Monetary Policy and Dutch Disease: The Case of Sticky Prices and Wages.

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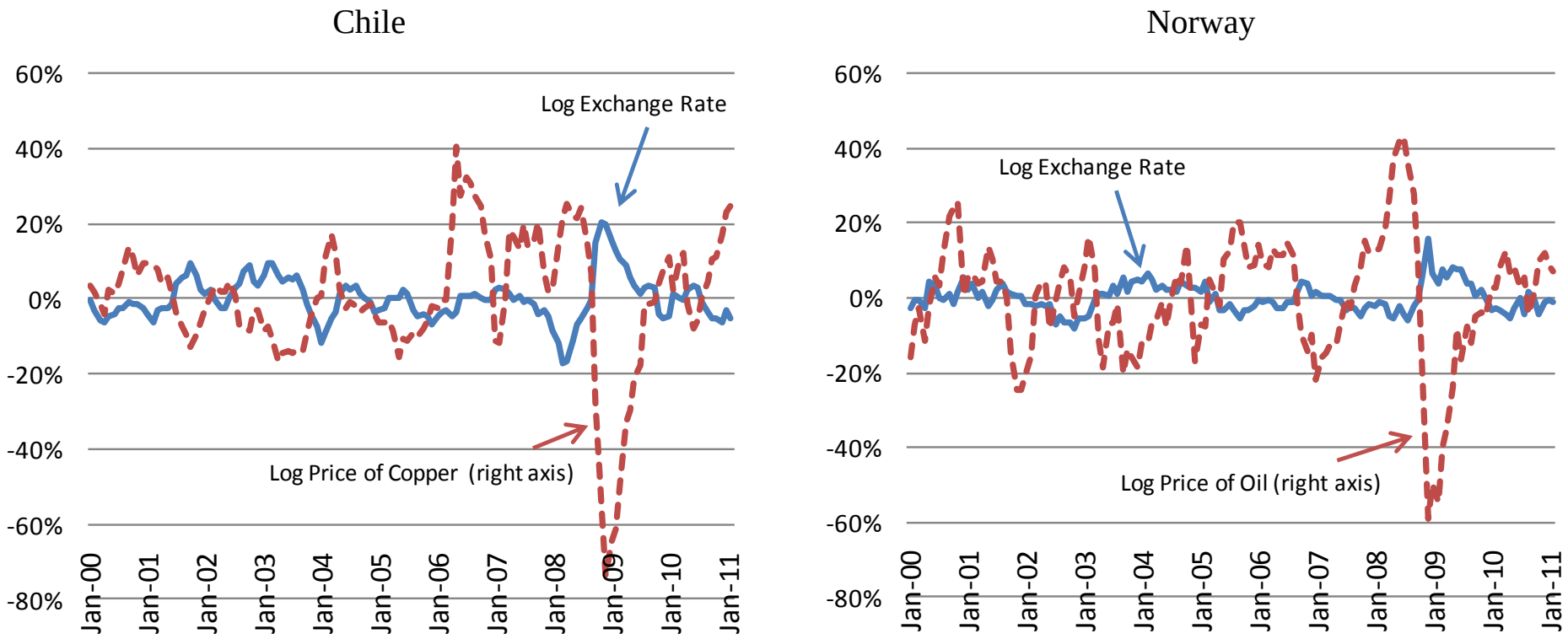
- Inflation Targeting regimes have been extremely successful.
- Inflation very close to target and very low volatility.
- Even during a period of large foreign shocks.
- Implication: exchange rate freely floats.
- Highly volatile nominal (and real) exchange rates. Correlated with commodity price. DD.

HP-Filtered Exchange Rate and Commodity Price

Data shown as percentage deviation from trend



Note: Series are first logged and then HP-filtered with a smoothing parameter of 14400

Summary Statistics Exchange Rate and Commodity Price

Data shown as percentage deviation from trend

	In US dollars		In Euros	
	Std. Deviation	Correlation	Std. Deviation	Correlation
Chile				
Exchange Rate	0.0506	-0.4729	0.0580	-0.5132
Price of Copper	0.1241		0.1266	
Norway				
Exchange Rate	0.0559	-0.5438	0.0316	-0.4332
Price of Oil	0.1459		0.1374	

Note: Data is first logged and then HP-filtered with a smoothing parameter of 14400

- Is this volatility inefficiently high?

- Chile intervened in 2008 and 2011. Justification: Copper Price too high, exchange rate too low.

- In a previous paper (Hevia and Nicolini (2013)) we studied a model of a SOE economy that exports commodities.

- The model can reproduce those volatilities and those correlations.

- Price stability is optimal for standard isoelastic preferences even if fiscal policy is unresponsive to shocks.

- The theoretical result fails if
  - Financial frictions (HN, work in progress).
  - Incomplete markets (Catao and Chang (2013))
  - Externalities in manufacturing (Hevia, Neumeyer, Nicolini, work in progress).
  - Add sticky wages (This paper)

The Model

- Discrete time, stochastic, cashless economy.
- Monetary policy.
- Fiscal policy: payroll tax on the wage bill paid by firms, τ_t^p.
- Complete markets.

Preferences:

$$E_0 \sum_{t=0}^{\infty} \beta^t U\left(C_t, L_t\right),$$

$$L_t = 1 - \int_0^1 n_{ht} dh.$$

$$N_t = \left[\int_0^1 n_{ht}^{\frac{\theta^w - 1}{\theta^w}} dh\right]^{\frac{\theta^w}{\theta^w - 1}}, \ \theta^w > 1.$$

- The demand for n_{ht} is

$$n_{ht} = \left(\frac{w_{ht}}{W_t} \right)^{-\theta^w} N_t,$$

- Wages are set as in Calvo (1983), the probability of being able to revise the wage $1 - \alpha^w$.

Final good firms

$$Y_t^h = \left[\int_0^1 y_{it}^{\frac{\theta^p - 1}{\theta^p}} di \right]^{\frac{\theta^p}{\theta^p - 1}}, \theta^p > 1$$

- Cost minimization

$$y_{it} = Y_t^h \left(\frac{P_{it}^h}{P_t^h} \right)^{-\theta^p}$$

- Prices are set as in Calvo (1983), $1 - \alpha^p$ is the probability to change prices.

Commodities sector

- Commodity z is imported, x is produced

$$X_t = A_t \left(n_t^x\right)^{\rho} E^{1-\rho},$$

- Law of one price

$$P_t^x = S_t P_t^{x*}, \quad P_t^z = S_t P_t^{z*}.$$

- Profit maximization

$$\rho S_t P_t^{x*} A_t \left(n_t^x\right)^{\rho-1} = W_t(1+\tau_t^p).$$

Intermediate good firms

- Technology is Cobb-Douglas, so

$$MC_t = \frac{\left(P_t^x\right)^{\eta_1}\left(P_t^z\right)^{\eta_2} W_t^{\eta_3}}{Z_t}.$$

- Using the solution for factor prices

$$MC_t = S_t \frac{\left(P_t^{x*}\right)^{\eta_1+\eta_3}\left(P_t^{z*}\right)^{\eta_2} A_t^{\eta_3}\left(\rho\left(n_t^x\right)^{\rho-1}\right)^{\eta_3}}{Z_t}.$$

- Note the exponent on P_t^{x*}.

Fiscal and monetary policies

- A flexible pair S_t, τ_t^p can jointly stabilize P_t and W_t.

- Domestic prices are proportional to marginal cost so $P_t = P$ implies

$$MC = S_t \frac{(P_t^{x*})^{1-\eta_2} (P_t^{z*})^{\eta_2} (\rho A_t (n_t^x)^{\rho-1})^{\eta_3}}{Z_t},$$

  so the S_t moves to absorb shocks.

- Delivers the negative correlation between S_t and P_t^{x*}.

- Solve for the nominal exchange rate, and use in the wage condition

$$\rho^{1-\eta_3} MC \left(\frac{P_t^{x*}}{P_t^{z*}} \right)^{\eta_2} Z_t \left[A_t \left(n_t^x \right)^{(\rho-1)} \right]^{(1-\eta_3)} = W_t (1 + \tau_t^p)$$

- So, to stabilize wages, the payroll tax must move.

- If fiscal policy **cannot** be jointly used with monetary policy, there is a trade off.

- The numerical analysis follows.

Numerical analysis.

- We completely abstract from implementation. Policy can set a nominal variable.

- We first consider a "fear of floating" regime, so

$$d \ln S_t = -\upsilon d \ln MC_t^*.$$

- $\upsilon = 1$, implies pure inflation targeting, while $\upsilon = 0$ implies a peg.

- We use the quadratic approximation methods of Schmitt-Grohe and Uribe (2004).

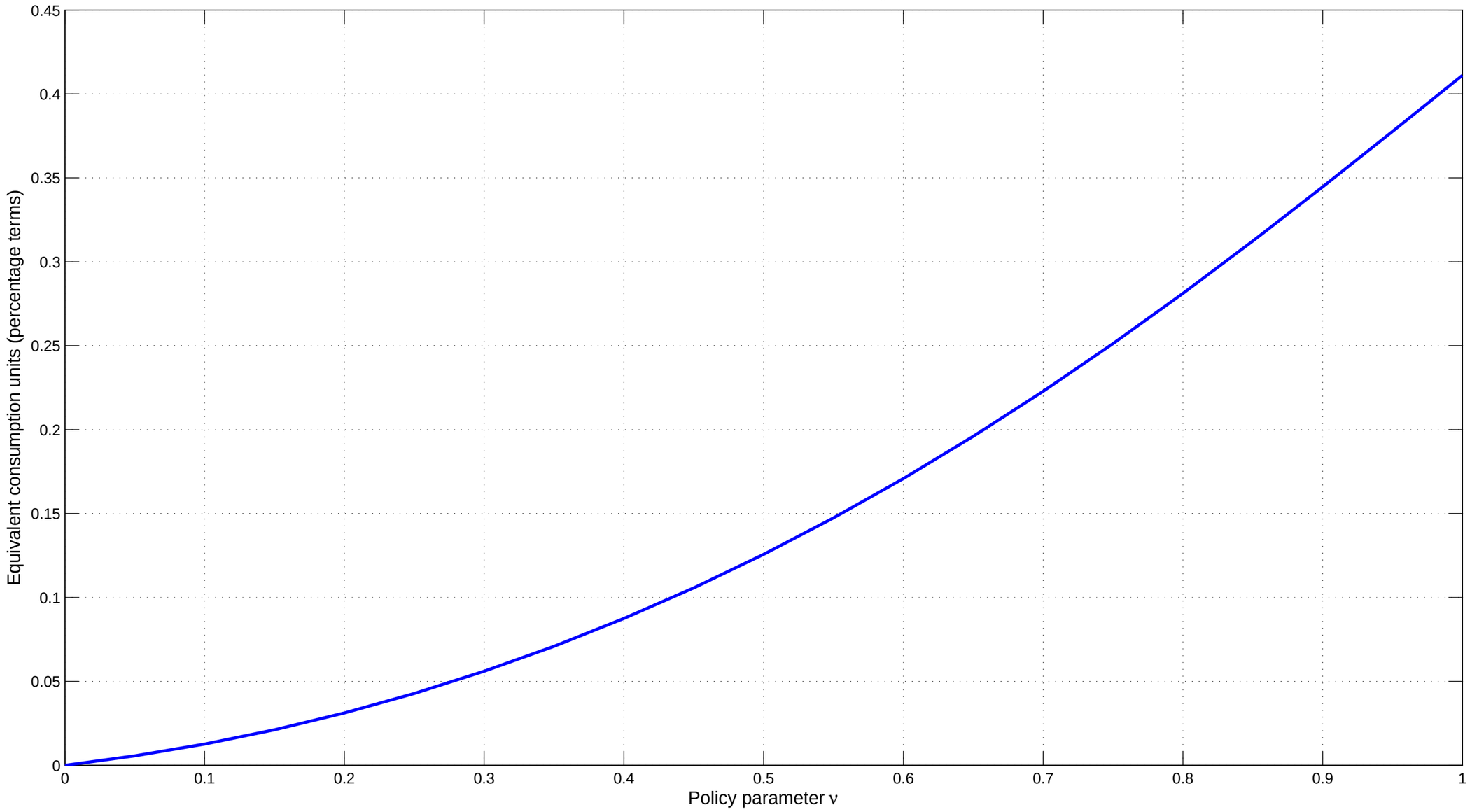
- We estimated an autoregressive process for P_t^{x*} and shut down all other shocks.

- We set $\alpha^p = 0.5$, $\alpha^w = 0.85$. (Christiano, Eichenbaum and Rebelo (2011)).

- Most of the other parameter values are from Neumeyer-Perri (used in Hevia and Nicolini (2013)).

Table X. Baseline parameters

Parameter	Description	Value
β	Discount factor (utility)	0.987
σ	Risk aversion (utility)	2
ς	Parameter leisure (utility)	1
ψ	Exponent leisure (utility)	2
ϕ	Ela. of subst. h and f (utility)	2
ϖ	Share foreign good (utility)	0.2
ρ	Share of labor in commodities	0.1
η_1	Share home commodity intermediates	0.1
η_2	Share foreign commodity intermediates	0.4
η_3	Share of labor intermediates	0.6
α^p	Calvo parameter intermediates	0.5
α^w	Calvo parameter wages	0.85
θ^p	Ela. subst. intermediate varieties	6
θ^w	Ela. subst. labor types	6
γ	Elasticity foreign demand home goods	1.5
K^*	Parameter foreign demand home goods	0.1
ν	Policy parameter	Varies across experiments
ρ^x	Coefficient on lagged value home commodity price	0.95
η^x	Standard deviation shock to commodity price	0.135


Exchange Rate Rule: Welfare gain over peg (ν=0) for α^w=0.85 and α^p=0.5
Equivalent consumption units (percentage terms)
Policy parameter ν
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

An alternative policy rule.

- The policy trade off implied by the previous rule may reflect the one implied by dirty floating regimes.

- In the theory section we showed how a payroll tax can be used together with the nominal exchange rate to stabilize both prices and wages.

- Absent τ_t^p, S_t can be used to stabilize either of them, but not both.

- A more natural trade off is stabilizing prices versus stabilizing nominal wages.

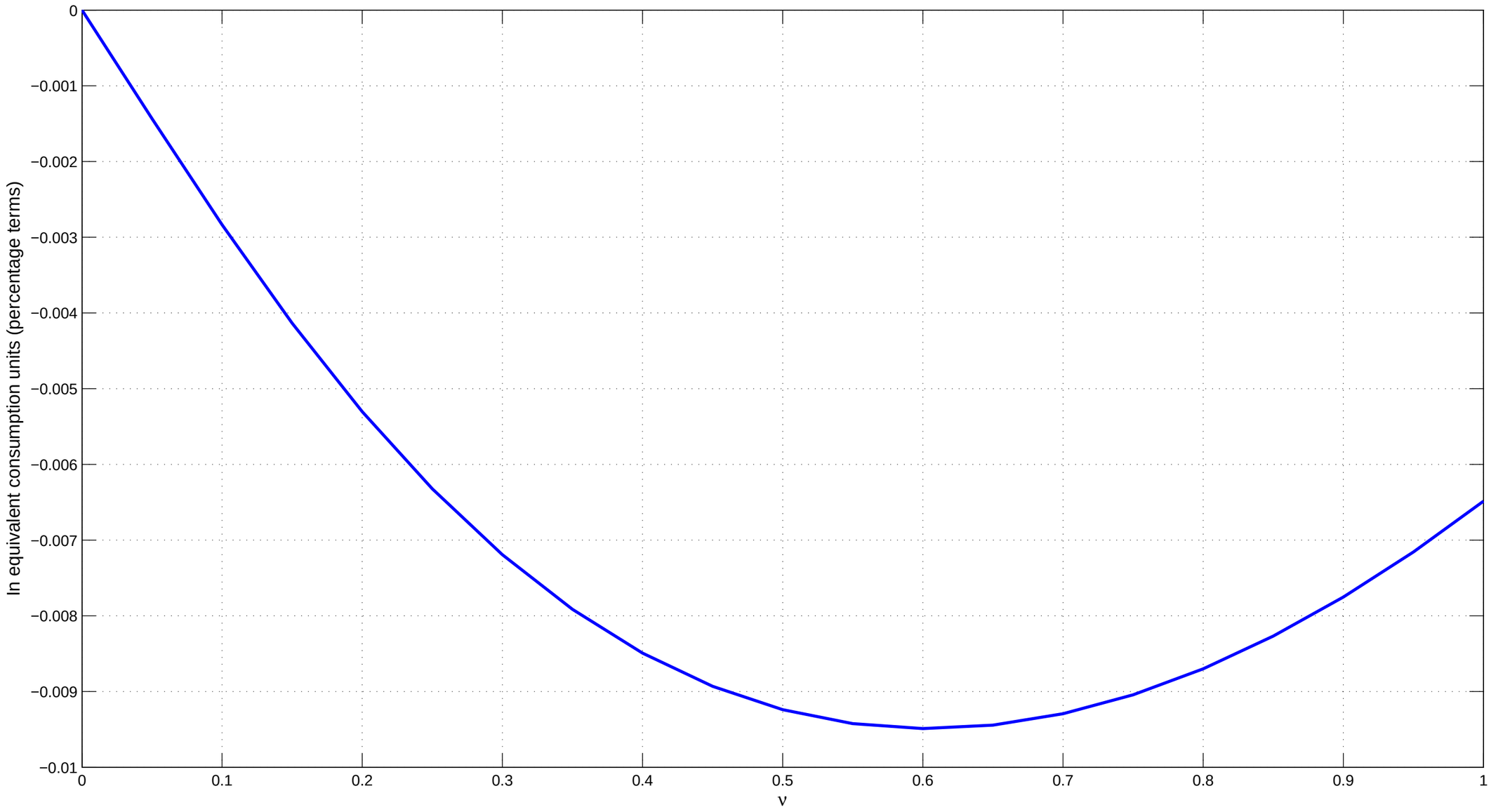
- Thus, let

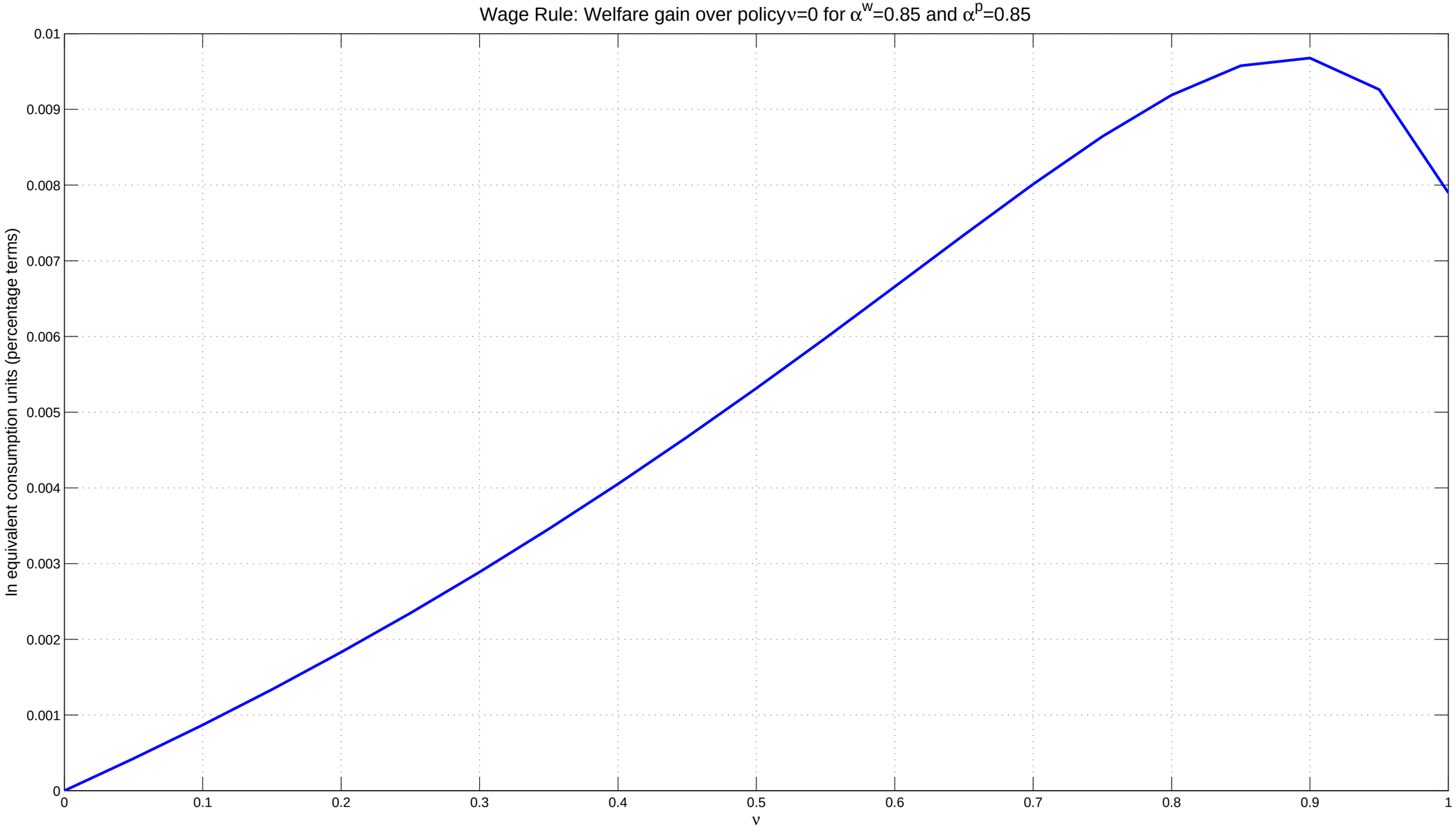
$$w_t^h \equiv \frac{W_t}{P_t^h}$$

- Then, we can define a policy where

$$d \ln W_t = \upsilon d \ln w_t^h.$$

- Thus, if $\upsilon = 0$, nominal wages are fully stabilized, while $\upsilon = 1$ implies full price stability.


Wage Rule: Welfare gain over policy ν=0 for α^w=0.85 and α^p=0.5
ln equivalent consumption units (percentage terms)
0
−0.001
−0.002
−0.003
−0.004
−0.005
−0.006
−0.007
−0.008
−0.009
−0.01
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
ν


Wage Rule: Welfare gain over policyν=0 for α^w=0.85 and α^p=0.85
ln equivalent consumption units (percentage terms)
0
0.001
0.002
0.003
0.004
0.005
0.006
0.007
0.008
0.009
0.01
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
ν

Conclusions: Presence of frictions on both prices and wages

- does not justify stabilizing the nominal exchange rate.

- Potential gains of optimizing the trade off between price and wage stability are low and not robust.