



SCHOOL OF ECONOMICS AND MANAGEMENT

Aging Populations and FDI Outflows

Exploring the effects of increasingly older populations on present and future levels of foreign direct investment

Bachelor thesis

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Abstract

Most of the world's rich countries are experiencing increasingly high life expectancies and low fertility rates. Fewer people of working age need to somehow support the many elderly, which puts pressure on the economy to reprioritize and change. This study investigates what possible effect this may have on international capital movements, and particularly foreign direct investment (FDI). The literature review suggests that FDI outflows may increase, due to the rich countries wanting to find higher returns on capital abroad. A panel data analysis is performed, and it does not prove a statistically significant correlation between aging populations and FDI outflows.

Keywords: Aging population, Demographics, FDI, International capital, Economic growth

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1. Introduction

Economic growth in the world's emerging markets and developing economies has been significant in the last 20-30 years (IMF, 2021). The terms today refer to much of Asia, parts of Latin America and some countries in Africa, and are often interchangeable with the "low to middle income countries" who are relatively poor but still have a vibrant economy. Economic growth has consistently been proven to raise the standards of living and drastically been able to reduce poverty in these regions (Adams, 2002, Ravallion & Chen, 1997).

There are several factors contributing to economic growth, notably a relative political stability that can allow an advanced economic system, a working population (labour) and capital (Mankiw et. al., 1992). In many emerging economies, the latter is scarce, and they therefore welcome investment from abroad in various forms (Balasubramanyam et al., 1999).

Foreign direct investment, FDI, is the form of investment where an economic entity, usually a corporation, branches out in another country or invests in another company that is based in that country. This gives the investor a controlling ownership of, and a larger responsibility for, the investment, as opposed to the case of a loan or a stock ownership. Because of this, FDI is a stable form of investment to the developing economies and a strong determinant of economic growth (Oeking & Zwick, 2015).

Even though FDI is a more stable form of capital flow for economic growth in emerging economies than for example portfolio investments, capital flows are very much intertwined in the modern financial system. For example, large companies, the providers of FDI are partly financed by many smaller investors in the form of stocks. This means that one kind of capital flows can be traced back to another.

Lending capital, in the case of people saving in portfolios, always comes with risk and only those who have enough money can afford it. Typically, working people in developed countries save up for their retirement by putting their money in various

financial instruments, either manually or via a company or the public pension system (OECD, 2019). Once retired, they take back their investment and the additional returns and live off this money in old age (Modigliani, 1986). This process is called the life-cycle hypothesis, coined already in the 1950s.

How much capital that exists with the pension funds of the world's rich countries, naturally depends on how much people save but perhaps more importantly the number of people who save. The size of different generations and change in demographics across the developed world becomes important to explore this.

The generation born in the Western World between approximately 1945 and 1965, often labeled baby-boomers, who are retiring right now, is very large. Due to economic prosperity in the decades following the end of the Second World War, families had many children. The baby-boomers themselves however had fewer children and ever since there has been a decline in birth rates in the world's richest countries (WHO, 2011). This means that there has been lots of capital in pension funds for 30-40 years, and that it is now decreasing since baby-boomers are retiring. The accumulated savings of following generations is simply not as large (OECD, 2019).

Less capital in the financial system might set off a chain reaction that reaches the levels of FDI, which in turn may affect any economic activities that rely on FDI, such as growth in the emerging economies. Speculated by author Peter Zeihan (2020), possible global economic changes could be the result of aging populations. Higher demand for public spending in OECD countries accompanied by less capital accumulation from the working population, will force countries to cut down on some other expenses (Clements et. al., 2015). It seems plausible that money spent on investments abroad would have to be directed toward the elderly at home instead, and is worth researching.

This study intends to conduct a statistical analysis to see if this could actually be the case, something that has not been found in the literature.

1.1 Hypothesis

The increasingly older populations in the OECD countries and China are correlated with the size of foreign direct investment (FDI) outflows of the same countries. Older populations have a negative effect on FDI outflows.

1.2 Aim and scope

This study focuses on examining the possible effect of aging populations on outward foreign direct investment. In order to test how large, if existent, the effect of aging populations in wealthy countries is on the tendency to invest abroad, a review of existing literature on the subject will be made, accompanied by a panel data analysis on the OECD countries and China.

The link to economic growth in developing countries is not the central scope of the statistical investigation since, by definition; a large outflow from investor countries will mean a large inflow to receivers. FDI flows are symmetrical in nature (Lipse, 2000).

1.3 Disposition

The paper will next present the literature it is based upon. Chapter 2 presents theories that create the foundation for what the study does, reviews what the previous literature states about the relationship of aging populations and FDI and examines what other variables may be included in the regression. Chapter 3 describes the method of the statistical analysis and the data that it uses. It also briefly discusses why this data is used and possible limitations with it. Chapter 4 presents the results of the regression, which are then discussed and given concluding remarks in chapter 5.

2. Background

This section will list and review relevant economic theory and previous research related to the study; demographic changes, FDI and its determinants, and possible links between the two.

2.1 Economic growth

GDP is the most often used measure of wealth for a society, and an increase in real GDP (GDP adjusted for inflation) over time is what defines economic growth from a macroeconomic perspective. In most cases, income is labelled Y when constructing a production function. Below is an equation determining value depending on various factors. The factors are productivity, A (sometimes labelled technology), capital, K, and labour, L.

Figure 1:

$$Y = F(A, K, L)$$

Economist Robert Solow developed one theoretical model for economic growth in the 1950s. The Solow model has since been able to converge well with empirical studies on economic growth across the world (Mankiw et. al., 1992). The model itself is based on the following Cobb-Douglas production function:

Figure 2:

$$F(K, L) = AK^\alpha L^{1-\alpha}$$

It assumes that the level of technology, A, is exogenous, meaning that it is constant and cannot change or be set at a specific level by the one who employs the model (the firm or, in this case, the developing country). The levels of labour and capital on the other hand can (Solow, 1956). The important aspect to take from this theoretical perspective is mainly that capital is important to economic growth, together with a working population.

If capital does not come from the domestic market of a country, it may be provided in the form of FDI. Low-income countries, that generally have fewer domestic investors, will make themselves available to foreign investment to boost the economy. It has been proven, with results consistent over time, that FDI inflows contribute massively to economic growth in developing countries (Balasubramanyam et al., 1999).

2.2 The life-cycle hypothesis

The industrialized parts of the world have in the last half-century become an increasingly individualistic society in terms of economic dependency. Instead of providing for elderly family members, one saves part of one's income in order to spend when one is old and can no longer work. In an economy where people earn enough to save this type of surplus, they can plan their own level of consumption over a span of their own life.

As early as in the 1950s, economists Franco Modigliani and Richard Brumberg developed the life-cycle hypothesis (LCH), which is an economic theory that describes the consumption and savings behaviour of the individual over time. The observation that it relies on is that people tend to earn money and accumulate wealth from young adulthood up until retirement, with a peak in income level at around middle age. However, consumption levels are relatively stable and savings are what makes this possible.

The theory uses the following mathematical equation, where the level of consumption in one year, C , depends on acquired wealth, W , future income, Y , and time. R represents the time in years left until retirement and T the assumed time in years until death.

Figure 3:

$$C = \frac{W + RY}{T}$$

The formula can be rewritten in the following steps to determine the aggregated level of consumption in society, given that every individual operates under the premise of the model. $1/T$ on an aggregate is noted by a and represents the marginal propensity to consume wealth and R/T by b , which is the marginal propensity to consume future income.

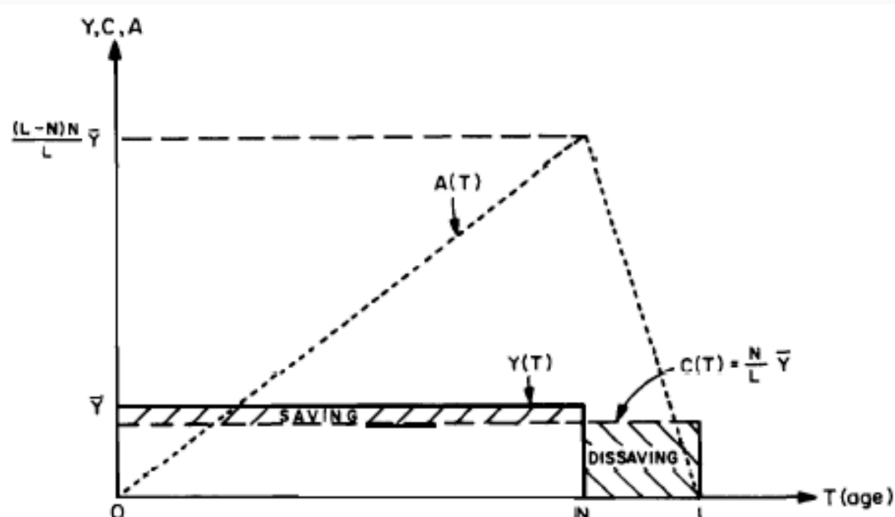
Figure 4:

$$C = \frac{1}{T} W + \frac{R}{T} Y$$

$$C = aW + bY$$

To get a function for the average level of consumption in society, the equation can be rewritten further. This is important because the average consumption level is the average of the fluctuations of saving and dissaving.

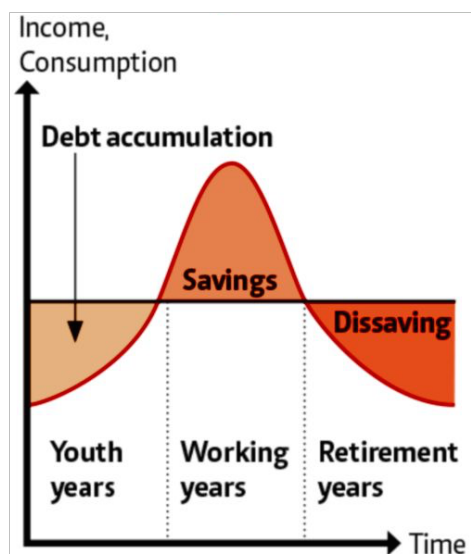
Figure 5: Income, consumption, saving and wealth as a function of age:



Modigliani, 1986.

In the life-cycle hypothesis, Modigliani makes the assumption that $Y(T)$, which is income, drops to 0 at retirement, N . The consumption, $C(T)$, is constant throughout life and the difference between C and Y is annual savings. All the annual savings constitute $A(T)$, aggregated savings, commonly referred to as wealth, and it is spent at a higher rate during the time of dissaving, between the time of retirement, N , and life expectancy (death), L .

Figure 6: A somewhat more visual illustration of the LCH:



New Straits Times, 2015.

In a society with a stable population, where the proportions of age groups remain unchanged, and where there is no economic growth, aggregated savings will be equal to zero. This is because the elderly dissave the same amount that the working population amount to, and the same wealth is simply passed around. This implies that with an aging population, aggregated savings would theoretically decrease over time, and with a growing younger population aggregated savings would increase over time.

Then there is the aspect of economic growth, which also affects the value of the aggregated savings and can, according to the model, counter the negative effects that an aging population may have on the aggregate economy. Studies from when Modigliani presented the LCH until today also show that the societies with higher economic growth will also have higher aggregated savings (Deaton, 2005).

2.3 Aging populations and FDI outflows

The research on effects of aging populations is often focused on domestic implications, and the need for changes in education systems, labour market structure and public spending (Clements et. al. 2015, OECD 2019, The World Bank 2016). This research makes it clear that capital flows might have to change, and that domestic spending would be prioritized.

Most studies, however, conclude that differences in age on the global level would stimulate capital flows from the rapidly aging countries to the less rapidly aging countries. Where the working population is larger, potential for economic growth is better. The wealthy OECD countries can compensate for their loss of a working population by having a high return on investment abroad (Borsch Supan 1996, Attanasio & Violante 2000, Brooks 2003). Most of the OECD countries, even though the largest senders of FDI, have only had on average 0-3% of their GDP constituted by FDI outflows over time (The World Bank, 2021). This is also an indicator that there is room for increase.

2.4 Other determinants of FDI outflows

The academic literature on FDI is large and it is often focused on developing countries and their emerging economies, which naturally moves the attention of this field to study inflows of FDI since developing countries primarily are FDI receivers. The determinants of levels of FDI inflows, domestic circumstances that attract foreign investors, are fairly well documented. See for example Antonakakis & Tondl (2015) and Zang (2012).

Foreign direct investment is the investment from one country into another; therefore, every inflow of FDI for one country is also registered as an outflow for some other country. This symmetry is further manifested in that FDI outflows and inflows are often determined by the same macroeconomic factors (Globerman, Shapiro, 1999, 2002. Zang, 2012. Lipsey, 2000). These factors may have the opposite effects on

inflows and outflows respectively, but the symmetrical relationship means that the determinants usually are not different. The determinants of FDI will be explored below.

2.4.1 The current account

The balance of payments of a country, in the broader sense, consists of the current account and the financial account and these two need to, by definition, balance each other out. Trade deficits will have to be accompanied by net capital inflows of the same magnitude and vice versa. Since FDI is recorded under the financial account, a relation between FDI and the current account is established.

Along with FDI under the financial account are the portfolio investments and other investments, which differ from the previous because they are not in the form of a controlling ownership. These are stocks, other financial instruments and loans, and therefore more volatile in nature.

Literature on the relationship between the current and financial account make a general difference, about what effects what, between developed and developing countries. In developed countries, there is a granger-causality that runs from current account to financial account and in developing countries it is the opposite (Fry et al., 1995, Sarisoy-Guerin, 2003, Yan 2005, Yan and Yang 2012). Granger-causality means that in a time series, a variable is affected by previous values of another variable, rather than its own previous values. For the developed countries, past current account values can predict future financial account values.

Oeking & Zwick (2015) also observed that the current account had a positive impact on FDI outflows, particularly in countries with larger FDI outflows than inflows. When the current account increased due to, for example, a larger net export, the tendency for domestic firms to invest abroad also increased. Since the countries with higher outflows than inflows are roughly the richer OECD members, this supports the inclusion of the current account as a variable to explain FDI outflows for the OECD countries.

2.4.2 Interest rate

Interest rates seem to be an important determinant for levels of FDI. As an economist, one must assume that capital is invested where returns are high and it is therefore reasonable to believe that countries with high interest rates also have high levels of FDI inflows. McCloud and Delgado (2018) have shown that more FDI inflows are associated with higher domestic interest rates, and more FDI outflows are associated with lower domestic rates. Many other factors are also involved, but the level of interest rate is relevant to a regression with FDI as the dependent variable.

2.4.3 Trade

FDI is when companies make investments which they have direct control over in a business entity abroad, and not when it trades in goods or services with one. Even though these are different economic activities, it seems plausible that levels could come somewhat hand in hand for a particular country. Trade openness does theoretically have a positive relationship with FDI.

The convergence of trade openness and FDI inflows is positive for emerging economies (Apergis & Cooray, 2016). This means that FDI will go to those countries that are more open to trade. That openness to trade attracts more FDI, is also evident, and Noy & Aizenman (2005) show that there are clear two-way positive feedbacks between FDI and international trade.

2.5 Country specification

The OECD (The Organisation for Economic Co-operation and Development) is an intergovernmental economic organisation, currently consisting of 38 member states, which are all committed to democracy and market economy and also generally high-income countries. Members are able to discuss international and domestic policy and exchange ideas.

As of 2017, the OECD member states contributed to 62.2% of the global nominal GDP (IMF, 2018), showing that they are indeed some of the world's richest countries. Since they also employ market economy and allow for international capital flows, they become particularly interesting, as a group of nations, for observing outflows of FDI.

3. Method

3.1 Data

The countries chosen for the study are the 37 countries that were members of the OECD in 2019 and China (Appendix 1). Costa Rica became a member of the OECD in 2020, while the data of this study ends in 2019. Costa Rica is therefore not a part of the study.

China, however, is included in the study, on the basis of being one of the economic powers of the world. FDI outflows from China are nominally large because of the size of the country's economy but have also risen dramatically since the turn of the millennium (UNCTAD, 2021). China's population has also aged considerably during the last century (The World Bank, 2021).

The variable of age is of most interest to the hypothesis, but other relevant variables are also included. These are chosen because they are domestic factors that, according to the existing theory and literature on the subject, determine the level of FDI outflows.

Since the study includes data over time as well as on different countries, a panel data analysis has been employed. This allows for the division by country to take the role as cross-sectional data, while simultaneously keeping the time-series dimension. The dated panel spans from 1970-2019 and includes the countries mentioned earlier. All data is collected from The World Bank, except the interest rates that are from OECD.

One limitation is that there is a relatively large amount of missing data. In many cases this is because some of the countries were formed or gained independence some time after 1970. In other cases, the reason for missing data is difficult to know for sure.

Table 1: Variables and descriptive statistics

Name	Description	Format	Min	Max	Mean	S.D.
FDI (dependent variable)	Outgoing foreign direct investment as a share of GDP	%	- 42.68	140.09	2.76	8.13
Retired	Share of population over 65 years of age	%	3.01	28.00	12.76	4.23
Current account	The sum of net export (trade balance) and net income as a percentage of GDP	%	- 23.15	16.17	- 0.61	4.75

Trade openness	Sum of exports and imports of goods and services, as a share of GDP	%	4.92	408.36	74.3	48.73
Interest rate	Interest rates of government bonds maturing in ten years	%	- 0.48	22.49	5.92	3.63

3.2 Regression

There are three ways to conduct an Ordinary Least Squares (OLS) regression using panel data analysis; a pooled OLS regression, a fixed-effects model and a random-effects model.

The pooled OLS, or the common constant model, treats every observation as if they were similar, without distinction between the units in the cross-sectional dimension. In this case, this implies that the model would be unable to differentiate between countries.

If a fixed effects model is used, the regression is able to take in the individual-specific effects of the cross-sectional differences of the observations. The performed Hausman test (Appendix 2) confirmed this by giving the result that a fixed-effects model should be used.

4. Results

The effect that the four explanatory variables may have on the dependent variable, FDI outflows, are manifested in the coefficients calculated in the regression. These coefficients also have a respective p-value that shows at which level of significance we might expect that the variable actually has said effect (at which level one should be indifferent between rejecting or not rejecting the null hypothesis).

Table 2: Coefficients and p-values

	Coefficient	P-value
Retirement	-0.28	0.16
Current account	-0.05	0.49
Trade openness	0.08	0.00
Interest rate	-0.19	0.08

Appendix 3

Table 3: Regression statistics

Number of observations	965
R²	0.29
Adjusted R²	0.27
S.D dependent variable (FDI)	8.90
F-statistic	10.18
P (F-statistic)	0.00

Appendix 3

The only variable significant at the 5% level is the trade openness, but the interest rate is significant at the 10% level. This means that these variables have significant effects or correlations. For trade openness the connection is positive, and for interest rate it is negative; in years and countries where the level of trade openness is high and the domestic interest rate is low, the FDI outflows are higher.

It is not possible to prove a relationship between FDI outflows and the current account or the retirement level, due to the high p-values of these variables.

5. Discussion and conclusions

The high p-value of the retirement variable in the regression makes it impossible to conclude that it has any significant effect on FDI. The study cannot prove or disprove the hypothesis because of this. However, its coefficient is negative, which would mean that older populations are correlated with lower FDI outflows, if the p-value were below 5% or at least below 10%.

Results from the trade openness and interest rate variables are definitely in line with what the literature claims, namely that high trade openness and low domestic interest rates both are associated with more FDI outflows. This indicates that the study is at least performed in a relevant manner and that the data is probably correct.

On the subject of whether aging populations decrease the FDI levels, the reviewed literature is not completely unanimous. Yet, since the regression has failed to show persuading conclusions, it becomes more noteworthy.

What is clear is that countries that face aging populations will have to domestically adjust in different ways; improve education levels, allow employment in older age and make the financial system more efficient (The World Bank, 2016).

Most previous studies point to the opposite of the hypothesis, and state that FDI outflows may increase as a result of an older population because the return on capital is higher in countries where people are younger. This is a way for the wealthy countries to compensate for the loss of income from a workforce (Borsch-Supan 1996, Attanasio & Violante 2000, Brooks 2003).

Literature in line with the hypothesis, that aging effectively decreases the FDI outflows, is not prominent. Reports from the OECD (2019) and IMF (Clements et. al., 2015) show that aging forces countries to change behaviours and reprioritize in some of their fiscal policy patterns. Yet, FDI is still generally a very small part of the GDP of a country, something that goes even for the OECD countries (usually 0-3%, (The

World Bank, 2021)). Perhaps FDI is far from the first thing to be changed because of aging populations. An idea that seems logical might still not be scientifically supported.

On the other hand, the negative coefficient of the retirement variable in the regression is interesting, even though untrustworthy. Is it possible that aging affects FDI in two different directions, perhaps depending on unknown circumstances? This may be a question for future interested researchers.

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Appendix 1: List of countries in the data

1 Australia	14 United Kingdom	27 The Netherlands
2 Austria	15 Greece	28 Norway
3 Belgium	16 Hungary	29 New Zealand
4 Canada	17 Ireland	30 Poland
5 Chile	18 Iceland	31 Portugal
6 Colombia	19 Israel	32 Slovakia
7 Czech Republic	20 Italy	33 Slovenia
8 Germany	21 Japan	34 Sweden
9 Denmark	22 South Korea	35 Turkey
10 Spain	23 Lithuania	36 USA
11 Estonia	24 Luxembourg	37 Switzerland
12 Finland	25 Latvia	38 China
13 France	26 Mexico	

Appendix 2: The Hausman test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	13.004091	4	0.0113

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
RETIRED	-0.282264	-0.193311	0.026412	0.5841
CURRENT_ACCOUNT	-0.052222	0.055021	0.001524	0.0060
TRADE	0.084024	0.072812	0.000450	0.5973
INTEREST_RATE	-0.198414	-0.139905	0.003197	0.3007

Eviews

Appendix 3: The regression

Dependent Variable: FDI
 Method: Panel Least Squares
 Date: 10/11/21 Time: 11:55
 Sample: 1970 2019
 Periods included: 50
 Cross-sections included: 35
 Total panel (unbalanced) observations: 965

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.424975	3.327509	0.728766	0.4663
RETIRED	-0.282264	0.201809	-1.398664	0.1622
CURRENT_ACCOUNT	-0.052222	0.076845	-0.679576	0.4969
TRADE	0.084024	0.022781	3.688345	0.0002
INTEREST_RATE	-0.198414	0.114309	-1.735771	0.0829

Effects Specification

Cross-section fixed (dummy variables)

Root MSE	7.471408	R-squared	0.294698
Mean dependent var	3.863070	Adjusted R-squared	0.265755
S.D. dependent var	8.901024	S.E. of regression	7.627120
Akaike info criterion	6.940873	Sum squared resid	53868.16
Schwarz criterion	7.137778	Log likelihood	-3309.971
Hannan-Quinn criter.	7.015840	F-statistic	10.18191
Durbin-Watson stat	1.297352	Prob(F-statistic)	0.000000

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