

Aggregate and Welfare Effects of Redistribution of Wealth Under Inflation and Price-Level Targeting

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2008 New Perspectives on Monetary Policy Design

Barcelona

October 9, 2008

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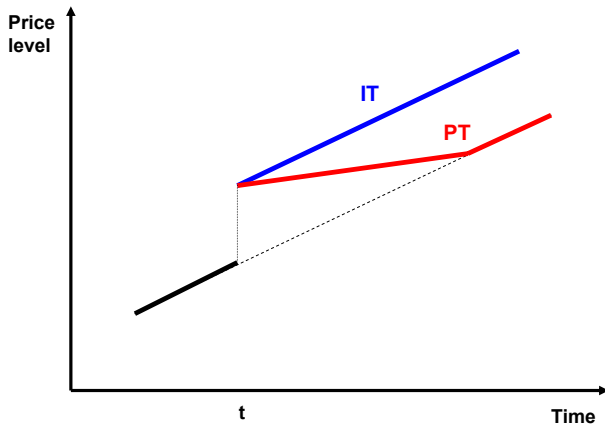
Introduction

- The main difference is that under inflation targeting (**IT**) past “mistakes” are ignored and under price-level targeting (**PT**) they are corrected.
- An unexpected surge in the price level has no effect on inflation expectations or in the subsequent inflation path for that matter under **IT** while it implies a reduction in inflation expectations under **PT**.

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Price Level Path under **IT** and **PT**



Questions

- 1 What are the redistributive effects of inflation that arise from the revaluation of nominal assets and liabilities under **IT** and **PT**?
- 2 What are the aggregate and welfare implications of these redistributive shocks under **IT** and **PT**?

Putting the question in context

- Many studies have examined important issues regarding **IT** and **PT** (eg., Gaspar et al. (2007) and Svensson (1999)). But they have omitted
Many studies omit redistributive effects of inflation under **IT** and **PT**.
- We know from the work of Doepke and Schneider (2006) and that of Meh and Terajima (2007) that inflation has large redistributive consequences.

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Redistribution Mechanism: **IT/PT** and *Term-to-Maturity*

- Unexpected rise in price level lowers real value of nominal assets and liabilities, thereby redistributes wealth from lenders to borrowers.
- Consider a one-time transitory inflation shock that moves the price level up.
- **IT**: no effect on inflation expectations and thus price level remains on its new path.
 - ◇ Shorter and longer term nominal claims are equally affected by price level changes.
- **PT**: central bank brings the price level back to its initial path.
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Findings

- Redistributive effects of inflation are significant and larger under **IT** than **PT**.
 - ▶ Winner: young workers
 - ▶ Losers: middle-aged workers, rich and old
- The effects of inflation on output are positive and larger under **IT** than under **PT**.
- Despite the positive effect on output, inflation reduces the weighted welfare of domestic households.
- Aggregate and welfare effects of inflation depend on fiscal policy.

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A look at the World: How to sort and what to look

- We think of 6 age groups; 3 classes: rich, middle-class, poor.
- We classify assets and liabilities into Short-term nominal assets, Long-term nominal assets and Real assets.
 - ▶ Short-term: Cash, Deposits, Credit cards
 - ▶ Long-term: Bonds, Pensions and Mortgages
 - ▶ Real: Durable, Indexed assets and liabilities
- In addition, we follow Doepke and Schneider (2006) in adjusting Equity to reflect the business sector's composition of assets.
- We we also deal with the government and foreign sectors. sector.
- Data: 2005 Survey of Financial Security (Statistics Canada)

Composition of Assets are Different: Households

SUMMARY

- Major nominal borrowers
 - ▶ Young poor and middle-class (mortgages)
- Major nominal lenders
 - ▶ Middle-aged rich (mortgages)
 - ▶ Old rich (long-term bonds)
 - ▶ Middle-aged/old middle-class (pensions)

Composition of Assets are Different: Households

Net Positions as % of Average Wealth in Each Household Group

	≤35	36-45	46-55	56-65	66-75	≥76
Rich						
Short-term	3.86	-3.73	-1.97	-2.36	8.48	8.56
Long-term	-6.52	5.89	18.40	19.89	19.03	21.26
Real	102.66	97.84	83.57	82.47	72.49	70.18
Middle Class						
Short-term	5.83	2.24	4.39	5.49	9.07	14.91
Long-term	-95.27	-28.71	7.01	20.55	20.29	18.97
Real	189.44	126.47	88.60	73.96	70.64	66.12
Poor						
Short-term	18.90	-0.06	5.04	13.84	12.58	10.96
Long-term	-71.01	-27.07	-8.30	6.89	1.57	12.79
Real	152.11	127.13	103.26	79.27	85.85	76.25

Composition of Assets are Different: Sectors

Data: 2005 National Balance Sheet Account (Statistics Canada)

<i>Sectors</i>	<i>Households</i>	<i>Government</i>	<i>Foreigners</i>
Short-term	12.25	-7.60	-4.65
Long-term	27.89	-35.39	7.49

A Simple Model (Needed to Assess Policies)

- Overlapping generations model of a small open economy.
- Agents live for I periods (retire at I^*) and can be one of $j \in \{1, \dots, J\}$ skill types with type specific endowment of efficient units of labour.
- Probability of surviving from age i to age $i + 1$ (trick to have shorter periods than length of life over 6)
- Preferences: $E \left\{ \sum_{i=1}^I \beta_j^{i-1} u_j(c_{i,j,t}, 1 - n_{i,j,t}) + \Psi_j(a_{I,j,t}) \right\}$.

Agents derive utility from consumption, leisure and bequests (“warm-glow”). and choose them optimally.

The BIG Caveat

- We assume, however, that the composition of assets is exogenously determined and depends on age and skill:
 - α_{ij}^s : share of assets held in short-term nominal form for type ij
with nominal rate of return = $(1 + \bar{\pi})$
 - α_{ij}^ℓ : share held in long-term nominal form for type ij
with nominal rate of return = $(1 + \bar{\pi})(1 + \bar{r})$
 - α_{ij}^r : share held in real assets for type ij
with real rate of return = $(1 + \bar{r})$

So the Policies Matter

- With an inflation shock of z , rates of return will be discounted by:
 - $\left(\frac{1}{1+z}\right)$ under both **IT** and **PT** for short-term nominal assets
 - $\left(\frac{1}{1+z}\right)$ only under **IT** for long-term nominal assets

Closing the Model

- Aggregate Cobb-Douglas production: $F(N_t, K_t) = K_t^\alpha N_t^{1-\alpha}$
- Foreigners borrow and lend in the domestic market.
- Government taxes labour income and issues government debt to finance government expenditure, interest payments and transfers to old. There is a need to specify the fiscal policy associated to the inflation shock.
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Commercial

- Unlike many papers on monetary policy that HIDE the implied fiscal adjustments by assuming a lump sum tax that deems it inexistent, we explore the set of typical adjustments. This is important because of redistribution.

Return

Mapping the Model to Data

- Calibrate the model to Canadian economy
- Households differ in patience, ability and laziness:
 - ▶ Discount factors (β 's): average wealth by class
 - ▶ Relative weight on leisure: average work hours of 40% for each type
 - ▶ Labour productivity: estimation from the panel data
 - ▶ Survival rates: fraction of retirees to be 17%
- Government:
 - ▶ Labour income tax rate: tax revenue of 32% of GDP
 - ▶ Retirement transfer: average transfer of 12.51% of GDP per HH
 - ▶ Government debt: debt to GDP ratio of 56.45%

Experiment: Redistribution Under **IT** and **PT**

- We use the 2005 composition of assets and liabilities of Canadian households, government and foreign sector.
- We assume **6-year horizon** to correct the price level under PT.

Redistribution of Wealth Across Sectors under **IT** and **PT** After a 1% Inflation Shock as a % of GDP

- Winners: Government (net borrowers)
- Losers: Households (net lenders)
- Gains and losses are larger under **IT** than under **PT**.

	Household	Government	Foreign
IT	-0.40	0.43	-0.03
PT	-0.15	0.14	0.01

Redistribution of Wealth Across Households After 1% Inflation Shock under **IT** as % of Group Net Worth

- Young poor/middle-class are major winners due to large mortgage.
- Old and rich are losing because of bonds and pensions.
- Middle-aged is also losing significantly.

Age cohort	≤ 35	36-45	46-55	56-65	66-75	≥ 76
Rich	0.03	-0.02	-0.16	-0.17	-0.27	-0.30
Middle	0.89	0.26	-0.11	-0.26	-0.29	-0.34
Poor	0.52	0.27	0.03	-0.21	-0.14	-0.24

Redistribution of Wealth Across Households After 1% Inflation Shock under **PT** as % of Group Net Worth

- The gains and losses from inflation are smaller under **PT** than **IT**.

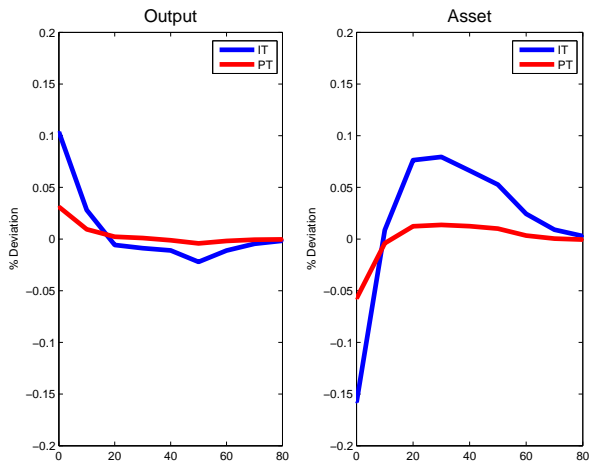
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Middle	0.19	0.07	-0.01	-0.07	-0.12	-0.19
Poor	0.03	0.06	-0.01	-0.13	-0.11	-0.13

Experiment: Aggregate and Welfare Implications

- We model inflation as an unanticipated zero-sum redistribution of real wealth that displaces the economy from its initial steady state.
- In the baseline, the government uses its windfall gain from the price level increase to cut labour taxes.
- We also consider other fiscal policy scenarios such as transfer to old and lump sum transfer to all households.

Output Changes under **IT** and **PT** After a 1% Shock

- Positive initial effects on output (4 times larger under **IT**)



Initial Output and Welfare Effects Under **IT** and **PT** for Different Fiscal Policy Scenarios

- The effects on output are larger for tax cut under both regimes
- With transfer to old, inflation is welfare improving (more so under **IT**)

Policies	Output		Welfare	
	IT	PT	IT	PT
Tax Cut	0.330	0.082	-0.032	-0.035
Transfer to Old	0.099	0.038	0.185	0.043
Lump Sum Transfer	0.014	0.010	-0.033	-0.022

Conclusion

- We assess quantitatively the redistributive effects of inflation that arise from the revaluation of nominal assets and liabilities under **IT** and **PT** in Canada
- Using a heterogeneous agents model we quantify the aggregate and welfare implications of redistributive effects of inflation under **IT** and **PT**

Conclusion

- Larger redistributions under **IT** than **PT**
 - ▶ Winners: Young workers
 - ▶ Losers: Middle-aged workers, rich and old
- Positive effects on output and larger under **IT** than under **PT**
- Negative average welfare effect with tax cut fiscal policy
- Aggregate and welfare effects of inflation depend on fiscal policy.

Real Real Conclusions

- We desperately need
 - A theory of portfolio choice: Why some long, some short, some nominal some real.
 - Of course a theory about the hardships of shifting savings into investment. What is so hard.

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