

Financing Technological Upgrading: The East Asian Experience

Rajah Rasiah and Shujaat Mubarik (draft)

University of Malaya and Mohamad Ali Jinnah University respectively

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1. Introduction

- East Asia was arguably the fastest growing region over the second half of the 20th century.
- China's GDP per capita grew the fastest by 31.9 times followed by South Korea by 22.2 times over the period 1960-2015.
- Thailand, Malaysia and Indonesia's GDP per capita grew by 9.9, 7.5 and 6.4 times respectively over the same period.
- While a wide range of reasons can be found to explain such dramatic growth experiences, including political leaderships, human and physical capital development, trade strategies, investment flows, technological upgrading has emerged as a major pillar explicating their success, but also the unequal growth performance among these countries.
- That Indonesia's, Malaysia's and Thailand's GDP per capita grew much more slowly than South Korea shows that the geography of being located in East Asia is not a decisive factor determining why some countries have developed more than others.
- In searching for answers the sources and uses of capital, and its management in financing technological upgrading has emerged as a critical plank in explaining such an unequal outcome.
- East Asian countries chosen are fairly small, started as poor with both resource rich and poor endowments, and experienced high integration into the global economy. China was excluded because it is too large for comparisons with most countries. Taiwan was excluded because of data problems, while Singapore is often considered a special case owing to its city state status.
- Hence, this paper seeks to examine the sources and uses, and the management of capital in the financing of technological upgrading in Indonesia, Malaysia, the Philippines, South Korea and Thailand.

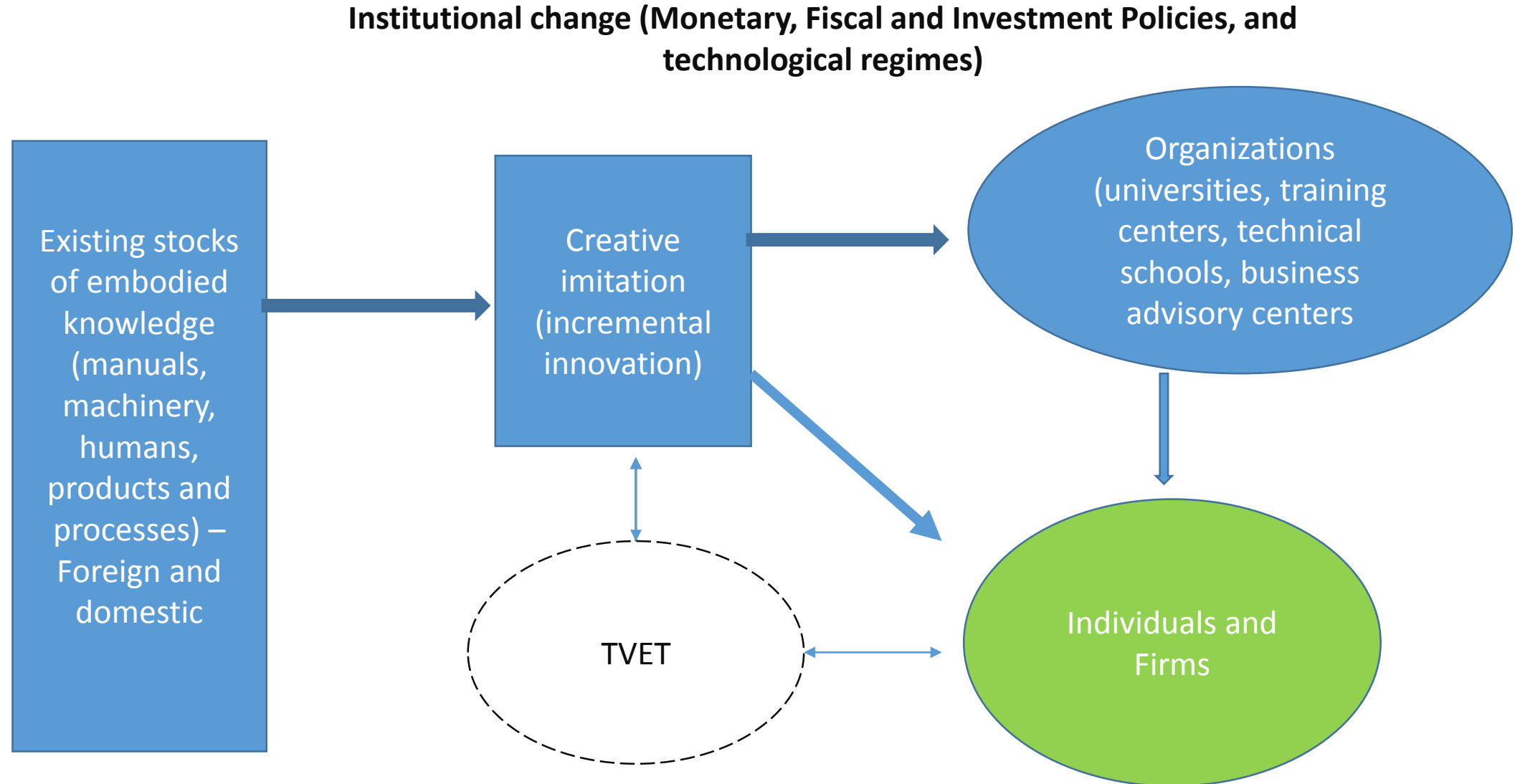
2. Theoretical considerations

- Four main models have evolved to explain the financing of economic growth:
- Feldman (1928)-Mahalanobis (1953) model of focusing on targeting capital goods production to support the production of domestic consumption goods. The focus here was on domestic accumulation based on a closed economy and without a significant assessment of savings.
- Solow and later the Solow-Romer neoclassical model of relative prices determining the choice between capital and labour in production, and existing demand patterns. Capital accumulation is the basis of economic growth but is driven by factor endowments with technical change captured in static terms. Capital market convertibility is critical in such models
- McKinnon-Shaw model of financial repression. Savers face lower rewards compared to costs borne by investors, and governments easily settle debt through keeping savings interest rates low.
- Rodrik's capital accumulation argument.
- Rodrik notes that savings need not be an essential requirement (as capital can come from abroad) while making the case that integration into the global economy is a major requirement (also Summer's position). He also asks the pertinent questions of how capital was sought, and how growth was managed but does not attempt to answer how technological catch was pursued and managed.
- Gerschenkron (1952) and Abramovitz (1956) address technological catch up by latecomers but do not offer concrete directions.

3. Methodology and Data

- Analytic framework emphasized sources and targets of investment, changes in interest rates, government's role in investment promotion, and in technological upgrading activities
 - Early stage adaptive learning with focus on incremental innovation (Figure 1)
 - Advanced stage technological catch up and leapfrogging for radical innovations (Figure 2)
- The study is limited by data access, and hence, the focus is on Indonesia, Malaysia, the Philippines, South Korea and Thailandaiwan.

Figure 1: Systemic Flows of Knowledge and Entrepreneurial Synergies



4. Sources of Finance, and support for Infrastructure Development

- Capital formation (Figure 3) – ODA (Figure 4), FDI (Figure 5), PEI (Figure 6), Grants (Figure 7), and savings (Figure 8).
- Finance to support infrastructure development – strong in all five economies

Figure 3: Gross Capital Formation in GDP, Selected Economies, 1960-2014

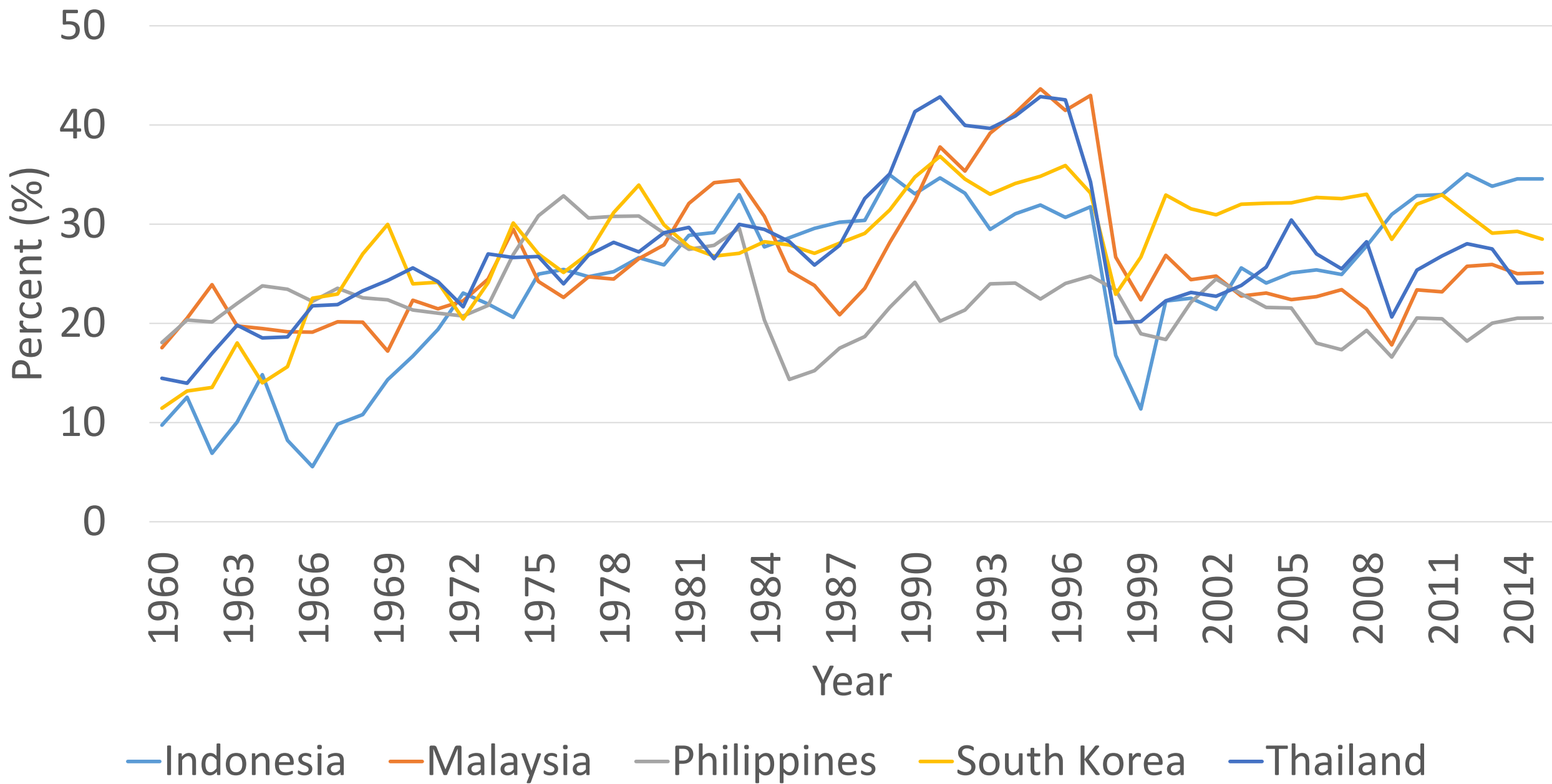


Figure 4: Overseas Development Assistance in GDP, Selected Economies, 1960-2014

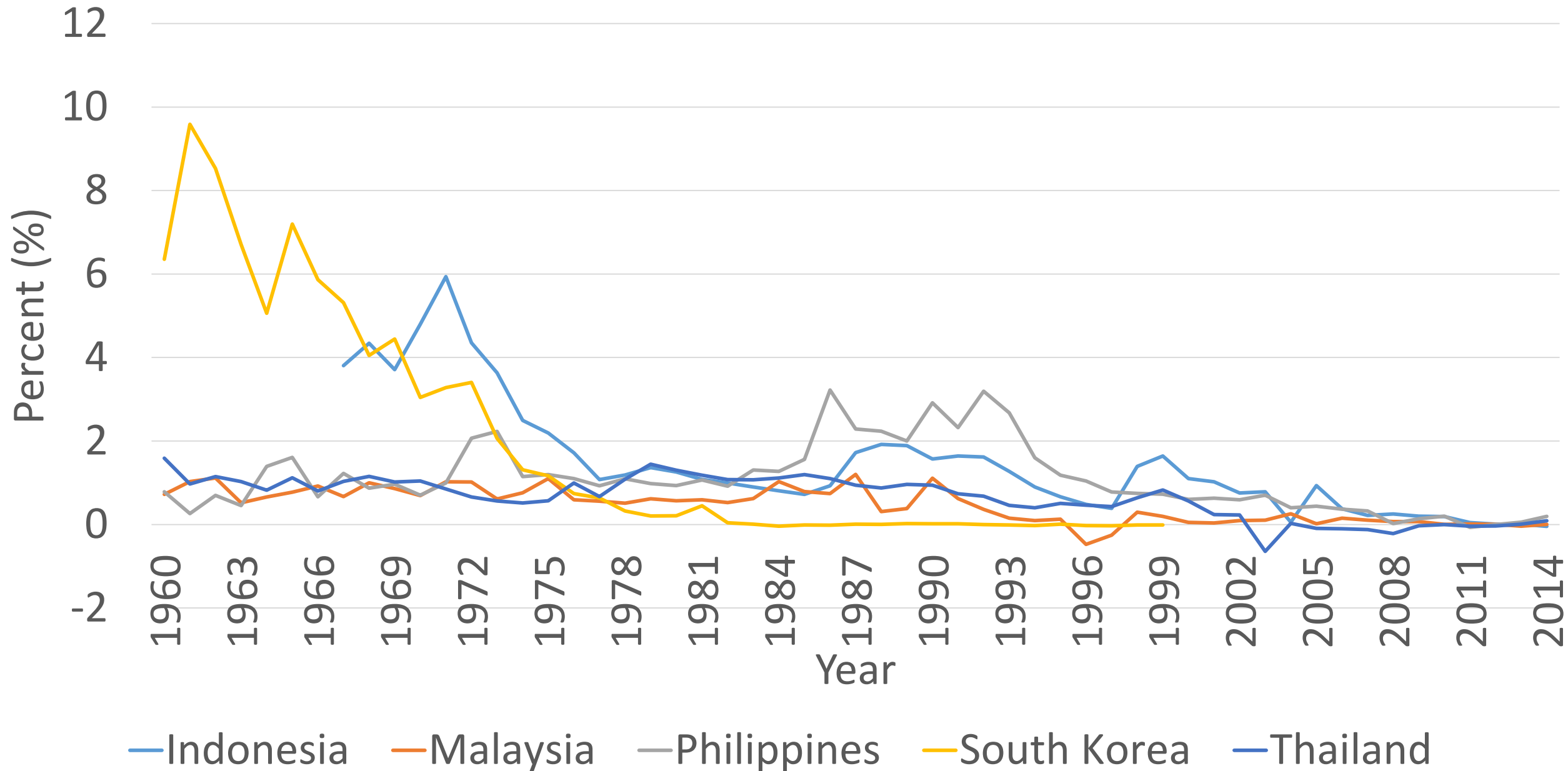


Figure 5: Net Foreign Direct Investment in GDP, Selected Economies, 1960-2014

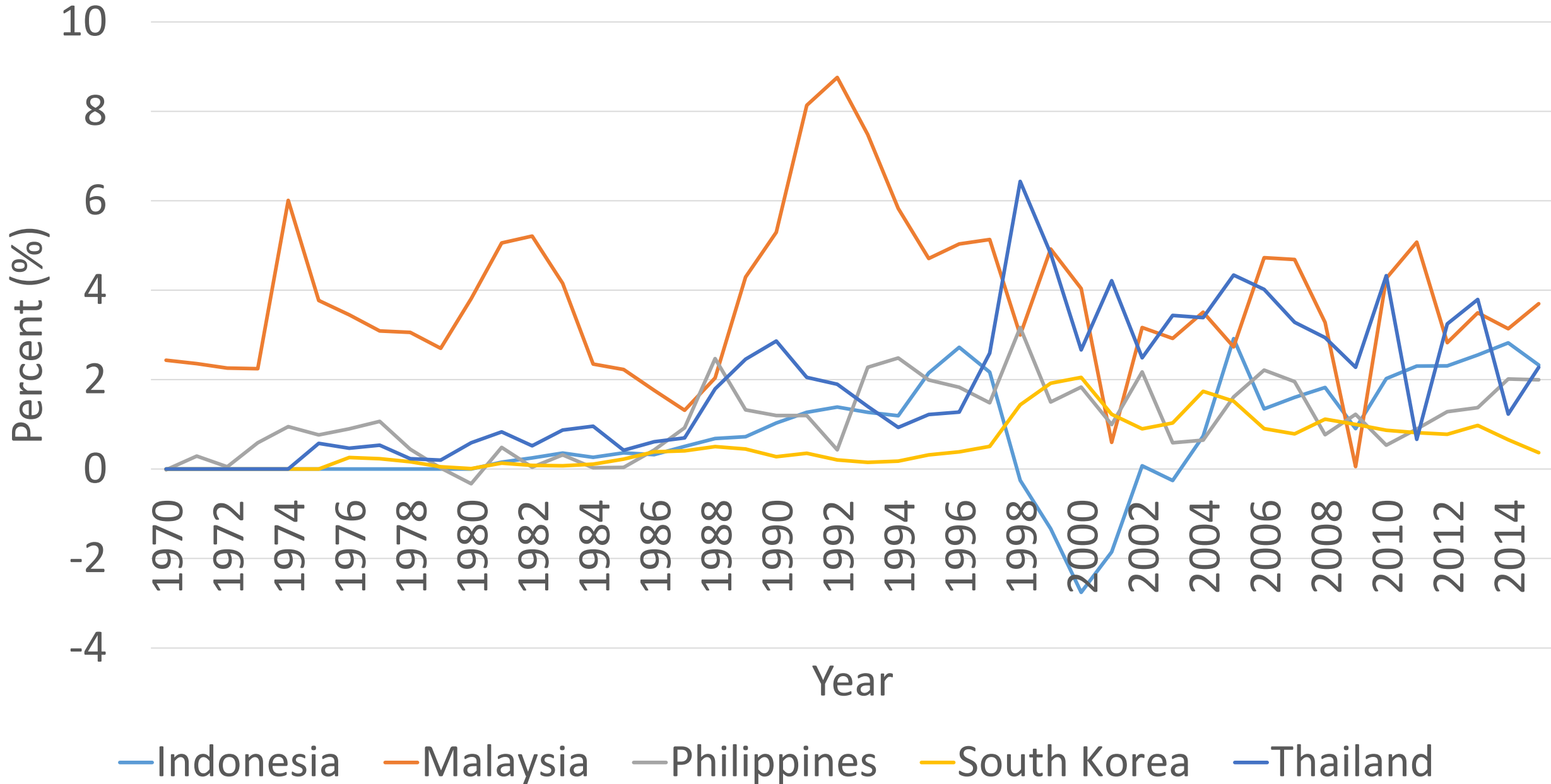


Figure 6: Net Portfolio Equity Investment in GDP, Selected Economies, 1960-2014

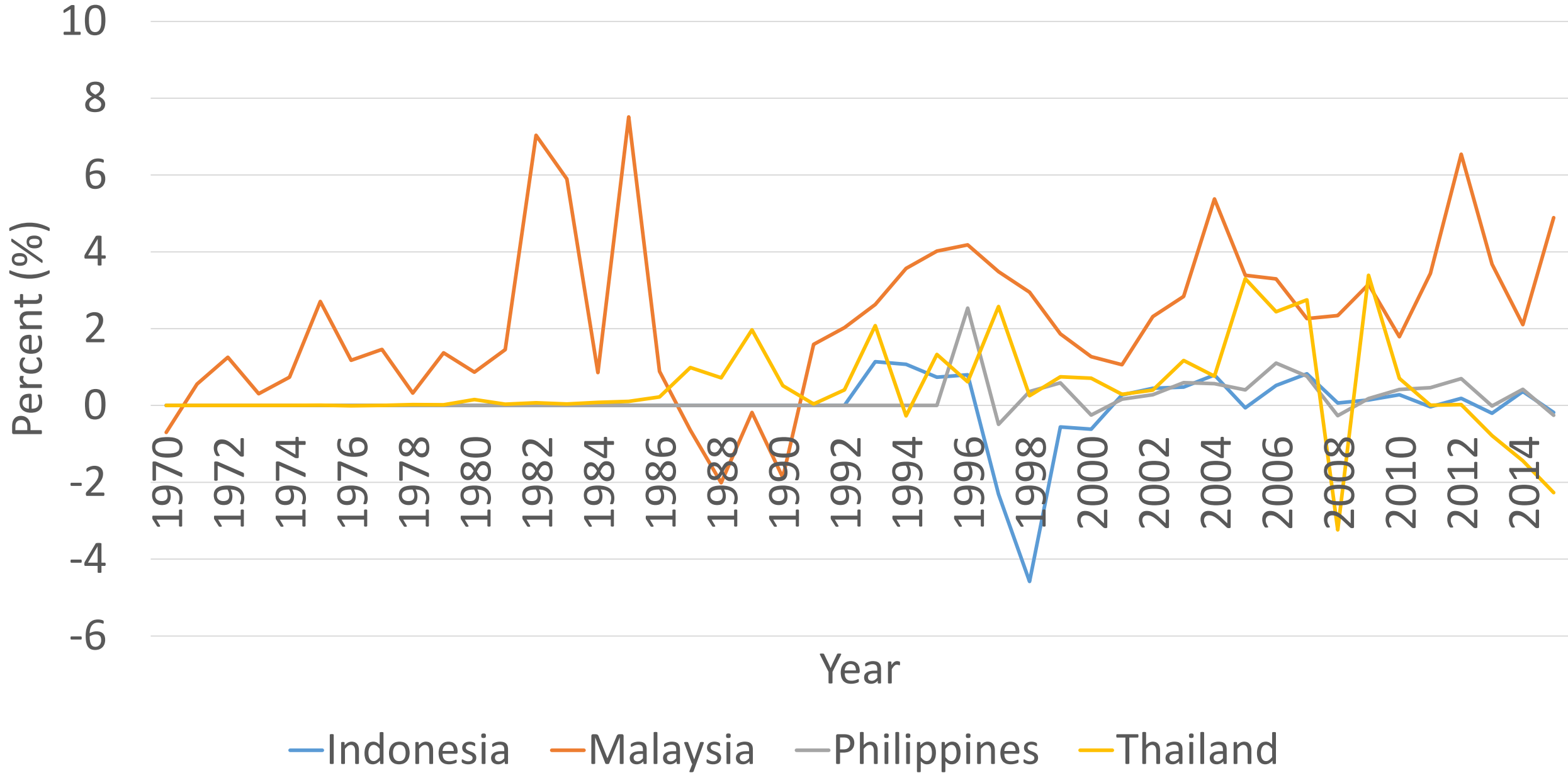


Figure 7: Grants in GDP, Selected Economies, 1960-2014

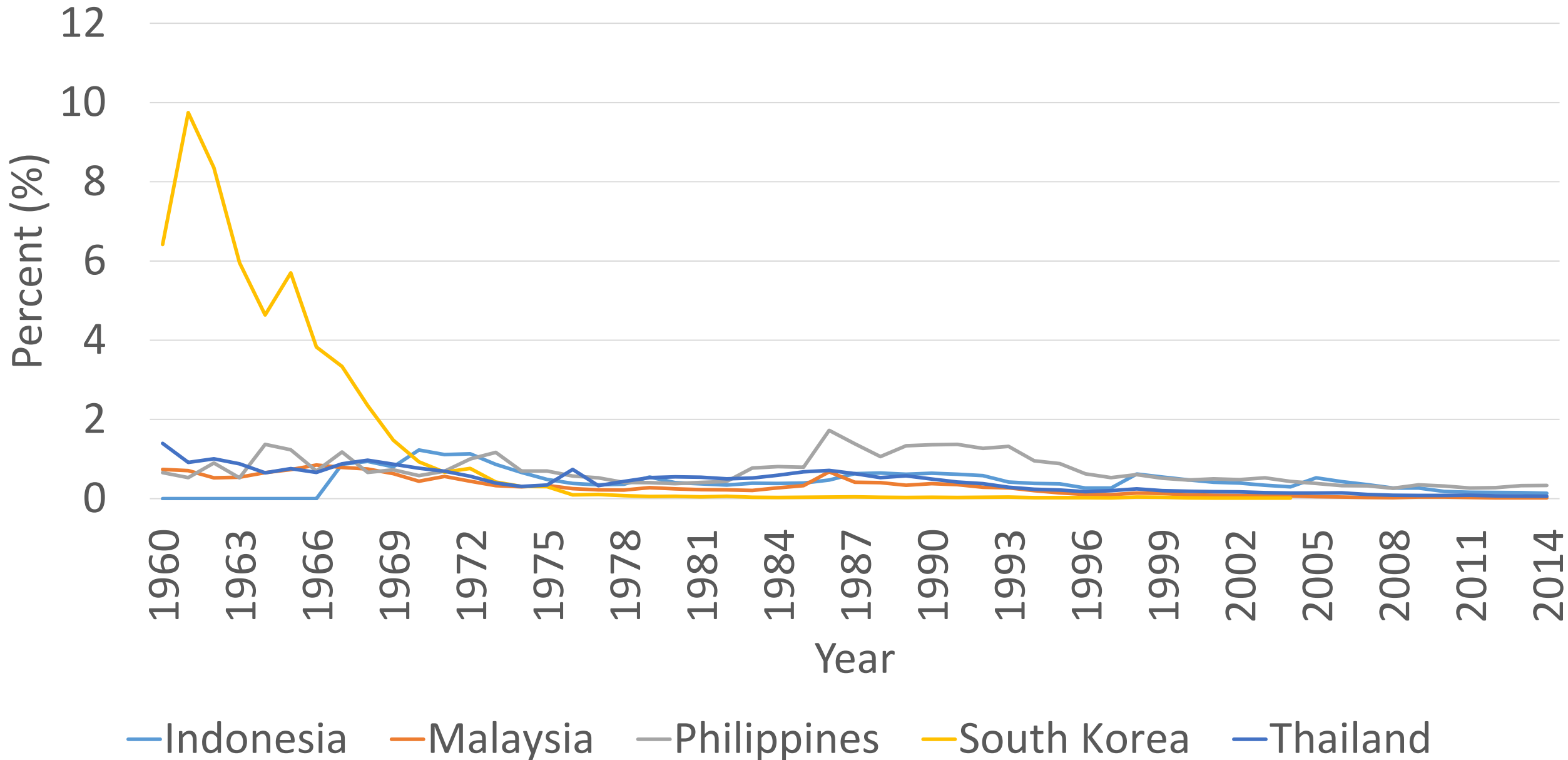
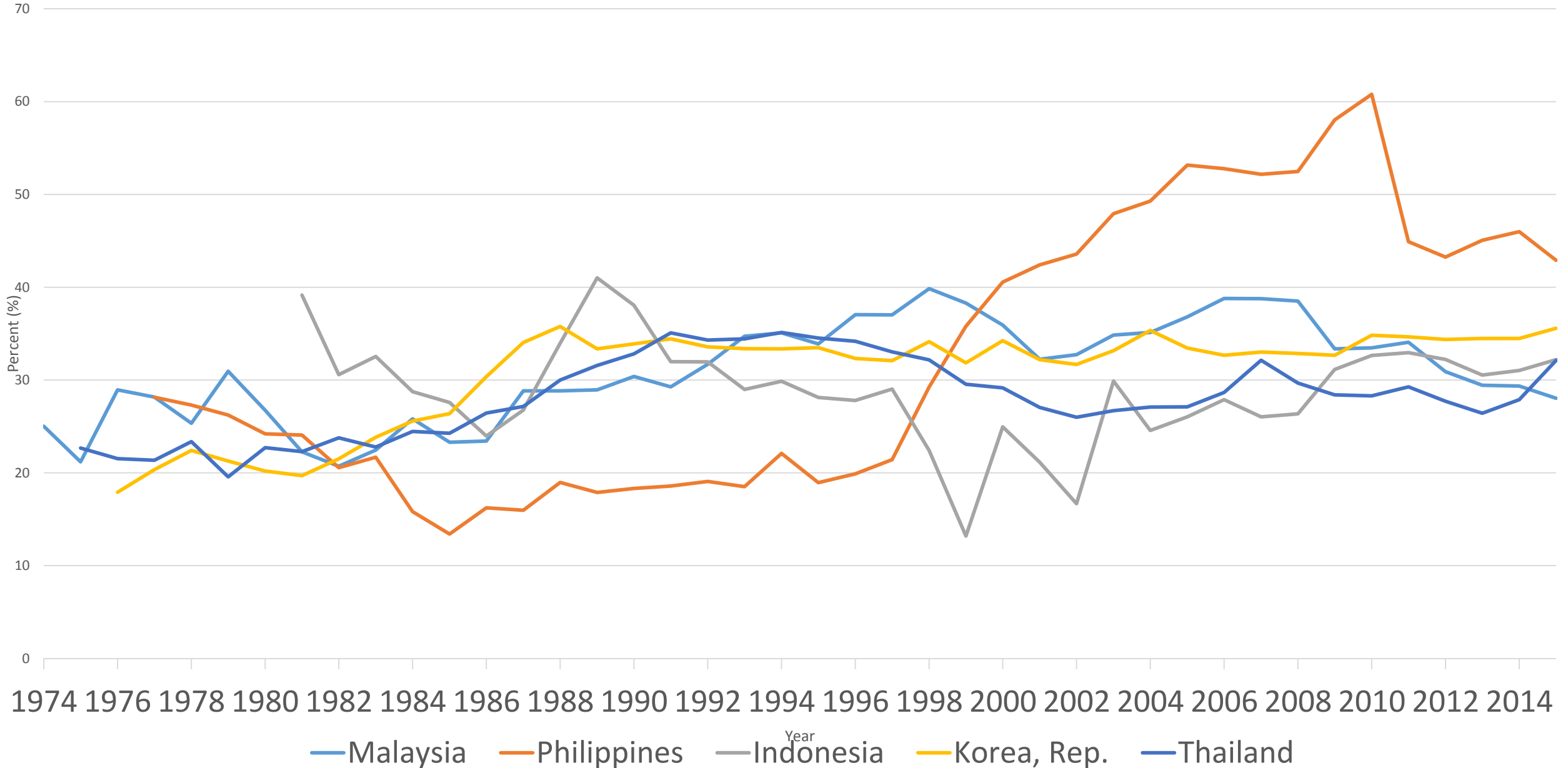


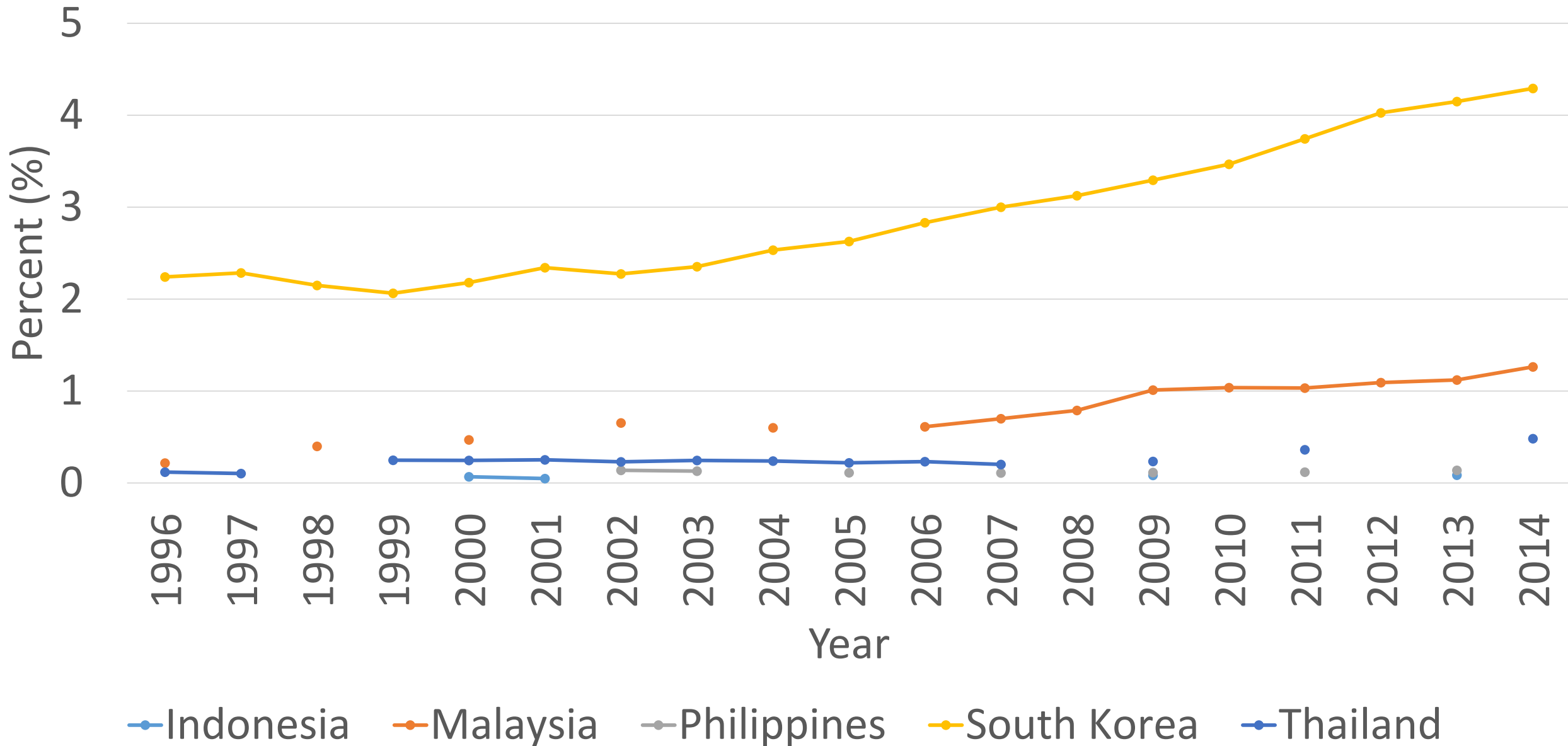
Figure 8: Savings in GDP, Selected Economies, 1974-2014 (%)



5. Investment into Technology

- Finance to support incremental innovation – strongest in South Korea with stringent conditions, reasonably strong in remaining economies – since 1970.
- Finance to support radical innovations – strong in South Korea from 1975 (HCI programme); since 1991 in Malaysia; none in remaining countries.
 - R&D expenditure in GDP (Figure 9).
- South Korea: Targeting chaebols with subsidized credit but with strong discipline
 - Catch up to leapfrogging: Samsung, Daewoo, POSCO
 - Catch up: Hyundai, Hynix, LG Electronics, Sanyong
 - Strong positive relationship between R&D expenditure and GDP since 1986
- Malaysia: No example; relationship between R&D expenditure and GDP.
- Governance mechanism to prevent rent dissipation strong in South Korea, none in the other countries

Figure 9: R&D Expenditure in GDP, Selected Economies, 1960-2014



7. Conclusions

- Five of the East Asian countries examined showed similarities and differences in how technological upgrading was financed over the period 1960-2014.
- Apart from the crisis years, GFC in GDP of these countries showed similar trends
- South Korea relied strongly on ODA and Grants, while Malaysia enjoyed fairly strong FDI inflows. Portfolio capital inflows were particularly strong in Malaysia but was characterized by volatile fluctuations.
- The most successful, which is South Korea, relied heavily on financing capital (mainly infrastructure development) and technology accumulation but drew the least from domestic savings in the early decades.
- Technology accumulation in South Korea was heavily regulated in the formative years of chaebols operations to prevent rent dissipation. Such regulation was minimal in Malaysia.
- South Korean industrial Firms have successfully experienced technological catch up and leapfrogging. The others still lie behind the globe's technology frontier.