

INVENTION IN PHILIPPINE INDUSTRY

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Philippine industrial firms face several options with regard to the improvement of production efficiency and the achievement of growth in real output per unit of input. First, subsidies, taxes, quotas and other interventions which cause firms to be inefficient in production may be eliminated. Second, firms can purchase improved technological capacity embodied in capital equipment from abroad. Third, they can purchase improved technology not embodied in capital equipment from abroad by paying royalties and technical fees to foreign suppliers of technology. Fourth, they can copy and initiate technology produced abroad without payment. And fifth, they can invent by means of indigenous process and product invention, and thus attain the capacity to produce improved capital equipment domestically, produce other goods more efficiently, and produce improved goods more efficiently.¹ The objective of this paper is to provide a summary of data on Philippine invention patents, utility models and industrial designs, and to discuss these data with respect to the use of options 3, 4 and 5 by Philippine firms.

The premise underlying the paper is that the purchase of technology from abroad (including copying and imitations) at low cost and the capacity to produce improved technology domestically are important to industrial development. The typical import-substitution stage of contemporary industrial development relies on the implementation of market interventions, which generally include import restrictions and capital goods imports (options 1 and 2). Foreign investment is expected to bring in scarce capital and to result in some technology importation of the disembodied sort (option 3). The experience of newly industrialized countries (NICs), however, indicates that the capacity to purchase and imitate foreign technology is the key factor that distinguishes the most successful industrial countries from countries where import-substitution programs have

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1. Philippine firms with multinational affiliations have an access to the purchase of foreign technology which is somewhat different from that of others without such affiliates.

produced highly protected industries lacking the capacity to compete in international markets.

In Part I of this paper, we discuss the different legal instruments utilized in the Philippines to encourage invention and to facilitate technology purchase. A brief history of the Philippine Patent System is provided. In Part II, we report data for all Philippine industries and compare them with similar data from other countries. Part III reports on data at the industry level and makes comparisons across industries. Part IV provides a summary and discusses several policy issues.

I. LEGAL SYSTEMS, INVENTION AND TECHNOLOGY PURCHASE

Legal systems and industrial organization policy in different countries influence the types of inventive activities undertaken by firms and the patentability of inventions. Some countries pursue policies which encourage the holding of inventions in trade secrecy. When industrial organization structures effectively discourage competition in an industry, firms may have little incentive to sell new technology in direct form and will attempt to capture rents through the sale of new technology embodied in products. This tendency is reinforced by trade secrecy laws which provide penalties for the pirating of trade secrets.

The traditional "invention patent" is designed to provide an alternative form of protection by granting the inventor legal means by which to prevent others from copying or using the invention without permission for a limited period of time (usually 15 years). Invention patent documents are required to provide an "enabling disclosure" which sufficiently describes the invention so as to enable one who is skilled in the technology field to replicate or make the invention.

Three fundamental requirements must be met by an invention to qualify for the standard *invention patent*:

- 1) The invention must be "novel,"
- 2) The invention must be "useful," and
- 3) The invention must exhibit an "inventive step," i.e., it must not be obvious to practitioners skilled in the technology field.

These requirements are important to an understanding of patent data when considered in conjunction with international patent "conventions," chiefly the Paris Convention. Membership in these conventions generally requires: (1) that the three requirements for

patentability be judged by international standards; (2) that member countries grant patent protection to inventors from other countries provided these standards are met.

An important alternative to the invention patent, usually termed as "petty" patent or *utility model*, is used in some countries, including the Philippines. Petty patents generally have a very weak inventive step requirement and in practical terms do not always require novelty vis-à-vis the world's inventions but only vis-à-vis national or regional inventions. In addition, *industrial designs* which do not require inventive steps and have relatively weak usefulness requirements are granted by most countries of the world, including the Philippines. *Trademarks* which require only novelty are likewise granted by most countries, including the Philippines.

The Philippine Patent System dates back 35 years ago when the Philippine Patent Office was created on 20 June 1947 by virtue of Republic Acts 165 and 166. The office is authorized to grant letters of patent for inventions, for industrial designs and utility models, and of registration of trademarks, trade names, service marks and other marks of ownership to manufacturing and business entities in the Philippines. It was initially placed under the Department of Justice. A few months after, it was transferred to the then Department of Commerce and Industry. In the 1973 reorganization plan of the government, it was placed under the Department of Trade, later renamed Ministry of Trade. Then in 1981, in a new government reorganization, Trade and Industry was merged into one Ministry, under which the Philippine Patent Office is now placed.

The patent classification scheme, as well as techniques of patent examinations, was patterned after the United States system. Starting in the early 1970's, there was a move to switch to the International Patent Classification. In the transition, each patent was given both U.S. and international patent classification (this is still the current practice).

The Philippines became a member of the Union of Paris Convention in 1965.

II. INVENTION PATENTS, UTILITY MODELS AND INDUSTRIAL DESIGNS: COMPARISON WITH OTHER COUNTRIES

Table 1 reports on annual numbers of invention patents, utility

models and industrial design patents granted to Philippine firms and individuals.

These data show that total invention patents granted in the Philippines grew rapidly until 1970 but that little growth occurred in the 1970's. Until 1970 or so, the dominance of foreign inventors was extremely high. Ninety-six percent of all invention patents prior to 1971 were granted to foreigners. During the 1970's, Philippine inventors improved their performance considerably, producing more than 100 invention patents in 1976 and 1978. For the decade, over nine percent of invention patents were granted to Philippine firms and individuals.

Foreign firms obtain patents in the Philippines to: (1) protect products that they export directly to the Philippines; (2) protect products produced in the Philippines by subsidiary firms and licensees of inventions; (3) protect technical assistance agreements and process invention licensing; and (4) protect products sold in third countries not providing patent protection against Philippine competitors. Our data do not enable us to say which of these motives is most important. We believe that reason number 4 is unlikely to be very important and that number 2 is probably the most important.

Table 1 also shows that the utility model or petty patent system in the Philippines has a very different pattern than the case for invention patents. With the exception of a few years in the early 1970's, Philippine firms have obtained more than 95 percent of all utility models. In recent years, the number of utility models granted to Philippine inventors has been five times the number of invention patents granted. Furthermore, the utility model series showed steady growth through the 1970's.

The industrial design is granted to patent designs which may in many cases also have a petty invention component. Table 1 likewise shows that Philippine firms had not been eligible for design protection until 1973. The data show rapid growth in domestic design patenting during the 1970's. This growth appears to reflect the same pattern in the utility model data, i.e., a rapidly growing Philippine capacity for minor inventions.

Tables 2, 3 and 4 provide internationally comparable data on invention patents, utility models and industrial designs, and trademarks against which the Philippine performance may be compared.

Table 2 provides data for some 50 countries on numbers of invention patents granted for 4 periods: 1967, 1971, 1976 and 1980.

The countries have been grouped into 6 classes: (1) industrialized market economies with high growth rates over the past 20 years; (2) industrialized market economies with moderate to slow growth rates; (3) semi-industrialized countries with high growth rates; (4) semi-industrialized countries with moderate to slow growth rates; (5) middle to low income developing countries; and (6) industrialized planned economies.

Reference to the table will reveal a few anomalies, particularly for the developing countries where some data are missing. It shows that the relative ranking of patenting by national inventors has changed appreciably over the period. The United States was the clear leader in 1967 with more than twice as many patents granted. USSR took the second place. France, Japan and the United Kingdom followed in third, fourth and fifth places, respectively. By 1979, both the USSR and Japan had surpassed the U.S. West Germany had moved into fourth place, with both France and the United Kingdom experiencing substantial declines in patents granted to nationals.

Patents granted to nationals in the U.S. were only 72 percent of the 1967 level in 1980 (only 60 percent in 1979). For all other industrialized market economies, patents granted to nationals actually increased slightly (2 percent) from 1967 to 1979. Patents granted to foreigners in the U.S. rose by 71 percent over the period. For other industrialized nations, patents granted to foreigners declined to only 66 percent of the 1967 level (about 43 percent of this decline was attributable to the decline in patenting abroad by U.S. inventors). Consequently, the share of foreigners patenting in the U.S. rose from 22 percent in 1967 to 40 percent in 1980.

Of the industrialized economies, both Japan and West Germany expanded patenting activity at home markedly. Only Japan, among large industrialized nations, realized a significant expansion of patenting abroad. The U.S. continued to be the dominant country in patenting abroad, with West Germany, Japan and France following.

The semi-industrialized nations have a somewhat varied experience in terms of patenting. Most of the rapid-growth countries show expansion in patents granted to nationals (or have relatively high levels of patenting, e.g., Spain). The slower growing semi-industrialized countries in general have experienced some decline in national patenting. Patents granted to foreigners have tended to increase in the fast growing semi-industrialized countries and

TABLE 1
INVENTION PATENTS, UTILITY MODELS AND INDUSTRIAL DESIGNS
AWARDED BY THE PHILIPPINE PATENT OFFICE, 1948-80

	<i>Invention patents</i>			<i>Utility models</i>			<i>Design patents</i>		
	<i>Foreign</i>	<i>Domestic</i>	<i>% Domestic</i>	<i>Foreign</i>	<i>Domestic</i>	<i>% Domestic</i>	<i>Foreign</i>	<i>Domestic</i>	<i>% Domestic</i>
1948	2	2	50	—	—	—	17	0	0
1949	36	4	10	—	—	—	2	0	0
1950	53	4	7	—	—	—	2	0	0
1951	26	2	7	—	—	—	3	0	0
1952	22	4	15	—	—	—	2	0	0
1953	13	8	38	0	1	100	10	0	0
1954	10	9	47	0	4	100	15	0	0
1955	18	3	14	0	0	—	—	—	**
1956	39	7	15	0	5	100	—	—	**
1957	77	4	5	0	10	100	—	—	**
1958	135	7	5	0	26	100	10	0	0
1959	112	11	9	0	28	100	15	0	0
1960	126	11	8	0	34	100	12	0	0
1961	187	7	4	2	49	96	50	0	0
1962	176	6	3	2	44	96	27	0	0
1963	266	8	3	4	49	92	23	0	0
1964	355	9	2	8	51	86	129	0	0
1965	503	21	4	8	52	87	76	0	0
1966	452	22	5	2	66	97	51	0	0

Table 1 (Continued)

	<i>Invention patents</i>			<i>Utility models</i>			<i>Design patents</i>		
	<i>Foreign</i>	<i>Domestic</i>	<i>% Domestic</i>	<i>Foreign</i>	<i>Domestic</i>	<i>% Domestic</i>	<i>Foreign</i>	<i>Domestic</i>	<i>% Domestic</i>
1967	496	15	3	3	95	97	65	0	0
1968	819	24	3	6	62	91	37	0	0
1969	642	16	2	4	61	94	60	0	0
1970	605	26	4	2	66	97	55	0	0
1971	947	46	5	9	145	94	85	0	0
1972	749	46	6	10	196	95	158	0	0
1973	665	51	7	18	237	93	123	13	10
1974	730	98	12	12	266	96	77	151	66
1975	680	75	10	43	301	88	52	119	70
1976	755	104	12	27	342	93	34	182	84
1977	985	88	8	10	454	98	19	162	90
1978	775	107	12	9	493	98	60	235	80
1979	770	81	10	2	479	(100)*	27	163	86
1980	796	88	10	17	470	97	62	304	83

*Approximately one hundred (100).

**None in the data set for these years; presumably none were issued.

TABLE 2
INVENTION PATENTS GRANTED BY COUNTRY: SELECTED YEARS

	Patents granted to nationals				Patents granted to foreigners				Patents granted to nationals in foreign countries			
	1967	1971	1976	1980	1967	1971	1976	1980	1967	1971	1976	1980
I. Industrialized Market Economies												
A. Rapid Growth												
Japan	13,877	24,795	32,466	38,032	6,896	11,652	7,582	8,074	6,843	15,832	20,246	20,663
Austria	1,188	1,230	1,177	1,227	6,896	7,460	5,235	4,745	1,913	2,399	1,066	1,669
France	15,246	13,696	8,420	8,433	31,749	37,760	21,334	19,622	14,393	17,150	12,677	12,511
Denmark	338	252	208	192	2,002	7,212	2,068	1,453	1,165	1,650	1,217	1,101
Germany	5,126	8,295	10,395	9,826	8,300	9,854	10,570	10,362	41,775	44,862	37,316	33,208
Belgium	1,586	1,345	1,034	837	15,041	15,004	12,110	5,081	2,701	2,894	1,903	1,720
Norway	225	386	210	276	2,831	2,363	1,881	1,843	618	658	617	549
Netherlands	322	318	370	417	1,913	2,396	3,219	2,907	7,253	8,745	5,901	5,964
B. Moderate to Slow Growth												
Canada	1,263	1,587	1,301	1,503	24,573	27,655	20,449	22,392	2,789	3,201	2,661	2,200
Italy	9,076	4,320	—	1,810	26,180	13,180	—	6,190	5,621	6,749	5,416	5,877
Ireland	28	16	27	24	635	788	1,055	1,407	113	151	146	106
Switzerland	5,388	4,165	2,432	1,475	16,452	11,914	8,818	4,486	12,452	15,409	10,954	9,827
Sweden	1,776	2,245	1,888	1,394	7,532	7,268	6,956	3,604	5,031	6,327	5,719	4,769
U.S.A.	51,274	55,988	44,162	37,052	14,378	22,328	26,074	24,675	73,960	87,589	90,273	54,360

Table 2 (Continued)

	Patents granted to nationals				Patents granted to foreigners				Patents granted to nationals in foreign countries			
	1967	1971	1976	1980	1967	1971	1976	1980	1967	1971	1976	1980
Australia	752	979	910	620	10,371	9,662	10,074	7,805	905	986	1,065	2,690
U.K.	9,807	10,376	8,855	5,158	28,983	31,178	30,942	18,646	17,579	21,179	14,072	11,140
Finland	231	350	291	439	739	1,312	921	1,467	345	559	650	928
New Zealand	—	—	211	137	—	—	1,314	1,122	135	1,420	91	235

III. Semi-Industrialized Market Economies

A. Rapid Growth

Spain	2,758	2,042	2,000	1,485	6,827	7,764	7,500	7,739	627	933	766	1,189
Israel	178	202	200	305	935	1,225	1,200	1,419	219	231	146	316
Greece	975	1,227	1,349	1,114	2,302	698	1,285	942	61	70	81	691
Singapore	5	2		1	26	334	—	548	—	—	5	5
Portugal	84	214	46	95	1,045	9,238	1,319	2,200	53	57	50	50
Brazil	262	429	450	349	684	1,548	1,500	3,494	63	85	88	113
Korea (S)	207	200	1,593	258	152	117	1,727	1,161	20	20	50	50

B. Moderate to Slow Growth

Chile	80	58	60	60	1,237	1,115	514	514	—	—	—	—
Venezuela	41	237	50	55	954	1,599	514	408	—	—	—	—
Argentina	1,244	1,346	1,300	1,264	4,485	3,480	2,800	2,843	81	152	102	133
Mexico	1,981	412	300	174	7,922	5,199	3,000	1,831	149	143	181	171
Turkey	30	52	35	34	438	357	588	424	—	—	—	—
Uruguay	165	88	46	41	351	161	110	236	—	—	—	—

III. Developing Economies

Ecuador	5	8	7	7	126	180	103	103	—	—	—	—
Iraq	22	5	12	14	146	67	150	24	—	—	—	—
Morocco	28	24	23	21	391	313	334	330	—	—	—	—
U.A.P.	48	13	16	10	873	236	511	317	—	—	—	—
Colombia	49	82	30	36	851	651	600	808	—	—	—	—
Philippines	16	46	108	82	498	946	767	755	—	—	—	—
Kenya	0	1	5	—	104	121	98	97	—	—	—	—
India	428	661	433	500	3,343	3,256	2,062	2,000	72	70	73	57
Sir Lanka	1	10	4	5	4	148	156	36	—	—	—	—
O.A.P.I.	1	15	3	26	573	455	545	545	—	—	—	—

IV. Planned Economies

Germany E.	11,520	8,295	3,755	4,455	8,351	9,354	2,735	1,371	976	2,240	1,652	992
Czechoslovakia	3,613	2,824	4,880	5,763	287	1,276	2,220	1,854	1,718	1,735	927	515
U.S.S.R.	24,008	33,534	40,259	92,897	662	2,098	1,883	7,852	1,379	2,973	3,309	2,601
Hungary	414	559	594	760	663	1,054	1,155	1,018	596	1,020	1,116	1,294
Poland	1,564	2,331	5,619	5,786	485	543	2,380	1,962	447	538	347	629
Bulgaria	423	674	250	1,271	90	240	393	102	78	164	167	242
Yugoslavia	173	143	58	58	650	706	355	355	95	90	87	110
Romania	2,955	1,075	1,123	1,194	1,283	1,246	572	—	224	313	106	103

Source: Industrial Property Statistics.

World Intellectual Property Organization, Geneva

to decrease quite drastically in the slow-growth countries (for the group, patenting by foreigners is only 40 percent of its 1967 level in 1980). This decline reflects policy changes by this group of countries and other developing countries toward multinational firms. In general, through administrative procedures and through exclusion of certain technology areas from patentability (chiefly food and drugs), patenting by foreigners has been cut back (e.g., India).

The Philippines is considered to be a middle income developing country in this comparison. Its inventive performance in terms of patents granted to nationals is somewhat better than that of most other middle income developing countries and moderate to slow growth semi-industrialized countries, given its size. It is roughly comparable to this group of countries in terms of the dominance of foreign firms in invention patenting.

The developing countries, on the whole, have relatively low levels of national patenting and high ratios of patenting by foreigners (policies in India have curtailed the latter). While data on patenting abroad are incomplete, available data for both semi-industrialized and developing countries indicate that the ratio of patenting abroad to patenting at home is much lower than is the case for industrialized countries.

The planned economies in general have relatively high levels of patenting by nationals and low levels of foreign patenting and patenting abroad. With the exception of East Germany and Romania, the planned economies have expanded patenting activity. This and the low levels of patenting by planned economy inventors in industrialized economies raise the possibility that patentability standards may differ somewhat between industrialized and planned economies.

Table 3 provides a summary of data for 9 countries operating utility model or petty patent systems. It is of some interest to note that all of these countries are relatively successful in invention, given their levels of development. (Brazil introduced its utility model in 1970 and we have only recent data; Italy has not reported recent data.) Petty patents are granted primarily to nationals (although Germany has granted a significant number to foreigners from countries without petty patent systems). They are also granted primarily to individuals rather than to large corporate firms. Most are granted in mechanical technology areas rather than in chemical or biogenetic technology areas.

The advantage of the petty patent is that it broadens the invention base by providing incentives to individuals and small firms to develop inventions. Some semi-industrial countries, notably South Korea and now Brazil, are using this legal system effectively. Japan and Germany have used it effectively in the past.

The Philippines compares favorably with other countries using this legal instrument to encourage inventions in which Philippine inventors may be said to have a comparative advantage.

Table 4 provides data for two weaker legal instruments — the industrial design patent and the trademark. Those countries with petty patent systems also have relatively active design patent systems. Design patents have generally not experienced the same pattern of decline observed in invention patents. Except for Canada and the smaller European Community countries, design patenting by foreigners is a relatively small fraction of total patenting. This is particularly true for semi-industrialized and developing countries where multinational firms have not utilized this instrument for protection (in contrast to invention patents).

The data on trademarks, on the other hand, show that foreign firms are using trademark protection in most markets, including the semi-industrialized and developing countries. A general expansion of trademark registration to both nationals and foreigners is observed in the majority of economies of all types except in the planned economies. The Philippines has an active and growing trademark system and grants more trademarks to domestic firms than to foreigners.

Table 2 provided data on patents granted to nationals at home, to nationals abroad and to foreign inventors. The ratio of patents granted to nationals to total patents granted varied from a high of .76 in the planned economies (and the U.S.) to a low of .11 for all developing economies in the late 1960's. The ratio of patents granted to nationals to patents granted to nationals abroad ranged from over 2.0 for many developing countries to around .1 for developing and slow growth semi-industrialized countries.

We do not have data on patents granted abroad to Philippine inventors. We would expect, however, that the ratio of patents granted abroad to patents granted at home would be low. This ratio, together with the data showing dominance of invention patenting by foreigners in developing countries, indicates a comparative advantage pattern in invention. Inventors in industrialized countries simply

TABLE 3
UTILITY MODELS (PETTY PATENTS) GRANTED IN 1967, 1975, 1980

	<i>Applications</i>						<i>Utility models granted</i>					
	<i>Nationals</i>			<i>Foreigners</i>			<i>Nationals</i>			<i>Foreigners</i>		
	<i>1967</i>	<i>1975</i>	<i>1980</i>	<i>1967</i>	<i>1975</i>	<i>1980</i>	<i>1967</i>	<i>1975</i>	<i>1980</i>	<i>1967</i>	<i>1975</i>	<i>1980</i>
Germany (FR)	42,214	30,114	26,094	11,344	11,938	8,153	20,948	12,099	10,252	2,400	2,181	1,879
Italy	4,418	—	—	778	—	—	3,935	—	—	702	—	—
Japan	109,154	178,992	190,388	1,906	1,668	1,397	20,601	47,449	49,468	721	957	533
Philippines	141	565	762	2	7	24	94	331	465	—	9	3
Poland	1,647	1,896	2,523	22	31	36	411	1,775	1,680	4	25	20
Portugal	139	78	118	25	13	15	77	153	159	9	25	6
Spain	7,601	7,650	5,830	710	1,353	1,162	6,177	4,128	3,845	600	2,041	1,131
Brazil	—	—	1,657	—	—	89	—	—	131	—	—	13
Korea	—	7,052	7,936	—	238	622	—	1,032	1,315	—	14	438

Source: Industrial Property Annual Statistical Reports.

TABLE 4
INDUSTRIAL DESIGN PATENTS AND TRADEMARKS GRANTED, 1975 AND 1980

	Industrial designs granted				Trademarks granted			
	Nationals		Foreigners		Nationals		Foreigners	
	1975	1980	1975	1980	1975	1980	1975	1980
I. Industrial Market Economies								
A. Moderate to Rapid Growth								
Japan	34,129	30,696	700	593	104,156	41,577	5,010	5,290
Austria	3,987	4,260	1,517	1,744	1,458	3,333	1,247	2,148
France	11,320	13,209	857	1,560	12,645	37,332	4,312	9,784
Denmark	390	314	486	630	1,520	1,324	3,704	3,339
Germany	54,231	70,701	2,609	4,844	9,396	13,006	3,432	3,838
Benelux	1,671	1,691	1,376	1,262	5,529	4,418	3,571	3,082
Norway	243	252	364	434	522	464	2,531	2,675
B. Slow Growth								
Canada	337	337	1,168	978	3,507	8,779	3,391	6,755
Ireland	34	46	176	284	107	162	893	2,098
Switzerland	465	351	213	325	2,552	2,462	1,508	1,507
Sweden	1,283	1,558	364	588	1,397	1,577	2,591	2,608
U.S.A.	3,428	3,056	854	892	28,353	17,319	2,578	1,566
Australia	1,165	1,377	568	580	2,835	1,860	4,252	2,715
U.K.	1,665	2,166	1,354	2,799	5,878	3,356	5,562	3,352

Table 4 (Continued)

	Industrial designs granted				Trademarks granted			
	Nationals		Foreigners		Nationals		Foreigners	
	1975	1980	1975	1980	1975	1980	1975	1980
Finland	165	371	222	350	276	703	1,126	3,542
New Zealand	157	170	167	173	845	524	2,015	1,318
II. Semi-Industrialized								
A. Rapid Growth								
Spain	3,234	2,239	224	407	—	11,119	—	12,822
Israel	115	266	42	56	224	255	1,064	868
Greece	—	—	—	—	1,546	1,260	1,469	1,800
Singapore	—	—	—	—	—	784	—	2,499
Portugal	266	335	216	228	770	1,035	481	581
Brazil	—	136	—	81	—	136,808	—	42,821
Korea (R)	1,583	3,917	6	154	—	—	—	—
Hong Kong	—	—	—	—	348	603	1,182	1,647
B. Moderate to Slow Growth								
Chile	—	—	—	—	2,883	1,986	2,810	1,735
Venezuela	59	77	34	16	635	2,360	1,452	1,961
Argentina	2,426	n.a.	159	n.a.	12,428	—	2,032	—
Costa Rica	—	—	—	—	521	—	974*	—
Mexico	—	—	—	—	3,352	8,637	3,117	8,292*
Turkey	—	—	—	—	557*	1,129**	1,171*	1,181**
Uruguay	—	—	—	—	1,293	6,414	1,152	541

III. Developing Economies

Ecuador	—	—	—	—	210	513	612	1,077
Iraq	19	9	—	—	68	184	236	885
Morocco	82	116	15	40	428	541	309	443
U.A.R. (Egypt)	127	166	8	27	234	145	396	408
Colombia	11	n.a.	5	n.a.	702	584**	1,542	672**
Philippines	119	304	52	62	539	1,225	341	1,013
Kenya	—	—	—	—	153	443	585	747
Ghana	—	—	—	—	27	8	263	167
India	723	n.a.	29	n.a.	3,019	n.a.	640	n.a.
Sri Lanka	8	n.a.	—	n.a.	43	160	130	376
Indonesia	—	—	—	—	1,160	6,479	697	2,741
Pakistan	74	93	14	36	283	494**	640	780**
Zambia	—	—	3	—	22	4	441	215
OAPI	26	—	57	—	62	n.a.	954	n.a.

IV. Planned Economies

Germany E.	—	—	—	—	299	150	325	265
Czechoslovakia	577	1,304	8	20	182	134	302	258
USSR	—	—	—	—	48	1,627	5	559

Table 4 (Continued)

	Industrial designs granted				Trademarks granted			
	Nationals		Foreigners		Nationals		Foreigners	
	1975	1980	1975	1980	1975	1980	1975	1980
Hungary	165	120	11	28	107	149	290	194
Poland	139	124	16	28	288	116	640	544
Bulgaria	27	38	5	6	15	73	434	492
Yugoslavia	102	n.a.	30	n.a.	156	n.a.	154	n.a.
Romania	—	—	—	—	205	418	734	53

Source: Industrial Property Annual Issues

*1976

**1979

TABLE 5
INVENTION PATENTS, UTILITY MODELS AND INDUSTRIAL
DESIGNS GRANTED BY THE PHILIPPINE PATENT OFFICE
BY COUNTRY OF ORIGIN

	Philippines	Germany	Japan	Taiwan	Switzerland	United Kingdom	United States	Total
A. Inventions								
1948-50	10	0	0	1	0	1	84	101
1951-55	26	0	0	0	1	0	86	115
1956-60	40	6	4	0	5	16	404	529
1961-65	51	32	58	2	42	60	1,099	1,538
1966-70	103	109	261	0	143	115	1,973	3,117
1971-75	316	271	600	8	163	138	1,886	4,087
1976-80	468	335	434	25	199	269	2,978	4,549
Total	1,014	753	1,357	36	553	649	7,618	14,036
B. Utility Models*								
1948-50	—	—	—	—	—	—	—	—
1951-55*	5	0	0	0	0	0	0	5
1956-60	103	0	0	0	0	0	0	193
1961-65	245	0	2	15	0	1	1	269
1966-70	350	1	4	10	0	—	1	367
1971-75	1,145	2	6	54	0	1	7	1,237
1976-80	2,238	0	9	22	0	0	7	2,303
Total	4,986	3	21	101	0	2	16	4,284

Table 5 (Continued)

	Philippines	Germany	Japan	Taiwan	Switzerland	United Kingdom	United States	Total
C. Design Patent								
pre-1951	0	0	0	0	0	0	0	22
1951-60	0	0	0	0	0	0	0	42
1961-70	0	0	0	0	0	0	0	473
1971-80	1,329	4	51	52	4	12	121	2,026
Total	1,329	4	51	52	4	12	121	2,563

* First granted in 1953, according to our data.

have a large comparative advantage in major forms of invention over inventors in semi-industrialized and developing countries. They have access to the large markets for improved products and the "economic laboratories" suited to the efficient production of such products and related processes. Semi-industrialized and developing countries have a comparative advantage in adaptive or derivative inventions. The fact that they do not achieve significant inventions abroad attests to this.

Table 5 shows the distribution of foreign countries obtaining invention patents, utility models and industrial design patents in the Philippines. Not surprisingly, the United States is the most important source of foreign invention by a large margin. Fifty-seven percent of foreign invention patents, 15 percent of foreign utility models and 17 percent of foreign industrial designs originated in the United States. Japan is next in importance and contributed 10 percent of foreign invention patents in the 1970's.

Table 6 provides an additional index of the comparative advantage of Philippine firms in invention. For recent years, we have been able to measure the number of "claims" per patent. This is a measure of the size of breadth of an invention. Here we note that the Philippine origin inventions are smaller than foreign origin inventions. This reinforces the fact that Philippine inventors have a comparative advantage in adaptive inventions.

TABLE 6
AVERAGE NUMBER OF CLAIMS, BY PATENT TYPE,
SELECTED COUNTRIES, ALL YEARS

	Utility model	Inventions	Design
Philippines	1.02	3.74	1.15
Denmark	—	10.12	1.00
France	1.00	8.47	1.00
Germany	1.00	8.93	1.00
Italy	1.00	6.79	1.00
Japan	1.00	7.43	1.00
Netherlands	1.00	10.50	1.00
Taiwan	1.00	5.29	1.00
Switzerland	—	11.42	1.00
United Kingdom	—	10.56	1.00
United States	1.00	11.22	1.01
Others	1.53	11.33	3.88

III. INVENTION BY INDUSTRY

The Philippine patent classification system enables an approximate assignment of patented inventions by industry.² We have developed a concordance between patent classes and the industries (see the Appendix), from which we were able to construct Table 7. This table provides us a basis for comparing the relative growth in patenting by industry as well as the ratio of foreign to domestic patenting.

It is clear from this table that patenting activity varies considerably from industry to industry. The leading industries in terms of total patenting activity are the chemical industries: inorganic acids, drugs, medicine, cosmetics and other chemical products. Patenting in the machinery industries is next in importance.

It is also clear from Table 7 that the relative importance of Philippine and foreign invention varies greatly by industry. Philippine invention is highest in the machinery-related industries. It is also significant in the mining and quarrying, electricity, food, paints and varnishes, and miscellaneous chemicals industries.

The utility model data show even more concentration on the machinery industries with agricultural machinery, motors and bicycles, and household appliances showing significant activity. Furnitures and fixtures also indicate a significant activity.

These relationships are somewhat better shown in Tables 8-10 where we have computed several ratios of interest for the 1971-80 period. These tables show ratios of utility models, industrial design patents, and invention patents granted each to the value-added and employment (in 1974) in each industry. We list in the tables the top ten industries according to these ratios. They show the most foreign invention-intensive industries to include the chemical industries (excluding fertilizer), plastic materials manufacturing, and electrical industrial machineries which require sophisticated laboratories or a high degree of skills. On the other hand, the most domestic invention-intensive industries are musical instruments, cutlery, handtools and hardware, furnitures and fixtures, footwear, structural metal products and electrical equipment, which are approximately the same industries with higher utility model-intensive ratios.

2. Ideally, we would like to be able to classify inventions according to both industry of origin and industry of use. This is not possible with the existing patent classification system. Sheres (1982) has undertaken such a classification of U.S. patents.

TABLE 7
INVENTION PATENTS AND UTILITY MODELS BY INDUSTRY

<i>Industry</i>	<i>Invention patents</i>						<i>Utility models</i>		
	<i>Philippines</i>			<i>Foreign</i>			<i>Philippines</i>		
	<i>1951-60</i>	<i>1961-70</i>	<i>1971-80</i>	<i>1951-60</i>	<i>1961-70</i>	<i>1971-80</i>	<i>1951-60</i>	<i>1961-70</i>	<i>1971-80</i>
0 Agriculture, hunting, etc.	4	7	36	2	15	30	1	23	87
1 Mining and quarrying	0	8	15	4	131	98	3	14	99
4 Electricity, gas steam	1	0	35	2	60	107	0	23	118
5 Construction	1	3	6	16	88	192	1	5	45
6 Wholesale, retail, banks, etc.	0	0	0	0	0	1	0	0	1
20 Food manufactured	1	2	44	11	41	230	0	1	1
21 Beverages	0	0	8	1	48	66	0	3	35
22 Tobacco products	4	12	2	7	48	73	0	3	10
231 Spinning, weaving, finishing	3	0	5	11	103	153	1	13	18
232 Knitting mills	0	3	30	0	5	5	0	0	3
241 Footwear	0	0	5	2	6	8	3	6	25
243 Wearing apparel, except footwear and embroideries	0	2	7	5	25	12	0	8	65
25 Wood and cork, except furniture	0	0	3	7	17	14	0	6	50
26 Furniture and fixtures	3	3	19	10	38	35	4	46	256

Table 7 (Continued)

Industry	Invention patents						Utility models		
	Philippines			Foreign			Philippines		
	1951-60	1961-70	1971-80	1951-60	1961-70	1971-80	1951-60	1961-70	1971-80
27 Paper and paper products	0	3	9	3	63	52	0	11	33
28 Printing, publishing, etc.	2	0	9	2	16	12	0	5	49
291 Tanneries and leather finishing	0	0	0	0	0	2	0	0	3
299 Other leather and leather products	0	1	0	0	0	1	0	1	21
30 Rubber products	0	0	0	4	47	23	0	1	5
3112 Inorganic acids, alkali and chlorine	0	0	9	0	0	1,759	0	0	7
3119 Other industrial chemicals and fertilizer	2	2	6	18	80	150	0	1	7
313 Paints, vanishes, etc.	1	7	27	11	102	144	2	4	19
314 Plastic materials	1	1	16	4	107	317	0	1	10
315 Drugs, medicines, cosmetics and cleaning preparation	0	1	19	54	447	1,079	5	10	87
319 Miscellaneous chemicals	3	8	48	27	323	564	4	32	69
32 Petroleum and coal products	2	2	12	3	22	17	0	1	11
33 Nonmetallic mineral products except petroleum and coal	0	1	6	2	45	68	3	20	74

34	Basic metal industries	2	0	5	2	40	65	1	26	41
352	Cutlery, hand tools, hardware	2	1	8	3	30	44	2	16	125
353	Structural metal products	0	1	3	1	3	7	11	9	11
359	Other fabricated metal products	0	5	19	2	69	70	2	21	103
362	Agricultural machinery	3	3	11	7	16	33	1	19	153
369	Machinery except electrical and agricultural machinery	7	27	118	69	424	673	15	19	395
371	Electrical industrial machinery	2	3	16	4	25	84	1	5	114
374	Batteries, electric lamps and wires	0	0	4	11	36	32	0	4	15
374	Household electric appliances	0	1	12	15	45	36			
375	Household radio, TV, etc.	0	3	16	62	63	74	2	11	92
379	Other electrical and appliances	0	1	14	1	39	77	1	10	71

Table 7 (Continued)

<i>Industry</i>	<i>Invention patents</i>						<i>Utility models</i>		
	<i>Philippines</i>			<i>Foreign</i>			<i>Philippines</i>		
	<i>1951-60</i>	<i>1961-70</i>	<i>1971-80</i>	<i>1951-60</i>	<i>1961-70</i>	<i>1971-80</i>	<i>1951-60</i>	<i>1961-70</i>	<i>1971-80</i>
381 Shipbuilding and repair	0	3	10	2	11	23	0	5	27
Motor vehicles,									
385 motors and bicycles	1	2	13	0	10	19	3	16	116
386 Aircraft	0	0	1	1	2	0	0	0	3
391 Professional instruments	1	3	11	9	78	193	0	4	40
392 Photographic and optical	0	1	2	2	11	16	0	5	10
393 Watches and clocks	0	0	1	2	0	4	0	0	3
394 Jewelry, silverwares, etc.	0	0	0	0	0	1	0	0	21
395 Musical instruments	0	0	3	2	1	0	0	4	5
396 Miscellaneous plastic									
products	0	1	10	10	86	69	0	1	5
399 Miscellaneous manufacture	5	6	81	25	238	295	22	68	618
622 Grocery and retail stores	0	0	0	0	0	2	0	0	3

TABLE 8
UTILITY MODEL INTENSITY RATIO BY INDUSTRY, 1971-80

<i>Industry</i>	<i>UM/VA^{a/}</i>	<i>UM/EM^{b/}</i>
352 Cutlery, handtools and hardware	34.417	213.311
299 Leather products	9.944	34.653
26 Furniture and fixtures	7.117	37.032
369 Machinery, excluding electrical	5.75	60.526
371 Electrical industrial machinery	4.431	69.343
374 Household electrical appliances	4.087	60.413
241 Footwear	3.927	11.743
353 Structural metal products	3.903	18.771
392 Photographic and optical instruments	2.870	78.740
395 Musical instruments	2.607	10.571

a. Number of utility models per unit of value added.

b. Number of utility models per employee.

TABLE 9
DOMESTIC INVENTION PATENTING INTENSITY RATIO
BY INDUSTRY, 1970-81

<i>Industry</i>	<i>DP/VA^{a/}</i>	<i>DP/Em^{b/}</i>
395 Musical instruments	5.213	21.142
352 Cutlery, handtools and hardware	2.203	13.652
369 Machinery, excluding electrical	2.018	21.237
391 Professional instruments	1.957	21.654
353 Structural metal products	1.065	5.119
241 Footwear	.785	2.349
374 Household electrical appliances	.645	9.539
371 Electrical industrial machinery	.622	9.732
26 Furniture and fixtures	.533	2.748
313 Paints and varnishes	.507	16.729

a. Number of domestic invention patents per unit of value added.

b. Number of domestic invention patents per employee.

TABLE 10
FOREIGN INVENTION PATENTING INTENSITY RATIO
BY INDUSTRY, 1971-80

<i>Industry</i>	<i>FP/VA^{a/}</i>	<i>FP/Em^{b/}</i>
3112 Inorganic acids and alkalis	67.267	1420.840
395 Musical instruments	35.971	45.877
314 Plastic materials	34.331	766.335
391 Professional instruments	16.860	379.921
352 Cutlery, handtools and hardware	12.115	75.085
369 Machinery, excluding electrical	8.916	93.841
3119 Industrial chemicals and fertilizers	6.102	93.400
392 Photographic and optical instruments	4.592	25.000
371 Electrical industrial machinery	3.265	51.095
313 Paints, varnishes, etc.	2.703	89.219

a. Number of foreign invention patents per unit of value added.

b. Number of foreign invention patents per employee.

Such a pattern could indicate three things. One, foreign patent protection may be effectively "blocking" local invention. Two, the Philippines' comparative advantage lies in small, adaptive inventions. And three, most chemical industries and other industries dominated by foreign patenting require a high degree of skills which most developing countries lack. (The second and third are related.) Our data do not show how much "blocking" effect of foreign patenting there is or how little comparative advantage we have in these sectors. However, our data suggest where the Philippine firms have a comparative advantage and where there is substantial scope for adaptive invention.

IV. POLICY ISSUES

We take it to be an objective of Philippine industrial policy to efficiently allocate resources toward productivity-improving activities. An optimal policy would mean that each of the several options of technology purchase and indigenous inventive activities will be pursued such that the marginal contribution to productivity growth per peso or resource invested may be equalized. We further take it to be reasonable that Philippine policy is nationalistic in the sense that there is need to recognize the intellectual property rights of foreign firms only because doing so produces gains to the Philippines. In other words, we do not presume, as some international lawyers

would, that intellectual property rights are "global." Legal systems to insure intellectual property rights are inherently nationalistic in character and should be designed to serve the national interest.

We further acknowledge that there may be a conflict between short and long-term policy objectives. Import substitution policies result in interventions which cause inefficiency in the short run so that Philippine consumers pay more for many goods than they would under free trade. In the long run, the premise behind such policy is that protected industries will achieve a high level of efficiency and eventually be able to export and provide domestic goods which are cheaper than imported goods.

Thus, one of the central tenets of Philippine industrial policy is that efficiency, as productivity gains, is critical to the success of the policy. We are not in a position to comment on the overall effectiveness and progress of Philippine industrial policy except to note that the Philippines has not yet entered the rapid growth export-oriented phase realized by several other successful newly-industrialized countries (NICs). We can, however, draw some comparisons between the Philippines and the NICs regarding the measures of invention discussed in this paper.

In this regard, the Philippines shows the general pattern of invention characterizing the advanced developing country or the "near NIC" country. It appears to rank ahead of most other developing countries and probably ahead of most slow growing semi-industrialized countries in terms of domestic inventions. It is not matching the performance, however, of most of the NICs.

In our judgement, the level of domestic inventive activity is a key factor in industrial development. Successful policies produce high levels of such activity broadly distributed among firms and individuals. The data on Philippine invention suggest a fair degree of success in stimulating indigenous invention. The utility model system in the Philippines appears to be working quite well in terms of stimulating adaptive inventions from a broad spectrum of Philippine inventors.

It seems clear from the industry specific data that Philippine firms have a comparative advantage in particular types of invention. Inventions in the light engineering industries, especially agricultural machineries, leather and footwear and furniture manufacturing and electrical equipment, appear to be stimulated by the utility model system. Inventions patent data suggest that these industries, along with musical and professional instruments and structural metal

industries, are the ones with substantial scope for Philippine adaptive invention.

Philippine patenting in most chemical industries (with the exception of fertilizers and paints and varnishes) and pharmaceutical industries is low relative to foreign patenting. This suggests a real comparative disadvantage for Philippine firms in these industries. This may be the result of limited scope for adaptive invention as it may be that the breadth of foreign patent protection effectively "blocks" local adaptive invention. If the latter is the case, the Philippines may wish to consider limitations on patent protection granted to foreigners in certain fields. After all, there is no *a priori* reason to grant protection to foreign inventors on the ground of global intellectual property rights. The granting of such protection has costs and benefits to the Philippines. On the cost side, such grants give rise to licensing and limitations in copying and imitation. This raises the costs of imparting technology. As noted, it may also block or discourage Philippine inventive activity. On the benefit side, foreign patent recognition regularizes the contract under which technology may be imported. It is quite possible that the granting of patenting recognition may lower the real net cost of importing and using foreign technology. This occurs because, in the absence of patent grants, foreign firms may not be willing to sell technical advisory services as well as provide blueprints, etc. The Philippines presumably also benefits from reciprocity in that, by recognizing the patents of foreigners, Philippine inventions will be granted recognition in foreign countries. This, as we have noted, is of little practical value because most Philippine inventions are primarily adaptive in nature and hence are of limited value in other countries.

Our data do not, in and of themselves, suggest obvious changes in the Philippine legal systems. The fact that the utility model system is producing significant inventions suggests that consideration should be given to the expansion of the breadth of the utility model and to aggressive use of the system to encourage more invention. Special efforts to provide low cost legal services and rapid evaluation and processing of utility model applications should be considered.

As to the possible alteration of the recognition of the foreign patents, we can suggest that further studies of the costs and benefits be undertaken. It may be that an expansion of utility model protec-

tion can accomplish some of the objectives that limitations on recognition of foreign patents would.

On the whole, the state of invention in Philippine industry appears to be consistent with its state of development. Or to put it another way, inventive activity does not appear to be a severe limiting factor preventing the Philippines from moving into an open export-based rapid growth phase. Other policy changes will be required to achieve this growth, although a more aggressive program to stimulate invention would contribute toward the achievement of this goal.

APPENDIX
Concordance Between the 1968 Philippine Standard
Industrial Classification and the Philippine
Patent Classification

<i>PSIC 1968</i>	<i>Industry description</i>	<i>Patent class^{a/}</i>
20	Food manufactured	Big class 17, 101, 127 and 426 excluding sub-classes included in beverage Big class 99 subclasses 1-24, 54-99, 100R, 100P, 101, 102, 103, 104, 107-9, 451 onwards
21	Beverage	Big class 210, 201, 202, 203 and 426 sub-classes, 7-31, 51, 61-64, 290, 330, 330.3, 330.4, 330.5, 422, 433, 477, 487, 489, 492-5, 506, 569, 590-2, 599, 624 Big class 99 subclasses 28-53, 105-6
22	Tobacco	131
23	Textile	
231	Spinning, weaving, finishing	8, 19, 26, 28, 38, 57, 68, 139
232	Knitting	66
24	Made-up textile	
241	Footwear except rubber and plastic	12, 36

Appendix (Continued)

<i>PSIC 1968</i>	<i>Industry description</i>	<i>Patent class^{a/}</i>
243	Wearing apparel, except footwear and other made-up textile	2, 87, 112, 223, 289
25	Wood and cork, except furnitures	90, 142, 143, 144, 211, 217
26	Furnitures and Fixtures	5, 147, 160, 248, 154, 155, 256, 297, 312
27	Paper and Paper products	93, 162, 229
28	Printing and Publishing	11, 40, 101, 199, 276, 281, 283, 402
29	Leather and leather products	
291	Tanneries and leather finishing	69
299	Other leather products	54, 190
30	Rubber and rubber products	152
31	Chemicals and chemical products	
311	Basic industrial chemicals and fertilizers	
3112	Inorganic acids, Alkali and Chlorine	Big class 260 subclasses 243.3, 244.4
3119	Fertilizers and other industrial chemicals	23, 71, 247, 268, 326, 423 Big class 260, subclasses 96, 551-562
313	Paints, varnishes, lacquer	106, 117, 427 Big class 260, subclasses 586, 588, 597

Appendix (Continued)

<i>PSIC 1968</i>	<i>Industry description</i>	<i>Patent class^{a/}</i>
314	Plastic materials	Big class 260, subclasses 2-34, 37-40, 42, 45, 95, 96, 293.3, 448, 709-822
315	Drugs, medicine, cosmetic, soap, and cleaning preparation	132, 167, 424 Big class 260, subclasses excluded above
319	Other chemical products	21, 34, 86, 96, 102, 129, 134, 148, 149, 156, 183, 195, 252
32	Products of petroleum and coal	44, 184
33	Nonmetallic mineral products	4, 65, 94, 125, 215
34	Basic metal industries	22, 80, 110, 113, 138, 164, 246, 270, 271, 285, 287, 295
35	Fabricated metal products except machinery	
352	Cutlery, handtools	7, 16, 30, 70, 76, 81, 85, 145, 171, 173, 175, 254, 294
353	Fabricated structural	168, 182, 189, 460
359	Other fabricated metals except machinery	10, 42, 59, 64, 89, 109, 124, 140, 151, 153, 163, 169, 205, 220, 245, 267, 292, 306
36	Machinery except electrical	
361	Engines and turbines	91, 92, 121, 123, 185, 251, 253, 418, 431
362	Agricultural machinery	56, 97, 130, 239
369	Other machinery excluding electrical and agricultural	25, 29, 51, 72, 74, 83, 100, 103, 118, 126, 146, 157-8, 177, 187, 188, 193, 196-8, 207, 212-3, 221-2, 224-8, 231, 234-5, 241-3, 249, 261, 266, 282, 291, 302-3, 308-9, 408, 415-7,

Appendix (Continued)

<i>PSIC 1968</i>	<i>Industry description</i>	<i>Patent class^{a/}</i>
		425 Big class 99 subclasses 335-450.8
37	Electrical machinery, apparatus, appliances and supplies	
371	Electrical industrial machinery	13, 174, 191, 192, 194, 200, 257, 307, 310, 321-3, 335-9, 429, 536
373	Dry cells and storage batteries	136, 320
374	Electric lamps	240, 313-6
375	Radio, TV, communication equipment	116, 178-9, 274, 325, 329, 330-4, 340, 343
379	Other electrical machinery	62, 219, 263, 279, 328, 432, 444
38	Transport equipment	
381	Shipbuilding and repair	9, 114, 115, 170
385	Motor vehicles, motorcycles	98, 180, 278, 280, 293, 295, 296, 298, 301, 305
386	Aircraft	244
39	Miscellaneous manufacturing industries	
391	Professional, scientific, measuring and controlling instruments	3, 32, 33, 73, 128, 324, 346

Appendix (Continued)

<i>PSIC 1968</i>	<i>Industry description</i>	<i>Patent class^{a/}</i>
392	Photographer and optical goods	88, 95, 350-3, 356
393	Watches and clocks	58
394	Jewelry	63
395	Musical instruments	84
396	Miscellaneous Plastic products	18, 264
399	Other manufactures, n.e.c.	15, 24, 46, 49, 53, 79, 82, 108, 120, 122, 133, 135, 137, 141, 159, 161, 181, 199, 206, 209, 214, 232, 233, 236, 269, 272, 273, 277, 300, 355, 401, 428
	Agriculture and fishery	1, 6, 43, 47, 111, 119
	Mining and quarrying	37, 172, 208, 255, 262, 286, 299
	Electricity, gas and steam	48, 55, 165, 176, 204, 230, 250, 317, 318, 429
	Construction	14, 50, 52, 60, 61, 104, 105, 166, 237, 238, 258, 290, 404

a. Except where indicated, patent classes are major ones (or big class).