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The subprime crisis, exchange rate and the Polish external tade: Stylized facts and facts

Skopje, April 7-8, 2016

Schedule

Preliminaries

- **The first stylized fact**: zloty's appreciations coincide with increasing trade deficits whereas deperciations 'induce' improvement in the trade and services' balance.

- **The second stylized fact**: the exchange rate seems to be not only an effective absorber of negative external shocks, but also – mainly due to the overshooting effects – a variable inducing positive tendencies in Polish foreign trade in the periods of economic slowdown.
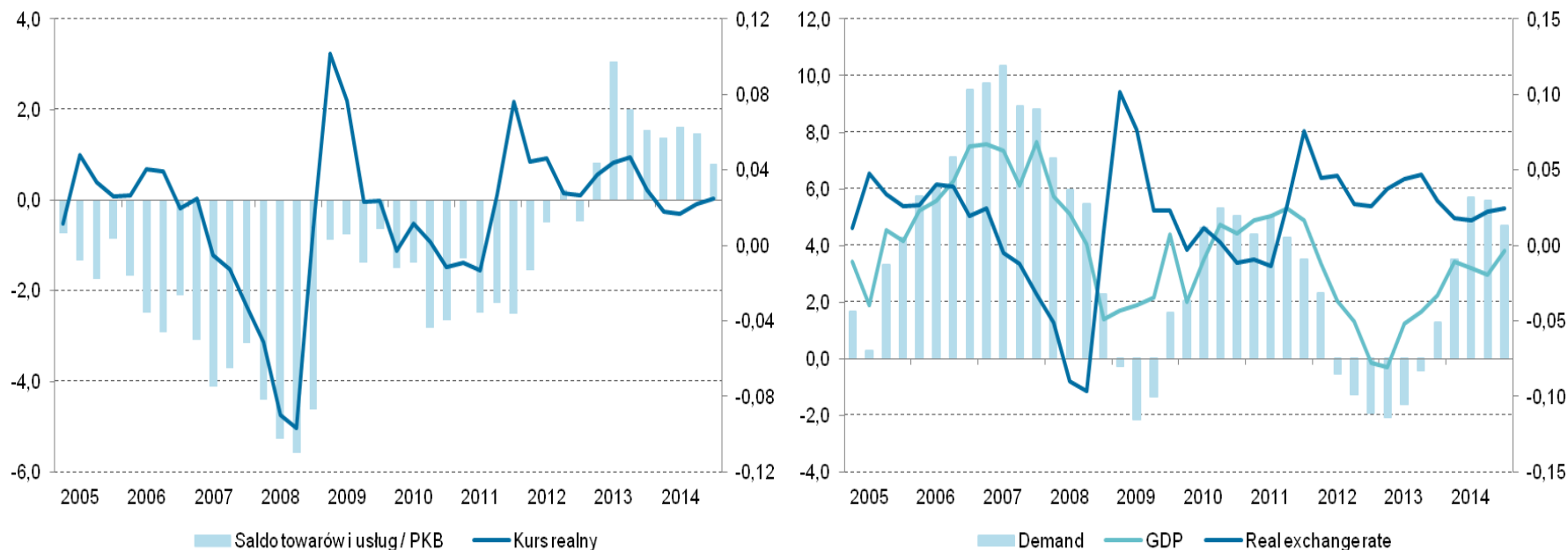
Preliminaries

- **A standard framework**

- Imperfect substitues model (demand function):

$$m_t = \eta_M d_t - \theta_M p_t^Q \qquad\qquad e_t = \eta_E d_t^* + \theta_E p_t^Q$$

- 'Orthodox' CES perspective:

$$m_t - d_t = -\theta_M p_t^Q \qquad\qquad e_t - d_t^* = -\theta_E p_t^Q$$

- IAD perspective:

$$\tilde{d}_t = \omega_t^C c_t + \omega_t^G g_t + \omega_t^A a_t + \omega_t^E e_t$$

- Addilog perspective:

$$m_t = \frac{\alpha_H}{\alpha_M} d_t - \theta_M p_t^Q$$

Preliminaries

■ … the almost identical course of both variables and the fact that differences in their dynamics occur almost exactly in periods in which the real exchange rate showed larger or longer deviations from the average…

■ Until mid-2008, relative imports and exports were increasing, accompanied by strong oscillations of the real exchange rate around a mean. At the peak of the subprime crisis (2008-2009) the appreciation of the zloty increasing from 2007 was accompanied by 'a surplus' of $m-d$ dynamics over $e-d*$ dynamics.
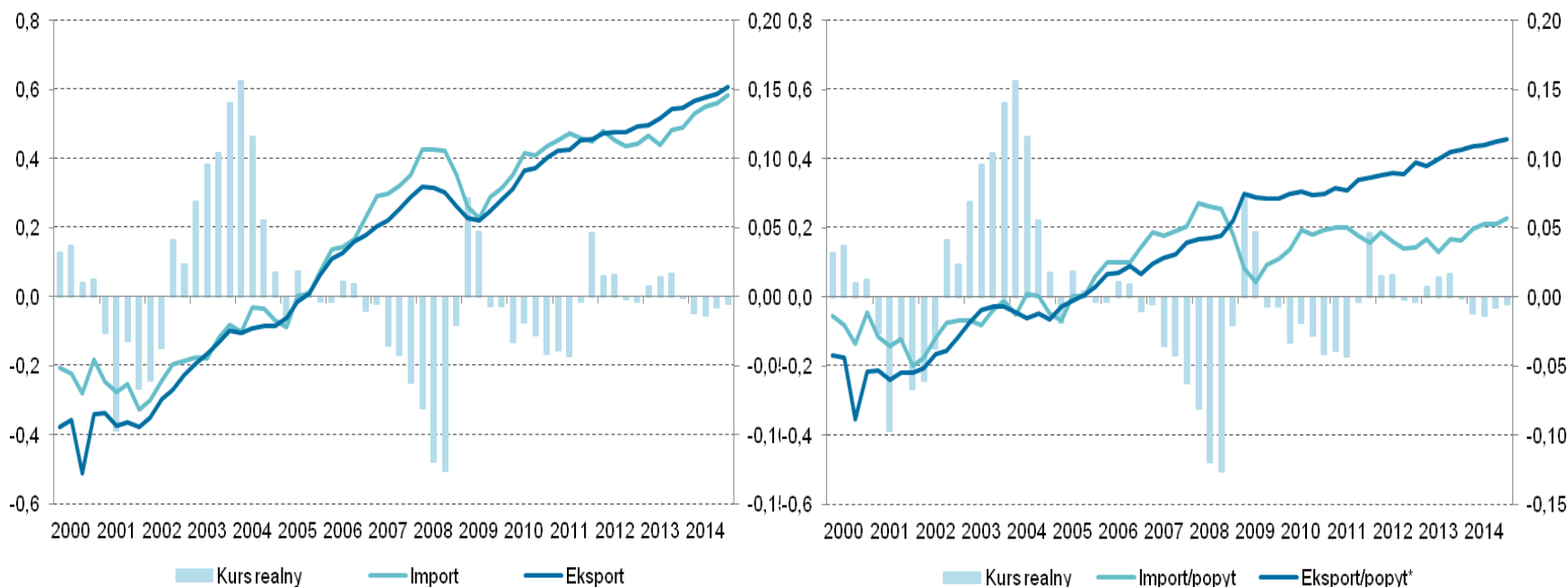
Aggregated model – estimation results

■ Framework: vector error correction model VEC

$$\Delta y_{(m)t} = \alpha(\beta' y_{(m)t-1}) + \sum_{s=1}^{S-1} \Gamma_s \Delta y_{(m)t-s} + \mu_{(m)} + \varepsilon_{(m)t}$$

■ Two equilibrium conditions:

$$m - 2{,}13\, x - 0{,}84\, x^* - 0{,}44\, f^{DI} + 0{,}005 t^D \sim I(0)$$
$$ (14{,}3) \quad\quad (13{,}1) \quad\quad\quad (10{,}3) \quad\quad\quad (10{,}4)$$

$$m - e + 0{,}60\, q - 0{,}002 t^D \sim I(0)$$
$$ (4{,}7) \quad\quad (14{,}7)$$

■ The main shortcoming of the aggregated model: exogeneity of the export

Aggregated model – estimation results

■ Imperfect substitues model

$$m_t = \eta_M d_t - \theta_M p_t^Q \qquad\qquad e_t = \eta_E d_t^* + \theta_E p_t^Q$$

■ New Trade Theory (NTT), New-New Trede Theory (NNTT) & Global Value Chains

$$m_t = \eta_{M1} x_t + \eta_{M2} x_t^* + \eta_{M3} f_t^{DI} + \eta_{M4} e_t - \theta_M p_t^Q$$

$$e_t = \eta_{E1} x_t^* + \eta_{E2} x_t + \eta_{E3} f_t^{DI} + \eta_{E4} m_t + \theta_E p_t^Q$$

Imports' & exports' heterogeneity

GVC imports =   **(42)** capital goods (except transport equipment),
 and parts and accessories (**parts & accessories**) +
 (53) transport equipment and parts and accessories
 (**parts & accessories**)

NONGVC imports = TOTAL imports – GVC imports

GVC exports =   **(4)** capital goods… + **(5)** transport equipment… +
 (61) consumer goods (durables)

GVC1 exports =   **(51)** transport equipment (**passenger motor cars**) +
 (61) consumer goods (**durables**)

GVC2 exports =   GVC exports – GVC1 exports

NONGVC exports = TOTAL exports – GVC exports

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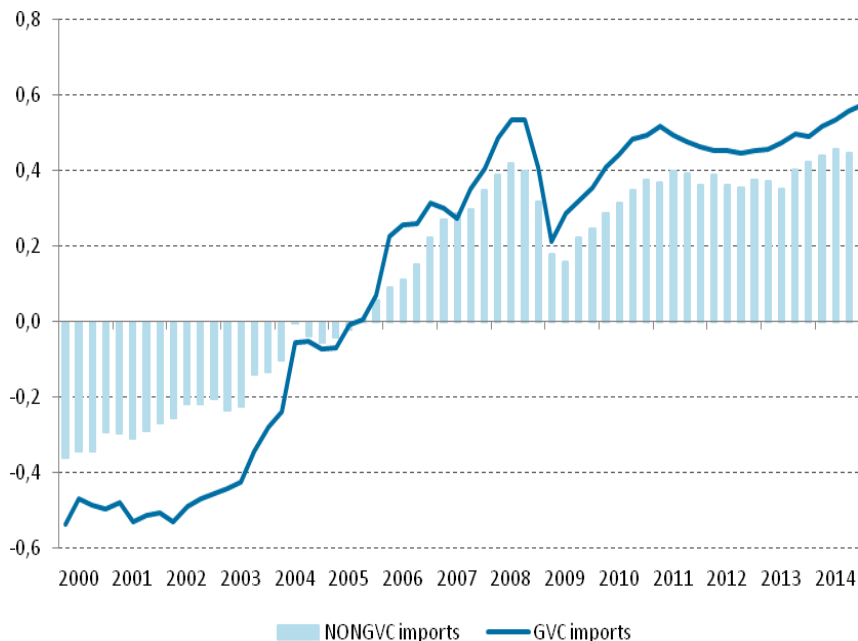**(61)** consumer goods (durables)

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**GVC2 exports** =   GVC exports – GVC1 exports

NONGVC exports = TOTAL exports – GVC exports

Imports' & exports' heterogeneity

■ Higher growth rates of the GVC imports before the subprime crisis, then convergence of the GVC i NONGVC import's dynamics…

■ Completely different pattens of the strict GVC1 exports and the two remaining exports components.

■ Does the globalization still matter?
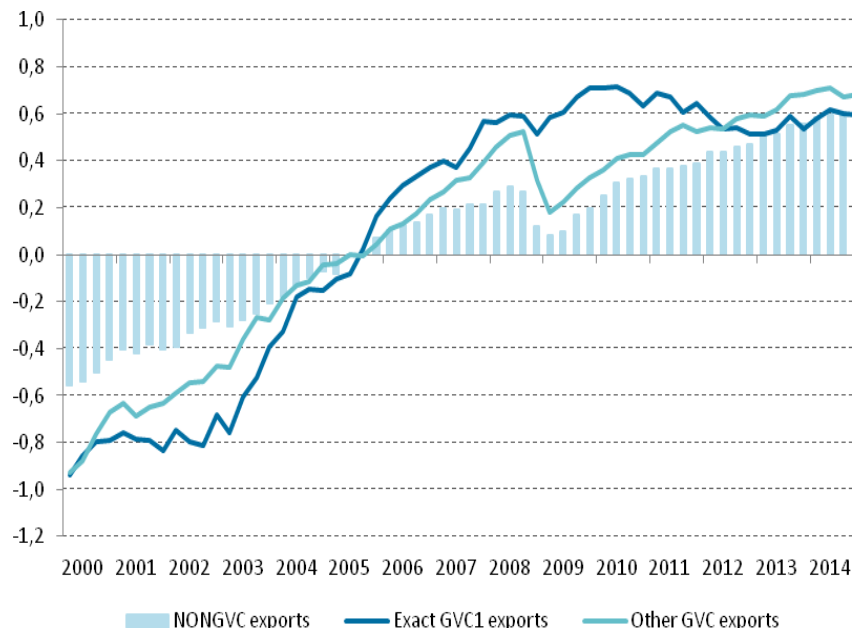
Imports' & exports' heterogeneity

- Does the foreign direct investment in Poland drive the strict GVC1 exports and the GVC imports?

- Do comovements of the strict GVC1 exports and the GVC imports signal a cause-effect relation between these variables?
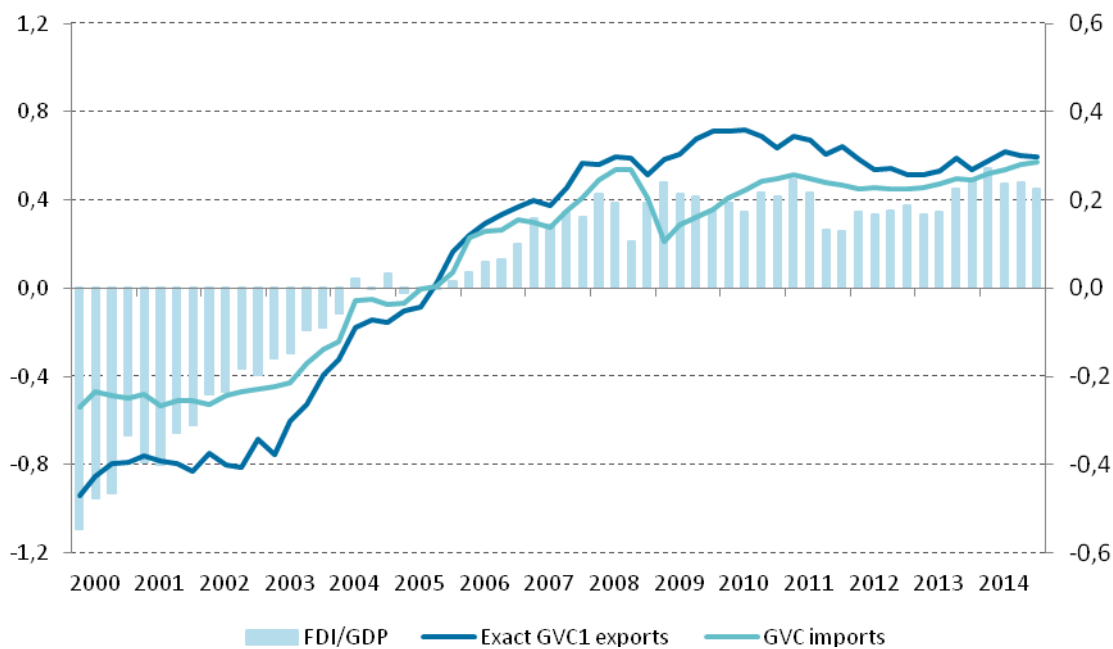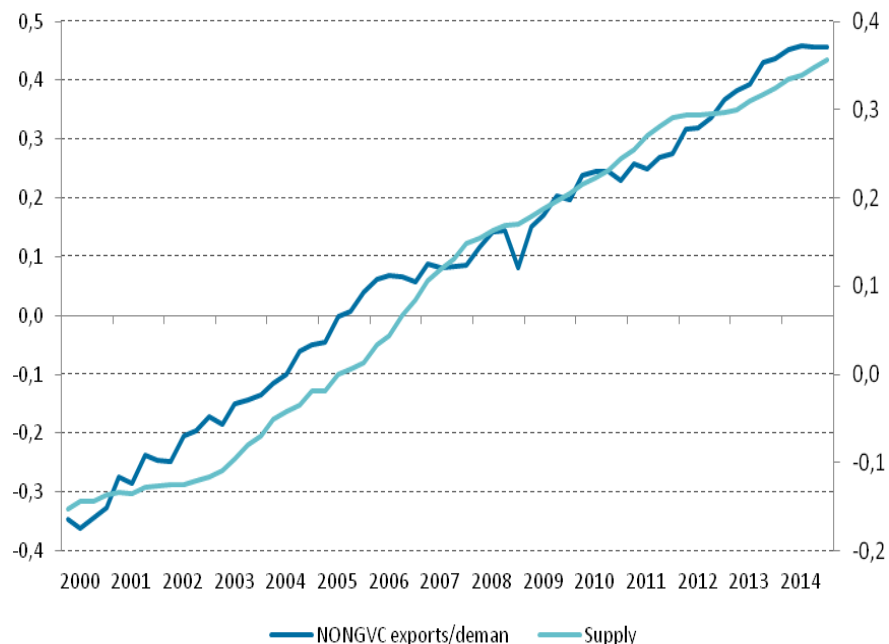
Imports' & exports' heterogeneity

- The similarity of the relation of
(i) NONGVC imports to gross
values added in Poland and
(ii) eurozone exports…
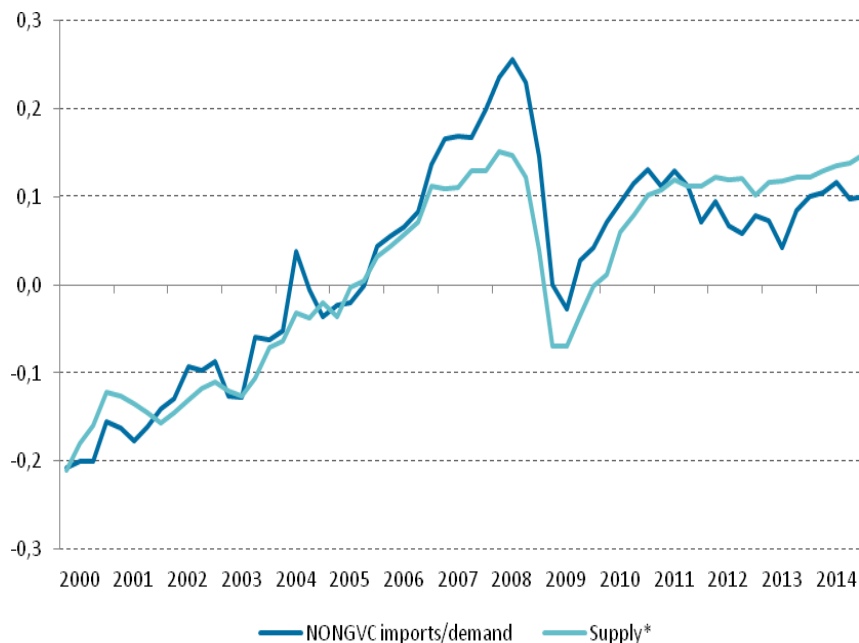
- The similarity of the relation of
(i) NONGVC exports to eurozone
exports and (ii) gross values
added in Poland…

Disaggregated model – specification

■ Framework: vector error correction model VEC

$$\Delta y_{(m)t} = \alpha(\beta' y_{(m)t-1}) + \sum_{s=1}^{S-1} \Gamma_s \Delta y_{(m)t-s} + \mu_{(m)} + \varepsilon_{(m)t}$$

■ Variables:

$$y = [m^{NG}, e^{NG}, m^{GV}, e^{GV1}, e^{GV2}, x, x^*, fdi, q]'$$

x gross value added in Poland (Eurostat)

x^* exports of the euro zone countries (Eurostat, ComExt)

q PPI-based real effective exchange rate

fdi cummulated FDI/GDP ratio

Disaggregated model – working hypotheses

- Do the FDI/GDP ratio, the strict GVC1 exports and NONGVC imports cointegrate?

- Can the influence of the relative prices on both these variables be omitted?

$$\delta_1 f^{DI} + \delta_2 e^{GV1} + \delta_3 m^{GV} + \ldots \sim I(0)$$

- Do the supply-side factors and the realtive prices explain the movements of the NONGVC imports and exports?

$$\phi_1 (m^{NG} - x) + \phi_2 x^* + \phi_3 q + \ldots \sim I(0)$$

$$\varphi_1 (e^{GV1} - x^*) + \varphi_2 x + \varphi_3 q + \ldots \sim I(0)$$

Disaggregated model – estimation results

■ Equlibrium relations & equilibrating (GVC submodel):

$$m^{GV} - x^* - 0{,}41 e^{GV1} - 0{,}14 e^{GV2} = coi(m^{GV}) \sim I(0)$$
$$\underset{(17,9)}{} \qquad \underset{(4,7)}{}$$

$$\Delta m_t^{GV} = -0{,}75 \, coi(m_{t-1}^{GV}) + \dots$$
$$\underset{(5,3)}{}$$

$$e^{GV1} - f^{DI} - 0{,}92 m^{GV} + 0{,}005 t_{0810} = coi(e^{GV1}) \sim I(0)$$
$$\underset{(23,0)}{} \qquad \underset{(7,8)}{}$$

$$\Delta e_t^{GV1} = -0{,}44 \, coi(e_{t-1}^{GV1}) + \dots$$
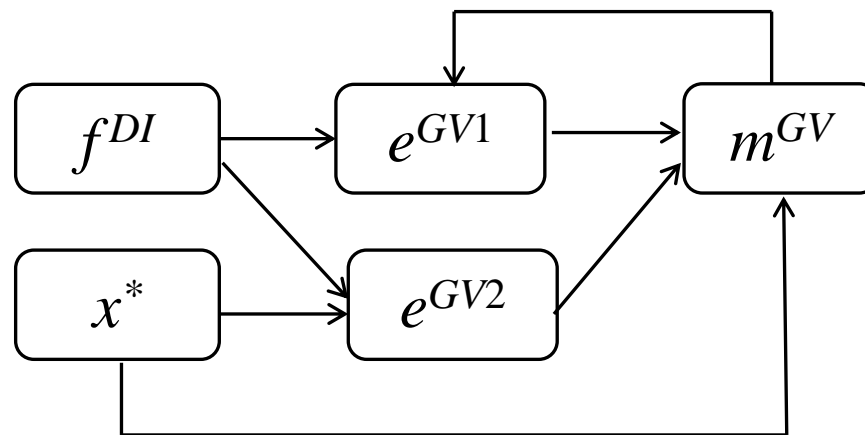$$\underset{(4,1)}{}$$

Disaggregated model – estimation results

- Equlibrium relations & equilibrating (GVC submodel):

$$e^{GV2} - x - f^{DI} - x^* - 0,002 t_{0\&10} = coi(e^{GV2}) \sim I(0)$$
$$(2,6)$$

$$\Delta e_t^{GV2} = -0,33 coi(e_{t-1}^{GV2}) + ...$$
$$(4,3)$$

- GVC submodel:

Disaggregated model – estimation results

■ Equlibrium relations & equilibrating (NONGVC submodel):

$$m^{NGV} - x - 0{,}34\,m^{GV} + 0{,}60\,q = coi(m^{NGV}) \sim I(0)$$
$$\quad\quad\quad\;\;\,{\scriptstyle(14,2)}\quad\quad\quad{\scriptstyle(6,9)}$$

$$e^{NGV} - x^{*} - 0{,}88\,x - 0{,}88\,q = coi(e^{NGV}) \sim I(0)$$
$$\quad\quad\quad\;\;\,{\scriptstyle(3,5)}\quad\quad{\scriptstyle(6,0)}$$

$$\Delta m_t^{NGV} = -0{,}63\cdot coi(m_{t-1}^{NGV}) - 0{,}50\cdot coi(m_{t-1}^{GV}) - 0{,}16\cdot coi(e_{t-1}^{NGV}) - 0{,}19\cdot coi(e_{t-1}^{GV1}) + \dots$$
$$\quad\;\;{\scriptstyle(6,7)}\quad\quad\quad\;\;{\scriptstyle(5,3)}\quad\quad\quad\;\;{\scriptstyle(2,8)}\quad\quad\quad\;\;{\scriptstyle(3,9)}$$

$$\Delta e_t^{NGV} = -0{,}28\cdot coi(e_{t-1}^{NGV}) - 0{,}10\cdot coi(e_{t-1}^{GV1}) - 0{,}40\cdot coi(m_{t-1}^{NGV}) - 0{,}19\cdot coi(m_{t-1}^{GV}) + \dots$$
$$\quad\;\;{\scriptstyle(5,6)}\quad\quad\quad\;\;{\scriptstyle(2,3)}\quad\quad\quad\;\;{\scriptstyle(4,9)}\quad\quad\quad\;\;{\scriptstyle(2,2)}$$

Disaggregated model – properties

■ Aggregate changes in annual growth rates of imports and exports induced by 1 p.p. shock to demand, supply, technology and real exchange rate (depreciation).

	$\Delta^4 x$		$\Delta^4 x^*$		$\Delta^4 f^{DI}$		$\Delta^4 q$	
	1 year	4 years	1 year	4 years	1 year	4 years	1 year	4 years
Imports:								
GVC	0.15	0.21	1.60	1.60	0.20	0.75	0.00	0.00
NONGVC	1.08	1.08	0.72	0.68	0.20	0.37	-0.20	-0.50
Total	0.92	0.94	0.84	0.85	0.19	0.41	-0.17	-0.42
Exports:								
GVC1	0.03	0.18	1.00	1.52	0.56	1.56	0.00	0.01
GVC2	1.08	0.98	0.88	1.00	0.64	0.96	0.03	0.02
NONGVC	0.80	0.84	0.76	0.88	-0.04	-0.12	0.24	0.72
Total	0.80	0.84	0.84	1.00	0.24	0.40	0.14	0.41

Disaggregated model – properties

■ The **SURPRISNG MAIN PROPERTY**
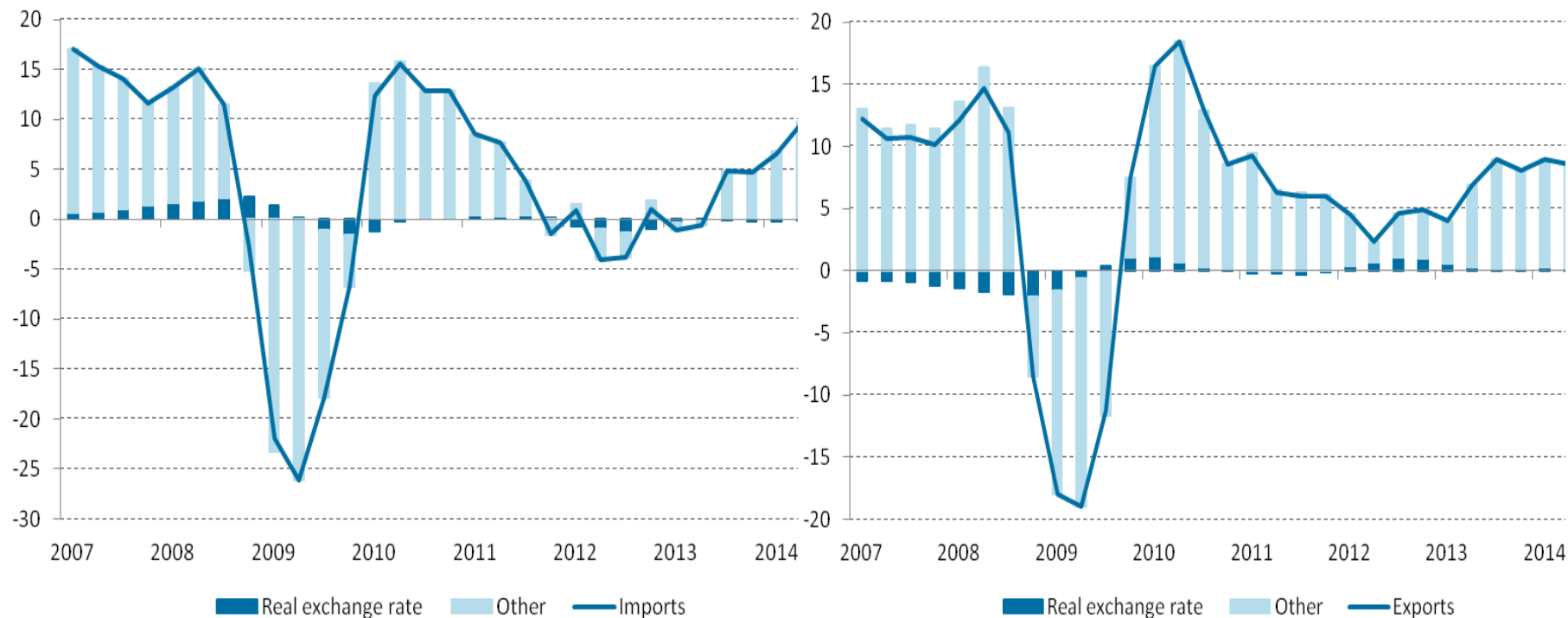
Conclusions

- The dichotomy of the Polish external trade, i.e. a significant insultaion of the GVC iimports and exports from their NONGVC counterparts.

- An increasing role of factors such as globalization and non-price competitiveness for Polish foreign trade. A considerable part of Polish foreign trade is shaped by the supply-side factors (via increasing products quality and exports variety) and technological factors (via foreign direct investment in Poland) and does not react to exchnage rate fluctuations.

- A moderate influence of the real exchange rate on NONGVC imports and exports. The net effects of the influence of the real exchange rate on overall imports and exports are too weak to justify expectations that an appropriately deep depreciation of the zloty might neutralize major disequilibria in the Polish external sector.

- It cannot be concluded that the policy of fully floating exchange rate was this component of macroeconomic policy that largely protected Poland from the financial crisis triggered by the collapse of the Lehman Brothers. The simulation results point out that the foreign trade balance was practically unaffected by the profound adjustment of the exchange rate which took place at the turn of 2009.

We protect the value of money

NBP Narodowy Bank Polski