Lecture 3 Part 2

Portfolio Balance Models

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The NIIP of the US

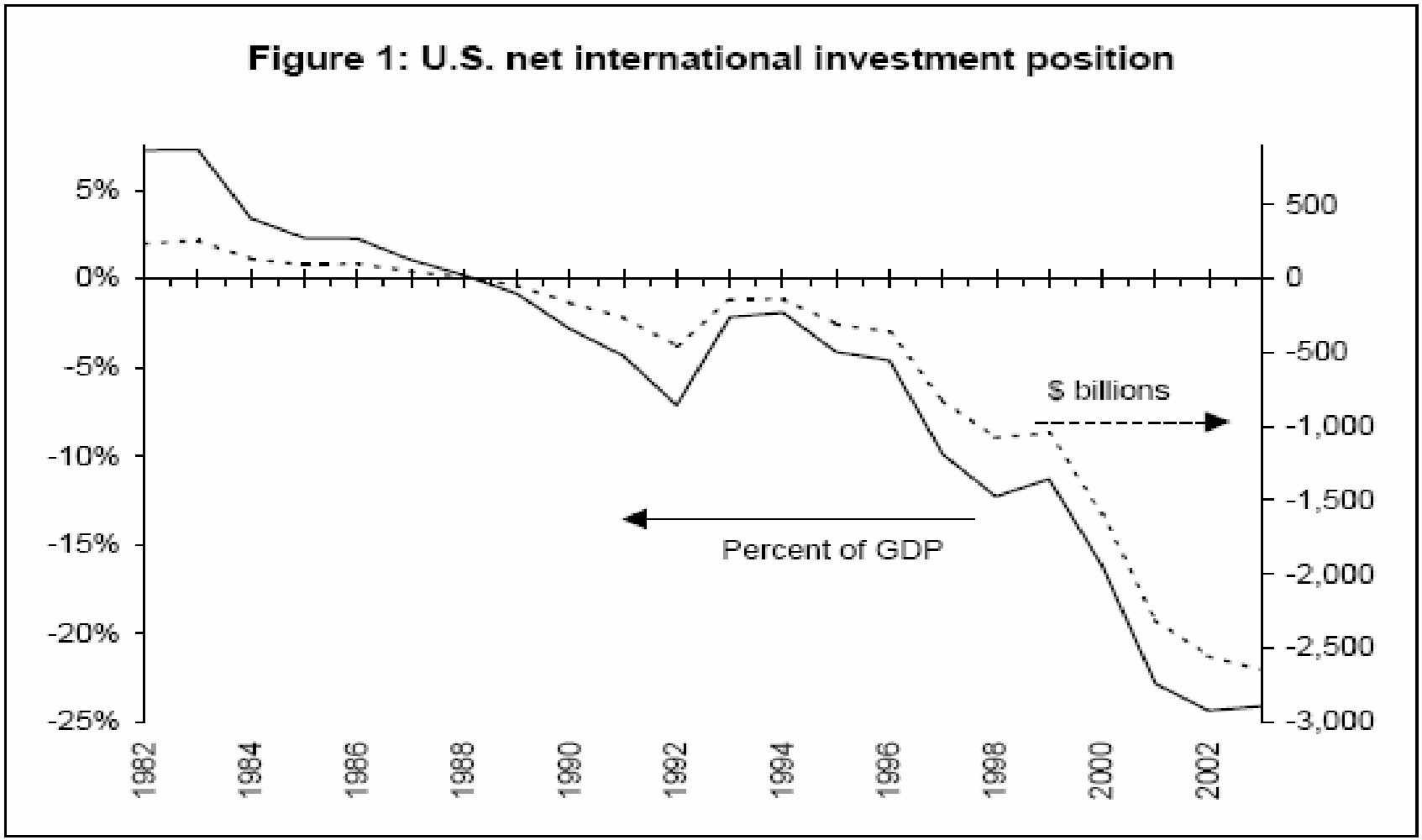
TABLE B–107.—*International investment position of the United States at year-end, 1995–2003*

[Billions of dollars]

Type of investment	1995	1996	1997	1998	1999	2000	2001	2002	2003 *r*
NET INTERNATIONAL INVESTMENT POSITION OF THE UNITED STATES:									
With direct investment at current cost	–458.5	–495.1	–820.7	–900.0	–775.5	–1,388.7	–1,889.7	–2,233.0	–2,430.7
With direct investment at market value	–305.8	–360.0	–822.7	–1,075.4	–1,046.7	–1,588.6	–2,308.2	–2,553.4	–2,651.0
U.S.-OWNED ASSETS ABROAD:									
With direct investment at current cost	3,486.3	4,032.3	4,567.9	5,090.9	5,965.1	6,231.2	6,270.4	6,413.5	7,202.7
With direct investment at market value	3,964.6	4,650.8	5,379.1	6,174.5	7,390.4	7,393.6	6,898.7	6,613.3	7,864.0
U.S. official reserve assets	176.1	160.7	134.8	146.0	136.4	128.4	130.0	158.6	183.6
Gold [1]	101.3	96.7	75.9	75.3	76.0	71.8	72.3	90.8	108.9
Special drawing rights	11.0	10.3	10.0	10.6	10.3	10.5	10.8	12.2	12.6
Reserve position in the International Monetary Fund	14.6	15.4	18.1	24.1	18.0	14.8	17.9	22.0	22.5
Foreign currencies	49.1	38.3	30.8	36.0	32.2	31.2	29.0	33.7	39.5
U.S. Government assets, other than official reserves	85.1	86.1	86.2	86.8	84.2	85.2	85.7	85.3	84.8
U.S. credits and other long-term assets	82.8	84.0	84.1	84.9	81.7	82.6	83.1	82.7	82.0
Repayable in dollars	82.4	83.6	83.8	84.5	81.4	82.3	82.9	82.4	81.7
Other	.4	.4	.4	.3	.3	.3	.3	.3	.3
U.S. foreign currency holdings and U.S. short-term assets	2.3	2.1	2.1	1.9	2.6	2.6	2.5	2.6	2.8

U.S. private assets:									
With direct investment at current cost	3,225.1	3,785.4	4,346.9	4,858.2	5,744.5	6,017.7	6,054.8	6,169.6	6,934.3
With direct investment at market value	3,703.4	4,404.0	5,158.1	5,941.7	7,169.8	7,180.1	6,683.1	6,369.4	7,595.6
Direct investment abroad:									
At current cost	885.5	989.8	1,068.1	1,196.0	1,414.4	1,531.6	1,686.6	1,840.0	2,069.0
At market value	1,363.8	1,608.3	1,879.3	2,279.6	2,839.6	2,694.0	2,314.9	2,039.8	2,730.3
Foreign securities	1,203.9	1,487.5	1,751.2	2,053.0	2,525.3	2,385.4	2,114.7	1,846.9	2,474.4
Bonds	413.3	481.4	543.4	578.0	521.6	532.5	502.1	501.8	502.1
Corporate stocks	790.6	1,006.1	1,207.8	1,475.0	2,003.7	1,852.8	1,612.7	1,345.1	1,972.2
U.S. claims on unaffiliated foreigners reported by U.S. nonbanking concerns	367.6	450.6	545.5	588.3	704.5	836.6	839.3	908.0	614.7
U.S. claims reported by U.S. banks, not included elsewhere	768.1	857.5	982.1	1,020.8	1,100.3	1,264.1	1,414.1	1,574.7	1,776.3
FOREIGN-OWNED ASSETS IN THE UNITED STATES:									
With direct investment at current cost	3,944.7	4,527.4	5,388.6	5,990.9	6,740.6	7,620.0	8,160.1	8,646.6	9,633.4
With direct investment at market value	4,270.4	5,010.9	6,201.9	7,249.9	8,437.1	8,982.2	9,206.9	9,166.7	10,515.0
Foreign official assets in the United States	682.9	820.8	873.7	896.2	951.1	1,030.7	1,082.3	1,212.7	1,474.2
U.S. Government securities	507.5	631.1	648.2	669.8	693.8	756.2	831.5	954.9	1,145.0
U.S. Treasury securities	490.0	606.4	615.1	622.9	617.7	639.8	704.6	796.4	956.7
Other	17.5	24.7	33.1	46.8	76.1	116.4	126.9	158.4	188.4
Other U.S. Government liabilities	23.6	22.6	21.7	18.4	21.1	19.3	17.0	17.1	16.6
U.S. liabilities reported by U.S. banks, not included elsewhere	107.4	113.1	135.4	125.9	138.8	153.4	123.4	144.6	190.6
Other foreign official assets	44.4	54.0	68.4	82.1	97.3	101.8	110.4	96.0	122.0
Other foreign assets:									
With direct investment at current cost	3,261.9	3,706.5	4,514.9	5,094.7	5,789.5	6,589.3	7,077.8	7,433.8	8,159.2
With direct investment at market value	3,587.5	4,190.0	5,328.1	6,353.7	7,486.0	7,951.5	8,124.6	7,954.0	9,040.8
Direct investment in the United States:									
At current cost	680.1	745.6	824.1	920.0	1,101.7	1,421.0	1,513.5	1,505.2	1,554.0
At market value	1,005.7	1,229.1	1,637.4	2,179.0	2,798.2	2,783.2	2,560.3	2,025.3	2,435.5
U.S. Treasury securities	327.0	433.9	538.1	543.3	440.7	381.6	358.5	457.7	542.5
U.S. securities other than U.S. Treasury securities	969.8	1,165.1	1,512.7	1,903.4	2,351.3	2,623.0	2,821.4	2,786.6	3,391.1
Corporate and other bonds	459.1	539.3	618.8	724.6	825.2	1,068.6	1,343.1	1,600.4	1,853.0
Corporate stocks	510.8	625.8	893.9	1,178.8	1,526.1	1,554.4	1,478.3	1,186.2	1,538.1
U.S. currency	169.5	186.8	211.6	228.3	250.7	256.0	279.8	301.3	317.9
U.S. liabilities to unaffiliated foreigners reported by U.S. nonbanking concerns	300.4	346.8	459.4	485.7	578.0	738.9	798.3	864.6	466.5
U.S. liabilities reported by U.S. banks, not included elsewhere	815.0	828.2	968.8	1,014.0	1,067.2	1,168.7	1,306.4	1,518.4	1,887.2

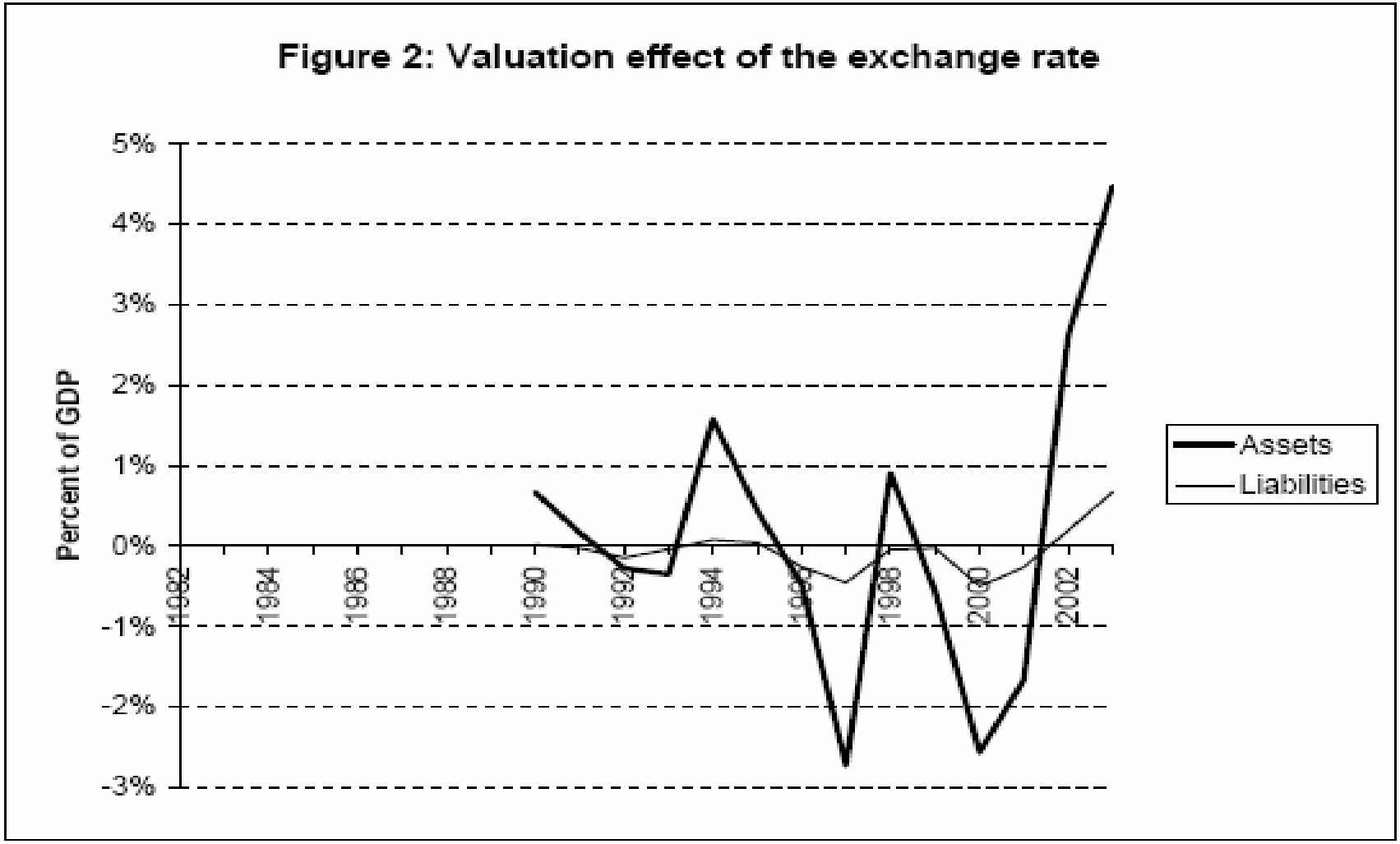
Graphically



A Puzzle

- Recently, each year the NIIP declines by *less* than the current account deficit
- Until recently, net income was positive, even though the US has been a net debtor
- Tille early on noted

A possible resolution



Tille (2005)

Why this valuation effect?

Table 2: Currency composition of U.S. assets and liabilities
end 2003, $ billions

	Assets						
	Official	FDI	Equity	Debt	Banks	Other	Total
Total	268.3	2,730.3	1,972.2	502.1	1,776.3	614.7	7,864.0
US $	190.6	14.8	11.4	333.7	1,671.9	490.5	2,712.8
Non-US $	77.8	2,715.5	1,960.8	168.5	104.4	124.2	5,151.1
Euro	21.9	817.8	564.5	90.1			1,494.3
U.K. pound		422.8	433.7	16.4			872.9
Japanese yen	17.6	112.1	208.8	25.1			363.6
Canadian dollar		293.7	109.6	21.5			424.7
Swiss franc		132.0	92.5	0.1			224.6
Latin American curr.		203.7	63.2	0.5			267.4
Caribbean curr.		238.7	208.5	0.2			447.5
M-East and African curr.		57.8	29.3	1.0			88.1
Other European curr.		100.9	58.8	8.2			168.0
Other Asian curr.		335.9	191.6	5.3			532.8
Other	38.2		0.2		104.4	124.2	267.0

Tille (2005)

Liabilities are also in USD

	Liabilities							
	Official	FDI	Equity	Debt	Treasury	Banks	Other (1)	Total
Total	1,474.2	2,435.5	1,538.1	1,853.0	542.5	1,887.2	784.5	10,515.0
US $	1,474.2	2,435.5	1,538.1	1,442.5	542.5	1,825.7	722.0	9,980.5
Non-US $				410.5		61.5	62.4	534.4
Euro				247.6				247.6
U.K. pound				66.9				66.9
Japanese yen				64.0				64.0
Canadian dollar				1.5				1.5
Swiss franc				19.0				19.0
Latin American curr.								
Caribbean curr.								
M-East and African curr.								
Other European curr.								
Other Asian curr.				2.9				2.9
Other				8.6		61.5	62.4	132.5

(1): includes U.S. currency held abroad

Two way causality dollar & net debt?

- These calculations indicate that dollar movements can have a large impact
- Up to nearly the entire current account deficit can be financed by valuation effects
- As long as the dollar continues to decline.
- If the dollar affects NIIP, could it be that NIIP affects the dollar?

Gourinchas-Rey

- Propose a framework for NFA-ex rate movements
- Builds upon reversion to trend in NFA
- And an intertemporal budget constraint
- So a deficit can be closed by either the traditional trade channel (net exports), or
- Closed by revaluation effects
- NB: depreciation works in same direction

Some Algebra

$$NA_{t+1} = R_{t+1}\left(NA_t + NX_t\right) \tag{1}$$

NX_t represents net exports, defined as the difference between exports X_t and imports M_t, and net foreign assets NA_t are defined as the difference between gross foreign assets A_t and gross foreign liabilities L_t, measured in the domestic currency.[3] Equation (1) states that the net foreign position increases with net exports and with the *total* return on the net foreign asset portfolio R_{t+1}.[4]

$$NX/NA = \rho - 1 < 0 \tag{2}$$

where $\rho = \gamma/R < 1$

Log linearization

$$\Delta na_{t+1} = r_{t+1} + \left(\frac{1}{\rho} - 1\right)(nx_t + na_t) \tag{3}$$

$nx_t = |\mu_x| x_t - |\mu_m| m_t$ is a linear combination of log exports and imports

$$\mu_x = \frac{\mu_{xw}}{\mu_{xw} - \mu_{mw}}; \ \mu_m = \mu_x - 1 \tag{4}$$

$$na_t = |\mu_a| a_t - |\mu_l| l_t$$

$$\mu_a = \frac{\mu_{aw}}{\mu_{aw} - \mu_{lw}}; \ \mu_l = \mu_a - 1 \tag{5}$$

Returns and nxa

$$r_{t+1} \approx |\mu_a| \, r^a_{t+1} - |\mu_l| \, r^l_{t+1} \tag{6}$$

$$nxa_t \text{ as } nx_t + na_t = |\mu_x| \, x_t - |\mu_m| \, m_t + |\mu_a| \, a_t - |\mu_l| \, l_t$$

No-Ponzi, solutions

$$\lim_{j \longrightarrow \infty} \rho^j nxa_{t+j} = 0 \ a.s.$$

$$nxa_t = -\sum_{j=1}^{+\infty} \rho^j \left[r_{t+j} + \Delta nx_{t+j} \right] \tag{7}$$

$$nxa_t = -\sum_{j=1}^{+\infty} \rho^j E_t \left[r_{t+j} + \Delta nx_{t+j} \right] \tag{8}$$

Key exchange rate implication

different channel: a predictable wealth transfer from foreigners to US residents. The role of the exchange rate can be illustrated by considering the case where gross liabilities are denominated in domestic currency while gross assets are in foreign currencies. We can then rewrite r_{t+1} as:

$$r_{t+1} = |\mu_a| \left(\tilde{r}^a_{t+1} + \Delta e_{t+1}\right) - |\mu_l| \, \tilde{r}^l_{t+1} - \pi_{t+1} \tag{9}$$

where $\tilde{r}^a_{t+1}$ and $\tilde{r}^l_{t+1}$ represent the gross *nominal* returns *in local currency*, Δe_{t+1} the rate of depreciation of the domestic currency and π_{t+1} the realized rate of domestic inflation between periods t and $t+1$. Holding local currency returns constant, a currency depreciation increases the return on gross assets (held in foreign currency), an effect that is magnified by the degree of leverage of the net foreign asset portfolio when $|\mu_a| > 1$.

Empirics

Estimate via dynamic OLS:

$$
\begin{aligned}
x_t &= \alpha_m + \beta_m m_t + \sum_{i=-k}^{k} b_{m,i} \Delta m_{t-i} + \epsilon_{mt} \qquad (10) \\
a_t &= \alpha_l + \beta_l l_t + \sum_{i=-k}^{k} b_{l,i} \Delta l_{t-i} + \epsilon_{lt} \\
x_t &= \alpha_a + \beta_a a_t + \sum_{i=-k}^{k} b_{a,i} \Delta a_{t-i} + \epsilon_{at}
\end{aligned}
$$

Nxa & “Normalized” *nxa*

$$nxa_t = |\mu_m| xm_t + |\mu_l| al_t + xa_t.$$

$$nxa_t = \left|\frac{\mu_m}{\mu_x}\right| xm_t - \left|\frac{\mu_l}{\mu_x}\right| al_t + \frac{1}{|\mu_x|} xa_t$$

$$nxa_t = x_t - 0.91m_t + 0.79a_t - 0.47l_t$$

More on *nxa*

- *Nxa* is normalized so export weight is unity
- This means it’s measured in same units as exports.
- Interpretation: *nxa* is (approx.) the %age increase in exports necessary to restore ext. balance
- i.e. compensate for the dev. fm trend of *nx*

Econometrics

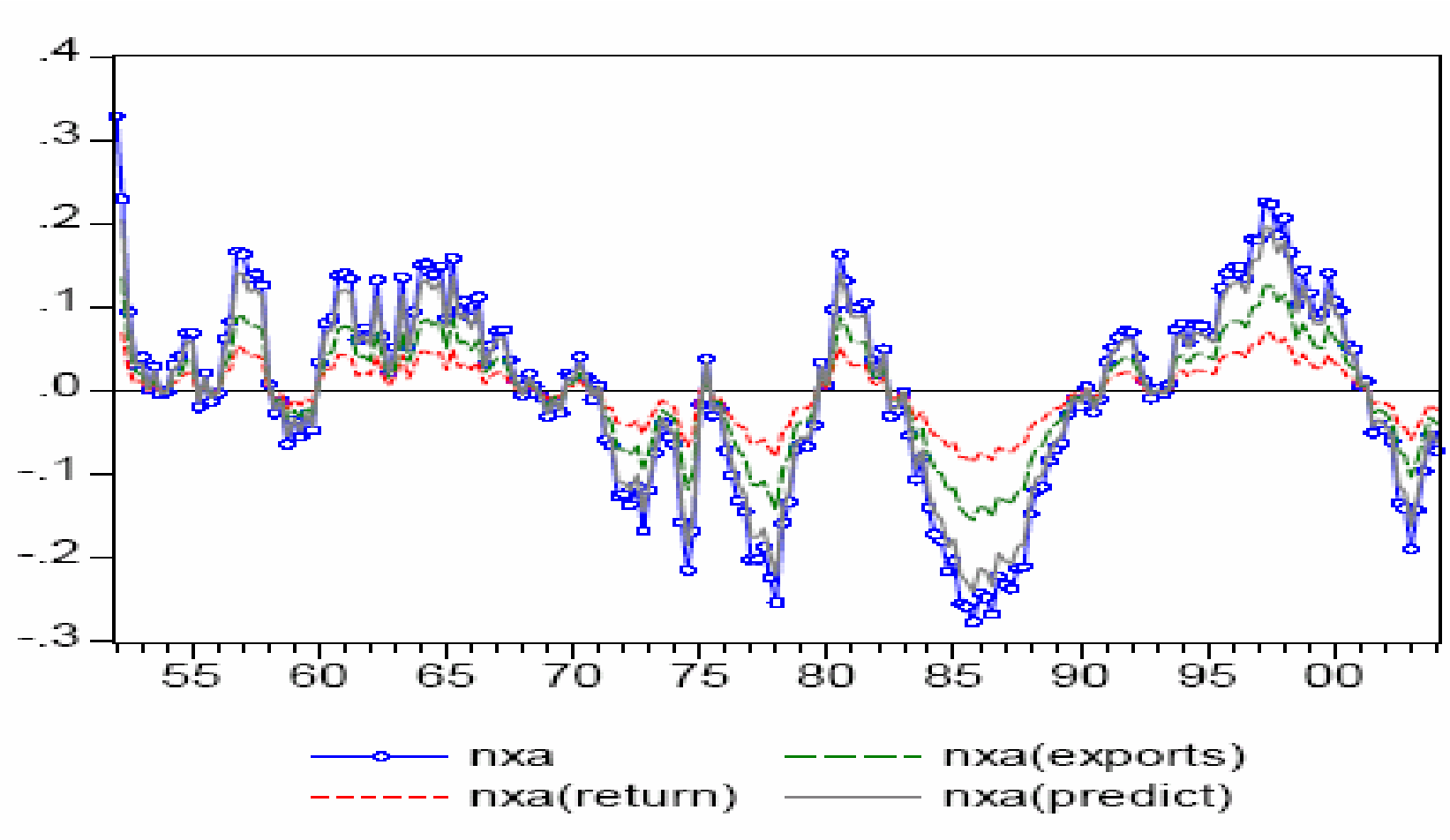
$$
\begin{aligned}
nxa_t &= -\sum_{j=1}^{+\infty} \rho^j E_t r_{t+j} - \sum_{j=1}^{+\infty} \rho^j E_t \Delta nx_{t+j} \qquad (11) \\
&\equiv nxa_t^r + nxa_t^{\Delta nx}
\end{aligned}
$$

First part: component that f'casts future ret.

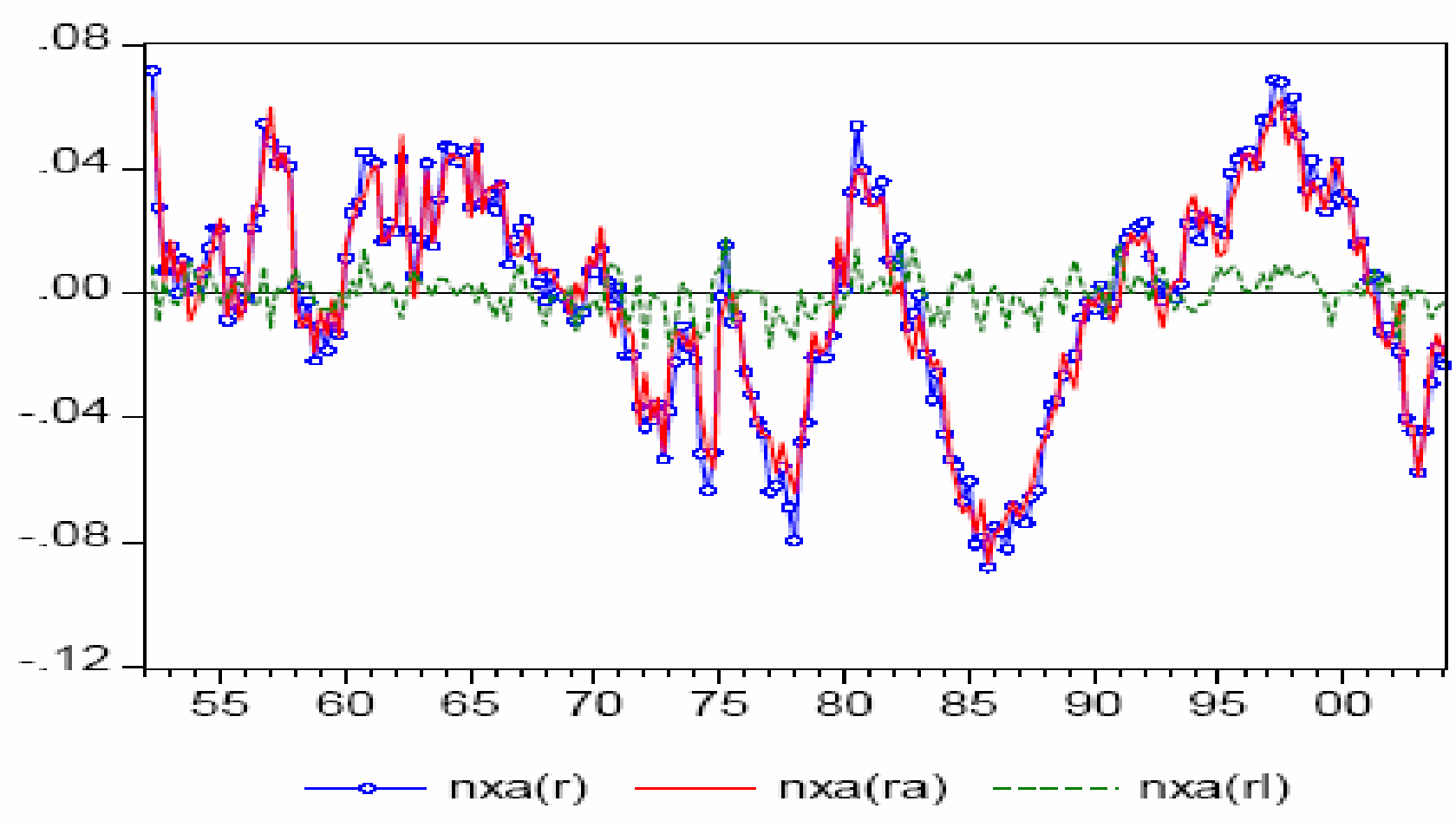
Second: component that f'casts nx growth

Estimate using VAR

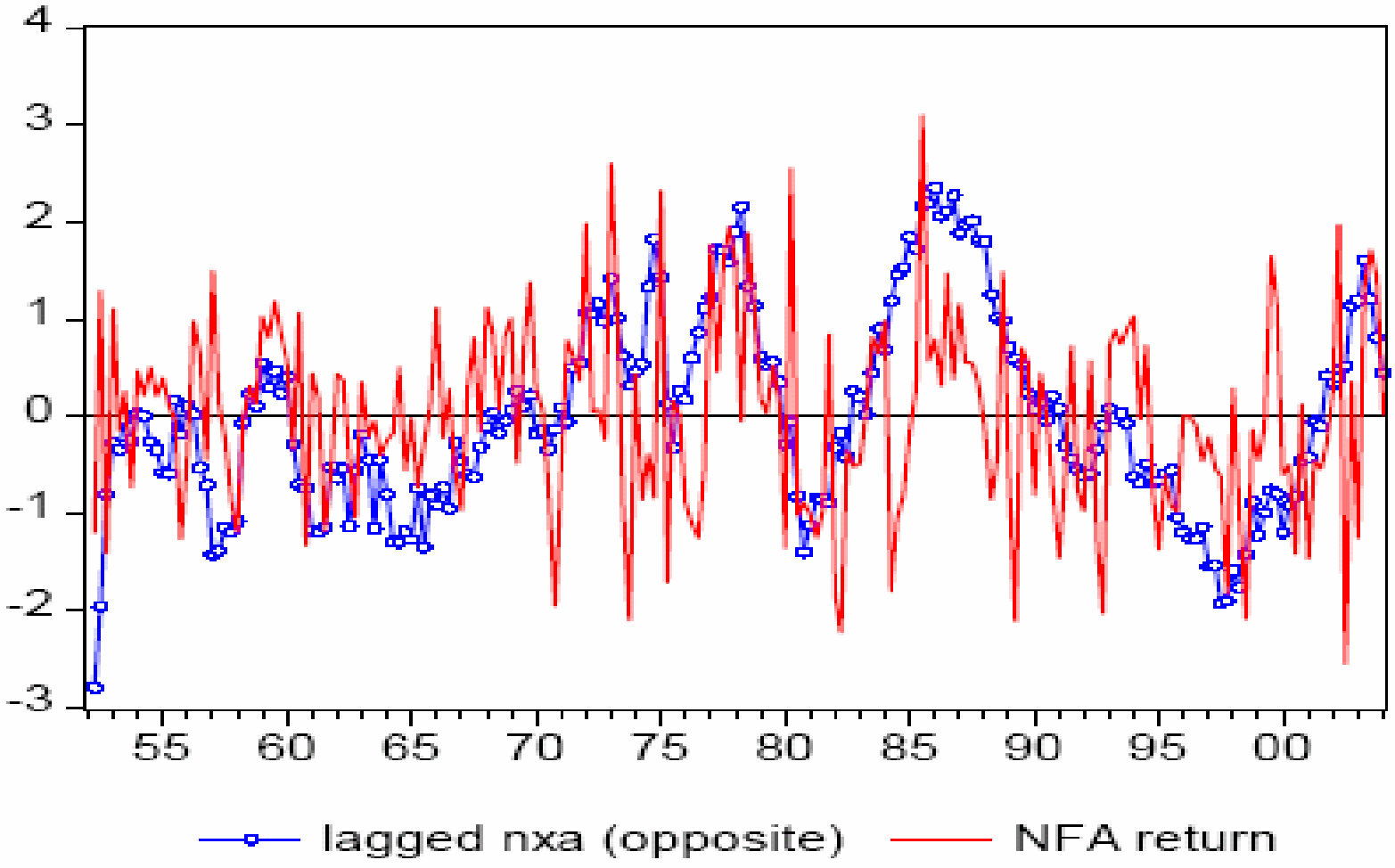
Decomposition (I)



Decomposition (II)



Prediction?


4
3
2
1
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55
60
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85
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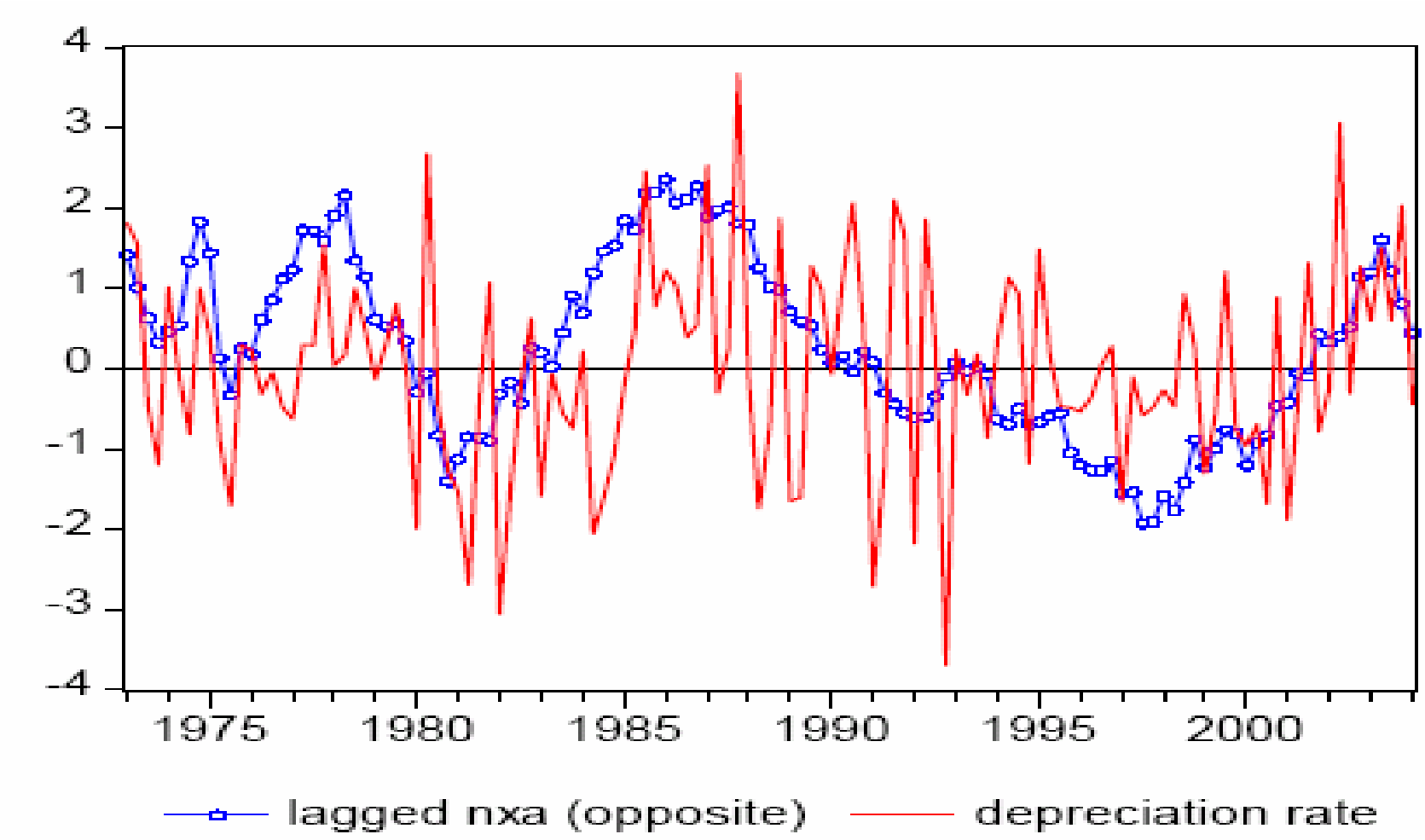
lagged nxa (opposite)
NFA return

Prediction of exchange rate?



Forecasting returns

#	nxa_{t-1} (s.e.)	lag (s.e.)	dp_{t-1} (s.e.)	dp^*_{t-1} (s.e.)	xm_{t-1} (s.e.)	R^2
	Panel A: Real Total Net Foreign Portfolio Return r_t					
1	**-0.41**					0.10
	(0.08)					
2		0.15				0.02
		(0.08)				
3			-0.37	0.90		0.00
			(2.43)	(2.02)		
4					**-0.42**	0.07
					(0.10)	
5	**-0.32**				-0.17	0.10
	(0.11)				(0.13)	
6	**-0.58**	0.06	-3.18	1.28	0.01	0.15
	(0.21)	(0.08)	(2.06)	(1.75)	(0.29)	

Forecasting gross liabilities returns

#	nxa_{t-1} (s.e.)	lag (s.e.)	dp_{t-1} (s.e.)	cay_{t-1} (s.e.)	R^2
	Panel C: Real Total Return on Gross Liabilities				
1	0.00				0.00
	(0.02)				
2		**0.17**			0.03
		(0.07)			
3			0.37		0.01
			(0.23)		
4				**0.78**	0.10
				(0.18)	
5	0.01	**0.18**	0.20	**0.72**	0.13
	(0.02)	(0.06)	(0.23)	(0.17)	

Forecasting gross assets returns

nxa_{t-1} (s.e.)	lag (s.e.)	dp^*_{t-1} (s.e.)	R^2
Panel E: Real Total Return on Gross Assets			
-0.04 (0.02)			0.03
	0.11 (0.09)		0.01
		0.08 (0.24)	0.00
-0.05 (0.03)	0.07 (0.10)	-0.02 (0.24)	0.02

Predicting exchange rates

Currency	nxa_{t-1} (s.e.)	R^2
UK pound	**-0.07**	0.03
	(0.03)	
Canadian dollar	-0.02	0.01
	(0.02)	
Swiss franc	**-0.16**	0.08
	(0.04)	
Japanese yen	**-0.12**	0.06
	(0.04)	
Deutschmark (Euro)	**-0.16**	0.10
	(0.04)	

What matters at what horizon

	Forecast Horizon (quarters)							
	1	2	3	4	8	12	16	24
	Real Total Net Portfolio Return $r_{t,k}$							
nxa	**-0.41**	**-0.40**	**-0.41**	**-0.39**	**-0.27**	**-0.18**	**-0.12**	**-0.04**
	(0.08)	(0.06)	(0.05)	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)
$\bar{R}^2(1)$	[0.10]	[0.17]	[0.24]	[0.27]	[0.24]	[0.15]	[0.10]	[0.02]
$\bar{R}^2(2)$	[0.12]	[0.22]	[0.31]	[0.35]	[0.32]	[0.22]	[0.14]	[0.04]
	Real Total Excess Equity Return $r^{ae}_{t,k} - r^{le}_{t,k}$							
nxa	**-0.12**	**-0.12**	**-0.11**	**-0.11**	**-0.06**	**-0.03**	-0.01	0.02
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
$\bar{R}^2$ (1)	[0.06]	[0.10]	[0.14]	[0.15]	[0.09]	[0.03]	[0.00]	[0.02]
$\bar{R}^2$ (2)	[0.09]	[0.17]	[0.23]	[0.26]	[0.20]	[0.11]	[0.07]	[0.13]
	Net Export growth $\Delta nx_{t,k}$							
nxa	**-0.07**	**-0.07**	**-0.06**	**-0.06**	**-0.05**	**-0.05**	**-0.05**	**-0.03**
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\bar{R}^2$ (1)	[0.04]	[0.07]	[0.09]	[0.11]	[0.18]	[0.27]	[0.33]	[0.36]
$\bar{R}^2$ (2)	[0.03]	[0.07]	[0.10]	[0.15]	[0.35]	[0.56]	[0.66]	[0.77]
	FDI-weighted effective nominal rate of depreciation $\Delta e_{t,k}$							
nxa	**-0.08**	**-0.08**	**-0.08**	**-0.07**	**-0.07**	**-0.05**	**-0.04**	**-0.02**
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\bar{R}^2$ (1)	[0.08]	[0.14]	[0.24]	[0.28]	[0.35]	[0.36]	[0.32]	[0.14]
$\bar{R}^2$ (2)	[0.11]	[0.22]	[0.37]	[0.44]	[0.57]	[0.61]	[0.61]	[0.35]

How does this paper fit in?

- Brings back in wealth
- Bonds and other assets matter
- Net foreign assets matter
- Nfa is trend reverting, so implies cointegration
- Implies something is predictable
- Exchange rates and net exports at different horizons