Unemployment and inflation in Spain (1980-2005): What explains the great moderation?

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Extremely preliminary and incomplete !!!!

Motivation

- Spanish unemployment (u) has decreased by 13.5 p.p. (22.0%, 8.5% during 1994-2005 while inflation (π) has remained subdued (2%-4%).
- Very different evolution over significant periods (Pre- EC: 1980-85, Post- EC, 1990-94, Run up-EMU 1996-1999, Post EMU-1999)
- Shifts in the PC intercept towards origin & different slopes
- Great moderation in π despite much larger reduction in u than in other EU countries.
- No fundamental LM or PM reforms
- Potential candidates in the racehorse: Credibility (Monetary & Fiscal policies), Globalization, <u>Immigration</u>

Figure 1 : Phillips Curve (PC)

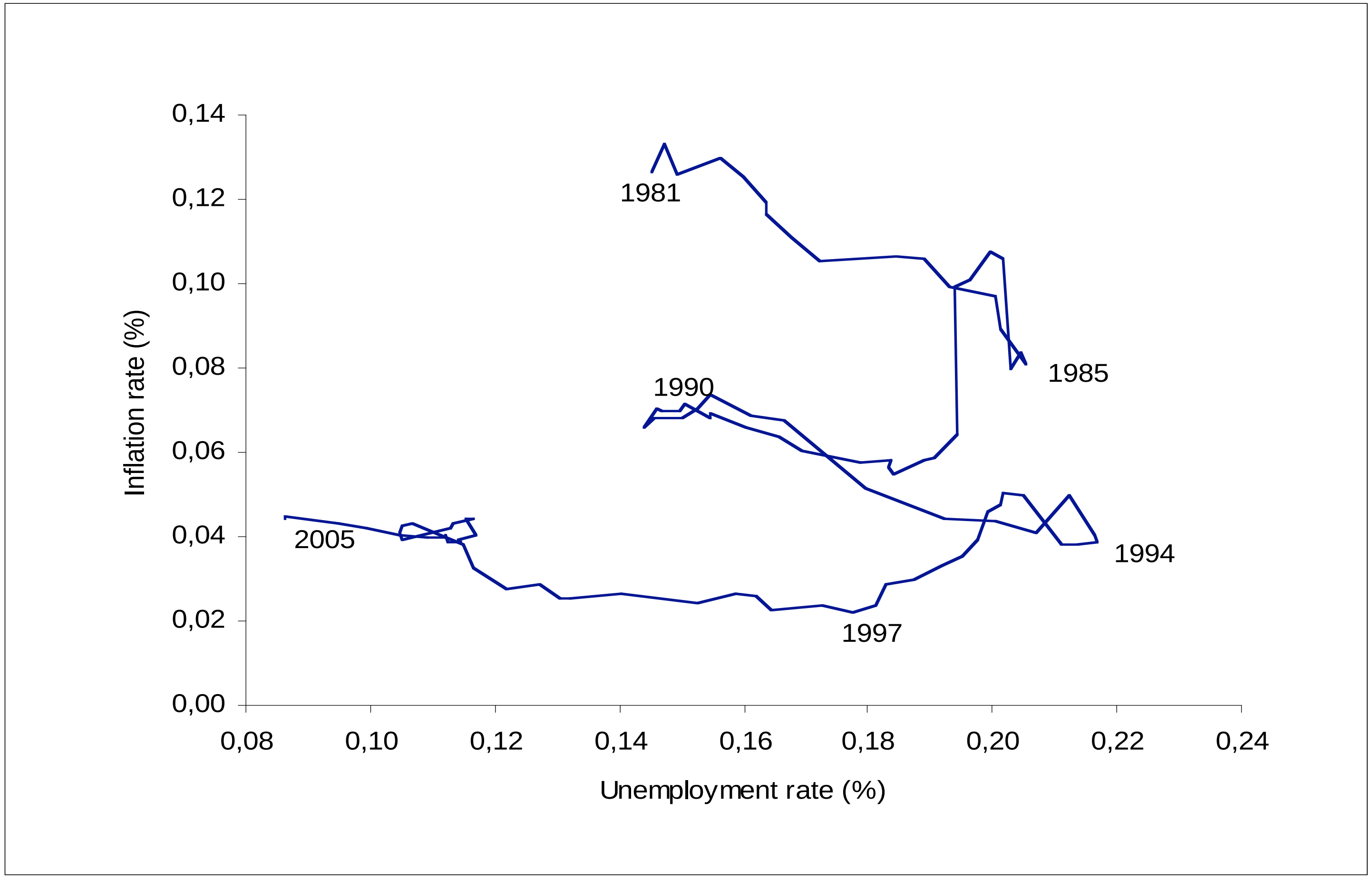


Figure 2 : Inflation and unemployment

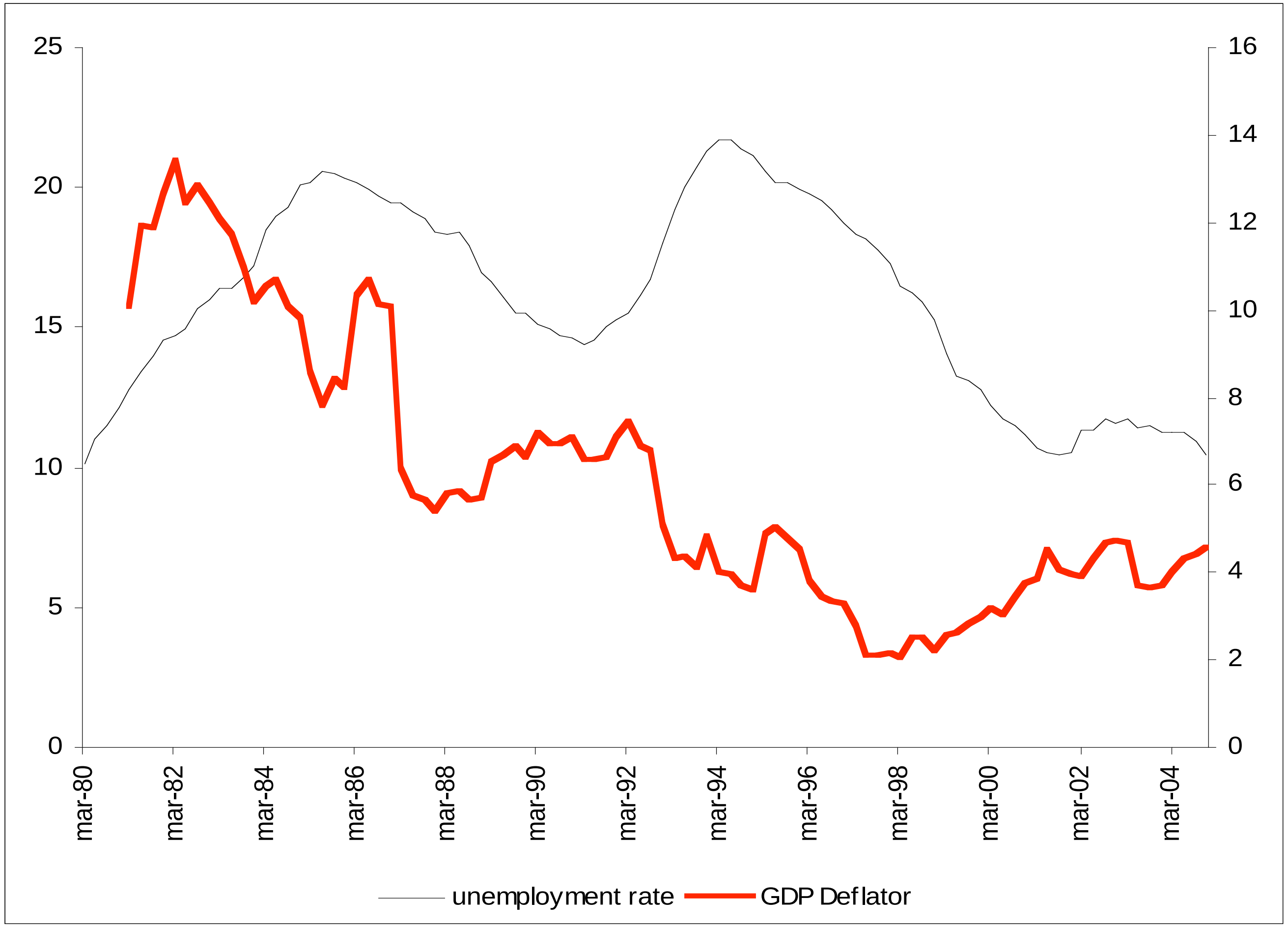


Figure 3: Inflation and growth rate of import prices (€)

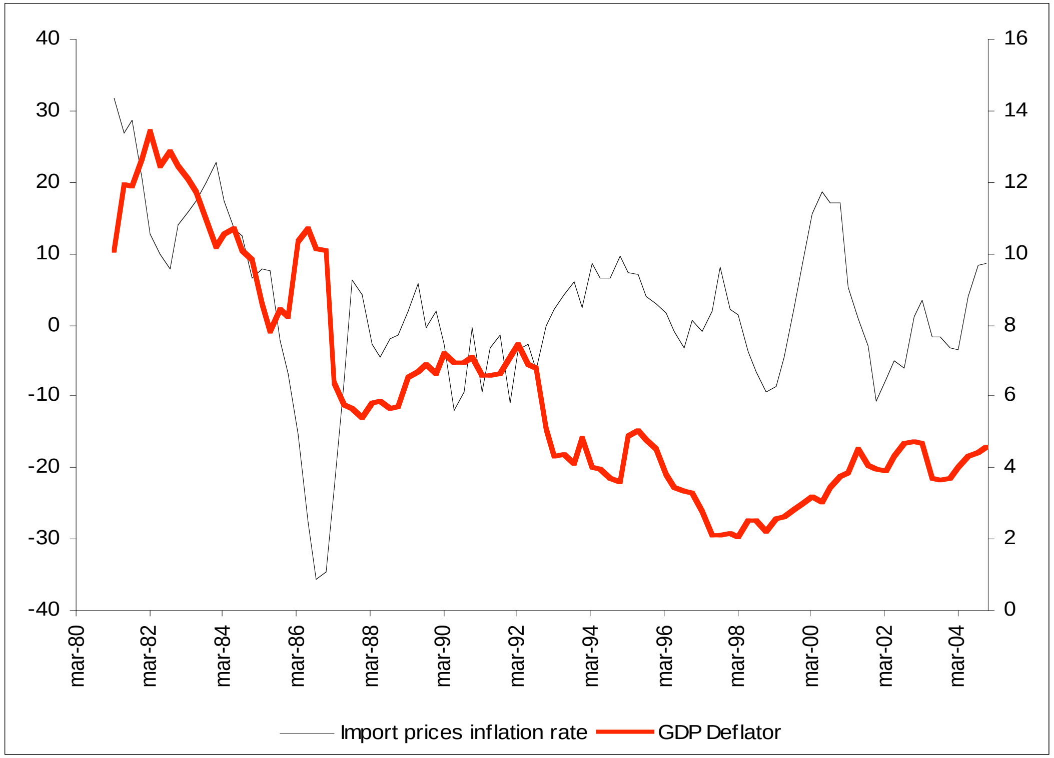


Figure 4: Inflation and immigration rate

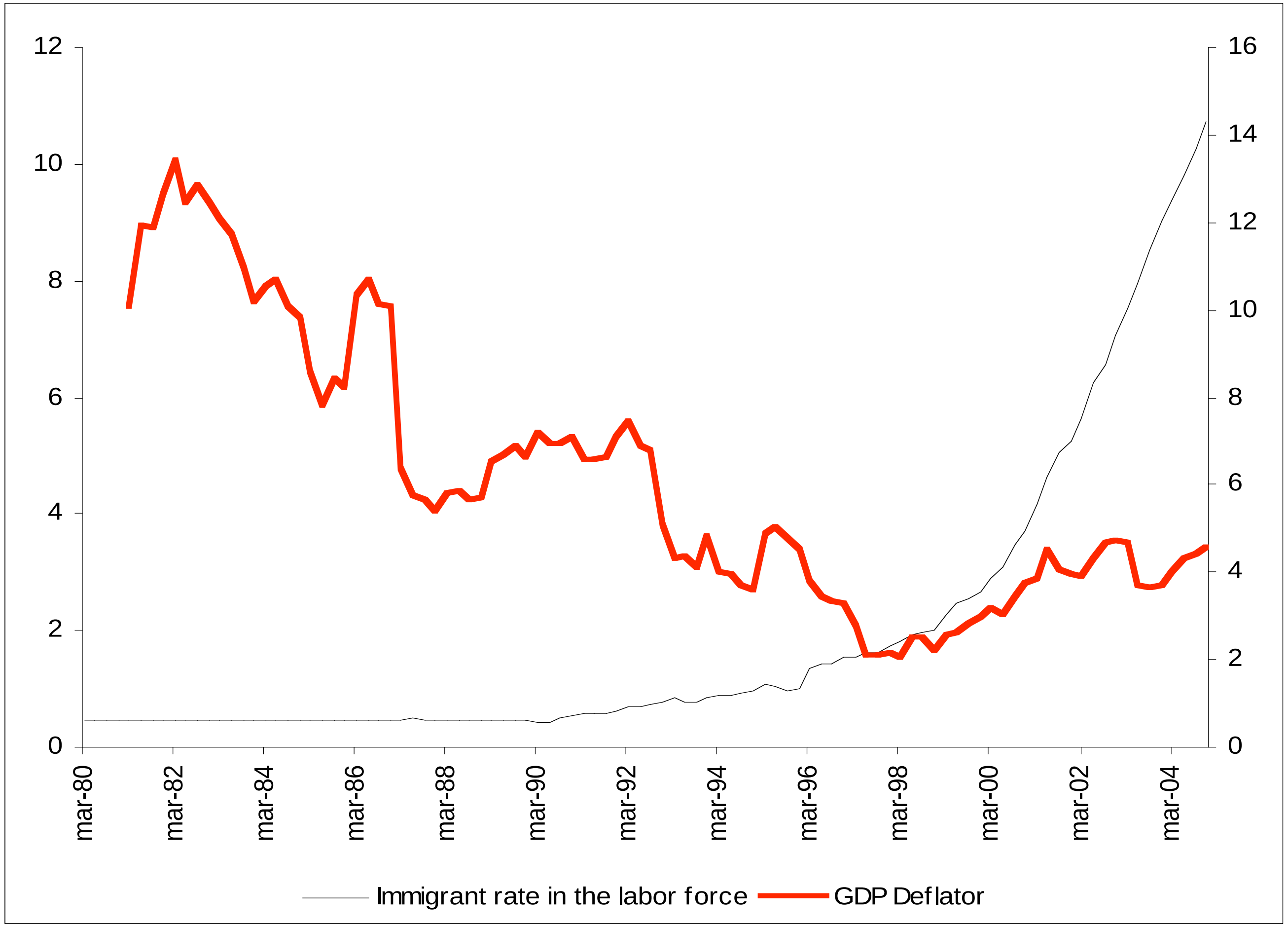


Figure 5: Inflation and relative unemployment rate (migrants/natives)

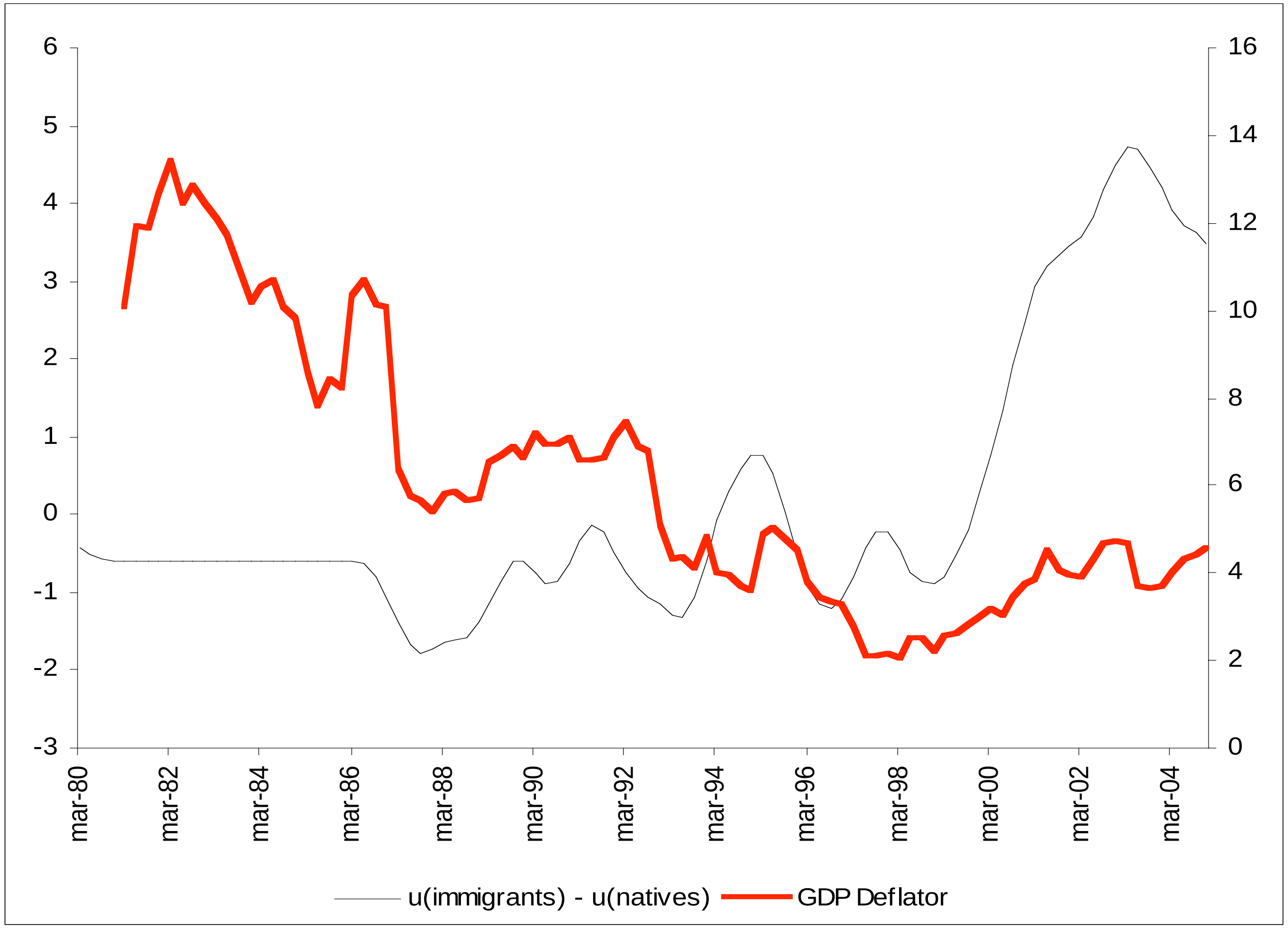


Figure 6: Unemployment rates of natives and migrants

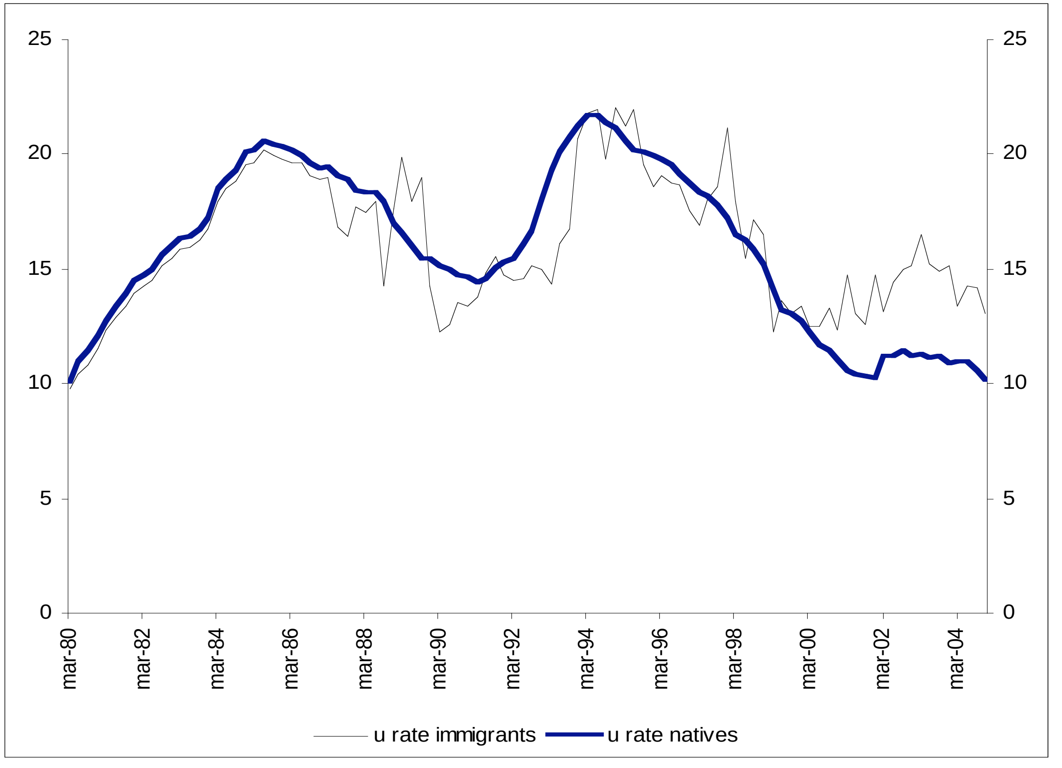
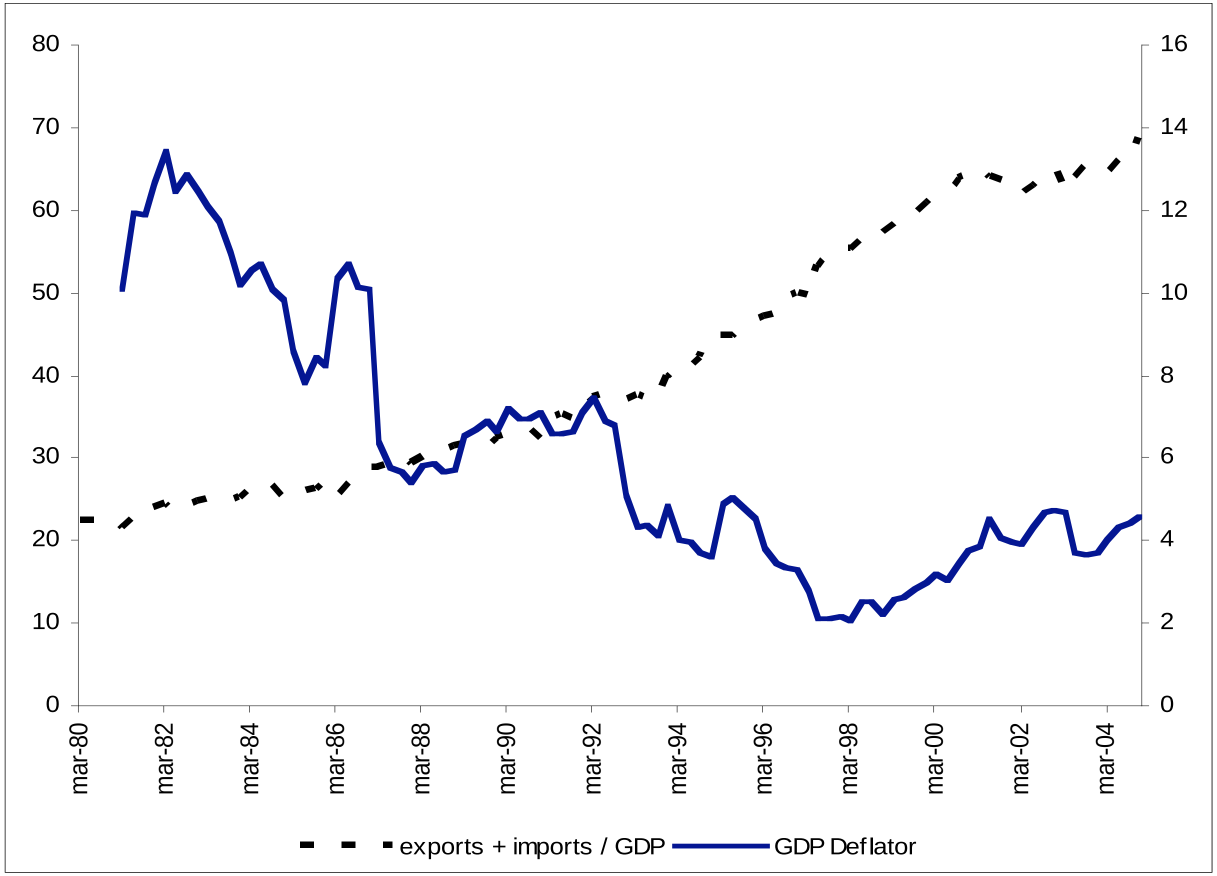


Figure 7: Inflation and degree of openness (X+M/Y)



Goals

- Derive a NPC which accounts for the effect of the different factors,

  Allowing for different wage rigidity/ labour supply elasticity of migrants and natives.

- Allocate the contributions of each factor to the shifts and changes in slopes in the different significant sub-periods.

- Analyze the changes in inflation persistence stemming from the process of those factors.

An immigration-augmented NPC

[Blanchard & Galí, 2006]

- **Output:** $Y = N^{\alpha} M^{1-\alpha}$

  MC: $mc + \mu^{p} = \omega - (y-n) - \log(1-\alpha) + \mu^{p}$

- **Composite labour input:**

$$N^{\sigma-1/\sigma} = \alpha_1 N_1^{\sigma-1/\sigma} + \alpha_2 N_2^{\sigma-1/\sigma} \quad .$$

where M **= Raw materials**

N_1 **=Native workers**

N_2 **=Immigrant workers**

- **Preferences:**

$$U_i = \ln(C_i) - e^{\xi}(L_i^{1+\varphi i})/(1+\varphi_i),\ i=1,2$$

MRS: $mrs_i = c_i + \varphi_i \ell_i + \xi$

- **Real wage rigidity:**

$$\omega_i = \gamma\, \omega_{i-1} + (1-\gamma)\, mrs_i,\ i=1,2,\ 0 \le \gamma < 1$$

s.t. $\varphi_2 > \varphi_1$ (higher LS elasticity for migrants)

➢ Aggregation (around S.S: X^*).

$n \approx \lambda n_1 + (1-\lambda) n_2$, $\lambda = \alpha [N^*_1/N^*_2]^{\sigma-1/\sigma}$

$\ell \approx \lambda \ \ell_1 + (1-\lambda) \ \ell_2$

$\omega \approx \lambda \ \omega_1 + (1-\lambda) \ \omega_2$, $c \approx \lambda c_1 + (1-\lambda) c_2 = y$

➢ Real Wage Dynamics

$$\omega = \Gamma \omega_{-1} + (1-\Gamma)(1-\alpha)^{-1} [\alpha \log(\alpha / 1-\alpha) + (1+\psi) \ \ell + (1-\lambda) \ \varphi_{21} \, \mathrm{tm}\ell + \xi - \alpha \, p_m]$$

where: $\mathrm{tm}\ell = \ell_2 - \ell_1$

$\Psi = \lambda \varphi_1 + (1-\lambda) \varphi_2$,

$\varphi_{21} = \varphi_2 - \varphi_1 > 0$

$\Gamma = \gamma / [1-\alpha + \gamma \alpha]$

p_m = price raw materials

.

- **2^{nd} -Best Flex-Price Eq. with monopolistic competition ($\mu^p \neq 0$, $\gamma=0$).**

$$mc^* + \mu^p = 0 \leftrightarrow \omega^* = y^* - \ell^* + \log(1-\alpha) - \mu^p$$
$$\omega^* = mrs^* = y^* + \psi \ell^* + (1-\lambda)\varphi_{21}\, tm\ell^* + \xi$$

$$\rightarrow (1+\psi)\ell^* + (1-\lambda)\varphi_{21}\, tm\ell^* = \log(1-\alpha) - \mu^p - \xi$$

- **MC Dynamics**

$$\Delta(mc + \mu^p) = -(1-\Gamma)\Gamma^{-1}\{\psi u + (1-\lambda)\varphi_{21}(tm\ell - tm)\} + \alpha \Delta p_m$$

$u = \ell - n$

$tm\ell - tm = (\ell_2 - \ell_1) - (n_2 - n_1) = u_2 - u_1$.

- **NPC (Galí & Gertler, 1999)**

- **Forward-looking:**

$$\pi = \beta\, E\pi_{+1} + \kappa_f\,(mc + \mu^p)$$

$\rightarrow$

$$\pi = \delta^f_1\, E\pi_{+1} + \delta^f_2\, \pi_{-1} - \delta^f_3\, u - \delta^f_4\, (u_2 - u_1) + \delta^f_5\, \Delta p_m$$

$\delta^f_1 = \beta/(1+\beta)$, $\delta^f_2 = 1/(1+\beta)$

$\rightarrow$ $\delta^f_1 + \delta^f_2 = 1$ (NO LRTO)

$\delta^f_3 = \kappa_f\, \psi(1-\Gamma)\,/\,\Gamma(1+\beta)$,

$\delta^f_4 = \delta^f_3\,(1-\lambda)\,\varphi_{21}$,

$\delta^f_5 = \kappa_f\, \alpha\,/(1+\beta)$

- **Hybrid:**

$$\pi = (\beta\theta/\tau)\, E\pi_{+1} + (\zeta/\ \tau)\, \pi_{-1} + \kappa_h\, (mc + \mu^p)$$

θ: Calvo´s (1993) degree of price rigidity

ζ: % backward-looking price setters

→

$$\pi = \delta^h_1\, E\pi_{+1} + \delta^h_2\, \pi_{-1} + \delta^h_3\, \pi_{-2} - \delta^h_4\, u - \delta^h_5\, (u_2 - u_1) + \delta^h_6\, \Delta\, p_m$$

$\delta^h_1 = \beta\theta/(\tau + \beta\theta)$, $\delta^h_2 = (\tau + \zeta)\,/(\tau + \beta\theta)$, $\delta^h_3 = -\zeta\ /(\tau + \beta\theta)$

→ $\delta^h_1 + \delta^h_2 + \delta^h_3 = 1$ (NO LRTO)

$\delta^f_4 = \kappa_h\, \psi\, \tau(1- \Gamma)\, /\, (\tau + \beta\theta)$,

$\delta^f_5 = \delta^h_4\, (1- \lambda)\, \varphi_{21}$,

$\delta^h_6 = \kappa_h\, \alpha\, \tau\, /(\tau + \beta\theta)$,

- Alternative approach

Real wage rigidity only for natives:

$$\omega_1 = \gamma\, \omega_{1\text{-}1} + (1\text{-}\gamma)\, mrs_1,$$

$$\omega_2 = mrs_2,$$

$$\text{s.t.} \quad \varphi_2 = \varphi_1$$

$$\rightarrow \quad \pi = \delta^n_1\, \pi_{+1} + \delta^n_2\, \pi_{-1} + \delta^n_3\, \pi_{-2} - \delta^h_4\, (u - \rho_1\, u_{-1})$$

$$\delta^n_4\, (\Delta\, p_m - \rho_2\, \Delta p_{m,-1}) - \delta^n_5\, [(tm)^2 * \Delta^2 (y-n)]$$

Leads to Additional dynamics

➢ Some preliminary results (GMM, t-ratios)

(I) Unrestricted FNPC, 1982(1) -2005(3)

$$\pi = 0.486\ \pi_{+1} + 0.493\ \pi_{-1} - 0.049\ u - 0.034\ (u_2 - u_1) + 0.016\ \Delta p_m$$

(5.500) (6.577) (3.807) (2.634) (2.572)

(II) Unrestricted FNPC, 1982(1) -1995(4)

$$\pi = 0.255\ \pi_{+1} + 0.6973\ \pi_{-1} - 0.088\ u + 0.0242\ (u_2 - u_1) + 0.018\ \Delta p_m$$

(4.302) (10.81) (3.573) (0.205) (3.458)

(III) Restricted FNPC, 1982 (1) -2005(3)

$$\pi = 0.483\ \pi_{+1} + 0.517\ \pi_{-1} - 0.053\ u - 0.038\ (u_2 - u_1) + 0.015\ \Delta p_m$$

(6.456) (---) (4.005) (2.708) (2.954)

$\rightarrow \beta = 0.934$

(IV) Conventional NPC, 1982(1) -2005(3)

$$\pi = 0.983\ \pi_{+1} + 0.027\ [\omega-(y-n)]$$

(73.25) (3.535)

Marginal cost

$$\Delta\ [\omega-(y-n)] = -0.830\ u - 0.103\ (u_2-u_1) + 0.031\ \Delta p_m$$

(17.61) (1.865) (2.756)

1982(1) -1995(4)

$$\pi = 0.824\ \pi_{+1} + 0.175\ [\omega-(y-n)]$$

(42.58) (13.07)

$$\Delta\ [\omega-(y-n)] = -0.057\ u - 0.128(u_2-u_1) + 0.043\ \Delta p_m$$

(1.442) (0.653) (2.604)

Conclusions

- NOT YET !!!!