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Asymmetric response of unemployment rate to export shock in Indonesia: Does educational attainment matter?

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ABSTRACT

Indonesia has long struggled with a high rate of unemployment. Export, one of the aggregate demand's components, typically affects the unemployment rate as argued by Keynes. Therefore, this study attempts to evaluate the asymmetric response of unemployment rate to export shock in Indonesia. Employing a Local Projection method, the analysis incorporates three important features: the asymmetric effects of export shock (positive or negative), business cycle (boom or slump), and educational attainment of workers (highly-educated or less-educated). Dataset consisted of province-level annual panel data of 18 provinces in Indonesia where the main ports for export activity are located, spanning from the years of 1990 to 2019. This study finds significant differences in the unemployment rate dynamics between less-educated and highly-educated workers. A positive export shock during the boom reduced the unemployment rate for less-educated workers, and the effect is more persistent. In contrast, highly-educated unemployment rate decreased when a positive export shock occurs during the slump period, and the effect was rather in the short run. These results suggest some policy implications such as strengthening the domestic market, relaxing export regulation on labor-intensive industries, and diversifying export products to enlarge job opportunities for highly-educated workers with varied qualifications.

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INTRODUCTION

An increase in export is typically associated with a decline in the unemployment rate. Keynes (1937) addressed this issue by considering aggregate demand. A shrink of aggregate demand, where export is one of its components, causes a decrease in labor demand and leads to unemployment in the short run. Someone may be unemployed even if they are willing to work under the current market condition because of the excess labor supply. Keynes argued that markets have no self-balancing mechanism to achieve full employment. Thus, government intervention is required to stimulate aggregate demand (Cornwall and Cornwall, 1997). In contrast, increasing aggregate demand will stimulate labor demand, so that the unemployment rate will decline. This effect will be extremely favorable to countries with abundant labor. Heckscher-Ohlin Theory suggests that the differences in the relative endowments of capital and labor drive trades among countries. Those with relatively plentiful labor tend to export labor-intensive products.

Therefore, an increase in export will reduce the unemployment rate in a labor-abundant country (Dutt et al., 2009).

Countries are inevitably exposed to an export shock in the global market, but how the unemployment rate responds to an export shock differs depending on the direction of the shock, whether the response is positive or negative, i.e., asymmetric responses of the unemployment rate to an export shock (Gaffard and Saraceno, 2012). A positive export shock will decrease the unemployment rate. The increasing global demand will stimulate domestic producers to expand their exports, leading to higher labor demand. In response to this situation, the unemployment rate may fall immediately due to a positive export shock. On the other hand, a negative export shock will raise the unemployment rate. It follows the similar logic, but in the opposite direction, a decrease in external demand induces decreasing labor demand and the increasing unemployment rate (Horvath and Zhong, 2018). However, it may take some time for labor market adjustments, so that the unemployment rate may rise at a slower pace partly due to a tight employment contract or labor union involvement. If an employer lays off a permanent employee or fires a worker before the termination of the employment contract, the employee is entitled to substantial severance money, which is a big burden for the employer. In addition, labor union generally provides protection against mass layoffs. As a result, employers cannot immediately reduce their workers even while facing a negative export shock.

Such asymmetric effects are a critical consideration when addressing unemployment. The government needs to implement different policies to recover from negative export shock and take advantage of positive export shock. The response of the unemployment rate to export shock, either boom or slump, is also influenced by the business cycle. As a fundamental circumstance, different labor market conditions between boom and slump can induce different effects of export shocks on the unemployment rate. During an economic boom (slump), labor markets are generally tight (loose) with excess demand for (supply of) labor (Hall, 2011; Siklos, 2002). A clear overview of how countries' business cycles (boom and slump) relate to the asymmetric effects of (positive and negative) export shocks on the unemployment rate is necessary for the government to arrange appropriate adjustments. Therefore, this study focuses on taking into account the asymmetry of both export shocks with the consideration of business cycles, which is one of the main contributions to the literature since it has not been examined by other research.

Furthermore, this study argues that the response of the unemployment rate to an export shock varies depending on educational attainment. Previous studies reveal that highly-educated workers are more resilient to shocks, and inversely less-educated workers are more sensitive to shocks (Eriksson et al., 2021; Liang, 2021). Although a positive export shock can lower the unemployment rate in general, the impact is more pronounced for the less-educated. This kind of workers typically performs manual routine tasks in mass production or often referred to as a blue-collar workers. Besides, the less-educated workers bear a higher risk of being detached from the job when a negative export shock occurs, while at the same time firms tend to keep their highly-educated workers. Highly-educated workers are more likely to master a certain skill, have been invested in on-the-job training, and have a stronger network, allowing them to have long-term ties with the firm (Mincer, 1991). Not to mention this situation is also linked to the business cycle. A shock during different business cycles might have different effects, which have not been examined extensively in previous studies. This study expects that boom and slump influence the asymmetric impacts of export shock on the different educational groups of the unemployment rate. Therefore, portraying educational attainment differences with respect to the business cycles and asymmetric export shocks will extensively signify the employees' tight or loose ties to the labor market.

In the case of Indonesia, Indonesia has to cope with a high rate of educated unemployment and an increasing-but-not-absorb-the-labor-well export. The problem of unemployment should be taken seriously since, as Staehr (2021) discovered, unemployment is one of the proxies for capacity pressures that might predict future changes in export. In total, according to data published by BPS (Indonesian Central Bureau of Statistics), less-educated people accounted for most of the unemployment in Indonesia from 1990 to 2019. Highly-educated unemployment should not be neglected mainly since its level has remained above 10% since 2015. According to Siddiqa (2021), developing countries need to spend more money on education if they wish to reduce unemployment. It has been found that local governments spending in the

form of policy programs can reduce unemployment (Imamah et al., 2020). Government spending does, in fact, tend to raise the human development index through GDP (Gross Domestic Product) which enhances a person's chances of finding work (Fatsabit and Yusran, 2019; Arfiyansyah and Khusaini, 2018). For export, manufactured goods account for the majority over periods and contribute the most to Indonesia's GDP. Meanwhile, this high share of manufacturing sector is the opposite of its labor absorption. In 2019, national manufacturing industries only employed 18,928,035 persons over 15 years old, accounting for roughly 16% of all workers (BPS, 2019).

Also, Indonesian export policies have their own set of difficulties. According to Faradila and Kakinaka (2020), being in an industrial estate increases firm productivity but fails to promote export activity. Adam et al., 2021), Erbahar (2020), and Wahyudi and Maipita (2018), on the other hand, discovered that a diversification strategy can help boost exports by expanding the job opportunities that may hire workers with various characteristics and mitigate the potential adverse effects of recessions abroad. Moreover, endowed with abundant human resources, Indonesia should prioritize labor-intensive industries, for example, by imposing a relaxation of export regulations for firms' operating in the labor-intensive sector, compared to capital-intensive firms. Participating in trade agreements or bilateral treaties is also supposed to promote trade and create investment opportunities (Htwe et al., 2020). One such organization is World Trade Organization (WTO), which gives aid for trade, targeting developing countries to improve their trade capacity, policy, and regulations (Kim et al., 2020). Those actions and policies for export promotion might be focused on sectors in which the country has a comparative advantage rather than sectors with high unemployment, as Ugarte and Olarreaga (2021) and Jin et al., 2019). Overall, considering several aspects will present a more thorough picture of the problems that have plagued Indonesia for long periods and what kind of actions must be implemented.

The study aims to investigate the response of unemployment rate to export shock in Indonesia, accounting for three aspects: (i) asymmetric effects of positive and negative export shocks; (ii) boom and slump as the business cycles; and (iii) educational attainment of workers divided into the highly-educated and less-educated. The combination of these three factors is rarely found in international trade studies. The body of literature mostly focuses on the effect of export on unemployment in general, even without considering unanticipated shocks. This research is expected to contribute studies concerning the asymmetric impact of export on the unemployment rate in developing countries.

RESEARCH METHOD

This study used annual province-level data sourced from the Indonesian Central Bureau of Statistics (BPS). Data coverage included 18 provinces in Indonesia where the major ports for export activity are located, i.e. Bali, DKI Jakarta, West Java, Central Java, East Java, West Kalimantan, South Kalimantan, East Kalimantan, Lampung, Papua, Riau, South Sulawesi, Central Sulawesi, Southeast Sulawesi, North Sulawesi, West Sumatera, South Sumatera, and North Sumatera. The research period ranged from 1990 to 2019, covering economic boom and slump including the 1997 Asian Financial Crisis and the 2008 Global Financial Crisis.

This study considered the unemployment rate as an outcome variable (Y). This study divided the unemployment rate into three groups to see the differences. They were (i) total unemployment rate; (ii) the unemployment rate for highly-educated workers; and (iii) the unemployment rate for less-educated worders. The total unemployment rate encompassed all levels of educational attainment, even individuals who have never attended a formal educational institution. The unemployment rate for highly-educated encompasses them who are university graduates (diploma, bachelor, or post-graduate degree). The unemployment rate for less-educated covers senior high school, junior high school, primary school graduates, and those who did not finish primary education.

This study also employed export data of FOB (Free on Board) export value. Export shocks are considered the treatment variable, measured by structural residuals of the log of real export derived from a Structural Vector Autoregressive models (henceforth: SVAR) model. Other variables employed in this study included GDP, provincial GRDP data, inflation rate, exchange rate, and labor participation rate.

The study tried to construct the export shock variable using the SVAR model as a preliminary step

before continuing to the empirical analysis. The Local Projection (LP) method was employed in three rounds to get a thorough understanding by incorporating important features.

Preliminary Step: Export Shock

This study built a Structural VAR (SVAR) model to get the export shock for each province in Indonesia. The SVAR model comprised four endogenous variables and three exogenous variables. Those four endogenous variables were the log of real exchange rate, inflation rate, the log of real export, and the log of real GRDP (Gross Regional Domestic Product). Three exogenous variables considered in this study were the log of US real GDP, trend, and its square value. Two lags were selected for the model specification. The specification of the SVAR model is presented by this equation:

$$A_0 z_t = \alpha + \sum_{i=1}^{n} A_i z_{t-i} + \varepsilon_t, \quad (1)$$

where z_t refers to a vector of variables and ε_t represents a vector of serially and mutually uncorrelated structural innovations. The structural residual of the log of real export was later used as the shock variable $\mathrm{SHOCK}_{i,t}$ in the Local Projection (LP) model.

Empirical Analysis: LP Method

This study employed the LP method to examine the asymmetric response of unemployment rate to export shock in Indonesia. Using OLS model, the LP method by Jordà (2005) is robust to misspecification (Olea and Møller, 2020) and accommodates nonlinearities compared to VAR. It also has a lower bias than VAR estimators (Li *et al.*, 2021). In addition, the LP method provides for a more flexible estimation of impulse response on data dynamics (Barnichon and Brownlees, 2019). The analysis consisted of three rounds: (i) without considering any asymmetry, also known as baseline model; (ii) incorporating the asymmetric effects of export shock; and (iii) incorporating the asymmetric effects of export shock accounting for business cycles.

The first round was to estimate the symmetric impulse responses of the unemployment rate to an export shock without considering any asymmetry. In the first round, the LP method was conducted following this baseline model:

$$Y_{i,t+h} - Y_{i,t-1} = \beta_1^h SHOCK_{i,t} + \theta^h X_{i,t} + \lambda_i^h + \delta_t^h + \varepsilon_{i,t}^h, \quad (2)$$

for the time horizon h=0,1,2,3,4. $Y_{i,t}$ denotes the unemployment rate as an outcome variable, distinguished into 3 categories: total, highly-educated, and less-educated. $X_{i,t}$ denotes control variables consisting of the inflation rate lags, the growth rate of real per capita GRDP, and labor participation rate. λ_i^h is the country's fixed effect, and δ_t^h is the time-specific effect. In this baseline the LP model, the Impulse Response Functions (IRFs) were computed using the estimated coefficients β_1^h. For robustness check, this study added the real exchange rate depreciation rate, the share of GRDP of the manufacturing sector, and the share of GRDP of the agricultural sector to the control variables. This model included 1-3 lags of independent variables. The same additional variables also applied for the robustness check in the second and third rounds of empirical analysis in this study.

In the second round, this study incorporated the asymmetric responses of unemployment rate to a positive or negative export shock. The extended model of the LP is as follow:

$$Y_{i,t+h} - Y_{i,t-1} = \beta_1^h PS_{i,t} + \beta_2^h NS_{i,t} + \theta^h X_{i,t} + \lambda_i^h + \delta_t^h + \varepsilon_{i,t}^h, \quad (3)$$

for the time horizon h=0,1,2,3,4. $Y_{i,t}$ denotes the unemployment rate and $X_{i,t}$ denotes other controls like the first round. The variable $SHOCK_{i,t}$ from the baseline model is differentiated into two dummy variables, namely positive export shock (PS) and negative export shock (NS). The value of PS equals shock if $SHOCK_{i,t}$ is bigger than zero; PS=0 otherwise. Also, the value of PS equals shock if $SHOCK_{i,t}$ is less than zero; NS=0 otherwise. In this extended the LP model, the impulse responses are computed using the estimated coefficients β_1^h and β_2^h. While β_1^h denotes the positive export shock, β_2^h denotes the negative export shock.

In the third round, this study further incorporated the business cycles differentiated into boom and slump into the LP model, allowing to discuss how the asymmetric responses relate to the two states. In each round, the unemployment rate was divided into three groups based on educational attainment: total, highly-educated, and less-educated. The estimated model of the LP is as follow:

$$\mathrm{Y_{i,t+h} - Y_{i,t-1}} = \beta_1^h \mathrm{I_{i,t}} \mathrm{PS_{i,t}} + \beta_2^h (1 - \mathrm{I_{i,t}}) \mathrm{PS_{i,t}} + \beta_3^h \mathrm{I_{i,t}} \mathrm{NS_{i,t}} + \beta_4^h (1 - \mathrm{I_{i,t}}) \mathrm{NS_{i,t}} + \theta^h \mathrm{X_{i,t}} + \lambda_i^h + \delta_t^h + \varepsilon_{i,t}^h \quad (4)$$

for the time horizon h=0,1,2,3,4; $Y_{i,t}$ denotes the unemployment rate and $X_{i,t}$ denotes other controls. This study applied the Hodrick-Prescott (HP) Filter to derive the cyclical components (CC) of the log of real GRDP (business cycles) for each province, denoted by a dummy variable I. Variable I equals one or indicates a boom if CC is positive. Otherwise, variable I equals zero or slump if CC is negative. In the third model, the Impulse Response Functions (IRFs) were computed using these four estimated coefficients β_1^h, β_2^h, β_3^h, and β_4^h. Each coefficient denotes a different stage of the business cycles as well as asymmetry in export shocks. The coefficient of β_1^h indicates the impulse response of a positive export shock during the economic boom, β_2^h indicates the impulse response of a positive export shock during the economic slump, β_3^h indicates the impulse response of a negative export shock during the economic boom, and β_4^h indicates the impulse response of a negative export shock during the economic slump. From these three LP models formed, empirical evidence would be obtained regarding the asymmetric response of the unemployment rate to an export shock in Indonesia from 1990 to 2019.

RESULT AND DISCUSSION

Unemployment and Export in Indonesia

Indonesian exports experienced an upward trend, although the value has decreased slightly in recent years. The highest ever exports peaked in 2011, as much as US$203,496.6 million, and declined slowly afterward until it reached US$167,525 million in 2019 (Figure 1). Manufactured goods were the biggest Indonesia's exports across periods. Although total export gradually fell in the last decade, the export share in the manufacturing sector has increased considerably. In 2019, it shared around 75.55% of total exports. In terms of GDP, the manufacturing sector also appeared to have the largest contribution. Although it was on the decline from 28.84% in 2003 to 19.7% in 2019, as shown in Figure 2, its contribution was still the biggest among all sectors. The second biggest share after the manufacturing sector was the agricultural sector, accounting for only 12.72%. Conversely, the manufacturing sector's high share was the contrary of its labor absorption. Indonesia manufacturing industries absorbed the third-largest employment, while the biggest absorption was in the agricultural sector, followed by the wholesale and retail commerce and automobile and motorcycle repair sectors (Table 1). Only 18,928,035 people above the age of 15 worked in Indonesia's manufacturing industry in 2019, accounting for around 16% of all workers (BPS, 2019).

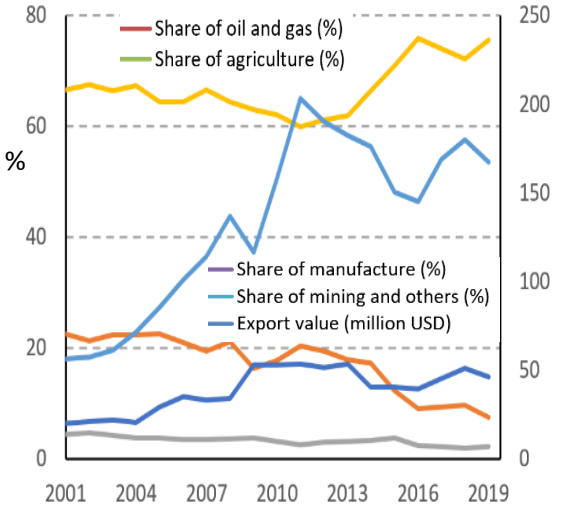

Figure 1. Indonesia's export value and share, 2001-2019

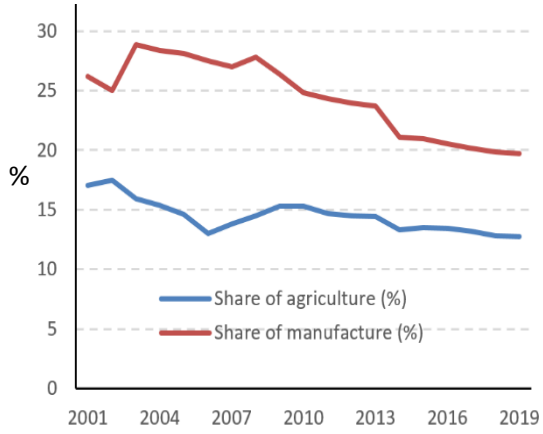

Figure 2. Share of agricultural and manufacturing sector to GDP in Indonesia, 2001-2019

From 1990 to 2019, less-educated people dominated the unemployment in Indonesia (BPS, 2019). The trend increased quite sharply until 2005, then gradually decreased. In 2005, the less-educated unemployment accounted for 94.08% of total unemployment, while in 2019 it accounted only for 83.73%, as shown in Figure 3.

On the other hand, higher education graduates made up about 16.27% of the overall unemployed in Indonesia in 2019. Although not as prevalent as the

low education group, unemployment among those with a high level of education should not be ignored, particularly since the rate has been rising in recent years. It has been above 10% since 2015, whereas it was only 9.51% of the total unemployment in 2014.

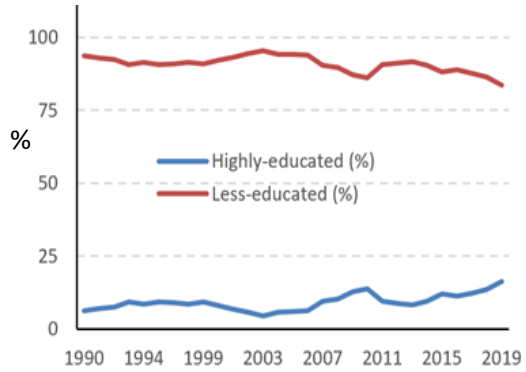

Figure 3. Share of unemployment by educational attainment in Indonesia, 1990-2019

Exchange rates, inflation, and GRDP are also linked to exports. Exports, which are international trade activities, were influenced significantly by the exchange rates of trading partner countries' currencies or typically represented in the US$ exchange rate. Indonesia's export performance has improved slightly since 2005 (Figure 4, panel A). The apparel business, for example, illustrates how poor and diminishing global value chain integration was owing to costly regulations: although rivals heavily relied on imported fabrics, Indonesian raw material import limitations applied. Meanwhile, the real effective exchange rate based on consumer prices in Indonesia was relatively stable (Firgure 1, panel B).

Inflation is also seen to have a negative impact on exports. Considering the structure of the company, some of them are capital-intensive industries that will engage machines and technology more than human resources (Wulandari, Utomo, Narmaditya, & Kamaludin, 2019). They might recruit workers to be machine operators and managerial teams, but not as many as labor-intensive industries. Hence, if they decided to spend money on appliances and invest in technology, they had to consider the price and its maintenance fee. As the cost usually rises over time, inflation may bring a cost-push effect. Later, it influenced their production output. In the recent years, Indonesia's inflation fluctuated but was relatively lower than the average of the G20 emerging market economies (Figure 5). GDRP or GDP, on the other hand, represents a region's economic strength as a fundamental ecosystem for export activity. US GDP is incorporated here as it reflects the global economic conditions.

Table 1. The Order of Average of Labor Absorption and Share of GDP by Sector in Indonesia, 2001-2019

Labor Absorption		Rank	Share of Gross Domestic Product	
A	Agriculture, Forestry, and Fishing	1st	C	Manufacturing
G	Wholesale and Retail Trade	2nd	G	Wholesale and Retail Trade
C	Manufacturing	3rd	A	Agriculture, Forestry, and Fishing
F	Construction	4th	F	Construction
P	Education	5th	B	Mining and Quarrying
R, S, T, U	Other Services Activities	6th	H	Transportation and Storage
I	Accommodation and Food Service	7th	K	Financial and Insurance Activities
H	Transportation and Storage	8th	J	Information and Communication
O	Public Administration, Defense and Compulsory Social Security	9th	O	Public Administration, Defense and Compulsory Social Security
K	Financial and Insurance Activities	10th	P	Education
Q	Human Health and Social Work	11th	I	Accommodation and Food Service
M, N	Business Activities	12th	L	Real Estate Activities
B	Mining and Quarrying	13th	R, S, T, U	Other Services Activities
J	Information and Communication	14th	M, N	Business Activities
E	Water supply, Sewerage, Waste Management, and Remediation	15th	D	Electricity and Gas
L	Real Estate Activities	16th	Q	Human Health and Social Work
D	Electricity and Gas	17th	E	Water supply, Sewerage, Waste Management, and Remediation

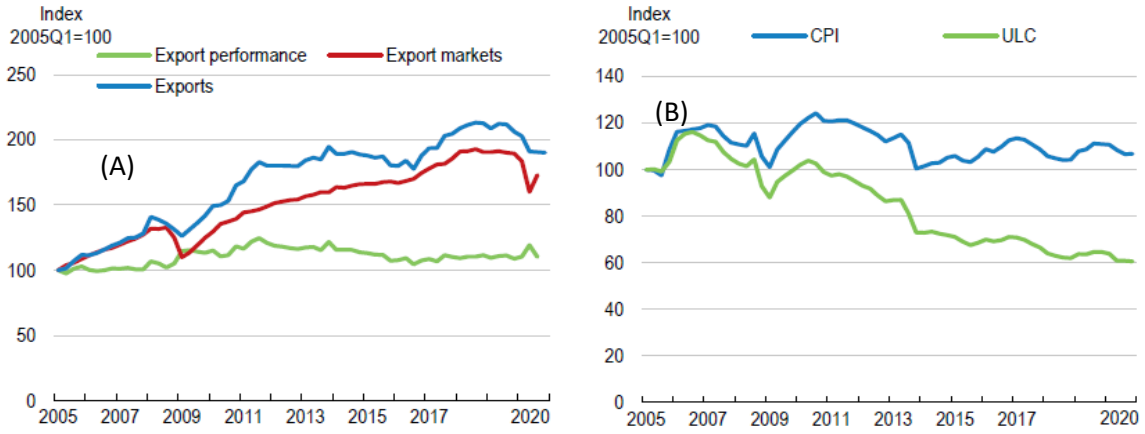

Figure 4. Export Performance (A) and Real Effective Exchange Rate by Deflator (B) of Indonesia, 2005-2020 (OECD, 2021)

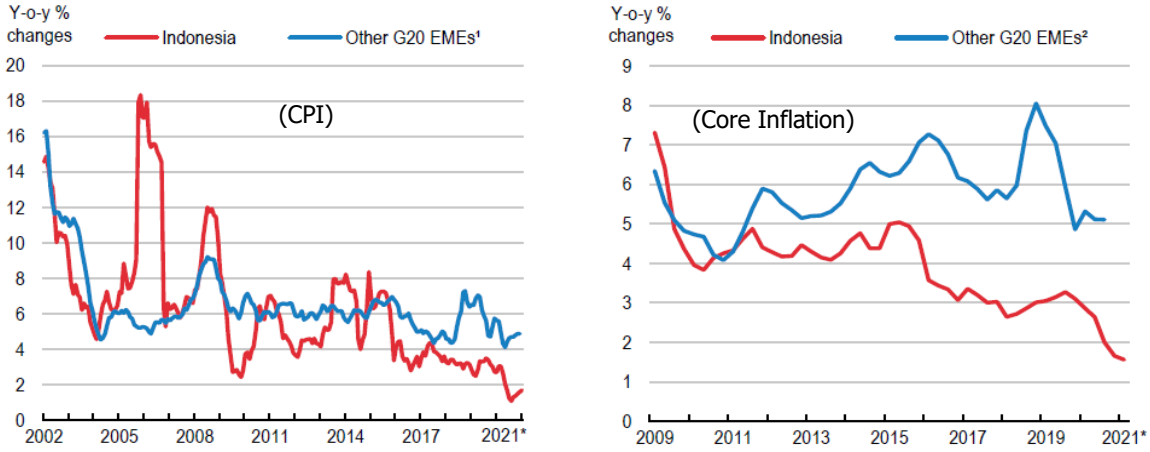

Figure 5. Inflation of Indonesia (CPI and Core Inflation) in comparison with G20 economies, 2002-2021(OECD, 2021)

1st Round: Unemployment and Export

In the first round, this study examined the response of the unemployment rate to an export shock in general without considering either the asymmetry of export shocks or business cycles. This study differentiated the unemployment rate into three categories: total unemployment rate, highly-educated, and less-educated. The LP is powerful to analyze the short-run impact. Therefore, this study focused on the short-run analysis from the year-0 when the shock happened to the year-4 after shock. Table 2 shows no significant changes in all categories of the unemployment rate responding to the export shock. There seems to be a decline in the total unemployment rate and the less-educated, but only less than 1.0% and not significant, so it can be neglected. The highly-educated show ambiguous responses to an export shock over years. These results match with the studies conducted by Yolanda (2017), Costa et al., 2016), Schubert (2011), and Şener (2001).

2nd Round: Incorporating the Asymmetry of Export Shocks

In the second round, this study incorporated the asymmetric effects of export shock into the model while still categorizing the unemployment rate into

three groups. The asymmetric effects of export shock were distinguished between positive and negative.

Due to the positive export shock, the response of the total unemployment rate and the less-educated were ambiguous. The highly-educated shows a 2.847% drop (Table 3), but only in the short run. On the other hand, the responses of the unemployment rate to the negative export shock are negligible as they are not significant at all. These results are the opposite of studies by Eriksson et al. (2021) and Liang (2021), but in line with those conducted by Egger et al. (2020), Artuc et al. (2010), and Şener (2001).

3rd Round: Incorporating Asymmetry and Business Cycles

The third round incorporated business cycles, whether boom or slump, and still incorporated the asymmetric effects of export shock and educational attainment differences. Depicted in Table 4, the results show different responses of the unemployment rate concerning educational attainment, positive or negative of export shock, and the business cycle. A positive export shock decreased the unemployment rate only when the shock occurred during the boom. In addition, when the unemployment rate was categorized into the highly-educated and less-educated, it responded differently to a positive export shock. For other cases, an export shock failed to affect the unemployment rate in every category.

About negative export shock, theory suggests that unemployment rate is increased by a negative export shock. However, our findings show that unemployment rate was not sensitive to a negative shock (resilient). Some scholars found that the less-educated group does not respond to a negative shock because they are not allowed to be unemployed, given their lower incomes and no safety-net. On the other hand, the educated group is more protected, and they are allowed to be unemployed. This can be called as "luxury unemployment" (Kataoka, 2019). However, results show that both the less-educated and the highly-educated was resilient to a negative export shock. In other words, Indonesia's labor market is resilient to a decline in export, which suggests that domestic demand is more crucial for labor market.

Table 2. Symmetric Impulse Responses of Export Shock on the Unemployment Rate

Estimate variable	Year 0	Year 1	Year 2	Year 3	Year 4
Total unemployment rate	-0.131	-0.0957	-0.351	-0.334	-0.510
	(0.252)	(0.195)	(0.328)	(0.294)	(0.453)
Highly-educated unemployment rate	-1.315*	-0.616	-0.948	0.439	0.290
	(0.666)	(0.551)	(0.956)	(0.481)	(0.824)
Less-educated unemployment rate	-0.0428	-0.0901	-0.278	-0.326	-0.577
	(0.281)	(0.205)	(0.327)	(0.318)	(0.483)
Observations	432	414	396	378	360

***, ** and * indicate significance at the 0.01, 0.05 and 0.10 level

Table 3. Asymmetric Impulse Responses of Export Shock on the Unemployment Rate

Estimate variable	Year 0	Year 1	Year 2	Year 3	Year 4
Positive export shock					
Total unemployment rate	-0.721*	-0.345	-1.016*	-0.605	-0.134
	(0.403)	(0.406)	(0.489)	(0.479)	(0.588)
Highly-educated unemployment rate	-1.552	-1.022	-2.847**	0.282	-0.677
	(1.211)	(1.915)	(1.169)	(1.453)	(1.393)
Less-educated unemployment rate	-0.629	-0.365	-0.819	-0.622	-0.135
	(0.466)	(0.449)	(0.515)	(0.487)	(0.617)
Observations	432	414	396	378	360
Negative export shock					
Total unemployment rate	-0.357	-0.154	-0.163	0.0535	0.723
	(0.457)	(0.211)	(0.555)	(0.467)	(0.801)
Highly-educated unemployment rate	1.156	0.523	-0.480	-0.504	-1.015
	(1.156)	(0.848)	(1.428)	(0.914)	(0.638)
Less-educated unemployment rate	-0.438	-0.195	-0.139	0.0208	0.837
	(0.467)	(0.204)	(0.577)	(0.554)	(0.846)
Observations	432	414	396	378	360

***, ** and * indicate significance at the 0.01, 0.05 and 0.10 level

Table 4. Asymmetric Impulse Responses of Export Shock on the Unemployment Rate

Estimate variable	Year 0	Year 1	Year 2	Year 3	Year 4
1. During boom					
Positive export shock					
Total unemployment rate	-1.022	-1.057**	-1.824***	-1.096	-0.0867
	(0.592)	(0.441)	(0.629)	(0.664)	(0.923)
Highly-educated unemployment rate	-1.234	-0.549	-3.290*	0.245	0.907
	(1.686)	(2.643)	(1.702)	(2.297)	(1.228)
Less-educated unemployment rate	-1.045	-1.242**	-1.753**	-1.225*	-0.239
	(0.650)	(0.443)	(0.697)	(0.664)	(0.931)
Observations	432	414	396	378	360
Negative export shock					
Total unemployment rate	-0.394	-0.695*	-0.332	-0.240	0.499
	(0.538)	(0.378)	(0.499)	(0.741)	(1.320)
Highly-educated unemployment rate	0.698	-0.836	-1.362	-1.381	-0.150
	(0.631)	(1.464)	(1.004)	(1.386)	(1.312)
Less-educated unemployment rate	-0.404	-0.775*	-0.228	-0.255	0.451
	(0.573)	(0.435)	(0.611)	(0.825)	(1.420)
Observations	432	414	396	378	360
2. During slump					
Positive export shock					
Total unemployment rate	-0.670*	0.360	-0.184	0.627	0.198
	(0.381)	(0.707)	(0.503)	(0.461)	(0.627)
Highly-educated unemployment rate	-2.805**	-1.906	-3.180*	0.243	-2.099
	(1.029)	(2.332)	(1.675)	(1.777)	(2.189)
Less-educated unemployment rate	-0.402	0.591	0.240	0.775	0.311
	(0.453)	(0.721)	(0.563)	(0.491)	(0.692)
Observations	432	414	396	378	360
Negative export shock					
Total unemployment rate	-0.206	0.403	-0.126	0.280	0.984
	(0.594)	(0.483)	(0.899)	(0.441)	(0.575)
Highly-educated unemployment rate	1.459	1.866*	-0.166	-0.0226	-1.823
	(2.189)	(1.002)	(2.115)	(1.294)	(1.363)
Less-educated unemployment rate	-0.341	0.411	-0.154	0.213	1.234*
	(0.566)	(0.480)	(0.872)	(0.537)	(0.600)
Observations	432	414	396	378	360

***, ** and * indicate significance at the 0.01, 0.05 and 0.10 level

Further, for the highly-educated workers, a positive export shock decreased the unemployment rate only when the shock occurred during the slump period, with as big as a 3.18% drop. Still, the effect was rather in the short run. However, for the less-educated workers, a positive export shock decreased almost 2.0% of the unemployment rate only when the shock occurred during the boom period, and the effect was more persistent.

Export Shock and Unemployment

This study also conducted robustness check by adding more variables and got the similar results (Table 5). The results show that the model in this study is robust.

Linking to the theory and literature review, theory suggests that unemployment rate is increased by a negative export shock. However, our findings show that unemployment rate in Indonesia was not sensitive to a negative export shock (resilient). Indonesia's labor market is resilient to a decline in export, which suggests that domestic demand is more crucial for labor market. On the other hand, theory suggests that unemployment rate is decreased by a positive export shock and this study reveals the identical point although the effect varied depending on educational attainment and business cycles. During the economic boom, a positive export shock leads the industries in Indonesia to hire additional personnel to pursue high-mass production. In this circumstance, blue-collar workers or the less-educated ones are mostly required. As a result, the labor demand for less-educated workers rises and the unemployment rate falls. This effect tends to last long generally due to the employment contract and labor union protection. In the case of Indonesia, amidst the Global Financial Crisis of 2008, the Indonesian economy was not so severe compared to other Asian countries. It was stable and performed in good condition due to this

characteristic. Furthermore, the unemployment rate for the less-educated fell from around 90% to under 90% (Figure 3).

Table 5. Effects of Export Shock on Unemployment

Export shock	Highly-educated		Less-educated	
	Boom	Slump	Boom	Slump
Positive	No effect	Decreasing effect (temporary)	Decreasing effect (persistent)	No effect
Negative	No effect	No effect	No effect	No effect

Meanwhile, during the slump, a positive export shock reduces the unemployment rate among the highly-educated. In the years 2000-2003, not long after the Asian Financial Crisis of 1998 hit Indonesia, the unemployment rate for highly educated people fell from around 9% to 4% (Figure 3). The firms tend to take an improvement acceleration approach, and thus they currently require individuals with advanced competencies to explore ideas and perform strategic research and development for the organization. However, because firms typically make rapid efforts, this effect does not persist long. They may hire employees for temporary or outsource to the freelancer that is not embedded as permanent workers. This finding is in contrast with Eriksson et al. (2021), Liang (2021), and Phelps and Zoega (2001). Their studies were conducted in the US and OECD countries, so the different findings reveal the importance of testing the argument in developing countries such as Indonesia. Developing countries respond differently in accordance with business cycles and export shocks compared to developed countries.

Research Implication

This study reveals how the unemployment rate responds to an export shock in Indonesia from 1990 to 2019 depending on educational attainment, export shock asymmetric effects, and the business cycles. Unemployment rate is not sensitive to a negative shock (resilient), which means that Indonesia's labor market is resilient to a decline in export. This result suggests that domestic demand is more crucial for labor market. However, the unemployment rate reacts to a positive export shock. During the slump period, the highly-educated workers in Indonesia respond to a positive export shock more sensitively, rather than the less-educated workers. A positive export shock during the slump reduces the unemployment rate for the highly-educated, and the effect is rather in the short run. In contrast, during the boom period, the less-educated workers respond to an export shock more sensitively. A positive export shock during the boom reduces the unemployment rate for less-educated workers, and the effect is more persistent.

Based on the research findings, the study provides the following implications. First, the importance of devoting to the domestic market. The government needs to strengthen the domestic demand by providing credit for consumption, accelerating the realization of the state budget, and campaigning the use of domestic products. One of the ways is the initiative for prioritizing the purchase of domestic over imported products in the procurement of goods and services by ministries and agencies and increasing the level of domestic components in manufacturing industries. A credit program for consumption will increase purchasing power, and economy will be less reliant on exports and will be able to foresee the negative consequences of foreign market uncertainties. It should be in accordance with the "Bangga Buatan Indonesia" campaign to support domestic producers and avoid import dependency as buying parity rises. Government institutions that prefer domestic goods in procurement may amplify these actions. The study by Faradila and Kakinaka (2020) stated that growing domestic demand in Indonesia allows local manufacturing firms to survive. It means that the domestic market is so potential and government really needs to take action.

Secondly, workers with lower levels of education can be more employed due to the positive export shock during boom. Therefore, the government needs to relax export regulation on labor-intensive industries to attract investors developing a labor-intensive business rather than capital-intensive, such as imposing tax incentives or following up the WTO trade aid for export-promoting policies and regulations (Htwe et al., 2020; Kim et al., 2020). However, instead of targeting the sectors with the highest unemployment rate, incentives should be directed toward critical sectors with a competitive advantage in order to maximize the results (Jin et al., 2019; Ugarte & Olarreaga, 2021). By having abundant human resources, Indonesia needs to prioritize labor-intensive industries. Imposing a relaxation of export regulations for firms' operating in the labor-intensive sector would be beneficial to strengthen export promotion. Providing internal training for the workers can also be an option because it seemingly makes

them more attached to the firm (Mincer, 1991). Employers can improve the efficacy of their performance by offering training to workers with low education. Training can help them enhance their skills without relying on formal education; besides, not all skills are taught in school. This training activity can teach specific skills linked to the company's business operations and core values, which may differ from other firms. The issuance of the 'PRAKERJA' card by the government of Indonesia is a good way to improve the abilities of job seekers in the hopes of better preparing them and lowering the training costs borne by workers or companies, but the implementation needs to be improved (Kurnianingsih et al., 2020). The first distribution of the card, which was targeted largely at mitigating the effects of the Covid-19 pandemic, seems to have failed to achieve the maximum goal because the community and stakeholders were not ready, particularly with regard to the digital learning ecosystem they were targeting. Nonetheless, the card seems to be able to bring more benefits in the long run.

Thirdly, the Indonesian government can still participate in trade agreements or bilateral treaties to promote trade and mitigate the adverse effects if a negative shock occurs (Htwe et al., 2020; Kim et al., 2020). Indonesia has been a member of the WTO since 1950, ASEAN Free Trade Area (AFTA), IJEPA (Indonesian-Japan Economic Partnership Agreement), and other trade agreements. This participation must be maintained and increased by active involvement. It will have a bigger positive impact on Indonesia economy for its ability to influence the organization's policies, such as on the imposing or not-imposing of tariffs and quotas, and even in terms of giving aid to member countries.

Lastly, government and investors may develop a diversification strategy for driving exports such as coal mining instead of manufacture and agriculture sectors (the two most prominent sectors in Indonesia's economy). The broader export products or fields are expected to enlarge job opportunities for workers with varied qualifications (Adam et al., 2021; Erbahar, 2020); Wahyudi and Maipita, 2018). Encouraging export-market diversification has long been done by developed countries (Adam et al., 2021). Indonesia can adopt this diversifying method which has shown to be able to suppress the potential negative consequences of global market uncertainty, especially because manufactured export commodities will be increasingly difficult to compete in the global market with China's re-emergence as a major competitor.

CONCLUSION AND SUGGESTION

This study has revealed how the unemployment rate responds differently to an export shock in Indonesia from 1990 to 2019, depending on several aspects. Although the unemployment rate does not react significantly or can be considered resilient to the negative export shock, the unemployment rate shows some responses to a positive export shock. The unemployment rate for the highly-educated is reduced by a positive export shock if the shock occurs during slump, and the effect is rather short-termed. In contrast, the unemployment rate for the less-educated is reduced by a positive export shock if the shock occurs during boom, and the effect is more persistent.

The results show a significant reducing effect of the positive export shock on the highly-educated unemployment rate. Therefore, this study suggests the Indonesian government mainly focuses on this by employing an export-diversification strategy. Moreover, the highly-educated unemployment rate has been consistently upper 10% in the recent years. Diversification strategy can enlarge job opportunities for workers with varied qualifications. If Indonesia continues to focus entirely on exports, skilled workers who can be employed in other areas will not be absorbed. Export diversification by developing potential industries that have not previously been prioritized will provide many job opportunities for workforce. The diversifying strategy can also be done by expanding the market.

This study has limitations because the data only include 18 of 34 provinces in Indonesia. This limitation arises from the fact that the complete data are only available at the 18 provinces where the major exporting ports are located. Analyzing the I/O (Input/Output) table can be used to do research involving all provinces, but it usually only allows for five years of data, making it challenging to employ.

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