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Abstract

The Indonesian rupiah depreciated 50 percent between July 2011 and January 2019. Blanchard *et al*. (2015) showed that capital outflows from emerging markets can reduce output by increasing the cost of financial intermediation and can increase output by increasing net exports. Regression results indicate that Indonesian banks are exposed to depreciations, but that exports are not stimulated by depreciations. The findings also indicate that Indonesia's export price index is positively correlated with commodity prices and negatively correlated with manufactured goods prices. Exporting more manufactured goods would reduce Indonesia's exposure to volatile commodity prices and allow depreciations to stimulate exports. This paper considers several steps that Indonesia could take to increase its manufacturing exports.

JEL classification: F14, F10

Keywords: Indonesia, Exchange rate elasticities; Exchange rate exposure; Foreign direct investment

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INTRODUCTION

The Indonesian rupiah depreciated 50 percent between July 2011 and January 2019. U.S. interest rate hikes and global turmoil acted as pull factors and Indonesian current account deficits and uneven fundamentals acted as push factors to generate capital outflows and weaken the currency. Blanchard *et al.* (2015) showed that outflows from emerging markets can increase the cost of financial intermediation and reduce output. They also demonstrated that the resulting exchange rate depreciations can increase net exports and output.

Capital outflows during the 1997-98 Asian Crisis depreciated the rupiah, eroded bank capital, and reduced financial intermediation. Indonesian banks faced a mismatch between rupiah assets and foreign currency liabilities. As the rupiah weakened, bank capital shrank and lending plummeted.

This paper investigates how the rupiah affects the banking sector and the Indonesian economy. To do this, it first examines how the rupiah/dollar exchange rate affects industry and aggregate stock returns. Economic theory holds that stock prices equal the expected present value of future net cash flows, implying that stock prices provide information about future economic activity. The results indicate that stocks in the aggregate are exposed to a rupiah depreciation. A one percent depreciation will cause aggregate returns to fall by almost one percent. Looking at individual sectors, only five out of 62 individual sectors are exposed to depreciations. Of these five, three are in the banking sector. These results indicate that the weakening rupiah reduces bank profitability.

Unlike during the Asian Financial Crisis, Indonesian banks now earn high profits, possess abundant liquidity, and have an aggregate capital adequacy ratio that exceeds 23 percent (IMF, 2018). However, 71 percent of bank loans go to corporations, and 45 percent of corporate debt is

denominated in foreign currency (IMF, 2018). Banks are thus exposed to exchange rate depreciations through their corporate loans and corporations are directly exposed to depreciations. The Indonesian government should promote sound risk management practices such as requiring banks to hold sufficient liquid foreign currency assets to meet extraordinary foreign exchange needs over a 30-day period (BIS, 2013) and extending corporate prudential foreign exchange regulations to all corporate foreign exchange liabilities (IMF, 2018).

Does a rupiah depreciation have the offsetting benefit that Blanchard *et al.* (2015) highlighted of stimulating exports? To investigate this question this paper employs both times series and panel data methods. Both approaches indicate that a weaker exchange rate will not increase Indonesia's exports. One reason for this is that half of Indonesia's exports are food, agricultural products, minerals, energy and other primary products. These goods are often denominated in U.S. dollars. A depreciation of the rupiah is associated with an appreciation of the U.S. dollar. When the dollar appreciates, the prices of primary products in terms of the importing countries' currencies increase and they import less. This offsets the price competitiveness gains that manufactured products receive from depreciations.

Indonesia's three leading export categories are vegetable oil, coal, and crude oil. As Figure 1 shows, the value of these exports rose before the 2008 Global Financial Crisis as commodity prices rose and tumbled after 2012 as commodity prices fell. Depending on primary exports thus exposes Indonesia to changes in world commodity prices. To investigate how diversification could reduce the impact of these price shocks, this paper examines the correlations between Indonesia's aggregate export price and world prices for individual goods. It finds large positive correlations between Indonesia's export prices and the prices of primary products such as iron, steel, aluminum, natural gas, paper, copper, and rubber. It also finds

negative correlations between Indonesia's export prices and the prices of both electronics goods such as computers, computer parts, cellphones, integrated circuits, televisions, and cameras and of labor-intensive manufactures such as textiles, apparel, toys, and footwear. Exporting more manufacturing products would thus reduce Indonesia's exposure to negative terms of trade shocks.

This paper considers how Indonesia can increase its manufacturing exports. It recommends that Indonesia follow Malaysia, Thailand, and Vietnam and attract foreign direct investment (FDI) from multinational corporations (MNCs) seeking efficient export platforms. Indonesia could pursue FDI by improving electricity supply, fighting corruption, reducing onerous severance pay requirements, resisting protectionism that increases the cost of imported inputs, investing in human capital and encouraging entrepreneurship. Now is an opportune time to focus on this strategy, as MNCs are seeking to diversify production out of China.

The next section examines the exposure of Indonesian industries to exchange rates. The following sections investigate how exchange rates affect exports and how Indonesia could reduce its exposure to terms-of-trade shocks. The penultimate section considers how Indonesia could increase its manufacturing exports and the final section concludes.

THE EXCHANGE RATE EXPOSURE OF INDONESIAN SECTORS

It is possible to examine how exchange rates affect industries by estimating the exchange rate exposures of stocks in individual sectors. Economic theory indicates that there is a strong link between stock prices and economic activity. Stock prices equal the expected present value of future net cash flows. Shapiro (1988) noted that these cash flows depend on real activity. Black (1987, p. 113) observed that "the sector-by-sector behavior of stocks is useful in predicting

sector-by-sector changes in output, profits, or investment. When stocks in a given sector go up, more often than not that sector will show a rise in sales, earnings, and outlays for plant and equipment." Barro (1990), Schwert (1990), Velinov and Chen (2015), Liu, Nissim, and Thomas (2007), and others reported strong links between stock prices and variables such as investment, production, and earnings. When the rupiah falls, industries that benefit from a depreciation should see their stock prices rise and industries that are harmed should see their prices fall.

There is a large literature investigating exchange rate exposures (see, e.g., Dominguez and Tesar, 2006, or Jayasinghe and Tsui, 2008). Industry stock returns ($\Delta R_{i,t}$) are regressed on exchange rate changes (Δe_t), changes in aggregate stock market returns ($\Delta R_{M,t}$), and other variables. In this paper a four factor model is estimated, with $\Delta R_{i,t}$ a function of Δe_t, $\Delta R_{M,t}$, the change in the price of crude oil ($\Delta crude_t$), and the change in the aggregate U.S. stock market return ($\Delta R_{US,M,t}$):

$$\Delta R_{i,t} = \alpha_i + \beta_{i,e} \Delta e_t + \beta_{i,M} \Delta R_{M,t} + \beta_{i,crude} \Delta crude_t + \beta_{i,US,M} \Delta R_{US,M,t} + \varepsilon_{i,t} \ . \qquad (1)$$

Crude oil prices should affect different types of industries in different ways. The U.S. stock market return controls for economic conditions in the U.S. and the rest of the world.

Data on returns on individual sectors and the market portfolio in Indonesia and on the market portfolio in the U.S. come from the Datastream database. The monthly change in the natural logarithm of stock prices is employed. Data on the monthly change in the log price of West Texas Intermediate crude oil also come from Datastream. Data on the monthly change in the log rupiah/dollar exchange rate are obtained from the CEIC database. The sample period for the estimation extends from January 2000 to June 2018.

Results with aggregate Indonesian stock returns as the dependent variable are as follows:

$$\Delta R_{M,t} = \underset{(0.0035)}{0.0083^{**}} - \underset{(0.11)}{0.91^{***}} \Delta e_t + \underset{(0.039)}{0.046} \Delta crude_t + \underset{(0.09)}{0.50^{***}} \Delta R_{US,M,t} + \varepsilon_{i,t}$$

Adjusted R-squared = 0.429, Standard error of regression = 0.051, Sample period = 2000M01-2018M06. Heteroscedasticity and autocorrelation consistent standard errors in parentheses). ***(**) denotes significance at the 1% (5%) levels.

The findings indicate that the aggregate Indonesian stock market is very exposed to the rupiah/dollar exchange rate. A 1 percent depreciation of the rupiah would decrease the return on the Indonesian stock market by 0.91 percent. These results indicate that depreciations exert a negative impact on economic activity in Indonesia.

To understand why, we can examine how individual sectors are affected. Stock returns on 62 sectors are regressed on the variables in equation (1). Those sectors whose exchange rate exposures are statistically significant at at least the 10 percent level are reported in Table 1.

The table indicates that the real estate sector benefits from depreciations. As the ADB (2018) noted, currency depreciations increase real estate prices in Asia by increasing demand from those who can access sources of foreign currency. The table also indicates that three of the five industries that are harmed by rupiah depreciations are in the financial sector. Most harmed of all is mortgage finance, with a 1 percent depreciation reducing stock returns by 0.94 percent.

Haswidi (2018) reported that the Indonesian Central Bank (BI) has to raise interest rates when the rupiah is weak and that mortgage lenders pass on the bulk of these interest rate increases to consumers. This in turn reduces consumers' demand for mortgages and reduces the quantity of loans and the profitability of mortgage lenders.

However, the exchange rate affects the aggregate economy and mortgage lenders apart from its induced effect on BI policy. Over the last few years BI has used the seven-day reverse repo rate (Repo) as its policy instrument. Before this it used the rate on one-month BI Certificates (SBI). The BI Deposit Facility Rate (BID) is available over a longer sample period than Repo or SBI and closely correlated with both. The correlation coefficient between the

change in Repo and BID equals 0.90 and the correlation coefficient between the change in SBI and BID equals 0.73. Regressing the return on the aggregate market and on mortgage finance stocks (Morfin) on BID and the variables employed above yields the following:

$$\Delta R_{M,t} = \underset{(0.0032)}{0.0099}^{***} - \underset{(0.11)}{0.99}^{***}\Delta e_t - \underset{(0.051)}{0.014}\Delta crude_t + \underset{(0.10)}{0.51}^{***}\Delta R_{US,M,t} - \underset{(0.014)}{0.035}^{**}BID + \varepsilon_{i,t}$$

Adjusted R-squared = 0.567, Standard error of regression = 0.040, Sample period = 2005M11-2018M06. Heteroscedasticity and autocorrelation consistent standard errors in parentheses). ***(**) denotes significance at the 1% (5%) levels.

$$\Delta Morfin = \underset{(0.0090)}{0.0035} - \underset{(0.45)}{0.91}^{**}\Delta e_t - \underset{(0.080)}{0.056}\Delta crude_t + \underset{(0.26)}{1.34}^{***}\Delta R_{M,t} + \underset{(0.29)}{0.03}\Delta R_{MUS,M,t} - \underset{(0.060)}{0.022}BID + \varepsilon_{i,t}$$

Adjusted R-squared = 0.399, Standard error of regression = 0.084, Sample period = 2010M01-2018M06. Heteroscedasticity and autocorrelation consistent standard errors in parentheses). ***(**) denotes significance at the 1% (5%) levels.

The results using Repo are similar, although the sample period is much shorter. These findings indicate that, controlling for interest rates, the exchange rate still exerts a large effect on the returns on the aggregate market and on mortgage finance stocks.

These results imply that the weakening rupiah reduces corporate and bank profitability. It thus reduces corporations and banks' ability to increase capital from earnings. Azis and Thorbecke (2004) found over an earlier period that exchange rate depreciations reduced capital at Indonesian banks. They argued that improved risk management practices would help Indonesian banks to weather exchange rate shocks.

Unlike during the Asian Financial Crisis, Indonesian banks now earn high profits, possess ample liquidity, and have a capital adequacy ratio exceeding 23 percent (IMF, 2018). However, 71 percent of bank loans go to corporations, and 45 percent of corporate debt is denominated in foreign currency (IMF, 2018). Banks are thus exposed to exchange rate depreciations through their corporate loans and corporations are directly exposed to depreciations.

It is important that the Indonesian government eliminate any associated moral hazard. As Azis (2018) noted, improvements in corporate resolution frameworks and bankruptcy regimes are needed. The government should also make clear that it will not bail out owners and managers who suffer due to foreign exchange losses. In addition, it should promote sound risk management knowledge and techniques. For instance, it could require banks to hold sufficient liquid foreign currency assets to meet extraordinary foreign exchange needs over a 30-day period (BIS, 2013). It could also extend corporate prudential foreign exchange regulations concerning hedging foreign exchange risk and maintaining sufficient foreign exchange assets to all corporate foreign exchange liabilities (IMF, 2018).

EXPORTS AND EXCHANGE RATES

Time Series Evidence

The imperfect substitutes model is used to estimate trade elasticities. In this framework export functions can be written as:

$$ex_t = \alpha_1 + \alpha_2 reer_t + \alpha_3 y_t' + \varepsilon_t ,$$

where ex_t represents real exports, $reer_t$ represents the real exchange rate, y_t' represents foreign real income, and all variables are measured in natural logs.

Data on the volume of Indonesia's exports to the world come from the Central Bureau of Statistics (CBS) via the CEIC database. Data on the Indonesian real effective exchange rate come from the Bank for International Settlements.

Rest of the world income (y_t') is calculated by employing a geometrically weighted average of income changes in Indonesia's top nine export destinations. The index is constructed using the following formula:

$$y_t' = y_{t-1}' \Pi_i (y_{i,t} / y_{i,t-1})^{w(i,t)} ,$$

where $y_{i,t}$ represents GDP in importing country i in quarter t and w(i,t) represents the value of Indonesia's exports going to country i in quarter t relative to the value of Indonesia's exports going to all nine leading importers. The weights are calculated using annual data on Indonesia's exports obtained from the CEPII-CHELEM database. The annual data are converted to quarterly data using linear interpolation.

The Indonesian real effective exchange rate experienced wild fluctuations during the 1997-98 Asian Financial Crisis. To prevent this from clouding inference, the sample period begins in 1999Q1 and extends to 2018Q2.

Augmented Dickey-Fuller indicate that the series are integrated of order one. The Schwarz Criterion is used to test for the number of lags in the unconstrained vector autoregression. The trace statistic permits rejection of the null hypothesis of no cointegrating relations between exports and the real exchange rate and real GDP against the alternative hypothesis of one cointegrating relation at the 3 percent level and the maximum eigenvalue statistic permits rejection of the null at the 9 percent level. Dynamic ordinary least squares estimation, a technique for estimating cointegrating relations, is this employed. The results, with heteroscedasticity and autocorrelation consistent standard errors in parentheses, are:

ex_t = 0.35* + 0.68$reer_t$ + 1.59***y_t' + ….
(0.20) (0.55) (0.36)

Adjusted R-squared = 0.772, Standard error of regression = 0.192, Sample period = 1999Q1-2017Q4, Seasonal dummies and two leads and four lags of first differenced independent variables included. ***(*) denotes significance at the 1% (10%) levels.

The coefficient on the real effective exchange rate is of the wrong sign, though not statistically significant. There is thus no evidence that a weaker exchange rate would increase Indonesia's exports. The coefficient on rest of the world GDP is of the expected sign and

statistically significant at the 1 percent level. The results indicate that a 10 percent increase in rest of the world GDP would increase Indonesia's exports by 15.9 percent.

Panel Data Evidence

This section uses a panel data set to estimate trade elasticities for Indonesia's exports. Standard export functions are again employed, with exports depending on the real exchange rate and importing countries' GDP. Minor importing countries are excluded, since these can have large percentage changes in imports from Indonesia due to idiosyncratic factors rather than macroeconomic variables.[1]

Data on exports are measured in U.S. dollars and obtained from the CEPII-CHELEM database. They are deflated using an Indonesian export price deflator measured in dollars and obtained from the Indonesian CBS via the CEIC database. Export data from CEPII-CHELEM extend to 2016 and the export price data from CBS begin in 2000.

Data on bilateral real exchange rates between the exporting and importing countries and real GDP in the importing countries are also obtained from the CEPII-CHELEM database. An increase in the real exchange rate represents an appreciation of the exporting country's currency.

A battery of panel unit root tests and Kao (1999) cointegration tests point to cointegrating relations among the variables. Therefore Mark-Sul weighted DOLS techniques are used. The estimated equation takes the form:

$$ex_{i,j,t} = \beta_0 + \beta_1 rer_{i,j,t} + \beta_2 y_{j,t}^{*} + \sum_{k=-p}^{p} \alpha_{1,j,k} \Delta rer_{i,j,t-k} + \sum_{k=-p}^{p} \alpha_{2,j,k} \Delta y_{j,t-k}^{*} + u_{i,j,t}, \qquad (2)$$
$$t = 1, \cdots, T; \qquad j = 1, \cdots, N.$$

[1]The importing countries employed are Australia, China, France, Germany, Hong Kong, India, Italy, Japan, Malaysia, the Netherlands, the Philippines, Saudi Arabia, South Korea, Spain, Taiwan, Thailand, the United Kingdom, the United States, and Vietnam.

where $ex_{i,j,t}$ represents real exports from Indonesia to country *j* at time *t*, $rer_{i,j,t}$ represents the bilateral real exchange rate between Indonesia and country *j*, and $y_{j,t}$* represents real GDP in country *j*.

One lag and one lead of the first differenced independent variables are included to correct for endogeneity and serial correlation. A sandwich estimator is employed to allow for heterogeneity in the long-run residual variances. Country fixed effects are also included.

The results, with standard errors in parentheses, are:

$ex_t = 0.43^{***}reer_t + 1.67^{***}y_t^* + \ldots.$
(0.09) (0.10)

Adjusted R-squared = 0.961, Standard error of regression = 0.196, Sample period = 2001-2016, One lag and one lead of the first differenced independent variables included. *** denotes significance at the 1% level.

The coefficient on the real exchange rate is again of the wrong sign and statistically significant. It indicates that a 10 percent depreciation of the rupiah is associated with a 4.3 percent decrease in exports. One reason why the coefficient takes on the wrong sign is that one-half of Indonesia's exports are primary products, and these are often denominated in U.S. dollars. An appreciation of the rupiah is associated with a depreciation of the U.S. dollar. When the dollar depreciates, the prices of primary products in terms of the importing countries' currencies decrease and they import more.

The coefficient on rest of the world GDP is of the expected sign and statistically significant at the 1 percent level. The results indicate that a 10 percent increase in rest of the world GDP would increase Indonesia's exports by 16.7 percent. These findings and the time series evidence reported above indicate that Indonesia's exports are exposed to a slowdown in the rest of the world.

An important implication of these results is that a weakening of the rupiah would not

stimulate exports. If Indonesia diversified its export basket to include more manufactured goods, it might allow exports to benefit more from the frequent bouts of depreciation that the rupiah has experienced over the last 22 years. The next section presents evidence that diversifying into manufactures could also reduce Indonesia's exposure to terms of trade shocks.

DIVERSIFYING THE EXPORT BASKET

As Table 2 shows, one-half of Indonesia's exports are food, agricultural products, mining, energy and other primary products. The table also shows that this is much more than for Indonesia's ASEAN neighbors. Figure 1 plots the value of exports for Indonesia's three leading categories. These are, with International Standard Industrial Classification codes in parentheses: vegetable oil (1514), coal (1010), and crude oil (1110). The figure shows that the value of all three categories rose before the 2008 Global Financial Crisis as commodity prices rose and tumbled after 2012 as commodity prices fell. Depending on primary exports thus exposes Indonesia to changes in world commodity prices. To investigate how diversification can reduce the effect of price shocks, this section examines the correlation between world prices for individual goods and Indonesia's export prices. Categories of goods whose prices are uncorrelated or negatively correlated with Indonesia's overall export price index offer diversification benefits.

World prices are proxied by import prices into the U.S., since the U.S. is the largest importer in the world and since the U.S. Bureau of Labor Statistics (BLS) provides long time series for import prices. Correlation coefficients between Indonesian aggregate export prices (measured in dollars) and U.S. import prices (also measured in dollars) are calculated. Data on

Indonesian export prices are obtained from the CEIC database and data on U.S. import prices are obtained from the BLS.

Monthly data on Indonesia's export prices in dollars are available from 2000 until 2018. For most product categories reported in Table 3, price data are available over the same sample period. In a few cases, the starting point for the data is 2002 or 2003.

The results in Table 3 indicate that world prices for many types of electronics goods are negatively correlated with Indonesia's export prices. This applies for computers, computer parts, cellphones, integrated circuits, televisions, and cameras. Thus exporting more electronics goods would provide an opportunity for Indonesian to diversify away risks associated with decreases in commodity prices. Table 3 also indicates that prices for many labor-intensive products such as textiles, apparel, toys, and footwear are negatively correlated with Indonesia's export prices. Exporting more labor-intensive manufactures would thus help the Indonesian economy to reduce its exposure to negative price shocks.

On the other hand, Table 3 indicates that there are large positive correlations between the prices for many primary products and Indonesia's export prices. These products include iron, steel, aluminum, natural gas, paper, copper, and rubber. Relying on commodity exports will lead to volatile growth.

INCREASING MANUFACTURING EXPORTS

The results above indicate that the prices of both electronics exports and labor-intensive manufactures are negatively correlated with Indonesia's aggregate export prices. Exporting more of these manufactured goods would help Indonesia to weather adverse terms of trade shocks.

For Asian countries Thorbecke (2018) found that a weaker exchange rate increases the depth of a country's electronics supply chain and Thorbecke and Salike (2018) reported that a weaker exchange rate increases a country's labor-intensive exports. Indonesia could harness the tailwind provided by rupiah weakness to increase manufacturing exports.

China, Malaysia, the Philippines, Thailand, Vietnam are integral parts of electronics supply chains but Indonesia is not. Figure 2 shows that Indonesia has not kept pace with its ASEAN neighbors in electronics exports. Its neighbors initially increased electronics exports by attracting FDI from multinational corporations seeking efficient export platforms. Over time, this vertical FDI led to the formation of industrial clusters and the transfer of knowledge to local firms.

Attracting FDI and Assimilating Technology

Obtaining FDI is important for Indonesia, as FDI fell 24 percent in the first half of 2018 compared to the first half of 2017 and Indonesia now finances current account deficits largely through volatile portfolio capital inflows rather than through more stable FDI (ADB, 2018).[2] How could Indonesia obtain more vertical FDI? Jones and Kierzkowski (1990) modeled what causes firms to fragment production. They demonstrated that firms slice up the value chain when the service cost of linking geographically separated production blocks is less than the production cost savings arising from fragmentation.[3] Thus lowering the service link cost or increasing the production cost savings will facilitate production sharing in Indonesia.

[2] Comparing the whole of 2018 with 2017, initial government estimates indicate that FDI fell by more than 40 percent (Pesek, 2019).

[3] This section focuses on what Kimura and Chen (2018) called the second unbundling. This involves the task-wise division of labor in the machinery industries. Although Indonesia should eventually achieve the third unbundling (the person-wise division of labor via the digital economy), it still has huge potential especially on Java to pursue the second unbundling.

The service link cost depends on the quality of physical infrastructure such as 1) the supply of electricity, 2) the network of highways, ports, and airports, 3) the information and communications technology infrastructure and also the quality of market-supporting institutions such as 1) the assignment and protection of property rights, 2) the enforcement of private contracts, 3) the ease of doing business and the absence of excessive red tape, 4) the consistent and coherent enforcement of laws and regulations at all governmental levels. Production cost savings depend on the cost of labor, capital, and other factors in the host country compared to the home country.

The World Economic Forum (WEF) (2017) surveyed executives to learn about the ease of doing business. For Indonesia, several problems stand out that either increase the service link cost or decrease the production cost savings of producing in Indonesia. In terms of infrastructure, the quality of electricity supply is an outlier. Indonesia's overall competitiveness ranking according to the WEF is 36th out of 137 countries, but its ranking in terms of electricity quality is 86th. In terms of doing business, the two most problematic factors highlighted by executives are corruption and inefficient government bureaucracy. In terms of production costs, Indonesia ranks 133rd out of 137 countries on redundancy costs in the labor market. On average employers need to pay 58 weeks of salary when they dismiss workers. Minimum wage increases have also made labor more expensive. Indonesia also relies heavily on imported capital goods. The weak exchange rate and protectionism increase the rupiah cost of these goods.

Indonesia currently generates electricity using coal and natural gas. Myanmar,

Cambodia, and other ASEAN countries have the potential to export hydropower.[4] Trading hydropower with its neighbors would increase Indonesia's electricity supply, reduce costs, and promote decarbonization.

Integrating energy markets in this way requires regulatory and price harmonization and massive infrastructure investment. Public-private partnerships could help to raise funds for infrastructure. ASEAN policymakers could increase investors' confidence by affirming their commitment to reducing carbon emissions and maintaining stable policies. Attracting sufficient capital, designing appropriate incentives, and overcoming other obstacles to energy integration will prove challenging. Researchers and policymakers in ASEAN should focus on resolving these issues (Anbumozhi, 2018).

Corruption in Indonesia has a long history, going back to the Suharto era (1965-1998) and before. Popular discontent with corruption (korupsi), collusion (kolusi) and nepotism (nepotisme), or KKN, also has a long history. Over the last 15 years Indonesia, with the help of the Corruption Eradication Commission, has made progress at reducing corruption. As Indonesia Investments (2017) noted, Transparency International's Corruption Index has improved steadily since 2005. Government leaders need to fight corruption if they want to attract FDI.

According to the World Bank (2018a), Indonesia has also improved government efficiency by allowing electronic processing for imports and online payment of taxes. However, the World Bank ranked Indonesia 144th out of 190 countries in terms of ease of starting a business and 145th out of 190 countries in terms of enforcing contracts. Creating a more business

[4] It is important to ensure that dams and other sources of hydropower in developing Asia are safe and that they do not disrupt the local population and environment.

friendly environment in these and other areas would reduce the service link cost and increase FDI in Indonesia.

Very high severance pay and rising minimum wages are intended to increase economic security for workers. There are better ways to do this though. Greenspan (2003) observed that restrictions on firing workers also reduce firms' willingness to hire workers. In addition, Krugman (1990) has noted that living standards over time depend on worker productivity. If high redundancy costs restrict FDI, they may reduce worker productivity and thus long run living standards. Hill (2018) also noted that onerous severance pay requirements in Indonesia reduce formal sector employment growth and increase dualism between wealthier formal sector workers and poorer informal sector workers.

Another strategy would be to lower labor costs, attract FDI, and pursue technology spillovers. Once Indonesia receives a critical mass of FDI, industrial agglomeration will take place (Lim and Kimura, 2010). Local small and medium-sized enterprises and service sector firms could then develop and become competitive. Workers could also migrate across firms, bringing their human capital with them and dispersing it across the cluster. This would increase output per worker. Economies of scale would accompany the agglomeration. With many firms located close together, firms could source more parts and components locally and could adapt more easily to changes in customer demand and technological requirements. This would lower the service link cost further and attract more FDI.

The ability to obtain technology transfer from FDI depends on the absorptive capacity of Indonesian firms. Urata, Matsuura, and Wei (2006) found that the intra-firm transfer of managerial technology from Japanese FDI firms to indigenous workers happens more quickly when workers in the host country are better educated. It is not enough to simply provide more

education. Rather students need a high quality education in science and math at the secondary school level and scientific training at the university level (see Yusuf *et al.*, 2003). The ability of Indonesian firms to assimilate new technologies depends especially on the quantity and technical capabilities of local engineers. Scholarships for science and engineering students could thus be helpful.

Importing sophisticated capital goods also plays a role in technology transfer. Yoshitomi (2003) noted that firms and workers in emerging Asia learn by using and reverse-engineering imported capital goods. Lee and Wie (2015), using firm-level data from the Indonesian Manufacturing Survey, found that foreign technology embedded in imported material and FDI caused greater demand for skilled labor in the manufacturing sector. They concluded that importing foreign technology leads to skill-biased technological change in Indonesia.

Promoting free trade could reduce the cost of capital goods imports and attract FDI. Indonesia could promote free trade by reducing tariff and non-tariff barriers and by joining free trade agreements such as the Regional Comprehensive Economic Partnership and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership.

Increasing Labor-intensive Exports

The discussion above has focused on how Indonesia could attract FDI, assimilate technologies, and export sophisticated products such as electronics goods. It could also benefit from exporting more labor-intensive goods. Indonesia has many lower-skilled workers, and exporting clothing, furniture, and footwear would provide employment for them. Indonesia's exports of manufactures in the past led to learning by doing and technological assimilation. Yoshitomi (2003) noted that entrepreneurs and workers learned new ways of organizing

economic activity and acquired new skills. Hill (2018) reported that productivity and wages in Indonesia grew rapidly after it embraced a labor-intensive, export-oriented industrialization strategy.

As Figure 3 shows, Indonesia has recently lagged behind neighbors such as Vietnam in labor-intensive exports. Since 2009 its export of furniture has declined, while its export of wood has almost doubled. The largest importer of Indonesian wood is China, and China uses Indonesian wood to produce furniture. If Indonesia could manufacture more of the furniture and other light manufacturing goods domestically, its workers could gain opportunities to participate in higher value added aspects of production such as design.

How can Indonesia increase its manufacturing base? Many of the strategies discussed above to create a more business friendly environment would help. In addition, it is crucial to invest in human capital and to encourage entrepreneurship.

Human capital investments should begin with good pre-natal care and healthcare and nutrition for the first 1,000 days of life. Early malnutrition and stunting hinders learning throughout life (see World Bank, 2018b). To help finance these investments, Indonesia could replace general price support programs for fuel consumption with subsidies targeted at the poor and near-poor. General price supports have raised fossil fuel consumption and carbon dioxide emissions, congested roads, reduced the cost advantages for investing in energy efficient technologies, and increased fuel imports and thus energy insecurity (see, e.g., Burke, Batsuuri, and Yudhistira, 2017). These funds could be better used investing in the young.

The World Bank (2018b) noted that routine and codifiable jobs are vulnerable in the digital economy. To resist this, it emphasized that education should impart advanced cognitive skills such as complex problem-solving, social skills such as teamwork, and adaptive skills such

as reasoning and self-efficacy. Indonesia has performed poorly relative to peers such as Vietnam in imparting skills. In the 2015 Programme for International Assessment (PISA) tests, Vietnam scored 8th out of 72 countries and Indonesia scored 62nd.

There are many obstacles to improving education in Indonesia. As Rosser (2018) discussed, low government investment in education, inadequately trained teachers, an incentive structure that fails to reward good teaching, and excessive government control have all militated against providing a quality education. It is crucial to focus on resolving these and other problems if Indonesia is to be competitive in the 21st Century. It is also important to be patient, as investments in education may take 15 years or longer to bear fruit (World Bank, 2018b).

Even with an educated workforce, entrepreneurship is vital for providing opportunities for workers. Entrepreneurship provides the decision making and initiative needed to transform new ideas into practice and to create new firms that will provide employment for workers (Yoshitomi, 2003). Taking steps to improve the business climate and remove red tape, as discussed above, is vital to encouraging entrepreneurship. In addition, the government should survey entrepreneurs and start-up firms to learn the obstacles that they face and the support that they need and should act assiduously on these recommendations.

When exporting, entrepreneurs face costs they do not face when selling domestically.[5] They incur costs to study market profitability, invest in products tailored to foreign markets, meet country-specific regulatory requirements, maintain distribution networks, ship goods abroad, and pay duties and insurance. It also takes 60 days longer on average for goods to be sold abroad than for goods to be sold domestically. The extra costs and delayed revenues make exporters dependent on external sources of finance. Strengthening bank risk management

[5] This paragraph draws on Manova (2015).

practices and deepening Indonesia's capital markets are thus important to maintain the flow of credit to entrepreneurs and facilitate exporting.

CONCLUSION

This paper investigates how exchange rates affect the Indonesian economy. Exchange rate exposure equations indicate that both the aggregate stock market and Indonesian banks are exposed to a weakening rupiah. This makes sense since the lion's share of bank loans flow to corporations and since 45 percent of corporate debt is denominated in foreign currency. Trade elasticity estimates indicate that a rupiah depreciation would not increase aggregate exports but that a decrease in trading partners' GDPs would cause exports to plummet. Correlation analysis indicates that there are large positive correlations between Indonesia's aggregate export prices and the prices of primary products such as iron, steel, aluminum, natural gas, paper, copper, and rubber and negative correlations between aggregate export prices and the prices of electronics goods and labor-intensive manufacturing goods.

These results imply that Indonesia is exposed to a rise in global risk aversion and a worldwide slowdown. During such a "risk-off" episode, the U.S. dollar tends to appreciate and commodity prices fall. The dollar appreciation (rupiah depreciation) would burden Indonesian corporations that have borrowed in foreign currency and increase risks for Indonesian banks that have loaned to corporations. The fall in the rupiah would not increase exports but the drop in rest of the world income would cause a large drop in exports. The fall in commodity prices would also worsen the terms of trade.

To hedge against this risk, Indonesia should diversify its export base and its trading partners. Exporting manufactured goods could increase Indonesia's resilience to decreases in

commodity prices and exchange rate depreciations. Exporting to many countries could reduce the Indonesian economy's exposure to downturns in key markets such as China and the U.S.

In the late 1980s and early 1990s, Indonesia advanced as an exporter of manufacturing goods. By attracting FDI and competing in world markets, workers learned new skills and firms became more dynamic. After the Asian Financial Crisis, however, primary products became ascendant in Indonesia's export basket. Just as an airplane is safer when it has two working engines, Indonesia should cultivate manufacturing exports as a second engine of growth alongside commodity exports.

TABLE 1 *The Exposure of Industry Stock Returns to Exchange Rates and Other Variables*

(1)	(2)	(3)	(4)	(5)
Sector	Exchange Rate Beta	Indonesian Market Beta	Crude Oil Beta	U.S. Market Beta
Real estate holding and dev.	0.695*	1.46***	-0.208*	-0.147
	(0.376)	(0.242)	(0.117)	(0.439)
Real estate	0.694*	1.46***	-0.208*	-0.149
	(0.377)	(0.242)	(0.117)	(0.439)
Real estate investment services	0.693*	1.46***	-0.209*	-0.142
	(0.376)	(0.243)	(0.118)	(0.440)
Brewers	0.414*	0.159	0.137	0.125
	(0.233)	(0.103)	(0.089)	(0.194)
Beverages	0.414*	0.159	0.137	0.125
	(0.233)	(0.103)	(0.089)	(0.194)
Tobacco	0.349**	0.962***	-0.075	-0.280**
	(0.176)	(0.096)	(0.061)	(0.132)
Personal and household goods	0.244**	0.792***	-0.093	-0.248
	(0.125)	(0.082)	(0.046)	(0.090)
Consumer staples	0.193**	0.942***	-0.0457	-0.283
	(0.093)	(0.057)	(0.040)	(0.080)
Financial	-0.260**	0.997***	-0.033	0.092
	(0.105)	(0.071)	(0.047)	(0.076)
Banks	-0.294**	0.997***	-0.0300	0.097
	(0.112)	(0.079)	(0.050)	(0.086)
Construction and materials	-0.313**	0.984***	-0.038	-0.110
	(0.136)	(0.096)	(0.051)	(0.106)
Building materials fixtures	-0.334**	0.984***	-0.037	-0.127
	(0.149)	(0.099)	(0.055)	(0.110)
Mortgage finance	-0.944**	1.36***	-0.054	0.000
	(0.455)	(0.252)	(0.079)	(0.304)

Notes: The table reports the results from regressing industry stock returns on the rupiah/dollar exchange rate (column 2), the return on the Indonesian aggregate stock market (column 3), the log change in the price of West Texas Intermediate crude oil (column 4), and the return on the aggregate U.S. market (column 5). Heteroscedasticity and autocorrelation consistent standard errors are in parentheses.

TABLE 2 *Share of Exports of Selected ASEAN Countries by Sector, 2016*

	Indonesia	Malaysia	Thailand	Vietnam
Manufacturing	50%	75%	76%	85%
Food & Agriculture	21%	9%	15%	12%
Energy	21%	13%	3%	2%
Mining and Others	7%	3%	9%	9%

Source: CEPII-CHELEM database.

TABLE 3 *Correlation Coefficients Between Indonesian Aggregate Export Prices and World Prices for Individual Product Categories*

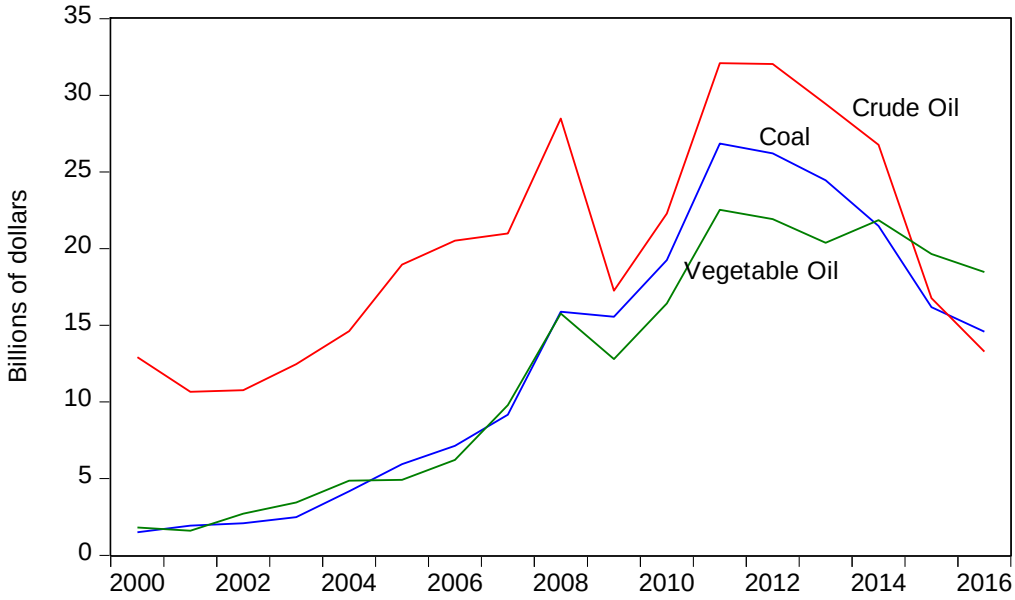
HS Code	Corr. Coeff.	Product Category
8473	-0.3428	Parts and accessories for computers and other office machines
8471	-0.3041	Computer equipment
8525	-0.267	Radio & TV transmission apparatus; video cameras & camera recorders; TV cameras
6203	-0.2362	Men or boys suits, ensembles, suit-type jackets, blazers & trousers
8517	-0.2344	Electrical apparatus for line telephony or line telegraphy; videophones; parts
8527	-0.2116	Radio receivers whether or not w/ clock, player or recorder in the same housing
8542	-0.1891	Electronic integrated circuits and micro assemblies; parts thereof
8528	-0.1493	TV reception apparatus; video monitors & video projectors
63	-0.1123	Made up or worn textile articles
9018	-0.1106	Instruments/appliances used in medical, surgical, dental, veterinarian sciences
29	-0.0488	Organic Chemicals
95	-0.0462	Toys, games and sports equipment; parts and accessories thereof
9503	-0.0389	Toys; models; puzzles; parts and accessories thereof
62	-0.0297	Articles of apparel and clothing accessories, not knitted or crocheted
88	-0.0272	Aircraft, spacecraft, and parts thereof (Dec. 2002=100)
64	0.0148	Footwear and parts of such articles
6403	0.0352	Footwear with uppers of leather
9405	0.046	Lamps, lighting fixtures, & illuminated signs and parts thereof
61	0.0647	Articles of apparel and clothing accessories, knitted or crocheted
8409	0.0789	Parts for spark-ignition and diesel internal combustion piston engines
90	0.0797	optical, photographic , medical and measuring instruments
96	0.1181	Miscellaneous manufactured articles
9401	0.1379	Seats other than barber dental and similar
9021	0.1391	Orthopedic appliances; artificial body parts; hearing aids, etc.
7102	0.1429	Diamonds, whether or not worked, but not mounted or set
8411	0.1464	Turbojets, turbopropellers and other gas turbines, and parts thereof
42	0.1566	Articles of leather; travel goods, bags, etc. of various materials
70	0.157	Glass and glassware
91	0.1601	Clocks and watches and parts thereof
9403	0.1697	Furniture other than seats,
8536	0.1762	Electrical circuit switching, protecting or connection app. of 1000 volts or less
8504	0.1927	Electrical transformers, inductors & static converters (rectifiers); parts
8483	0.2005	Parts for transmitting power (clutches, shafts, gears & boxes, pulleys, etc)
8516	0.2047	Electro thermic domestic appliances; water & space heaters; resistors
2709	0.2055	Petroleum oils and oils from bituminous minerals, crude
82	0.2215	Tools, implements, cutlery, spoons and forks, of base metal; parts thereof
8703	0.2284	Motor vehicles designed to transport people

87	0.2305	Motor vehicles and their parts
8708	0.242	Parts of tractors, buses, automobiles, trucks, spec. vehicles
9506	0.2424	Articles & equipment for sports; parts & accessories thereof
94	0.2556	Furniture & stuffed furnishings; lamps & lighting fittings, prefab bldgs
8413	0.2849	Pumps for liquids; liquid elevators; parts thereof
69	0.2903	Ceramic products
7108	0.2921	Gold (incl plated with platinum), unwrght, semi-mfg or pwdr
8501	0.315	Electric motors and generators (excludes generating sets)
83	0.3488	Miscellaneous articles of base metal
8431	0.3566	Parts for materials handling & construction machines
40	0.3685	Rubber and Articles Thereof
8481	0.3709	Taps, cocks, valves & similar appliances; parts thereof
74	0.3896	Copper and articles thereof
48	0.4713	Paper and paperboard; articles of paper pulp, paper or paperboard
73	0.4718	Articles of iron or steel
76	0.4836	Aluminum and articles thereof
27	0.4939	Mineral fuels, oils and residuals, bituminous substances and mineral waxes
8414	0.4952	Air or vacuum pumps, compressors and fans; vent & recycling hoods; parts
2711	0.5006	Petroleum gases and other gaseous hydrocarbons
7601	0.5416	Aluminum, unwrought
72	0.5925	Iron and steel

Notes: The table reports the correlation coefficients between Indonesia's aggregate export prices, measured in U.S. dollars, and world prices for individual product categories measured in U.S. dollars. World prices are proxied by U.S. import prices for the individual product category. HS Code represents the Harmonized System product code and Corr. Coeff. Represents the correlation coefficient.

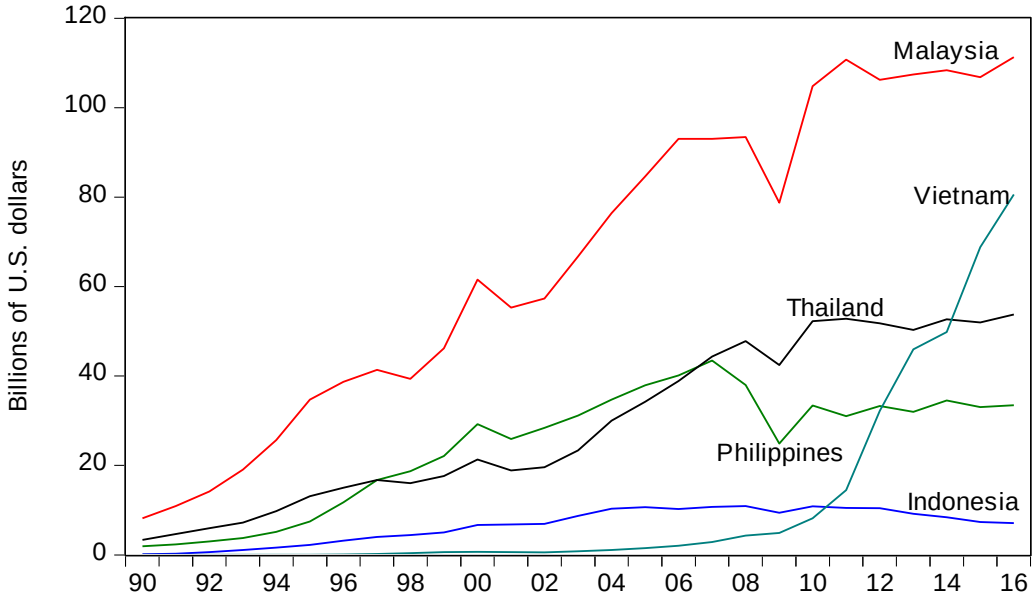
Source: U.S. Bureau of Labor Statistics, CEIC Database, and calculations by the author.

FIGURE 1 *The Value of Exports for Indonesia's Three Leading Export Categories*



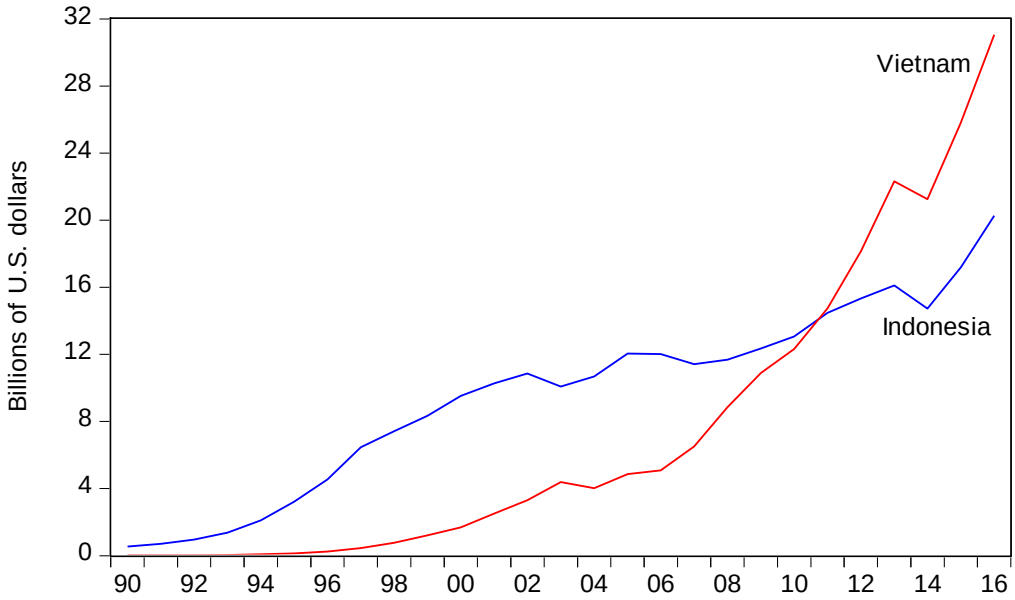
Source: CEPII-CHELEM database
Notes: The International Standard Industrial Classification codes for these products are 1514 for vegetable oils, 1010 for coal, and 1110 for crude oil.

FIGURE 2 *The Value of Electronics Exports from Selected ASEAN Countries*



Source: CEPII-CHELEM database
Notes: Electronics goods according to the CEPII-CHELEM database come from the following categories: precision instruments, clockmaking, optics, electronic components, consumer electronics, telecommunications equipment, and computer equipment.

FIGURE 3 The Value of Labor-Intensive Exports from Indonesia and Vietnam.



Source: CEPII-CHELEM database
Notes: Labor-intensive goods come from the following categories: carpets, clothing, fabrics, furniture, knitwear, leather, and yarns.

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