

Back to oil: Indonesia economic growth after Asian financial crisis

Heru Iswahyudi¹

¹ Ministry of Finance Republic of Indonesia
e-mail: heru.iswahyudi@gmail.com

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Abstract

This paper examines the growth experience of Indonesia in the years before and after the Asian financial crisis. Particular attention is paid to the relationship between economic growth and petroleum sector's total factor productivity (TFP). It finds the possibility that post-crisis Indonesian economic growth has 'recoupled' with petroleum sector's TFP – fluctuations in petroleum TFP is directly correlated with fluctuations in economic growth. Further, although keeping Indonesia's petroleum sector open to fair competition should be the prime policy, the fact regarding resource nationalism might need to be taken into account in designing the policy to develop the productivity of Indonesia's petroleum sector.

Abstrak

Makalah ini membahas pengalaman pertumbuhan Indonesia pada tahun-tahun sebelum dan setelah krisis keuangan Asia. Perhatian khusus diberikan untuk hubungan antara pertumbuhan ekonomi dan total factor productivity (TFP) sektor minyak bumi. Hasil penelitian ini mengungkapkan bahwa pasca krisis keuangan pertumbuhan ekonomi Indonesia adalah 'ditambah' dengan TFP sektor minyak bumi. Fluktuasi TFP minyak bumi berhubungan langsung dengan fluktuasi pertumbuhan ekonomi. Selanjutnya, meskipun kebijakan menjaga sektor minyak bumi Indonesia ini terbuka untuk persaingan yang sehat tetap harus dijadikan kebijakan utama, nasionalisme sumber daya mungkin perlu diperhitungkan dalam merancang kebijakan untuk mengembangkan produktivitas sektor minyak bumi di Indonesia.

Introduction

This paper examines the growth experience of Indonesia in the years before and after the Asian financial crisis of 1997/1998. In particular, it examines how pre-crisis Indonesia was able to release its heavy dependence on petroleum sector and how post-crisis Indonesia once again relies on its petroleum sector amid continuously declining production. A review of literature discussed below shows that this study is the first to apply growth accounting exercise to Indonesia's petroleum sector and examines the relation between the sector's total factor productivity (TFP) and Indonesia economic growth.

The period 1991-2010 is selected as the scope of study because these are two of the most dynamic, turbulent decades in the

history of Indonesia. There were events which had profound impacts on the economic development of the country. The years 1991-1997 were the end years of the Soeharto regime, where efforts to release the country from its dependency on petroleum were in full swing. The years 1998-2003 were marked by severe economic, social and political crises in Indonesia which culminated in the fall of Soeharto (after ruling the country for over 30 years) and this event was followed by a period of instability. The years 2004-2010 was a period of political stability amid economic problems which still have to be faced by the country. The year 2004 witnessed the change of status of the country from a net oil exporter into a net oil importer. Further,

the global financial crisis of 2008 adversely affected the country's economic growth although its impact was less severe than the Asian financial crisis of 1997/1998.

Review of literature shows that there are many studies that have applied the neoclassical model to determine the sources of economic growth of nations, however, the larger proportion of them take an aggregate level or national level point of view rather than focus on a specific economic sector or an industry level point of view. For example, using cross-country national level data Young) employed the neoclassical model to analyze the sources of the phenomenal economic growth of the East Asian countries. They found that the source of high economic growth rates experienced by those countries was due to the massive growth in capital and labour inputs. Furthermore, Krugman) argued that since the source of this growth was not derived from TFP, those countries would not be able to maintain their high rates of economic growth. This is because, in the long-run, adding more capital and labour inputs would result in a decrease in output per unit of input, brought about by the logic of diminishing returns (Solow, 1957).

Other cross-country studies using different data, measurement methods and time periods have provided various results. For example, using data from 145 countries, Baier, Dwyer, and Tamura) found that the contribution of TFP in economic growth is much higher in western countries, Southern Europe and Newly Industrialised Countries (NIC) than in other regions. Based on data from 99 nations, Chen and Yu) found that the production pattern of the majority of these countries showed the ability to take advantage of technological innovations. A study by Grosskopf and Self) concluded that TFP appeared to be the driving force behind the economic growth of Thailand, the Philippines and Singapore, while the economic growth of Indonesia

and Malaysia could be explained by the accumulation of physical capital.

Despite the analytical rigor and meticulous attention to detail, there are, however several limitations that need to be raised regarding the cross-country analysis. Firstly, by grouping several countries together, country-specific socio-economic differences could lead to conceptual and statistical problems (Crafts; Levine & Zervos; Taylor). Secondly, estimating the growth rate of several countries altogether may not be appropriate due to the broad exogenous differences across countries such as the differences in human capital, government policy and natural resources (Quah).

Due to the inherent limitations of cross-country analysis, several empirical studies have focused their attention on the application of the neoclassical growth model within a country-specific context at the aggregate level and in the case of Indonesia it can be studied in the works of Alisjahbana); Osada); Van der Eng), among others. When these types of studies disaggregate the national level data into the industry level, however, more attention is usually paid to the Indonesian manufacturing industry rather than the petroleum industry (see, for example, in Aswicahyono and Hill); Ikhsan); Margono and Sharma); Suyanto and Salim)). Hence, although considerable research has been devoted to the analysis of the sources of growth in the Indonesian economy, less attention has been paid to the petroleum sector.

Indonesia's economic history shows that oil shocks of 1970s and early 1980s brought a significant change in Indonesia's petroleum industry and the economy. As such, during this period the government became increasingly dependent on the petroleum industry for its revenue and as the source of foreign exchange earnings (Barnes). The proportion of petroleum revenue in total government revenue increased significantly during these two oil shocks,

from around 26% in 1969 to 55% in 1974 and reached its peak in 1981 with a share of 71% of total government revenue (Widiyanto).

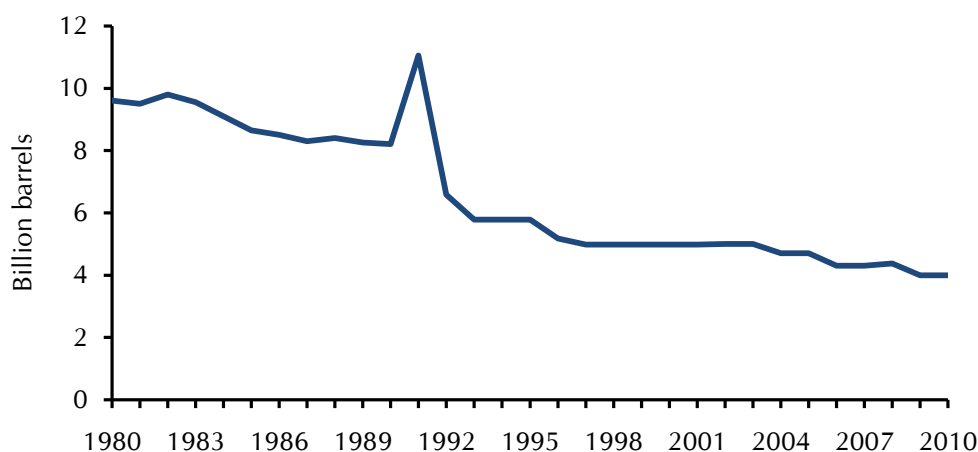
These huge windfall profits successfully removed the acute balance of payments constraint which for three decades since the country's independence had limited the ability of the government to implement its economic development programs (Arndt). Hence, Indonesia's economic growth showed significant increases compared to the previous period. During 1960-1967 the economy grew at an average rate of only 1.7% annually. Following the windfall profit from oil revenue, economic growth increased significantly and reached an annual average of 7.9% during 1967-1973 and 7.5% during 1973-1981 (Booth).

Overall, the years from 1968 to 1981 had witnessed some remarkable economic achievements in Indonesia where the average annual gross domestic product (GDP) growth rate accelerated to over 7% per year. Compared to the economic achievements during the first two decades after independence, this was indeed an impressive record. According to Booth), this rapid growth can be closely associated with the sustained improvement in the country's terms of trade that mostly accrued from oil revenue.

The periods of oil boom for Indonesia eventually ended after 1981. The share of petroleum in the government's total fiscal revenue declined after 1982. From 1980 until 1984 petroleum revenue still accounted for over 65% of the total revenue. However, by 1992 the petroleum industry contributed no more than 30% of total government revenue (Widiyanto). This long-term decline might closely be associated with, first, the decline in the world's oil prices and, second, the depletion of Indonesia's proven oil reserves.

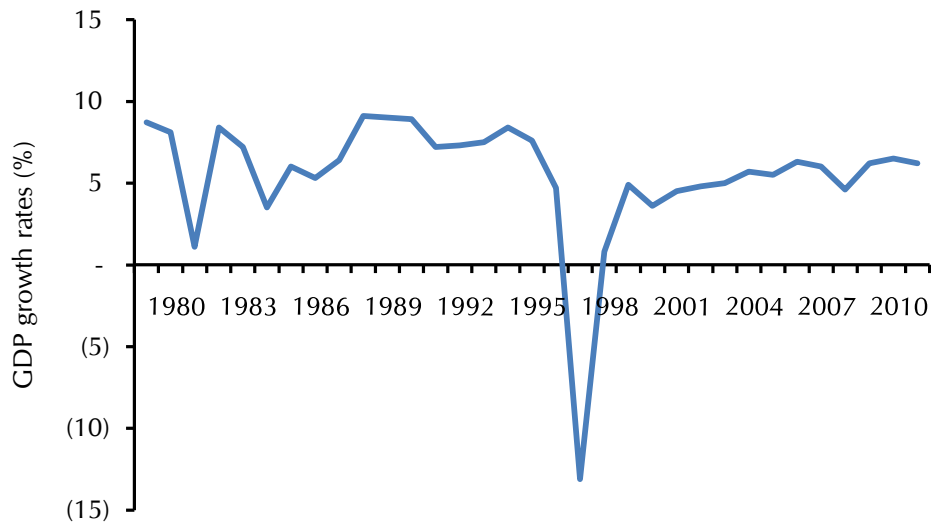
After the steep increase in oil prices due to the two oil shocks in the 1970s the price of oil reached its peak in 1980 at US\$35.48 per barrel and since then, at least until 1999, oil prices declined. Further, Indonesia's proven oil reserves looked bleak. Figure 2 illustrates the conditions of the proven oil reserves in Indonesia from 1980 to 2010.

As seen in Figure 1, Indonesia's proven oil reserves have shown a steadily declining trend since 1980. Even though it peaked briefly in 1991 with 11 billion barrels of proven reserves, it has been consistently falling and stayed at approximately 4 billion barrels from 2004 to 2010. This depletion in oil reserves was consequently followed by the reduction in the production of crude oil and eventually caused the oil revenue to also decline.



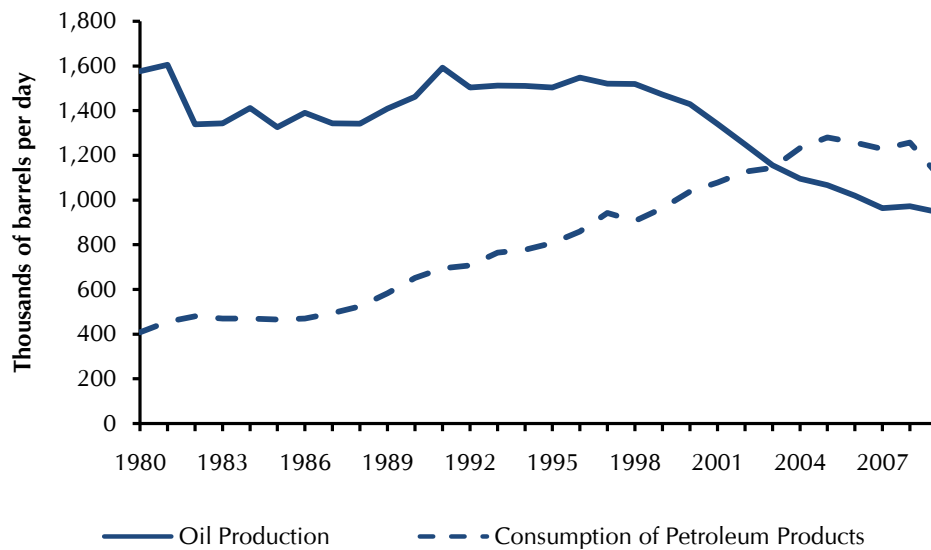
Source: The Titi Tudorancea Bulletin)

Figure 1: Indonesia's proven oil reserves, 1980-2010



Source: World Bank)

Figure 2: Indonesia's GDP growth, 1981-2012



Source: The Titi Tudorancea Bulletin)

Figure 3: Oil production and consumption, 1980-2009

After the end of the oil boom era, Indonesia's economic growth during the early part of 1980s declined significantly, as shown in figure 3.

It can be seen in figure 3 that during 1980-1982 Indonesia's economic growth rate steadily declined from 8.7% in 1980 to 8.1% in 1981 and declined steeply in 1982 with an economic growth rate of only 1.1%. Although there was a brief increase in 1983 with a growth of 8.4%, economic

growth declined significantly in 1985 with a rate of only 3.5%.

Due to the end of the oil boom era and the consequent decline in economic growth, the Indonesian government applied an 'exit strategy' of diversifying the economy away from its heavy dependence on oil resources. This strategy had, more or less, successfully prevented Indonesia from catching the Dutch disease (Usui). Indonesian economic ministers at that time recognised the limitations of the government as

the only single engine of prosperity and thus promoted market-based production structures as new engines of economic growth (Arndt; Prawiro). The consequence of this policy was the deregulation of many sectors of the economy to enable private investment to thrive. This deregulation affected, among others, the financial, manufacturing and trade sectors (Booth).

All measures taken under the exit strategy appeared to work. The growth rates of GDP from the mid-1980s to the mid-1990s were similar to, and at times were slightly above, the oil boom era (Figure 2). This was achieved even though petroleum only contributed an average of 44% to total government revenue during 1985-1990 and only an average of 27% during 1991-1996. So confident was the government of the successes of its exit strategy that in 1994, President Soeharto addressed the OPEC delegation in Bali stating that oil “no longer plays an important role” in the Indonesian economy (Barnes).

However, deregulation, especially the deregulation of the financial sector¹, was believed to be one of the factors that led the economy into the 1997/1998 financial crisis (Bennett; Kaminsky & Reinhart). An overly liberalised banking system coupled with a weak financial structure had led to a procreation of precariously undercapitalised and poorly supervised banks. These conditions, in turn, prompted large private external debts (most of which was unhedged and short-term) and a rapid build-up of volatile private capital inflows (Djiwandono; Hill; Thee). All of these worsened the burden of the crisis for the country. Indonesia was the worst affected by the Asian financial crisis compared with other East Asian countries such as Malaysia, Thailand or South Korea (Hill, 2000). So

¹ In October 1988 the central bank of Indonesia (Bank Indonesia) launched a deregulation package known as PAKTO 88 that relaxed significantly the establishment of private and foreign-owned banks in Indonesia see Bennett); (Prawiro).

severe was the crisis in Indonesia that its economic growth rate fell by a dramatic amount in just one year, from an average of over 7% annually during 1990 to 1997 to almost -14% in 1998 (Figure 2).

After the fall of Soeharto (dubbed ‘*era reformasi*’² or the reformation era), the petroleum industry struggled to regain its production capabilities back to the same level as before. During this time period domestic oil production steadily decreased whereas domestic consumption of petroleum products was increasing (Figure 3).

This mismatch between the supply of oil and demand for oil, as shown Figure 3, impacted on the position of Indonesia as one of the world’s oil producers. In 2004, for the first time since oil was found in the Netherlands East Indies era, Indonesia became a net oil importer. Eventually, in September 2008, OPEC announced that Indonesia – which had been a member since 1962 – had formally suspended its membership in the organization (Pallone).

In 2010, Indonesia’s proven oil reserves amounted to 3.99 billion barrels. With the 2010 level of exploitation of around 300 million barrels a year and without significant new investment in exploration and advanced exploitation technologies the available reserves may be completely dry by the mid-2020s (OECD/IEA).

The *era reformasi* was also marked by two dramatic events relating to the petroleum industry. The first event was the enactment of Law No.22/2001 which had the main aim of attracting new investment to Indonesia’s ailing petroleum industry and the second event was the annulling of some of the significant provisions of this law in 2012.

² This is the name Indonesians give for the time period since the fall of Soeharto in 1998. The name signifies the effort to reform the country’s social, political and economic structures from the legacy of Soeharto administration which was generally characterised by corruption, collusion and nepotism (Anwar, 2004)

Recognizing the continuing decline in oil production, the Indonesian government with the approval of the parliament passed the Petroleum Law No. 22/2001 which had the main purpose of attracting new investment, either from domestic sources or foreign sources, in the upstream petroleum industry, with the hope of increasing the industry's level of production. Under the new law, the regulatory functions in upstream and downstream activities were transferred from the state oil company, Pertamina, to new institutions called BPMIGAS (Executive Agency for Upstream Petroleum Activity) and BPHMIGAS (Executive Agency for Downstream Petroleum Activity) (OECD/IEA).

This new law replaced the Pertamina Law No.8/1971 and thus practically ended the monopoly power of Pertamina, as the company had to surrender its position as licensor, supervisor and regulator in the Indonesian petroleum industry, rendering it only like a common petroleum company (Karim). The pro free-market nature of the new law was formulated with the hope of increasing competition and the economic efficiency of the petroleum industry and eventually be able to boost the country's petroleum output.

In 2012 a petition was submitted by a number of prominent figures and organizations against the Law No.22/2001, as they saw this law as too liberal, violating the state sovereignty in the energy sector. The Constitutional Court, having considered Article 33 Section 3 of the Constitution, which states: 'The land and the waters and the natural riches contained therein shall be controlled by the State and shall be used for the greatest benefit of the people', hinged its decision on its interpretation of 'shall be controlled by the State' and ruled that BPMIGAS was unconstitutional and thus must cease to exist (Cornwell & Anas; Karim).

To avoid turmoil and legal uncertainty in the Indonesian petroleum industry following the liquidation of BPMIGAS, the

President issued decree No. 95/2012 which transferred the duties, functions, and organizations of BPMIGAS to SKKMIGAS (Special Task Force for Upstream Petroleum Activities) – which is a unit under the Ministry of Energy and Mineral Resources. Furthermore, the government announced that all contracts including Production Sharing Contract or Contract of Work that were signed between all parties and BPMIGAS before the annulment would remain valid (Azwar; Wardany). According to the presidential decree, SKKMIGAS was not intended to be a permanent body (Karim), however, three years later the government has not yet worked out its replacement.

This event made foreign investors nervous (*The Economist*). Even though the government gave assurances that all current contracts would be honoured, international oil giants who have operations in Indonesia, such as ExxonMobil, Chevron and CNOOC, are now wondering what will happen when they come up for contract renewals. Indeed a study by Boyd, Devero, Frias, Meyer, and Ross) which was conducted in 2009, three years before the BPMIGAS debacle, concluded from several interviews with petroleum company executives in Indonesia that impetuous legislative decisions and frequent regulatory changes have deteriorated the legal certainty climate for investors and thus have adversely impacted their business sentiment. According to some interviewees in the study, ambiguous legislation and abrupt changes in laws and regulations as well as the nonexistence of reliable channels to settle business disputes have damaged investor confidence and subsequently deterred them from funding new exploration projects. It is not hard to see that these conditions may have thwarted the petroleum industry's expansion and thus negatively affected output production.

The petition against Petroleum Law No. 22/2001 reflected the rise of resource

nationalism in Indonesia, particularly since the *era reformasi* began (Habir; Soesastro). Some studies suggested that resource nationalism is a cyclical phenomenon where many factors might become involved in its rise and fall (Bremmer & Johnston; Vivoda). The high price of oil since the 2000s was considered to be the main reason for the resurgence of resource nationalism in many resource rich countries (Vivoda, 2009). Related to this, in Indonesia this sentiment became stronger when the government began to reduce its fuel subsidy due to budgetary pressures following international oil price increases.

Method

It is considered that the production structure of the petroleum sector can be represented by an aggregate Cobb-Douglas production function:

$$Y_t = A_t K_t^\alpha L_t^{(1-\alpha)}$$

where Y_t is output, K_t is physical capital, L_t is labour and A_t is TFP.

Since there is no official estimate on capital stock, the capital stock series is constructed from investment expenditure in the upstream petroleum industry. Following (Taylor), capital stock series is constructed by summing capital stock from all existing asset vintages using the following formula:

$$\sum_{i=1}^t I_i - \delta_i/P_i$$

Here, I represents gross investment in the petroleum sector, t denotes the age of the oldest vintage of capital stock in the petroleum sector, $i=1$ denotes the current capital stock in the petroleum sector, δ is the depreciation³, and P is the price level.

Following Van der Eng), the main data source that is used to estimate the val-

ue of α for the Indonesian economy is the BPS' Sistem Neraca Sosial Ekonomi (social accounting matrix or SAM) (Badan Pusat Statistik). However, BPS does not publish SAM yearly and during the period of 1991-2010 SAM was published in only particular years. Hence, these data will be used as the base to estimate capital's share of output for the whole period under study. The calculations are shown in Table 1 and α is found to be 0.56.

Past studies reveal that the value of α applied to Indonesia ranged from 0.36 to 0.69; further, the value of α used for different countries in East Asia ranged from 0.49 to 0.75 (Alisjahbana; Lau & Park; Van der Eng). Thus, it appears that the α value of 0.56 for Indonesia is consistent with prior estimations.

Table 2 presents the results of the growth accounting exercise for the petroleum sector in Indonesia for the period 1991-2010.

Results Discussion

As seen in Table 2, during 1991-1997, petroleum output growth was mostly the result of capital stock accumulation. This dominant contribution of capital stock is consistent with the generally conducive investment climate in the petroleum sector during the period.

During the period of transition and adjustment of 1998-2003, the contribution of both capital accumulation and TFP declined and the growth of petroleum output was mostly due to the expansion in labour input. This relatively high contribution of labour input as compared to other factor inputs appears to be consistent with government policy in encouraging the development of human resources through the expansion of petroleum education and the opening of many training facilities which were started during the second five-year plan or REPELITA II in the 1970s (Indonesian Government, 1974).

³ The rate of depreciation used in this study is the same as the implicit rate of depreciation used by BPS in its System of National Accounts, which is 5%.

Table 1: Capital's share of output (2005=100)

<i>SAM Year</i>	<i>Output (million US\$)</i>	<i>Capital Income (million US\$)</i>	<i>Capital's share of Output= (Capital Income)/Output</i>
1993	588.959,63	321.322,62	0,55
1995	697.587,30	396.693,56	0,57
1998	179.595,76	136.548,25	0,76
1999	219.184,28	102.482,79	0,47
2000	224.260,44	142.343,53	0,63
2003	264.926,46	117.308,56	0,44
2005	270.627,21	138.741,92	0,51
2008	367.686,30	192.859,20	0,52
AVERAGE			0,56

Sources: Badan Pusat Statistik); author's calculations.

Table 2: Indonesian petroleum sector's growth accounting (average annual changes, %)

Period	Change in Output	Due to Capital Stock	Due to Labour Input	Due to TFP
1991-1997	-0,92	-0,12	-0,41	-0,39
1998-2003	-1,60	-0,77	0,14	-0,97
2004-2010	0,77	0,11	0,08	0,58

Source: author's calculations

The period from 2004 to 2010 witnessed a surge in the contribution of TFP to petroleum output. This significant progress in the contribution of TFP may be unexpected since it occurred during a time full of unfavourable conditions that normally make productivity improvements in this sector very challenging. First, particularly since 1998, there was no coherent and comprehensive government policy on the medium-to-long-term development of the country's petroleum sector. The main focus of the central government at this time was to deal with social unrest and separatism that overwhelmed the country following the Asian financial crisis and the resignation of Soeharto. Nevertheless, to claim that during this time period there was no government supervision of the industry at all would be an exaggeration. The Indonesian ministry of resources (Kementerian ESDM) and BPMIGAS (now SKKMIGAS), as the technical arms of the government in the upstream petroleum sector, still played a key role in the development of this sector, particularly in short-term planning and development. Nevertheless, at the national

level there was no comprehensive medium-to-long-term national strategy that could bind all of the nation's stakeholders towards a common goal of achieving the optimum benefit from the country's endowment in petroleum resources.

Second, the period from 1998 to 2003 was a period of social and political abnormality in Indonesia. In the political sphere, there were three presidents, each with their own cabinets. In the social sphere, there were widespread and violent social conflicts, imminent terrorism activities and the increasing secessionist movements in some regions. Even though social and political normalization has generally been achieved since 2004, some of these problems still exist, albeit at a reduced frequency. Moreover, during the 2004-2010 period, the country continued to have the same issues which have dragged the economy down for decades, such as corruption and weak legal systems (Basri).

Amid these unfavourable circumstances, the reform in the petroleum sector in the early 2000s appeared to have resulted in this acceleration of TFP growth. This

significant increase in TFP growth during 2004-2010 occurred following the implementation of the petroleum sector's deregulation policy which was marked with the introduction of Petroleum Law No. 22/2001 and came into effect on 23 November 2001. This new law practically ended the monopoly power of Pertamina in Indonesian petroleum industry. The pro free-market nature of this law encouraged the petroleum sector to shed some of its inefficiencies, as it has been able to stay competitive in a new era of market competition.

During the Soeharto era, Pertamina held monopoly power in all areas of the petroleum industry in Indonesia. In the area of upstream petroleum, the company served as licensor, supervisor, regulator and operator all at once (Butt & Siregar, 2013; Karim). Even though over 90% of Indonesia's petroleum at this time was produced by private oil companies (World Bank), under the scheme of production sharing contract (PSC) and contract of work (CoW) these private companies in effect operated under the control of Pertamina and were subject to its directives. In other words, they were no more than just 'service providers'. With this background, the productivity of the Indonesian upstream petroleum sector before the enactment of the new law may best be represented by the conditions of Pertamina itself.

When Pertamina still held its monopoly power, aside from its main job in managing all aspects of the country's petroleum industry, the company was also burdened by responsibilities to assist the national development efforts. One of the prominent examples of such a responsibility was Pertamina's financing role in the establishment of Krakatau Steel plant, a US\$5 billion mega project established with the purpose of supporting the country's industrialization process – which unfortunately became a misadventure due to gross mismanagement (Dowling & Yap).

Rather than be obligated only by specific financial performance or returns on investment, Pertamina was also burdened by many social obligations such as guaranteeing the availability of oil products throughout the vast archipelagic country at a uniform subsidized price regardless of the costs (World Bank). Further, a special audit report revealed that embezzlement, illegal commissions, mark-ups on procurement contracts and sheer inefficiency had cost Pertamina around \$6.1 billion in lost revenue between 1997 and 1998 alone (OGJ). Procurement and resources allocation processes in Pertamina were lengthy (sometimes over 10 months) and were being done without adequate demand planning and forecasting, supply planning or good inventory management. Inefficiencies that can be attributed to these procurement and resources allocation processes alone were estimated to reach around US\$1 billion each year (World Bank, 2000). In the global upstream industry's rank, Pertamina's financial returns from exploration and production activities fell into the bottom quartile. The estimated inefficiencies stemming from exploration and production activities alone reached between US\$1.3 billion to US\$2.0 billion (World Bank, 2000).

Also, there was a conflict of interest arising from the position of Pertamina as an operator while at the same time also serving as a regulator. As an operator, Pertamina engages in exploration, development and production activities; whereas as a regulator, it grants new exploration areas to private companies. This arrangement may allow Pertamina to hold some specific fields which hold better prospects but not carry out the exploration and development activities, while at the same time denying access for private companies to the field (World Bank). Overall, Pertamina was far from implementing sound business practices in all aspects of its operations. With all its power and lack of accountability, during

these times Indonesians liked to satirise Pertamina as 'not a company but a country within a country'. These practices eventually led to inefficiencies in Indonesia's petroleum sector.

After the fall of Soeharto and the start of the reformation era, the country's stakeholders intended to tackle these inefficiencies in Indonesia's petroleum sector with the enactment of the Petroleum Law No. 22/2001. This law was enacted with three key components. First, Pertamina no longer holds a monopoly over all activities in the petroleum sector and the company no longer performs the dual functions of regulator and industry participant. Second, the country's petroleum sector is disaggregated into 'upstream' and 'downstream', and a new regulator has been established for each of those sub-sectors. Third, the 'authority to mine' which was previously held by Pertamina, is now held by the government (Tivey, Habriansyah, & Abrar). The law guarantees that Pertamina holds the same position as other ordinary petroleum companies. The main objective of this arrangement is that the petroleum sector in Indonesia will be subject to competition mechanisms that are reasonable, fair and transparent with appropriate pricing in accordance with market forces (Pertamina, 2013).

A study by Bridgman, Gomes, and Teixeira) on the sources of TFP growth in Petrobras (Brazil's national oil company) concluded that even the threat of – despite no immediate *de facto* – privatization and market competition is enough to force improved productivity. In the case of Pertamina, after losing its monopoly power, the company has been forced to operate with more focus on performance and efficiency, as any other private company should be. Thus, for the Indonesian upstream petroleum sector, the reform brought a level playing field for all players in this sector and this put pressure on them to be more efficient in order to survive.

In the more democratic Indonesian society after the end of Soeharto era, the public demands a more transparent and responsible public governance. Responding to these public pressures, many public institutions (including those involved in the petroleum sector) have adopted managerial best practices which can usually be found in large and well-managed private corporations.

According to the Law No. 22/2001, responsibility for three key functions of the governance of petroleum sector – i.e. policy, regulation and commercial (business) (Lubiantara) – which was previously held solely by Pertamina, is now separated into three distinct bodies. The policy function became the responsibility of the Ministry of Energy and Mineral Resources (Kementerian ESDM), regulation function (including its monitoring and controlling) is the responsibility of BPMIGAS (now SKK Migas), while the commercial aspects are the responsibility of Pertamina as a state-owned company.

For Pertamina, ever since the fall of Soeharto regime, the company has been put under intense public scrutiny due to its strategic and important position for the country's economy. The public demands that Pertamina be more transparent, clean and profitable. Further, as Pertamina now does not hold monopoly power and thus becomes an ordinary player in Indonesia's petroleum sector, the company is required to be able to directly confront its competitors. These combined pressures have pushed the company to transform its business process by adopting good corporate governance which usually can be found in well-managed private entities.

In its stated strategic direction, Pertamina's business process transformations were focused on building a new corporate culture which includes: instilling anti-corruption and customer focussed mind-set among the employees, changing the company's values from a bureaucratic and mo-

nopolistic company to a more competitive and entrepreneurship-oriented company, ensuring effective leadership within the company and creating a good public image to support the company's operations as well as to gain the government and public recognition for trustworthiness. Showing its seriousness, in 2006 Pertamina established a separate unit called the Management Center Program whose tasks are to manage and ensure that these transformation programs run smoothly within the company (Pertamina, 2006).

On the other side, the Ministry of Energy and Mineral Resources (Kementerian ESDM) has implemented a series of bureaucratic reforms which touches the areas of, among others, accountability, human resources and organization (KESDM). To improve its accountability, the ministry compiles and publishes its financial reports regularly. Although a yearly financial report is usual in private sector, in the Indonesian public sector this is indeed a significant achievement. Further, in the area of accountability the ministry also regularly publishes its performance report (LAKIP). LAKIP is an accountability report from public officials of a public organization to their stakeholders which reports the use of resources available to that organization. For a developing country which has gone through a violent transition from decades of autocratic regime to a democracy, these practices are indeed significant steps towards a more thorough implementation of sound management principles in public sector organizations.

Compared to Pertamina and Kementerian ESDM, BPMIGAS is rather slow in adopting managerial best practices from private sector organizations. This condition might be related to the status of BPMIGAS as a newly established institution. As a new government agency which was established in 2002 following the end of Pertamina's monopoly, one of the problems faced by BPMIGAS was that the

regulations necessary to support its operations were slow to materialise. One example was the difficulty faced by BPMIGAS in compiling its yearly financial report. Until 2008, BPMIGAS has been unable to compose its balance sheet because the Ministry of Finance had not decided the initial equity of this new agency (BPMIGAS, 2011). Further, regarding the financial reports of BPMIGAS, the chairman of Indonesia's supreme audit body (BPK) commented that the management control for the cost recovery (which is one of the main points in BPMIGAS' financial reports) was not transparent enough, and BPK therefore gave an adverse opinion or disclaimer on BPMIGAS's financial reports (BPK, 2009).

Evolution of the relationship between the rates of growth of GDP and TFP in petroleum sector shows a different path when the period 1991-2010 is divided into the three sub-periods as seen in Table 3. During 1991-1997, GDP growth had a negative (and weak) relationship with the growth of petroleum TFP. This negative relationship implies the possibility that the exit strategy which was implemented during the Soeharto era, might have succeeded in pulling the economy away from its dependency on the petroleum sector. In other words, it is possible that from 1991 to 1997 economic growth had 'decoupled' from the growth of petroleum industry, since fluctuations in the productivity of the petroleum sector had a negative relationship with the fluctuations in the country's economic growth.

Table 3: Correlations

Year	Coefficient of correlation between the growth rates of GDP and petroleum TFP
1991-1997	-0,08
1998-2003	0,53
2004-2010	0,60

Source: author's calculations

After the Asian financial crisis of 1997/1998, for the period 1998-2003, GDP

growth became positively correlated with the growth of petroleum TFP albeit at a moderate level. Hence, this positive relationship implies the possibility that post-crisis Indonesian economy has 'recoupled' with the petroleum industry – fluctuations in petroleum productivity growth could now be directly associated with fluctuations in the country's economic growth. The period of 2004-2010 shows the same pattern as the period of 1998-2003. GDP growth continues to have positive correlation with the growth of petroleum TFP.

As post-crisis economic growth became positively correlated with petroleum TFP while at the same time oil output continued to decline, it might be only natural to ask: how dependent is the economy on the petroleum industry? To answer this question it might be necessary to highlight the comparisons between the role of the petroleum sector in the economy during the oil boom era and during the post-crisis period.

At the height of the oil boom era between the mid-1970s and the early 1980s, the average share of petroleum revenue in total government revenues was around 60% (Widiyanto), whereas in the post-crisis era of 2000-2010, on average it only reached 28% (Bank Indonesia). Hence, government revenue in post-crisis years may be less prone to be affected by fluctuations in petroleum prices than during the oil boom years. It appeared that, unlike the oil boom years, the non-petroleum sectors now contribute the majority of government income.

During 1970-1983, the petroleum sector's contribution to total exports was on average around 60% (Warr, 1992), whereas during 2000-2010 its share only reached around 21% (Bank Indonesia). Hence, it seems that aside from the low potential impact of oil price fluctuations on government revenue, the main source of foreign exchange earnings may no longer rest on the exports of petroleum. During the oil boom era, oil exports significantly improved the

country's current account in the balance of payments. Foreign exchange revenues provided by booming oil exports during this time period successfully removed the acute balance of payments constraint which for decades had limited the ability of the government to implement its economic development programs (Arndt; Booth). It is possible that with the now diversified sources of foreign exchange earnings, the post-crisis economy in general might not have serious problem on the revenue side.

There is the possibility that the issue in the post-1997/1998 crisis period, however, lies on the expenditure side. The combination of declining domestic oil production and increasing domestic demand for oil products put a lot of pressure on the country's balance of payments since oil must be imported to plug the gap between domestic oil supply and demand. After Indonesia became a net oil importer, in the period of 2004-2010 an annual average of 35% of the country's total reserves of foreign exchange has to be spent on oil imports alone (Bank Indonesia).

Another difference between the oil boom era and the post-crisis era may lie in the area of energy subsidies. During the early 1970s, the government even reported income surpluses as the price of oil products in the domestic market was higher than their production cost. However, rapidly growing consumption eventually outpaced production cost and by the end of 1970s and the early 1980s, subsidies for oil products began to show negative signs – which meant deficits in annual government budget. During this period, the magnitude of the fuel subsidy stood at around 8% of total expenditure budget (Dick). In post-crisis years, particularly after 2004, subsidies for oil products swelled to around 17% of total annual government expenditure (Bank Indonesia). In line with this, recent fuel subsidy reforms are a good start to ease the burden of subsidy and provide more fiscal space for the government (World Bank).

Thus, it appears that the recoupling of the economic growth with the productivity growth of petroleum sector in the post-crisis era occurred when the importance of petroleum sector in the economy was less than during the oil boom years. The economy no longer depends as much on the petroleum sector as a source of revenue and foreign exchange earnings. It is possible that the one crucial role of the petroleum industry in this recoupling process may lie in the ability of the industry to limit the impact of any external shocks that might adversely affect the economy due to the rising fuel subsidy. Even amidst steadily declining output, revenue from petroleum sector consistently remain above total expenditures on fuel subsidy. For example, between 2001-2010, fuel subsidy averaged only about 47% of total revenue from the petroleum sector (Bank Indonesia).

Although Indonesia's petroleum TFP experienced significant growth between 2004-2010, steadily declining petroleum output, the fact that there are still unexplored basins and the absence of the application of advanced extraction technology might indicate that there remains room for further improvement in the productivity of the petroleum sector. Combined with the finding in this study that economic growth after the Asian financial crisis of 1997/1998 is positively correlated with the petroleum productivity growth, long-term policy or strategy to provide the path for continuous productivity enhancement in the petroleum sector might be relevant for the future of Indonesia's economic growth.

One of the challenges in Indonesia's petroleum development is the rising sentiment of resource nationalism. There are several measures that could be taken by both international oil companies (IOCs) and the host government to deal with resource nationalism (Maniruzzaman). First, a progressive taxation or profit-sharing method inherent in the initial exploitation agreement may be able to save the time and

trouble for the parties involved in the event of high oil prices, which usually serves as a trigger for the resurgence of resource nationalism. Second, equity participation in petroleum exploitation by the host government may be diplomatically and strategically necessary to serve as a shield against the wave of resource nationalism, because failing to protect the government's investment would typically mean inviting unnecessary domestic political scrutiny. Third, corporate social responsibility (CSR) programs may be able to serve as a buffer for IOCs and the government against nationalistic demands, especially from the local population where the petroleum resources lie. Fourth, transparency of corporate activities could be improved in order to minimise the lack of trust on the operational conducts of IOCs. Fifth, an early detection and prevention mechanism for disputes could be implemented so that immediate and appropriate solutions can be quickly devised whenever there are early signs of friction among parties. Sixth, it might be better for IOCs to include international financial institutions (such as the World Bank or Asian Development Bank) in their investment efforts, either as guarantor, lender or investor in order to bring more leverage in dealing with the rising sentiment of resource nationalism. Losing important development aid from these international financial institutions may invoke domestic political pressures for the host government. Hence the presence of these institutions might deter any hostile action against IOCs that are operating in a foreign country.

Even though there are several ways in which to minimise the risks associated with resource nationalism, it might have to be admitted that this sentiment is prevalent in Indonesia and might not be able to be completely eliminated. Therefore, even though keeping Indonesia's petroleum sector open to fair competition should be the prime policy, it might be better if the fact regarding resource nationalism is also taken

into account in designing the strategy or policy to develop the productivity of Indonesia's petroleum sector.

Hence, perhaps the reasonable strategic policy would be to encourage Pertamina to be the driver for the development of the petroleum sector while still keeping the sector open for competition. It might be important to also note that proposing policies for the development of the petroleum sector often involves trade-offs between short-term and long-term objectives.

Since the social and political conditions in Indonesia dictate that it might be very hard and also unwise to exclude Pertamina from the development process of the country's hydrocarbon resources, it might be necessary for the government – as the sole owner of Pertamina – to provide greater financial freedom to Pertamina to be able to develop its own choice of technological core competencies. Reflecting on the success story of Statoil (Norwegian NOC) in building its unique technological competence, this policy requires government support in shaping the innovative mentality and long-term outlook of the NOC. To achieve these objectives, in the case of Statoil, the Norwegian government granted the company full discretion over its cash flow with ready access to capital and with minimum budget constraints. Of course, just as in any other frontier technological development, there are cost overruns and project delays, but repercussions for failures were nonexistent, especially for the technical personnel. Hence, these arrangements create ideal conditions for technological risk-taking and the result is Statoil's core technological competencies in deepwater exploitation, operations in harsh environment, integration of complex value chains for natural gas projects and in producing as well as refining heavy oil (Thurber & Istad)⁴.

One of the challenges of this policy is that it may adversely affect the government's ability to collect rent from its petroleum resources, at least in short-term. Hence, significant reduction in tax revenues and dividends with all of its political consequences might have to be endured by the ruling government. Another challenge may lie in the euphoria of anti-corruption in Indonesia, which has occurred ever since the end of the Soeharto era and often results in 'witch hunt' type of prosecutions. Therefore, the chance of criminalisation for failures in government-funded technological development projects is rather high in Indonesia, especially in the capital-intensive petroleum industry. One of the ways to circumvent this condition is by issuing government regulation, hence reducing legal uncertainty, that places a certain maximum cap (for example at a certain percentage of Pertamina's retained earnings) for research and development fund that is available for technological development and investment purposes which Pertamina could use without having to be liable for negative results in their field applications.

Moreover, it might be appropriate for the government to consider devising local content policy for the petroleum sector through the imposition of tariff barriers. This may serve as second best option amid the strong sentiment of resource nationalism in Indonesia. Carefully designed local content policy may create backward linkages as well as forward linkages and thus would spur the process of technology spillover along the value chain of the petroleum sector. The argument that a local content policy may create distortions and inefficiencies may hold true. However, carefully designed policy with good transparency, reliability and predictability might be able to minimise these adverse effects. Local

⁴ In contrast, an Indonesian energy analyst stated that only 10% of Pertamina's profit is reinvested back to the company by the government, whereas as a com-

parison, the Malaysian government reinvested 70% of Petronas' profit back to the company (Dhany, 2013).

content policy may induce inefficiency if the policy is introduced without carefully considering the degree of “technological strangeness” in the economy (Tordo). Primitive or very limited economies could not be expected to quickly be able to supply industrial intermediate goods or services. Hence, the policy should be designed in gradual stages that closely follows the ability of the rest of the economy to develop supporting industries and services for the petroleum sector. For example, when the U.K. needed to boost its stalling economy in 1970s, the country decided to speed up the development of its North Sea hydrocarbon fields and attracted American service companies and expertise without giving enough time for its domestic industries to learn and develop their skills. In contrast, Norway developed its petroleum sector more slowly, allowing its domestic service sector to catch up, gain expertise and develop. The result is that Norway’s supply industry now has a strong expertise and competence in managing logistical services in complex petroleum projects (Thurber & Istad; Hallwood, 1990, as cited in Tordo, 2011).

The local content policy objectives may be better achieved through the imposition of tariffs rather than non-tariff barriers. Tariff barrier is more transparent and may provide less distortions in the market than non-tariff barrier (Anderson; Moschini). Although non-tariff barriers could be employed to correct market failures, however, they could also be used to distort free trade. Hence, it could be difficult to distinguish ‘legitimate’ from protectionist motivations for non-tariff barriers policy (WTO).

Further, it might be necessary for the tariff rates to closely follow the best practices in the East Asian region in order to avoid over-protection of the domestic industries that could lead to inefficiencies in the overall value chain of the petroleum sector. Different import tariffs could be employed with higher rates imposed for

products or services which could be supplied by domestic firms, whereas lower rates could be imposed for products or services which cannot be acquired from domestic sources. This policy has been implemented for decades in the Indonesian automotive industry and the petroleum sector could take the lessons from the long period of implementation of this policy in the automotive industry.

Lastly, it might be important for the government to consider giving fiscal incentives as an instrument to encourage technological progress in the petroleum sector. Drawing lessons from the successful development of fracking technology which was spurred by fiscal incentive in the form of tax credit for unconventional gas exploration and exploitation (Graves), this pattern could also be applied in some Indonesian basins which, due to their characteristics, present a high level of technological challenges. A report by the Indonesian ministry of energy and mineral resources stated that there are 22 basins in Indonesia that have not been explored and most of them are located in deepwater areas in the eastern regions of the country (KESDM). These regions are infamous for their lack of infrastructure facilities. Therefore, fiscal incentives could be devised with the aim to develop the exploitation of hydrocarbon reserves in these areas. These incentives could also focus on spurring the development of more advanced and complicated extraction technologies, such as hydraulic fracturing, for the exploitations of petroleum resources in other regions of Indonesia.

Conclusion

Analysis on the relationship between economic growth and petroleum sector’s TFP revealed the possibility that after the Asian financial crisis of 1997/1998, the Indonesian economy recoupled with the petroleum sector. Before the crisis, the country’s GDP growth rates used to have a negative corre-

lation with the growth rates of petroleum TFP. However, the correlation between them became positive in the post-crisis era.

One of the challenges in Indonesia's petroleum development is the rising sentiment of resource nationalism. Even though keeping Indonesia's petroleum sector open to fair competition should be the prime policy, it might be more appropriate if the fact regarding resource nationalism is also taken into account in designing the strategy or policy to develop the productivity of Indonesia's petroleum sector.

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