish Maitra [Member]**

Abstract

Developing countries are overwhelmingly heterogeneous. Among many, one distinction that has been getting attention is that between a formal and an informal economy. There are three major forms in which such distinction may show up; in output markets, in labour markets and in financial markets. The Indian economy has high degree of informality: about half of India's GDP is from the informal sector activities (Anand et al., 2016), and a large share of workers work outside of the protected employment relationship. About 84 percent of the Indian labour force is informally employed, which is the largest in the emerging economies (Narayanan, 2015).

A major challenge for the Indian economy is the growing informalisation of jobs in the organised sector, that is, there is an increase in the share of informal employment in the formal sector firms. In India, employment in the formal economy accounts only for 16 percent of the total employment, of which almost half of the workers are recruited informally, where they are not provided with social security or employment benefits. Informal employment in the formal sector was 32 percent in 1999-2000, 54 percent in 2004-05, and increased to 63 percent in 2009-10 and 67 percent in 2011-12. This is mainly due to the increase in contractual jobs in the formal sector (Mehrotra et al., 2013, 2014).

This dissertation is an attempt to understand the formal-informal heterogeneity in a developing economy. We first turn to the factor market – the labour market heterogeneity – by studying the changing structure of formal-informal wage gap in India. By using National Sample Survey (NSSO) Employment-Unemployment Survey (EUS) data for four rounds from 1999-00 to 2011-12, we estimate the pattern of formal-informal and skilled-unskilled wage gaps. Though there seem to be no dearth of such studies, the existing literature has explored the *overall* wage gaps

between the formal and informal workers, and that between the skilled and unskilled workers. That is, they do not control for the skill effects while studying the formal-informal wage gap or the informal employment while studying the skilled-unskilled wage gap. The first essay attempts to uncover the *'true formal-informal wage gap'* by controlling for the skill effect and the *'true skilled-unskilled wage gap'* by controlling for the informal employment. The study finds that there is no discernable change in the true formal-informal wage gap across years, and that the true skilled-unskilled wage gap has narrowed over the years.

The second essay incorporates segmentations in goods market (Williamson, 2008, 2009) and labour market in a general equilibrium model to study the effect of productivity shocks and its transmission. The formal households work in high productive sectors – manufacturing sector, and high-end services sector, and the informal households work in low productive sectors – agriculture sector and low-end services sector. Both formal households and informal households consume formal and informal goods. Such preferences are calibrated based on consumption data from the 2011-2012 Indian National Sample Survey (NSSO) 68^{th} round Employment-Unemployment Survey (EUS) data. The households' savings are modelled in the form of capital, where formal households save in manufacturing capital that is used in the production of consumer durables, and informal households save in consumer durables that is used in the production of low-end services. The linkage between the formal and the informal households is through trade in the goods market and the resultant income flow (Chakrabarti, 2016). This essay proposes to understand how a technological shock propagates from the formal sector to the informal sector and vice versa. The incorporation of the informal services as an input to the production of formal service contributes to the novelty of this work.

Table of Contents

Abstract 2

Declaration 4

Acknowledgements 5

Chapter 1. Essays on Informal Economy: An Introduction 14

1 Introduction 14

2 Definitions 16

3 A summary of the thesis 19

Chapter 2. Labour market discrimination and Wage Structure 23

1 Introduction 23

2 Literature review 24

3 Policy implication of the study 28

4 Methodology: The argument 30

4.1 Decomposition of the Formal-informal Wage Gap 30

4.2 Decomposition of the Skilled-unskilled Wage Gap 33

5 Data description and Descriptive statistics 35

5.1 Formal and informal workers 37

5.2 Skilled and unskilled workers 39

6 Decomposition technique: Theory 44

6.1 Formal and informal workers 44

6.2 Skilled and unskilled workers 48

7 Results 49

7.1 Formal-informal wage gap 50

7.1.1 Comparing results 57

7.2 Skilled-unskilled wage gap 58

7.2.1 Robustness check 60

7.2.2 Comparing results 63

7.2.3 Mahatma Gandhi National Rural Employment Guarantee Scheme 64

7.2.4 Evidence for the Stolper-Samuelson (SS) theorem 66

7.3 Relative effects of informality 66

7.3.1 Quantile analysis 67

7.3.2 State-level analysis 69
8 Summary and concluding remarks 78
9 Chapter 2 Appendix 80
A.1 True Formal-Informal wage gap: Significance test 80
A.2 Wage gap decomposition for each quantile across years 82
References 84
Chapter 3. RBC model of the Indian economy with formal informal sector linkages 89
1 Introduction 89
2 Literature review 96
2.1 Asset market segmentation 96
2.2 Goods market segmentation 100
2.3 Labour market segmentation 102
3 Model/Equations 104
3.1 Households 104
3.1.1 Formal Households 104
3.1.2 Informal Households 110
3.2 Firms 114
3.2.1 Formal Sector firms 114
3.2.1.1 Manufacturing firms 114
3.2.1.2 High-end services firms 115
3.2.2 Informal Sector firms 116
3.2.2.1 Low-end services firms 116
3.2.2.2 Agriculture firms 117
3.3 Resource constraints 118
4 Quantitave analysis/results 119
4.1 Calibration 119
4.1.1 Description of parameters 119
4.2 Results 123
4.2.1 Single Period Positive Productivity Shock in the Agriculture Sector 126
4.2.2 Single Period Positive Productivity Shock in the Manufacturing Sector 130
4.2.3 Single Period Positive Productivity Shock in the High-end services Sector 133
5 Conclusion 136
6 Chapter 3 Appendix 138

A.1 Formal households - First-order conditions 138
A.2 Informal households - First-order conditions 139
A.3 Manufacturing firms - First-order conditions 140
A.4 High-end services firms - First-order conditions 141
A.5 Low-end services firms - First-order conditions 142
A.6 Single Period Positive Productivity Shock in the Agriculture Sector 144
A.7 Single Period Positive Productivity Shock in the Manufacturing Sector 145
A.8 Single Period Positive Productivity Shock in the High-end services Sector 146
References 147

Figures

Figure 1.1. Country wise share of informal employment in non-agricultural sector 15
Figure 2.1. Construction of Formal Counterfactual worker 32
Figure 2.2. Construction of Formal-Skilled Counterfactual worker and Formal-Unskilled Counterfactual worker 35
Figure 2.3. Percentage distribution of wage earners 42
Figure 2.4. Kernel Density Function Distributions for Formal and Informal workers 43
Figure 2.5. Kernel Density Function Distributions for Skilled and Unskilled workers 43
Figure 2.6. Percentage of workers with union membership 44
Figure 2.7. Wage gaps 52
Figure 2.8. Ratio of True F-IF to F-IF and True S-US to S-US wage gaps across quantiles 55
Figure 2.9. Wage gap across quantiles 56
Figure 2.10. Robustness check for Skilled-Unskilled wage gap 62
Figure 2.11. Degree of informality and skill gap for each quantile 68
Figure 2.12. Degree of informality and skill gap across quantiles 69
Figure 2.13. Comparing degree of informality and skill gap: State-wise 77
Figure 3.1. Model economy 93
Figure 3.2. Saving and borrowing behaviour 97
Figure 3.3. Savings behaviour 98
Figure 3.4. Borrowing behaviour 99
Figure 3.5. Food and non-food consumption of urban and rural households 101
Figure 3.6. Impact of a single period positive productivity shock in the agriculture sector 127
Figure 3.7. Impact of a single period positive productivity shock in the manufacturing sector 131
Figure 3.8. Impact of a single period positive productivity shock in the high-end services sector 134
Figure A1. Impact of a single period positive productivity shock in the agriculture sector 144

Figure A2. Impact of a single period positive productivity shock in the manufacturing sector 145
Figure A3. Impact of a single period positive productivity shock in the high-end services sector 146

Tables

Table 1.1. Employment share in India 15
Table 1.2. Gross Value-Added share in India.....15
Table 1.3. Sector-wise Distribution of Workers (in percentages).....17
Table 2.1. Formal and informal sector and employment based on enterprise type and activity status.....39
Table 2.2. Status of Employment.....41
Table 2.3. Descriptive statistics 41
Table 2.4. Oaxaca-Blinder decomposition of Formal-Informal wage gap (All years) 51
Table 2.5. Wage gap decomposition across years: Summary.....52
Table 2.6. Wage gap decomposition for each quantile across years.....54
Table 2.7. Wage gap decomposition of Skilled workers 59
Table 2.8. Wage gap decomposition of Unskilled workers 60
Table 2.9. True Skilled-Unskilled wage gap.....60
Table 2.10. Skilled-Unskilled wage gaps: Robustness 62
Table 2.11. State-wise wage gap decomposition 1999-00.....73
Table 2.12. State-wise wage gap decomposition 2004-05.....74
Table 2.13. State-wise wage gap decomposition 2009-10.....75
Table 2.14. State-wise wage gap decomposition 2011-12.....76
Table A.1. Wage gap decomposition across quantiles: 1999-00 82
Table A.2. Wage gap decomposition across quantiles: 2004-05 82
Table A.3. Wage gap decomposition across quantiles: 2009-10 83
Table A.4. Wage gap decomposition across quantiles: 2011-12 83
Table 3.1. Sector-wise Distribution of Workers 91
Table 3.2. Employment share 93
Table 3.3. Share in Gross Value Added.....93
Table 3.4. Saving and borrowing behaviour in India in 2017.....100
Table 3.5. Variables used in the model.....105
Table 3.6. Households expenditure share on consumption.....120
Table 3.7. Values of parameters.....122
Table 3.8. Steady state - 4 sector economy compared to 1 sector economy.....124
Table 3.9. Steady state values 125

6 Appendix

A1. Formal households - First-order conditions:
The first-order conditions(in terms of the shadow price) is given by:

$$\frac{\partial \mathcal{L}}{\partial C^A_{F,t}} : \frac{U^F_{C^A,t}}{P^A, t} = \lambda_{F,t} \tag{F1}$$

$$\frac{\partial \mathcal{L}}{\partial C^B_{F,t}} : \frac{U^F_{C^B,t}}{P^B, t} = \lambda_{F,t} \tag{F2}$$

$$\frac{\partial \mathcal{L}}{\partial C^S_{F,t}} : \frac{U^F_{C^S,t}}{P^S, t} = \lambda_{F,t} \tag{F3}$$

$$\begin{aligned}
&\frac{\partial \mathcal{L}}{\partial H^B_t} : \frac{\partial U}{\partial L^F_t}\frac{\partial L^F_t}{\partial H^B_t} + \lambda_{F,t} W^B_t = 0 \\
&\implies -U^F_{L,t} + \lambda_{F,t} W^B_t = 0 \\
&\implies \frac{U^F_{L,t}}{W^B_t} = \lambda_{F,t}
\end{aligned} \tag{F4}$$

$$\begin{aligned}
&\frac{\partial \mathcal{L}}{\partial H^S_t} : \frac{\partial U}{\partial L^F_t}\frac{\partial L^F_t}{\partial H^S_t} + \lambda_{F,t} W^S_t = 0 \\
&\implies -U^F_{L,t} + \lambda_{F,t} W^S_t = 0 \\
&\implies \frac{U^F_{L,t}}{W^S_t} = \lambda_{F,t}
\end{aligned} \tag{F5}$$

$$\begin{aligned}
&\frac{\partial \mathcal{L}}{\partial K^R_t} : -\lambda_{F,t} P^R_t + \rho E_t \lambda_{F,t+1}[R n^R_t + (1-\delta^R) P^R_{t+1}] = 0 \\
&\implies \lambda_{F,t} P^R_t = \rho E_t \lambda_{F,t+1}[R n^R_t + (1-\delta^R) P^R_{t+1}]
\end{aligned} \tag{F6}$$

A2. Informal households - First-order conditions:
The first-order conditions(in terms of the shadow price) is given by:

$$\frac{\partial \mathcal{L}}{\partial C^A_{I,t}} : \frac{U^I_{C^A,t}}{P^A, t} = \lambda_{I,t} \tag{I1}$$

$$\frac{\partial \mathcal{L}}{\partial C^B_{I,t}} : \frac{U^I_{C^B,t}}{P^B, t} = \lambda_{I,t} \tag{I2}$$

$$\begin{aligned}
&\frac{\partial \mathcal{L}}{\partial H^A_t} : \frac{\partial U}{\partial L^I_t}\frac{\partial L^I_t}{\partial H^A_t} + \lambda_{I,t} W^A_t = 0 \\
&\implies -U^I_{L,t} + \lambda_{I,t} W^A_t = 0 \\
&\implies \frac{U^I_{L,t}}{W^A_t} = \lambda_{I,t}
\end{aligned} \tag{I3}$$

$$\begin{aligned}
&\frac{\partial \mathcal{L}}{\partial H^U_t} : \frac{\partial U}{\partial L^I_t}\frac{\partial L^I_t}{\partial H^U_t} + \lambda_{I,t} W^U_t = 0 \\
&\implies -U^I_{L,t} + \lambda_{I,t} W^U_t = 0 \\
&\implies \frac{U^I_{L,t}}{W^U_t} = \lambda_{I,t}
\end{aligned} \tag{I4}$$

$$\begin{aligned}
&\frac{\partial \mathcal{L}}{\partial K^B_t} : -\lambda_{I,t} P^B_t + \rho E_t \lambda_{I,t+1}[R n^B_t + (1-\delta^B) P^B_{t+1}] = 0 \\
&\implies \lambda_{I,t} P^B_t = \rho E_t \lambda_{I,t+1}[R n^B_t + (1-\delta^B) P^B_{t+1}]
\end{aligned} \tag{I5}$$

A3. Manufacturing firms - First-order conditions:

The production function of the manufacturing firm is given by:

$$Y_t^B = A_t^B (H_t^B)^{\Gamma} (K_{t-1}^R)^{1-\Gamma} \tag{M1}$$

The firm maximizes its profits:

$$\pi_t^B = P_t^B Y_t^B - W_t^B H_t^B - R n_{t-1}^R K_{t-1}^R \tag{M2}$$

The first-order conditions is given by:

From the profit function we have:

$$\frac{\partial \pi_t^B}{\partial H_t^B} : P_t^B f_{H^B}(A_t^B, H_t^B, K_{t-1}^R) - W_t^B = 0$$

$$\implies f_{H^B}(A_t^B, H_t^B, K_{t-1}^R) = \frac{W_t^B}{P_t^B} \tag{M3}$$

$$\frac{\partial \pi_t^B}{\partial K_{t-1}^R} : P_t^B f_{K^R}(A_t^B, H_t^B, K_{t-1}^R) - R n_{t-1}^R = 0$$

$$\implies f_{K^R}(A_t^B, H_t^B, K_{t-1}^R) = \frac{R n_{t-1}^R}{P_t^B} \tag{M4}$$

From the production function we have:

$$f_{H^B}(A_t^B, H_t^B, K_{t-1}^R) = \frac{\partial Y_t^B}{\partial H_t^B} = \Gamma A_t^B (H_t^B)^{\Gamma-1} (K_{t-1}^R)^{1-\Gamma}$$

$$\implies f_{H^B}(A_t^B, H_t^B, K_{t-1}^R) = \frac{\Gamma A_t^B (H_t^B)^{\Gamma-1} (K_{t-1}^R)^{1-\Gamma}}{H_t^B} = \frac{\Gamma Y_t^B}{H_t^B} \tag{M5}$$

$$f_{K^R}(A_t^B, H_t^B, K_{t-1}^R) = \frac{\partial Y_t^B}{\partial K_{t-1}^R} = (1-\Gamma)A_t^B(H_t^B)^{\Gamma}(K_{t-1}^R)^{-\Gamma}$$

$$\implies f_{K^R}(A_t^B, H_t^B, K_{t-1}^R) = \frac{(1-\Gamma)A_t^B(H_t^B)^{\Gamma}(K_{t-1}^R)^{1-\Gamma}}{K_{t-1}^R} = \frac{(1-\Gamma)Y_t^B}{K_{t-1}^R} \tag{M6}$$

A4. High-end services firms - First-order conditions:
The production function of the high-end services firm is given by:

$$Y_t^S = A_t^S(H_t^S)^{\eta}(Y_t^U)^{1-\eta} \tag{S1}$$

The firm maximizes its profits:

$$\pi_t^S = P_t^S Y_t^S - W_t^S H_t^S - P_t^U Y_t^U \tag{S2}$$

The first-order conditions is given by:

From the profit function we have:

$$\frac{\partial \pi_t^S}{\partial H_t^S} : P_t^S g_{H^S}(A_t^S, H_t^S, Y_t^U) - W_t^S = 0$$

$$\implies g_{H^S}(A_t^S, H_t^S, Y_t^U) = \frac{W_t^S}{P_t^S} \tag{S3}$$

$$\frac{\partial \pi_t^S}{\partial Y_t^U} : P_t^S f_{Y^U}(A_t^S, H_t^S, Y_t^U) - P_t^U = 0$$

$$\implies g_{Y^U}(A_t^S, H_t^S, Y_t^U) = \frac{P_t^U}{P_t^S} \tag{S4}$$

From the production function we have:

$$g_{H^S}(A_t^S, H_t^S, Y_t^U) = \frac{\partial Y_t^S}{\partial H_t^S} = \eta A_t^S (H_t^S)^{\eta-1} (Y_t^U)^{1-\eta}$$

$$\implies g_{H^S}(A_t^S, H_t^S, Y_t^U) = \frac{\eta A_t^S (H_t^S)^{\eta-1} (Y_t^U)^{1-\eta}}{H_t^S} = \frac{\eta Y_t^S}{H_t^S} \tag{S5}$$

$$g_{Y^U}(A_t^S, H_t^S, Y_t^U) = \frac{\partial Y_t^S}{\partial Y_t^U} = (1-\eta) A_t^S (H_t^S)^{\eta} (Y_t^U)^{-\eta}$$

$$\implies g_{Y^U}(A_t^S, H_t^S, Y_t^U) = \frac{(1-\eta) A_t^S (H_t^S)^{\eta} (Y_t^U)^{1-\eta}}{Y_t^U} = \frac{(1-\eta) Y_t^S}{Y_t^U} \tag{S6}$$

A5. Low-end services firms - First-order conditions:
The production function of the low-end services firm is given by:

$$Y_t^U = A_t^U (H_t^U)^{\gamma} (K_{t-1}^B)^{1-\gamma} \tag{L1}$$

The firm maximizes its profits:

$$\pi_t^U = P_t^U Y_t^U - W_t^U H_t^U - R n_{t-1}^B K_{t-1}^B \tag{L2}$$

The first-order conditions is given by:

From the profit function we have:

$$\frac{\partial \pi_t^U}{\partial H_t^U} : P_t^U j_{H^U}(A_t^U, H_t^U, K_{t-1}^B) - W_t^U = 0$$

$$\implies j_{H^U}(A_t^U, H_t^U, K_{t-1}^B) = \frac{W_t^U}{P_t^U} \tag{L3}$$

$$\frac{\partial \pi_t^U}{\partial K_{t-1}^B} : P_t^U f_{K^U}(A_t^U, H_t^U, K_{t-1}^B) - Rn_{t-1}^B = 0$$

$$\implies j_{K^B}(A_t^U, H_t^U, K_{t-1}^B) = \frac{Rn_{t-1}^B}{P_t^U} \tag{L4}$$

From the production function we have:

$$j_{H^U}(A_t^U, H_t^U, K_{t-1}^B) = \frac{\partial Y_t^U}{\partial H_t^U} = \gamma A_t^U (H_t^U)^{\gamma-1} (K_{t-1}^B)^{1-\gamma}$$

$$\implies j_{H^U}(A_t^U, H_t^U, K_{t-1}^B) = \frac{\gamma A_t^U (H_t^U)^{\gamma-1} (K_{t-1}^B)^{1-\gamma}}{H_t^U} = \frac{\gamma Y_t^U}{H_t^U} \tag{L5}$$

$$j_{K^B}(A_t^U, H_t^U, K_{t-1}^B) = \frac{\partial Y_t^U}{\partial K_{t-1}^B} = (1-\gamma) A_t^U (H_t^U)^{\gamma} (K_{t-1}^B)^{-\gamma}$$

$$\implies j_{K^B}(A_t^U, H_t^U, K_{t-1}^B) = \frac{(1-\gamma) A_t^U (H_t^U)^{\gamma} (K_{t-1}^B)^{1-\gamma}}{K_{t-1}^B} = \frac{(1-\gamma) Y_t^U}{K_{t-1}^B} \tag{L6}$$

$$\text{(L3) and (L5)} \implies \frac{\gamma A_t^U (H_t^U)^{\gamma-1} (K_{t-1}^B)^{1-\gamma}}{H_t^U} = \frac{W_t^U}{P_t^U} \tag{L7}$$

$$\text{(L4) and (L6)} \implies \frac{(1-\gamma) A_t^U (H_t^U)^{\gamma} (K_{t-1}^B)^{1-\gamma}}{K_{t-1}^B} = \frac{Rn_{t-1}^B}{P_t^U} \tag{L8}$$

A6. Single Period Positive Productivity Shock in the Agriculture Sector

In addition to the impulse response functions in figures 3.6-3.8, the below figures A1-A3 plots the impulse response functions of consumption-output ratios, investment-output ratios and capital output ratios, where $C_B^F/Y^B$is the ratio of formal households' consumables consumption to manufacturing output, C_B^I/Y^B is the ratio of informal households' consumables consumption to manufacturing output, $(C_B^F + C_B^I)/Y^B$ is the ratio of total consumables consumption to manufacturing output, similarly C_A^F/Y^A and C_A^I/Y^A is the ratio of formal and informal households' agriculture consumption to agriculture output respectively. The capital-output ratio graphs are plotted from period 2. K_1^R is the end of period 1 capital, used in the manufacturing sector in period 2, for producing Y_2^B, correspondingly the graph plots $\frac{P^R K_1^R}{P^B Y_2^B}$ in period 2, $\frac{P^R K_2^R}{P^B Y_3^B}$ in period 3, and so on. Similar logic applies to $\frac{P^B K^R}{P^U Y^U}$ graph.

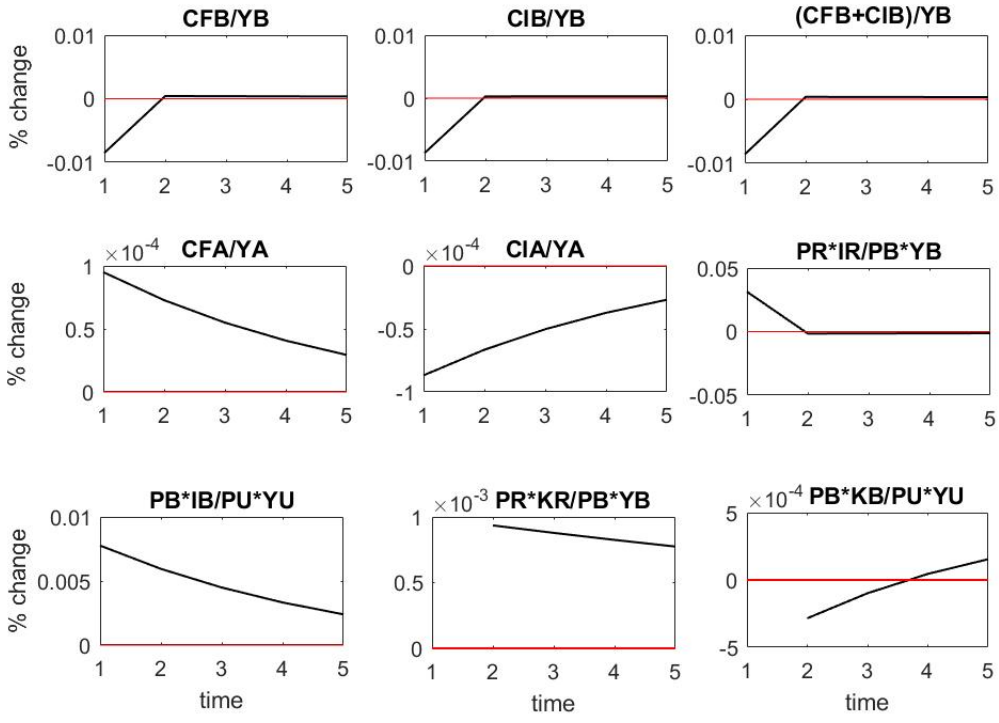

Figure A1. Impact of a single period positive productivity shock in the agriculture sector (A^A)

A7. Single Period Positive Productivity Shock in the Manufacturing Sector

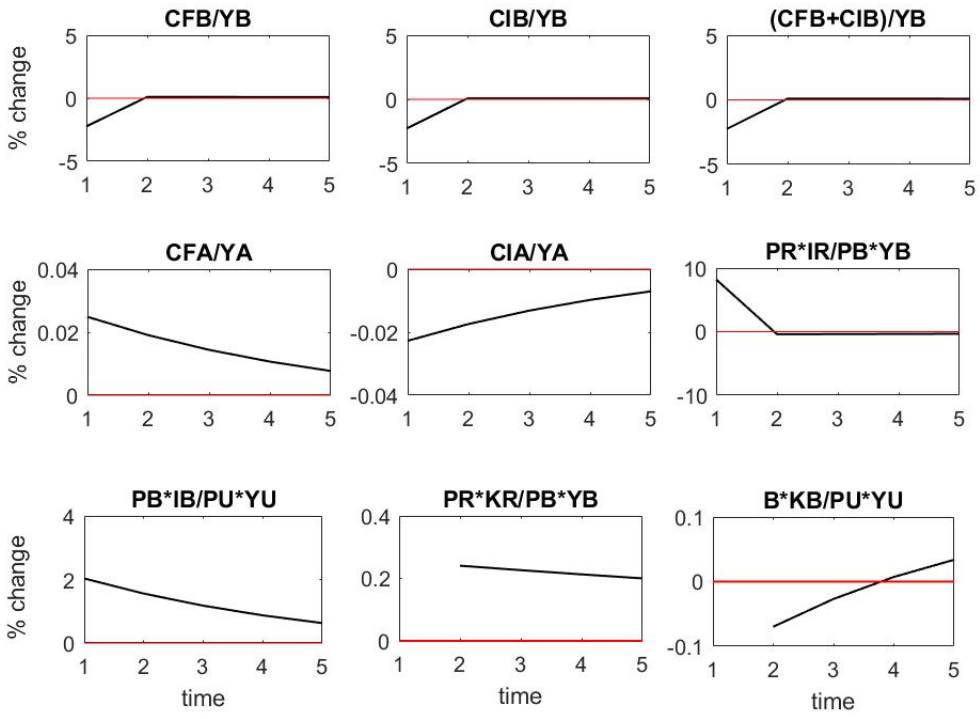

Figure A2. Impact of a single period positive productivity shock in the manufacturing sector (A^B)

A8. Single Period Positive Productivity Shock in the High-end services Sector

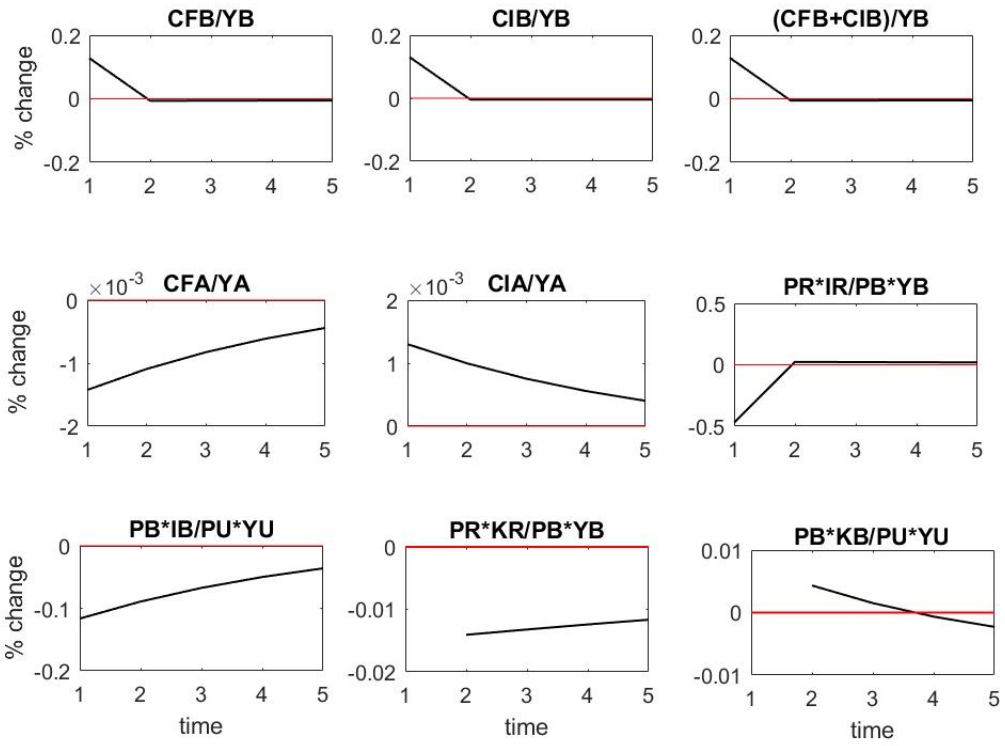

Figure A3. Impact of a single period positive productivity shock in the high-end services sector (A^S)

References

Alvarez, F., Atkeson, A., 1997. Money and exchange rates in the Grossman-Weiss-Rotemberg model. J. Monet. Econ. 40, 619–640.

Alvarez, F., Atkeson, A., Kehoe, P.J., 2002. Money , Interest Rates , and Exchange Rates with Endogenously Segmented Markets. J. Polit. Econ. 110, 73–112.

Alvarez, F., Lucas, R., Weber, W., 2001. Interest Rates and Inflation. Am. Econ. Rev. 91, 219–225.

Anand, R., Das, S., Khera, P., 2016. Monetary Policy Transmission in the Presence of Product and Labor Market Frictions: The Case of India, in: Ghate, C., Kletzer, K.M. (Eds.), Monetary Policy in India: A Modern Macroeconomic Perspective. Springer, New Delhi, pp. 151–169.

Basole, A., 2018. State of working India. Cent. Sustain. Employment, Azim Premji Univ.

Batini, N., Kim, Y., Levine, P., Lotti, E., 2010. Informal labour and credit markets: A survey. Int. Monet. Fund 10.

Batini, N., Levine, P., Yang, B., Lotti, E., 2011. Monetary and Fiscal Policy in the Presence of Informal Labour Markets. Natl. Inst. Public Financ. Policy, India 11.

Bhalla, G.S., Singh, G., 2012. Economic liberalisation and Indian agriculture: a district-level study. SAGE Publications India.

Bilbiie, F.O., 2008. Limited asset markets participation, monetary policy and (inverted) aggregate demand logic. J. Econ. Theory 140, 162–196.

Castillo, P., Montoro, C., 2010. Monetary policy in the presence of informal labour markets. No. 2010-009. Banco Central de Reserva del Perú, 2010. Banco Cent. Reserv. del Perú.

Chakrabarti, A.S., 2016. Inflationary effects of monetary policies in newly industrialized economies with cross-sectoral labor and capital immobility. J. Macroecon. 50, 151–167.

Chaurey, R., 2015. Labor regulations and contract labor use: Evidence from Indian firms. J. Dev. Econ. 114, 224–232.

Chen, M.A., 2007. Rethinking the Informal Economy: Linkages with the Formal Economy and the Formal Regulatory Environment. DESA Work. Pap. 1–17.

Cravino, J., Lan, T., Levchenko, A.A., 2020. Price stickiness along the income distribution and the effects of monetary policy. J. Monet. Econ. 110, 19–32.

Dabla-Norris, E., Koeda, J., 2008. Informality and bank credit : evidence from firm-level data. IMF Work. Pap. WP/08/94 1–39.

Fuerst, T.S., 1992. Liquidity, loanable funds, and real activity. J. Monet. Econ. 29, 3–24.

Gabriel, V., Levine, P., Yang, B., 2016. An Estimated DSGE Open-Economy Model of the Indian Economy with Financial Frictions, in: Ghate, C., Kletzer, K. (Eds.), Monetary Policy in India: A Modern Macroeconomic PerspectiveA Modern Macroeconomic Perspective. Springer, New Delhi.

Gabriel, V.J., Levine, P., Yang, B., 2010. An Estimated DSGE Model of the Indian economy. Discuss. Pap. Univ. Surrey.

Galí, J., 2018. The state of new keynesian economics: A partial assessment. J. Econ. Perspect. 32, 87–112.

Ghate, C., Gupta, S., Mallick, D., 2018. Terms of Trade Shocks and Monetary Policy in India. Comput. Econ. 51, 75–121.

Goyal, A., 2011. A general equilibrium open economy model for emerging markets: Monetary policy with a dualistic labor market. Econ. Model. 28, 1392–1404.

Kaplan, G., Moll, B., Violante, G.L., 2018. Monetary policy according to HANK. Am. Econ. Rev. 108, 697–743.

Kapoor, R., Krishnapriya, P.P., 2017. Informality in the Formal Sector: Evidence from Indian Manufacturing. Int. Growth Centre. Work. Pap.

La Porta, R., Shleifer, A., 2014. Informality and Development. J. Econ. Perspect. 28, 109–126.

Lahiri, A., Singh, R., Vegh, C.A., 2004. Optimal monetary policy under asset market segmentation. Univ. Br. Columbia.

Lucas, R.E., 1990. Liquidity and Interest Rates. J. Econ. Theory 50, 237–264.

Mehrotra, S., Parida, J., Gandhi, A., 2014. Explaining Employment Trends in the Indian Economy: 1993-94 to 2011-12. Econ. Polit. Wkly. 49, 49–57.

Murthy, S.V.R., 2019. Measuring Informal Economy in India: Indian Experience, in: Ministry of Statistics and Programme Implementation, National Statistical Office, New Delhi. pp. 1–19.

Narayanan, A., 2015. Informal employment in India: Voluntary choice or a result of labor market segmentation? Indian J. Labour Econ. 58, 119–167.

Ngalawa, H.P.E., Viegi, N., 2013. Interaction of Formal and Informal Financial Markets in Quasi-Emerging Market Economies. Econ. Model. 31, 614–624.

Schneider, F., 2012. The Shadow Economy and Work in the Shadow: What Do We (Not) Know? IZA Discuss. Pap. 6423.

Straub, S., 2005. Informal sector: The credit market channel. J. Dev. Econ. 78, 299–321.

Turnovsky, S.J., Basher, M.A., 2009. Fiscal policy and the structure of production in a two-sector developing economy. J. Dev. Econ. 88, 205–216.

Williamson, S.D., 2008. Monetary Policy and Distribution. J. Monet. Econ. 55, 1038–1053.

Woodford, M., 2010. Optimal monetary stabilization policy. Handb. Monet. Econ. 3, 723–828.

Woodford, M., 2003. Interest and prices :Foundations of a theory of monetary.