Working Paper
in Economics and
Development Studies

Department of Economics
Padjadjaran University

No. 200606

Productivity Growth in Thailand and Indonesia: How Agriculture Contributes to Economic Growth

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February, 2006

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Productivity Growth in Thailand and Indonesia:

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Abstract

Total factor productivity growth in the agricultural, industry and services sectors is studied in this paper for two countries: Thailand and Indonesia, over the period 1981 to 2002. A feature of the analysis is the decomposition of aggregate total factor productivity growth into two components: productivity growth in individual sectors; and the reallocation of resources from low productivity to high productivity sectors. The results show that in both countries virtually all factor productivity growth at the sectoral level derives from agriculture, but the reallocation of resources away from agriculture was a much larger source of aggregate productivity growth.

JEL classifications: O47; Q10; O30

Key words: total factor productivity growth; Thailand; Indonesia.

* Contributed paper to the Australian Agricultural and Resource Economics Society Annual Conference, Sydney, 8-10 February 2006. Excellent research assistance was provided by Arief Ramayandi.

1. Introduction

Understanding long-term growth requires distinguishing between increases in the quantities of factors of production employed and improvements in their productivity, an exercise often called growth accounting. The original contribution was Solow (1957), who contended that 80 per cent of the long term increase in per capita output in the United States was due to productivity growth and only 20 per cent due to capital accumulation. An enormous literature has ensued. A decade ago, growth accounting was popularized by Paul Krugman (1994), in one of the most famous articles ever written by an economist. Regarding the rapid growth of East Asia, Krugman argued that, in contrast with Solow's findings, the East Asian growth 'miracle' was due almost entirely to growth in factor inputs; productivity growth was minimal.

Krugman drew out two implications from these findings. First, there was nothing 'miraculous' about Asia's growth, since it derived mainly from 'perspiration' (increased factor inputs) coming primarily from greatly increased rates of investment and extension of basic education. More specifically, the claim that productivity had increased because far-sighted industrial policies had generated massive efficiency gains ('inspiration') was not credible. Second, Krugman claimed that since the large increases in investment shares over GDP and the extension of basic education were not sustainable indefinitely, a long-term slowdown of growth based on these sources could be expected.

The data on which Krugman based these conclusions was drawn mainly from Singapore and Hong Kong. This paper analyses the sources of growth in Thailand and Indonesia, two countries not covered by Krugman's discussion or the empirical work by Young (1994) on which it was based. The analysis covers the years 1980 to 2002. The macroeconomic experience of Thailand and Indonesia during this period was roughly similar. Prior to 1987 growth was moderate. An investment-driven boom followed over the next decade, during which these two countries were among the fastest growing in the world. This boom collapsed with the 1997-98 financial crisis and a moderate recovery has since occurred. Our analysis is therefore conducted for each of the four periods implied by this experience: the pre-boom years of 1981 to 1986; the boom period of 1987 to 1996; the crisis of 1997-98 and the 1999 to 2002 recovery.

Growth accounting focuses on supply-side determinants of output. During the first two periods (1980 – 1986 and 1987 – 1996) output was primarily supply-constrained; aggregate demand was not the binding constraint on output and factors of production were more or less fully employed. However, the crisis and recovery periods from 1997 onwards were characterized by a deficiency of aggregate demand, reflected in unemployment and unused capacity. It is debatable whether a growth accounting framework, which focuses on the determinants of aggregate supply, is relevant for such periods. The data are included here in any case, but separate estimates are presented for the pre-crisis period.

We begin with a theoretical decomposition of productivity growth into three components: growth of total factor use adjusted by average productivity; productivity growth in individual sectors; and productivity growth arising from factor reallocation among sectors. The following section applies this framework to data for Thailand and Indonesia.

2. Aggregate and Sectoral Productivity Growth

The objective of this theoretical discussion is first the familiar one of decomposing aggregate output growth into a component due to growth in the use of factor inputs and another due to growth in aggregate total factor productivity. The second objective is to decompose further the aggregate productivity growth component just described into one component due to growth in productivity in individual sectors and a second due to the reallocation of resources among sectors of differing total factor productivity.[1]

Let output in sector *j* be given by

$$Y_j = F_j T_j \qquad (1)$$

where F_j is an index of factor use in sector *j* and T_j is an index of total factor productivity in that sector. For example, in the case of the familiar constant returns to scale Cobb-Douglas production function $Y_j = A_j K_j^{\alpha} L_j^{1-\alpha}$, with K_j and L_j denoting capital and labour use in sector *j*, respectively, and $0 \le \alpha \le 1$ denoting the coefficient on capital, $F_j = K_j^{\alpha} L_j^{1-\alpha}$ and $T_j = A_j$.

Aggregate output in the economy is given by

$$Y = FT \tag{2}$$

where F and T are indexes of aggregate factor use and total factor productivity, respectively. Aggregate output is simply $Y = \sum_j Y_j$ and aggregate factor use is $F = \sum_j F_j$. Aggregate total factor productivity is then defined as $T = Y/F$.

Now consider the growth of aggregate output

$$dY = \sum_j dY_j = TdF + FdT = \sum_j (T_j dF_j + F_j dT_j) \tag{3}$$

$$y = dY/Y = \sum_j S_j y_j = \sum_j S_j f_j + \sum_j S_j t_j, \tag{4}$$

where $S_j = Y_j/Y$ is the share of total output deriving from sector j, $f_j = dF_j/F_j$ is the growth rate of factor use in sector j and $t_j = dT_j/T_j$ is the growth rate of productivity in sector j.

Equation (4) states that the aggregate growth rate can be decomposed into two components, one due to the growth of factor inputs at the sectoral level and the other due to the growth of total factor productivity in each sector. Consider the first of these. It can be further decomposed as follows,

$$\sum_j S_j f_j = \sum_j (F_j T_j/FT) f_j = T\sum_j F_j f_j/Y + \sum_j F_j \tilde{T}_j f_j/Y, \tag{5}$$

where $T_j = \tilde{T}_j + T$ and $\tilde{T}_j$ is thus the difference between the *level* of productivity in sector j and the aggregate level of productivity, economy-wide, T, as defined above.

The growth of total factor use in the economy is given by

$$f = \sum_j F_j f_j/F = T\sum_j F_j f_j/Y, \tag{6}$$

[1] This distinction was apparently first identified by Jorgenson (1988) in the context of US productivity growth.

which corresponds to the first right hand side component of equation (5). Equation (5) thus has two components: the growth of output due to growth of total factor use, f, and the growth due to the *reallocation* of factors among sectors of varying total factor productivity. To confirm this interpretation of the final term of equation (5), suppose that *total* factor employment in the economy remains constant. Factor employment at the sectoral level can then change only from the reallocation of factor use among sectors. Then $f = 0$ and from (5)

$$\sum_j S_j f_j = \sum_j F_j \tilde{T}_j f_j / Y. \qquad (7)$$

Now, combining equations (4) and (6),

$$y = f + \sum_j S_j t_j + (\sum_j F_j \tilde{T}_j f_j)/Y. \qquad (8)$$

That is,

[Growth of output] = [growth of total factor use adjusted by average productivity]

+ [weighted sum of TFP growth within individual sectors]

+ [productivity growth from factor reallocation among sectors]

The first and second components of this expression are well understood, but the third is commonly overlooked.

The relevance of this result is that total factor productivity growth at the aggregate level, defined as the difference between the growth rate of aggregate output and the growth rate of factor inputs, $t = y - f$, is *not* just the weighted sum of total factor productivity growth in the various sectors, $\sum_j S_j t_j$, but *also* the efficiency effect of resource movement among sectors of differing *levels* of total factor productivity. When factors move to sectors of lower to higher productivity, this component is positive, contributing to aggregate growth. The same issue arises within sectors. Because sectoral output is always an aggregate of various sub-sectors (themselves ultimately aggregates of firm-level data), this distinction between TFP

growth at an aggregate level and productivity growth at a disaggregated level is always present.

3. Productivity Growth in Thailand and Indonesia

This section applies data set on factor employment by sector in Thailand and Indonesia to study rates of total productivity growth by sector.[2] The data include:

- physical capital used by sector;
- employment of labour by educational category by sector;
- use of land in agriculture by extent of irrigation coverage; and
- cost shares for each of the above factors of production by sector.

The data set covers the years 1980 to 2002 and identifies the sectors agriculture, industry and services. In the case of Indonesia, the mining industry, including petroleum, is also identified separately, because of its special importance for Indonesia. The data set assembled for this purpose allows for improvement in the 'quality' of labour and land used by each sector. This is done, in the case of labour, by constructing a separate factor, human capital, equal to the aggregate value of labour inputs minus the value of its unskilled labour component. The unskilled labour component is calculated by taking the number of workers and multiplying this number by unskilled wage rates. Data on labour use by educational category are used for this purpose. For land, the 'quality adjusted' data set uses land price data for irrigated and non-irrigated land to form quality adjusted measures of the use of land in agriculture and therefore in the total economy.

The growth of output and the use of factors of production is summarized in Tables 1 and 2 for Thailand and Indonesia, respectively.[3] In Tables 3 and 4 these data are then used to construct factor growth rates over the following four sub-periods for each of the two countries:

Pre-boom – 1980 to 1986

[2] Kind assistance with the raw data used in this analysis was provided by Pranee Tinakorn of Thailand Development Research Institute and Thammasat University, Bangkok, and from Kirida Bhaopichitr and David Robalino of the World Bank Office, Bangkok.

[3] Data for 1979 were used to construct the annual growth rates shown in Tables 3 and 4, but these 1979 data are not reported in Tables 1 and 2.

Boom – 1987 to 1996
Crisis – 1997 to 1998
Recovery – 1999 to 2002

As discussed in the Introduction, during the 'crisis' and 'recovery' periods output was constrained by a contraction in aggregate demand. It is debatable whether total factor productivity calculations are relevant in such circumstances because of their focus on the determinants of aggregate supply. For this reason, Tables 3 and 4 and the subsequent calculations of factor productivity also show results for the sub-periods:

Pre-crisis – 1980 to 1996
Post-crisis – 1997 to 2002

It seems that output was supply-constrained during the first of these two periods and there that factor productivity calculations are more meaningful. Finally, we present calculations for the full time period covered by the data:

Whole period – 1980 to 2002.

Standard growth accounting methods with time-varying cost shares were used to estimate rates of total factor productivity growth using the data summarized in Tables 1 to 4. The averages of these cost shares over the whole period are summarized in Table 5. The cost shares vary over time and were constructed from data on factor prices and input use by sector. Finally, Tables 6 and 7 show the results of the calculations of total factor productivity.

The results for Thailand shown in Table 6 may be summarized as follows. First, over the two decades 1980 to 2002, aggregate GDP grew at an average annual rate of 6 per cent, but measured TFG growth at the aggregate level accounted for only one tenth of that growth. Growth of factor inputs accounted for the other 90 per cent. Growth of the physical capital stock was the overwhelming component of this increased level of factor inputs.

Second, although output (value added) grew more slowly in agriculture (2.64 per cent) than in either industry (8.09 per cent) or services (5.53 per cent) it was the only major sector to record positive TFP growth. This TFP growth in agriculture contributed one twentieth of the

overall growth of GDP. In agriculture, the growth of output of 2.64 per cent per year was achieved by factor input growth of 0.47 per and TFP growth of 2.17 per cent (Table 6). TFP growth therefore accounted for 82 per cent of the growth of value-added in agriculture.

Third, the *level* of factor productivity in agriculture remained significantly lower than elsewhere in the economy, despite its higher TFP growth over this period. The movement of factors of production out of agriculture, shown in Figures 1 and 2, thus further contributed to economic growth by raising the productivity of these factors. Indeed, this reallocation effect contributed 24 per cent of the growth of aggregate output that actually occurred. It was almost *five times* as important for overall growth as the growth in the productivity of the factors that remained within agriculture.

The story for Indonesia is qualitatively similar. Agriculture was the only sector to record positive TFP growth. This productivity increase accounted for 30 per cent of the actual growth of value-added in agricuture and for 3.5 per cent of overall economic growth. However, the reallocation effect, the movement of resources out of agriculture, was more than four times as important for overall growth as this, contributing 16 per cent of the overall growth of GDP that occurred.

4. Conclusions

The results of the analysis of this paper indicate that agriculture's contribution to economic growth in both Thailand and Indonesia included impressive rates of TFP growth. But its main contribution occurred through releasing resources which could be used more productively elsewhere, *while still maintaining output*, rather than through expansion of agricultural output. It is seriously wrong to characterize agriculture in these countries as 'stagnant', based merely on the fact that output growth is slower in agriculture than in other sectors. If agriculture had really been 'stagnant' economic growth would have been substantially lower because it would not have been possible to raise productivity significantly within agriculture or to release resources massively while still maintaining moderate growth of output.

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Appendix: Data Sources

Thailand:[4]

Real GDP by sector: data from National Accounts Division, National Economic and Social Development Board, Bangkok.
Capital stocks: data from Macroeconomic Analysis Division, National Economic and Social Development Board, Bangkok.
Employment by sector and educational category: data from Labour Force Survey of Thailand, National Statistical Office, Bangkok.
Wages by sector and educational category: data from Labour Force Survey of Thailand, National Statistical Office, Bangkok.
Land use in agriculture: data on irrigated and non-irrigated land use from the Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Bangkok.

Indonesia:[5]

Real GDP by sector: data from *Indikator Ekonomi*, Central Bureau of Statistics, Jakarta, various issues.
Capital stocks, constructed using inventory accumulation method, from 1969, using data from *Indikator Ekonomi*, various issues.
Labour force in various categories by sector: data employment levels from *Labour Force Situation in Indonesia*, Central Bureau of Statistics, Jakarta, various issues. Aggregated from published categories as follows: Raw labour = No schooling + Not yet completed primary school + primary school. Human capital = higher educational categories minus raw labour component.
Land use in agriculture: data on irrigated and non-irrigated land use from Ministry of Agriculture, Jakarta.

[4] Kind assistance with the raw data used in this analysis was provided by Pranee Tinakorn of Thailand Development Research Institute and Thammasat University, Bangkok, and from Kirida Bhaopichitr and David Robalino of the World Bank Office, Bangkok.
[5] Assistance with the raw data used and the subsequent statistical analysis was provided by Arief Ramayandi of the Australian National University.

Table 1 Thailand: Growth of Output and Factor Supplies, 1980 to 2002 (1980 = 100)

Year	Real GDP	Raw labour	Human capital	Physical capital	Agricultural land
1980	100	100	100	100	100
1981	105.9	108.2	100.17	106.2	103.7
1982	111.6	110.2	121.32	112.2	105.0
1983	117.8	111.8	117.45	119.6	109.1
1984	124.6	115.4	53.94	127.5	111.2
1985	130.4	114.8	158.38	134.7	115.5
1986	137.6	118.5	44.24	141.8	111.8
1987	150.7	122.7	661.10	150.7	109.5
1988	170.7	130.8	787.00	162.7	118.2
1989	191.5	136.0	737.85	178.3	119.8
1990	212.9	137.0	947.34	200.0	116.4
1991	231.1	138.3	1419.23	224.9	112.3
1992	249.8	143.9	1924.73	251.8	113.6
1993	270.8	142.8	2267.78	281.3	111.2
1994	295.0	142.6	2383.25	314.6	114.1
1995	321.2	144.7	2549.28	351.6	114.9
1996	340.3	143.2	2687.29	388.0	117.1
1997	334.6	147.3	2973.03	412.9	117.8
1998	300.5	142.8	3152.76	420.5	118.5
1999	313.1	137.0	3091.01	426.8	119.2
2000	328.9	139.7	3323.67	434.6	119.9
2001	335.3	142.6	3571.19	455.6	120.6
2002	352.9	146.9	3864.10	477.9	121.3

Sources:
Real GDP by sector: data from National Accounts Division, National Economic and Social Development Board, Bangkok.
Capital stocks: data from Macroeconomic Analysis Division, National Economic and Social Development Board, Bangkok.
Employment by sector and educational category: data from Labour Force Survey of Thailand, National Statistical Office, Bangkok. Human capital = higher educational categories minus raw labour component.
Wages by sector and educational category: data from Labour Force Survey of Thailand, National Statistical Office, Bangkok.
Land use in agriculture: data on irrigated and non-irrigated land use from the Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Bangkok.

Table 2 Indonesia: Growth of Output and Factor Supplies, 1980 to 2002 (1980 = 100)

Year	Real GDP	Raw labour	Human capital	Physical capital	Agricultural land
1980	100	100	100	100	100
1981	107.5	107.3	110.2	98.5	101.3
1982	108.8	114.6	119.7	106.2	101.2
1983	113.1	119.6	134.7	112.2	101.2
1984	120.1	124.7	148.6	119.1	101.1
1985	131.1	129.8	161.4	119.3	99.2
1986	138.8	134.9	173.1	200.5	104.2
1987	146.1	141.4	203.6	220.3	108.3
1988	155.1	147.6	217.6	265.5	113.0
1989	167.0	149.7	207.5	326.6	114.4
1990	178.9	150.2	240.0	502.3	115.5
1991	191.1	151.3	233.7	580.3	117.0
1992	204.3	155.6	240.3	626.3	109.4
1993	217.8	157.0	267.2	666.8	109.4
1994	255.8	162.6	267.3	796.9	111.2
1995	276.8	159.2	288.0	984.4	111.1
1996	298.4	170.3	305.4	1134.2	111.6
1997	312.4	173.1	340.7	1321.5	112.3
1998	271.4	179.1	278.1	1332.5	112.6
1999	273.7	183.0	286.9	1289.5	112.6
2000	286.8	177.8	331.2	1311.1	112.6
2001	296.9	179.8	397.1	1285.8	112.6
2002	307.8	181.4	419.6	1204.3	112.6

Sources:
Real GDP by sector: data from *Indikator Ekonomi*, Central Bureau of Statistics, Jakarta, various issues.
Capital stocks, constructed using inventory accumulation method, from 1969, using data from *Indikator Ekonomi*, various issues.
Labour force in various categories by sector: data employment levels from *Labour Force Situation in Indonesia*, Central Bureau of Statistics, Jakarta, various issues. Aggregated from published categories as follows: Raw labour = No schooling + Not yet completed primary school + primary school. Human capital = higher educational categories minus raw labour component.
Land use in agriculture: data on irrigated and non-irrigated land use from Ministry of Agriculture, Jakarta.

Table 3 Thailand: Factor growth rates, 1980 to 2002 (per cent per year)

	Pre-boom 1980-1986	Boom 1987-1996	Crisis 1997-1998	Recovery 1999-2002	Whole period 1980-2002
All sectors:					
1. Labour	2.91	1.94	-0.10	0.75	1.80
2. Human capital	0.14	3.32	2.45	1.47	2.04
3. Physical capital	5.99	10.61	1.68	3.26	7.43
4. Agricultural land	1.91	0.51	0.60	0.59	0.92
Agriculture:					
1. Labour	1.96	0.07	-2.20	-4.19	-0.40
2. Human capital	3.45	3.32	2.45	1.47	2.04
3. Physical capital	1.41	4.49	-4.33	-1.70	1.72
4. Agricultural land	1.91	0.51	0.60	0.59	0.92
Industry:					
1. Labour	3.55	7.89	3.24	2.79	5.36
2. Human capital	1.77	3.08	3.10	1.64	2.46
3. Physical capital	9.60	13.47	6.39	4.30	10.11
Services:					
1. Labour	6.22	3.82	1.81	7.83	5.02
2. Human capital	2.89	1.32	2.05	0.87	1.73
3. Physical capital	5.80	10.36	3.89	3.12	7.21

Source: Author's calculation from data in Table 1.

Table 4 Indonesia: Factor growth rates, 1980 to 2002 (per cent per year)

	Pre-boom 1980-1986	Boom period 1987-1996	Crisis 1997-1998	Recovery 1999-2002	Whole period 1980-2002
All sectors:					
1. Labour	3.22	2.39	2.54	0.34	2.30
2. Human capital	20.49	6.07	-3.40	11.04	10.50
3. Physical capital	14.50	19.54	8.67	-2.45	13.24
4. Agricultural land	1.17	0.40	0.11	0.00	0.54
Agriculture:					
1. Labour	3.48	0.12	5.71	-0.63	1.50
2. Human capital	10.65	8.25	-5.19	17.55	9.43
3. Physical capital	3.29	19.08	4.13	-6.67	8.50
4. Agricultural land	1.17	0.40	0.11	0.00	0.54
Mining:					
1. Labour	10.18	6.05	2.45	3.96	6.63
2. Human capital	13.94	8.61	-8.46	8.97	8.81
3. Physical capital	5.23	9.59	-10.04	-5.04	4.01
Industry:					
1. Labour	6.00	6.88	0.64	2.18	5.25
2. Human capital	13.07	13.67	-8.37	12.39	11.35
3. Physical capital	16.67	19.33	10.27	-3.06	13.84
Services:					
1. Labour	4.99	4.04	0.58	0.84	3.47
2. Human capital	9.16	6.25	2.98	6.51	6.90
3. Physical capital	16.13	28.90	5.22	3.13	18.47

Source: Author's calculation from data in Table 2.

Table 5 Thailand and Indonesia: Average Cost Shares, 1980 to 2002 (per cent)

	Raw labour	Human capital	Physical capital	Agricultural land
Thailand				
All sectors	0.402	0.112	0.469	0.018
Agriculture	0.590	0.039	0.130	0.241
Industry	0.304	0.120	0.576	0.000
Services	0.310	0.092	0.598	0.000
Indonesia				
All sectors	0.610	0.095	0.234	0.061
Agriculture	0.594	0.029	0.060	0.318
Mining	0.315	0.280	0.365	0.000
Industry	0.290	0.199	0.511	0.000
Services	0.782	0.113	0.105	0.000

Source: Author's calculations using data from Thai and Indonesian government sources.

Table 6 Thailand: Total Factor Productivity Growth, 1980 to 2002 (per cent per year)

	Pre-boom 1980-1986	Boom 1987-1996	Crisis 1997-1998	Recovery 1999-2002	Whole period 1980-2002
All sectors:					
1. Output growth	5.46	9.50	-5.93	4.11	6.01
2. Factor growth	4.60	7.50	3.11	2.55	5.41
3. TFP growth	0.86	2.00	-9.03	1.55	0.60
Agriculture:					
1. Output growth	3.61	2.67	-0.33	2.58	2.64
2. Factor growth	3.83	0.15	-1.44	-2.84	0.47
3. TFP growth	-0.22	2.52	1.10	5.41	2.17
Industry:					
1. Output growth	6.72	12.77	-7.70	6.32	8.09
2. Factor growth	8.23	12.26	6.37	4.40	9.20
3. TFP growth	-1.50	0.51	-14.07	1.92	-1.11
Services:					
1. Output growth	5.43	9.01	-5.44	2.45	5.53
2. Factor growth	6.86	7.99	3.88	6.53	7.04
3. TFP growth	-1.43	1.03	-9.32	-4.08	-1.51
All sectors:					
1. Aggregate sectoral TFPG	-1.22	1.02	-10.28	-0.44	-0.85
2. Reallocation	2.08	0.99	1.25	1.99	1.45

Source: Author's calculations.

Table 7 Indonesia: Total Factor Productivity Growth, 1980 to 2002 (per cent per year)

	Pre-boom 1980-1986	Boom period 1987-1996	Crisis 1997-1998	Recovery 1999-2002	Whole period 1980-2002
All sectors:					
1. Output growth	6.07	8.00	-4.21	3.20	5.51
2. Factor growth	6.28	7.01	4.22	1.70	5.62
3. TFP growth	-0.22	0.99	-8.44	1.50	-0.11
Agriculture:					
1. Output growth	4.07	3.59	-0.16	1.69	3.08
2. Factor growth	3.05	1.85	2.89	1.16	2.19
3. TFP growth	1.02	1.74	-3.05	0.53	0.90
Mining:					
1. Output growth	1.11	3.93	-0.32	1.52	2.28
2. Factor growth	10.48	11.44	-2.23	1.30	8.20
3. TFP growth	-9.37	-7.52	1.91	0.22	-5.92
Industry:					
1. Output growth	11.56	12.44	-5.43	4.37	9.21
2. Factor growth	11.91	14.91	7.09	0.14	10.75
3. TFP growth	-0.34	-2.48	-12.52	4.23	-1.53
Services:					
1. Output growth	6.94	8.30	-5.44	3.27	5.81
2. Factor growth	6.62	7.30	2.90	3.50	6.05
3. TFP growth	0.31	0.99	-8.34	-0.23	-0.24
All sectors:					
1. Aggregate sectoral TFPG	-1.00	-0.72	-7.89	1.48	-0.99
2. Reallocation effect	0.78	1.71	-0.54	0.02	0.88

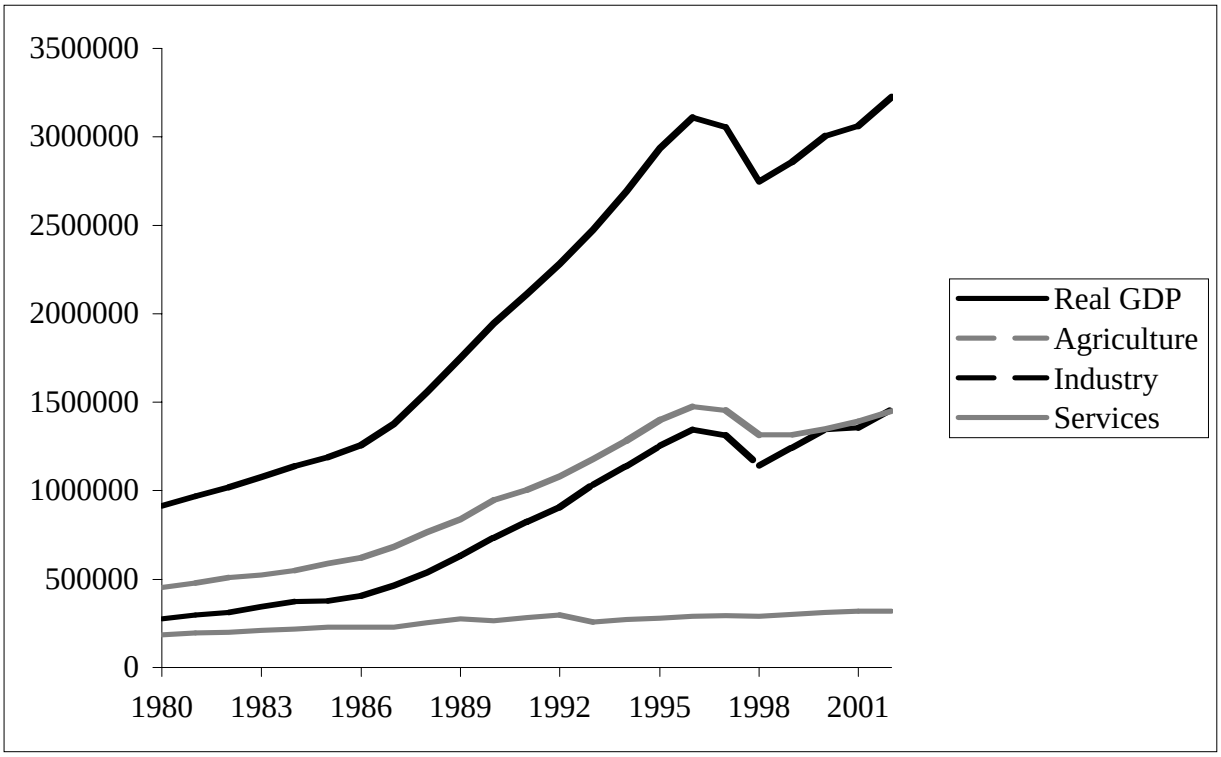
Source: Author's calculations.

Table 8 Thailand and Indonesia: Contributions to Economic Growth, 1980 to 2002 (per cent)

	Thailand		Indonesia	
	Pre-crisis period	Whole period	Pre-crisis period	Whole period
	1980-1996	1980-2002	1980-1996	1980-2002
Aggregate factor growth	80.30	89.94	93.13	101.94
Aggregate TFP growth	19.70	10.06	6.87	-1.94
Agriculture TFP growth	2.85	5.00	4.61	3.53
Mining TFP growth	-	-	-13.64	-12.25
Industry TFP growth	-1.11	-7.06	-5.56	-7.51
Services TFP growth	0.65	-12.03	3.99	-1.72
Reallocation effect	17.32	24.14	17.48	16.00
Total	100.00	100.00	100.00	100.00

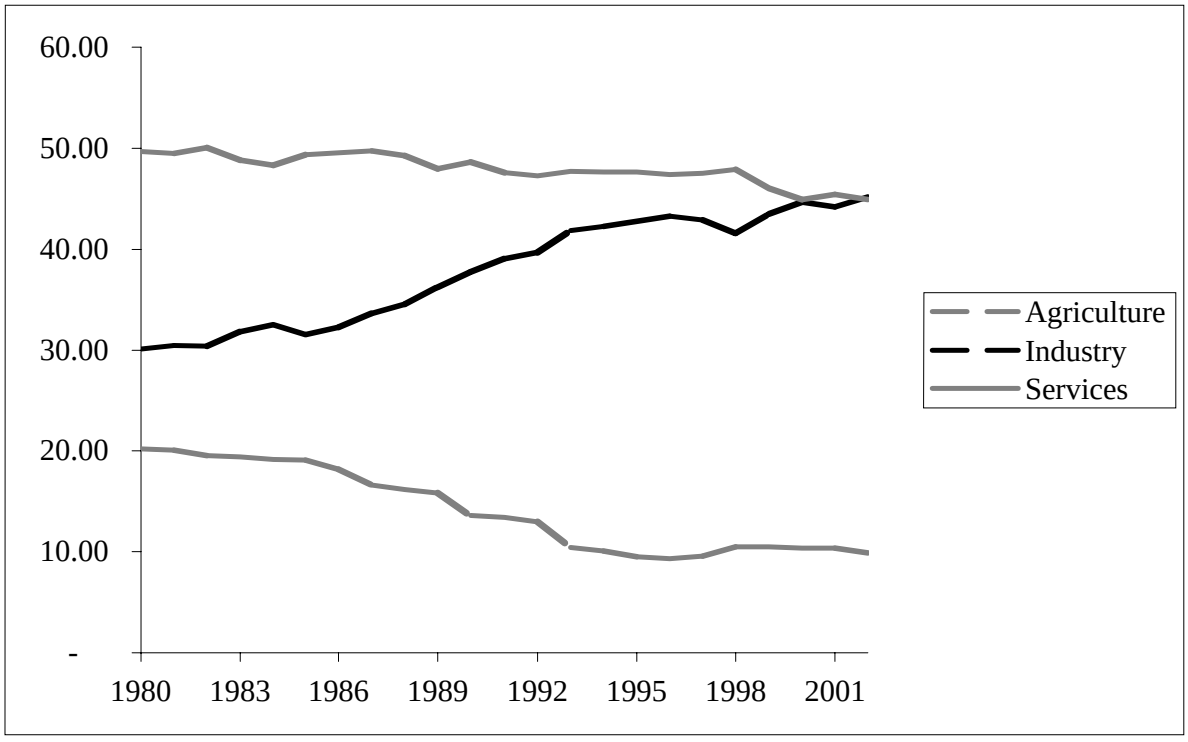
Source: Author's calculations.

Figure 1 Thailand: GDP and its Sectoral Components, 1980 to 2002



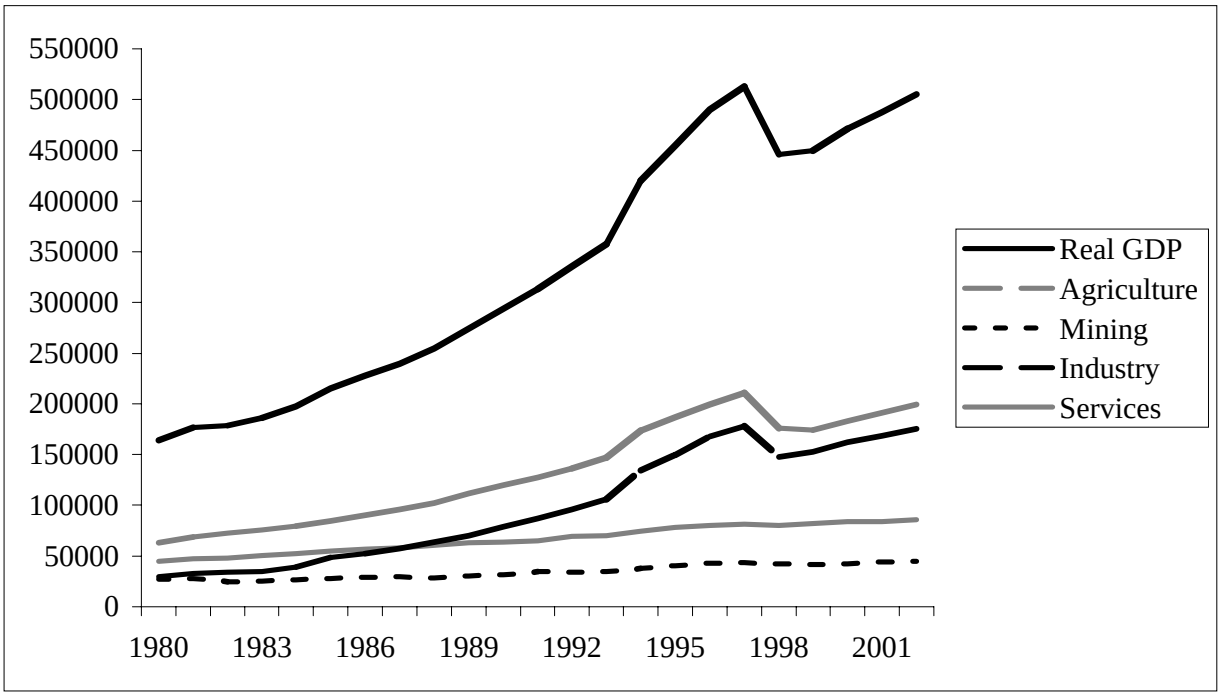
Source: National Economic and Social Development Board, Bangkok.

Figure 2 Thailand: Sectoral Composition of GDP, 1980 to 2002



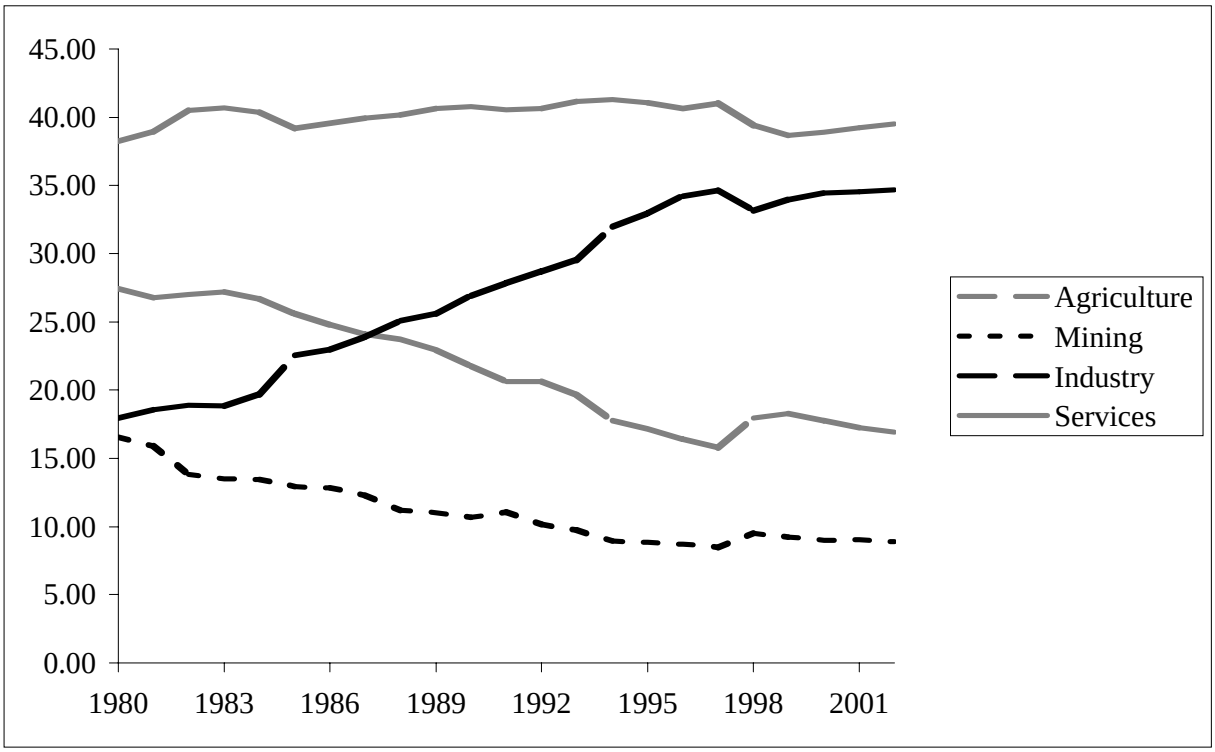
Source: National Economic and Social Development Board, Bangkok.

Figure 3 Indonesia: GDP and its Sectoral Components, 1980 to 2002



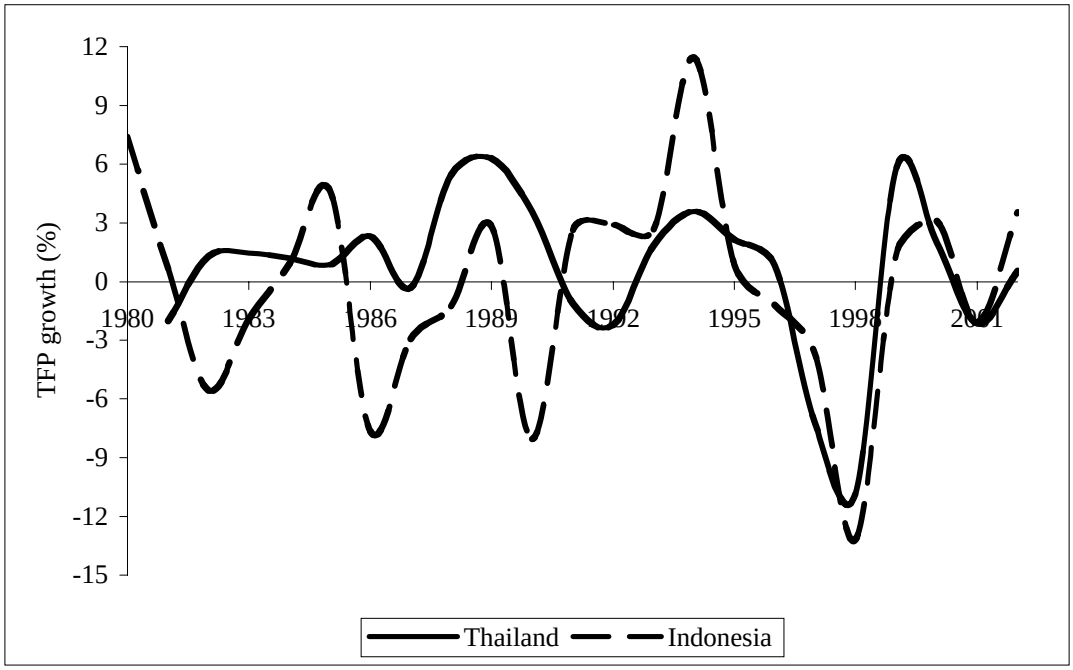
Source: Indikator Ekonomi, Central Bureau of Statistics, Jakarta, various issues.

Figure 4 Indonesia: Sectoral Composition of GDP, 1980 to 2002



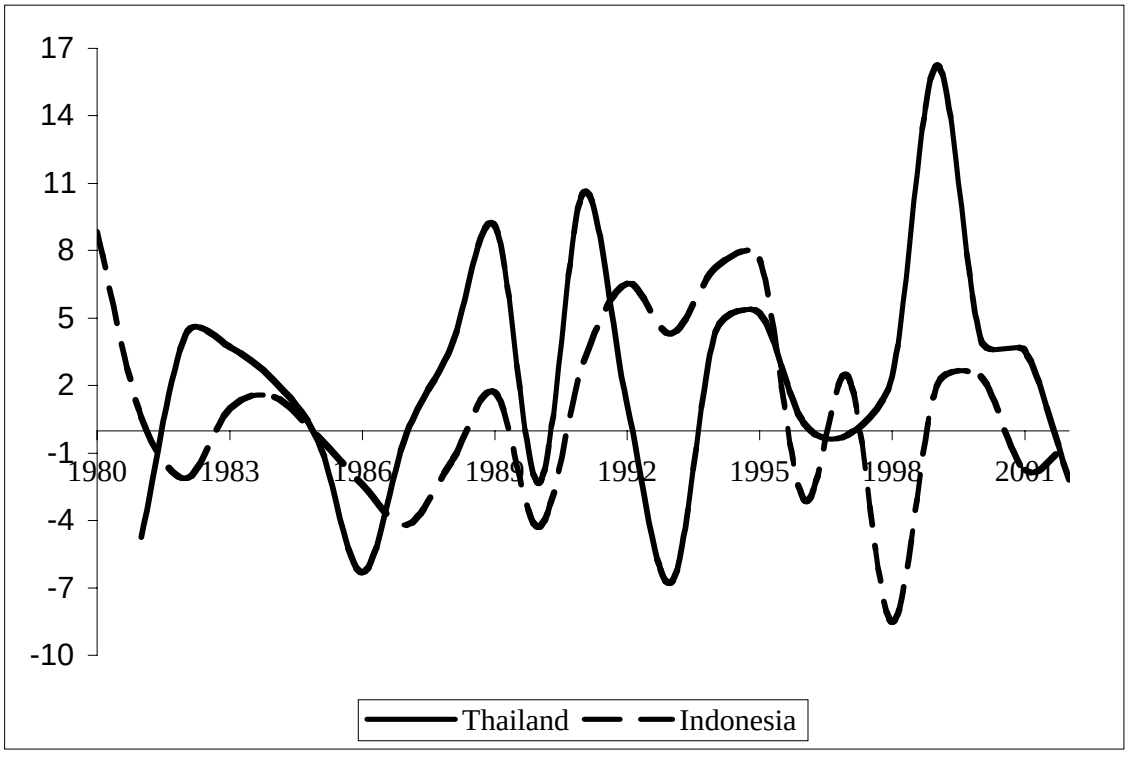
Source: Indikator Ekonomi, Central Bureau of Statistics, Jakarta, various issues.

Figure 5 Thailand and Indonesia: Aggregate TFP Growth, 1980 to 2002



Source: Author's calculations using data summarized in Tables 6 and 7.

Figure 6 Thailand and Indonesia: Agricultural TFP Growth, 1980 to 2002



Source: Author's calculations using data summarized in Tables 6 and 7.