Graduating to globalisation

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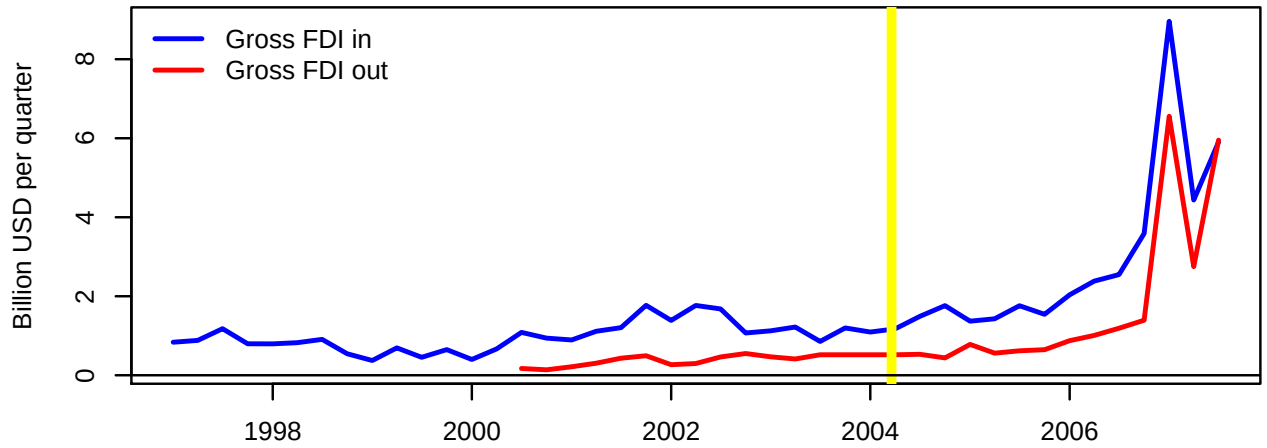
The new phenomenon of outbound FDI by Indian firms



- Outbound FDI by Indian firms has risen rapidly in recent years, starting from near-zero levels
- A surprising phenomenon. We normally expect capital to flow from rich countries to poor countries.
- What is going on?

Preview our key findings

- Understanding the behaviour of *firms* is of essence in illuminating this *macroeconomic* phenomenon
- Models of exporting at the firm level are intimately linked to models of outbound FDI at the firm level.
- There is a hierarchy where some firms graduate to globalisation with exporting, and an intensification of these very firm characteristics induces outbound FDI.

Conceptual framework

Backdrop New Trade Theory perspective on firms and internationalisation.

Helpman, Melitz, Yeaple (2003) : a firm can serve foreign markets through export or outbound FDI. In equilibrium, only the more productive firms export, and the most productive firms do outbound FDI.

Head & Ries (2003) : HMY predictions can be reversed if the foreign country is a low-cost production venue. No such risk in India.

A firm and foreign customers

Four cases;

- **D** Domestic firm
- **DX** Domestic production + exports
- **DXI** Domestic production, exports and outbound FDI
- **DI** Domestic production + outbound FDI

The **D** firm (domestic only)

Firm	Gross_Value_Added
Container Corpn. Of India Ltd.	952.11
Shipping Corpn. Of India Ltd.	1369.06
Neyveli Lignite Corpn. Ltd.	1438.89
Chennai Petroleum Corpn. Ltd.	1464.16
Unitech Ltd.	1475.02
Mahanagar Telephone Nigam Ltd.	2803.76
N M D C Ltd.	3393.02
G A I L (India) Ltd.	3559.67
Power Grid Corpn. Of India Ltd.	3727.95
N T P C Ltd.	11549.00

- Probably shielded from globalisation by staying in non-tradeables
- Probably a low-productivity firm that does not have an edge in the global market.

The **DX** firm (domestic + export)

Firm	Gross_Value_Added
I T C Ltd.	4990.62
Bharat Petroleum Corpn. Ltd.	5049.45
Reliance Communications Ltd.	5399.74
Bharat Heavy Electricals Ltd.	5648.65
Hindustan Zinc Ltd.	6841.52
Bharti Airtel Ltd.	8383.78
Steel Authority Of India Ltd.	15304.77
Indian Oil Corpn. Ltd.	16457.74
Reliance Industries Ltd.	22562.97
Oil & Natural Gas Corpn. Ltd.	33091.63

- Productive enough to sell to foreign markets
- Low wages in India + high costs of transportation
- Productivity advantage large enough to overcome costs of transportation

The **DXI** firm (domestic + export + outbound FDI)

Firm	Gross_Value_Added
H C L Technologies Ltd.	2072.97
Mahindra & Mahindra Ltd.	2276.12
Grasim Industries Ltd.	3077.70
Larsen & Toubro Ltd.	3472.00
Tata Motors Ltd.	4201.54
Satyam Computer Services Ltd.	5277.01
Tata Steel Ltd.	8804.57
Wipro Ltd.	9339.30
Infosys Technologies Ltd.	10737.88
Tata Consultancy Services Ltd.	11870.35

- Productive enough to sell to foreign markets
- Low wages in India + high costs of transportation
- High fixed costs of setting up FDI abroad are overcome by high productivity differential.

The **DI** firm (domestic + outbound FDI)

Firm	Gross_Value_Added
Chowgule Steamships Ltd.	27.93
Reliance Industrial Infrastructure Ltd.	32.24
Venus Remedies Ltd.	44.19
Sical Logistics Ltd.	91.13
Berger Paints India Ltd.	192.46
Balmer Lawrie & Co. Ltd.	193.98
Kansai Nerolac Paints Ltd.	254.29
Asian Paints Ltd.	638.11
United Spirits Ltd.	639.71
Reliance Energy Ltd.	972.84

- Non-traded sectors; unable to export
- But is a high productivity firm and jumps to serving foreign markets.

Our dataset

- CMIE Cospi index: all firms with trading frequency of over 66% over the last six months.
- We take all non-financial firms which are in this index in March 2008.
- We track them from 1997-98 till 2006-07 – 10 years of data. Firm-years with sales or assets below Rs.10 million are dropped.
- This yields unbalanced panel data.
- In 2006-07, these firms have $0.5 trillion in total assets (50% of GDP) and have exports of $87 billion (37% of total exports of goods and services).

Part I

Describing the phenomenon

Aggregate exports by these firms (billion rupees)

Year	Exports	Sales	X/S (%)
1998	500.32	5086.97	9.84
1999	515.42	5635.61	9.15
2000	589.94	6699.18	8.81
2001	756.78	7804.03	9.70
2002	830.22	8051.02	10.31
2003	1031.67	9154.18	11.27
2004	1298.39	10526.68	12.33
2005	1977.22	13181.95	15.00
2006	2431.55	15793.82	15.40
2007	3476.69	20114.06	17.28

From $12 billion to $87 billion of exports.

Count of exporting firms

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
FALSE	657	697	765	747	748	746	770	759	766	698
TRUE	960	1006	1036	1096	1101	1175	1212	1254	1309	1320

Outbound FDI by some well-known firms (billion rupees)

	Tata Tea	Ranbaxy	Tata Steel	Infosys
1998	0.00	0.00	0.00	0.00
1999	0.00	2.36	0.00	0.00
2000	0.00	2.33	0.00	0.00
2001	4.41	2.66	0.00	0.00
2002	5.07	2.33	0.02	0.67
2003	5.07	2.33	0.02	0.54
2004	5.12	2.33	0.03	1.01
2005	5.01	5.73	1.52	1.50
2006	5.12	6.62	9.73	1.81
2007	14.28	25.59	10.46	2.13

These same examples, expressed as percent of total assets

	Tata Tea	Ranbaxy	Tata Steel	Infosys
1998	0.00	0.00	0.00	0.00
1999	0.00	10.81	0.00	0.00
2000	0.00	10.41	0.00	0.00
2001	32.94	11.13	0.00	0.00
2002	35.63	9.24	0.01	2.63
2003	34.43	8.14	0.01	1.51
2004	35.75	6.36	0.02	2.03
2005	32.53	13.52	0.91	2.28
2006	30.06	13.65	5.05	1.99
2007	52.43	36.14	3.26	1.64

Aggregate foreign assets in dataset (billion rupees)

Year	For. inv.	Total Assets	FI/TA (%)
1998	0.56	6526.31	0.01
1999	3.42	7136.94	0.05
2000	8.74	7712.96	0.11
2001	82.18	8426.56	0.98
2002	105.02	9190.19	1.14
2003	127.48	10230.08	1.25
2004	123.66	11451.36	1.08
2005	165.45	13438.72	1.23
2006	245.06	16267.77	1.51
2007	387.87	20790.48	1.87

From 0 to $10 billion.

Count of FDI firms

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
FALSE	1615	1699	1774	1750	1707	1758	1792	1793	1820	1747
TRUE	2	4	27	93	142	163	190	220	255	271

Defining categorical variables

- We define “an exporting firm” as one with over 1% of sales as exports.
- We define “an outbound FDI firm” as one where overseas assets exceed 1% of total assets.
- Using this, we get four categories:
  1. Neither: **D**
  2. Exporting only: **DX**
  3. Exporting and outbound FDI]: **DXI**
  4. Outbound FDI but not export: **DI**

Counts of firms in the four categories

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
D	656	696	761	741	735	730	750	735	744	677
DI	1	1	4	6	13	16	20	24	22	21
DX	959	1003	1013	1009	972	1028	1042	1058	1076	1070
DXI	1	3	23	87	129	147	170	196	233	250
Sum	1617	1703	1801	1843	1849	1921	1982	2013	2075	2018

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Sum	1617	1703	1801	1843	1849	1921	1982	2013	2075	2018

There are just 21 DI firms.
This is consistent with the notion that there is a hierarchy from D to DX to DXI; it's hard for D firms to jump to DI.
From here on, we drop the DI firms.

Transition probabilities from category at time t to category at time $t+1$

	D	DX	DXI
D	86.45	13.33	0.23
DX	7.08	89.62	3.30
DXI	0.32	8.47	91.22

Transition probabilities from category at time t to category at time $t + 1$

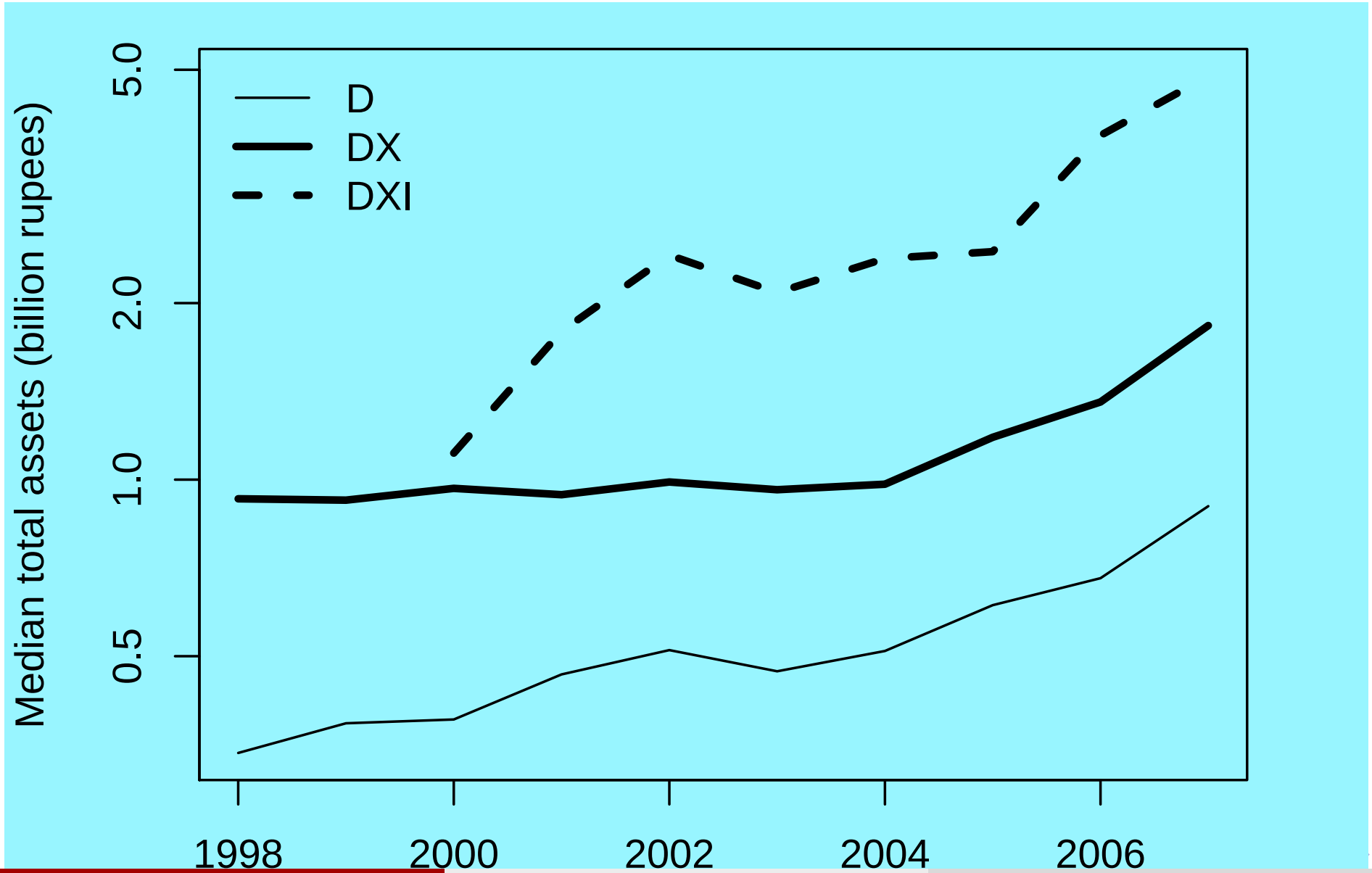
	D	DX	DXI
D	86.45	13.33	0.23
DX	7.08	89.62	3.30
DXI	0.32	8.47	91.22

Firms don't seem to fluctuate around; there's an 86 / 90 / 91 percent chance of staying in a given state.
Jumping from D to DXI is only 0.23%

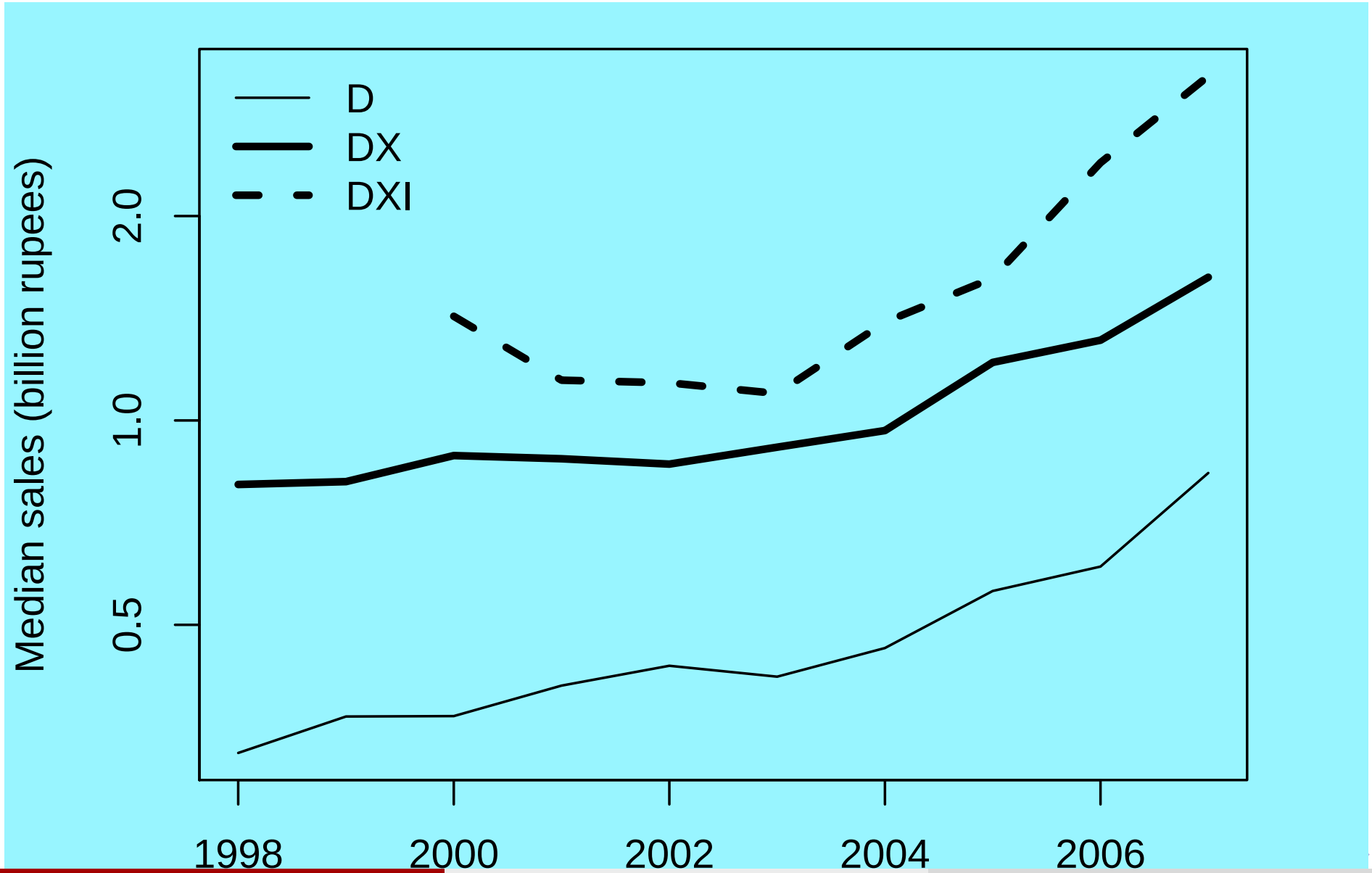
Part II

Describing the three categories (D DX DXI)

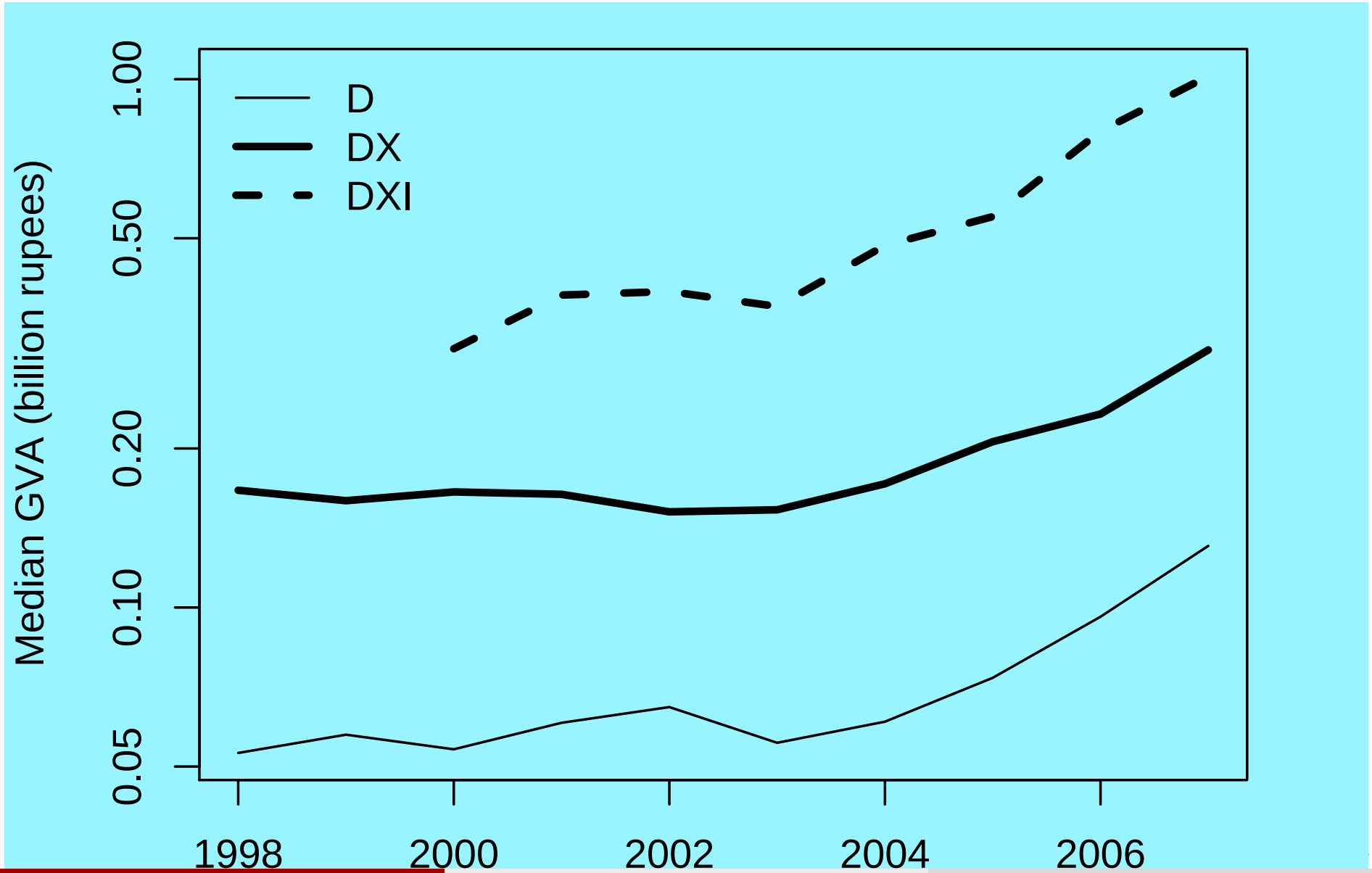
Median total assets



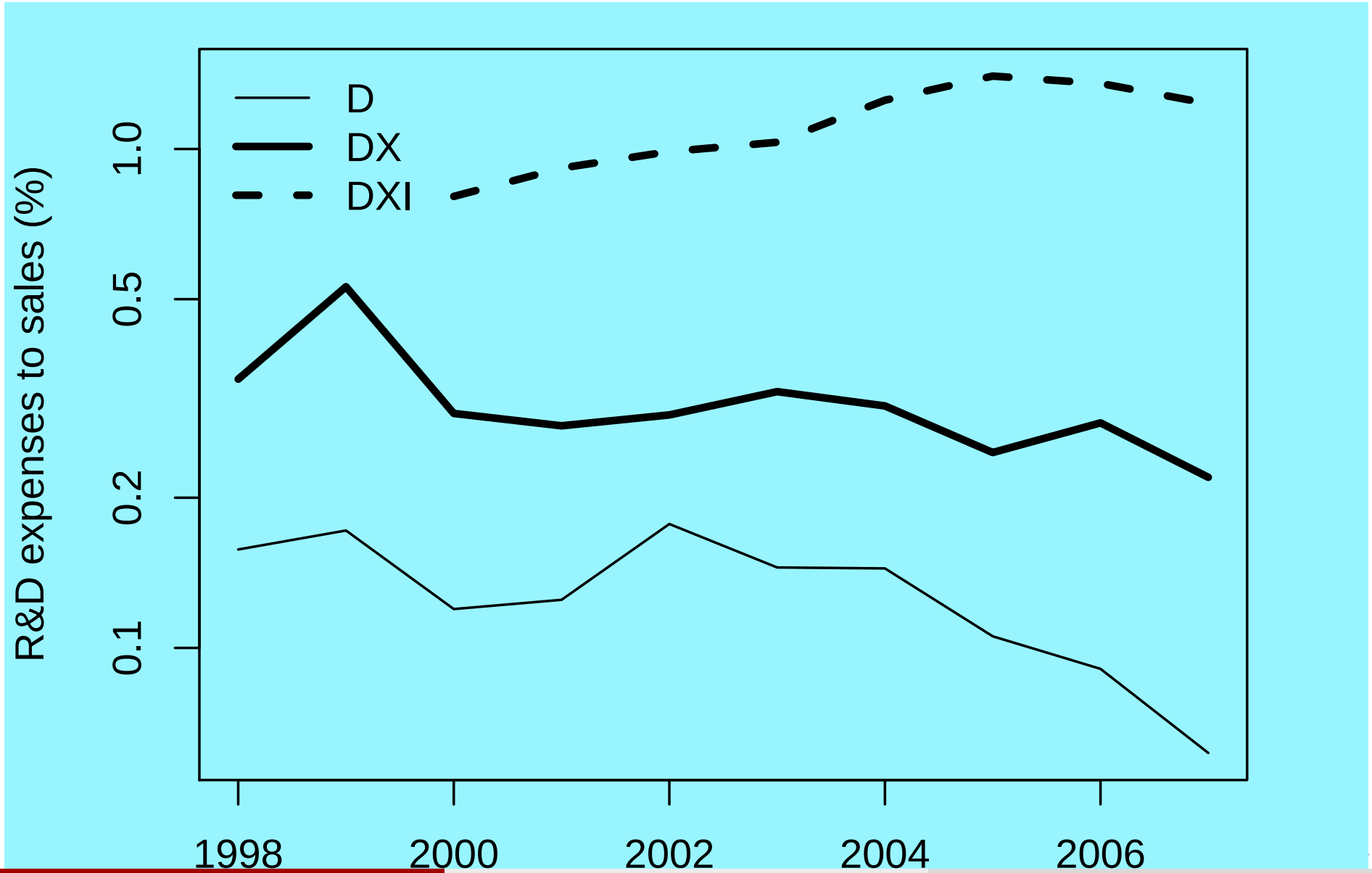
Median sales



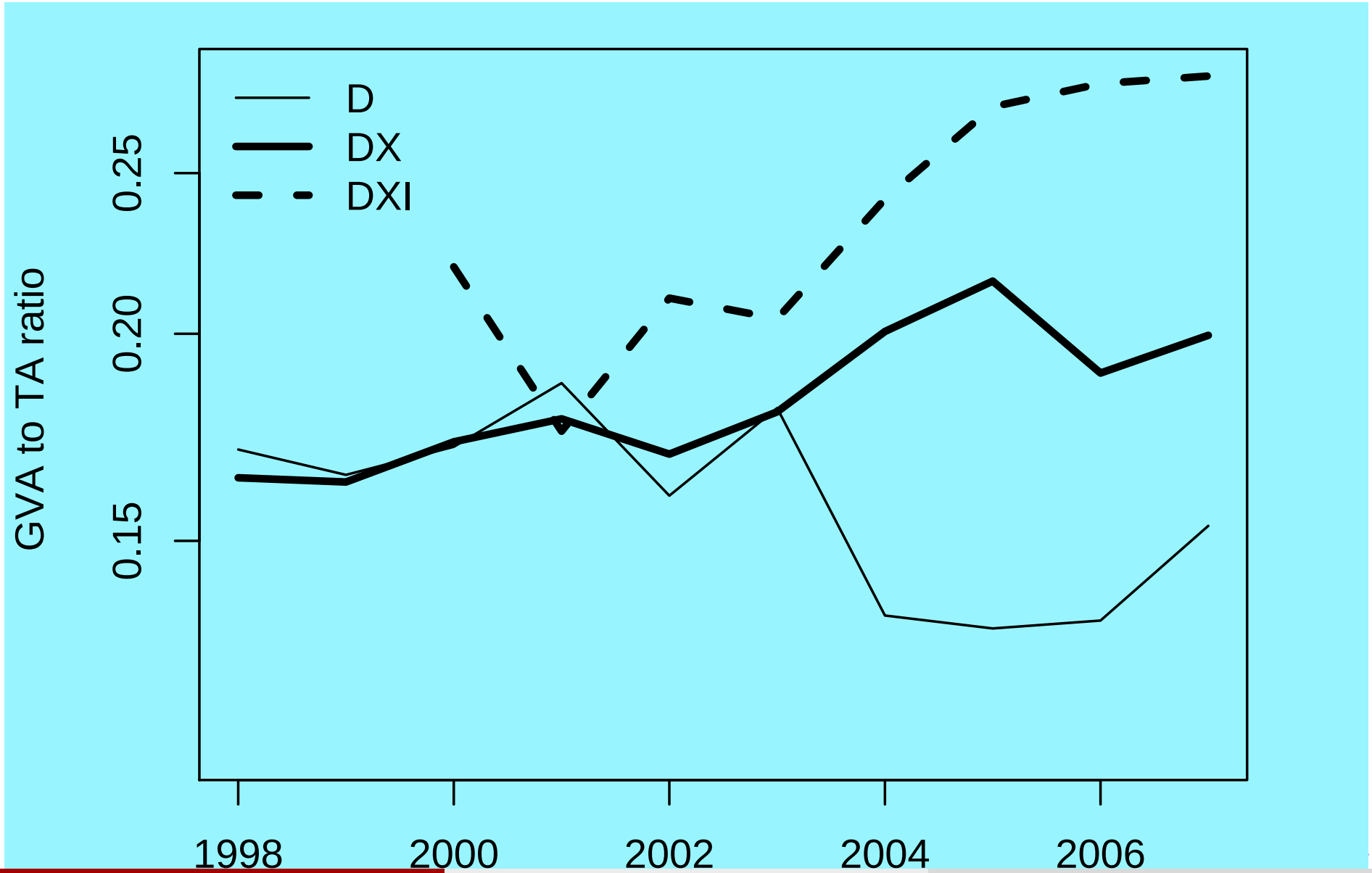
Median output in each group



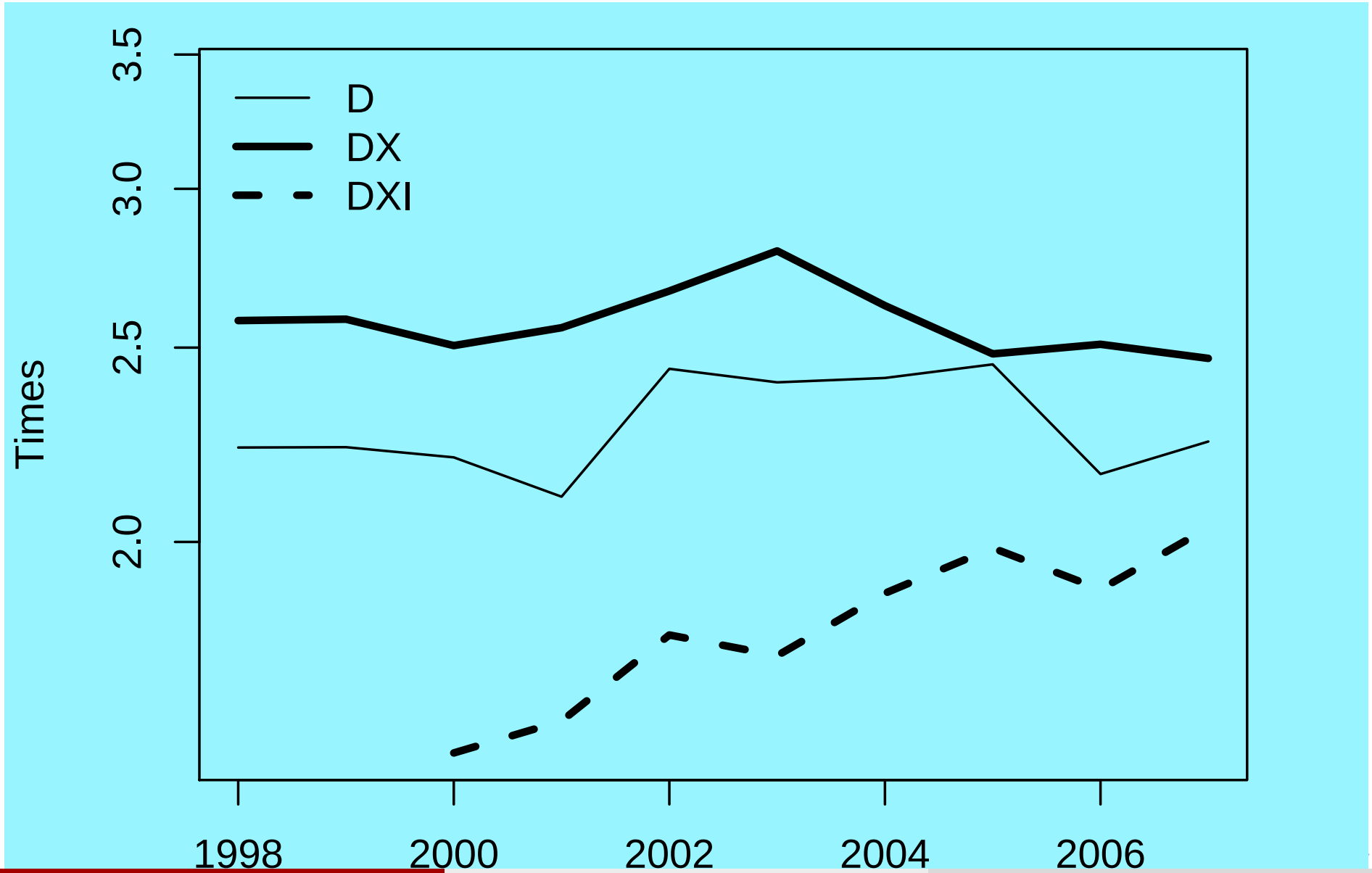
R&D expenses to sales



Output per assets



Leverage



Summarising broad patterns

1. Total assets: DXI $>$ DX $>$ D
2. Sales: DXI $>$ DX $>$ D
3. Output: DXI $>$ DX $>$ D
4. R&D expenses to sales ratio: DXI $>$ DX $>$ D
5. Output per unit assets: DXI $>$ D $>$ D
6. Leverage: DX $>$ D $>$ DXI
   (Debt market has shunned dynamic sectors, and sectors with less tangible assets as collateral, but it's getting a bit better).

Part III

Explaining the D - DX - DXI progression

A model that expresses this hierarchy

- Could do a bivariate probit model: one equation for export and another for outbound FDI.
- But this misses the hierarchy

Ordered probit

y^* is unobserved, and there are cutoffs τ_1 and τ_2 that determine what we observe:

$$\begin{aligned} y^* &= \beta' X + u \qquad\qquad u \sim N(0, \sigma^2) \\ y &= \begin{cases} \mathbf{D} & \text{if} \quad y^* < \tau_1 \\ \mathbf{DX} & \text{if} \quad \tau_1 \leq y^* < \tau_2 \\ \mathbf{DXI} & \text{if} \quad \tau_2 \leq y^* \end{cases} \end{aligned}$$

- Parameter vector estimated by MLE: $\theta = (\beta, \tau)$.
- $y^* = \beta' X$ is a single propensity measure: big values induce exports and bigger values induce outbound FDI too.
- The data can reject the model by giving τ values which are smeared together.

Careful handling of extreme values and nonlinearities

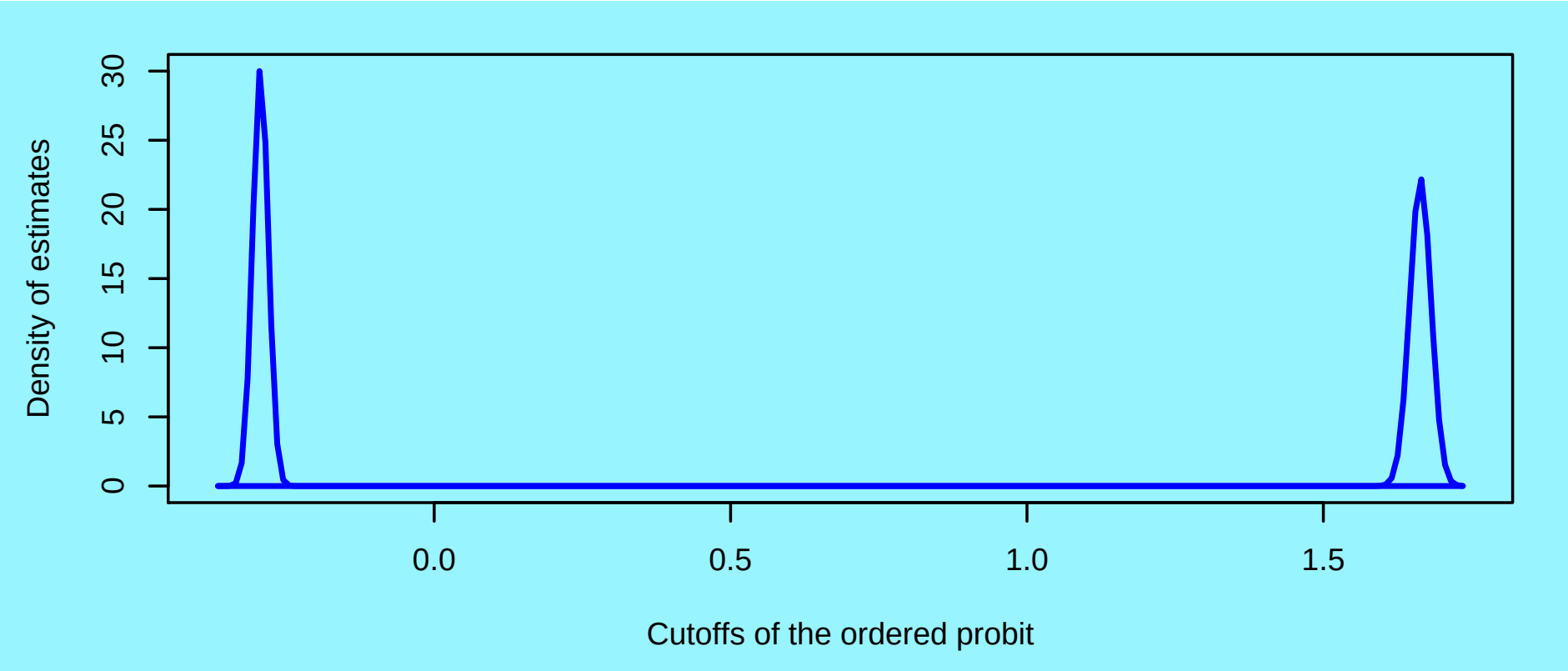
- Many accounting variables have extreme values. Example: Return on equity ranges from -32900% to 118500%.
- We do 'winsorisation': Clip the distribution to the (.01, .99) quantiles.
- Nonlinearities of response are prevalent.
- We use cubic orthogonal polynomials in the model.

Estimates with full data

What matters in the model:

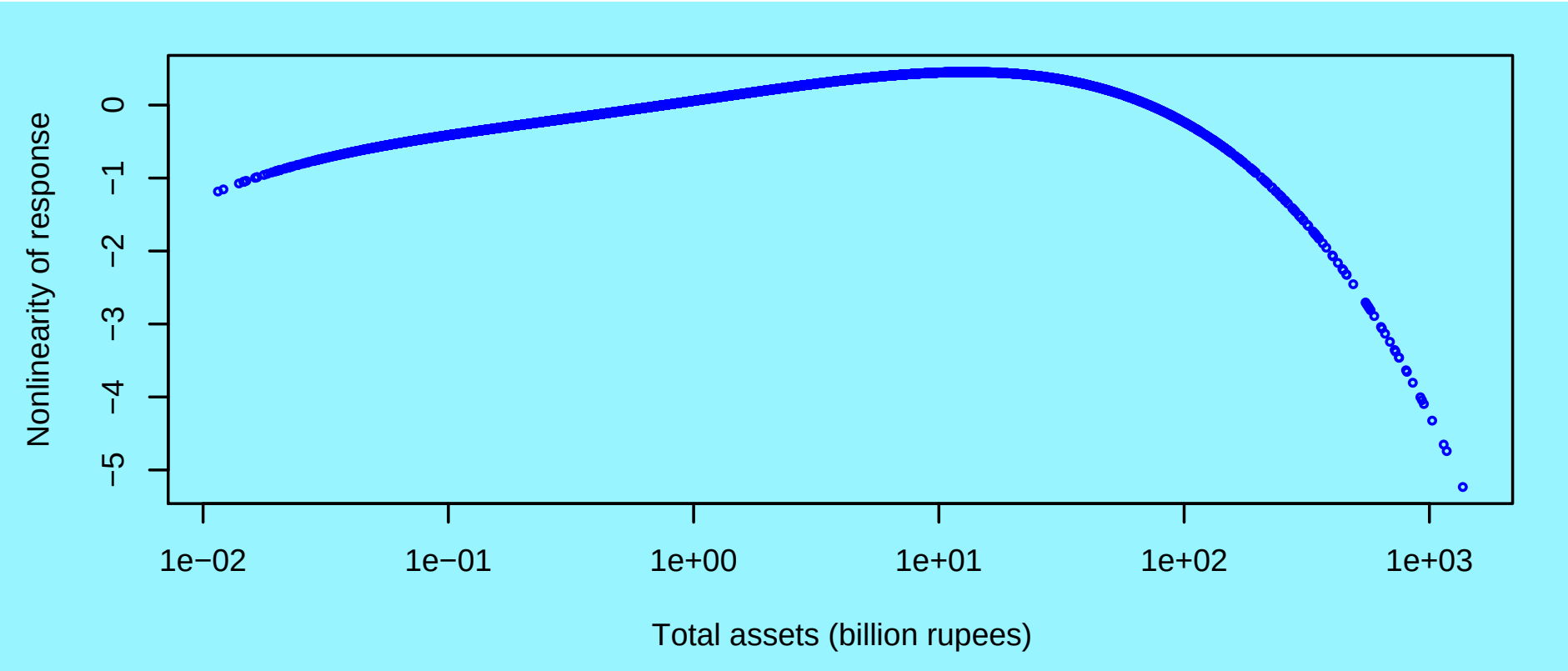
- Log total assets (4th degree)
- Year of incorporation (4th degree)
- Winsorised R&D to sales ratio (4th degree)
- Gross value added (4th degree)
- Winsorised ratio of fixed assets to total assets (4th degree)
- A dummy variable for above median return on equity

Distribution of the estimated cutoffs

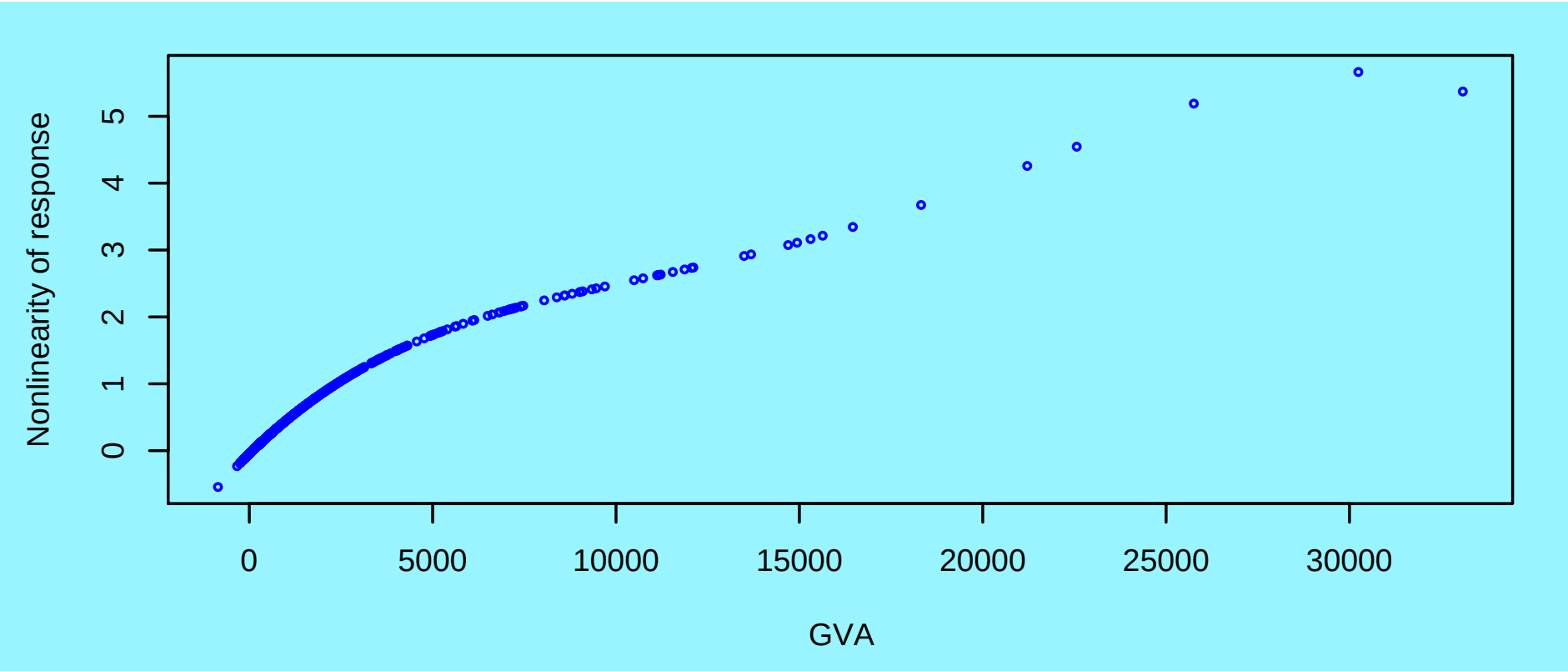


Roughly speaking: A shift in $\beta' X$ of 2 shifts a firm from the threshold of exporting to the threshold of outbound FDI.

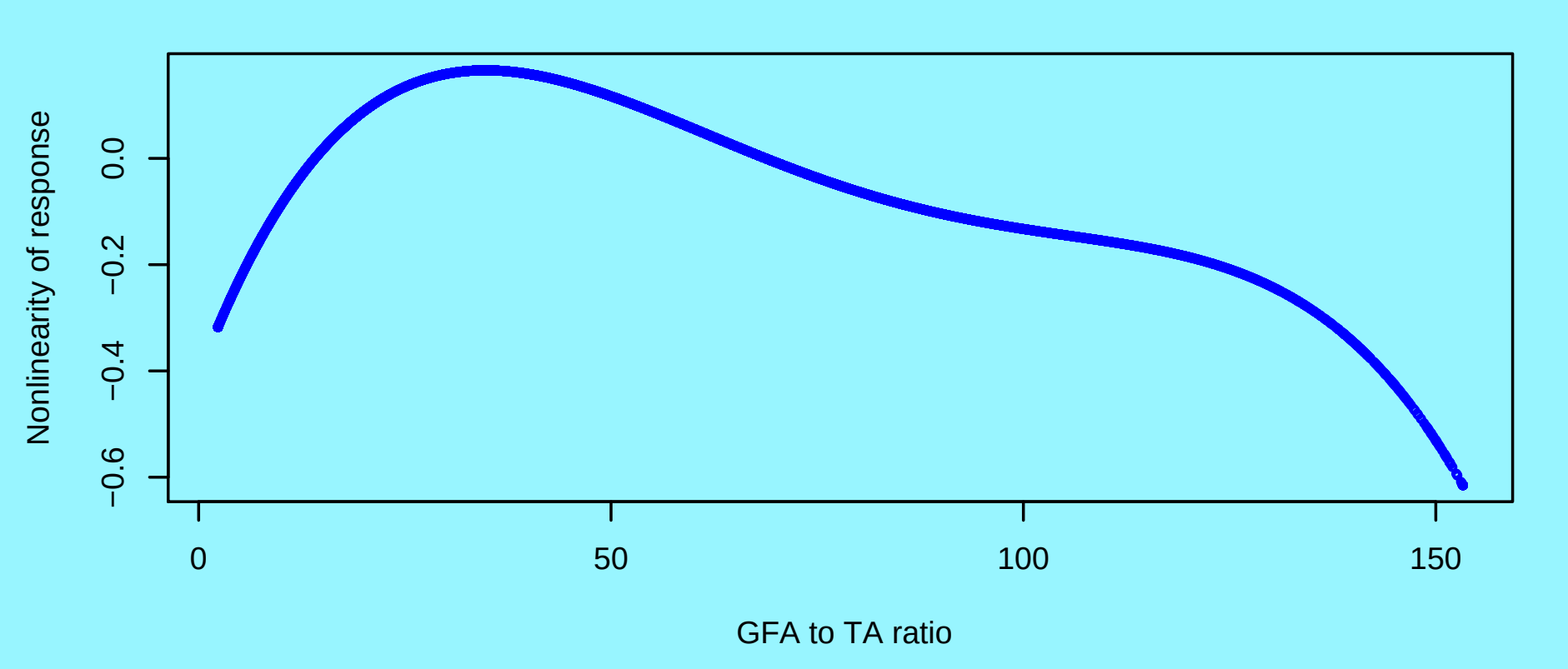
Response to total assets



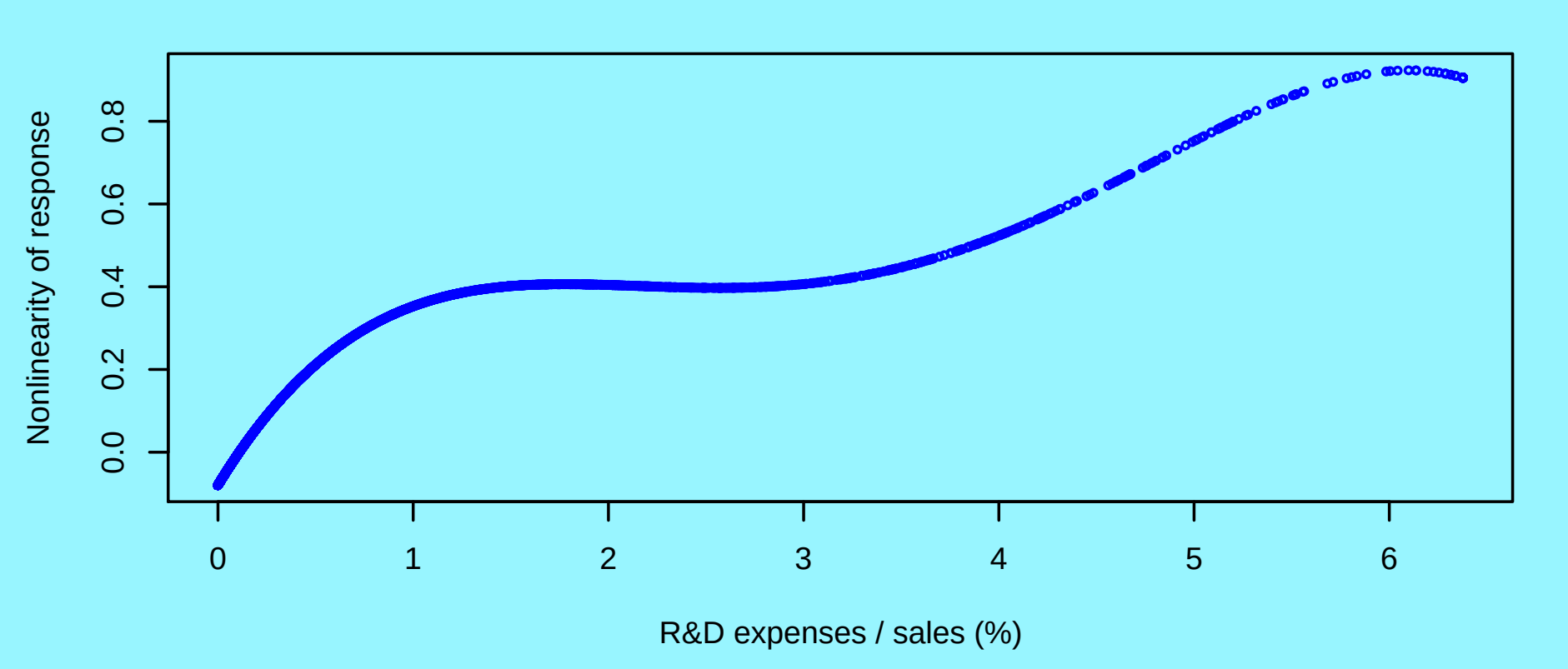
Response to gross value added



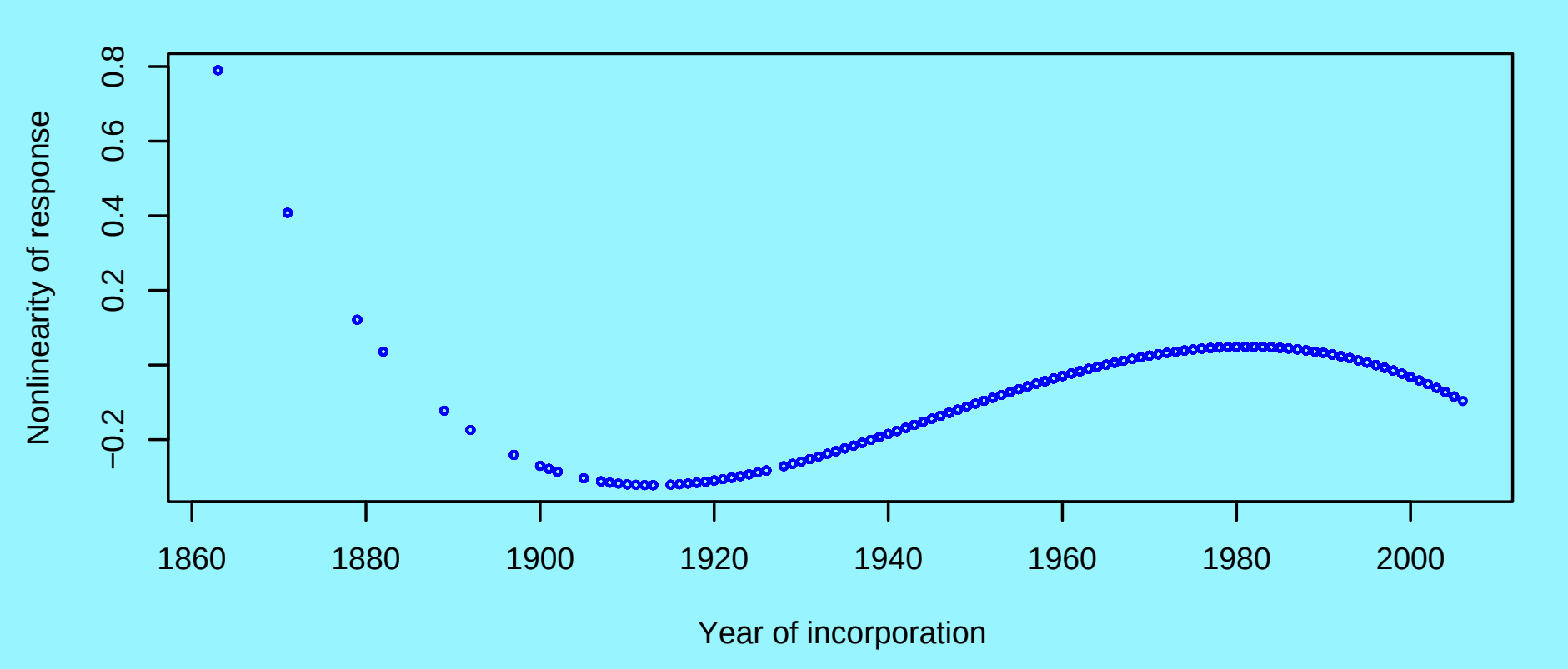
Response to tangibility of assets (GFA/TA)



Response to R&D expenses to sales ratio (winsorised)



Response to year of incorporation



Summary of results

- R&D expenses to sales matters: First, going from 0 to 2% helps, and then going beyond 5% helps.
- The most outward oriented firms have total assets between 10 and 100 billion rupees of total assets. Bigger firms (beyond Rs.100 billion of assets) are actually less internationalised.
- Very old firms are more internationalised. The least international firms are those born between 1890 and 1960.
- These regressors look like productivity measures. To this extent, this supports the HMY model.

Conclusion

- There is a link between the huge rise in India's exports and the huge rise in India's outbound FDI
- More productive firms appear to be driving both developments: more productive firms export and the most productive firms do outbound FDI.
- There appears to be a hierarchy where firms go from autarky to exporting to outbound FDI
- A unified model of both phenomena.
- Related to the literature on two-way links between trade liberalisation and capital account liberalisation.

Thank you.