



Research article

Financial immunity of companies from Indonesian and Shanghai stock exchange during the US-China trade war

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ABSTRACT

This study aims to examine the country-level financial immunity and vulnerability due to the multidimensional impact of the US-China trade war by using potential driving factors, namely financial and market performance, economic conditions, and government interventions. This study uses financial distress as a moderating variable to examine the relationship between financial immunity and stock returns of companies listed on the Indonesia Stock Exchange and the Shanghai Stock Exchange, which have different characteristics. The research samples were companies listed on the Indonesia stock exchange and the Shanghai stock exchange with 767 and 736 observations, respectively, in 2016–2019. The first-stage test method uses balanced data panel regression to test individual interactions as a sufficient condition. Regression model specification of the response variable for the fixed effects model can overcome the common effects model limitations. The second stage is a matched test or Paired Samples T-Test for hypothesis testing after testing each individual interaction for each country. The results of this study show that financial immunity has a positive effect on stock returns in two countries: Indonesia and China. Meanwhile, the financial distress of the US-China Trade War for Indonesia and Shanghai shows different results. Financial distress significantly reduces stock returns on the Indonesian Stock Exchange, while the distress does not affect stock returns on the Shanghai Stock Exchange. During the US-China trade war, trade policy uncertainty has caused economic policy uncertainty, thus triggering systemic risks in ASEAN markets, including Indonesia.

1. Introduction

The US-China trade war is the biggest challenge for the global economy because this trade war involves the world's two economic giants. The war began with the actions of former US President Donald Trump that imposed a 30–50% tariff on solar panel imports on January 22, 2018 (Costa and Sukartha, 2020). The situation got worse when the US imposed an additional 25% tariff on imported steel and an additional 10% tariff on imported aluminum for most major countries, including China (Wu and Turvey, 2021). On March 22, 2018, China responded by imposing additional tariffs of up to 25% on 128 US products (WTO, 2020). Comparing shipments in 2016–2017 to 2018–2019, US exports to China dropped by 15–27%, while US imports from China dropped by 14–23% (C. He et al., 2021). Since then, the two countries have retaliated against each other to raise tariffs for various goods imported from each other. As a result, there have been severe disruptions to the aggregate

trade flows worldwide, such as crisis and business bankruptcy. While affected exporting firms have to cope with an increase in their product selling price, importers need to pay more for their purchases or find new suppliers. These things erode firms' competitiveness and reduce sales and profits, thus forcing them to form corporate immunity to withstand the crisis. To investigate the country-level financial immunity to the US-China trade war, this study raises three major categories: financial, economic stability, and government interventions variables (Ding et al., 2021; Zaremba et al., 2021).

The present study aims to examine the country-level financial immunity and vulnerability to stock returns due to the US-China trade war. The research design used is to collect all the potential driving factors multidimensionally, namely financial and market performance, economic conditions, and government interventions due to the US-China trade war. Previous studies on the trade war tend to focus on aspects of who wins and who loses the war (An et al., 2020; Nugroho et al., 2021)

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and the impact of the war on poverty, bankruptcy, and crises (Cui and Li, 2021; Shi et al., 2021; Wu and Turvey, 2021; Xu and Lien, 2020). The impact of country-level financial immunity on the US-China trade war has never been studied, especially in developing countries like Indonesia. This study uses a multi-country analysis where the results of this study show that financial immunity to overcome the US-China trade war varies between countries. This study focuses on financial immunity in Indonesia and China (Shanghai). The reason for choosing China is that in global competition, China is considered one of the Asian countries that has been significantly progressing, and what makes it even more interesting is that the US administration considers China's trade practices to be unfair in bilateral trade (Adekola, 2019; Lai, 2019). China's export value beats the US, making China the second-largest exporter of goods globally. This makes the US deficit larger because the US only exports a quarter of China's exports (Steinbock, 2018). Meanwhile, the reason for choosing Indonesia is that the US-China trade war negatively affects Indonesia because the two countries are Indonesia's largest export destination countries (BPS, 2020). The trade war makes Indonesia experience a significant economic impact, where Indonesia's trade balance is still in a deficit against China. When seeing Indonesia's non-oil and gas export market data, China ranks first while the US ranks third after Japan. Meanwhile, Indonesia is not overly dependent on imports from the US because Indonesia's largest non-oil and gas import market is China (Wulandari and Inayah, 2021).

This study contributes to the existing literature as follows. First, this study provides an analysis in overcoming the impact of the US-China trade war, namely the issue of financial immunity. Additionally, this is the first scholarly paper to analyze the vulnerability aspect to the crisis as an aspect that strengthens (or weakens) financial immunity in the US-China trade war as there has been no research analyzing this so far. Second, this study uses two contrasting points of view: the largest exporting country to Indonesia (China) and the developing country with the highest import value from China (Indonesia). Both points of view are very relevant to be analyzed as this study investigates financial immunity during the US-China trade war. Third, related to the methodological aspect, this study integrates financial immunity, trade war settlement, and multi-country analysis. This study uses an agnostic approach undertaking a series of methods arranged in several stages. The first stage is a series of panel data regressions that examine individual interactions. The next stage is to test dimensions for the financial and market, country characteristics, and policy responses aspects. However, Zaremba et al. (2021) postulate that a multidimensional information set has a weakness because it may potentially feature overlapping information contents and makes it irrelevant to use for decision making. Therefore, to overcome the overlapping information contents, this study applies a new approach with the features or dimensions of financial immunity, which are broken down into three major aspects, namely accounting and market financial, state economic conditions, and government interventions which will later be analyzed using the matched test or Paired Samples T-Test for hypothesis testing after testing each individual interaction for each country.

The remainder of the paper is organized as follows. Section 2 reviews the extant literature and develops some hypotheses of this research. Section 3 describes the construction of the sample and research model as well as statistical testing. Sections 4 and 5 outline the empirical strategies and discuss the research results. Finally, Section 6 presents conclusions, suggestions, and implications.

2. Literature review and theoretical basis

2.1. The US-China trade war

Interactions among nations have become very active globally, especially in international trade transactions. This condition triggers a high competition level to reach the best market from each country. The US-China trade war can become very damaging to the global economy.

The war between the two countries disrupts the stabilization of international trade policies, which impacts not only on the two countries but also on other countries, including their trading partners. In the Shanghai Stock Exchange, there was a sharp decline in the index in early 2018 until the end of 2019, but after that, the Shanghai Stock Exchange condition gradually began to recover as indicated by an increase in the index to almost the same point as before the trade war (Hu and Wang, 2018). For LQ-45, the decline also occurred in 2018–2019 and began to recover after the trade war ended, although the conditions were not as good as before the trade war (Hu and Wang, 2018).

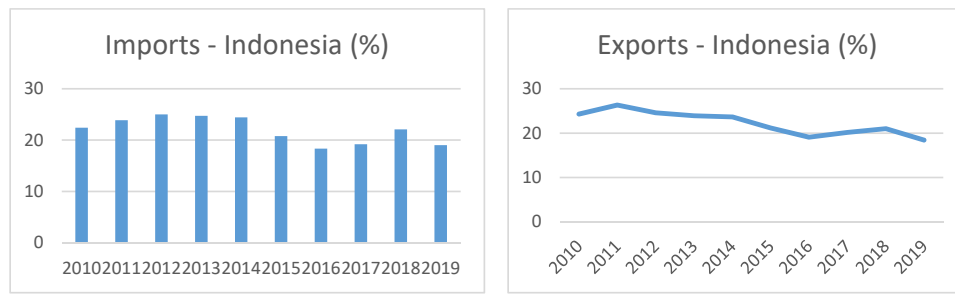
The theory of globalization is based on the problem of the global economy's structure that determines the processes of social development in every sector of the economy (An et al., 2020). International trade becomes an essential reference in encouraging economic development in a country. Every trade policy, both domestic and foreign, has the same goal: to increase state revenue in order to improve the nation's welfare.

From the economic aspect, a trade war is an economic conflict manifested by imposing restrictions on imports and exports between countries, such as import tariffs on goods, import bans on certain goods, and setting high standards on imported goods. The main determinant of the trade war was the high US trade deficit contributed by China, followed by the action of imposing each country's respective import-export policies (Nugroho et al., 2021; Shi et al., 2021). This trade war had a negative impact on the Chinese economy; retail sales in July 2019 decreased to 7.6%, lower than expectation of 8.6%, while the unemployment rate increased to 5.3% compared to June, which was only 5.1% (Cui and Li, 2021; Nugroho et al., 2021; Shi et al., 2021; Xu and Lien, 2020). It is undeniable that the US-China are two countries with the largest economies in the world, so the dispute between the two affects the economic conditions of other countries, especially their main trading partner countries. Companies in Indonesia participate in increasing their trade through import and export activities undertaken in several countries, including the US and China. Figure 1 exhibits the declining trend of Indonesia's imports and exports in 2010–2019. This signifies that the trade war has increased global uncertainty and decreased investor optimism about the economy's future. Import and export activities themselves imply a country's economic conditions, which are closely related to the economic conditions of its trading partner countries. On the other hand, changes in the economy of trading partners will have a direct or indirect effect on the country's economic conditions.

2.2. Determinants of corporate financial immunity

This study considers various categories of variables that can boost the stock markets' immunity to the US-China trade war. The categories adopt Zaremba et al. (2021) and Ding et al. (2021), which include financial and market performance, economic conditions, and government interventions. The first category relates to companies' financial condition in Indonesia and China and their ability to cope with extreme market conditions. The companies' ability to access internal and external funding can help to cope with the negative impact of the US-China trade war.

A declining stock market condition (bearish market) caused by the trade war can be overcome with a healthy balance sheet and financial position (An et al., 2020; Prager et al., 2018; Takahashi and Yamada, 2021). Policies taken under these conditions play a significant role in companies' survival goals. An example of such policies is conservative investment policies. Companies need debt to expand aggressively. In a business cycle recession, when companies operate below their full capacity, revenues decrease, but expenses, particularly arising from paying debt obligations, do not tend to change significantly. The ensuing decrease in corporate earnings translates into a less immune stock market. The impact of the US-China trade war will be low if companies apply conservative investment policies to survive (Zaremba et al., 2021). The determinants of corporate financial immunity are explained as follows:



Source: Worldbank (2020)

Figure 1. Indonesia's imports and exports in 2010–2019. Source: Worldbank, 2020.

2.2.1. Financial data

Financial data from the financial and market aspects are retrieved from companies' financial statements (Ding et al., 2021; Zaremba et al., 2021). Financial data is a company's financial position as the main determinant of corporate financial immunity to the US-China trade war. This study uses important financial ratio to survive, namely, return on assets. Furthermore, this study also uses indicators that were identified in country-level asset pricing studies, namely book-to-market value and price-earnings-ratio. The design of this study combines two variables that represent the stock market structure in two different countries: Indonesia and China. The following is an explanation of each ratio:

2.2.1.1. Return on assets. This ratio is used to assess a company's financial condition from the accounting aspect. This ratio illustrates how much return is generated from the effective and efficient use of assets. The higher the ratio, the better the financial condition because the company can produce high returns in undertaking all forms of resource management. The formula for calculating ROA is as follows:

$$Return\ on\ Assets_{i,t} = \frac{Earning\ after\ tax_{i,t}}{Total\ assets_{i,t}} \tag{1}$$

2.2.1.2. Book-to-market value. This ratio is used to assess a company's financial condition from the market aspect. This ratio is calculated by dividing the book value by the market value. A high book to market value indicates that investors are less interested in the company's stocks, causing the stocks to be undervalued. The formula for calculating book to market value is as follows:

$$Book\ to\ Market\ Value_{i,t} = \frac{Book\ value_{i,t}}{Market\ value_{i,t}} \tag{2}$$

2.2.1.3. Price-earnings-Ratio. This ratio is used to measure the market value of a stock relative to its earnings. It is calculated by dividing the current stock price by the current earnings per stock. The ratio reflects the price of a stock experiencing undervalued or overvalued.

company stocks will reduce investor interest in investing and vice versa. The formula for calculating price earnings ratio is as follows:

$$Price\ Earnings\ Ratio_{i,t} = \frac{Closing\ price_{i,t}}{Earning\ per\ share_{i,t}} \tag{3}$$

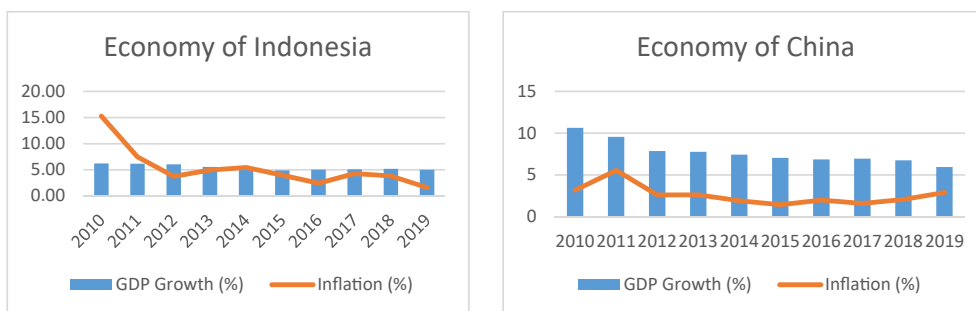
2.2.2. Economic

In order to survive in times of crisis, a country's economic performance and environment play a critical role in dealing with a trade war.

The US-China trade war is an economic conflict between the two countries that can affect many countries' macroeconomic performance (C. He et al., 2021; Kida, 2020; Shi et al., 2021; Xu and Lien, 2020). This study includes several macroeconomic variables that cast light on a country's economic growth, such as gross domestic product and inflation. Gross domestic product (GDP) is the total production of goods and services in a country produced using domestic resources, while inflation is a criterion for the price of domestic goods to increase (Inaba, 2020; Thampanya et al., 2020). A high inflation rate will reduce the actual income earned by investors. Figure 2 exhibits the economic conditions of Indonesia and China based on the annual GDP growth and inflation. According to the Worldbank (2020), China had an annual GDP growth of 10.6% (2010) and a downward trend to 6% (2019). Meanwhile, Indonesia's GDP growth has never been above 6% since 2010. This difference can also be seen from the inflation condition in Indonesia, which had a downward trend of 1.6% (2019) and China had an upward trend of 2.9% since 2017 (2019). These changes are indicated due to the US-China trade war.

2.2.3. Government interventions

The role of government in economic development is critical to a more prosperous society. The role is indispensable in overcoming market failures such as price rigidity, monopolies, and externalities that are detrimental to the state. This role can be carried out through direct or indirect interventions. Government interventions refer to a government's intentional interference to influence a country's resource allocation and market mechanisms. The interventions are divided into several



Source: World Bank (2020)

Figure 2. Economic conditions of Indonesia and China. Source: Worldbank, 2020.

categories, namely regulations, subsidies, monetary, fiscal policies, and accountability to society. The role of government interventions is a common occurrence in economic development (Zaremba et al., 2021). Government interventions should be carried out to overcome a country's problems such as unemployment and limited employment opportunities, poverty (Ding et al., 2021), income distribution, inflation (McKibbin, 2020), poor corporate governance (CG), and low social responsibility awareness.

The GCG factor is an approach that promotes an information transparency system regarding the management of go-public companies that focuses on stakeholder theory. In recent years, one of the important GCG indicators for monitoring focuses on the economic implications of corporate social responsibility (CSR). More than 80% of multinational companies have incorporated CSR as a global management strategy to improve the level of information transparency (Durand and Vergne, 2014; Kong et al., 2020). Investor confidence can be increased by environmental disclosure as the axis of CSR to identify risks sustainably.

CSR is very beneficial in global phenomena that occur in various countries. The implementation of social responsibility in Indonesia is not only regulated by the central government but also local governments, both provincial and district or city. Apart from being a company strategy in gaining customer trust (Feng et al., 2020; Singh and Misra, 2021), CSR has direct and indirect benefits and impacts for stakeholders. For the community, CSR can prevent corruption (Joseph et al., 2016). For companies, CSR can reduce risk and improve performance (Hsu and Chen, 2021). While CSR is categorized into two implementation patterns: activities carried out simultaneously with the community whose benefits can be directly felt by the community and activities carried out disjointly with the community, but the benefits can be felt directly by the community. In their operations, companies cannot be separated from the environment. If the CSR program is regarded as one of the strategic aspects in operations, its implementation is included in the operational costs. If not managed properly, these costs will negatively impact the companies. Companies must consider various stakeholders so that CSR can help reduce the risk of losing one or more support from stakeholders (Giuseppina, 2021). In this study, government interventions are measured by implementing each company's corporate social responsibility (CSR) in each country. This variable uses a dummy variable, namely 1 if the company implements corporate social responsibility and 0 if not.

2.3. Financial distress

Financial distress is a condition in which a company cannot meet its current obligations. Financial distress can enforce companies from two aspects, namely direct (legal, administrative, and consulting costs related to bankruptcy) and indirect (decreased business operations, lower employee morale, etc.). Companies facing high liquidation costs tend to choose capital structures in such a way that financial distress becomes less likely (Bose et al., 2021).

The measurement of this financial distress variable adopts the Zmijewski model. The reason for choosing the Zmijewski model is because this model has proven to be effective and quite accurate in predicting a firm's financial health over the last twenty decades (Qiu et al., 2020). Besides, the model can also predict corporate failure (Almamy et al., 2016). This model assesses how much financial distress a firm has by combining the three main pillars of the firm's financial ratios, namely liquidity, profitability, and solvency. The liquidity ratio is a ratio that can be used to measure firms' ability to meet their short-term obligations on time (Andreou et al., 2021). Firms will be considered good if they have sufficient liquidity to finance their operations and obligations in a timely manner. The profitability ratio indicates the condition of firms' performance in terms of profitability to achieve their economic position. Finally, solvency is firms' ability to finance their assets with debt. These three ratios are used in this model. The Zmijewski method's assessment criteria are that if $Z < 0.5$, the firm is declared healthy and vice versa. The formula used is as follows (Saputri et al., 2021):

$$Z = -4.3 - 4.5X_1 + 5.7X_2 + 0.004X_3 \quad (4)$$

Where, X_1 is return on assets, X_2 is total debt to total assets, X_3 is current assets to current liability.

The Zmijewski model has a cutoff value of 0, with the assessment criteria:

1. If a firm's score is less than 0 ($X < 0$), then the firm is in non-financial distress (healthy).
2. If a firm's score is more than 0 ($X > 0$), then the firm is predicted to experience financial distress.

According to Michalkova et al. (2018), some of the causes of financial distress are as follows:

1. Neoclassical model: financial distress occurs due to an error in unraveling information contained in the financial statements, while the information is used as a basis for resource allocation.
2. Financial model: financial distress is characterized by the wrong financial structure that causes liquidity constraints so that the firm will not last long.
3. Corporate governance model: financial distress occurs due to a poor corporate governance system; thus, even though the firm has the right asset composition and good financial structure, it cannot create corporate sustainability.

2.4. Financial immunity and stock return

Financial immunity refers to a company's performance from financial and market, economic conditions, and government interventions aspects. The company's performance from the financial and market aspects reflects its ability to manage assets and debts, both short- and long-term, and make a profit. In asset management, companies must have optimal managerial capabilities to avoid risks. To be sustainable, companies need to have competent managers in asset management (Ding et al., 2021; Grundke and Moser, 2019; C. He et al., 2021). Competent managers will affect companies' financial condition by making a profit, reducing costs, and optimizing asset management. In managing debt, both short- and long-term, the most significant contribution is to reduce the cost of capital and maintain liquidity, which is reflected in companies' ability to pay both short- and long-term obligations. In this condition, companies will perform a financing mix by using external funds to finance the companies in addition to internal funds from retained earnings. If the proportion of debt exceeds companies' ability to pay their obligations, they will experience financial risk. Investors are more interested in buying stocks of companies that can make high profits, have optimal debt management, and have competitive stock prices. High investor demand for company stocks makes the stocks more attractive; thereby, stock returns are expected to be higher.

In addition to companies' performance from the financial and market aspects, financial immunity can also be seen from the aspect of the economic conditions. Gross Domestic Product (GDP) and inflation are references in seeing the condition of a nation. Government interventions that help build country-level financial immunity would subsequently benefit investors (Cui and Li, 2021; Wu and Turvey, 2021; Zaremba et al., 2021). In this case, CSR is considered a long-term company investment. Therefore, CSR can also be used as a corporate strategy in forming a positive brand image as a company that cares about the environment. Socially responsible companies are considered as companies that not only run their own business but also care about the surrounding environment, which subsequently attract investors (Ajina, 2019; Alsaadi et al., 2017; Boubaker et al., 2020). Good company performance, combined with favorable country conditions and government interventions, can attract investors to invest in that country. This indicates that the company has strong financial immunity. Companies with financial immunity will be more immune to corporate risks. As a result, investors are

interested in investing because companies' prospects are good so that they can get high returns. The number of investors interested in investing increases companies' stock prices and value.

The US-China trade war has made the condition of several countries unstable both from company and market performance and the countries' economic conditions aspects (Ding et al., 2021; Zaremba et al., 2021). Direct impact occurs mainly in countries directly involved in the trade war, namely the US and China. Conditions before and during the trade war are different because some cash flows should have entered but are hampered or even stopped. In consequence, the financial immunity of companies in the countries also decreases. In such conditions, investors will re-select their investment. Companies that are significantly affected will be reflected in their low level of financial immunity. As a result, there is a tendency that these stock investments will be less attractive to investors, thus decreasing stock prices and stock returns.

- H1. Financial immunity has a positive effect on stock returns.
- H2. Financial immunity will be lower during the US-China trade war.
- H3. Stock returns will be lower during the US-China trade war.

2.5. Financial immunity, financial distress, and stock return

As time goes by, companies must continue running their business and dealing with fierce competition. In this condition, companies must provide the best service and have competitive prices in meeting consumer demand (Almamy et al., 2016; Andreou et al., 2021). If companies cannot meet consumer demand, they will go bankrupt sooner or later because there is no cash inflow. As a result, they are experiencing financial difficulties reflected by their difficulties paying their obligations to creditors or suppliers of funds. Companies with strong financial immunity but high financial distress would have lower immunity. Financial distress will also give a signal to investors that companies are experiencing high financial risk. The risk that investors do not tolerate makes the companies unattractive (C. He et al., 2021). Consequently, the companies' stock prices will decrease. During the US-China trade war, companies' performance and the market and economic conditions of a country were more unstable, resulting in a crisis due to high economic uncertainty. Companies in this condition are more vulnerable, so that financial distress will increase.

- H4. Financial distress moderates financial immunity to stock returns.
- H5. Financial distress will be higher during the US-China trade war.

3. Research method

3.1. Data and sample

The research data used must meet the criteria: first, the companies were listed on the Indonesia Stock Exchange and the Shanghai Stock Exchange in 2016–2019. Second, Indonesia's and China's economic and government interventions data were taken from the official World Bank website. Third, all required data, including control variables, were available. Based on these criteria, the research samples were 767 observations in Indonesia and 736 observations in China. This study employed two regression models: single interaction panel data regression and multiple interaction panel data regression with a pair sample-test to determine the impact before and during the US-China trade war. The input data were balanced data, meaning that the same company was compared from time to time. The reason is that this study intends to analyze the financial immunity and vulnerability of the same company from time to time during the US-China trade war. The regression model specification test using the Chow Test resulted in the Fixed Effects Model as the best model (cross-section Chi-square probability <5%), and the Hausman test results also resulted in the Fixed Effects Model as the best model (cross-section random probability <5%). Panel data combined

cross-section and time-series data making it more informative, efficient, dynamic and avoiding multicollinearity problems to minimize bias when aggregating from individuals to broader generalizations. Regression model specification of the response variable for the fixed effects model can overcome the common effects model limitations.

The dependent variable of this study is stock return, which is a percentage of the return earned by investors for the risk they bear on an investment. The greater the expected return from the investment, the higher the risk will be, so it is said that the expected return has a positive relationship with risk. The formula used to measure the stock return is as follows:

$$\text{Stock Return}_{i,t} = \frac{\text{stock price}_{i,t} - \text{stock price}_{i,t-1}}{\text{Stock price}_{i,t-1}} \quad (5)$$

The independent variable of this study is financial immunity, which is measured multidimensionally with three main aspects, namely financial and market performance, economic conditions of a country, and government interventions. The moderating variable in this study is financial distress, which is measured using the Zmijewski method. The control variables used are Tobin's-Q, which is the ratio between the market capitalization value and companies' book value and firm size, which is calculated using the logarithm of total assets. Tobin's-Q is needed to see stock performance from a market perspective, while firm size is needed to naturalize the variation in companies' total assets of high total assets and low total assets on the Indonesia Stock Exchange and the Shanghai Stock Exchange. The trade war is a dummy variable. 1 is given for the period during the trade war of 2018–2019, while 0 is for the period before the trade war of 2016–2017. Meanwhile, the trade war dummy variable separates the analysis on two conditions: before and during the US-China trade war.

3.2. Statistical method

The model for testing the hypothesis in this study is as follows:

Model 1: Testing is done using panel data regression.

H1: Financial immunity to stock returns without being moderated by financial distress

$$R_{i,t} = \alpha + ROA_{i,t} + BMV_{i,t} + PER_{i,t} + GDP_{i,t} + IF_{i,t} + CSR_{i,t} + SIZE_{i,t} + TOBINSQ_{i,t} + WAR_t + \varepsilon_{i,t} \quad (6)$$

H4: Financial immunity to stock returns moderated by financial distress

$$R_{i,t} = \alpha + ROA_{i,t} + BMV_{i,t} + PER_{i,t} + GDP_{i,t} + IF_{i,t} + CSR_{i,t} + FD_{i,t} + FD*ROA_{i,t} + FD*BMV_{i,t} + FD*PER_{i,t} + FD*GDP_{i,t} + FD*IF_{i,t} + FD*CSR_{i,t} + SIZE_{i,t} + TOBINSQ_{i,t} + WAR_t + \varepsilon_{i,t} \quad (7)$$

Where, $R_{i,t}$ is stock return rate, $ROA_{i,t}$ is return on assets, $BMV_{i,t}$ is book to market value, $PER_{i,t}$ is price earnings ratio, $GDP_{i,t}$ is gross domestic product, $IF_{i,t}$ is inflation, $CSR_{i,t}$ is corporate social responsibility, $FD_{i,t}$ is financial distress, $SIZE_{i,t}$ is firm size, $TOBINSQ_{i,t}$ is company's financial performance, WAR_t is dummy variable, 1 is for after the trade war, and 0 is for before trade war.

Model 2: Testing is done using pairwise.

H2: Financial immunity will be lower during the US-China trade war.

H3: Stock returns will be lower during the US-China trade war.

H5: Financial distress will be higher during the US-China trade war.

4. Results

Table 2 presents the test results of the effect of financial immunity on stock returns (see Table 1).

Tests were conducted on 767 companies in Indonesia and 736 companies in China (SSE). In Table 2 for H1, financial immunity, as indicated by the ROA, BMV, PER, GDP, IF, and CSR proxies, has a different

Table 1. Research model (Pairwise Testing).

Model	Objection	Formula
Model 2	Pairwise Test Before and during the Trade War US-China: Stock Returns and Independent Variable	$xR_{after} \neq xR_{before}$ $xROA_{after} < xROA_{before}$ $xBMV_{after} < xBMV_{before}$ $xPER_{after} < xPER_{before}$ $xGDP_{after} < xGDP_{before}$ $xIF_{after} < xIF_{before}$ $xCSR_{after} < xCSR_{before}$ $xFD_{after} > xFD_{before}$

direction of relationship and significance level both between variables and between countries. Indonesia and China both have a negative direction on BMV and IF. The PER ratio has an insignificant effect on stock returns in Indonesia, while it has a significant positive effect in China. The ROA, GDP, and CSR ratios have a significant positive effect on returns in Indonesia and China. WAR shows that the dummy variable before and during the US-China trade war also has the same results, which is a significant negative effect. The control variables of size and Tobin's-Q have a significant positive effect on returns in Indonesia and China. The adjusted R-Squared value for Indonesia and China are almost similar: 0.017 for Indonesia and 0.019 for China. In the first testing without using a moderating variable, Indonesia's adjusted R-Squared was lower than China's adjusted R-Squared.

In Table 2 for H4, ROA, GDP, and CSR have a significant positive effect on returns in Indonesia. Meanwhile, PER has no significant effect on returns in Indonesia. In contrast to Indonesia, ROA, PER, GDP, and CSR in China have a significant positive effect on returns. Financial distress has a significant negative effect on Indonesia's returns, and on the contrary, China's financial distress has no significant effect on returns.

Table 3 presents the results of the matched test or Paired Samples T-Test for hypothesis testing. There are differences in results between countries and between variables caused by the US-China trade war. This table also shows the results of hypotheses 2, 3, and 5 of this study. Hypothesis 2 is accepted as financial immunity is proven to be lower during the US-China trade war in Indonesia and China. Hypothesis 3 is accepted as stock returns are lower during the US-China trade war. Hypothesis 5 is accepted as financial distress is higher during the US-China trade war in Indonesia and China.

5. Discussion

5.1. Financial immunity and stock return

Financial immunity is indicated by the ROA, BMV, PER, GDP, IF, and CSR variables. ROA reflects the ability of company managers to manage company assets. Managers who are good in asset management (Ding et al., 2021; Grundke and Moser, 2019; C. He et al., 2021) can attract investors to buy companies' stocks. The ability of managers will have an impact on companies' financial condition, especially in making a profit. The BMV and IF variables have a negative direction, indicating that the higher the BMV and IF, the lower the resulting returns. BMV reflects companies' value compared to their market value. A high BMV does not provide a favorable stock price difference for the companies. While IF reflects an increase in the overall price of goods in a country. Thus, domestic goods are less preferable because they seem expensive, and consequently, people prefer foreign or imported goods. This results in unattractive domestic investment for investors leading to stock prices tend to fall.

Both Indonesia and China (SSE) experienced changes after the US-China trade war. The results of this study are in line with research conducted by Grundke and Moser (2019) and He et al. (2021). The US-China trade war leads to unstable company performance and state income (Ding et al., 2021; Zaremba et al., 2021). CSR is also a corporate strategy in forming a positive brand image as a company that cares about the

environment and obeys government regulations (Ajina, 2019; Alsaadi et al., 2017; Boubaker et al., 2020). Socially responsible companies that have suitable investments attract more investors. The war variable is used to see conditions before and during the US-China trade war. A significant negative result indicates that financial immunity and returns in Indonesia and China diminish during the US-China trade war. Companies with financial immunity will be more immune to risk, so investors are interested in investing in the companies because the companies' prospects are good. The hope is that investors get high returns because of the tendency for the companies' stock prices and stock value to increase. This premise is supported by Dogah (2021) that reveals the effect of trade policy uncertainty on economic policy uncertainty in the ASEAN region. This domino effect is due to the trade war involving the two countries with the largest global trade so that the policies issued by the two countries have global effects and a domino effect (Li et al., 2020). In line with He et al. (2021), this present study proves that the US-China trade war significantly reduces financial immunity and stock returns in China and Indonesia.

5.2. Financial immunity, financial distress, and stock return

Financial distress has a significant negative effect on Indonesia's returns, and on the contrary, China's financial distress has no significant effect on returns. This difference in results is possible because the financial distress experienced by different country levels gives different results. Even in an unfavorable condition, it turns out that companies in China can still survive in overcoming financial distress. As one of the countries with a strong economy, companies in China can still pay their short- and long-term obligations during the US-China trade war. Meanwhile, financial distress in Indonesia weakens financial immunity so that the resulting return will decrease. Different results are found in China in which the financial distress has not reached the limit that can reduce financial immunity; thus, the immunity level is still acceptable, which subsequently makes stock returns is still controllable.

These results are supported by Chang (2021) and Yu and Huang (2021), which recommend that the impact of economic policy uncertainty on stock market volatility is highly dependent on each country's characteristics. The impact of the US-China trade war on the Indonesia Stock Exchange and the Shanghai Stock Exchange has increased the uncertainty of government policies for business regulations, primarily on the determination of product prices and costs in international trade traffic. There was a significant reaction from stock market participants on policies during the US-China trade war, which greatly influenced investment decisions. Trade policy uncertainty impacts a volatile economy, causing investors to behave more conservatively. Investors save their assets through safer investment allocations to anticipate potential ongoing risks. Therefore, during the US-China trade war, trade policy uncertainty has caused economic policy uncertainty, thus triggering systemic risks in ASEAN markets, including Indonesia. Dogah (2021) reveals that bilateral relations and trade affect policy uncertainty. This is understandable considering that the US and China are essential players in the global economy, owners of capitalization, and investing large amounts of money in many countries.

China's trade policy uncertainty contributes to the most substantial contagion effect on ASEAN markets, including Indonesia. Therefore, a solid bilateral trade relationship between China and Indonesia from the supply side is a critical determinant of corporate financial immunity to the global policy uncertainty challenge. This relationship is further strengthened by the high trade dependence and transnational investment associations between China and ASEAN (Yang et al., 2021). At first, the impact of the US policy uncertainty was very significant, but its impact on the ASEAN market gradually began to diminish (Dogah, 2021). Controlling the uncertainty is very strategic because it will likely weaken companies' financial immunity. Gerrans, Faff and Hartnett (2015) examine that some investors shift risky assets in their portfolios when the economic crisis hits the world. This value creation is backed up by

Table 2. Financial immunity, financial distress, and stock return (Model 1).

Variable	H1						H4					
	Indonesia			Shanghai			Indonesia			Shanghai		
	Standardized Coefficients	t	Sig.	Standardized Coefficients	t	Sig.	Standardized Coefficients	t	Sig.	Standardized Coefficients	t	Sig.
(Constant)		-2.071	0.039**		-1.836	0.011**		-2.278	0.023**		-1.921	0.031**
ROA	0.098	0.152	0.079*	0.958	1.210	0.056*	0.005	0.044	0.065*	0.643	1.231	0.016**
BMV	-0.870	-1.314	0.189	-0.093	-0.229	0.029**	-0.149	-0.300	0.064*	-0.071	-0.172	0.072*
PER	0.931	1.654	0.199	0.241	0.261	0.043**	0.002	0.038	0.143	0.064	0.129	0.021**
GDP	1.321	2.142	0.032**	0.924	1.926	0.016**	1.197	2.149	0.032**	0.785	1.273	0.044**
IF	-1.421	-2.426	0.615	-0.879	-1.162	0.125	-1.217	-0.515	0.607	-0.890	-1.291	0.218
CSR	0.991	1.290	0.097*	0.195	0.252	0.055*	0.051	0.812	0.017**	0.129	0.217	0.091*
FD							-1.168	-1.323	0.086*	0.912	1.721	0.122
ROAFD							0.001	0.009	0.048**	0.731	1.284	0.025**
BMVFD							-1.074	-0.608	0.043**	-0.199	-0.213	0.081*
PERFD							1.059	1.615	0.107	0.347	0.732	0.021**
GDPFD							0.017	0.010	0.088*	0.093	0.115	0.027**
IFFD							-0.241	-1.163	0.025**	-0.953	-1.233	0.128
CSRFD							0.923	1.086	0.078*	0.109	0.121	0.021**
Size	0.082	0.144	0.086*	0.182	0.237	0.019**	-0.032	-0.180	0.057*	0.117	0.177	0.067*
Tobin's Q	0.182	0.277	0.082*	0.085	0.143	0.042**	0.048	0.254	0.099*	0.493	0.453	0.083*
War	-1.392	-2.341	0.020**	-0.932	-1.121	0.018	-1.298	-2.350	0.019**	-0.978	-1.221	0.027**
N			767			736			767			736
Adj. Rsquare			0.017			0.019			0.020			0.017
F-stat			4.956			4.673			5.704			4.973

***significant at 1%.
 **significant at 5%.
 *significant at 10%.

Table 3. Financial immunity before and during the US-China Trade War. (Model 2: H2, H3, and H5).

Variable	WAR	Indonesia		China	
		F	Sig	F	Sig
ROA	1	7.047	0.088*	6.521	0.018**
	0				
BMV	1	10.030	0.015**	8.324	0.025**
	0				
PER	1	0.717	0.240	1.217	0.139
	0				
GDP	1	0.456	0.000**	1.236	0.000***
	0				
IF	1	6.500	0.000**	2.124	0.000***
	0				
CSR	1	0.799	0.091*	1.533	0.032**
	0				
FD	1	0.745	0.061*	1.491	0.047**
	0				

***significant at 1%.
 **significant at 5%.
 *significant at 10%.

government policies in each country to retain a conducive business climate and acceleration to maintain companies' economic value.

6. Conclusions, suggestions, and implications

Financial immunity from the impact of the US-China trade war has never been studied, especially in developing countries like Indonesia. The multi-country analysis in this study reveals that financial immunity

has a direct impact on the US-China and an indirect impact on Indonesia as the largest export destination country. The economic impact felt by Indonesia is very significant as Indonesia's trade balance is in a deficit position compared to China. This becomes more serious because Indonesia's largest non-oil and gas import market is China. Meanwhile, Indonesia is not overly dependent on imports from the US.

The test results of model 1 show that financial immunity has a positive effect on returns in Indonesia and China. While the moderating variable in the two countries shows different results. Indonesia's financial distress has a significant negative effect on returns, and on the contrary, China's financial distress has no significant effect on returns. The test results of model 2 reveal that both Indonesia and China experience changes in financial immunity, stock returns, and financial distress after the US-China trade war. This reflects that the US-China trade war has significantly affected both macroeconomic and firm performance.

For future research, it is recommended to develop further from the policy aspect to see which policy uncertainty fundamentally contributes to the most significant impact on the systemic risk of capital markets in China and Indonesia during the US-China trade war. A previous study by Dogah (2021) revealed that the significant effect of risk has shifted from developed to developing countries, and the most significant influence was triggered by uncertainty in economic policies from China to countries in ASEAN, while the impact from the US gradually began to diminish. Although the US initially triggered the trade war, China is currently the most influential contributor to regional systemic risks related to financial immunity.

This present study can have implications for companies in developing and developed countries and policy-making bodies in a country. This suggests structuring China's economic and trade policies in emerging markets because trade connectivity is the main source of risk contagion. While future concerns will be on counter-macroprudential policy-making that hedges against market volatility to maintain financial immunity. The strategy taken can be done through exposure to collaboration in

international trade policies because it is presumed that developing countries cause uncertainty shocks. Therefore, to improve financial immunity after the US-China trade war, it is necessary to consider reforming regional capital market investment connectivity policies in dealing with the ASEAN and Chinese economic swells.

The multi-country analysis performed in this study does not involve all developing countries, especially ASEAN countries other than Indonesia. Therefore, the impact of the US-China trade war on emerging markets could not be fully revealed for each ASEAN country. Moreover, it is necessary to consider dimensions that have the potential to affect financial immunity and vulnerability in times of crisis, namely during the US-China trade war.

Declarations

Author contribution statement

Liliana Inggrit Wijaya and Zunairoh Zunairoh: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Rizky Eriandani: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

I Made Narsa: Contributed reagents, materials, analysis tools or data.

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Data will be made available on request.

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The authors declare no conflict of interest.

Additional information

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References

- Adekola, T.A., 2019. US – China trade war and the WTO dispute settlement mechanism. *J. Int. Trade Law Pol.* 18 (3), 125–135.
- Ajina, A., 2019. Does Corporate Social Responsibility Reduce Earnings Management? The Moderating Role of Corporate Governance and Ownership. *La responsabilité sociale des entreprises réduit-elle la gestion des Gouvernance and Ownership.*
- Almamy, J., Aston, J., Ngwa, L.N., 2016. An evaluation of Altman's Z-score using cash flow ratio to predict corporate failure amid the recent financial crisis: evidence from the UK. *J. Corp. Finance* 36, 278–285.
- Alsaadi, A., Ebrahim, M.S., Jaafar, A., 2017. Corporate social responsibility, Shariah-compliance, and earnings quality. *J. Financ. Serv. Res.* 51, 169–194.
- An, J., Mikhaylov, A., Richter, U.H., 2020. Trade war effects: evidence from sectors of energy and resources in Africa. *Heliyon* 6 (November), e05693.
- Andreou, C.K., Andreou, P.C., Lambertides, N., 2021. Financial distress risk and stock price crashes. *J. Corp. Finance* 67 (December 2020), 101870.
- Bose, U., Filomeni, S., Mallick, S., 2021. Does bankruptcy law improve the fate of distressed firms? The role of credit channels. *J. Corp. Finance* 68 (December 2020), 101836.
- Boubaker, Sabri, Cellier, Alexis, Manita, Riadh, Saeed, A., 2020. Does Corporate Social Responsibility Reduce Financial Distress Risk? (October).
- BPS., 2020. *Expor dan Impor*. Retrieved from <https://www.bps.go.id/exim/>.
- Chang, K., 2021. Do economic policy uncertainty indices matter in joint volatility cycles between U.S. and Japanese stock markets. *Finance Res. Lett.* (December 2020), 102579.
- Costa, G. F. Da, Sukartha, I.M., 2020. Perbandingan Reaksi Pasar di AS, China dan Indonesia terhadap Perundingan Perang Dagang AS-China. *E-Jurnal Akuntansi* 30 (9), 2270–2280.
- Cui, C., Li, L.S., 2021. The effect of the US – China trade war on Chinese new firm entry. *Econ. Lett.* 203, 109846.
- Ding, W., Levine, R., Lin, C., Xie, W., 2021. Corporate immunity to the COVID-19 pandemic. *J. Financ. Econ.* 141 (2), 802–830.
- Dogah, K.E., 2021. Effect of trade and economic policy uncertainties on regional systemic risk: evidence from ASEAN. *Econ. Modell.* 104 (August), 105625.
- Durand, R., Vergne, J., 2014. Asset divestment as a response to media attacks IN stigmatized industries. *Strat. Manag. J.* 36 (8).
- Feng, X., Groh, A., Wang, Y., 2020. Board diversity and CSR. *Global Finance J.* (September), 100578.
- Gerrans, P., Faff, R., Hartnett, N., 2015. Individual financial risk tolerance and the global financial crisis. *Account. Finance* 55 (September 2013), 165–185.
- Giuseppina, M., 2021. CSR & financial performance: facing methodological and modeling issues commentary paper to the eponymous FRL article collection. *Finance Res. Lett.* (xxxx), 102036.
- Grundke, R., Moser, C., 2019. Hidden protectionism? Evidence from non-tariff barriers to trade in the United States. *J. Int. Econ.* 117, 143–157.
- He, C., Mau, K., Xu, M., 2021a. Trade shocks and firms hiring decisions: evidence from vacancy postings of Chinese firms in the trade war. *Lab. Econ.* 71 (June), 102021.
- He, F., Lucey, B., Wang, Z., 2021b. Trade policy uncertainty and its impact on the stock market -evidence from China-US trade conflict. *Finance Res. Lett.* 40 (September 2020), 101753.
- Hsu, F., Chen, S., 2021. US quantitative easing and firm's default risk: the role of Corporate Social Responsibility (CSR). *Q. Rev. Econ. Finance* 80, 650–664.
- Hu, G.X., Wang, J., 2018. Chinese Capital Market: an Empirical Overview. Retrieved from https://www.nber.org/system/files/working_papers/w24346/w24346.pdf.
- Inaba, K., 2020. Information-driven stock return comovements across countries. *Res. Int. Bus. Finance* 51 (August 2019), 101093.
- Joseph, C., Gunawan, J., Sawani, Y., Rahmat, M., Avelind, J., Darus, F., 2016. A comparative study of anti-corruption practice disclosure among Malaysian and Indonesian Corporate Social Responsibility (CSR) best practice companies. *J. Clean. Prod.* 112, 2896–2906.
- Kida, N., 2020. Impact of investment, trade and income per capita on the growth of the manufacturing in kosovo. *Int. J. Econ. Bus. Admin.* VIII (1), 425–432.
- Kong, X., Pan, Y., Sun, H., Taghizadeh-hesary, F., 2020. Can environmental corporate social responsibility reduce firms' idiosyncratic risk? evidence from. *Front. Environ. Sci.* 8 (December), 1–15.
- Lai, E.L., 2019. The US – China trade war, the American public opinions and its effects on China. *Econ. Politic. Stud.* 7 (2), 169–184.
- Li, Y., Zhuang, X., Wang, J., Zhang, W., 2020. North American Journal of Economics and Finance Analysis of the impact of Sino-US trade friction on China's stock market based on complex networks. *N. Am. J. Econ. Finance* 52 (February), 101185.
- McKibbin, W.F., 2020. Global Macroeconomic Scenarios of the COVID-19 Pandemic. Centre for Applied Macroeconomic Analysis.
- Michalkova, L., Adamko, P., Kovacova, M., 2018. The analysis of causes of business financial distress. *Adv. Econ. Bus. Manag. Res.* 56 (January), 49–52.
- Nugroho, A., Irawan, T., Amaliah, S., 2021. Does the US – China trade war increase poverty in a developing country? A dynamic general equilibrium analysis for Indonesia. *Econ. Anal. Pol.* 71, 279–290.
- Prager, D.L., Burns, C.B., Miller, N.J., 2018. How Do Financially Vulnerable Farms Finance Debt in Periods of Falling Prices?, pp. 412–424.
- Qiu, W., Rudkin, S., Dlotko, P., 2020. Expert Systems with Applications Refining understanding of corporate failure through a topological data analysis mapping of Altman's Z-score model. *Expert Syst. Appl.* 156, 113475.
- Saputri, N.A., Malang, U.M., Effendi, Y., Malang, U.M., 2021. ANALISIS financial distress pada PERUSAHAAN AGRIBISNIS dalam MENGHADAPI COVID-19. *Jurnal Akuntansi Indonesia* 17 (1).
- Shi, Y., Wang, L., Ke, J., 2021. Does the US-China trade war affect co-movements between US and Chinese stock markets. *Res. Int. Bus. Finance* 58 (May), 101477.
- Singh, K., Misra, M., 2021. Linking corporate social responsibility (CSR) and organizational performance: the moderating effect of corporate reputation. *European Research on Management and Business Economics* 27 (1), 100139.
- Steinbock, D., 2018. U.S.-China trade war and its global impacts. *China Quart. Int. Strat. Stud.* 4 (4), 515–542.
- Takahashi, H., Yamada, K., 2021. International Review of Financial Analysis when the Japanese stock market meets COVID-19: impact of ownership, China and US exposure, and ESG channels. *Int. Rev. Financ. Anal.* 74 (June 2020), 101670.
- Thampanya, N., Wu, J., Ali, M., Liu, J., 2020. Fundamental and behavioural determinants of stock return volatility in ASEAN-5 countries. *J. Int. Financ. Mark. Inst. Money* 65, 101193.
- Worldbank., 2020. World Bank national accounts data, and OECD National Accounts data files. Retrieved from <https://data.worldbank.org/country/CN>.
- WTO., 2020. United States — Tariff measures on certain goods from China. Retrieved from https://www.wto.org/english/tratop_e/dispu_e/dispu_e543r_e.pdf.
- Wu, Y., Turvey, C.G., 2021. The impact of the China – USA trade war on USA Chapter 12 farm bankruptcies. *Agric. Finance Rev.* 81 (3), 386–414.
- Wulandari, D.A., Inayah, A., 2021. The impact of China's belt and road initiative on Indonesia's export to China introduc on. *J. World Trade Stud.* 6 (1), 1–14.
- Xu, Y., Lien, D., 2020. Dynamic exchange rate dependences: the effect of the U.S. -China trade war. *J. Int. Financ. Mark. Inst. Money* 68, 101238.
- Yang, W., Xue, F., Shi, J., Shao, Y., Wang, D., 2021. Factors affecting the trade dependence relationship of asian countries with China: implications for China's belt and road initiative. *Sustainability* 13 (10844).
- Yu, X., Huang, Y., 2021. The impact of economic policy uncertainty on stock volatility: evidence from GARCH – MIDAS approach. *Physica A* 570, 125794.
- Zaremba, A., Kizys, R., Tzouvanas, P., Aharon, D.Y., Demir, E., 2021. The quest for multidimensional financial immunity to the COVID-19 pandemic: evidence from international stock markets. *J. Int. Financ. Mark. Inst. Money* 71, 101284.

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Assoc. Prof. Jonathan Chan

Assoc. Prof. Jonathan H. Chan is an associate professor of computer science and a co-founder of D-Lab at the School of Information Technology, King Mongkut's University of Technology Thonburi, Thailand. Jonathan holds a Ph.D. from the University of Toronto, where he has also served as a visiting professor. In addition to his role as the section editor of *Heliyon Computer science*, Dr. Chan is an action editor of *Neural Networks*, and a member of the editorial boards of *International Journal of Machine Intelligence and Sensory Signal Processing*, *International Journal of Swarm Intelligence*, and *Proceedings in Adaptation, Learning and Optimization*.

Dr. Chan is a founding member and a current VP of the IEEE-CIS Thailand Chapter, and a senior member of IEEE, ACM, and INNS, a member of the Professional Engineers of Ontario (PEO), and a governing board member of APNNS. He also holds an NVIDIA Deep Learning Institute (DLI) University Ambassadorship and is a certified DLI instructor. His research interests include intelligent systems, biomedical informatics, and data science and machine learning in general.

Dentistry

Meet the full editorial team for [Heliyon Dentistry](#).



Gaetano Isola, PhD

Dr. Gaetano Isola qualified in Dentistry at the University of Messina, Italy and obtained his PhD in "Physiopathology of the Stomatognathic Apparatus and Dental Materials" at the University of Turin, Italy. He is a visiting research fellow at the Laboratory of the Study of Calcified Tissues and Biomaterials at the Department of Periodontology, Université de Montréal, Canada. Dr. Isola did an advanced course in periodontology at the University of Ferrara and a 3-year certificate in oral surgery at the University of Naples "Federico II." He is a visiting Professor at the Department of Periodontology, University of North Carolina at Chapel Hill, USA and at the Department of Oral Surgery, University of Granada, Spain. He is also a visiting researcher at the Department of Implantology and Oral Surgery, University of Bern, Switzerland, and the Department of Periodontology, Eastman Dental Institute, London.

Dr. Isola is an active member of the Italian Society of Oral Surgery (SIdCO) and of the International Piezoelectric Surgery Academy (IPA). He serves on the board of the International Association of Dental Research (IADR) and is a member of the Italian Society of Periodontology (SIdP), as well as an active member of the International IADR Constitution Committee of the International Association of Dental Research (IADR) (2016–2019 and 2019–2022).

His main research interests focus on the clinical, biological, and pharmacological aspects of periodontitis, and the relationship between oral health and systemic health and the pre-neoplastic disorders.

Earth science

Meet the full editorial team for [Heliyon Earth science](#).



Prof. Andrew S. Hursthouse

Professor Hursthouse is a professor of environmental geochemistry at the University of the West of Scotland (UWS) and holds a Ph.D. in environmental radioactivity from University of Glasgow and a B.Sc. degree in geochemistry from University of Reading. He holds a 100 talent high-end expert fellowship at Hunan University of Science & Technology, Xiangtan, PRC. He has editorial roles in several earth and environmental science journals and has worked in academic and industrial research environments.

Professor Hursthouse's areas of interest and expertise are in earth process interactions and the environmental geochemistry of metallic elements, resource exploitation and implications for human health, and this approach also applied to environmental pollution, industrial processes, economic development and society; remediation and treatment of chemical pollution; chemical and environmental hazards, waste and environmental management and regulation.

Education

Meet the full editorial team for [Heliyon Education](#).



Prof. David González-Gómez

Heliyon Education is led by Section Editor David González-Gómez, Ph.D. Dr. González-Gómez is a Professor in the Department of Science and Mathematics Education and the Dean of the Teaching Trainer School at the University of Extremadura (Spain). Dr. González-Gómez is known internationally for work in science education; science, technology, engineering, and mathematics (STEM); active learning methodologies for teaching science; affective domain in the science learning process; education for the sustainability; SDGs. Currently, he is an advisory council of the Science, Technology, and Innovation of Extremadura government in Spain.

Energy

Meet the full editorial team for [Heliyon Energy](#).



Dr. Socrates Kaplanis

Prof. Socrates Kaplanis obtained his degree in physics from University Thessaloniki, a MSc in nuclear reactors from Aston University, and a PhD in radiation detection and modelling from the University Patra. He has held academic positions including professor of renewable energy systems at the Technological Educational Institute of Patra, head of the renewable energy systems laboratory, honorary professor and doctor honoris causa at the Transylvania University in Brasov, and as a visiting professor at the University of

Applied Sciences in Aachen, Germany.

Prof. Kaplanis has a research background in solar radiation, prediction modelling, zero and intelligent energy buildings, PV systems engineering, solar thermal engineering, and PV based hybrid systems. He has held various posts, including president of the Technological Educational Institute of Patra, president of the Technological Educational Institute of Western Greece, and vice-president and President of the European Institutions in Higher Education (EURASHE).

Engineering

Meet the full editorial team for [Heliyon Engineering](#).



Prof. Andrea Francesco Morabito

Professor Andrea Francesco Morabito received his Ph.D. in computer, biomedical, and telecommunications engineering from the University of Reggio Calabria, Italy, where he has also served as an assistant professor in electromagnetic fields since 2010. His research work is mainly focused on models and effective strategies for the solution of inverse problems, in particular, antenna synthesis, phase retrieval, and electromagnetic inverse scattering.



Prof. Mohammad Mehdi Rashidi

Professor Mohammad Mehdi Rashidi received his Ph.D. in mechanical engineering from Tarbiat Modares University, Iran. He is currently a professor of mechanical engineering at Tongji University in Shanghai, China, and previously taught at Bu-Ali University in Iran. Prof. Rashidi was named a 2018 highly cited researcher by Clarivate Analytics.

Environment

Meet the full editorial team for [Heliyon Environment](#).



Prof. Frederic Coulon

Professor Frederic Coulon holds a chair in Environmental Chemistry & Microbiology at Cranfield University, UK. In addition to his position as section editor for *Heliyon Environment*, Prof. Coulon is an associate editor for *Environment International* and *Science of the Total Environment*. His professional interests include: soil and water chemistry; fate and transport of chemicals in surface and subsurface waters; water and wastewater treatment; soil and sediment treatment; hazardous waste site remediation; energy and environment; population and environment; and public communication of environmental science and engineering. His research achievements address international priorities under the umbrella of the Water-Soil-Waste nexus across sectors and scales. His work is premised on the understanding that environmental resources are inextricably intertwined and therefore there is a need of advancing a nexus approach to enable integrated and sustainable management of water, soil and waste systems.



Prof. Christian Sonne

Professor Christian Sonne, DVM, PhD, DScVetMed, Dipl. ECZM-EBVS, holds a professorship in veterinary ecotoxicology and wildlife medicine at Aarhus University, Denmark. In addition to his position as section editor for *Heliyon Environment*, Prof. Sonne serves as special issues editor for *Environmental Pollution*. Since 1997, Prof. Sonne has specialized in the cross-field of biological effects from exposure to environmental chemicals, diseases and climate change, giving him a unique insight and profile working with a broad range of animals including predatory mammals, raptorial birds, sea birds, fish and humans. He has a broad insight and interest in internal and reproductive organs (histopathology, size, and morphology), skeletal system (bone density and morphology using e.g. DXA scanning), immune system (intra dermal testing of lymphocyte functioning, immune globulin production and cytokine and APP expressions), endocrine system (steroid and peptide hormones), PBPK modelling, blood biochemistry and infectious diseases (zoonosis). Prof. Sonne uses his global network to obtain interdisciplinary research results. Since 2015, he has applied his in-depth knowledge and understanding of biological processes to also include specific un-solved wildlife issues in Denmark (eider duck population declines) and health of raptors. Recently his innovative approaches have led to the first interactions with private industry focusing on natural resources developments and translational medicine within insulation, osteoporosis and metabolic syndrome. Prof. Sonne also specializes in surgical field implantations of intra-coelomic (abdominally) and subcutaneously satellite transmitters (PTTs) in various sea bird species and immobilization of deer spp.

Food science and nutrition

Meet the full editorial team for [Heliyon Food science and nutrition](#).



Dr. Lilian Mariutti

Dr. Lilian R. B. Mariutti received her master and doctorate degrees in food science from the School of Food Engineering - University of Campinas, Brazil, where she currently has a position as assistant professor. She was a researcher fellow in the Laboratory of Veterinary Drug Residues of the Brazilian Ministry of Agriculture, Livestock and Food Supply. Her research focuses on the identification and bioaccessibility of bioactive compounds and lipids and design of food ingredients from non-conventional sources.

Genetics

Meet the full editorial team for [Heliyon Genetics](#).



Qiang Wu, PhD

Dr. Qiang Wu is an associate professor in the State Key Laboratory of Quality Research in Chinese Medicine, Macau University of Science and Technology. He obtained his Ph.D degree from National University of Singapore in 2003. He then received his postdoc training in Genome Institute of Singapore (Mentor: Prof Huck Hui Ng) and the Gurdon Institute, University of Cambridge (mentor: Prof Magdalena Zernicka-Goetz). He went back to National University of Singapore as an assistant professor in 2009. He joined Macau University of Science and Technology in 2017.

Dr. Wu's research interest is to study how genetic and epigenetic factors determine stem cell fates and regulate cancer progression with a combination of molecular, cellular and high throughput approaches.

Global Health & Infectious Diseases

Meet the full editorial team for [Heliyon Global Health & Infectious Diseases](#).



Dr. Chaisiri Angkurawaranon

Public Health

[Chiang Mai University](#), Chiang Mai, Thailand

Chaisiri Angkurawaranon received his MD from Chiang Mai University and specialises in Family Medicine. He received a Masters in Medical Statistics and a PhD in Non-communicable Disease Epidemiology from the London School of Hygiene and Tropical Medicine. His research focuses on global health issues related to ageing and chronic conditions (both communicable and non-communicable) in primary care.



Assoc. Prof. Nitika Pant Pai

Infectious Disease

[McGill University](#), Montreal, Canada

Dr. Nitika Pant Pai is a tenured Associate Professor in the Department of Medicine at McGill University. Her global implementation research program for the past twenty years is focused on point-of-care diagnostics for HIV and other sexually transmitted blood borne infections; specifically the innovation, implementation and impact of digital strategies with rapid diagnostics and wearable solution. She develops integrated connected strategies with digital innovations, Bayesian diagnostics, artificial intelligence to plug health service delivery gaps in diagnostics in rapid diagnostics. She serves to inform domestic and global policy on point-of-care diagnostics.

Her research program is based in Canada, India and South Africa. She has led many diagnostic trials, cohort/cross sectional studies, meta-analyses, systematic reviews, modelling studies, to inform the gaps in policies to end the HIV epidemic. Her research has been supported by grants from the Canadian Institutes of Health Research, the FRQS, Grand Challenges Canada, Bill and Melinda Gates Foundation, National Institutes of Health, MRC SHIP, South African DST, IC-IMPACTS, Clinton Health Access Initiative, among others.

She has served on many technical working groups for national and international agencies: WHO, Foundation for Innovative Diagnostics, PSI, The Bill and Melinda Gates Foundation, ASLM, CDC, PHAC, REACH, among others. She has advised the office of the US Congress on multiplex testing. She has also contributed to HIV self-testing guidelines and policy guidance for HIV self-testing for the WHO. She serves the Strategic Advisory Board of the Foundation for Innovative Diagnostics and is on WHO's Roster of Digital Health Experts. She serves on the Editorial Board for biomedical journals and regularly reviews for key international health agencies.

She is an elected member of the College of New Scholars, Artists & Scientists of the Royal Society of Canada.

Immunology

Meet the full editorial team for [Heliyon Immunology](#).



Mats Waldemar Johansson, PhD

Immunology, Eosinophils

Dr. Mats W. Johansson received his PhD degree in biology within the research field of invertebrate immunology/innate immunity at Uppsala University, Sweden, was a postdoctoral fellow in cell biology at the Sanford Burnham Prebys Medical Discovery Institute, La Jolla, California, USA, and was then an Assistant and Associate Professor, and Director of Studies of biology at Uppsala University. He is currently a Senior Scientist and Research Professor (honorific) at the Morgridge Institute for Research, Madison, Wisconsin, USA, and affiliated as an Honorary Associate/Fellow with the Division of Allergy, Pulmonary and Critical Care Medicine of the Department of Medicine and the Department of Biomolecular Medicine, University of Wisconsin-Madison. Since coming to Madison he has done research on eosinophil biology, asthma, and eosinophilic esophagitis (EoE), and now recently also COVID-19.

Information Science

Meet the full editorial team for [Heliyon Information Science](#).



Prof. Gregorio González Alcaide

Gregorio González-Alcaide (PhD) is a full Professor at the Department of the History of Science and Library & Information Sciences, at the University of Valencia.

Dr. González Alcaide teaching activities include Bibliometrics, skills in writing and academic communication and processes for evaluating research activities. He has also worked to raise awareness on the importance of academic honesty, to discourage behaviors like plagiarism and to foster respect for the ethical principles that must guide the research and publication process.

His main line of research has focused on the study of scientific collaboration by means of Bibliometrics and social network analysis as research methodologies. His studies have aimed to determine the extent of cooperative practices, structural properties, and the characteristics of scientific networks at different analytical levels (authors, institutions, and countries) and in different disciplines or areas of knowledge. He has also investigated cooperative practices as a process and researchers' perceptions with regard to this phenomenon, combining quantitative and qualitative approaches based on surveys and interviews.

Materials science

Meet the full editorial team for [Heliyon Materials science](#).



Prof. Luis M. Gandía

Luis M. Gandía is a full professor of chemical engineering at the Public University of Navarre (UPNA) since 2010. Prof. Gandía obtained his Ph.D. in chemistry at the Faculty of Chemistry of the University of the Basque Country in Donostia/San Sebastián in 1993. He is a founding member of the Institute for Advanced Materials (InaMat) at UPNA. He is the head of a multi-disciplinary research team mainly working on renewable resources valorization and the development of catalytic materials for environmental and energy applications. His research interests include: preparation and physico-chemical characterization of heterogeneous catalysts; structured and micro-structured catalysts and chemical reactors; photocatalysis; biofuels and synthetic fuels; hydrogen energy; Li-ion batteries; methane conversion; CO₂ valorization and Computational Fluid Dynamics (CFD).

Mathematics

Meet the full editorial team for [Heliyon Mathematics](#).



Prof. Hermann J. Eberl

Dr. Hermann Eberl is a professor in the Department of Mathematics and Statistics at the University of Guelph (Canada), where he is also the director of the Biophysics Interdepartmental Graduate Program. Prior to joining the University of Guelph he obtained his graduate degrees (Dipl.Math., Dr.rer.nat) at the Technical University of Munich (Germany) and was a postdoctoral fellow first at the Delft University of Technology (the Netherlands), and then at the GSF National Research Center for Environment and Health in Oberschleissheim (Germany).

His research is in mathematical modelling, analysis, and simulation of biological systems and their interaction with their physical environment. This encompasses dynamical systems, partial differential equations, numerical analysis and scientific computing. The two primary strands of his research in recent years were the development and application of mathematical methods in biofilm research and mathematical modelling of honeybee colonies and their diseases.

Microbiology

Meet the full editorial team for [Heliyon Microbiology](#).



Assoc. Prof. Dana Stanley

Associate Professor Dana Stanley was awarded a PhD in molecular microbiology from Victoria University, Melbourne, in 2009. Her PhD project, "Generation and Characterisation of Ethanol-Tolerant *Saccharomyces cerevisiae* Mutants," investigated the molecular and metabolic determinants of ethanol tolerance in yeast and was awarded "the most outstanding PhD in 2009" by the University. Prof. Stanley held a postdoctoral position in CSIRO's Animal Health Laboratories (AAHL), one of the world's most sophisticated animal research laboratories, where she researched poultry intestinal health, specifically gut microbiota and genetics. Currently, Prof. Stanley is a leader of the molecular microbiology research cluster at Central Queensland University, focusing in human and livestock intestinal health, probiotic and next generation antibiotic development and pathogen control. She is working in collaboration with world's leading probiotic companies on research projects aiming to improve intestinal health of agricultural animals and humans. Prof. Stanley's work has been published in *Nature Medicine* (as the first author), *Nature Communications* and *Nature Immunology*.

Neuroscience

Meet the full editorial team for [Heliyon Neuroscience](#).



Assoc. Prof. Mario Tiberi

Dr. Mario Tiberi is a senior scientist at the Ottawa Hospital Research Institute's Neuroscience Program, and associate professor at the University of Ottawa Faculty of Medicine in the departments of medicine, cellular and molecular medicine, and psychiatry. He is also a member of the University of Ottawa Brain and Mind Research Institute. Dr. Tiberi completed his PhD in Pharmacology (1990) on opioid receptors at the Université de Montréal under the supervision of Dr. Jacques Magnan, before moving on to a very successful post-doctoral training at the Howard Hughes Medical Institutes at Duke University in Dr. Marc Caron's laboratory. It was during his postdoctoral training that Dr. Tiberi refined his area of research expertise in molecular biology and biochemistry of dopamine receptors. His research interests focus on dopamine receptors, G proteins, signal transduction, desensitization and phosphorylation. Dr. Tiberi's work aims to understand complex structure and molecular relationships of dopamine receptor signaling complexes using in vitro cellular systems and pre-clinical in vivo models, with the aim of aiding in the development of novel therapeutic strategies for brain disorders such as Parkinson's disease, stroke, schizophrenia and drug addiction. Dr. Tiberi has published over 50 scientific papers and edited two books. He has wide experience with undergrad and graduate student supervision as well as teaching. Many of his former graduate students have gone on to successful independent research careers.

Pharmaceutical science, pharmacology and toxicology

Meet the full editorial team for [Heliyon Pharmaceutical science, pharmacology and toxicology](#).



Prof. Emilio Clementi

Emilio Clementi graduated in medicine and surgery at the University of Milano, received his doctorate in pharmacotherapy at the University of Brescia to move as research fellow to the University College London. He is currently full professor of pharmacology and director of the clinical pharmacology unit of the National Health System at the University of Milano, co-opted member in the executive committee of the International Union of basic and clinical Pharmacology (IUPHAR).

He has published on the pathophysiology of nitric oxide and its relevance in therapeutic perspective, especially in skeletal muscle, and on pharmacokinetics, pharmacogenetics and pharmacoepidemiology in paediatrics. He is presently the editor in chief of pharmacological research.



Prof. Dimitrios Lamprou

Dimitrios Lamprou (Ph.D. MBA) is a reader in pharmaceutical engineering and the MSc programme director in industrial pharmaceuticals

at the School of Pharmacy in Queen's University Belfast (UK). He is also the chair at United Kingdom and Ireland Controlled Release Society (UKICRS). Dr. Lamprou specialises in the areas of pharmaceutical manufacturing & emerging technologies and his research and academic leadership have been recognised in a range of awards, including the Royal Pharmaceutical Society Science Award and the Scottish Universities Life Sciences Alliance Leaders Scheme Award. His group is applying nano and microfabrication techniques in pharmaceutical and medical device manufacturing, such as 3D printing & bioprinting, electrospinning and microfluidics.



Dr. Martin Leonard

Dr. Leonard obtained his PhD in pharmacology in 2000 from University College Dublin, Ireland. He has over 15 years' experience as a toxicologist focussed to developing and improving on models and methods for assessment of toxicological hazard, including the use of high content omics technology and iPSC in vitro models of the airway. Dr. Leonard is a European registered toxicologist and currently holds a position as principal toxicologist at Public Health England directing research into the mechanisms of allergen and particulate hazard associated with asthma and allergic airway disease. Dr. Leonard has published extensively in the fields of toxicology, cell biology and immunology. In addition to section editor at Heliyon, he is also associate editor for the journal *Toxicology in Vitro*.

Physics

Meet the full editorial team for [Heliyon Physics](#).



Prof. Gerald Cleaver

Gerald B. Cleaver earned his Ph.D. in early universe cosmology and string theory at Caltech. He is a professor and graduate program director of the department of physics at Baylor University in Waco, Texas. He also heads the Early Universe Cosmology and String Theory (EUCOS) division of Baylor's Center for Astrophysics, Space Physics and Engineering Research (CASPER).

With CASPER colleagues, Prof. Cleaver (i) explores quantum gravity effects in the early universe and the signatures of specific quantum gravity proposals, especially with regard to the cosmic microwave background (CMB), (ii) studies relativistic thermodynamics and physics & cosmology applications to cryptography, (iii) analyzes spacetime curvatures (and their possible divergences) for theorized spacetime wormholes, and (iv) investigates advanced spacecraft propulsion systems. Prof. Cleaver was a member of a NASA blue-ribbon review committee for advanced propulsion system proposals. He has written over 100 journal articles and conference proceedings, is co-author of an elementary particle physics textbook, author of six book chapters, on the editorial board of four science journals, and referee for nine physics journals.

Psychology

Meet the full editorial team for [Heliyon Psychology](#).



Dr. Pavica Sheldon

Prof. Pavica Sheldon received her PhD in communication studies from Louisiana State University, and currently serves as chair and associate professor in the Department of Communication Arts at University of Alabama in Huntsville. Dr. Sheldon is an author of three books and over 40 journal articles, studying uses and gratifications of social media, and also how people communicate forgiveness in interpersonal relationships.

Quantitative biology, biotechnology and bioengineering

Meet the full editorial team for [Heliyon quantitative biology, biotechnology and bioengineering](#).



Dr. Andrea de Martino

Andrea De Martino received his PhD in theoretical physics from SISSA (Trieste, Italy). He worked at the Hahn-Meitner-Institut (Berlin, Germany), the Italian Institute for the Physics of Matter (Rome, Italy) and Sapienza University (Rome) before joining the National Research Council and, more recently, the Italian Institute for Genomic Medicine in Turin, where he is part of the Statistical Inference & Computational Biology Unit.

Dr. De Martino is generally interested in the physics of living systems across multiple scales, from single cells to ecosystems. He works in broadly defined systems biology (computational & mathematical biology, genome-scale models, bioinformatics, etc.). Dr. De Martino's favorite questions revolve around the functional roles of cell-to-cell heterogeneities, the interplay between physiology and gene

expression in proliferating vs quiescent cells, the processing of information by biological networks, and the emergence of multi-cellular and population-level behavior.

Social science

Meet the full editorial team for *Heliyon Social science*.



Prof. P. Vigneswara Ilavarasan

P. Vigneswara Ilavarasan (PhD - IIT Kanpur) is a professor of information systems at the Dept. of Management Studies, Indian Institute of Technology Delhi. He researches and teaches about the interaction of information and communication technologies (ICTs), society, and business.

Dr. Ilavarasan has been a visiting research fellow at United Nations University - School of Computing and Society (Macau) and School of Management, Curtin University (Perth). He is a recipient of the Outstanding Young Faculty Fellowship Award at IIT Delhi and Prof. M.N. Srinivas Memorial Prize of the Indian Sociological Society. He is also a senior research fellow at LIRNEasia, a leading regional ICT policy and regulation think tank. He has received large research grants from Dept of Science & Technology (Govt of India), ICSSR (India), IDRC (Canada), Oxford Analytica (UK), IPTS (European Commission), CIPPEC (Argentina) and IdeaCorp (Philippines). His research has appeared in various leading international journals and at numerous global conferences.



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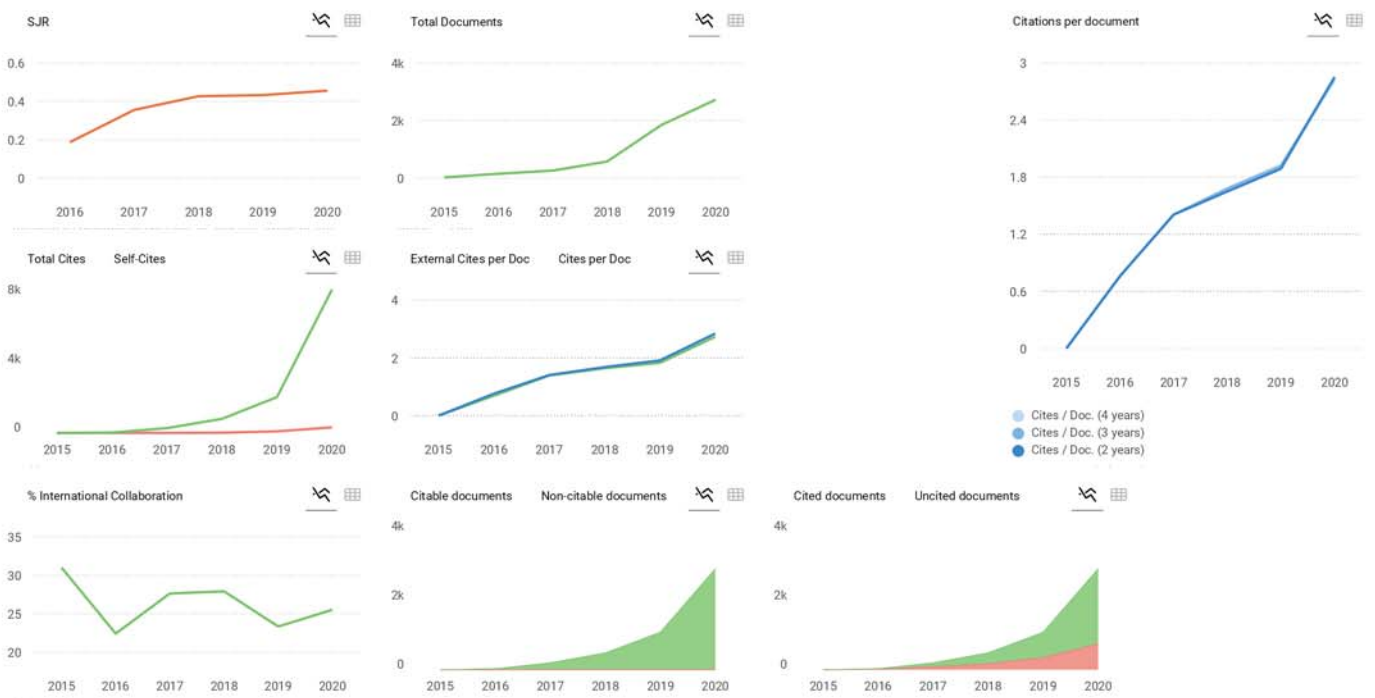
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