<div align="center">学位論文及び審査結果の要旨</div>

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　　　　　　　　　　　Price Distortion in Indonesia
　　　　　　　　　　　（インドネシアにおけるエネルギー価格の歪みの除去がもたらす
　　　　　　　　　　　社会的経済的諸影響)
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論文の要旨

The countries were encouraged to reform their energy subsidy policy, as formulated in the G-20 Summit held in Pittsburgh in 2009, by reducing the fossil fuel subsidies gradually. Sequentially, the Paris Agreement of 2015 adopted during COP 21 aimed to fight the climate change by enriching the actions and investments to achieve a sustainable low carbon society in the future. The international framework set by this Agreement is intended for the years after 2020. These consensuses were supported by the current level of world oil prices that are relatively lower than before. As a result, a plan to implement the energy subsidy reform became politically more feasible.

This dissertation provides a comprehensive approach consisting of some chapters about the implementation of the energy subsidy reform. This dissertation targets Indonesia as a study case. Indonesia is an extraordinary country in terms of energy subsidy reform with its various attempts and mitigation programs toward the various subsidized energy goods. The reform in Indonesia was analyzed exclusively by the World Bank, the IMF, and other institutions.

This dissertation aims to fill the gaps in the existing energy subsidy reform studies by addressing the following research questions:

(1) Does the energy subsidy reform deliver the inflationary impact significantly in the short and the long run?

(2) Does inflation affect the growth in the short and the long run? How much is the threshold level of inflation?

(3) What is the impact of the energy subsidy reform on the welfare and the government saving in the period of low oil prices and high oil prices?

After the introduction in Chapter 1, Chapter 2 examines the short-run and long-run relationship between the energy subsidy and inflation in Indonesia. This chapter utilizes the Autoregressive Distributed Lag (ARDL) model that demonstrates an advantage in tackling a short period of data. The model in this chapter corrects the previous study by including the trend issue and some possible structural breaks in this particular topic. To avoid omitted variable bias, this chapter also includes the oil price index and broad money supply as regressors. According to the result, the energy subsidy exhibits a negative and significant relationship in the short run and long run on the consumer price index, which means that a reduction in the energy subsidy would immediately bring an inflationary impact. Moreover, the world oil price index and broad money supply positively and significantly affect the consumer price index. This chapter suggests that the energy subsidy reform should be applied gradually.

Demonstrating that the energy subsidy reform creates inflation in the short run and long run, and the examination about the impact of inflation on the economy is conducted. The mixed interpretations from the literature on whether inflation brings either a positive or negative impact on the economic growth motivates the study in this dissertation and materialized into Chapter 3. In Chapter 3, by employing the ARDL model, the nexus between inflation and economic growth in the short and long run is investigated. To date, the ARDL model was not utilized in the previous inflation-growth study, especially for Indonesia's case. The model also incorporates some regressors that also affect economic growth theoretically. This dissertation found that inflation demonstrates a negative and significant impact on economic growth, both in the short run and the long run. The examination is continued to measure the optimum level of inflation that possibly affects economic growth positively. To measure the threshold inflation level in Indonesia, Chapter 3 utilizes two methods such as Threshold Regression and Quadratic Regression. By utilizing these methods, the two optimum inflation thresholds are found. Both Threshold Regression and Quadratic Regression perform very well bypassing the required error diagnostic checks. Threshold Regression indicates that the threshold level of inflation is at 7%, while Threshold Regression proves 14.31% is the optimum level of inflation that positively affects the economic growth in Indonesia. In general, this chapter suggests that the optimum level of inflation in Indonesia is at around 7% to 14.31%.

The optimum level of inflation that positively affect the economy in Indonesia is at around 7% to 14.31% (according to the findings of two previous methods in Chapter 3). According to the data from the Central Bank of Indonesia, from 2001 to 2017, the average of inflation targeting was about 5.53%, with the average of actual inflation around 7.31%. The average of actual inflation is almost similar to the threshold inflation level at 7% and is still below the suggested optimum inflation level from quadratic regression, which is around 14.31%. If the energy subsidy reform is applied, the inflationary impact is assumed will be at the range of the

suggested optimum level of inflation (up to 14.31% is considered safe to the economy) concerning that the average inflation targeting was about 5.53%. Therefore, the energy subsidy reform could be implemented.

Chapter 4 aims to conduct a simulation of energy subsidy removal and measure its impact on welfare and government saving. Chapter 4 employs two large-scale datasets of the Indonesian National Socioeconomic Survey (SUSENAS) of 1999 and 2012. According to Indonesia's previous reform attempts, a very high fiscal burden would lead to a reform attempt, especially after the Asian financial crisis. This dissertation selects 1999 and 2012 as the periods of simulation because both years represent two cases of distinctive high fiscal pressures under two different environment of world oil prices (low and high). Therefore, this study intends to produce a robust conclusion about the reform under the conditions of either high world oil prices or low prices. It also provides a simulation using the SUBSIM tool. The application of this tool to the Indonesian case is the first attempt. As inputs to this simulation tool, the unit subsidy and the price elasticity of demand from subsidized energy goods are also calculated. Chapter 4 uses the new method in calculating the elasticity of demand of subsidized energy goods, which is the Almost-Ideal Demand System Iterated Linear Least-Square (AIDS-ILLS) method that overcomes the endogeneity issue of the common AIDS method. Furthermore, after conducting simulations on two different years, this dissertation found that the negative welfare impact of the 1999 reform is smaller than that of the 2012 reform. It is also reasonable knowing that Indonesia was as a net oil exporter in 1999 and vice versa in 2012. However, this dissertation also found that government saving in 2012 is greater than in 1999. Chapter 4 suggests other important keys in the reform, which are the current level of welfare when the simulation is conducted and the database of mitigation program recipient.

The findings from Chapters 2 through 4 suggest that in Indonesia's case, the inflationary consequence is inevitable when implementing the energy subsidy reform. Hence, knowing the level of inflation threshold is essential prior to the reform. The preparedness of the reform is important to avoid a greater impact on the welfare; also, the current level of welfare (i.e., poverty rate) and the preciseness of mitigation program would determine the amount of financial gain for the government. Ultimately, the reform should also intensively be communicated to the public effectively to secure the transparency of the government as much as possible.

From the findings, international community can obtain insightful policy perspectives and lessons to materialize successful energy subsidy reform. First, the governments need to reform the energy subsidy carefully. Most of the countries chose to reform gradually to avoid a significant increase in inflation; but choosing the right subsidized energy goods to eliminate is essential. Indonesia has shown its successful and unsuccessful stories of the energy subsidy reform that could be an excellent example to learn in planning and applying the reform.

Second, the governments should not hesitate to reform in the face of the inflationary and

negative welfare impacts. This dissertation found that the level of inflation that positively affects the growth is around 7% to 14.31% in Indonesia, and the threshold is relatively higher than the ITF. Similarly, the inflation threshold is found to be higher than the level of the inflation target for some countries that adopted ITF, such as Ghana, Mexico, The Philippines, Sweden, and Turkey. Further studies for the inflation threshold in other countries that adopted ITF are needed to find a more comprehensive comparison between the inflation threshold and the target of inflation. Furthermore, the welfare impact can be minimized using a precise mitigation program. Indeed, the mitigation programs are well known in some countries that attempted to reform (i.e., Poverty Family Benefit program in Armenia, Targeted Social Assistance in Azerbaijan, Bolsa Familia in Brazil, Nominative Targeted Compensation program in Moldova, and other similar programs in other countries). The mitigation programs should be designed not only for a short period but also for a long time. As a matter of fact, Indonesia has implemented cash transfer mechanisms along with other noncash transfer mitigation programs.

Third, the period of the reform is essential, especially when the world oil prices at a lower level. The reform is feasible and even could produce a bigger gain if the government has prepared certain conditions such as a precise database of targeted recipients for mitigation programs, relatively low level of poverty, stable exchange rate, and communicative government.

審査結果の要旨

　本研究は、インドネシアにおけるエネルギー補助金廃止の効果を実証的に分析した業績である。発展途上国は、福祉政策が不十分な状況にあるが、国民の福祉の向上を目的として、補助金によって燃料価格を低水準に抑制する政策を実施している国が多い。これは価格をゆがめ、地球環境に悪影響を与える（二酸化炭素の排出増を招く）政策であり、近年は国際的に廃止論が高まっており、実際に廃止の実例も増えている。著者は、国際的状況をふまえつつ、「改革」すなわち燃料補助金の削減または廃止の、貧困問題への影響を分析した。補助の対象となるエネルギーおよび燃料とは、電力、LPG（液化石油ガス）、キロシン、ガソリンおよび自動車用ディーゼル油（ADO）の５財である。

　Chapter 1 の序論に続いて、Chapter 2 では、エネルギー補助金がインフレに与える影響が分析される。既存研究と対比して著者は research gap を提示する。その上で、ARDL モデルによりデータを分析して、次のような結論を引き出した。インドネシアではエネルギー価格の上昇は、長期でも短期でも、インフレ率の上昇に結果した。この効果は長期で持続するため、国際エネルギー価格の上昇時は補助金による影響緩和策の実施が必須であると、著者は判断する。

　Chapter 3 では、インフレと経済成長の関係が分析される。ARDL モデルによる分析と ECM による補足分析で、インフレ率と成長率の間には、長期でも短期でも明確な負の相関関係が認められた。次に threshold の確認作業へとうつる。横軸にインフレ率、縦軸に平均成長率（2%毎）をと

ると、グラフは４つのピークと１つの谷（インフレ率 13%）を描く。threshold 回帰分析をおこなって、 14.31%が最適値として算出される。このことはエネルギー補助金の廃止がインフレ率に与える影響を検討する上で重要な意味を有すると、著者は考察する。

　Chapter 4 の課題は、補助金改革の社会的影響とくに貧困問題への影響を、需要の弾力性を含めて分析することである。とくに国際石油価格低迷期の 1999 年と国際石油価格高騰期の 2012 年の改革を比較し、後者のほうが補助金廃止の影響が大きかったことを明らかにしている。1999 年はアジア通貨危機（97 年〜98 年）の直後で、人々の経済的困窮度合いは 2012 年よりも高かった。しかし石油価格は低水準であったので、補助金引き上げの影響は小さかった（キロシンの影響が最大）。対照的に、2012 年は、貧困状況が緩和していたので、補助金改革（削減）の影響はより公平に人々に吸収されたが、影響そのものは 1999 年よりも大きかった。Chapter 5 は結論である。

　本論文の貢献は、次の 2 点に整理できる。第 1 に、インドネシアにおけるエネルギー補助金の廃止の影響を、既存研究で十分につかわれていない分析手法を適用して実証的に検証した点にある。また時系列分析を実施した点にも、新規性が認められる。第 2 に、制度分析の面では、多くの国のエネルギー補助金の事情を整理し、豊富な情報の中で、他国との対比でインドネシアの特徴を明らかにした。たとえば、国際石油価格高騰時にインフレ覚悟の補助金廃止を大胆に実行しことが、この国の特徴の 1 つとして挙げられる。

　本論文の第 3 章は、Journal of Applied Economic Sciences (Vol. 14/ Issue 1, pp.241-251, 2019) に、第 4 章は International Journal of Energy Economics and Policy (Vol. 10/ No. 4, pp. 122-134, 2020)に、それぞれ掲載された論文に基づいている。

　本論文の課題として、以下を指摘しておきたい。第 3 章で算出されたインフレ率の threshold が 14%強だという点について、高すぎるのではないかという一般的印象が残る。計量的検証以外の資料もふくめて、これを補強する情報がより多く含まれていた方が、説得力がより増したと考えられる。また制度面では、生産企業への補助金の変化が企業内のどのような仕組みを通じて価額の下落または上昇に結果したのか、より詳しい紹介があれば、読者は問題をよりよく理解できると思われる。

　以上のような課題も含まれているが、本研究が達成した高い学術的価値を損なうような弱点ではない。総合的にみて、本論文が途上国経済や開発経済論の分野で達成した学問的貢献は高い。

　本論文審査委員一同は、本学府の博士号審査基準（１）に照らして、アーマーディ・ムルヤニ氏の学位請求論文「Social and Economic Impacts of Elimination of Energy Price Distortion in Indonesia」が博士（経済学）の学位を授与するに値するものと判断する。

　令和 3 年 1 月 25 日
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参考：アーマーディ・ムルヤニ氏の指導委員会の構成員は以下のとおりである。

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