Downward Nominal Wage Rigidity in Canada: Evidence against a 'Greasing Effect'

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Downward Nominal Wage Rigidity

Motivation

- For a variety of reasons workers as well as firms are often reluctant to lower wages in response to poor labour-market conditions.
- As a result, DNWR *could* cause labour-market corrections occur disproportionately through the employment margins rather than through reduced wages.
- These downward nominal wage rigidities (DNWR) have been identified as a justification for positive inflation targets.

Main Questions

Questions

- To what extend does DNWR explain the joint dynamics of unemployment and wage inflation in Canada?
- Do higher inflation targets cause a 'Greasing Effect' in the short run?

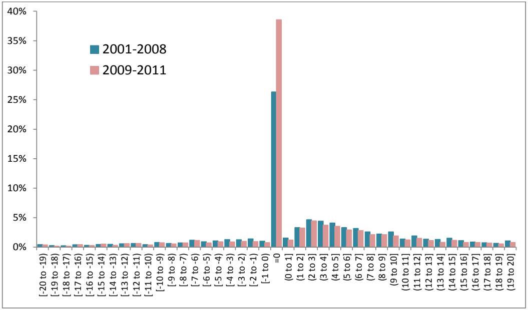
Answers

- Evidence of DNWR in Canada. DNWR helps explain the joint dynamics of unemployment and wage inflation during the Great Recession.
- Higher inflation targets *do not* shorten the overall recovery time nor attenuate the response of unemployment.

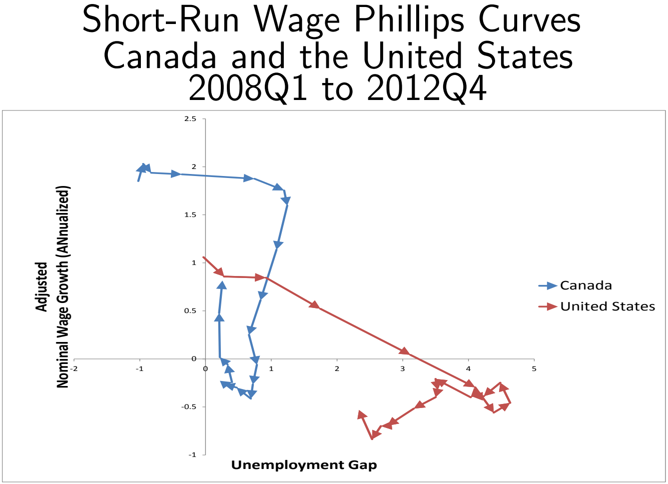
Downward Nominal Wage Rigidity

DNWR in Canada

- Brouillete, D., Kostyshyna O. and N. Kyui, (2015a)
    - Evidence suggests that DNWR increased in Canada during the Great Recession.



Downward Nominal Wage Rigidity



Model

Model Framework

- DGE model with DNWR by Daly and Hobijn (2014).
- Each period a random fraction λ of workers will be unable to adjust wages downward (if required).
- The household is populated by members with a variety of costlessly differentiable labour types.
- Agents are forward looking and make optimal wage setting decisions in response to:
    - Aggregate shocks: Productivity and Preference shocks
    - Idiosyncratic shocks: Labour disutility shock
- Goods production is perfectly competitive

Households

Households Lifetime Utility

$$\sum_{t=0}^{\infty} \beta^t e^{-\sum_{s=0}^{t-1} D_s} \left[\ln C_t - \frac{\gamma}{\gamma+1} \int_0^1 Z_{it} L_{it}^{\frac{\gamma+1}{\gamma}} di \right], \quad \gamma > 0$$

- C_t household consumption
- L_{it} labour supplied by member i of the household
- Z_{it} denotes the time dependent idiosyncratic disutility
  - where $ln(Z)$ is $N\left(-\frac{\sigma^2}{2}, \sigma\right)$ with $E(Z) = 1$.
- D_s is a preference shock, β subjective discount factor, γ the Frisch elasticity of labour supply

Household's budget constraint

$$B_t + P_t C_t = (1 + i_{t-1}) B_{t-1} + \int_0^1 W_{it} L_{it} di.$$

Firms

Production

$$Y_t = A_t L_t.$$

Production Technology $\quad A_t = (1 + a_t) A_{t-1}$

Aggregate Labour

$$L_t = \left[\int_0^1 L_{it}^{\frac{\eta-1}{\eta}} di \right]^{\frac{\eta}{\eta-1}}$$

Labour Demand Function

$$L_{it} = \left(\frac{W_t}{W_{it}} \right)^{\eta} L_t$$

Aggregate Wage Rate

$$W_t = \left[\int_0^1 \left(\frac{1}{W_{it}} \right)^{\eta-1} di \right]^{-\frac{1}{\eta-1}}$$

Downward Wage Rigidity

With DNWR, a fraction of the household members λ are unable to adjust wages downward ($w' \geq w$) when required

Household member i maximize

$$V_t(w) = (1-\lambda)\int_0^\infty \max_{w_{it}\geq 0}\left(\Omega(Z_{it}, w_{it}, L_t) + \beta e^{-D_t} V_{t+1}(w')\right) dF(Z_{it})$$

$$+\lambda \int_0^\infty \max_{w_{it}\geq w}\left(\Omega(Z_{it}, w_{it}, L_t) + \beta e^{-D_t} V_{t+1}(w')\right) dF(Z_{it}).$$

Where $F(Z_{it})$ denotes the distribution of the idiosyncratic disutility shock Z_{it}

$$\Omega(Z_{it}, w_{it}, L_t) = {w_{it}}^{1-\eta} - \frac{\gamma}{\gamma+1} Z_{it} {w_{it}}^{-\eta\frac{\gamma+1}{\gamma}} {L_t}^{\frac{\gamma+1}{\gamma}}$$

Detrended real wage in period $t+1$ is

$$w' = w_{it}/((1+\pi_{t+1})(1+a_{t+1}))$$

Downward Wage Rigidity

Labour supply

$$L_t = \left(\frac{\eta - 1}{\eta}\right)^{\frac{\gamma}{1+\gamma}} \left(\frac{1}{Z_t^*}\right)^{\frac{\gamma}{1+\gamma}}$$

Aggregate disutility

$$\begin{aligned} Z_t^* = \Bigg(& (1-\lambda)\int_0^\infty \left(\frac{1}{Z_{it}}\right)^{\frac{\gamma(\eta-1)}{\eta+\gamma}} \left(\frac{w_t^f(Z_{it})}{w_t^*(Z_{it})}\right)^{\eta-1} dF(Z_{it}) \\ & + \lambda \int_0^\infty \left(\frac{1}{Z_{it}}\right)^{\frac{\gamma(\eta-1)}{\eta+\gamma}} G_{t-1}\left(w_t^*(Z_{it})(1+\pi_t)(1+a_t)\right) \left(\frac{w_t^f(Z_{it})}{w_t^*(Z_{it})}\right)^{\eta-1} dF(Z_{it}) \\ & + \lambda \int_0^\infty \left(\frac{1}{Z_{it}}\right)^{\frac{\gamma(\eta-1)}{\eta+\gamma}} \left[\int_{w_t^*(Z_{it})}^\infty (1+\pi_t) g_{t-1}\left(w(1+\pi_t)(1+a_t)\right) \left(\frac{w_t^f(Z_{it})}{w_t^*(Z_{it})}\right)^{\eta-1} dw\right] dF(Z_{it}) \Bigg)^{-\frac{\eta+\gamma}{\gamma(\eta-1)}} \end{aligned}$$

where $G_t(w)$ is the distribution of real wages across workers

Monetary Policy

Taylor Rule

$$i_t = \frac{(1+\bar{\pi})(1+\bar{a})}{\beta} \left(\frac{y_t}{\bar{y}}\right)^{\phi^Y} \left(\frac{1+\pi_t}{1+\bar{\pi}}\right)^{1+\phi^\pi} - 1$$

- $\bar{\pi}$ and $\bar{a}$ are steady-state inflation and growth rates respectively.
- $\frac{y_t}{\bar{y}}$ is the output gap with ϕ^Y its weight.
- $\frac{1+\pi_t}{1+\bar{\pi}}$ is the inflation gap with $1+\phi^\pi$ its weight.
- $r_t = (1+i_t)/(1+\pi_{t+1}) - 1$

Calibration

Parameters	Function	Value
η	Labour demand elasticity	1.33
γ	Frisch elasticity of labour supply	0.5
β	Discount factor	0.9921
$\bar{\pi}$	Target inflation	0.005
ϕ^Y	Taylor rule parameter for the output gap	1
ϕ^π	Taylor rule parameter for the inflation gap	0.3
$\bar{a}$	Technological growth rate	0.005
σ	Standard deviation of the idiosyncratic disutility shock to labour	0.294
ϵ^D	Size of the demand shock	-0.0124
ρ^D	Persistence of the demand shock	0.95
λ	Calvo parameter for wages	(0.40, 0.70, 0.85, 0.99)

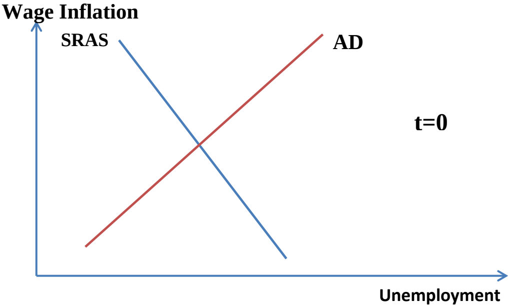
Results: Roadmap

Two Specific Questions:

1. To what extend does DNWR explain the joint dynamics of unemployment and wage inflation following an economic downturn in Canada?
2. Do higher inflation targets cause a 'Greasing Effect' in the short run?

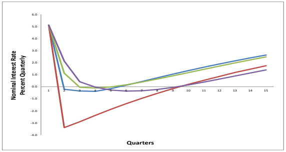
DNWR over the Business Cycle

Evolution of the SRAS and the AD Curve to a Negative Demand Shock

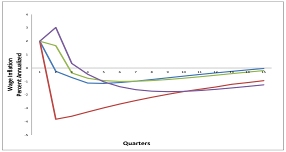


Impulse Response Functions

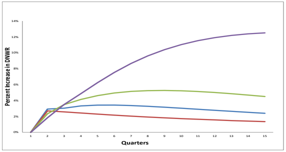
Negative Demand Shock



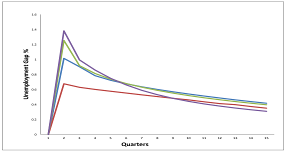
(a) Interest Rates (Annualized)



(b) Wage Inflation (Annualized)



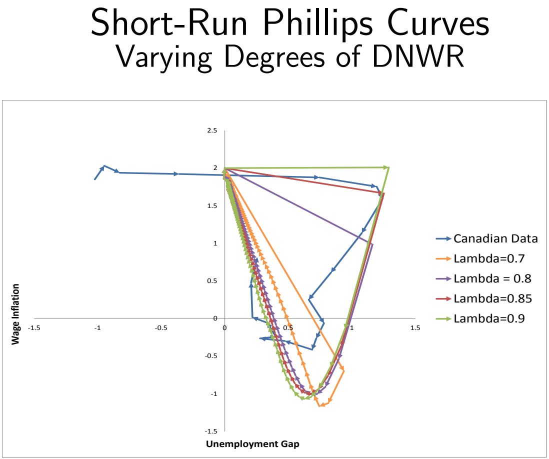
(c) Increase in the Percentage of Workforce Accepting a Nominal Wage Freeze



(d) Unemployment Gap

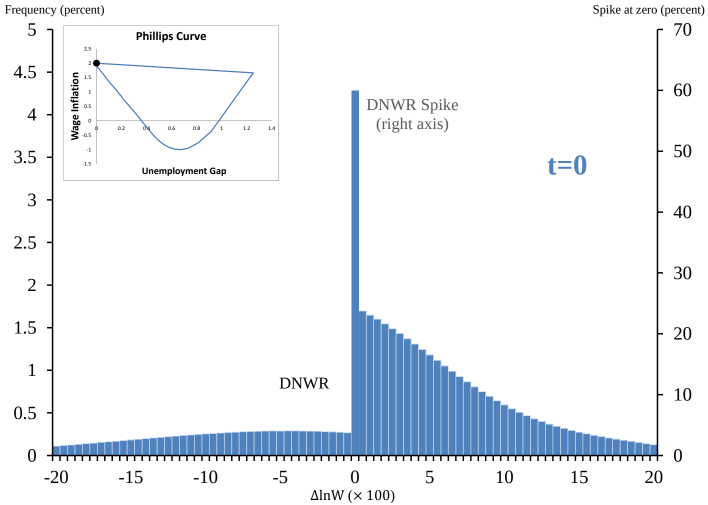
$$\lambda = (0.40,\ 0.70,\ 0.85,\ 0.99)$$

Response to a Negative Demand Shock



Response to a Negative Demand Shock

Wage Growth Distribution



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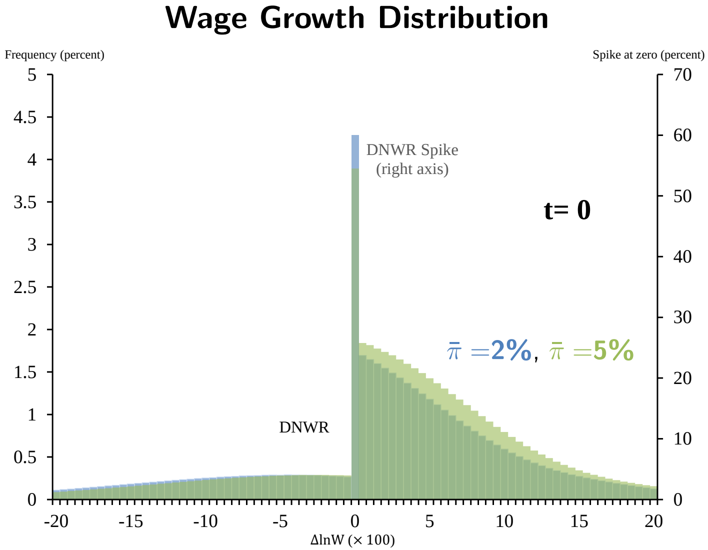

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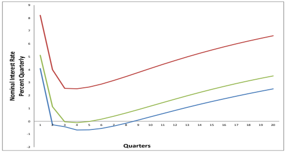

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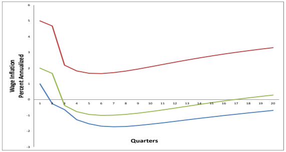

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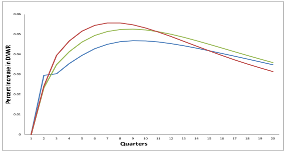

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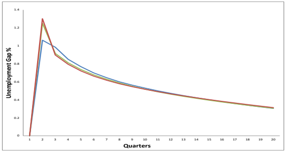

(d) Unemployment Gap

$$\bar{\pi} = (1\%, \quad 2\%, \quad 5\%)$$

Conclusion

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Answer

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