Economic Papers Vol. 26 No. 3 September 2007 pp. 276–294

DETERMINANTS OF PROTECTION IN THAI MANUFACTURING

by

JUTHAHIP JONGWANICH* AND ARCHANUN KOHPAIBOON**♣

This paper examines determinants of effective rates of protection (ERP) and nominal rates of protection (NRP) in Thai manufacturing.. Our results indicate political bargains in Thailand are struck over ERP rather than NRP. Moreover, protection tends to be granted to industries that have a high level of industry concentration and are experiencing increased import competition. The relatively open foreign investment policy regime in Thailand means that policymakers are more responsive to requests made by foreign investors, including requests for tariff cuts. The decision to grant protection to Thai industries is justified on the basis of the ability of industries to generate employment and backward linkage to the rest of the economy.

Keywords: Effective Rate of Protection, Developing Countries, Thailand, Trade Policy

JEL Codes: F13, O14, O24 and O53

1 Introduction

Whilst there is a consensus regarding the benefits of freer trade and more neutralised trade policy regimes, in practice protection continues to exist. While progress on tariff reduction has occurred as a consequence of the Uruguay Round, it is clear that much remains to be done. There has been a considerable decline in average tariff rates in developing countries, especially in Asia and Africa, but this has occurred in an uneven manner, thereby increasing tariff dispersion. This implies that countries with low average tariff rates are likely to have very high tariff peaks and exhibit escalation at higher levels of disaggregation. Even though the traditional argument that interest groups lobby for protection could provide an explanation for dispersed protection across industries, this argument is, at best, tenuous. A better understanding of what factors drive the divergence between theory and practice would also help economists to convey to policymakers, and to the public, the benefits from freer trade. Such

* Research Department, Asian Development Bank.

** Faculty of Economics, Thammasat University, and Department of Economics, Ateneo de Manila University.

♣ The authors thank Prema-chandra Athukorala for his valuable suggestions.

 ISSN 0812-0439

understanding would also contribute positively to the effort to further reduce tariffs and perhaps making substantial inroads into the other negotiations occurring as part of the World Trade Organisation's (WTO) Doha round.

Despite its policy relevance, there are few comprehensive treatments of the political and economic determinants of protection.[1] This paper seeks to fill this gap through an in-depth case study of the Thai manufacturing sector. Nominal rates of protection (NRP) and effective rates of protection (ERP) in 2002 and 2003 are constructed and compared with estimates from previous studies to illustrate the evolution of protection in Thailand over the past three decades.

There has been no systematic analysis of the determinants of trade protection in Thailand. Previous studies for Thailand (e.g. see Akrasanee and Ajanant, 1986; World Bank, 1988; TDRI, 2006) are limited to estimating ERP. A systematic analysis of protection variation across industries has not been attempted. As Thailand has pursued a cascading tariff structure over the past four decades, the level of protection has varied considerably across industries.

The paper is structured as follows. Section 2 discusses the development of trade policy in Thailand with an emphasis on recent efforts to lower tariff rates. Estimates of ERP for 2002 and 2003 are provided in Section 3. Section 4 provides the analytical framework for analysing protection. The model and data are presented in Sections 5 and 6 respectively. Section 7 discusses the regression results. The final section summarises the study's key findings.

2 Trade Policy and Nominal Protection in Thailand

As in other developing countries, Thailand implements both tariff and quantitative restrictions (QRs) as trade policy instruments, but historically, there has been greater reliance on tariffs rather than QRs. Over the past two decades, Thailand has made significant progress in trade liberalisation. The early emphasis on import-substitution (IS) strategy (1970–1987) has given way to a greater emphasis on equalising incentives between import-competing and export-oriented production. Significant reduction and rationalisation of the tariff structure and the dismantling most of the non-tariff barriers took place in the second half of 1980s. As part of its commitments under the WTO, a comprehensive plan for tariff reduction and rationalisation was proposed in 1990 and implemented between 1995 and 1997. In mid-1997, the reform process was temporarily interrupted by the financial crisis. Tariffs on a number of luxury imports were temporarily raised in 1997[2] to increase tax revenue in order to meet the budget surplus of one per cent of gross domestic product (GDP) agreed to with the International Monetary Fund (IMF) in late 1997.

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1 There are ample studies examining this question but they have been concentrated on the experience of developed countries. See the comprehensive survey in Lederman (2005) and works cited therein.

2 In October 1997, the Government raised tariffs on completely built-up vehicles, perfumes, cosmetics, clothing, leather products, glassware and crystal products, certain shoes and jewelry, and lenses, eyeglasses, cameras, watches, pens and lighters.

TABLE 1
AVERAGE TARIFF OF TOP 15 ITEMS UNDER TARIFF RESTRUCTURING IN THAILAND, 2002–2005

HS		Average Tariff Rates				Tariff Difference
		2002	2003	2004	2005	2002–2005
		(1)	(2)	(3)	(4)	(1)–(4)
40	Rubber and articles made from rubber	23.3	23.3	15.0	8.6	8.3
70	Glass and glassware	18.0	10.1	10.1	10.1	7.9
60	Knitted fabrics	20.0	20.0	12.5	5.0	7.5
81	Base metals	9.4	3.2	2.5	2.5	7.0
58	Woven fabrics, lace, etc.	20.0	20.0	13.2	6.1	6.8
68	Articles of stone	18.3	11.6	11.6	11.6	6.6
55	Man-made staple fibre	15.9	15.9	9.4	4.8	6.5
56	Wadding yarns	17.7	17.7	11.4	6.1	6.3
52	Cotton	15.5	15.5	9.2	4.8	6.3
21	Miscellaneous vegetable preparations	30.3	24.1	24.1	24.1	6.2
54	Man-made fibres	15.0	15.0	8.9	5.0	6.1
13	Laces, gums, and other vegetables	16.1	10.0	10.0	10.0	6.1
50	Silk	14.9	14.9	8.9	5.1	6.1
48	Paper and paperboards	17.7	12.2	12.2	6.8	5.5
83	Miscellaneous articles of base metals	19.1	13.6	13.6	13.6	5.5
	Average of all tariff items	14.3	13.3	12.0	11.0	2.3

Source: Compiled from Official Data provided by Ministry of Finance.

Tariff restructuring has received renewed emphasis as an essential part of overall economic reforms aimed at strengthening efficiency and competitiveness (see Warr, 2000; WTO, 1999). The Thai Government introduced tariff cuts, commencing in June 2003 (implemented in October 2003), followed by a four-year period of tariff reduction from 2004 to 2008. There are around 900 items involved in the tariff reduction process, covering a wide range of manufacturing intermediates such as rubber and articles thereof (HS40), glass and glassware (HS70), knitted fabrics (HS60), base metals (HS81), woven fabrics (HS58), articles of stone (HS68), man-made staple fibres (HS55), wadding yarns (HS56), cotton (HS52), and miscellaneous vegetable preparations (HS21). Table 1 provides selected items that had tariff rate cuts between 2002 and 2005 according to the magnitude of the cuts. Changes in tariff rates between 2006 and 2008 are minor, compared to the 2005 tariff structure. The magnitude of such tariff reduction is moderate, within the range of 0–8.9%.

All in all, over the past three decades, there have been significant reductions in nominal tariff rates. The simple average applied tariff rate declined sharply from 40% between 1985 and 1994 to 23% from 1995 to 1996 and 17% in 1997 (Table 2). The downward trend in the average tariff was temporarily reversed during the onset of the crisis. The average tariff rate was further reduced to 13.3% in 2003, and declined further to 12% in 2004. Since then, the rate has been more or less stable at around 11%.

TABLE 2
AVERAGE TARIFF RATES IN SELECTED ASIAN COUNTRIES, 1985–2001 (UNWEIGHTED, PER CENT)

	China	Indonesia	Korea	Malaysia	Philippines	Taiwan	Thailand	Vietnam
1985	n.a.	27.0	n.a.	n.a.	27.6	26.5	41.2	n.a.
1986	38.1	31.5	n.a.	15.8	27.9	22.8	n.a.	n.a.
1987	39.5	n.a.	22.9	13.6	27.9	19.4	n.a.	n.a.
1988	n.a.	n.a.	18.9	13	27.9	12.6	n.a.	n.a.
1989	n.a.	25.2	14.9	17	27.6	9.7	40.8	n.a.
1990	40.3	20.6	13.3	n.a.	27.8	9.7	39.8	n.a.
1991	n.a.	20.3	11.4	16.9	26	n.a.	38.7	n.a.
1992	42.9	20.0	10.1	12.8	24.3	n.a.	n.a.	n.a.
1993	39.9	19.4	8.9	14.3	22.6	n.a.	45.6	n.a.
1994	36.3	n.a.	n.a.	13	21.7	n.a.	23.3	n.a.
1995	n.a.	n.a.	n.a.	n.a.	20	11.2	23.1	12.8
1996	23.6	13.2	13.4	8.7	14.3	9.7	n.a.	n.a.
1997	17.6	n.a.	13.3	9.1	13.4	n.a.	17.0	13.4
1998	16.8	9.5	11.1	7.1	10.7	n.a.	20.1	n.a.
1999	n.a.	10.9	8.7	9.7	10.1	8.8	17.1	n.a.
2000	17.5	8.4	n.a.	n.a.	7.5	n.a.	18.4	16.5
2001	17.5	8.4	n.a.	10.2	7.6	n.a.	18.5	15.7

n.a. = not available.

Sources: Hoekman *et al.* (2002, Table A-1) for the period 1985–1989; WTO, Trade Policy Review – Country Report (various) and individual country tariff schedules available from the Asia Pacific Economic Cooperation (APEC) Secretariat online database, www.apec.org, for other years.

TABLE 3
COVERGAE RATIO OF NTBS IN IMPORT TRADE (UNWEIGHTED, per cent)*

	1984–1987	1988–1990	1991–1993	1997–2000
China	10.6	23.2	11.3	5.7
Indonesia	94.7	9.4	2.7	3.1
Korea, Rep	8.8	4.0	2.6	1.5
Malaysia	3.7	2.8	2.1	2.3
The Philippines	44.9	n.a.	n.a.	1.8
Thailand	12.4	8.5	5.5	2.1

n.a.= not available

* Calculated as a percentage of the import value of HS6 tariff lines affected by NTBs in total imports. NTBs include quantitative restrictions in the form of all types of licences and import authorisation, quotas, import prohibitions, advanced import deposits, foreign exchange restrictions, fixed customs valuations, and state trading monopolies. Figures reported under a given sub-period relate to a single year within that sub-period.

Source: Hoekman *et al.* (2002, Table A-1) for the period 1985–1989; WTO, Trade Policy Review – Country Report (various) and individual country tariff schedules available from the Asia Pacific Economic Cooperation (APEC) Secretariat online database, www.apec.org, for other years.

TABLE 4
*NOMINAL AND EFFECTIVE RATES OF PROTECTION IN THAILAND, 1980–2003 (*per cent*)*

Nominal rate of protection (NRP)	1980	1985	2002	2003
Processed foods	34.4	30.9	22.7	20.3
Textile products	41	27.8	18.9	18.6
Leather and footwear products	54.1	26.8	18.8	18.5
Wood products	31.6	28.2	13.7	13.5
Paper and pulp	24.0	17.8	14.4	10.5
Chemical and petroleum products	32.8	21.4	9.4	8.4
Rubber products	29.1	26.8	23.2	23.2
Other non-metal products	36.7	23.0	15.0	10.0
Metal products	25.2	16.6	13.2	10.7
Machinery	22.4	14.3	6.2	6.2
Consumer goods and motor vehicles	31.2	19.7	11.4	10.6
Total manufacturing	32.9	23.8	16.4	15.4
Overall	n.a.	22.9	14.7	13.9
Effective rate of protection (ERP)				
Processed foods	58.1	135.2	37.4	32.4
Textile products	74.5	118.4	36.4	36.2
Leather and footwear products	87.8	152.7	20.8	23.8
Wood products	65.4	62	26.6	26.9
Paper and pulp	20.4	53.5	47.8	32.2
Chemical and petroleum products	43	44.5	16.7	14.2
Rubber products	2.1	42	58.5	58.8
Other non-metal products	72.1	108.5	32.8	19.3

Nominal rate of protection (NRP)	1980	1985	2002	2003
Metal products	35.6	70.9	25.1	20.0
Machinery	27.1	29.3	–0.5	0.9
Consumer goods and motor vehicles	48.4	45.6	18.8	19.8
Total manufacturing	51.7	78.4	27.8	24.4
n.a.	22.9	14.7	13.9	19.4
Coefficient variation of ERPs	120.0	200.0	131.3	143.9
Spearman Rank Correlation Coefficient with 2002 ERP	0.58	n.a.		
Spearman Rank Correlation Coefficient with 2003 ERP	0.49	n.a.	0.94	1

Notes: 1. Detail of ERP estimates for 1985 is not available. Spearman Rank correlation coefficient is defined by $1-6\sum\left(\frac{d^2}{N(N^2-1)}\right)$ where d = the difference in statistical rank of corresponding variables.

2. NRP and ERP in 2002–2003 are calculated as unweighted averages.

Source: ERP estimates for 1980 are from Akrasanee and Ajanant (1986), those of 1985 from World Bank (1988) and of 2002–2003 are from the authors' calculations.

By regional standards, Thailand remained a high-tariff country until about the mid-1990s (Table 2). During this period, Thailand's simple average tariff rate continued to exceed levels in Malaysia, the Philippines, Indonesia, and even mainland China by a wide margin. Nevertheless, the utilisation of non-tariff measures, represented by the coverage ratio of non-tariff barriers (NTBs), in Thailand has been low compared to most other East Asian countries (Table 3). This makes tariffs virtually the sole means of border protection in Thailand.

A cascading tariff structure has been the key characteristic of the tariff structure in Thailand over the past three decades, even though the Government has tended to lower levels of tariff protection. At the sectoral level, industries producing intermediate goods (chemicals, fertilizer, metal products and construction material, for example) have relatively low rates of tariff protection. By contrast, final-goods producing sectors (such as food and drinks, pharmaceuticals, garments), with the exception of non-electrical machinery and electrical machinery and equipment, have relatively high rates of protection. In addition, tariff rates are generally higher for manufacturing, compared with agriculture and other primary product sectors. This is indicated in Table 4 by the fact that the average applied tariff rates (without the various exemptions) for the manufacturing sector were higher than those for the overall economy between 1980 and 2003. This is consistent with patterns observed in other developing countries and reflects the belief in industrialisation as the road to economic independence.

3 Effective Protection

As a consequence of the cascading tariff structure, nominal protection does not provide a precise picture of protection in a particular industry.[3] Effective protection in each industry depends not only on the tariff rate applicable to that sector, but also on tariffs of all other sectors which provide production input (intermediate and capital goods) to that sector. The effective protection in each industry can be summarised by calculating the *ERP* as follows;

$$ERP_j = \frac{t_j - \sum_{i=1}^{n} a_{ij} t_i}{1 - \sum_{i=1}^{n} a_{ij}} \qquad (1)$$

where t_j = nominal tariff on output j^{th}

t_i = nominal tariff on input i^{th}

$\sum_{i=1}^{n} a_{ij}$ = the sum of the shares of intermediate inputs (1, . . . , n) in the output value of product j^{th}

Tables 4 and 5 illustrate ERP estimates for 2002 and 2003, as well as previous studies' estimates for 1980 and 1985. Note that a comparison of ERP across studies must be treated with caution because the ERP estimates from different studies have been based on different types of data and different product definitions. Some have used official tariff rates, whereas others have used tariff rates estimated from customs duty collections or from price comparison. It is difficult to draw inference from a direct comparison of the industry's ERP estimates. Nevertheless, a broad comparison would still provide useful information in understanding the evolution of the protection structure in Thailand. In addition, a rank correlation of ERP estimates across studies, rather than a simple correlation, is constructed to provide statistical evidence of changes in inter-industry protection structure over the period.

Three key inferences can be drawn. Firstly, from 1980 to 2003, ERP estimates exhibited a downward trend in all industries (Table 4). The simple average of the ERP in the manufacturing sector fell from 51.7% in 1980 to 27.8% and 24.4% in 2002 and 2003, respectively. Secondly, the pattern of ERP estimates across industries did not change significantly between 1980 and 2003 (Table 4). As a consequence of the cascading tariff structure, ERP estimates for finished goods such as agro-processing products, textiles, and leather products are likely to be higher than those for intermediate products (e.g. chemical and petroleum products, machinery, metal products). Measured by the coefficient of variation (CV) of ERP estimates, the degree

[3] With uniform tariff rates across all sectors, the nominal and effective tariff rates are equal. For example, there is no need to estimate effective rates of protection for the Chilean economy, because that country has a uniform import duty (8%) across all sectors.

of ERP dispersion seems to be more or less unchanged. The rank correlation coefficients of ERP estimates, which indicate a change in the industry ranking according to the level of protection, are 58 and 49% during the period 1975–2002 and 1975–2003, respectively. Thirdly, any interpretation of ERP estimates of consumer goods and motor vehicles in Table 4 requires caution. The figure represents average protection across a wide range of manufacturing products, covering consumer goods, electrical appliances, auto parts and motor vehicles, some of which were recently subject to low tariffs. For example, ERP estimates of electrical appliances were around 9–10% (Table 5). Most auto parts were recently subject to tariff rates of less than 10% (see Kohpaiboon, 2006c).

TABLE 5
ERP ESTIMATES OF MANUFACTURING SECTOR, 2002–2003

IO Code		Percentage of value added	2002		2003	
			NRP	*ERP*	*NRP*	*ERP*
	Manufacturing	73.2	16.0	26.1	15.09	24.38
	Agro-processing	6.7	10.5	1.7	9.5	–0.7
042	Slaughtering	1.3	5.1	–26.6	3.8	–30
043	Canning and preserving of meat	0.6	40.0	110.9	38.3	108.4
044	Dairy products	0.5	10.3	7.3	10.2	9.5
045	Canning and preserving of fruits and vegetables	0.7	18.1	20.0	14.2	8.3
046	Canning and preserving of fish and seafoods	1.6	2.9	–56.4	2.9	–55.5
047	Coconut and palm oil	0.3	0.0	–45.3	0.0	–43.6
048	Other vegetable and animal oils	0.1	17.0	95.6	16.4	92.8
049	Rice milling	1.3	3.9	21.2	3.9	21.3
050	Flour and sago mild products and tapioca milling	0.2	30.1	27.1	30.0	29.4
051	Grinding corn	0.0	0.0	–1.3	0.0	–1.1
052	Flour and other grain milling	0.2	31.7	144.4	25.8	115.9
	Other manufacturing	66.5	16.6	28.6	15.7	26.9
053	Bakery and other	0.3	27.3	48.1	23.9	43.4
054	Noodle and similar products	0.2	30.0	51.4	30.0	61.1
055	Sugar refineries	1.3	16.1	34.5	14.5	30.8
056	Confectionery and snack	0.2	30.0	66.9	30.0	71.5
058	Monosodium glutamate	0.1	30.0	49.5	5.0	–17.3
059	Coffee and cocoa and tea processing	0.3	14.5	10.1	11.7	5.7
060	Other food products	0.8	21.5	29.6	15.9	19.7
061	Fish meal and animal feed	0.3	6.6	–13.5	6.5	–12.4

IO Code		Percentage of value added	2002		2003	
			NRP	*ERP*	*NRP*	*ERP*
062	Distilling and blending of spirits	0.1	58.6	132.7	58.5	134.3
063	Breweries	2.6	60.0	78.1	60.0	78.8
064	Soft drinks and carbonated water	1.0	7.8	0.6	6.4	–1.7
066	Tobacco products	1.4	60.0	76.2	60.0	76.3
067	Spinning	1.7	4.2	–14.4	4.2	–14.1
068	Weaving	2.8	19.7	45.2	19.5	45.1
069	Textile bleaching, printing and finishing	0.1	12.7	25.4	12.7	27.1
070	Made-up textile goods	0.5	20.9	38.2	20.5	38.6
071	Knitting	0.7	28.6	66.2	28.6	66.6
072	Wearing apparels	4.4	32.9	75.3	32.9	76.4
073	Carpets and rugs	0.1	18.8	36.5	16.3	30.2
074	Jute-mill products	0.1	13.9	19.1	13.9	19.5
075	Tannery and leather finishing	0.1	5.2	–18.7	4.9	–10.7
076	Leather products	2.3	29.8	51.4	29.3	51.2
077	Footwear, except of rubber	0.8	21.4	29.8	21.4	31.0
078	Saw-mill and wooden construction materials	0.5	4.4	6.3	3.8	5.2
079	Wood and cork products	0.2	16.7	40.6	16.6	41.9
080	Wooden furniture and fixtures	1.3	20.0	32.8	20.0	33.6
081	Paper and paperboard	1.8	5.8	5.4	4.5	3.9
082	Paper and paperboard products	0.3	25.3	113.3	17.7	75.6
083	Printing and publishing	0.6	12.1	24.7	9.3	17.0
084	Basic chemicals	0.4	2.6	–0.3	2.5	0.1
085	Fertilisers, pesticides and insecticides	0.2	6.2	8.7	6.1	8.7
086	Petrochemical products	2.9	16.3	26.2	16.3	26.8
087	Paints	0.3	8.7	22.5	5.5	10.5
088	Drugs and medicines	0.6	6.2	0.1	6.2	1.6
089	Soap and cleaning preparations	0.3	8.1	12.1	5.6	4.4
090	Cosmetics	0.2	24.0	54.7	24.0	56.7
091	Matches	0.0	17.3	30.1	15.9	27.6
	Other chemical products	0.4	9.0	12.8	8.4	11.6
093	Petroleum refinery and gas separated plant	4.7	4.6	18.0	2.2	8.7
094	Other coal and petroleum products	0.5	0.0	–1.0	0.0	–0.8
095	Rubber sheet and block rubber	0.7	13.4	54.7	13.4	54.8
096	Types and tubes	0.6	27.2	60.8	27.2	61.2

IO Code		Percentage of value added	2002		2003	
			NRP	*ERP*	*NRP*	*ERP*
097	Other rubber products	0.5	29.0	60.1	29.0	60.4
098	Plastic wares	0.9	16.1	24.5	16.1	25.0
099	Ceramic and earthenware	0.4	19.8	40.3	17.2	34.7
100	Glass and glass products	0.3	15.8	36.9	10.2	19.0
101	Structural clay products	0.3	20.0	50.4	10.1	23.7
102	Cement	1.4	1.1	–0.2	1.1	0.5
103	Concrete and cement products	0.6	19.4	45.4	7.1	13.1
104	Other non-metallic products	0.1	12.7	32.3	8.0	19.3
105	Iron and steel	0.1	1.0	–1.6	1.0	–0.6
106	Secondary steel products	1.6	9.2	16.7	8.6	16.0
107	Non-ferrous metal	0.6	8.7	14.7	4.6	7.4
108	Cutlery and hand tools	0.4	20.1	41.9	11.2	18.9
109	Metal furniture and fixtures	0.1	18.1	39.4	17.4	38.8
110	Structural metal products	0.2	15.6	26.8	12.2	19.4
111	Other fabricated metal products	1.4	19.7	37.5	19.7	39.7
112	Engines and turbines	0.3	11.3	12.2	11.3	13.5
113	Agricultural machinery and equipment	0.4	5.5	–0.3	5.5	0.1
114	Wood and metal working machines	0.1	4.1	–7.8	4.1	–4.7
115	Special industrial machinery	1.0	4.3	–2.2	4.4	–0.7
116	Office equipment and machinery	4.7	2.3	–4.6	2.3	–3.9
117	Electrical industrial machinery and appliances	0.8	9.4	9.0	9.4	10.5
118	Radios, television sets and communication equipment	2.4	7.5	4.8	7.5	5.7
119	Other electrical appliances	0.3	19.4	52.5	19.4	55.3
120	Insulated wire and cables	0.4	13.2	19.3	13.2	23.7
121	Electrical accumulators and batteries	0.2	3.4	–12.3	3.4	–7.7
122	Other electrical apparatuses and supplies	0.6	3.9	–5.3	3.8	–2.7
123	Ship building	0.4	9.1	6.6	7.0	2.2
124	Railway equipment	0.0	2.8	–4.0	2.7	–3.1
125	Motor vehicles	2.1	27.7	65.8	27.7	66.8
126	Motorcycles and bicycles and other carriages	0.3	44.8	131.2	44.8	132.
128	Aircraft	0.2	2.0	–0.6	2.0	–0.1
129	Scientific equipment	0.3	2.5	–12.5	2.3	–12.1
130	Photographic and optical goods	0.9	7.8	5.3	5.6	3.1
131	Watches and clocks	0.5	8.9	9.9	5.7	5.8

IO Code		Percentage of value added	2002		2003	
			NRP	*ERP*	*NRP*	*ERP*
132	Jewelry and related articles	2.6	1.2	–5.7	1.7	–2.2
133	Recreational and athletic equipment	0.2	10.3	5.5	10.3	6.8
134	Other manufacturing goods	1.1	17.3	28.1	13.3	18.5

Source: Authors' calculations. This formula is applied to calculate the ERP for 2002 and 2003 with the most recent available input–output tables (which are for 2000).[4] Tariff rates in the Harmonised System at 4-digit level of disaggregation were converted into input–output industry codes, using the concordance prepared by The National Economic and Social Development Board, Thailand. The tariff measure is assumed to be the only instrument of trade protection. As mentioned above, Thailand has a greater reliance on tariffs, so such an assumption does not seem unwarranted.

4. Determinants of Protection

4.1 Analytical Framework

The analytical framework to understand the determinants of protection across industries is typically based on political explanations, given the economic consensus regarding the efficiency of free trade. That is, a level of protection granted to a particular industry is determined by the interaction between demand for, and supply of, protection. Demand for protection is derived from the fact that the effect of imposing protection is asymmetric. The benefits of trade protection are likely to accrue to a narrow group of stakeholders in the protected industry, whereas costs are spread over a much larger number of consumers, each of whom loses only a small amount. Hence, there is an incentive for interest groups, who are referred to as industries and/or the owners of factors of production, to form lobby group to exert political pressure for protectionist actions.

Whilst the interest group lobbies for protection, their successes depend on their ability to overcome the 'free-rider problem', i.e. benefits of collective action by an industry association can be absorbed by all industry participations, regardless of their contribution to the collective action (see Olson, 1965; Anderson and Baldwin, 1981; Corden, 1974; Pincus, 1975; Caves, 1976; Becker, 1983; Leamer and Neary, 1987; Trefler, 1993; Lee and Swagel, 1997; Gawande and Bandyopadhyay, 2000). The higher the ability to avoid this problem, the greater are the benefits associated with protection.

The incentive to form interest groups also depends on three key industry characteristics; namely, growth prospects, the nature of market orientation and the ownership structure.[5] Industries that exhibit a declining trend and/or display a rapid increase in import penetration levels are likely to ask for protection (see Anderson and Baldwin, 1981; Magee *et.al.*, 1989; Lee and Swagel, 1997). For industries with a high

[4] In this study, Corden's (1966) method is chosen where nontradable inputs are treated like other primary factors in calculating *ERP* in each sector. For details of this formula see Corden (1966).

[5] The magnitude of the factor benefits from a given increase in the degree of an industry's protection could also be affected by the elasticity of demand for the product as well as the foreign supply elasticity (Anderson and Baldwin, 1981; Grossman and Helpman, 1994). However, when the foreign supply curve is infinitely elastic, as is usually assumed for a small open economy, the domestic price always rises by the degree to which the tariff is increased and the demand elasticity will be irrelevant (Anderson and Baldwin, 1981).

degree of export orientation, gains from protection tend to be offset by an increased probability of foreign retaliation against the exports of these industries (see Anderson and Baldwin, 1981; Trefler, 1993; Lee and Swagel, 1997). Similarly, subsidiaries of multinational enterprises that are engaged in considerable international trade in inputs and outputs would prefer more liberal trade. A rise in import duties will lower the profitability of these enterprises. Thus, industries with a high degree of export orientation and foreign participation are unlikely to lobby for protection.

The view of policymakers toward the development path of industries also plays a pivotal role in supplying protection (see Caves, 1976; Lederman, 2005). Two views play a crucial role in supplying protection. The first view is consistent with the 'infant industry' argument. In industries that have potential to generate benefits for the rest of an economy (e.g. creating value added and generating backward linkages) but need time to acquire production efficiency, temporary protection can be justified to allow them to develop. Secondly, governments tend to protect industries that are in decline and/or are threatened by import competition. Assistance to declining industries can be justified to the public as being a social welfare measure to slow the pace of structural change, especially if rapid change itself is seen as undesirable. Corden (1974, p. 107) coined the term 'conservative social welfare function' to describe this situation. Such a justification on welfare grounds would be even easier if feelings of nationalism are strong, creating less resistance to assisting such industries (see Anderson and Baldwin, 1981).

4.2 Empirical Model

According to the analytical framework discussed above, the level of protection (PRO) is a function of demand (D_P)- and supply-side (S_P) factors. That is,

$$PRO = g(D_P, S_P) \tag{2}$$

Both ERP and NRP are employed in this study as alternative measures of the model's dependent variable because there is no consensus amongst economists as to the choice of one over the other. ERP is theoretically superior to NRP, but, as argued by Cheh (1974) NRP is a more visible indicator of protection to interest groups who tend to demand changes in protection on nominal rates on their outputs, rather than seeking changes in the rates of tariff on inputs.

Demand-side Factors

Demand-side factors consist of the degree of industrial concentration, output growth, changes in import penetration, export–output ratio, and share of foreign firms. The degree of industrial concentration (CON) captures the level of the 'free-rider problem' and the success of collective lobby action (Olson, 1965; Pincus, 1975). The higher the concentration level, the greater is the ability of an industry to coordinate collective action and the lower the costs of monitoring member participation. Hence, the expected relationship between industry concentration and protection is positive.

Two widely-used proxies for industry concentration, namely the Herfindahl–Hirshman index of concentration (HHI) and the market share of the first five largest

firms (CR5), are employed to check the sensitivity of the results. The formula to calculate both proxies for industry concentration are in Equations 3 and 4, respectively.

$$CR5_j = \frac{\sum_{i=1}^{5} s_i}{\sum_{i=1}^{n} s_i} \quad (3)$$

$$HHI_j = \sum_i \left(\frac{s_i}{\sum s_i} \right)^2 \quad (4)$$

where s_i is total sales of firm i^{th} in the industry j^{th}

The annual growth of output (G) and the change in the import penetration ratio (IMC) in each industry are used to capture the industry's growth prospects. In any industry which is experiencing output contraction and/or an increased import threat, there is the incentive for individual producers to lobby for protection. Thus, negative and positive coefficients associated with (G) and (IMC) are expected respectively.

Benefits from protection tend to be less for export-oriented and/or foreign firms. Hence, their corresponding coefficients are expected to be positive. The degree of export orientation is measured by the export-to-output ratio (EX), whereas foreign presence is reflected by the extent to which foreign firms participate in the industry. There are at least three alternative ways to measure the relative importance of foreign firms i.e. employment, output and capital shares (FOR1, FOR2 and FOR3, respectively). In this study, these three measures are used as alternatives when examining the sensitivity of results with different measures to foreign presence.

Supply-side Factors

Three industrial characteristics are used to reflect the role of the policymaker's view in supplying protection. As protection tends to be granted to industries that have potential to contribute positively to the rest of the economy, such a positive contribution in this study is defined in terms of labour absorption, value added creation, and backward linkage generation. The capital–labour ratio (KL) is used to reflect the degree of labour absorption. The lower the KL ratio, the greater the potential to absorb labour so that the coefficient corresponding to the KL ratio is expected to be negative. The industry's value added (VAD) is included to capture the Government's concern regarding 'foot-loose' industries. Finally, as used in previous empirical studies (see, for example, Athukorala, 1998), the degree of backward linkage (BWL_j) is measured by the horizontal summation of the Leontief domestic inverse matrix. In any column j, the summation indicates the total units of output required directly and indirectly from all sectors (including the unit of output delivered to final demand by the given sector) when the demand for the j^{th} commodity rises by one unit. These three characteristics are expected to be positively related to protection. In addition, policymakers tend to be more responsive to the lobby groups of industries that are heavily capital intensive and have a greater minimum efficient scale. Hence, the minimum efficient scale (MES),

proxied by the average firm size in a given industry, is also included. The larger the MES, the greater the expected level of protection.

Value added as a percentage of total cost (VRT) is employed to test whether ERP or NRP is used in the political process in protection bargaining (see Caves, 1976: p. 293). If the bargain focuses on ERP, any change in VRT would induce producers to request changes in either tariffs on finished goods or tariffs on intermediates to ensure ERP is unchanged. Any change in VRT would not affect ERP. Otherwise, it would have effects on both NRP and ERP.

The reduced-form equation to be estimated can be specified as follows:

$$PRO_j = \alpha + \beta_1 CON_j + \beta_2 G + \beta_3 IMC + \beta_4 EX + \beta_5 FOR + \beta_6 KL + \beta_7 VAD + \beta_8 MES + \beta_9 BWL + \beta_{10} VRT + \mu \quad (5)$$

where

PRO_j	= protection level of the j^{th} industry, measured alternatively by (1) Effective rate of protection (ERP_j), (2) Nominal rate of protection (NRP_j)
CON (+)	Degree of industry concentration of the j^{th} industry, represented by (1) HHI_j = Herfindahl–Hirshman index of concentration, (2) $CR5_j$ = the top five firms in total sectoral output
G (-)	The average output growth of the j^{th} industry
IMC (+)	A change in import penetration ratio of the j^{th} industry
EX (-)	Export output ratio of the j^{th} industry
FOR (-)	Foreign presence of the j^{th} industry, represented by (1) FOR_1 = the employment share of foreign firms to total industry, (2) FOR_2 = the output share of foreign firms to total industry, (3) FOR_3 = the capital share of foreign firms to total industry
KL (-)	Capital–labour ratio of the j^{th} industry
VAD (+)	Value added of the j^{th} industry
MES (+)	Average firm size of the j^{th} industry
BWL (+)	Backward (inputs) linkages of the j^{th} industry
VRT (+ or 0)	Value added as a percentage of total cost,
μ	A stochastic error term, representing the omitted other influences on bilateral trade.
	(The expected sign of explanatory variables is in the bracket.)

4.3 *Data*

The NRP and ERP estimates in 2003 analysed in Section 3 are employed as the dependent variable in the cross-sectional analysis. Constructing variables of annual output growth (G), changes in import penetration ratio (IMC), export–output ratio (EX), value added (VAD) and backward linkages (BWL) are based on data available in the

input–output tables in 1995 and 2000, obtained from The National Economic and Social Development Board (NESDB) in Thailand.

Data for capital–labour ratio (KL), concentration indices i.e. Herfindahl–Hirshman index of concentration (HHI), market share of the first five largest plants (CR5), the average firm size (MES) and all measures of foreign presence (FOR_1, FOR_2 and FOR_3) are compiled from unpublished returns to the Industrial Census 1997 (data for 1996) conducted by the National Statistics Office (NSO). The census covers 32,489 plants with employment greater than ten workers, belonging to one hundred and twenty-six, four-digit industries of the Thai Standard of Industry Classification (TSIC). We apply data-cleaning procedures as used in Kohpaiboon (2006b) (dropping unanswered questionnaire returns, deleting irrelevant industries and eliminating duplicated samples). As a result, the total records cover 15,624 plants (1,510 foreign-owned and 14,114 domestic-owned plants) across 105 industries. These firms accounted for 41% of Thailand's manufacturing employment and 55% of manufacturing value added in 1996. Data are available electronically for all years from 1993 to 1999. The year 1996 is chosen for the study because the 1997–1999 data are not seen as representing 'normal' years, and the firm and detail coverage of 1993–1995 is rather incomplete.

While KL, HHI, CR5, and FOR have been compiled by adding plant-level data to industry-level data, MES is constructed from plant-level data. Where FOR is concerned, all firms with FDI (regardless of the magnitude of foreign share in the capital stock) are considered as foreign firms so as to attain the foreign presence for the identification of local firms. Since the data from the industrial census is based on the TSIC classification, concordance between input–output and TSIC classifications is developed to obtain the data for the regression analysis. The sample covers sixty-eight manufacturing sectors according to the input–output table classification.

5 Results

The model was estimated using ordinary least squares (OLS). Since all independent variables are pre-determined, the standard OLS estimates are unlikely to be affected by simultaneity bias. Cook's Distance[6] was used to identify suspected outliers. Based on the Cook's distance measure, five industries were treated as sample outliers, namely canning and preserving of meat (IO 43), manufacture of canning and preserving of fish and seafood (IO 46), manufacture of flour and other grain milling (IO 52), manufacture of motor vehicles (IO 125) and manufacture of motorcycles and bicycles and other carriages (IO 126).

All the regression results are reported in Table 6. Columns 6.1 and 6.2 contain the results without and with outlier dummy variables where *ERP* is the dependent variable. It is clear that outliers have had a considerable effect on the regression results. Most explanatory variables in column 6.1 are not statistically significant, whereas the results in Column 6.2 pass the F-test for overall statistical significance at the 1% level and

[6] Cook's (1977) distance is takes into account both the studentised residuals (i.e. the residual divided by its standard error) as well as the estimated variances of the residuals to identify outliers. For details see Belsley *et al.* (1980) and Barnett and Lewis (1994).

perform well on the standard diagnostic tests. Hence, introducing outlier dummy variables is needed.

TABLE 6
REGRESSION ESTIMATES OF ERP AND NRP DETERMINANTS IN 2003

	(6.1) PRO = ERP	(6.2) PRO = ERP	(6.3) PRO = NRP	(6.4) PRO = ERP
α	0.22	–0.10	–0.06	0.23
	(0.37)	(–0.24)	(–0.39)	(0.83)
$(HHI)^{\wedge 2}$	0.51	0.93	1.13	1.20
	(0.45)	(1.15)*	(3.74)*	(1.70)**
IMC	0.29	0.33	0.18	0.36
	(0.83)	(1.29)*	(1.95)**	(1.47)*
G	0.12	–0.15	–0.04	–
	(0.35)	(–0.59)	(–0.46)	
EX	–0.21	–0.04	0.05	–
	(–1.07)	(–0.30)	(0.84)	
FOR_I	–0.11	–0.16	–0.11	–0.18
	(–0.50)	(–1.00)	(–1.88)**	(–1.23)*
KL	–0.06	–0.07	–0.04	–0.06
	(–1.36)	(–2.06)***	(–3.26)***	(–2.10)***
VAD	–0.002	0.02	0.01	
	(–0.07)	(0.83)	(1.40)*	
MES	0.03	0.04	0.01	0.03
	(0.75)	(0.89)	(0.86)	(1.00)*
BWL	0.13	0.17	0.16	0.15
	(0.64)	(1.15)*	(2.81)***	(1.09)*
VRT	0.28	0.16	0.12	
	(0.59)	(0.46)	(0.94)	
No. of dummies	0	5	5	5
Adjusted R^2	–0.06	0.47	0.46	0.49
Overfit (F-stat.)	0.61	5.01	4.78	6.94
	(p = 0.80)	(p = 0.00)	(p = 0.00)	(p = 0.00)
No. of observation	68	68	68	68
Functional form[2]	0.09	2.92	7.75	1.67
	(p = 0.76)	(p = 0.09)	(p = 0.01)	(p = 0.20)
Normality[3]	38.0	3.29	1.17	1.24
	(p = 0.00)	(p = 0.19)	(p = 0.56)	(p = 0.54)
Heteroscedasticity[4]	0.03	2.41	0.36	2.25
	(p = 0.86)	(p = 0.12)	(p = 0.55)	(p = 0.13)

Notes: Numbers in parentheses are t-statistics with the statistical significance denoted as: *** 5%, ** 10%; and * 15%.

[2] Ramsey Test for functional form misspecification; distribution as χ^2

[3] Jarque–Bera Test for normality of the error term; distribution as χ^2

[4] White Test for heteroscedasticity; distribution as χ^2.

Source: Authors' estimates based on the data-series discussed in the text.

The results using NRP as the dependent variable are reported in Column 6.3. The results bear a striking resemblance to those in Column 6.2, but the former is subject to a functional form mis-specfication problem. In addition, the positive, but insignificant estimate corresponding to VRT observed in Column 6.2 implies that protection bargains in Thai manufacturing are struck on ERP. Hence, the following discussion is based on ERP-based estimation results.

All variables are in natural logarithms so that estimated coefficients are interpreted as elasticities. The results are not sensitive to alternative measures of foreign presence and industry concentration. Based on the overall statistical significance (F-test), therefore, FOR_I and HHI are used to represent the level of foreign presence and industrial concentration. Note that even though the estimate of HHI is positive and significant, the overall model is subject to functional form mis-specification. Thus, the square of HHI (HHI^2) is used instead. The coefficient corresponding to the industry's concentration remains statistically significant with the expected sign and the overall model is free from functional form mis-specification. Estimates corresponding to some explanatory variables (e.g. G, EX, VAD and VRT) in Column 6.2 are not statistically different from zero. The low value of the correlation coefficient between any two explanatory variables suggests that statistical insignificance is not the result of multicollinearity. Hence, Column 6.4 contains the results where the specification in Column 6.2 was re-estimated with the insignificant variables dropped.

The evidence supports the hypothesis that a highly concentrated industry is more likely to lobby policymakers successfully to provide protection. The 'free-rider problem' tends to decrease and the ability of an industry to coordinate to form collective actions tends to increase. That IMC is statistically significant suggests that an industry that is threatened by import competition tends to get higher levels of protection. This implies that an increase in imports would make it easier for enterprises to form an interest group to lobby for protection.

The statistical insignificance of EX could have two plausible explanations. First, as in many developing countries, Thailand has had several schemes of input tariff exemption for exporters. Thus, requests for lowering protection levels from exporters may have less effect on policymakers. Second, even though applying duty drawback schemes would involve costs (e.g. administrative costs) for exporters, requesting improvements in the administration of tariff exemption (e.g. reducing red tape and bureaucratic procedures) would be easier and less costly than requesting any reduction of input tariffs. By contrast, the statistically significant negative coefficient of FOR_I suggests that an industry with large numbers of foreign firms tends to succeed in gaining protection reductions. This could also reflect the nature of the relatively open foreign investment policy regime in Thailand. Thai policymakers are likely to be more responsive to foreign investors' requests that include requests for protection reductions.

With regard to supply-side factors, employment and backward linkage generation have been important factors in the decision to grant protection. Estimates corresponding to KL and BWL are statistically significant, with the expected signs. The statistically significant negative sign on the KL estimate could reflect the nature of the cascading tariff structure where finished products are generally more labour-intensive than intermediate products and/or raw materials. Hence, the lower the KL ratio, the greater is the ERP estimate. The insignificant coefficient on VAL suggests that whether industries

are or are not regarded as 'foot-loose' is determined by employment and backward linkage generation. The findings for the coefficient of MSE suggest that protection was granted in Thai manufacturing based on the claim that protection provides opportunities for industries to reach the minimum efficient scale and gain maturity.

6 Conclusions and Policy Implications

This paper has examined the determinants of protection in Thai manufacturing. NRP and ERP of individual industries in 2003 have been calculated and are used to identify the key determinants of protection. The key finding is that, even though there was a significant tariff reduction and rationalisation in the mid-1990s, the tariff structure in Thai manufacturing is still cascading, with a lower tariff on intermediate inputs than on finished products. Our results indicate that political bargains in Thailand are indeed struck over ERP rather than NRP. Protection tends to be granted to industries that have a high level of industry concentration and are experiencing increased import competition. The relatively open foreign investment policy regime in Thailand means that policymakers are more responsive to requests made by foreign investors, including requests for tariff cuts. The decision to grant protection to Thai industries is justified by the ability of industries to generate employment and backward linkage to the rest of the economy.

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