ERASMUS UNIVERSITY ROTTERDAM

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Trade and Government Expenditure: Evidence from OECD Countries

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Abstract

This paper empirically analyses the positive effect of trade openness on government expenditure derived from the compensation hypothesis. A disaggregation of government expenditure into several categories was applied into the analysis. The sample used are 30 OECD countries from 1998 to 2018 using the methodology of panel regressions with country and time fixed effects. Significant negative associations between trade openness and government expenditure were found for all expenditure categories except for the general public services category. In general, the findings of this paper do not support the compensation hypothesis.

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I. Introduction

The current era of globalisation has opened many pathways to global integration. One strong characteristic of globalisation would be economic openness. This refers to the extent of foreign countries participation, or the ability to have one, in the domestic economy (Gräbner et al., 2020). Trade, as an economic activity of goods and service exchange, also experiences this openness brought by globalisation, characterised by its increasing value relative to GDP. This is evident from the global trade that was reported to be 46% of the global GDP in 1998 and its trend that has progressed ever since until it reached 59% in 2018 (WDI, 2019).

However, the Covid-19 pandemic has caused a pitfall in the global trade trend with a drop of 21% in global merchandise trade in the second quarter of 2020 relative to the same quarter of the previous year, and this drop is even more pronounced for trade in developed countries (UNCTAD, 2021). OECD countries, which are mostly developed, reported a 27% drop in its merchandise trade during the same period (OECD, 2020). Although, a recovery in global trade is highly anticipated in parallel with the pandemic being more contained and economic activities regaining their pace. Thus, this urges the importance of acknowledging possible impacts from the expected rise in trade openness in the future recovery period.

A possible impact from trade is the changes in government expenditure. A rise in trade openness is suspected to carry certain risks and volatilities that raise the insecurity of the domestic economy. In response to this, the government is expected to compensate for this insecurity through increased support in public welfare, characterised by the government expenditure (Rodrik, 1998). Hence, the research question of this paper would be:

"Does trade significantly increase government expenditure in OECD countries?"

This paper aims to reassess the findings from previous literature by utilising the most recent available data of 30 OECD countries from 1998 to 2018 to see whether the relationship of interest will hold for this specific period and sample countries. In light of the expected rise in trade for the next periods, this paper also aims to provide insights to the policymakers regarding the possibility of an increase in government expenditure as an impact from the future rise in trade, and therefore prepare the countries to face this impact better.

A deeper intuition behind the proposed relationship in the research question will be explored along with evidence from previous literature. A description of data and methodology used for the empirical analysis of this paper will also be discussed. Finally, the results and its interpretations will be presented to give conclusive findings and proper suggestions.

II. Theoretical Framework

Globalisation removes international barriers between countries, including the economic barrier, and thus instinctively implies greater openness in an economy (Gräbner et al., 2020). This openness in an economy is thought to lead to various impacts for the domestic economy. Harrison (1996) found that one of her openness measures affects economic growth positively in developing countries. However, although openness may benefit an economy as a whole, there are people who gain and lose from this openness when the population is disaggregated.

Kapstein (2000) reviewed the concerning effect of globalisation, and the openness that comes along with it, on the increasing wage inequality in the United States and other industrial countries which creates winners and losers in society. This distributional problem is explained by the rising exposure to imports from developing countries. Thus, the sector which faces this direct import competition eventually contracts and unemployment rises in this sector. The labor in this sector then becomes the loser of globalisation and its openness.

The international trade pattern itself is initiated by the Law of Comparative Advantage. A country is said to have a comparative advantage in producing a certain good or delivering a service if its relative price is lower than the relative price in other countries when both are in autarky (Deardorff, 1980). Each country will only produce and sell the goods that they have comparative advantage in, and then buy the other goods from other countries. Therefore, each country has specific products or services that they export and import.

A trade model that explains this distributive effect of openness is the Heckscher-Ohlin model through the role of comparative advantage. It assumes two factors of production, labor and capital, and different factor endowments of each country which leads to different comparative advantages that one country possesses from another (Ohlin, 1933). Furthermore, the model introduces the idea of abundance factor in a country and production intensity of a good. A theorem derived from this model is the Stolper-Samuelson theorem. It stated that the real return of the sector which produces a good that uses the country's abundance factors intensively will increase, while the other sector which produces another good that uses the country's scarce factors intensively will decrease. Another theorem derived from the model stated that a country will export goods from the industry that uses the country's abundance factor intensively and import otherwise, known as the Heckscher-Ohlin theorem (Leamer & Levinsohn, 1985).

The two theorems of the Hecksher-Ohlin model mentioned above imply that the real return of the factor used in the exporting sector intensively will increase, and thus the

exporting sector will expand, while the real return of the factor used in the importing sector intensively will decrease, and thus the importing sector will contract. Although the two factors can freely move across sectors, those that are trapped in the importing sector will bear the loss. This then results in a distribution problem as now the exporting industry will gain from trade while the importing sector will lose. Hence, trade divides the population into winners and losers.

Additionally to the distribution problem, openness to trade is expected to be positively associated with volatility. Giovanni and Levchenko (2009) explored the relationship between trade openness and aggregate volatility in industry-level through three different channels. Firstly, the results show that trade openness in a sector indeed has a positive association with volatility changes within that sector. As proposed by Newbery and Stiglitz (1984), an industry becomes more susceptible to world demand and supply shocks due to the openness in the economy. Secondly, higher trade openness in a sector leads to lower dependency of that sector on global growth. Finally, greater openness of the economy significantly leads to less diversified and more specialized production which becomes a medium for higher volatility. Although the second channel does not support the theory of positive association between trade openness and aggregate volatility, this result is relatively smaller in magnitude when compared to the theory-supporting results from the first and third channels. In conclusion, trade openness has a positive association with aggregate volatility due to individual sectors volatility and less diversified production.

The distributional problem and volatility risks associated with economic openness initiated the *compensation hypothesis*. Prior to the formation of the *compensation hypothesis*, Cameron (1978) was the first to introduce the positive association between economic openness and government size from 18 OECD countries observed between 1960 and 1975. The idea is that greater openness leads to higher industrial concentration, which strengthens labor unionisation and social collective bargaining power. This leads to a bigger public economy as the labour are able to place more demands on government transfers, which becomes an indicator for government size.

Cameron's association was then extended into the *compensation hypothesis*. It is proclaimed that openness in the economy will expose a country to external risks in the world market thus making it prone to price and employment instability, for example through dependency on global markets and increasing competition from abroad. These external risks and volatilities, along with economic distributional problems associated with openness, incline the labor to place more persistent demand for the government to provide safety nets

for them. These safety nets or social insurance, measured in government spending, act as a compensation for the risks that they have to bear due to the openness in the economy, known as the *compensation hypothesis* (Ruggie, 1982; Rodrik, 1998). In Rodrik's analysis, a positive association was found between openness in the economy and government spending, especially in social security.

This compensation hypothesis is also rephrased to be a result of redistributive demands from the median voter and oftentimes, they are the globalisation loser in developed countries. In support of this, trade is found to be positively associated with pro-redistribution policies in developed or high-manufacturing countries, conditional on the size of the losers' sectors (Ventura, 2006). As the size of the losing sector in the samples are significantly large, the losers of trade become the median voters with their pro-redistribution policies demand. By the median-voter theorem, politicians who attend to the median voters preference will get elected and thus these pro-redistribution policies will be applied, given if the politicians fulfill their campaign promises. Hence, this analysis may give a different result if the size of the losing sector is very small and the median voters are not the losers of trade.

Walter (2010) mentioned that the c*ompensation hypothesis* is constituted from both the demand and supply side. In relation to Ventura (2006), the paper stated that openness results in higher social security demanded by the voters, representing the demand side. Meanwhile, the government, representing the supply side, provides greater social security and transfers in order to fulfill this compensation demand, which therefore leads to a more expansive government size. Walter also added an extended link between openness and government size expansion, as compared to previous literatures. The previous literature stated that openness leads to economic insecurity due to the volatility and external risks brought by it, which then leads to higher demand for social security and finally an increase in government expenditure. Meanwhile, Walter added another link after the higher demand for social security, this demand is expected to lead to increasing preference for left parties characterized by pro-labor welfare policies, which eventually leads to increased government expenditure from the implemented policies by the elected left politicians.

Additionally, there is a different perspective on the link between trade openness and government size. A commonly cited work of Alesina and Wacziarg (1998) stated that there are negative associations between country size and trade openness, and between country size and government size. Therefore, a positive association between trade openness and government size may result from this indirect link.

However, indeed there are also several criticisms and doubts against the *compensation hypothesis*. Firstly, openness in the economy may not escalate to greater demand for social security at all (Rehm, 2009). Rehm found a positive association between individual redistribution preference and risk exposure at occupation-level, such as skill-specific occupational competition, instead of at industry-level, such as industrial international competition. Therefore, greater openness, which increases industrial competition from abroad, will not escalate to greater demand for redistribution in social security.

Secondly, even if openness leads to greater demand for social security, there is no guarantee that the government will be able to fulfill the demand (Cerny, 1995). This is because globalisation entails both trade and capital openness. While trade openness can lead to greater government expenditure through the *compensation hypothesis*, capital openness can lead to lower government expenditure due to lower taxation revenue which constrains government budgets. As a response to increased capital openness, the domestic government is forced to impose lower tax on mobile capital in fear of it fleeing abroad to other countries with lower tax.

Furthermore, it is still vague whether the positive association between openness and government size, as claimed by the *compensation hypothesis*, is due to the rising volatilities or other reasons such as structural changes brought by the openness in globalization (Garrett and Mitchell, 2001). Finally, in contrast to the *compensation hypothesi*s, some findings also show a negative association between openness and government size. These counter findings will be shown in the literature review section along with other supporting findings of the *compensation hypothesis*.

III. Literature Review

A considerable amount of empirical research has been done to observe the *compensation hypothesis* validity. This is done by analysing the effect of openness in the economy, measured in trade or capital openness, on the government size, often measured in government spending or expenditure.

Liberati (2007) tested the *compensation hypothesis* by doing a regression analysis of both trade and capital openness on central government expenditure using samples of developed countries. However, the results do not support the validity of the *compensation hypothesis* as there is a significant negative relationship between openness, both capital and trade, and central government expenditure. The explanation behind this result may be due to the use of cross-country samples which conceals the real effect of openness on government expenditure as countries have differing institutional and economic structures. Thus, sub-regional analysis of a country may provide a clearer analysis, given if it's a decentralized country with redistribution authority granted for each sub-regional local government. Secondly, the use of other levels of government expenditure other than central, such as local, may provide different results as different government levels often have different expenditure structures.

The association between openness and government size was further extended by Epifani and Gancia (2009). In their research paper, there was an alternative reasoning behind the expected positive association. Trade openness in a country is expected to generate terms-of-trade gain, especially through tariffs, and this gain will be spent for the public expenditure. Aside from this reasoning, the paper also tried to identify the validity of the *compensation hypothesis* by using samples from 143 countries observed from 1950 to 2000. Although there is a strong correlation between openness and government size across periods and countries, the results only show a positive association between openness and government size for non price-taker countries, thus the big economies in the global market.

Observations from 1980 to 1999 in Latin America revealed that trade openness significantly increases government spending in social security and education, though there is no valid conclusion for the relationship with capital openness (Avelino et al., 2005). This research improved the previous findings by using more precise and thorough measures for trade openness and capital openness; it used a purchasing power parity (PPP-based) trade measurement. Furthermore, it also claimed to use more complete data of Latin America government spending than the previous research. Additional to these findings, it also found

that more democratic countries significantly have higher social spending especially on those that improve human capital.

In contrast to the literature that has been reviewed above, Balle and Vaidya (2002) analysed the association between openness and government expenditure on a state-level in the United States. The increasing import competition from the trade between the US and developing countries is thought to be the driving force behind this association. Trade openness exposes these states to cheaper foreign labour which raises unemployment for low-skilled labor in manufacturing. This further leads to increasing income inequality between high-skilled and low-skilled labor. The results from its empirical analysis show that as the states become more open and involved in international trade, state expenditures in public welfare and health care also increases.

Another research was done with observations from 1960 until 2000 in Spain as the sample, and throughout this period there have been massive changes in the fiscal and trade policy of the country. The findings found differing signs in the association between openness and government size across the periods. There was a positive association until the early 90s with the increase in democracy strengthening this association. However, this association was inverted into a negative one as the fiscal structure was reassembled in order to join the euro (Sáenz et al., 2013).

Hardiman et al. (2008) failed to find a significant positive relationship between openness and government expenditure in Ireland. One of the reasons behind this was that the Irish government may have already applied compensation policies as a reaction to openness. However, this may be in the form of non-budgetary measures, such as structural shifts in industrial interconnections to reduce the risks and volatilities on the industry's labor due to the openness. This approach may be chosen instead of the budgetary expenditure because Irish economy highly depends on foreign direct investment (FDI) and thus it cannot politically impose high corporation tax which constrains the government budget, as also reasoned by Cerny (1995).

More on the issue of non-budgetary measures for compensation, Garen and Trask (2005) examined the effect of openness on government size through both budgetary and non-budgetary measures. For non-budgetary measures, the paper used the extent of price controls, the number of state-owned enterprises, competition restrictions, and others as the indicator for government size. Overall, the paper found a negative association between openness and government size. However, additional results were found when the countries were broken down into low and high income categories. High income countries are relatively

more open and have higher budgetary compensation measures, shown by higher government expenditure, while low income countries are relatively less open and have higher non-budgetary compensation measures.

Garrett and Mitchell (2001) also analysed the *compensation hypothesis* in 18 OECD countries from 1961 to 1993 by using panel regression. However, its result is the opposite of the hypothesis as higher trade openness significantly leads to lower government spending. Moreover, there was not enough evidence that cheap imports from low income countries are significant risks for the welfare state in high income countries. This paper was then improved by Kittel and Winner (2005) by modifying the methodology into dynamic models and involving non time-varying variables. The results show that the domestic economic environment, instead of international, is the main driver of any changes in government spending which does not support the *compensation hypothesis*.

Moreover, Ram (2009) did an analysis to prove the claim of Alesina and Wacziarg (1998) empirically by using panel samples from 150 countries throughout a 41-years period. A fixed-effects regression shows that there is not enough significant evidence of a negative association between country size with both trade openness and government size. Therefore, any positive association between trade openness and government size would be due to its own direct link, instead of the indirect one that was claimed by Alesina and Wacziarg in the previous section of this paper.

Shelton (2007) extended the previous research by disaggregating the government spending into its levels, central and local, and its functions, such as social security, education, transport, and others. Samples from 100 countries across 1970 until 2000 show that the positive association between trade openness and government spending are more applicable for functions that are not directly linked to transfers. This finding is even more prominent for developing countries. Furthermore, the paper found that countries with higher GDP per capita often have older demographics and thus the high dependency ratio will lead to higher social transfers and higher government spending. This dependency ratio is also positively associated with local government spending through all functions. Additionally, political rights and inequality in a country is positively associated with redistribution and hence social security spending. However, the paper does not have a conclusion on the association between trade openness and government spending alone.

Aside from Shelton, Benarroch and Pandey (2012) also did an analysis between openness and disaggregated government expenditure. The paper disaggregates the government expenditure into its functions, the same way as Shelton (2007), and the countries

into income levels, high and low. This is an extension of a research that has been done by the same authors beforehand but without the disaggregation in government expenditure and country income levels, and the previous result shows that there is not enough evidence to support the *compensation hypothesis* (Benarroch and Pandey, 2008). Through the disaggregation in the extended paper, it was hoped to reveal any effects of openness on government expenditure that was concealed in the previous research due to the aggregated data. However, the dynamic panel results from 119 countries from 1972 until 2000 show that there is no causal relationship between openness and government expenditures for low income countries and a negative causal relationship for high income countries. Moreover, the disaggregation of functions shows that there is only one positively significant causal relationship, which is between openness and government expenditure for education in low income countries. In response to the rising competition from increased openness, low income countries may resort to spending more on education as a form of human capital investment to increase future competitiveness.

Although there has been plentiful existing literature analysing the validity of the *compensation hypothesis*, the results still remain inconclusive. This paper aims to extend the previous findings by disaggregating government expenditure into several functions, as this has not been done by many. Moreover, this paper provides a more extensive disaggregation structure of government expenditure into 10 functions instead of what has been done before by Benarroch and Pandey (2012), which is into only 8 functions. The functions in this paper are pre-determined in the database and consist of *general public services, defence, public order and safety, economic affairs, environment protection, housing and community amenities, health, recreation culture and religion, education, and social protection*. In comparison to the previous literature, this paper will analyse the *compensation hypothesis* on *environment protection*, *general public services*, and *public order and safety*. The environment protection function is new and has not been incorporated in the previous literature. Meanwhile, the last two functions are a breakdown of what the previous literature only classified as one function, which is *public*.

Furthermore, this paper is value-adding to existing literature as it aims to analyse whether the compensation hypothesis has changed over time by using the most recent period from 1998 to 2018. Samples are taken from 30 OECD countries as developed countries are said to have significant government expenditure as part of their GDP with welfare redistribution being one of their most crucial policies and their social security programs are said to be relatively more established (Liberati, 2007; Rudra, 2002). Ventura (2006) also

mentioned that low-skilled labor in developed countries are the ones exposed to import competition from developing countries, thus developed countries should display a more significant increase in government expenditure than developing countries if the *compensation hypothesis* is valid. Moreover, developing economies are said to have numerous differences in institutional differences that are relevant to their policy priorities and implementation, thus the interpretation of their cross-country analysis would be less reliable (Akai and Sakata, 2002). Therefore, the hypothesis raised by this paper would be:

Trade significantly increases general government expenditure in OECD countries

A number of expenditure functions are thought to have a relatively more direct link to the *compensation hypothesis*. Firstly, the *compensation hypothesis* essentially lies on social protection expenditure as the compensation medium (Ruggie, 1982; Rodrik, 1998; Walter, 2010). Secondly, Hanushek et al. (2003) discussed a government transfer program through education subsidy as means to reduce income inequality. As Kapstein (2020) has mentioned, increasing income inequality is associated with greater trade openness. Thus, the government can try to compensate for this economic insecurity, due to the openness, by increasing expenditure in education. Lastly, Breyer and Haufler (2000) reviewed a redistributive characteristic from public health insurance, especially of the EU countries. Public health insurance becomes redistributive when the low-income individuals spend relatively higher medical costs than high-income individuals, given that they pay the same or even lower mandatory premium. As greater trade openness is expected to be followed by increasing income inequality, there will also be an increase in the number of low-income individuals with high dependency on this health insurance. Therefore, health care expenditure may become another means of compensation from the government. Hence, a sub-hypothesis addressed in this paper would be:

Trade significantly increases general government expenditure for social protection, education, and health in OECD countries

IV. Data

A panel data of 30 OECD countries observed from 1998 to 2018 will be used for analysis. The openness measure, as the independent variable, will be in the form of trade openness. Trade openness is annually-measured as the total value of imports and exports of a country from and to the world, as a ratio of the country's GDP. This indicator is the most widely used by previous literatures (Rodrik 1998; Garen and Trask, 2005; Liberati 2007, Shelton 2007; Benarroch and Pandey, 2012). The data is retrieved from World Development Indicators (WDI), The World Bank primary database for development indicators and is a collection from various reliable international sources.

The government expenditure, as the dependent variable, is also measured as a ratio of GDP. Both aggregated and disaggregated government expenditure data are retrieved from OECD.Stat, a database for countries of OECD members. The database provided total government expenditure and 10 government expenditures by functions; *general public services, defence, public order and safety, economic affairs, environment protection, housing and community amenities, health, recreation culture and religion, education, and social protection*. Furthermore, the GDP data is also retrieved from OECD.Stat. Both variables are retrieved from the same data source and are reported in the same currency, therefore eliminating the currency conversion problem when merging both variables into a ratio. However, due to data unavailability, the government expenditure for *environment protection* and *housing and community amenities* are only available for 28 and 29 OECD countries observed from 1998 to 2018 respectively. Details of government expenditures classification can be seen in Appendix Table A1.

Several control variables are added in this analysis as an attempt to reduce omitted variable bias that is often associated with the methodology that will be used, and thus increase the internal validity. The control variables used would be GDP per capita (in current US dollars), population aged below 15 ratio, population aged above 64 ratio, urbanization ratio, and total population, all are benched on the initial *compensation hypothesis* analysis done by Rodrik (1998) and also by Benarroch and Pandey (2012) who added the population variable. These control variables are said to be chosen based on the overall best regression fit (Rodrik, 1998). All of these variables are retrieved from World Development Indicators (WDI), The World Bank database.

GDP per capita is included as a control variable as Wagner's Law stated that the demand for government services is income elastic and therefore higher income countries spend higher government expenditure (Rodrik, 1998; Shelton, 2007). Furthermore, Wagner's

Law had been analysed and proven to be valid in previous literature (Oxley, 1994; Easterly and Rebelo, 1993).

Secondly, the population aged below 15 measures the population of those below 15 years old as a fraction of the total population regardless of citizenship or legal residency status. The population aged above 64 is interpreted exactly the same way. Although Rodrik (1998) combined both the population aged below 15 and above 64 as the age-dependency ratio to the working-age population, Shelton (2008) revealed that the effect of these two age population groups differ on the public expenditure. The retirement-age population prefers higher labor tax and transfers while working parents of young children prefer lower labor tax and lower pension transfers. Furthermore, Sanz and Velázquez (2007) found that the share of elderly population has a positive association with public expenditure in OECD countries, especially through the social welfare and health sectors.

Urbanization ratio measures the fraction of people who live in urban areas relative to the total population. The data is compiled from national statistical offices based on their measures of urban population. Urbanization is associated with higher public spending as people who live in urban areas have higher recognition of inequality than those in rural areas. They also have higher recognition of the government's role as the solution provider for inequality problems. Therefore, they are more likely to ask for redistribution, more evidently at the education, health and social protection sectors (Jetter and Parmeter, 2017).

Lastly, the total population is expected to have a positive association with total public expenditure as there is more expenditure coverage. This total population variable has also been incorporated in the analysis of Benarroch and Pandey (2008, 2012) and Shelton (2007). Summary statistics of the variables used in the analysis can be seen in Appendix Table A2.

V. Methodology

An empirical analysis to evaluate the association between trade openness and government expenditure will be done by using an OLS regression with country and time-fixed effects. There will be a total of 11 OLS regressions as the total government expenditure and each of 10 government expenditure categories will be regressed on one-period lagged trade openness. A total of 600 observations will be used for all 9 OLS regressions and less than 600 observations for the remaining 2 OLS regressions due to the limited availability of the data.

Total government expenditure, as the dependent variable, will be regressed on one-period lagged trade openness, as the independent variable. This is an attempt to reduce reverse causality bias as the government expenditure at the current period is observed as an effect of the trade openness at one period earlier (Benarroch and Pandey, 2012). The regression will be in natural logarithmic form to minimize skewed distribution (Benoit, 2011).

$$lnExpenditure_{it} = \alpha + \beta lnOpenness_{it-1} + \sum_{j} \delta_j lnX_{ijt} + \gamma_t + \eta_i + \varepsilon_{it}$$

$i = 1, \ldots\ldots, 30$ and $t = 1998, \ldots\ldots, 2018$

$Expenditure$= A country's total general government expenditure as a ratio of its GDP

$Openness$= A country's trade openness (Trade measure as a ratio of its GDP)

X_{ijt}= Control variables

γ_t= Time-fixed effects

η_i= Country-fixed effects

ε_{it}= Error term

The measurement of government size by using government expenditure as a ratio of GDP for the *compensation hypothesis* was initiated by Cameron (1978). This relative measurement, rather than if the government expenditure is stated absolutely, allows the comparison of public economy scope expansion across many countries. Other literature on the *compensation hypothesis* have followed this measurement of government size.

Omitted variable bias is a concern in this analysis as its presence will reduce the internal validity of the empirical research. Any effect found in the government expenditure may not solely come from trade openness but also from other variables that are not accounted for in the analysis. Therefore, country-fixed effects are added to reduce omitted variable bias as it eliminates bias from time-invariant variables in a country. It controls for country-specific

variables that do not vary over time. Furthermore, time-fixed effects are added as it controls for variables that are constant across countries but vary over time. Control variables are also added into the regression to control for time-variant variables as these are not taken into account in the country-fixed effects.

Aside from the analysis of trade openness effect on total government expenditure, 10 different categories of government expenditure will also be regressed on trade openness. All regressions, except for two categories, will use the same amount of sample of 600 observations. Initially, a sample of 30 OECD countries from 1998 to 2018 will give 630 observations but the method of regressing government expenditure on one-period lagged trade openness reduces the observation by 1 period for each country, thus reducing 30 observations in total. The regressions with government expenditure of *environmental protection* and *housing community and amenities* will only utilise 560 and 580 observations. The equation for different categories of government expenditure is shown below:

$$lnExpenditureFunction_{ikt} = \alpha + \beta lnOpenness_{it-1} + \sum_{j} \delta_j lnX_{ijt} + \gamma_t + \eta_i + \varepsilon_{it}$$

The subscript *k* in ExpenditureFunction variable represents each of the 10 government expenditure categories. These expenditures are also measured as a ratio of the country's GDP and the other variables remain the same as those in the first regression equation.

It is important to note that the method of regressing the independent variable as a lagged variable does not ensure complete elimination of reverse causality bias as Reed (2015) stated that the use of this method still results in inconsistent estimates. Furthermore, this paper will not claim complete elimination of omitted variable bias as the methodology above only aims to reduce as many omitted variable biases as possible, with various limitations such as inability to control for unobservable time-varying variables.

A reverse causality was found by Benarroch and Pandey (2008) where lagged government expenditure negatively affects trade openness. Therefore, although the methodology above has attempted to reduce reverse causality bias, a sensitivity analysis will still be conducted to inspect this bias. A similar methodology as above will be done, but instead of a regression of government expenditure on lagged trade openness, it will be a regression of trade openness on lagged government expenditure. A significant result will indicate the presence of reverse causality where government expenditure at the previous period significantly affects the trade openness at the current period. Nonetheless, even if there is no significant result, this does not imply complete absence of reverse causality bias.

VI. Results

A. Diagram

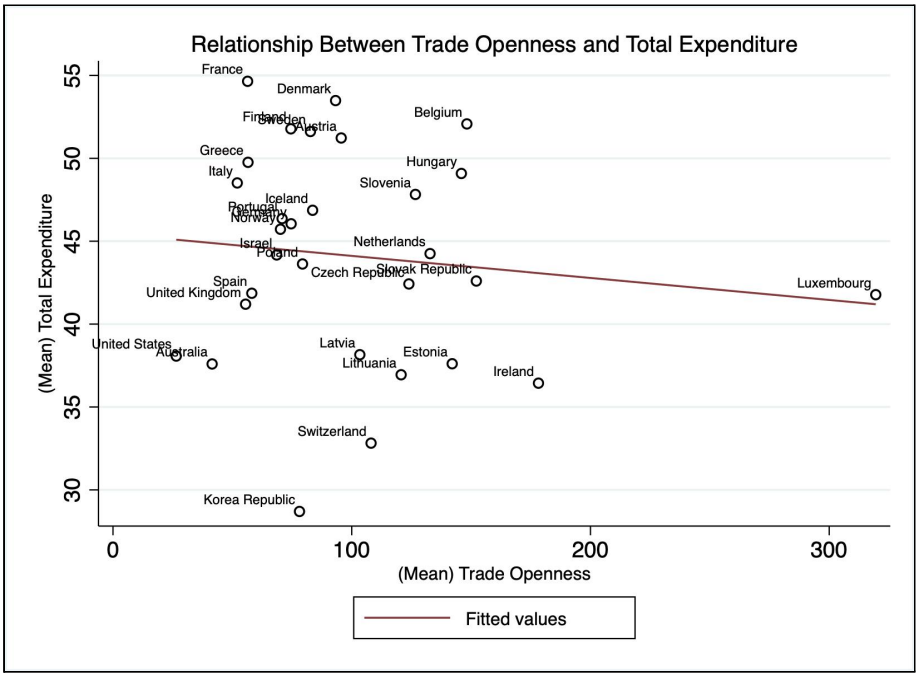

Figure 1. *Scatter plot for relationship between Trade Openness and Total Government Expenditure for 30 OECD countries averaged from 1998 to 2018*

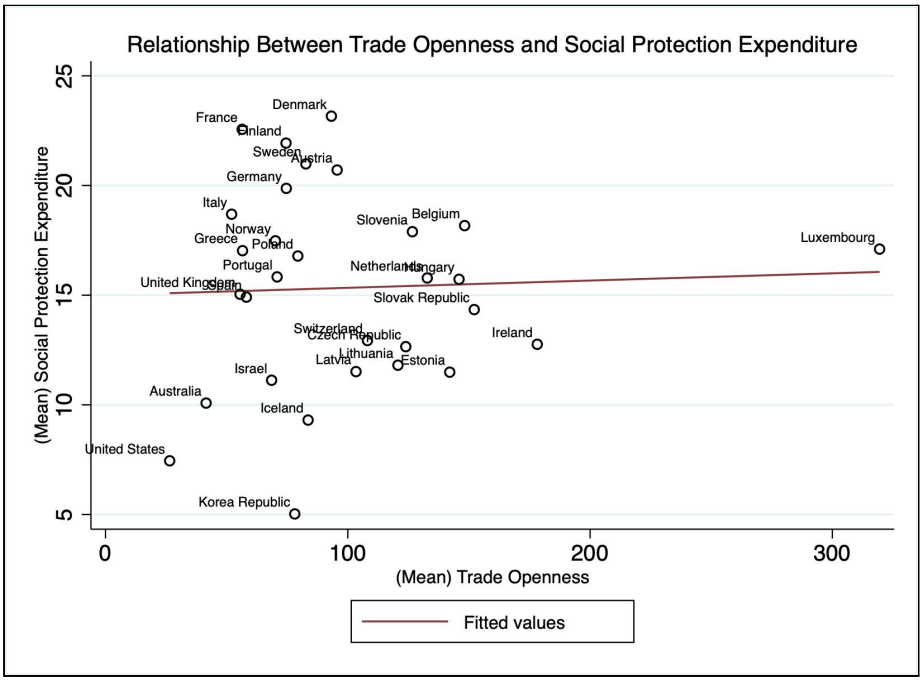

Figure 2. *Scatter plot for relationship between Trade Openness and Social Protection Expenditure for 30 OECD countries averaged from 1998 to 2018*

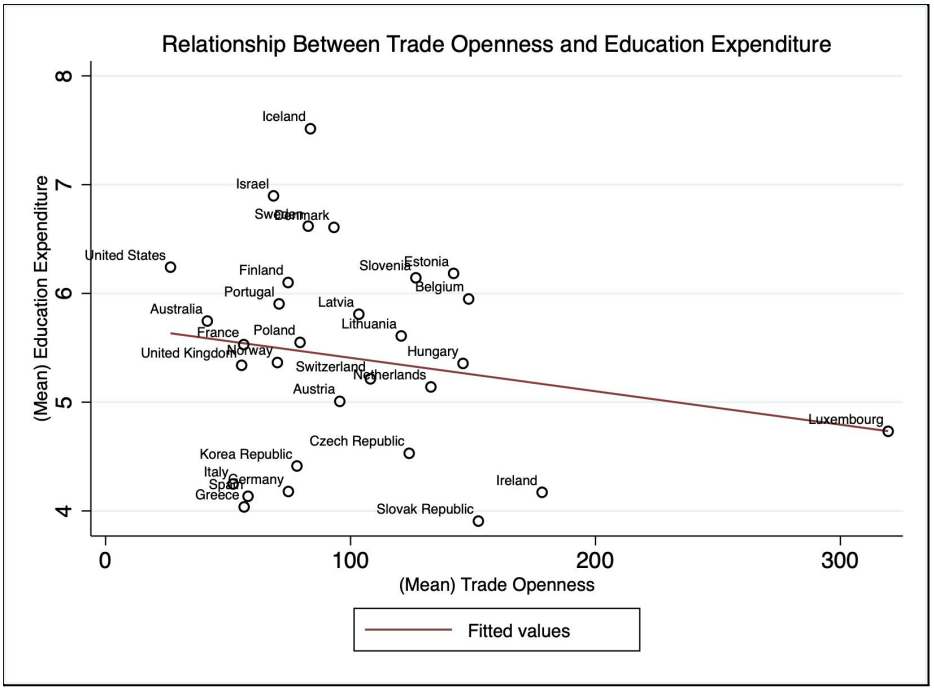

Figure 3. *Scatter plot for relationship between Trade Openness and Education Government Expenditure for 30 OECD countries averaged from 1998 to 2018.*

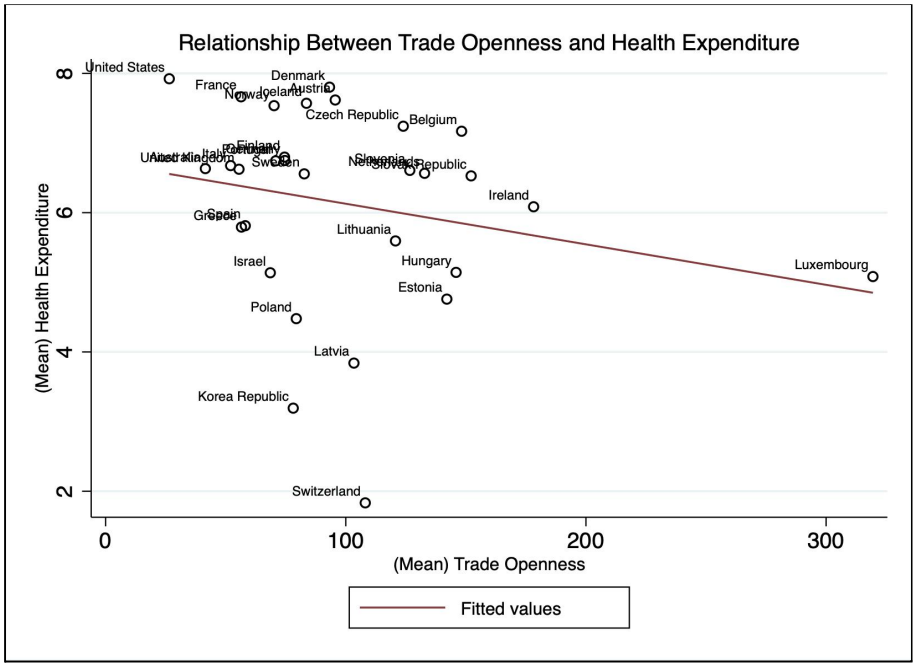

Figure 4. *Scatter plot for relationship between Trade Openness and Health Government Expenditure for 30 OECD countries averaged 1998 to 2018.*

Figure 1 to 4 show the relationship between trade openness and total, social protection, education, and health government expenditure respectively in the form of scatter plots. They are plotted by each country and the panel data from 1998 to 2018 were averaged

for the trade openness and each expenditure measurement. A fitted line is also included to display the rough depiction of the relationship in each figure.

All figures, except for figure 3, show negative linear relationships. This implies that more open countries tend to spend lower government expenditures in total, education and health. In contrast, figure 3 shows a slightly positive linear relationship which implies that more open countries tend to spend higher expenditures in social protection, in line with the *compensation hypothesis*. A closer observation of the correlation relationship between trade openness and each of the 4 government expenditures can be seen in the correlation matrices in Appendix Table A3.

A few plots can be identified as outliers such as Luxembourg in all figures, Korea Republic in figure 1 and 2, Iceland in figure 3, and Switzerland in figure 4. However, these figures only serve as a rough relationship depiction of the raw data. This is prior to the methodology being adjusted to give relatively more proper and valid findings. Therefore, the implications from these figures do not indicate any causal relationship nor suggest any conclusion for the hypothesis of this paper. The next section of this paper will present regression findings with proper methodology to further analyse the relationship between each government expenditure and trade openness. Furthermore, all variables in the regression will be in a natural logarithmic form to minimize the large outliers seen on these figures.

B. Model Results

All regression results of government expenditure on trade openness are presented in Table 1, which includes both the aggregated and disaggregated government expenditure. Each column represents each function of the government expenditure, as has been mentioned in the previous part of this paper. All results are obtained by using country and time fixed effects with the inclusion of control variables.

All regressions possess significant negative findings except for general public expenditure. Due to the natural logarithmic form, the interpretation of the findings will be in percentage changes rather than percentage points, in which the effect of trade openness on government expenditure will be proportional to the government expenditure.

	Total	Defence	Economic affairs	Education	Environment	Health
$ln(Openness_{t-1})$	-0.225*** (0.036)	-0.278*** (0.099)	-0.460*** (0.107)	-0.126*** (0.034)	-0.469** (0.147)	-0.199*** (0.046)
$ln(GDP\ per\ capita)$	-0.127*** (0.022)	0.087 (0.059)	-0.200*** (0.064)	-0.059*** (0.021)	0.219** (0.091)	-0.039 (0.027)
$ln(urban\ ratio)$	0.201 (0.163)	-0.609 (0.443)	-1.154** (0.479)	-0.504*** (0.153)	0.669 (0.636)	-0.179 (0.205)
$ln(age > 15)$	-0.098 (0.076)	-0.354* (0.207)	-0.278 (0.224)	-0.119* (0.072)	-0.936*** (0.307)	-0.392*** (0.096)
$ln(age > 64)$	0.097 (0.074)	-0.296 (0.201)	-0.864*** (0.217)	0.125* (0.069)	-1.033*** (0.285)	0.649*** (0.093)
$ln(population)$	-0.268*** (0.074)	-0.285 (0.202)	-0.743*** (0.218)	0.241*** (0.070)	-1.539*** (0.293)	0.298*** (0.093)
Observations	600	600	600	600	560	600
Number of countries	30	30	30	30	28	30

	General public	Public order	Recreation	Housing	Social protection
$ln(Openness_{t-1})$	0.080 (0.068)	-0.174*** (0.048)	-0.223*** (0.068)	-0.507*** (0.166)	-0.228*** (0.050)
$ln(GDP\ per\ capita)$	-0.072* (0.041)	-0.192*** (0.029)	0.095** (0.041)	0.180* (0.100)	-0.197*** (0.030)
$ln(urban\ ratio)$	0.666** (0.307)	0.838*** (0.215)	0.172 (0.306)	-0.546 (0.724)	0.488** (0.226)
$ln(age > 15)$	0.395*** (0.144)	-0.336*** (0.101)	-0.032 (0.143)	-0.376 (0.337)	-0.162 (0.106)
$ln(age > 64)$	0.523*** (0.139)	0.041 (0.097)	0.235* (0.139)	-0.781** (0.325)	0.511*** (0.102)
$ln(population)$	-0.463*** (0.140)	0.145 (0.098)	-0.241* (0.140)	0.093 (0.343)	-0.109 (0.103)
Observations	600	600	600	580	600
Number of countries	30	30	30	29	30

*Table 1. Regressions of government expenditures on one-period lagged trade openness with control variables, time-effects, and country-effects; *** significance at 1%, ** significance at 5%, * significance at 10%*

Trade openness is significant on the total government expenditure. However, in contrast to the *compensation hypothesis*, it shows a significant negative finding with a coefficient of -0.225 at 1% significance level. The coefficient implies that a 1% increase in trade openness leads to a 0.2% decrease in total government expenditure for the next period. This finding is consistent with the previous findings of Garrett and Mitchell (2001), Liberati (2007), Sáenz et al. (2013), and Garen and Trask (2005) who found negative associations

between trade openness and government expenditure. Therefore, this paper found that trade openness has a significant negative association with total government expenditures. Possible explanations behind this finding will be discussed in the discussion section.

Significant negative findings are also found in government expenditures for social protection, education, and health with coefficients of -0.228, -0.126, and -0.199 respectively at 1% significance level. These imply that a 1% increase in trade openness leads to a 0.2%, 0.1%, and 0.2% decrease in government expenditure for social protection, education, and health. These findings are against the *compensation hypothesis* which should have found a positive association. Although the scatter plot figure in the previous section shows a positive linear relationship between trade openness and social protection expenditure, the regression results show the opposite and these are obtained after the methodology was applied. Moreover, these findings are not in line with Benarroch and Pandey (2012) who did not find any significant findings for social protection, education, and health expenditures, though education expenditure is found to be significantly positive only in low-income countries specifically. However, Benarroch and Pandey (2012) used samples of 119 countries observed from 1972 to 2000 while this paper uses 30 OECD countries from 1998 to 2018, which may explain the difference in findings. Thus, this paper found that trade openness has significant negative associations with government expenditure in social protection, education, and health.

The newly incorporated expenditure categories in this paper; environment, public order, and general public, show significant negative findings except for the latter one with a non-significant finding. The significant coefficients are -0.469 and -0.174. The public order and general public categories are a breakdown of what Benarroch and Pandey (2012) considered as one category, public, which was found to be non-significant. Meanwhile, the environment category has not been incorporated by Benarroch and Pandey (2012). In addition, the rest of government expenditures; defence, economic affairs, recreation, and housing, all possess significant negative findings shown by the coefficients of -0.278, -0.460, -0.223, -0.507 respectively. However, these findings are also not in line with Benarroch and Pandey (2012) who could not find significance for the stated categories. Therefore, this paper found that trade openness has significant negative associations with government expenditures in environment, public order, defence, economic affairs, recreation, and housing.

Nevertheless, the findings from this paper do not claim a causal relationship between trade openness and government expenditure. It only implies an association between the two due to the presence of omitted variable bias that may still exist despite the attempts to reduce it through the use of fixed effects and control variables in the methodology.

C. Sensitivity Analysis

Reverse regressions are done to observe the presence of reverse causality between trade openness and government expenditure. Table 2 below will show the findings when trade openness is regressed on each of one-period lagged government expenditure functions.

	Openness	**Openness**	**Openness**	**Openness**	**Openness**	**Openness**
$ln(ExpenditureFunction_{t-1})$	-0.046 (0.049)	-0.032* (0.017)	-0.031* (0.016)	-0.040 (0.051)	-0.042*** (0.013)	-0.121*** (0.037)
$ln(GDP\ per\ capita)$	-0.143*** (0.026)	-0.135*** (0.024)	-0.144*** (0.025)	-0.139*** (0.025)	-0.104*** (0.026)	-0.143*** (0.024)
$ln(urban\ ratio)$	-0.445** (0.183)	-0.480*** (0.183)	-0.493*** (0.183)	-0.473** (0.183)	-0.427** (0.184)	-0.467** (0.181)
$ln(age > 15)$	-0.501*** (0.084)	-0.511*** (0.084)	-0.500*** (0.083)	-0.507*** (0.084)	-0.525*** (0.087)	-0.530*** (0.083)
$ln(age > 64)$	0.011 (0.083)	-0.002 (0.083)	-0.019 (0.084)	0.009 (0.083)	-0.030 (0.084)	0.097 (0.087)
$ln(population)$	-0.844*** (0.078)	-0.839*** (0.078)	-0.855*** (0.078)	-0.826*** (0.079)	-0.895*** (0.081)	-0.784*** (0.079)
Observations	600	600	600	600	560	600
Number of countries	30	30	30	30	28	30
Expenditure Function	Total	Defence	Economic Affairs	Education	Environment	Health

	Openness	**Openness**	**Openness**	**Openness**	**Openness**
$ln(ExpenditureFunction_{t-1})$	0.158*** (0.024)	-0.183*** (0.034)	-0.059** (0.025)	-0.026** (0.011)	-0.031 (0.035)
$ln(GDP\ per\ capita)$	-0.120*** (0.024)	-0.172*** (0.025)	-0.131*** (0.024)	-0.087*** (0.025)	-0.143*** (0.026)
$ln(urban\ ratio)$	-0.550*** (0.176)	-0.250 (0.182)	-0.436** (0.182)	-0.498*** (0.179)	-0.440** (0.184)
$ln(age > 15)$	-0.548*** (0.081)	-0.521*** (0.082)	-0.488*** (0.083)	-0.416*** (0.083)	-0.504*** (0.084)
$ln(age > 64)$	-0.094 (0.081)	0.025 (0.081)	0.024 (0.083)	0.028 (0.081)	0.020 (0.085)
$ln(population)$	-0.743*** (0.076)	-0.786*** (0.077)	-0.841*** (0.078)	-0.624*** (0.083)	-0.836*** (0.078)
Observations	600	600	600	580	600
Number of countries	30	30	30	29	30
Expenditure Function	General Public	Public Order	Recreation	Housing	Social Protection

*Table 2. Regressions of trade openness on one-period lagged government expenditure function with control variables, time-effects, and country-effects; *** significance at 1%, ** significance at 5%, * significance at 10%*

All findings show significant negative coefficients at varying significance levels except for total, education, and social protection government expenditure. The significant findings imply that higher government expenditure leads to lower trade openness and hence there is a reverse causality to the hypothesis of this paper. This paper intends to test the hypothesis of a positive effect of trade openness on government expenditure. Thus, reverse causality is believed to be present in the relationships that give significant findings in Table 2. However, even if there are no significant findings in the total, education, and social protection government expenditure on trade openness, this does not imply that reverse causality is entirely absent from these relationships. This sensitivity analysis only attempts to suspect the presence or absence of reverse causality. Therefore, given the findings, reverse causality is believed to be present in defence, economic affairs, environment, health, general public, public order, recreation, and housing government expenditure on trade openness.

D. Discussion

The regression results in this paper show negative associations between trade openness and government expenditure. A possible explanation behind this finding is because countries who are less interventionist in the market, and thus are more open to trade, are more likely to apply less interventions on its public economy and spend lower government expenditure.

Henry (2008) discussed the idea of *laissez-faire* economy, a free-market economy with minimum government interventions. The paper mentioned that government regulations, or interventions, are viewed as a violation to freedom. Viner (1928) provided an elaboration for freedoms and its 4 interconnected arguments; freedom from feudal political authority, freedom of religion, freedom of trade, and freedom of property. In this case, freedom from feudal political authority implies that the government should refrain from interfering with anything related to capitalism, such as the increasing goods price competition, increasing unemployment rate, decreasing wage rate; and these characteristics are the reasons behind the demand for compensation in the *compensation hypothesis*. While freedom of trade implies that the government should refrain from interfering with the flow of goods in the market and thus will not apply any restrictions nor support such as tariffs or subsidies.

When a country pursues a *laissez-faire* economy, it believes that the market can adjust by itself better when it is left on its own rather than with the interventions of government. This consequently brings the country to be more open to trade and have less interventions on

its public welfare, which insinuates less social protection programs, health care insurance subsidy, education subsidy, and the government expenditure in general. Therefore, this ideology may explain the negative associations between trade openness and government expenditure in social protection, health, education, and total.

In relation to the findings interpretation in the Model Results section, the findings cannot be concluded as a causal relationship due to the possible presence of both positive and negative selection bias, a form of omitted variable bias. Positive selection bias implies that the observed value in the findings is higher than the true value which leads to over-valuation, while negative selection bias implies that the observed value is lower than the true value which leads to under-valuation (Stock and Watson, 2015).

The reasons can be explained by Shelton (2007) who found that political rights, such as democracy, and inequality have positive associations with redistribution and thus also positive associations with government expenditure for social protection. On the other hand, Li and Reuveny (2003) found a negative association between democracy and trade openness. Therefore, democracy has a positive association with government expenditure in social protection and a negative association with trade openness, this will result in a negative selection bias when the democracy variable is left out of the regression. This is in line with Sáenz et al. (2013), mentioned in the Literature Review section above, who found that democracy strengthens the positive relationship between trade openness and government expenditure. Hence, it is implying that an absence of the democracy variable in the regression will lead to under-valuation of the findings and gives a negative selection bias. Meanwhile, Roser and Cuaresma (2014) found that democracy has a small but significantly positive association with trade openness in developed countries, in which OECD countries are considered to be developed in general. Therefore, inequality has positive associations with both government spending in social protection and trade openness, this will result in a positive selection bias when the inequality variable is left out of the regression.

Thus, theoretically the true value of the findings should have been either more or less negative than those presented in regression Table 2, depending on which selection bias is stronger. If positive selection bias is stronger, the true value should have been more negative but if negative selection bias is stronger, the true value should have been less negative. In the case of negative selection bias being stronger, this may explain the negative relationship between trade openness and government expenditure found in this paper.

VII. Conclusion

The evidence of this paper found that trade openness has a significant negative association with total government expenditure. This is in contrast to the hypothesis of this paper, derived from the *compensation hypothesis*, stating that trade openness positively affects total government expenditure. Furthermore, this finding is also in line with the other literature analysing the same hypothesis such as Garrett and Mitchell (2001), Liberati (2007), Sáenz et al. (2013), and Garen and Trask (2005). Moreover, trade openness has significant negative associations with all government expenditure categories, except for the general public services showing non significance. This is also in contrast with the hypothesis as trade openness should positively affect government expenditure in social protection, education, and health. These findings are not in line with Benarroch and Pandey (2012) who did not find significant results for all categories except for education in low-income countries. Hence, the findings of this paper do not support the *compensation hypothesis*.

A possible explanation behind the findings is because countries who are less interventionist in the trade market and thus have higher trade openness are also more likely to have less interventions in the public welfare and thus have lower government expenditure, based on the *laissez-faire* economic ideology. Moreover, omitted variable bias such as positive and negative selection bias affects the findings and reduces internal validity.

Based on these findings, the consequence that the government has to prepare itself after the reopening of trade during the pandemic recovery period is the possibility of a reduction in government expenditure. Butkiewicz and Yanikkaya (2011) found that reduced government expenditure leads to positive economic growth for developed countries, especially in social protection expenditure as its reduction will increase individual incentives to save and invest. Meanwhile, the expenditure for education has the opposite effect as it is a form of investment and its reduction will lead to decreased economic growth. Hence, the adjustment of government financing structure is necessary in order to maintain education expenditure level when the other expenditures are being reduced as trade openness increases.

The shortcomings of this paper offer several improvements. Future research is encouraged to include democracy and inequality measurement as these variables contribute to selection bias. Another method such as Instrumental Variables (IV) estimation can also be applied to theoretically eliminate all omitted variable bias. Additionally, a research of specific trade restrictions effect, such as import tariffs, on government expenditure will be insightful. It can show the extent of government's protection for its domestic trade market and its impacts on the size of compensation provided.

References

Akai, N. & Sakata, M. (2002). Fiscal Decentralization Contributes to Economic Evidence from State-Level Cross-Section Data for the United States. *Journal of Urban Economics, 52*(1), 93-108. doi: 10.1016/S0094-1190(02)00018-9

Alesina, A. & Wacziarg, R. (1998). Openness, Country Size and Government. *Journal of Public Economics, 69*(3), 305–321. doi: 10.1016/S0047-2727(98)00010-3

Avelino, G., Brown, D.S., & Hunter, W. (2005). The Effects of Capital Mobility, Trade Openness, and Democracy on Social Spending in Latin America, 1980-1999. *American Journal of Political Science, 49*(3), 625-641. doi: 10.1111/j.1540-5907.2005.00146.x

Balle, F. & Vaidya, A. (2002). A Regional Analysis of Openness and Government Size. *Applied Economic Letters,* (5), 289-292. doi: 10.1080/13504850110067450

Benarroch, M. & Pandey, M. (2008). Trade Openness and Government Size. *Economic Letters, 101,* 157-159. doi: 10.1016/j.econlet.2008.06.016

Benarroch, M. & Pandey, M. (2012). The Relationship Between Trade Openness and Government Size: Does Disaggregating Government Expenditure Matter?. *Journal of Macroeconomics, 34*, 239-252. doi: 10.1016/j.jmacro.2011.11.002

Benoit, K. (2011). Linear Regression Models with Logarithmic Transformations. Rwtrieved from https://kenbenoit.net/assets/courses/ME104/logmodels2.pdf

Butkiewicz, J.L. & Yanikkaya, H. (2011). Institutions and the Impact of Government Spending on Growth. *Journal of Applied Economics, 14*(2), 319-341. doi: 10.1016/S1514-0326(11)60017-2

Breyer, F. & Haufler, A. (2000). Health Care Reform: Separating Insurance from Income Redistribution. *International Tax and Public Finance, 7*, 445-461. doi: 10.1023/A:1008773103834

Cameron, D.R. (1978). The Expansion of the Public Economy: A Comparative Analysis. *The American Political Science Review, 72*(4), 1243-1261. doi: 10.2307/1954537

Cerny, P. G. (1995). Globalization and the Logic of Collective Action. *International Organization, 49*(4), 595-625. Retrieved from https://www.jstor.org/stable/2706920

Deardorff, A.V. (1980). The General Validity of the Law of Comparative Advantage. *Journal of Political Economy, 88*(5), 941-957. Retrieved from http://www.jstor.org/stable/1833142

Easterly, W. & Rebelo, S. (1993). Fiscal Policy and Economic Growth: An Empirical Investigation. *Journal of Monetary Economics, 32*(3), 417–458. doi: 10.1016/0304-3932(93)90025-B

Epifani P. & Gancia, G. (2009). Openness, Government Size and the Terms of Trade. *The Review of Economic Studies*, *76*(2), 629–668. doi: 10.1111/j.1467-937X.2009.00546.x

Garen, J. & Trask, K. (2005). Do More Open Economies Have Bigger Governments? Another Look. *Journal of Development Economics, 77*(2), 533-551. doi: 10.1016/j.jdeveco.2004.04.002

Garrett, G. & Mitchell, D. (2001). Globalization, Government Spending, and Taxation in the OECD. *European Journal of Political Research, 39*(2), 145-177. Retrieved from https://link.springer.com/article/10.1023/A:1011043120145

Giovanni, J. & Levchenko, A.A. (2009). Trade Openness and Volatility. *The Review of Economics and Statistics, 91*(3), 558-585. doi: 10.1162/rest.91.3.558

Gräbner, C., Heimberger, P., Kapeller, J., & Springholz, F. (2020). Understanding Economic Openness: A Review of Existing Measures. *Review of World Economics, 157*, 87-120. doi: 10.1007/s1029 0-020-00391-1

Hanushek, E.A., Leung, C.K.Y., & Yilmaz, K. (2003). Redistribution Through Education and Other Transfer Mechanisms. *Journal of Monetary Economics, 50*, 1719-1750. doi: 10.1016/j.jmoneco.2003.01.004

Hardiman, N., Murphy, P., & Burke, O. (2008). The Politics of Economic Adjustment in a Liberal Market Economy: The Social Compensation Hypothesis Revisited. *Irish Political Studies, 23*(4), 599-626. doi: 10.1080/7907180802452838

Harrison, A. (1996). Openness and Growth: A Time-series, Cross-country Analysis for Developing Countries. *Journal of Development Economics, 48*(2), 419-447. doi: 10.1016/0304-3878(95)00042-9

Henry, J.F. (2008). The Ideology of the Laissez Faire Program. *Journal of Economics Issues, 42*(1), 209-224. doi: 10.1080/00213624.2008.11507122

Jetter, M. & Parmeter, C.F. (2017). Does Urbanization Mean Bigger Governments?. *The Scandinavian Journal of Economics, 120*(4), 1202-1228. doi: 10.1111/sjoe.12256

Kapstein, E.B. (2000). Review: Winners and Losers in the Global Economy. *International Organization, 54*(2), 359-384. Retrieved from https://www.jstor.org/stable/2601301

Kittel B. & Winner, H. (2005). How Reliable Is Pooled Analysis in Political Economy? The Globalization-Welfare State Nexus Revisited. *European Journal of Political Research, 44*(2), 269-293. doi: 10.1111/j.1475-6765.2005.00228.x

Leamer, E.E. & Levinsohn, J. (1985). Chapter 26 International Trade Theory: The Evidence. *Handbook of International Economics* (pp. 1339-1394). doi: 10.1016/S1573-4404(05)80006-1

Li, Q. & Reuveny, R. (2003). Economic Globalization and Democracy: An Empirical Analysis. *British Journal of Political Science, 33*(1), 29-54. Retrieved from https://www.jstor.org/stable/4092267

Liberati, P. (2007). Trade Openness, Capital Openness and Government Size. *Journal of Public Policy, 27*(2), 215-247. Retrieved from https://www.jstor.org/stable/40072021

Newbery, D.M.G. & Stiglitz, J.E. (1984). Pareto Inferior Trade. *The Review of Economic Studies, 51*(1), 1–12. doi: 10.2307/2297701

Ohlin, B. (1933). *Interregional and International Trade*. London: Harvard University Press.

Oxley, L. (1994). Cointegration, Causality, and Wagner's Law: A Test for Britain 1870–1913. *Scottish Journal of Political Economy, 41*(3), 286–298. doi: 10.1111/j.1467-9485.1994.tb01127.x

Ram, R. (2009). Openness, Country Size, and Government Size: Additional Evidence From a Large Cross-Country Panel. *Journal of Public Economics, 93*(1-2), 213-218. doi: 10.1016/j.jpubeco.2008.04.009

Reed, W.R. (2015). On the Practice of Lagging Variables to Avoid Simultaneity. *Oxford Bulletin of Economics and Statistics, 77*(6), 897-905. doi: 10.1111/obes.12088

Rehm, P. (2009). Risks and Redistribution: An Individual-Level Analysis. *Comparative Political Studies, 42*(7), 855-881. doi: 10.1177/0010414008330595

Rodrik, D. (1998). Why do More Open Economies Have Bigger Governments?. *Journal of Political Economy, 106*(5), 997-1032. doi: 10.1086/250038

Roser, M. & Cuaresma, J.C. (2014). Why is Income Inequality Increasing in the Developed World?. *The Review of Income and Wealth, 62*(1), 1-27. doi: 10.1111/roiw.12153

Rudra, N. (2002). Globalization and the Decline of the Welfare State in Less-Developed Countries. *International Organization, 56*(2), 411–445. Retrieved from https://www.jstor.org/stable/3078610

Ruggie, J.G. (1982). International Regimes, Transactions, and Change: Embedded Liberalism in the Postwar Economic Order. *International Organization, 36*(2), 379-415. doi: 10.1017/S0020818300018993

Sáenz, E., Sabaté, M., & Gadea, M.D. (2013). Trade Openness and Public Expenditure. The Spanish Case, 1960-2000. *Public Choice, 154*, 173-195. doi: 10.1007/s11127-011-9841-8

Sanz, I. & Velázquez, F.J. (2007). The Role of Ageing in the Growth of Government and Social Welfare Spending in the OECD. *European Journal of Political Economy, 23*(4), 917-931. doi: 10.1016/j.ejpoleco.2007.01.003

Shelton, C.A. (2007). The Size and Composition of Government Expenditure. *Journal of Public Economics, 91*, 2230-2260. doi: 10.1016/j.jpubeco.2007.01.003

Shelton, C.A. (2008). The Ageing Population and the Size of the Welfare State: Is There a Puzzle?. *Journal of Public Economics, 92*(3-4), 647-651. doi: 10.1016/j.jpubeco.2007.10.002

Stock, J. & Watson, M. (2015). *Introduction to Econometrics*. Harlow, United Kingdom : Pearson Education.

UNCTAD. (2021). *Key Statistics and Trends in International Trade 2020*. Retrieved from https://unctad.org/system/files/official-document/ditctab2020d4_en.pdf

Ventura, L.B. (2006). Trade Openness and Preferences for Redistribution: A Cross-National Assessment of the Compensation Hypothesis. *Business and Politics, 8*(2), 1-50. doi: 10.2202/1469-3569.1131

Viner, J. (1928). "Adam Smith and Laissez Faire". In Clark, J.M., Douglas, P., Hollander, J., Morrow, G., Palyi, M., & Viner, J. (Eds.), *Adam Smith 1776-1926* (pp. 116-177). New York, NY: Augustus M. Kelley.

Walter, S. (2010). Globalization and the Welfare State: Testing the Microfoundations of the Compensation Hypothesis. *International Studies Quarterly, 54*(2), 403-426. doi: 10.1111/j.1468-2478.2010.00593.x

Data Source

Organisation for Economic Co-operation and Development (OECD). (2020). *Government Expenditure by Function (COFOG)*. Retrieved from https://stats.oecd.org/Index.aspx?datasetcode=SNA_TABLE11

Organisation for Economic Co-operation and Development (OECD). (2020). *Gross Domestic Product (GDP)*. Retrieved from https://stats.oecd.org/index.aspx?queryid=60702

Organisation for Economic Co-operation and Development (OECD). (2021). *Monthly International Merchandise Trade (IMTS)*. Retrieved from https://stats.oecd.org/Index.aspx?DataSetCode=MEI_TRD#

World Development Indicator (WDI). (2019). *GDP Per Capita (Current US$)*. Retrieved from https://data.worldbank.org/indicator/NY.GDP.PCAP.CD

World Development Indicator (WDI). (2019). *Population Ages 0-14 (% of Total Population)*. Retrieved from https://data.worldbank.org/indicator/SP.POP.0014.TO.ZS

World Development Indicator (WDI). (2019). *Population Ages 65 and Above (% of Total Population)*. Retrieved from https://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS

World Development Indicator (WDI). (2019). *Population, Total.* Retrieved from https://data.worldbank.org/indicator/SP.POP.TOTL

World Development Indicator (WDI). (2019). *Trade (% of GDP)*. Retrieved from https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS

World Development Indicator (WDI). (2019). *Urban Population (% of Total Population)*. Retrieved from https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS

Appendix

Table A1: Classifications of expenditure by sector

Health	**Defence**	**Public order and safety**	**Housing and community amenities**	**Environment protection**
Medical products, appliances, and equipment	Military defence	Police services	Housing development	Waste management
Outpatient services	Civil defence	Fire-protection services	Community development	Wastewater management
Hospital services	Foreign military aid	Law courts	Water supply	Pollution abatement
Public health services	R&D defence	Prisons	Street lighting	Protection of biodiversity and landscape
R&D health	Defence n.e.c.	R&D public order and safety	R&D housing and community amenities	R&D environmental protection
Health n.e.c.		Public order and safety n.e.c.	Housing and community amenities n.e.c.	Environmental protection n.e.c.
Recreation, culture, and religion	**Economic affairs**	**General Public Services**	**Education**	**Social protection**
Recreational and sporting services	General economic, commercial, and labor affairs	Executive and legislative organs, financial, fiscal, and external affairs	Pre-primary and primary education	Sickness and disability
Culture services	Agriculture, forestry, fishing, and hunting	Foreign economic aid	Secondary education	Old age
Broadcasting and publishing services	Mining, manufacturing, and construction	General services	Post-secondary and non-tertiary education	Survivors
Religious and other community services	Fuel and energy	Basic research	Tertiary education	Family and children
R&D recreational, culture, and religion	Transport	R&D general public services	Education not definable by level	Unemployment
Recreational, culture, and religion n.e.c.	Communication	General public services n.e.c.	Subsidiary services to education	Housing
	R&D economic affairs	Public debt transactions	R&D education	Social exclusion n.e.c.
	Economic affairs n.e.c.	Transfers of general character between different levels of government	Education n.e.c.	R&D social protection
				Social protection n.e.c.

Table A2: Summary statistics

Variable	Obs.	Mean	Median	Min	Max	Std Dev.
Trade openness	630	100.655	85.244	22.154	408.362	57.497
Total expenditure	630	44.108	44.480	23.567	65.106	7.070
Social protection	630	15.338	15.497	3.224	25.481	4.679
Recreation	630	1.252	1.220	0.267	4.162	0.538
Public order	630	1.686	1.694	0.742	4.129	0.443
Housing	609	0.657	0.605	0.013	1.707	0.330
Health	630	6.125	6.462	1.454	9.306	1.548
General public	630	6.453	5.947	2.998	15.520	2.225
Environment	588	0.733	0.706	0.091	1.703	0.285
Education	630	5.406	5.419	3.216	8.164	0.986
Economic affairs	630	4.921	4.679	1.335	25.029	1.767
Defence	630	1.572	1.303	0.013	8.819	1.252
Urban ratio	630	75.252	76.691	50.701	98.001	11.646
Age < 15	630	17.294	16.842	12.973	28.374	2.978
Age > 64	630	15.779	16.019	6.636	22.752	6.636
GDP per capita	630	34561.110	30466.700	2970.586	118823.600	22014.800
Population (in million)	630	28.656	9.829	0.274	326.688	55.754

Table A3: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) $Openness_{t-1}$	1.000						
(2) $Total$	-0.106	1.000					
(3) $GDP\ per\ capita$	0.303	0.055	1.000				
(4) $Urban\ ratio$	-0.048	0.127	0.459	1.000			
(5) $Age > 15$	-0.109	-0.096	0.149	0.433	1.000		
(6) Age < 64	-0.073	0.407	0.047	-0.081	-0.694	1.000	
(7) $Population$	-0.386	-0.137	0.070	0.100	0.097	-0.063	1.000

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) $Openness_{t-1}$	1.000						
(2) $Social\ protection$	0.047	1.000					
(3) $GDP\ per\ capita$	0.303	0.197	1.000				
(4) $Urban\ ratio$	-0.048	-0.023	0.459	1.000			
(5) $Age > 15$	-0.109	-0.314	0.149	0.433	1.000		
(6) Age < 64	-0.073	0.581	0.047	-0.081	-0.694	1.000	
(7) $Population$	-0.386	-0.230	0.070	0.100	0.097	-0.063	1.000

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) $Openness_{t-1}$	1.000						
(2) $Education$	-0.183	1.000					
(3) $GDP\ per\ capita$	0.303	0.061	1.000				
(4) $Urban\ ratio$	-0.048	0.343	0.459	1.000			
(5) $Age > 15$	-0.109	0.423	0.149	0.433	1.000		
(6) Age < 64	-0.073	-0.122	0.047	-0.081	-0.694	1.000	
(7) $Population$	-0.386	-0.001	0.070	0.100	0.097	-0.063	1.000

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) $Openness_{t-1}$	1.000						
(2) $Health$	-0.176	1.000					
(3) $GDP\ per\ capita$	0.303	0.220	1.000				
(4) $Urban\ ratio$	-0.048	0.153	0.459	1.000			
(5) $Age > 15$	-0.109	0.024	0.149	0.433	1.000		
(6) Age < 64	-0.073	0.234	0.047	-0.081	-0.694	1.000	
(7) $Population$	-0.386	0.227	0.070	0.100	0.097	-0.063	1.000

Table A4: Model Results Without Time and Country Fixed Effects

	Total	**Defence**	**Economic affairs**	**Education**	**Environment**	**Health**
$Log(Openness_{t-1})$	-0.019 (0.019)	0.051 (0.122)	-0.023 (0.034)	-0.133*** (0.020)	0.247*** (0.044)	-0.080*** (0.024)
$Log(GDP\ per\ capita)$	0.000 (0.012)	-0.378*** (0.042)	-0.051*** (0.019)	-0.033*** (0.009)	0.101** (0.040)	0.086*** (0.025)
$Log(urban\ ratio)$	-0.030 (0.056)	-0.104 (0.229)	0.329*** (0.104)	0.166*** (0.057)	0.342*** (0.113)	-0.323*** (0.077)
$Log(age > 15)$	0.418*** (0.082)	1.920*** (0.393)	-1.269*** (0.136)	0.568*** (0.074)	-0.791*** (0.176)	0.821*** (0.124)
$Log(age > 64)$	0.604*** (0.048)	1.037*** (0.209)	-0.577*** (0.086)	0.318*** (0.041)	-0.773*** (0.126)	0.772*** (0.097)
$Log(population)$	-0.010* (0.006)	0.376*** (0.055)	-0.063*** (0.011)	-0.061*** (0.006)	0.116*** (0.015)	0.005 (0.009)
$Observations$	600	600	600	600	560	600
$Number\ of\ countries$	30	30	30	30	28	30
	General public	**Public order**	**Recreation**	**Housing**	**Social protection**	
$Log(Openness_{t-1})$	-0.162*** (0.042)	0.025 (0.025)	0.037 (0.047)	0.292*** (0.060)	0.190*** (0.029)	
$Log(GDP\ per\ capita)$	-0.024 (0.026)	-0.195*** (0.013)	-0.120*** (0.023)	-0.119*** (0.040)	0.068*** (0.018)	
$Log(urban\ ratio)$	0.304*** (0.090)	-0.306*** (0.070)	0.675*** (0.101)	-0.433*** (0.128)	-0.556*** (0.083)	
$Log(age > 15)$	0.191 (0.138)	0.310*** (0.110)	0.046 (0.154)	0.706*** (0.271)	1.052*** (0.133)	
$Log(age > 64)$	0.503*** (0.083)	0.344*** (0.094)	0.510*** (0.088)	-0.854*** (0.137)	1.629*** (0.091)	
$Log(population)$	-0.037*** (0.014)	0.053*** (0.008)	-0.174*** (0.015)	0.176*** (0.021)	0.026*** (0.010)	
$Observations$	600	600	600	580	600	
$Number\ of\ countries$	30	30	30	29	30	

Table A5: Model Results Without Time and Country Fixed Effects and Control Variables

	Total	**Defence**	**Economic affairs**	**Education**	**Environment**	**Health**
$Log(Openness_{t-1})$	-0.018 (0.013)	-0.788**** (0.037)	0.153*** (0.021)	-0.053*** (0.013)	0.108*** (0.029)	-0.114*** (0.017)
$Observations$	600	600	600	600	560	600
$Number\ of\ countries$	30	30	30	30	28	30
	General public	**Public order**	**Recreation**	**Housing**	**Social protection**	
$Log(Openness_{t-1})$	-0.114*** (0.024)	-0.079**** (0.021)	0.342*** (0.045)	-0.060 (0.041)	0.117*** (0.027)	
$Observations$	600	600	600	580	600	
$Number\ of\ countries$	30	30	30	29	30	