Intellectual Property Rights and Developing Countries: Theory and Evidence

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The global movement to strengthen IPR has been controversial

- This movement began in the United States, but quickly took on an international dimension
- Developing countries still object to this shift, long after TRIPs ratification
  - Higher prices for patent-protected goods
  - Stronger IPR may retard Southern industrial development
- Advocates of stronger IPR continue to argue that reform has had positive effects
  - Stronger incentives for local firms to innovate
  - Stronger incentives for MNCs to transfer production of more sophisticated goods to their Southern affiliates, promoting Southern industrial development

USA! HANDS OFF OUR MEDICINE
STOP THE TRANS PACIFIC PARTNERSHIP'S ATTACK ON GENERIC MEDICINES

Limited evidence that stronger IPR in developing countries promotes indigenous innovation

- Grossman and Lai (2004): advanced country markets already provide an incentive for innovation
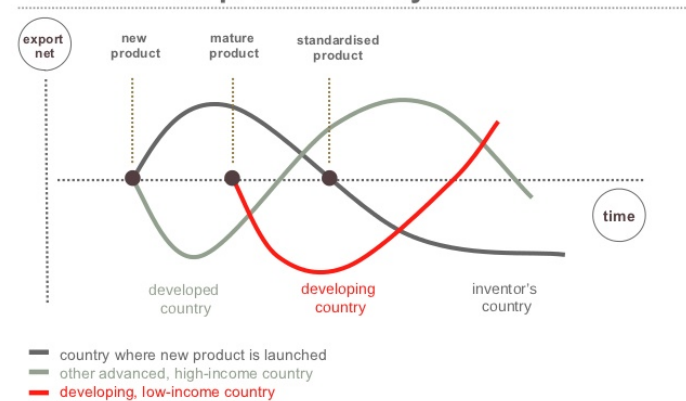
- Studies of large samples of patent reforms generate limited evidence in favor of a strong, short-term impact on innovation
  - Lerner (2002)
  - Moser (2005)
  - Qian (2007)
  - Kanwar and Evenson (2003)

- Evidence from econometric case studies of particular reforms is mixed
  - Sakakibara and Branstetter (2001)
  - Lo (2005)

How do trade economists think about the impact of stronger IPR in the South on the global economy?

- **Grossman and Helpman (1991) and Helpman (1993)**: There is an international product cycle; innovation occurs in the North, and that is where new goods are initially produced
- Over time, production of established goods shifts to the low-wage South, via imitation by Southern producers or the transfer of production to the Southern affiliates of Northern multinationals
- This shifting of production is good for North and South; production of existing varieties can be done more cheaply in the South; Northern resources can be reallocated from production to R&D, increasing global innovation
- The strength of the Southern IPR regime can influence the *speed* at which production of Northern goods shifts to the South, the *share* of the South in global manufacturing production at any point in time, and the *pace* of global innovation – positively *or* negatively

international product life cycle

export net — new product — mature product — standardised product

developed country   developing country   inventor's country

— country where new product is launched
— other advanced, high-income country
— developing, low-income country

based on: Raymond Vernon , 1966. *International investment and international trade in the product cycle*, The Quarterly Journal of Economics, 80(2), pp. 190-207.

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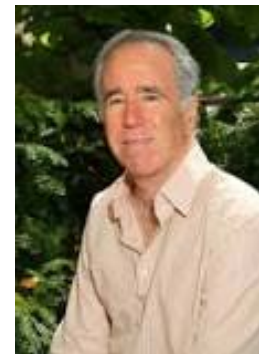


Gene Grossman

Elhanan Helpman

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The role of FDI is crucial in these models

- If Northern multinationals do *not* respond, then stronger IPR in the South can slow down the product cycle, retarding Southern industrial development and slowing global innovation (Helpman, 1993; Glass and Saggi, 2001)
  - Stronger IPR in the South slows down imitation; "production shifting" decelerates; Southern wages and terms of trade are lower
  - Northern resources are tied up in production, so global innovation decelerates
- If Northern multinationals respond by shifting more production to the South, the opposite result can obtain (Lai, 1998)
  - Stronger IPR in the South slows down imitation; but the response of multinationals more than compensates; net increase in production shifting to the South; South's share of global manufacturing rises
  - More goods shift to the South than would do so under weak IPR, freeing up resources in the North to invest in R&D

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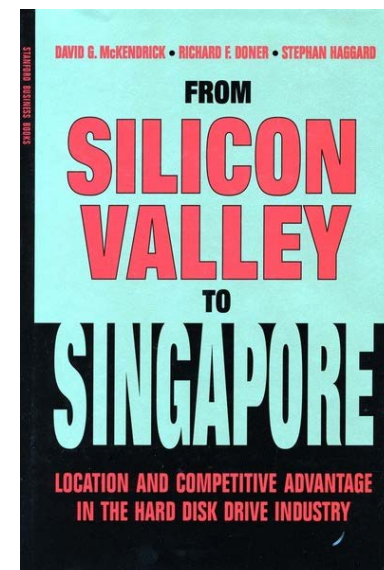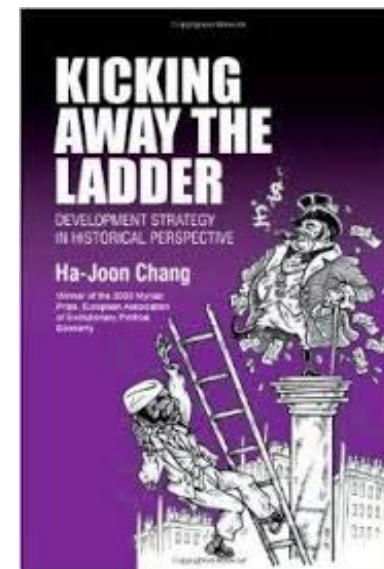
Stronger IPR enhances Southern industrial development

- U.S. affiliates appear to expand the scale of their operations, with especially strong effects for the affiliates of "technology-intensive" firms

- Technology transfer to and R&D spending by affiliates of "technology-intensive" firms increase

- Analysis of highly disaggregated trade data and industry output data suggests that any decrease in "Southern imitation" is more than offset by an expansion of production-shifting through multinationals
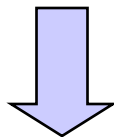
Evidence for increased production shifting

Complementary evidence

- Lee and Mansfield (1996)

- Nunnenkamp and Spatz (2004)

- Javorcik (2004)

- Ito and Wakasugi (2009)

- Poole (2010)

- Hu and Png (2010)

- Bilir (2014)

Stronger IPR can play a constructive role in the process of industrial development

■ Stronger IPR can enhance FDI

■ FDI inflows can support industrial development

■ The diffusion of knowledge from foreign affiliates can benefit indigenous firms

■ Progress on IPR can be an important part of an industrial development agenda

Empirical specifications

(53)
$$Inputs_{ilt} = \alpha_0 + \alpha_{il} + \alpha_t + \beta_0 y_{jt} + \beta_1 P_{it} + \beta_2 H_{jt} + \beta_3 A_{ilt} +$$
$$\beta_4 R_{jt} + \beta_5 R_{jt} * Tech_{il} + \varepsilon_{ilt}$$

$$Transfer_{ilt} = \alpha_0 + \alpha_{il} + \alpha_t + \beta_0 y_{jt} + \beta_1 P_{it} + \beta_2 H_{jt} + \beta_3 A_{ilt} +$$
$$\beta_4 R_{jt} + \beta_5 R_{jt} * Tech_{il} + \varepsilon_{ilt}$$

$$R \& D_{ilt} = \alpha_0 + \alpha_{il} + \alpha_t + \beta_0 y_{jt} + \beta_1 P_{it} + \beta_2 H_{jt} + \beta_3 A_{ilt} +$$
$$\beta_4 R_{jt} + \beta_5 R_{jt} * Tech_{il} + \varepsilon_{ilt}$$

(54)
$$VA_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_t + \beta_0 y_{jt} + \beta_1 H_{jt} + \beta_2 R_{jt} + \beta_3 R_{jt} * Tech_i + \varepsilon_{ijt}$$

(55)
$$P_{jt} = \alpha_0 + \alpha_j + \alpha_t + \beta_1 H_{jt} + \beta_2 R_{jt} + \varepsilon_{jt}$$

Table 4 – U.S. Multinational Responses to Patent Reform

Dependent Variable:	Log of Affiliate Assets		Log of Affiliate Net PPE		Log of Affiliate Employment Compensation	
	(1)	(2)	(3)	(4)	(5)	(6)
Post Reform Dummy	**0.1590**	**0.1114**	**0.1248**	**0.0245**	**0.1634**	**0.1210**
	(0.0140)	**(0.0173)**	**(0.0328)**	**(0.0430)**	**(0.0157)**	**(0.0205)**
Post Reform Dummy * High Technology Transfer Dummy		**0.0912**		**0.1882**		**0.0790**
		(0.0181)		**(0.0443)**		**(0.0217)**
Host Country Trade Openness	0.0063	0.0062	0.0072	0.0071	0.0001	0.0001
	(0.0016)	(0.0016)	(0.0035)	(0.0035)	(0.0016)	(0.0016)
Log of Host Country GDP per Capita	0.3335	0.3406	0.6986	0.7166	0.4639	0.4713
	(0.1522)	(0.1518)	(0.2916)	(0.2908)	(0.1904)	(0.1900)
Log of Host Country GDP	0.9086	0.9037	-0.1305	-0.1374	0.6229	0.6179
	(0.1635)	(0.1632)	(0.3234)	(0.3226)	(0.1928)	(0.1924)
Real Exchange Rate	-0.3179	-0.3161	-0.3280	-0.3231	-0.3673	-0.3657
	(0.0198)	(0.0198)	(0.0483)	(0.0483)	(0.0238)	(0.0238)
Log of Parent R&D Expenditures	0.0079	0.0076	0.0322	0.0315	0.0056	0.0054
	(0.0036)	(0.0035)	(0.0089)	(0.0089)	(0.0040)	(0.0040)
Log of Parent System Sales	0.0461	0.0467	0.0544	0.0555	0.0596	0.0601
	(0.0089)	(0.0088)	(0.0143)	(0.0143)	(0.0093)	(0.0093)
No. of Obs.	26,184	26,184	22,342	22,342	24,844	24,844
R-Squared	0.8882	0.8884	0.8375	0.8377	0.8788	0.8789

Empirical specifications

(53)
$$Inputs_{ilt} = \alpha_0 + \alpha_{il} + \alpha_t + \beta_0 y_{jt} + \beta_1 P_{it} + \beta_2 H_{jt} + \beta_3 A_{ilt} +$$
$$\beta_4 R_{jt} + \beta_5 R_{jt} * Tech_{il} + \varepsilon_{ilt}$$

$$Transfer_{ilt} = \alpha_0 + \alpha_{il} + \alpha_t + \beta_0 y_{jt} + \beta_1 P_{it} + \beta_2 H_{jt} + \beta_3 A_{ilt} +$$
$$\beta_4 R_{jt} + \beta_5 R_{jt} * Tech_{il} + \varepsilon_{ilt}$$

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(54)
$$VA_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_t + \beta_0 y_{jt} + \beta_1 H_{jt} + \beta_2 R_{jt} + \beta_3 R_{jt} * Tech_i + \varepsilon_{ijt}$$

(55)
$$P_{jt} = \alpha_0 + \alpha_j + \alpha_t + \beta_1 H_{jt} + \beta_2 R_{jt} + \varepsilon_{jt}$$

Empirical specifications

(53) $Inputs_{ilt} = \alpha_0 + \alpha_{il} + \alpha_t + \beta_0 y_{jt} + \beta_1 P_{it} + \beta_2 H_{jt} + \beta_3 A_{ilt} + \beta_4 R_{jt} + \beta_5 R_{jt} * Tech_{il} + \varepsilon_{ilt}$

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(55) $P_{jt} = \alpha_0 + \alpha_j + \alpha_t + \beta_1 H_{jt} + \beta_2 R_{jt} + \varepsilon_{jt}$

Table 4 – Multinational Response to Patent Reform

Dependent Variable:	100 X Log of Intrafirm Royalty Payments/ Affiliate Sales		100 X Log of R&D Expenditures/ Affiliate Sales	
	(7)	(8)	(9)	(10)
Post Reform Dummy	**0.0787**	**-0.1311**	**0.0151**	**-0.0129**
	(0.0268)	**(0.0274)**	**(0.0232)**	**(0.0252)**
Post Reform Dummy * High Technology Transfer Dummy		**0.3985**		**0.0546**
		(0.0323)		**(0.0275)**
Host Country Trade Openness	-0.0072	-0.0074	0.0016	0.0016
	(0.0029)	(0.0029)	(0.0020)	(0.0020)
Log of Host Country GDP per Capita	0.6684	0.6963	0.0129	0.0196
	(0.3208)	(0.3193)	(0.4142)	(0.4135)
Log of Host Country GDP	0.0196	-0.0007	-0.0512	-0.0537
	(0.3357)	(0.3339)	(0.4115)	(0.4109)
Real Exchange Rate	-0.1181	-0.1097	0.0566	0.0578
	(0.0403)	(0.0401)	(0.0373)	(0.0373)
Log of Parent R&D Expenditures	0.0079	0.0072	0.0074	0.0072
	(0.0041)	(0.0040)	(0.0027)	(0.0027)
Log of Parent System Sales	0.0087	0.0058	-0.0019	-0.0015
	(0.0091)	(0.0092)	(0.0039)	(0.0039)
No. of Obs.	25,600	25,600	16,143	16,143
R-Squared	0.6625	0.6651	0.6644	0.6645

Empirical specifications

$$(53) \quad Inputs_{ilt} = \alpha_0 + \alpha_{il} + \alpha_t + \beta_0 y_{jt} + \beta_1 P_{it} + \beta_2 H_{jt} + \beta_3 A_{ilt} +$$
$$\beta_4 R_{jt} + \beta_5 R_{jt} * Tech_{il} + \varepsilon_{ilt}$$

$$Transfer_{ilt} = \alpha_0 + \alpha_{il} + \alpha_t + \beta_0 y_{jt} + \beta_1 P_{it} + \beta_2 H_{jt} + \beta_3 A_{ilt} +$$
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$$(55) \quad P_{jt} = \alpha_0 + \alpha_j + \alpha_t + \beta_1 H_{jt} + \beta_2 R_{jt} + \varepsilon_{jt}$$

Table 5 Impact of Reform on Industry Value-Added

Dependent Variable:	Log of Industry Value Added					
Sample:	All Reforms			Drop China and Argentina		
	(1)	(2)	(3)	(4)	(5)	(6)
Post Reform Dummy	0.0956	0.0731	0.0501	0.0605	0.0383	0.0226
	(0.0167)**	(0.0173)**	(0.0203)*	(0.0188)**	(0.0194)*	(0.0226)
Post Reform Dummy * Technology Intensive Dummy		0.1252			0.1222	
		(0.0252)**			(0.0275)**	
Post Reform Dummy * High FDI Dummy			0.0924			0.0888
			(0.0211)**			(0.0234)**
Host Country Corporate Tax Rate	-0.1503	-0.1506	-0.1140	-0.0937	-0.0933	-0.0748
	(0.1107)	(0.1106)	(0.1147)	(0.1291)	(0.1290)	(0.1342)
Host Country Inward FDI Restrictions	-0.2450	-0.2448	-0.2350	-0.2381	-0.2375	-0.2320
	(0.1012)*	(0.1016)*	(0.1098)*	(0.1012)*	(0.1016)*	(0.1097)*
Host Country Capital Controls	0.0851	0.0853	0.0602	0.2097	0.2097	0.1819
	(0.0329)**	(0.0328)**	(0.0336)	(0.0336)**	(0.0334)**	(0.0338)**
Host Country Trade Openness	0.0008	0.0008	-0.0001	0.0002	0.0002	-0.0012
	(0.0023)	(0.0023)	(0.0023)	(0.0028)	(0.0028)	(0.0029)
Log of Host Country GDP per Capita	2.1138	2.1157	2.0320	2.4143	2.4141	2.3596
	(0.1488)**	(0.1485)**	(0.1551)**	(0.2007)**	(0.2001)**	(0.2130)**
Log of Real Exchange Rate	-0.3417	-0.3420	-0.3253	-0.4025	-0.4029	-0.3798
	(0.0318)**	(0.0316)**	(0.0309)**	(0.0413)**	(0.0411)**	(0.0399)**
No. of Obs.	6,884	6,884	6,183	6,069	6,069	5,427
R-Squared	0.9595	0.9596	0.9582	0.9584	0.9586	0.9570

Table 5 Impact of Reform on Industry Value-Added

Dependent Variable:	Log of Industry Value Added					
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	(1)	(2)	(3)	(4)	(5)	(6)
Post Reform Dummy	0.0956	0.0731	0.0501	0.0605	0.0383	0.0226
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Post Reform Dummy * Technology Intensive Dummy		0.1252			0.1222	
		(0.0252)**			(0.0275)**	
Post Reform Dummy * High FDI Dummy			0.0924			0.0888
			(0.0211)**			(0.0234)**
Host Country Corporate Tax Rate	-0.1503	-0.1506	-0.1140	-0.0937	-0.0933	-0.0748
	(0.1107)	(0.1106)	(0.1147)	(0.1291)	(0.1290)	(0.1342)
Host Country Inward FDI Restrictions	-0.2450	-0.2448	-0.2350	-0.2381	-0.2375	-0.2320
	(0.1012)*	(0.1016)*	(0.1098)*	(0.1012)*	(0.1016)*	(0.1097)*
Host Country Capital Controls	0.0851	0.0853	0.0602	0.2097	0.2097	0.1819
	(0.0329)**	(0.0328)**	(0.0336)	(0.0336)**	(0.0334)**	(0.0338)**
Host Country Trade Openness	0.0008	0.0008	-0.0001	0.0002	0.0002	-0.0012
	(0.0023)	(0.0023)	(0.0023)	(0.0028)	(0.0028)	(0.0029)
Log of Host Country GDP per Capita	2.1138	2.1157	2.0320	2.4143	2.4141	2.3596
	(0.1488)**	(0.1485)**	(0.1551)**	(0.2007)**	(0.2001)**	(0.2130)**
Log of Real Exchange Rate	-0.3417	-0.3420	-0.3253	-0.4025	-0.4029	-0.3798
	(0.0318)**	(0.0316)**	(0.0309)**	(0.0413)**	(0.0411)**	(0.0399)**
No. of Obs.	6,884	6,884	6,183	6,069	6,069	5,427
R-Squared	0.9595	0.9596	0.9582	0.9584	0.9586	0.9570

Empirical specifications

(53)
$$Inputs_{ilt} = \alpha_0 + \alpha_{il} + \alpha_t + \beta_0 y_{jt} + \beta_1 P_{it} + \beta_2 H_{jt} + \beta_3 A_{ilt} +$$
$$\beta_4 R_{jt} + \beta_5 R_{jt} * Tech_{il} + \varepsilon_{ilt}$$

$$Transfer_{ilt} = \alpha_0 + \alpha_{il} + \alpha_t + \beta_0 y_{jt} + \beta_1 P_{it} + \beta_2 H_{jt} + \beta_3 A_{ilt} +$$
$$\beta_4 R_{jt} + \beta_5 R_{jt} * Tech_{il} + \varepsilon_{ilt}$$

$$R\&D_{ilt} = \alpha_0 + \alpha_{il} + \alpha_t + \beta_0 y_{jt} + \beta_1 P_{it} + \beta_2 H_{jt} + \beta_3 A_{ilt} +$$
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$$VA_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_t + \beta_0 y_{jt} + \beta_1 H_{jt} + \beta_2 R_{jt} + \beta_3 R_{jt} * Tech_i + \varepsilon_{ijt}$$

(55)
$$P_{jt} = \alpha_0 + \alpha_j + \alpha_t + \beta_1 H_{jt} + \beta_2 R_{jt} + \varepsilon_{jt}$$

Table 6 Impact of Reform on Entry into Exports of New Goods

Dependent Variable:	Count of Initial Export Episodes							
Specification Type:	Poisson				Negative Binomial			
Sample:	All Reforms		Drop Argentina and China		All Reforms		Drop Argentina and China	
Goods Categories	All Goods	Tech Goods	All Goods	Tech Goods	All Goods	Tech Goods	All Goods	Tech Goods
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post Reform Dummy	**0.2772**	**0.3182**	**0.2902**	**0.3866**	**0.2340**	**0.3420**	**0.2488**	**0.4165**
	(0.0129)**	**(0.0309)****	**(0.0148)****	**(0.0359)****	**(0.0635)****	**(0.1040)****	**(0.0716)****	**(0.1198)****
Host Country Corporate Tax Rate	0.0588	0.0949	-0.0363	0.1055	-0.2282	-1.2256	-0.1762	-0.8890
	(0.0794)	(0.1916)	(0.0961)	(0.2315)	(0.3653)	(0.5526)*	(0.4604)	(0.6793)
Host Country Inward FDI Restrictions	-0.0673	0.1598	-0.0338	0.1074	-0.1260	-0.1055	-0.1344	-0.1380
	(0.0248)**	(0.0508)**	(0.0268)	(0.0540)	(0.1187)	(0.1805)	(0.1246)	(0.1859)
Host Country Capital Controls	-0.1123	-0.1948	-0.0237	-0.0725	-0.1287	-0.1201	-0.1249	-0.1310
	(0.0198)**	(0.0559)**	(0.0226)	(0.0646)	(0.0831)	(0.1420)	(0.0970)	(0.1731)
Host Country Trade Openness	0.0110	0.0115	0.0114	0.0096	0.0057	0.0059	0.0081	0.0082
	(0.0008)**	(0.0018)**	(0.0008)**	(0.0018)**	(0.0034)	(0.0043)	(0.0038)*	(0.0047)
Log of Host Country GDP per Capita	0.0173	-0.1301	-0.1746	0.0964	-0.1582	0.0788	-0.1071	0.2670
	(0.0422)	(0.0944)	(0.0571)**	(0.1272)	(0.1571)	(0.2023)	(0.1915)	(0.2155)
Log of Real Exchange Rate	0.3140	0.2788	0.4101	0.2597	0.4106	0.2402	0.4748	0.3065
	(0.0268)**	(0.0634)**	(0.0302)**	(0.0740)**	(0.1282)**	(0.2009)	(0.1528)**	(0.1344)
No. of Obs.	176	176	154	154	176	176	154	154
Log Likelihood	-2342	-1162	-2147	-1061	-912	-691	-801	-606

Are the IPR regime changes "endogenous"?

■ Concern # 1: Countries reform IPR when they reach a "threshold" level of economic development and technological maturity
  – Our 16 reforming countries were at very *different* levels of per-capita income and development at the time of reform

■ Concern # 2: The increase in technology transfer predates reform; a change in the market environment generates more technology transfer and better protection
  – Table VI shows that the increase in technology transfer, R&D, and patenting seems to come *after* reform

■ Concern #3: The reforms in our sample were the result of precisely *targeted* and *timed* U.S. political pressure
  – In a hazard model of IPR regime change, a country's placement on America's "special 301 watch list" has *no* explanatory power
  – Diplomatic histories of IPR regime change suggest that American pressure is often resisted

Table VI

Timing of reforms

Dependent Variable:	Log of Intrafirm Royalty Payments	100 X Log of Intrafirm Royalty Payments/Affiliate Sales	Log of R&D Expenditures	Log of Non-Resident Patent Filings
	(1)	(2)	(3)	(4)
Constant	-2.0441	0.7016	-0.8979	0.8188
	(2.3708)	(1.6815)	(2.0430)	(4.7270)
Reform(t-4)	-0.0780	-0.0305	-0.0147	-0.2616
	(0.1048)	(0.0569)	(0.0777)	(0.1801)
Reform(t-3)	-0.1139	-0.0195	0.0842	-0.0541
	(0.1036)	(0.0552)	(0.0667)	(0.1041)
Reform(t-2)	-0.0638	-0.0199	0.0802	-0.0105
	(0.0319)	(0.0254)	(0.0358)	(0.1015)
Reform(t)	0.0432	0.0267	0.1509	0.2272
	(0.0560)	(0.0280)	(0.0368)	(0.1024)
Reform(t+1)	0.1265	0.0835	0.1145	0.7052
	(0.0403)	(0.0296)	(0.0577)	(0.2646)
Reform(t+2)	0.2172	0.1196	0.1639	0.6654
	(0.0631)	(0.0362)	(0.0827)	(0.2948)
Reform(t+3)	0.1990	0.1561	0.0475	0.6764
	(0.0745)	(0.0475)	(0.1050)	(0.2864)
Reform(t+4)	0.2261	0.1480	0.2093	0.7309
	(0.1160)	(0.0827)	(0.1234)	(0.2681)