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# The Demographic Dividend and International Capital Flows

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## Abstract

The demographic transition of falling fertility and mortality can provide countries with one generation that is proportionately bigger than the previous and following ones. This period, known as the demographic dividend, gives countries the opportunity for increased economic growth due to temporarily favorable dependency ratios. When the dividend period is over, countries face the prospect of an ageing population. This causes individual and society to accumulate funds for future pensions. This study aims to investigate the potential capital flows from the ageing countries where capital supply is increasing to the countries experiencing the dividend where capital demand is increasing.

**Keywords:** The demographic dividend, International Capital Flows, Foreign Direct Investment

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# 1 Introduction

*This chapter presents the background of the paper, including a brief introduction to the theory it is based on. The aim and scope of the paper will also be explained.*

## 1.1 Introduction

The demographic dividend has often been described as a window of opportunity (Bloom and Canning 2005). Many studies have shown that many success stories of modern economic growth around the world have been driven partly by change in population structure. While population growth has a much debated but ambiguous effect, it is the change in age structure that has the biggest impact, specifically the working age share of the population. When mortality declines due to improved living standards it normally undermines the incentives for children, which causes a drop in fertility. The last high-fertility generation will hence be bigger than both the following and the previous generation, and when they reach working age they will have smaller amounts of dependants than the previous and following generations. This time period gives the country an opportunity for demographically enhanced growth, the so called demographic dividend or demographic bonus. Most studies of the dividend have focused on institutional arrangements to take advantage of the dividend, often with specific policy suggestions for the public sector. This study aims to take a private sector perspective and look at the investment flows caused by the demographic dividend.

There is a large amount of debating both in the academic world and in the political realm about the problems of ageing society in most developed countries in the world. The stability and sustainability of pensions are questioned and a lot of reforms being implemented. At the same time, a lot of economic and political influence is being transferred to the emerging economies. A lot of projections predict that China will overtake the USA as the world's main economic power before 2050 (Casetti 2003). In time, even other countries such as India will become significantly more powerful. It is in the combination of these 2 larger trends, ageing society in the west and emerging economies in the developing world, that the interest of this study lies. The ageing society have a lot of accumulated capital but a decreasing number of workers to utilize it, while in parts of the developing world the situation is the other way around, little accumulated capital and an increasing number of increasingly skilled workers. This could potentially spur large capital flows from the developed world were its available to the developing world where it is needed. The outflows in capital from the ageing countries will be studied separately, as well as the inflows into the countries experiencing the demographic dividend of a large working-age share.

Investment flows is a complex issue that has a lot of dependents variables, they can be economical, political and psychological. All of these things make investment flow a complex phenomenon to measure. Demography can often influence the investment flows by proxy as well as directly, and might be an underrated force in the academic discourse on the subject.

## 1.2 Aim and Scope

The aim of this paper is to investigate the effect of demography, the demographic dividend specifically, on investment flows between countries. The flows that are being studied are those between countries with an increasing labor force and those with a decreasing labor force but an increasing accumulation of capital. A selection of 25 countries that are roughly

representative of their respective larger region has been selected, and data on the capital flows in the form of FDI between these countries will be investigated.

The cause of the demographic dividend is the larger demographic transition, which in turn is a combination of the fertility transition and the mortality transition. These processes will be explained as a background but will not be investigated empirically. The focus will be on the capital flows that it generates, and what other factors influence these flows. Data on capital flows has not been recorded historically; hence the timeframe of the study is the rather recent 1980-2005. This means that one cannot look at the complete dividend of any country in conjunction with FDI, but rather look at some countries that are entering it, some that are culminating and some where it hasn't really started yet. The main focus on the study will be the post-dividend countries since these are supposed to be the most capital rich, and the countries that are seeing an increasing trend in their working-age population. Some countries have what could be seen as a pre-dividend situation and will also be discussed.

## **2 Theoretical perspectives**

*This chapter will present the theories behind the demographic dividend and other issues related to the hypothesis from various sources of literature. From these sources it will also draw theories on the prerequisites of taking advantage of the demographic dividend. A couple of countries and regions of interest will be presented to show some practical aspects of the demographic dividend. Finally theory surrounding the second demographic dividend and the resulting capital flows which form the core of this paper will be presented.*

### **2.1 Neoclassic Economics**

The theory behind the reasoning of the hypothesis is basically neoclassic economics as defined by Thorstein Veblen in his "*Preconceptions of Economic Science*" (1990). The theory focuses on the determination of prices in markets through supply and demand relationships, which reach equilibrium through people maximizing their utility. The idea of capital moving from the country where supply is abundant to the country where demand is abundant to reach an equilibrium is basic neoclassic reasoning applied to international capital movements and migration in the opposite direction. The assumptions of the theory are not agreed upon by all scholars but some of the basic pillars of the theory is that people make decisions that maximize their utility based on perfect information. This is not the case in this study where the information of the investors is rarely perfect, nevertheless, that only means that the market might not reach equilibrium, but the forces pulling towards equilibrium are still there and can be studied. Neoclassic economics de-emphasize institutions in a way that this study does not. Institutions are here considered to be a part of the decision equation that maximizes the investors utility, and is included in the data.

### **2.2 The Demographic Dividend**

The reason population structure would have a significant impact on economic growth is that people at different stages in their lives are more or less productive and that they hence either are dependants or support dependants. The more children and elderly in a society, the higher share of the resources has to be allocated to these, and it is the people of working age that have to produce them.

Throughout most of history people have been living in subsistence economy and had large amounts of children and died early. When population grew it also meant that there was less resources left for each person, which in time strained the supply to the point where food shortage and social unrest would again reduce the population. This is the mortality trap defined by Malthus (1803) that was the norm in large part of the world in the pre-industrial period. The population was this way held in equilibrium (Lee 2002) through the effect of the “positive check”, which is the decline in wages due to population increase, which lacking significant productivity gains meant that the available resources had to spread more thinly. The other effect keeping the population growth slow was the “preventive check”, were the depressed wages due to the increased population spurred postponement of marriage and fertility, which returned population growth to equilibrium.

With the dawn of the industrial revolution and modern economic growth this began to change. When productivity increased population could also increase without lessening the available resources per person. This increased the health standards, and therefore mortality decreased, causing people to have longer and more productive lives. According to Soares (2007) the mortality transition happens in four stages, although the actual number of years varies between countries.

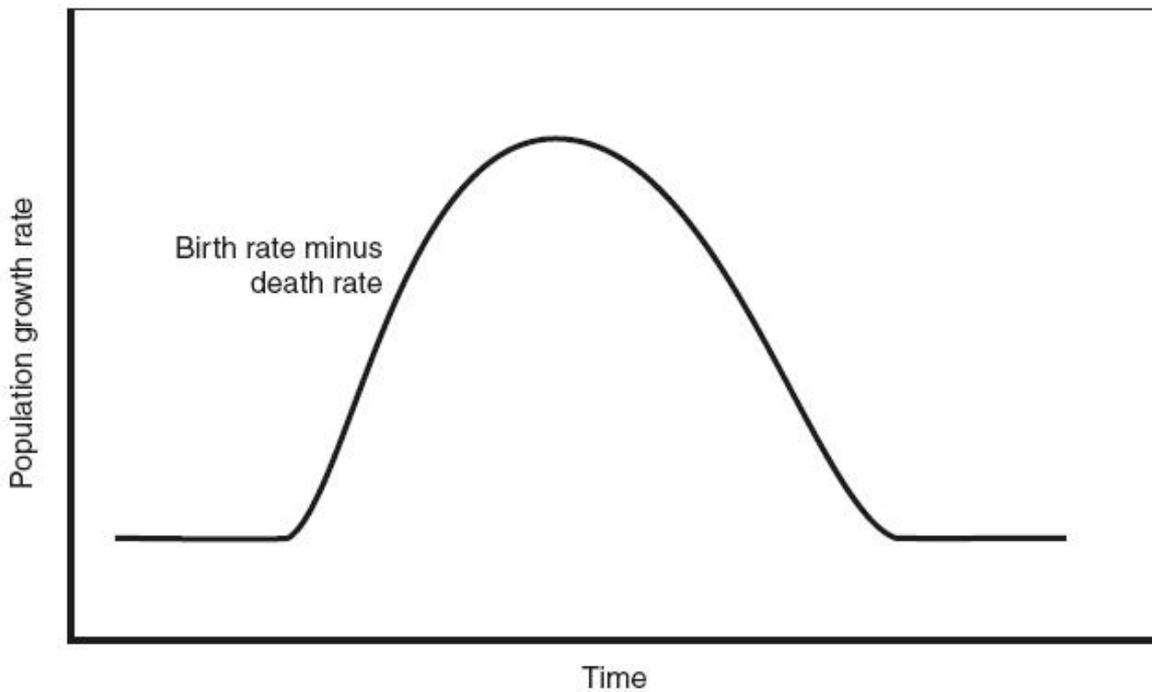
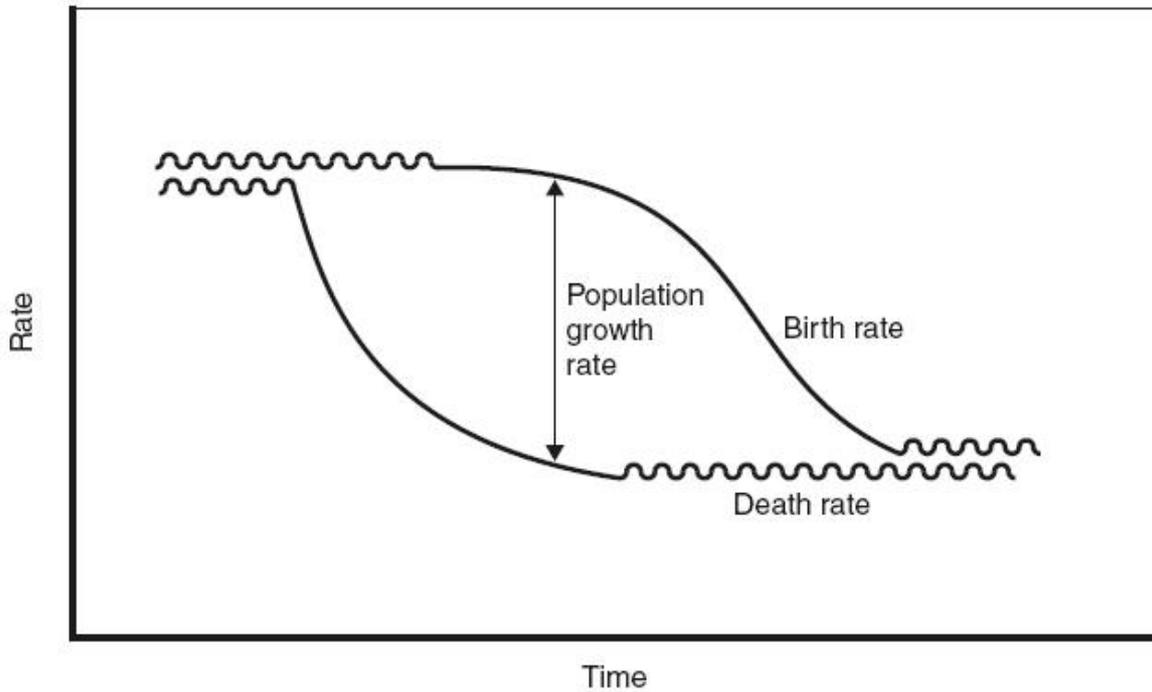
- In the early day of mortality transitions malnutrition is the big reason of high mortality, with increased efficiency in agriculture this has become a smaller problem for all but a minority of the world population.
- The second stage is the health improvements built in increased knowledge of bacteriology and the resulting improvements in hygiene and sanitation. This stage is more based on knowledge than resources and is hence the one with the weakest link to economic growth.
- With the arrival of antibiotics the prevalence of infectious decreased from being a major cause of death to a smaller one.
- In today’s developing world circulatory disease at old age is one of the main causes of death and modern technology intensive medical has been the driver in reductions and the fourth stage.

Poor health and child mortality were some of the main reasons of the high fertility, and with more children surviving into productive age the reasons to have large amounts of children were diminished. Cleland and Wilson (1987) express the incentives for having children as “reduced fertility must be perceived advantageous”, and means advantageous mainly in economic terms. In the subsistence economy, children are viewed as insurance for old age and unexpected events as well as political influence of the family and a source of labor. With modernization follows the fertility transition where governmental or private sector entities take the responsibility for insurance against old age and safety, therefore decreasing the incentives for children. With the advent of mass education the labor utility of children were also lessened (Lee, 2003). And a part from incentive factors the innovation of contraceptives gave parents more control and the gap between the ideal and actual amount of children decreased.

The result of the transitions in mortality in fertility is the different shifts in dependency ratios, the amount of people able to produce compared to the people that only consume, namely children and elderly. An important distinction should be made between old-age and child dependency, since the latter is the future work force. According to Mason (2005) USA in 1850 had a share of working age of around 40%, while projected working age share for Japan

in 2070 is likewise 40%. The difference is however that while the US in 1850 had an extremely young population where most of the dependants were children while in Japan 2070 2 out of 3 of dependants will be elderly. The difference of course has a large impact on the future growth as young dependants are the economic equivalent of an investment while old age dependencies could be likened to paying back a debt.

Both mortality and fertility drop in response to improvements in the circumstances of the individual. The difference between the two is that mortality is a consequence controlled by nature, while fertility is result of choices, and is hence behavioral. The fundamental forces for decline in mortality and fertility might be the same, but there is a lag between the responses due to one being natural and the other behavioral. The result of this is that mortality drops before fertility drops, causing one transition generation to be larger than the previous and the following one. When this generation reaches working age, they will be unusually large compared to the amount of children, who due to fertility decline is unusually small, and compared to old people, who still haven't accumulated to a large groups since mortality has declined so recently. People of working age are generally net producers, while elderly and children are net consumers. With an increase share of net producers the surplus increases causing economic growth on the aggregate level. Bloom and Canning (2005) explain the dividend with the following graphs.



The first figure shows the shift in birth rate and death rate, and the different timing between the 2. By the figure you might think that death rate and birth rate would reach some kind of equilibrium, this is not the case, but the dividend period nonetheless is a deviation from general trend. In the second figure this sudden population growth is shown on the timescale as compared to the regular population growth rate. It is this large generation as it moves like a wave through time that is the demographic dividend.

## 2.3 Prerequisites for the Demographic Dividend

It should always be remembered that the demographic dividend does not automatically translate into an economic dividend. It is merely an opportunity provided by population change to experience a period of favorable dependency ratios. This period provides a window of opportunity of increased growth, but it will only happen if other prerequisites for growth are in place, such as institutional factors and education. A large share of working age population will not benefit the economy if they are largely unemployed. Some of the prerequisites are health, education, labor-market flexibility and openness to trade. A lot of authors express these as “policy environment” (Bloom and Canning 2005) but some of the changes seem to occur without a political decision so in this study a broader view than government policy is taken in the prerequisites.

One area that is expected to be an important prerequisite is health. A healthy population is more productive and has a large contribution to the impact of the demographic dividend. Not only does productivity of the working age population increase, but some of the people of working age share can also be dependents themselves because of sickness. Public programs such as immunization or policies to make contraceptives used are important but also innovations such as antibiotics have historically had a large impact. The spread of knowledge in matters like bacteriology has also improved the health situations even were the economy has not. Health does not only impact productivity but also the momentum of the demographic change itself, since the health is clearly the reason for decreased mortality and also has a major impact on fertility, since high infant mortality due to poor health conditions is a driver for higher fertility.

The amount of children potential parents get basically depends on 2 things, their ideal number of children and their possibility to control the fertility to achieve the desired amount. The ideal family size for the individual is derived from circumstances such as norms and culture as well as economic stability. Government policies for ideal family size can have an impact but might to an even larger extent be a result of complex considerations both conscious and sub-conscious on the individual level. As for the ability to control that the actual fertility, policy can impact through promoting the use contraceptives, but the innovation of contraceptives has historically has a large impact. The United Nations Population Fund (Population Council, 1995; United Nations Populations Fund, 1999) estimates that about half of all pregnancies in the world are unwanted or mistimed. In the developing world this number is lower (Bongaarts and Bulatao, 1999), down to a fourth if China is excluded. This would imply that a lot of the world's unwanted pregnancies are not due to lack of contraceptives but rather other factors such as a preference for induced abortion. Nevertheless, the United Nations Population Fund estimates that there are 120 million women in the world that would use contraceptives had it been available to them. Hence most scholars would include viable family policies as a prerequisite for taking advantage of the demographic dividend. Institutions in the broader sense is therefore of major importance. In addition to family policies property rights, rule of law and a stable justice system are all indirect prerequisites.

Educated potential parents face bigger opportunity costs of having children (Lee 2003), so while education in itself is a force of demographic change, an educated workforce is also more productive and affects the ability of a country to take advantage of a favorable demographic situation. The long-term trend in the economy is that with the constant development of new technologies, human capital has become an increasingly valuable resource relative to physical resources. Hence the demand for unskilled labor will likely not

be big enough to take care of a large share of working age population, resulting in unemployment. A large working-age population will be counterproductive if the employment opportunities are not sufficient, and the country's working-age population might experience increased frustration that might cause crime and social unrest. There is also a strong connection between education and health, as educated people tend to stay healthier and healthy people are more receptive to education.

As economies transform from labor based to knowledge based the demands on workers to be constantly learning increases. This will demand that workers in industries dealing with obsolete technologies have to be able to find new employment elsewhere. Labor market flexibility is mainly a public domain, so for the demographic dividend to be fully utilized economic policies that promote labor market flexibility needs to be put in place. The problem with a flexible labor market is that although according to most theories beneficial to the overall economy, it might not be popular on the individual level due to the added insecurity. The individual might prefer the safety of a steady income over country-wide economic growth which might or might not benefit that particular individual. This can create political problems of resisting the implementation of labor market flexibility policies. Minimum wage is also a measure that often has political popularity but also slows economic growth by deterring risk-taking and hence investments. Flexible labor-market in the international perspective means free trade, and already Adam Smith (1776) pointed out how specialization is the foundation for economic growth and in time the field of economics counted trade as a prerequisite for country-level specialization through comparative advantages. For a country to take advantage of its demographic dividend most economic models would imply that free trade is beneficial for economic growth, which in turn would provide the working-age population with employment and capital. Much like labor market flexibility openness to trade benefits the country on the aggregate levels in most circumstances but the economic adjustment it can cause also means that some industries in some countries will be losers, and may cause insecurity and short term unemployment. The general benefits of trade might very well depend on the sectors the country is trading in, but that is a large subject that is beyond the scope of this paper.

## **2.4 The Second Demographic Dividend**

As the disproportionately big generation, the one that the demographic dividend consists of, moves through history, it is at some point bound to get old and become a dependent generation itself. With continuously low fertility rates there will not be an equally large new generation of working age to fill their place and hence dependency ratios increase. This is the backside of the demographic bonus, and it can be described as the hangover after the party of the demographic bonus period. There is however a positive side to the ageing population, namely the second demographic dividend. The second demographic dividend is a result of people approaching pension saving more for their retirement, and these funds leading to increased investment which in turn is a driver for growth. The second demographic dividend hence also depends on the expectations and other behavioral aspects (Mason 2005), which makes it harder to study than the first dividend. However, what also makes the second dividend more relevant is the increasing amount of funded pension system meaning that is not only private savings being accumulated and invested but also large government-controlled funds. The capital can be invested domestically, spurring capital deepening given that the population is educated enough to absorb the capital. It can also be invested abroad, which is

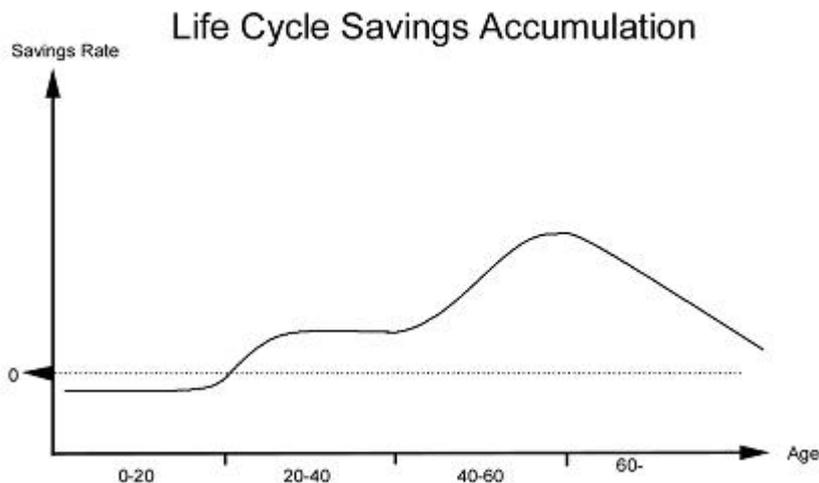
the focus of this study, as FDI outflow and will increase the current account. Either way, the investments will cause economic growth and is hence called a dividend.

### 2.4.1 Lifecycle Savings

The savings on individuals over their lifecycle vary significantly over time; in a situation where people have the possibility to save up for old age, like a developed country, the following lifecycle of savings is valid on the aggregate level.

- Ages 0-20: In the early years of an individual, the individual does not save because there is no production, which makes the individual an investment object for the previous generations.
- Ages 20-40: In early working ages the individual is a net producer but savings rate are low as funds are transferred to their children and further education.
- Ages 40-64: In late working ages savings rates are high since people tend to accumulate capital for pensions.
- Ages 65-: In their retirement age the individual consumes the savings previously accumulated.

The age 40-60 is defined by Reisen (1998) as “prime savers age”, when savings increase the most. The term will here be used more in the sense of “capital rich age”, measuring accumulated capital in place of growth of the savings rate.



This makes the segment 40- the most capital rich period in an individual’s life, as all the funds will not be consumed at 65 when the individual stops saving. When a large share of the population in a country that is capital-rich is of this age-group, the supply of funds for investment will increase. Golley (2006, also Higgins 1998) calls this the “center of gravity” of investment supply. Simultaneously these countries will have a lower share of working age population, which is the “center of gravity” for investment demand, when workers need capital work with. When the supply is a lot larger than demand due to the divergence between people of saving ages and people of working ages, the result is that capital will leave the ageing country, in other words, a surplus in the countries current accounts. In this study, the term “capital-rich age share” will be used to test the hypothesis of the second dividend spurring more FDI outflow. The age consists of the prime-savers age 40-65 and the retirees

60- to capture the age in the life cycle when people have a the biggest amount of capital available for placement.

## 2.5 Country and Region Examples

Some areas of the world are particularly interesting either because they represent a typical demographic development of a certain time period, or because they are a special case with unusual circumstances. The following countries and regions are chosen for those particular reasons, but are by no means intended to give a complete picture of the global situation.

East Asia is one of the examples of the positive impact of the demographic dividend, with its many successful economies in the period of the study 1980-2005. Mason and Kinagusa (2005) measure the dividend as the ratio between producers and consumers and estimate the impact of the dividend on individual countries. They estimate that 15.5% Thailand's growth in 1960-2000 is a result of the dividend. In Europe at the same time the much smaller dividend is expected to account for 6.1% of the growth. They establish demography as one of the main drivers for the success of many East Asian countries. Bloom et al (2000) calculated using different methods and a slightly shorter period that up to a third of the East Asian growth miracle in the period 1965-1990 are a result of the demographic dividend. One reason for the discrepancy in the 2 studies could be the shorter time span in the latter. Since the demographic dividend is an up-going trend with a culmination and a down- going trend, a shorter time period spanning the peak will show the dividend in its concentrated form. Cai and Wang (2006) claim that a 25% of Chinas growth in GDP from 1980-2003 is a result of the demographic dividend in the same period Chinas dependency ratio dropped by a fifth. Large parts of East Asia such as the Asian Tigers have been very successful economically during the second half of the 20<sup>th</sup> century, and although the exact percentages vary between scholars it would seem like the unusually quick drop in fertility has caused an unusually "sudden" demographic dividend. Japan sticks out in this area, experiencing a "sudden" dividend as well but earlier than most countries in this area. The result is that Japan is now facing the post-dividend downward slope and is one of the countries in the world with the most advanced ageing process, facing difficulties in dependency ratios the coming decades.

In Europe, Ireland makes for an interesting case study. With its strong catholic heritage it sticks out, especially among the countries in the northern half of Europe, in its traditional conservative attitudes towards contraceptives. In 1979 (Bloom and Canning 2003) contraceptives were made available to women with doctor's prescription and in a decade the crude birth rate fell by a third, from 21 to 14. In the same period Ireland also saw sharply increased female labor force participation, and a stem in the outward migration flows of working age male. All this contributed to Ireland growing much faster than most other European nations in the decades following. As for the rest of Europe they are largely in the post-dividend period where fertility is below replacement rate and the working-age share of the population declining in favor of the elderly-share. Europe has been benefitting a lot from the demographic dividend since it has had an economic environment that could take advantage of it. However, not all countries have. Saudi-Arabia is an example of a country where the demographic dividend is being experienced without the economic benefits being gained. In 2002 (Bloom and Canning) 60% of the population were under 25 years of age. The education is largely outdated and largely focused around religion (Prokop 2003) which has not made the young workforce competitive and attractive to investment. At the same time, restrictive labor laws make it very difficult to dismiss a Saudi national from employment. This discourages risk taking and encourages the employers to utilize foreign guest workers instead. Another

area that has not fully take advantage of its dividend is Latin America. Latin Americas fertility decline started in the sixties and seventies the area has seen significant improvements in health conditions in the same period. Life expectancy increased with 15 years 1965 to 1990 and fertility is today close to replacement level in a lot of countries. The demographic development as such has been quiet similar to the one of East Asia, yet the economic development has been quite different. GDP growth in East Asia in the period 1975-1995 averaged 6,8 while the same number for Latin America was 0,7. According to the Bloom and Canning (2005) the difference in Economic Growth is a result of policy, particularly one regarding openness to trade. Until the early 1990s a lot countries were almost closed off to trade with protectionist policies. From 1995 there was an increase in openness and in some countries growth has ensued. With increase openness Latin America started to take more advantage of its demographic dividend, according to Bloom and Canning (2005) openness can triple the effect of the dividend since the flows of trade and investment help create work opportunities for the working age people.

Africa south of the Sahara is a special case and has not developed as expected, given expectations by countries who previously gone through the demographic transition. Infant mortality has fallen substantially as has mortality due to infectious disease. But those gains have not affected fertility to the same extent as it has in other countries. Infant mortality fell by 43% from 1960 to 2000, but fertility only 19% (Bloom and Canning 2005). This has caused a situation with a rapidly growing population and an increase in dependency ratios due to the large number of children. This builds a base for a future dividend once fertility falls, but the timing of the fertility transition depends on the mechanisms of fertility not covered in this paper. The AIDS epidemic has a negative impact on the utilization of the dividend since it is mainly people of working age suffering from and dying in the disease.

## **2.6 Investment Flows**

At the core of this paper is the effect of the demographic dividend on investment flows. The focus will be on 2 flows, the inflow into countries with a large share of working age population and the outflow from countries with an ageing population. However, the problem with measuring investment that it is in the end a sum of decisions made by investors. These decisions can be based on macroeconomic variables, such as a favorable economic cycle in a particular country. It can also be made based on microeconomic variables surrounding the particular investment object, such as a company, or the sector in which the investments are made. But added to the logical conclusions is also the “gut feeling” of single investors, and while random and unusual investments based on personal feelings are probably neutralized on the aggregate level, attitudes common in particular societies might still affect the aggregate. If a particular country gets a lot of negative news coverage that is an exaggeration of what actually happens in the country, it is likely to affect the investment flows negatively.

### **2.6.1 FDI Inflow**

For workers to be effective they need capital to work with, and capital will if it can flow freely always look for a place where it can be utilized to maximum gain of the capital holder. A lot of countries experiencing or having experienced the demographic dividend have been developing countries at the time, and capital is hence often lacking. Capital will be accumulated locally but a lot of the capital will come from abroad, hence the focus on FDI. Investment from developed to developing countries also has some positive externalities.

According to Borensztein et al (1998) FDI is more important than domestic investment because it has the added effect of technology diffusion. With a lot of competence such as management techniques being transferred from the developed country to the developing country, adding to the catch-up effect of the developing country. This way, not all innovations have to be slowly innovated again locally but rather transferred much faster, adding to the catch-up process. There is however a threshold of human capital that has to be present for the new knowledge to get absorbed into the society. If there isn't a sufficient amount of educated workers to learn the new knowledge it will only stay in the country as long as the company or other unit investing in the country stays, and wield few positive externalities. There is also the possibility that foreign investment will crowd out domestic investment, but according to Borensztein et al the benefits of an overall larger capital stock and the additional technology transfers are bigger. In a situation where a large amount of capital from abroad is committed to a certain project, it is also common that the investor raises local equity in addition. This inflates the size of the investment and will make the societal impact bigger than the pure amount of FDI would imply. Most theory on the area would confirm that FDI does have positive impact on the economic growth of the target country, but on condition that there is sufficient human capital locally to absorb new technology. Another threshold is certain institutional prerequisites; certain policies such as protectionism can distort the incentives for FDI and attract capital but still not generating economic growth.

## **2.6.2 FDI Outflow**

A result of second dividend is likely to be an increased supply of capital, and therefore an increased demand for investment opportunities. As savings increase more capital is available increasing the supply of investment capital. Simultaneously, the working-age share in the same country is decreasing, lessening the demand for domestic investment. The logical conclusion is an increase in foreign investment, particularly to countries with a large working age share, since that's where the demand for investment capital should be the highest. This might be offset to some degree though as an ageing population might lead to reduced growth resulting in reduced investment demand. It might also be reduced by the capital deepening in the ageing country were a small but highly educated generation can absorb the new capital. There are 2 basic relationships as a chain of events to be looked at as when it comes to the effect of demography on investment:

- The effect of demography on savings
- The effect of savings on investment

In this study, the effect being studied is the effect of demography on foreign direct investment, hence the middle stage of savings is assumed to be a function of the demography, which is a simplification of a relationship that is not that clear cut. Higgins (1998) calculated the effect of demography on the current account balance to be more than 6% and increasing for a number of countries.

The pension systems in many developed countries are considered unsustainable with an ever increasing share of elderly in the society. Throughout the 20<sup>th</sup> century the dominating system for pension was the pay-as-you-go system where each generation through their taxes support the current retired population and earn the right to be supported at their own age by the subsequent generation. As the share of elderly keeps growing as a result of the demographic transition, the burden on the younger generations will increase to unsustainable levels. Many studies such as Galasso (2004) have concluded that the pay-as-you-go system most OECD countries use will not be sustainable unless an unlikely improvement in productivity takes

places. Because this is not viable in the long run most of the OECD countries are moving toward funded pension systems, where each generation accumulates wealth to support itself at old age. When a country moves towards a funded pension system, the private savings rate of the country also tends to increase (Reisen 2007), because not only do people save collectively through their taxes but it also increases the incentives for private savings. This should increase the amount of capital available for investment, and some of it bound for emerging markets. Emerging markets have proved not to be as correlated as the markets of the most developed countries, making them attractive as a part of an asset portfolio in terms of risk management. With demographic forces increasing the demand and hence the revenue of emerging market investment, flows to the emerging markets, which are largely experiencing the demographic bonus, would expect to increase with the transition to funded pension systems.

## 2.7 Previous Research

Andrew Mason of the University of Hawaii is one of leading scholars in the studies of the demographic dividend, ends his 2005 article “*Demographic Dividends; The Past, the Present, and the Future*” by saying that the effect of the demographic dividend on international capital flows has been “neglected entirely”. That means that there is little directly comparable literature, and more a combination of literature on different related subjects and trying to make links between them. There is a rather large amount of literature on the two demographic dividends, of which a few will be mentioned here. The ageing population and the effect of pension savings on investment is also a subject which through its contemporary urgency has attracted a lot of academic attention. Finally, some of the literature that does deal with demographic influence on capital flows will be reviewed.

Bloom, Canning and Sevillas 2003 book “*The Demographic Dividend*” offers an overview and a summary of the studies on demographic dividend. They focus on the policy environment that needs to be in place for a country to take advantage of the dividend, and offer examples from most regions of the world. They do not offer calculations as to how much of the growth in a particular area or country is derived from changing age structure. But other authors have done that, although most of the time with a smaller geographical scope. Mason and Kinagusa (2008) focus on the 2 demographic dividends in East Asia. They start up with their views on the debate on the effect population growth on the economy, but soon move into the demographic dividends. They notice that the dividend occurred much later in East Asia than in Europe and that it was partly the speed of the transition that caused the speed of the economic growth in the region from 1960-2000. They measure the first dividend by comparing growth rate in working population and growth rate in dependent population, and conclude that different Asian nations had 9-15% of their growth due to the demographic dividend. Other authors though have calculated that the growth of East Asia is derived to as much as a third or a fourth from demography. Mason (2005) uses econometric analysis, focusing mainly on the US, India and Japan to test the more long-term effects on demography on economic growth. He concludes that the USA has benefitted greatly for 150 years from changing age structure, while Japan only started benefitting after 1950. The effect of this was that Japan experienced a more sudden or concentrated dividend with very high growth rates in the post-war period. In the same way, he expects that India has yet to reap most of the benefits of its concurrent demographic dividend.

Reisen (2000) writes on the lack of sustainability of the pay-as-you-go pension systems in the OECD countries and how it will hurt future economic growth. He predicts that this will

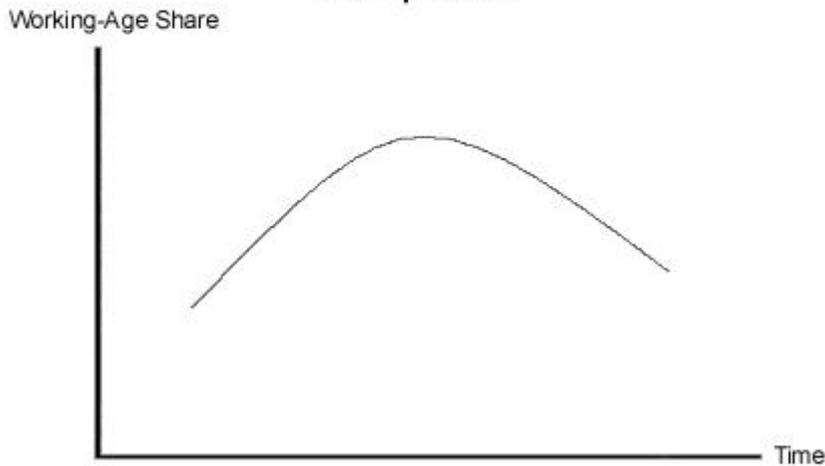
lead to future capital flows into what he calls “the young capital-hungry countries” and by young he means a young age structure. Since emerging markets tend to have a business cycle uncorrelated to the OECD, he argues that from a risk diversification aspect the emerging markets will be an increasingly attractive investment for the portfolios of the pension funds. He makes the distinction between private investors and funds and pension funds and argues that the latter through its stability is what going to build a capital stock in the emerging markets. Reisen predicts massive flows of capital from the OECD to emerging markets in the future; give the right policies of the receiving countries. In his 1998 article “*Demography, national savings and international capital flow*” Matthew Higgins estimates the demographic effect on savings rate across 100 countries. He concludes that increases in both youth and old-age dependency ratios has a negative effect on the national savings rate, which in turns has an effect on capital flows across the border. He uses the national accounting term current account to signify the net of in and outflows of capital. In this paper net FDI will be used predominantly. A large part of the article is summing up the debate on the effect of young dependants, and their effect on the savings rate. While youth as dependants are net consumers, they also are connected to a growing workforce, which attract investment. So while it has a negative effect on the savings rate and hence the supply of capital, it has a positive effect on the demand for investment. This conclusions of Higgins ties in to the hypothesis of this paper, because investment demand can easily be satisfied with foreign capital while the other way to reach equilibrium, migration, is not as flexible. Most of the discourse on demography and investment is focused on savings rate and hence deal mainly with the prime savings age of 40-65. In this paper, the importance is not put in the savings rate but rather the capital accumulation. Higgins also defines 2 “centers of gravity” in the age distribution, were investment demand is related to the youth share and capital supply through the share of prime savings age. When the age structure of a country changes it also moves from one towards the other center of gravity, he calls this the “demographic swing”. The idea of the demographic swing if not the term is at the core of the hypothesis. He also concludes that openness to capital is one of the most important influencing factors if the equilibrium is going to be reached. This factor has also been included as a variable in the empirical investigations of this paper.

## 2.8 Hypothesis

The demographic transitions happen at different periods in different countries, while some countries like Japan or large part of Europe have gone through it and are experiencing and ageing population; the transition is still to happen in some developing countries. The hypothesis in this paper is that the different timing of the dividend in the different countries will spur international capital flows.

In the case of the countries with the ageing population, they have at best already experienced the demographic bonus and have a large capital stock, since the savings rate has increases with older age as people save up for their retirement. With an unusually large generations all having saved up capital, they will have an unusually large capital stock as well. At the same time, the working age population to work with the capital has shrunk as the generations born in low fertility period enter the workforce.

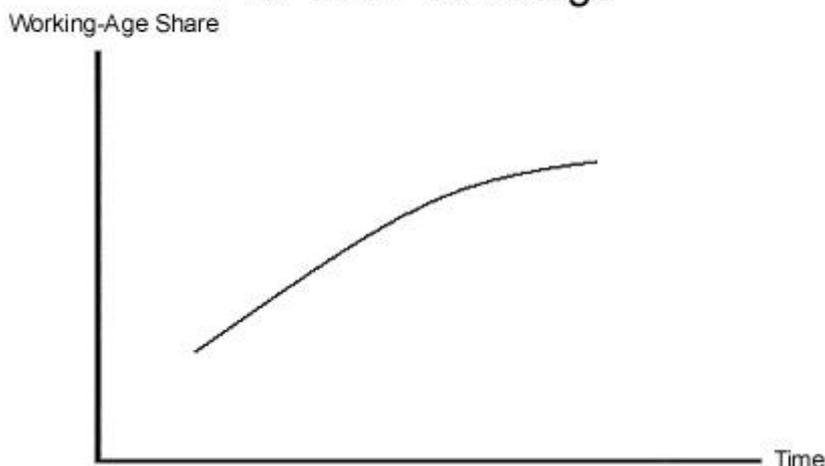
## The Demographic Dividend Completed



This would augment the capital/labor ratio in the country, making labor the scarce resource and capital the plentiful one. Hence the demand for labor could potentially rise and demand for capital decrease in the post-dividend countries in the most simple economic model.

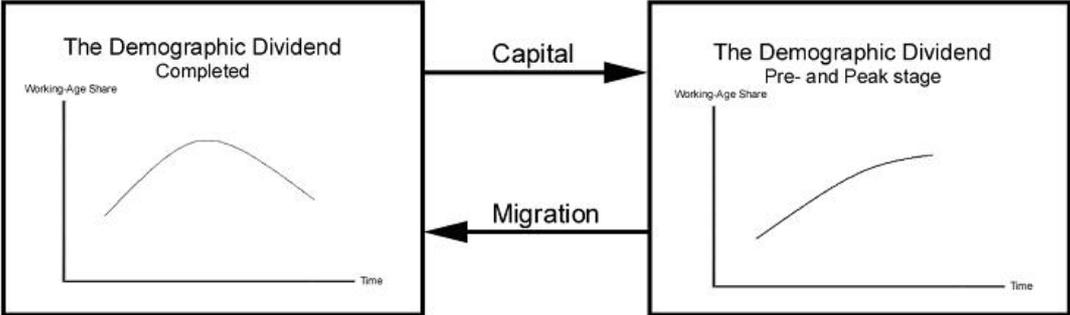
Simultaneously, in the country entering the demographic bonus period the demand for capital should be higher since there is a large share of working age population and hence a large supply of labor. This labor force will need more capital to work with, which increases the demand for capital and therefore its price, which increases the interest on investment in the particular country.

## The Demographic Dividend Pre- and Peak stage



This could potentially result in 2 flows; labor should flow towards the capital-rich country and capital towards the labor-rich country. In the case of labor this flow is essentially migration, but is expected to be slower and associated with more transaction costs and obstacles than capital which is of a far more liquid nature. Part of the migration flow would be offset by labor-rich countries specializing in labor-intensive goods and exporting these but this would

at least when capital flows are free result in investment from the capital rich countries into the labor rich countries. Hatton and Williamson (2002) discuss these flows and predict increased immigration flows from Sub-Saharan Africa to Europe for partly demographic reasons. The migration flows caused by demography will however be outside of the focus of this study.



As for the flow of capital between countries, it is not necessary that an increase in working-age population would lead to inflow of capital. I could also have the effect that the labor-rich country specializes in labor-intensive industries and hence doesn't spur demand for more capital. At the same time however the increase in population in a labor-rich country would still spur demand for capital to retain the same capital per worker, regardless if the economy is moving towards being more capital-intensive or not. Since industries of the post-dividend countries tend to be more capital-intensive it could even be that the demand for capital will be even greater in these countries.

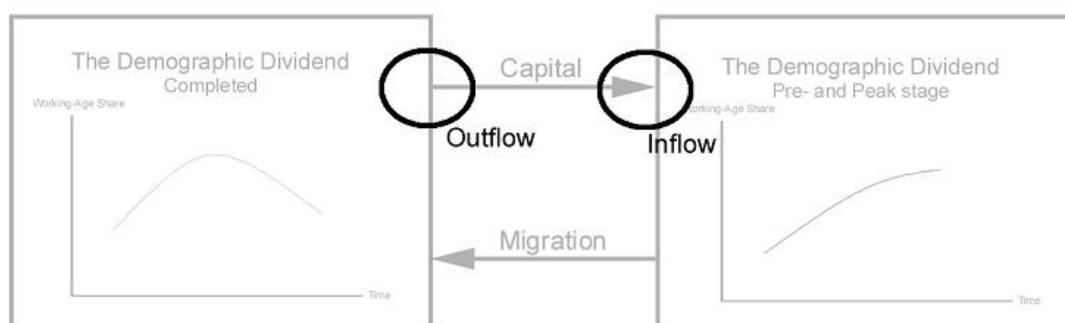
This study aims to investigate if FDI flow is affected by the demographic dividend, given the right circumstances. It will investigate both the flow out of the post-dividend country with a large amount of accumulated capital and the inflow into the target economy. Especially in the economy receiving investments institutional and other circumstances are expected to play a big role. Obviously whether the country is even open to foreign capital is a circumstance of major importance but even educational level is expected to be important.

### 3 Methods and Data

*This chapter will give an overview on the data used for the studies, its sources and how it will be analyzed.*

#### 3.1 Method

The basic assumption in this study is that structural change of the population has a significant impact on investment flows, given certain prerequisites. In this study, OLS regressions will be used to define these relationships and these prerequisites have to be accounted for in the regressions. There are two separate flows that will be measured, the outflow from the country with an ageing population with a lot of accumulated capital, and the inflow into the country with a large share of working age population.



The data used in this study is panel data from 25 years for 25 countries. The data is hence quantitative and aggregated on country level. Data is looked at only on the country level, since looking at aggregate classifications of countries would contain too many different circumstances, and since intra-country levels such as sector or industry have different circumstances of labor mobility and is not as affected by demography. The regressions are not expected to prove as much as give indications of the investment flows, given their complex nature. The hypothesis will be tested with the variables representing the dividend, but since the share and therefore the dividend is not a binary model, one could argue that it's the broader demographic effect being measured rather than the demographic dividend in particular.

To prevent estimations driven by single outliers in the data, extreme values were removed from the data much like Higgins (1998) did in his study. Higgins also removed outlier-countries to get more robust results but with data for 100 countries it was more affordable to him than to this study. He found that impact was negligible and that his estimation concerning demography and savings rate were not driven by outliers. In some cases, data was available in 5-year spans and then interpolation has been made to increase the number of observations. Interpolations were done mainly on population age-share and life expectancy measures, which are quite slow in their change process so the interpolation is not expected to create bad data. Other measures such as investment flows have not been interpolated since the year-to-year variations are too big.

The 2 fundamental flows that the study looks at are inflows and outflows. This means that 2 separate main regressions will be estimated. Both of them will have 1 main population-related variable to express the effect of the demographic dividend. Age structure variable represent the peak of the dividend in the case of the inflow and the downward or stagnating trend when estimating the demographic effect on the outflow. Regressions will be done by country group, with three separate regressions for outflow and inflow respectively. This is done to test the hypothesis if the investment patterns are the strongest in the country group that are expected to be strongest. Some of the variables will be used in both regressions, since the circumstances affecting investment flows are partly the same for in- and outflow. Therefore, the variables are presented as one list.

### 3.2 Variables

*FDI Outflow and Inflow per capita*- Both will be used as a dependent variable, since there is a large variation in capital stock and between countries and only the per capita measurement will capture the effect of demographic and other variable in a comparable way.

*Working-Age share* – The independent variable that is the main one in measuring the demographic dividend. It is therefore expected to have a positive impact on FDI inflows.

*Old-age dependency*- Some countries have a similar dependency ratio but a different distribution of old-age and young-age dependents. This variable is added as a compliment to the working-age share to see the added effect of big share of elderly dependants.

*Educational level* - Years of education is expected to be important especially measuring the inflow, as it should be very important in the attraction of the target economy. A better educated workforce is more productive and hence a better investment.

*Life expectancy* – Health is an important factor influencing the aggregate productivity of a country. Since different countries are promoting health in different ways, such as public or private, life expectancy is the most appropriate proxy for the health status of the population. Some health can also be related to geography or climate life expectancy also captures that in a way that public health expenditure or a similar measurement could not.

*GDP growth* – Positive growth, especially during a longer time, will have very positive impact on the willingness to invest in a particular country. Growth in the economy will likely benefit the whole market and hence the industry or firm that investments are being made into. The reputation of the country is also being improved which will have a positive long-term influence on the willingness to invest in it.

*Openness to trade* – Trade works here as proxy for international integration, were trading is free with few obstacles; capital will be able to move as well. The metric for openness is imports and exports divided by GDP. This is a commonly used variable for openness but has been questioned for its validity (Butkiewicz and Yanikkaya, 2005). What openness really means is the absence of restrictions of trade, and with the current measures an extreme demand could strengthen the ratio in spite of severe restrictions.

*Institutional quality* – The political and civil rights of the population is of major importance to potential investors, since it’s a proxy for political stability. In addition stable institutions tend to foster a better business climate with more trust and fewer transaction costs. It is expected to have a larger impact on inflows than outflows.

**3.3 Data**

Data for the regression was collected from various sources to create a data set spanning 25 countries at different stages of development from 1980-2005. The countries will be divided in three categories as follows:

<b>Most Developed Countries</b>	<b>More Developed Countries</b>	<b>Least Developed Countries</b>
Australia	Argentina	Botswana
Canada	Egypt	Ghana
France	Brazil	Malawi
Germany	Chile	Mali
Italy	China	
Japan	India	
Korea	Indonesia	
Sweden	Malaysia	
United Kingdom	Mexico	
United States	Pakistan	
	Tunisia	

The classification is based on the UNs definitions, but since the study spans 25 year countries might have moved from one group to the next, and does not follow the UN ranking exactly. The group least developed countries is a combination of less developed and least developed in most countries. The countries have been chosen as either because they are representative for a

number of countries, i.e. typical for their area or because they are special cases to be looked at. They have also been chosen because they have had a certain stability in terms of governance and war and no great social upheavals have taken place in the time period. The exception here would be Germany with the re-unification of east and west in 1989, but data has been available and adjustments made.

### **3.3.1 Data Sources**

*Population and Age structure* - All data on population age structure comes from the UN Department of Economic and Social Affairs while FDI data from the UN Agency for Trade and Development. Age structure data was available in 5-year spans and interpolations were performed to get data for the full period.

*Education* – This variable is measured as years of education, with data from Barro and Lee (2000). Although it does not take into consideration repeated years of schooling or quality of schooling it serves as a proxy for the general ability of the population to perform qualified tasks. The data measures the educational attainment of age 15 and over for both males and females. Interpolations were performed as it was measured in 5-year spans.

*Institutional Quality* - Freedom House is a non-profit organization that among other things collects data on Political and Civil rights in various countries over time. They data utilizes a score of 1-7 where 1 is the best performance. For this dataset, these 2 have been combined to one variable that measures institutional quality where 12 is the best and 0 the lowest.

*GDP Growth* - The World Bank provides data on GDP growth and is the sum of the gross value added by all resident producers in the economy. It is measured at market prices in constant local constant currency. No deductions have been made for depreciation of assets or degradation of natural resources.

*Openness to trade* - The measure consists of imports and exports as a share of GDP and is an accepted measure of openness, made available by Penn World Tables. The measure is calculated in the local current currency.

*Life expectancy* - Data provided by the World Bank and signifies life expectancy *at birth*. Data was available in 5-year spans so interpolations were performed.

## **4 Empirical Analysis**

*In this chapter the theories presented will be tested empirically to see if they have any validity in the data of the study. FDI Inflow and Outflow will be analyzed separately with a number of explanatory graphs followed by OLS regressions.*

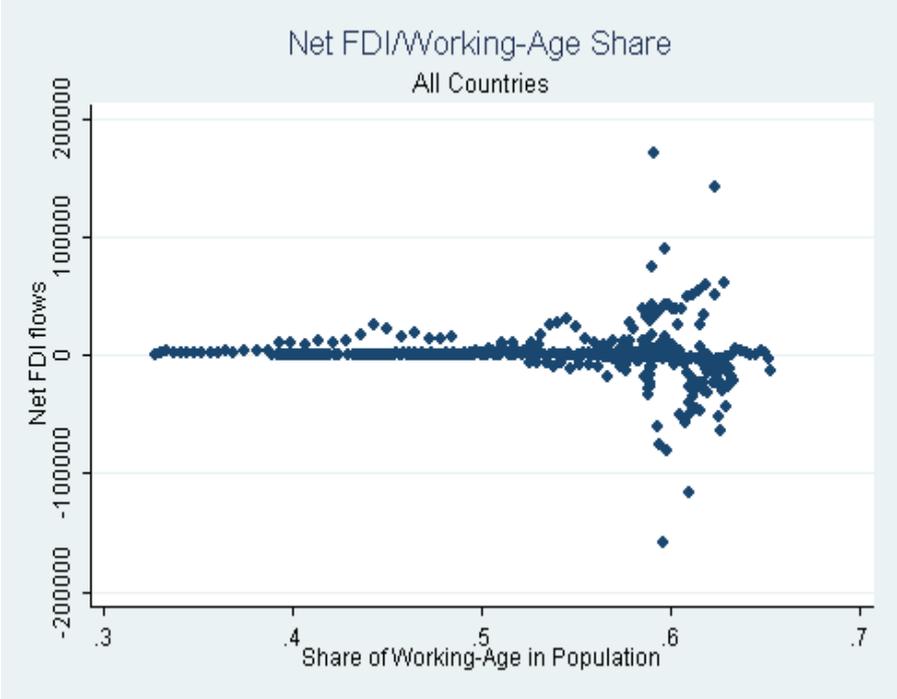
### **4.1 Inflow**

#### **4.1.1 Preliminary Results**

For preliminary analysis of the data the net of ingoing and outgoing FDI will be used to examine the validity of the theory. The net FDI is the same as what is known in economics as Net Capital Outflow. A positive net FDI from a country's perspective means that its investing more abroad than what is being invested in it. A negative net FDI therefore means that a country is attractive for investments, which will increase the GDP of the receiving country, but it can also cause an increased exchange rate which can partly negate the effect as exports grow more expensive to trade partners. Given the expectations presented in the hypothesis we

would hence expect a decreasing net FDI as working-age share increases. The graph includes all the countries in the dataset.

Figure 1 Net FDI/Working-Age share

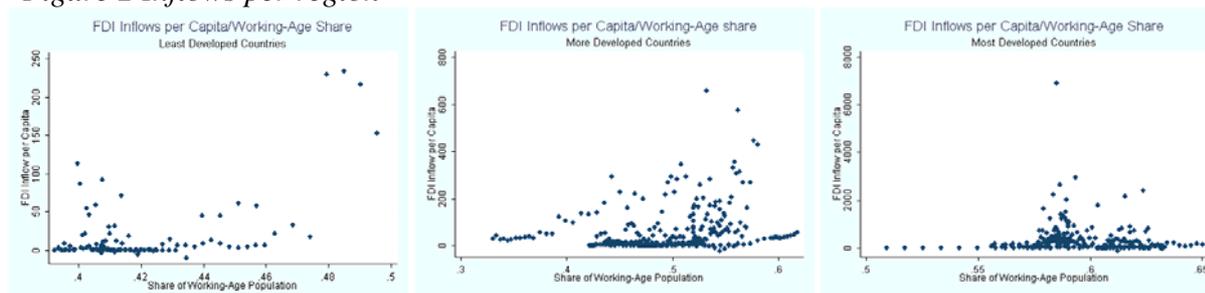


Looking at the net of the whole dataset it seems like working-age share increase both ingoing and outgoing investment activity as evident by the "crossbow" shape in figure 1. It could either be that countries develop in different directions or that the inter-country volatility from year to year increases. Since the variable is the net of FDI, the numbers presented are in actual dollars and will scale with the size of the country. It could also be the effect discussed in the hypothesis were the ageing capital intensive economies actually have a greater demand for capital since they need more capital per worker. This demand could potentially be stronger than the demand for capital in the labor-intensive countries, if their demand for capital per worker is low enough to offset the increasing working-age share.

As the net figure in this case proved inconclusive as a response to the hypothesis, 2 things have to be changed. To be able to compare countries the measurement in total dollars needs to be replaced with a per capita measure, to be able to compare large and small countries. In addition, the country groups will be used to see the effect of capital flows in different economic contexts.

Looking at the FDI inflows per capita of countries in the 3 groups, "most developed countries", "more developed countries" and "least developed countries", compared to the working age share there is a pattern of increased activity with increase working age share.

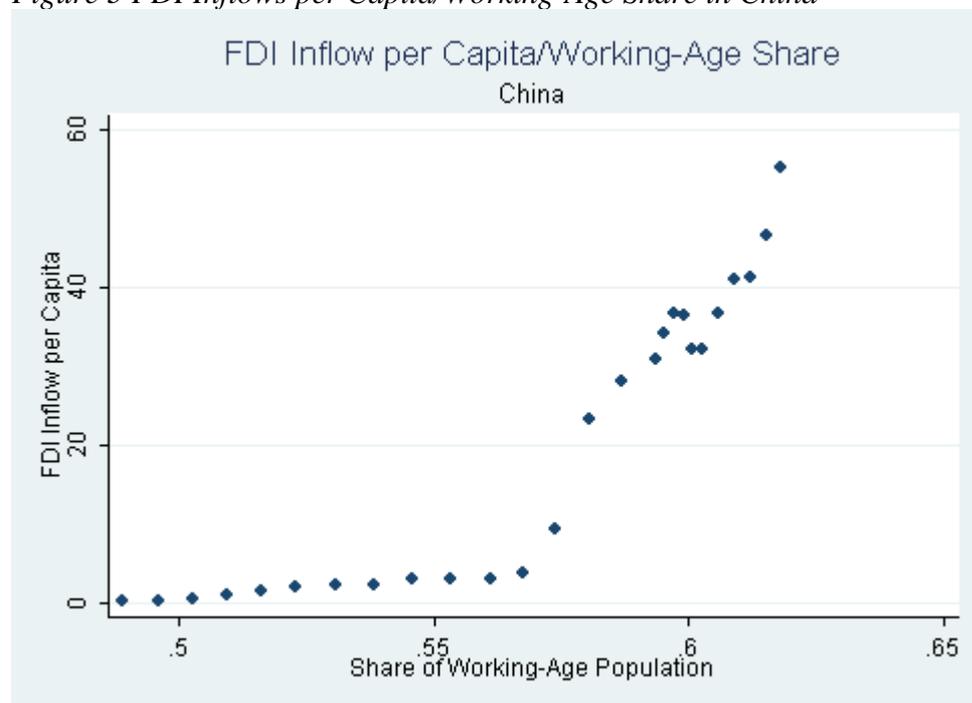
Figure 2 Inflows per region



In all countries there is an upward trend of ingoing of investment, stronger in the more developed countries than in the most developed countries. It is in the more developed countries we expect to see the most significant demographic impact on investment according to theory, since it's these countries that have a high share of working-age population while still being relatively well educated. Still the scale of FDI per capita will be very different for different countries, since the size of the economies varies widely. Looking at a few country cases can give a clearer picture of the impact of working-age share. In the least developed countries any correlation seems to be largely driven by outliers and would likely not yield significant results in case of estimation.

Next we will look at China, a country belonging to the more developed countries and is known to have attracted a lot of FDI in the period of the study.

Figure 3 FDI Inflows per Capita/Working-Age Share in China

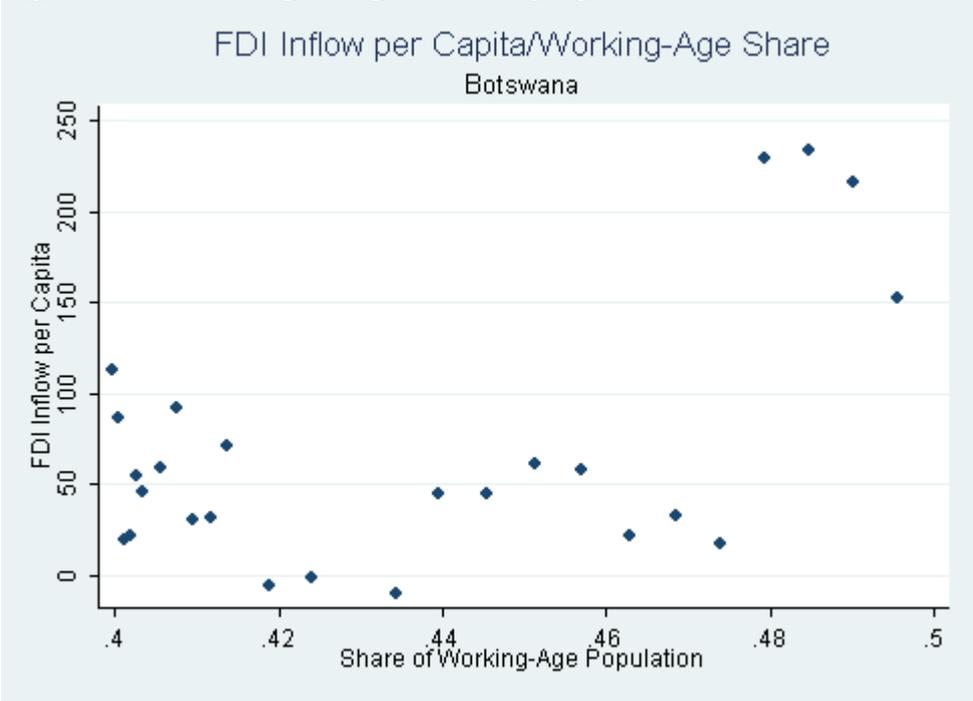


For China, it's clear that that the inflow of investment is correlated with the working-age share population. Although not a time-series, it is likely that it corresponds somewhat with Chinas demographical and economical development. While causality cannot be proven with this graph alone, its still serves as an indication of Chinas development, since the correlation is so strong. In the case of China it was expected to be a stronger than average correlation since growth in the period of the study has been largely dependent on labor-intensive

industries. In a country more dependent on capital-intensive industries the correlation with demography would be expected to be weaker.

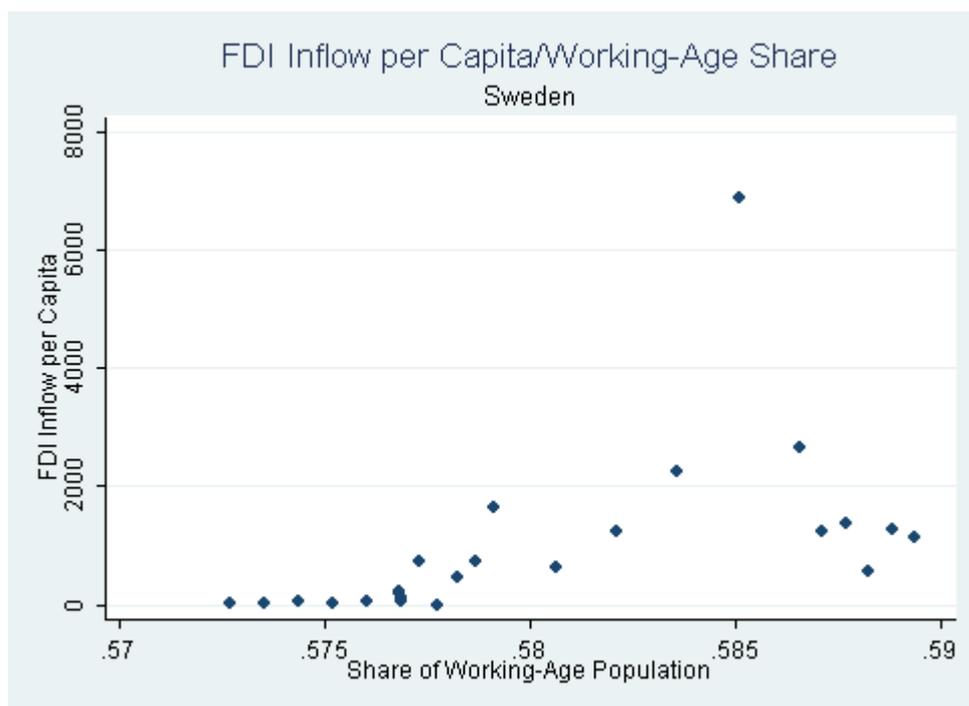
Looking at Botswana, an example of a developing country, the pattern looks different.

Figure 4 FDI Inflows per Capita/Working-Age Share in Botswana



Botswana as a country is heavily dependent on its commodities, diamonds in particular. This creates a situation where the actual FDI per capita rises higher than Chinas for a lot of years, but there is little correlation with the working-age share of the population. It seems that investments in very commodity-dependent economies have little correlation with the demography of that particular country, since the resources being invested in it's the land. However, when comparing to figure 2, the same graph for China, it needs to be noted the scale different were Botswana could be argued to have similar development to China in the 45-50% working age share span. This could indicate that a larger than expected share of the investments in Botswana is actually in labor-intensive industries, or it is mainly a result of both working-age share and FDI increasing simultaneously over time as a result of improved economic and social conditions. Looking at a developing country, in this case Sweden, it is clear that the correlation is not as clear cut as China.

Figure 5 FDI Inflows per Capita/Working-Age Share in Sweden



Sweden is a post-dividend country but is still quite close to its peak; hence the really high numbers in working-age share. The dependents are hence to large degree elderly. The correlation here looks somewhat stronger than Botswana to the naked eye but definitely weaker than China. The relative change in working-age share in Sweden has also been considerably smaller, going from roughly 57% to 59% in the time period, while China moved from roughly 49% to 63% in the same time period. While Sweden's FDI inflow seems to have largely stagnated around 58%, Chinas has continued past 63% and does not seem to be stagnating. This could be an effect of the dependants being different; the share of elderly might be higher compared to young-age dependants in Sweden than those of China. Elderly are considerably more expensive to support than young-age dependants due to cost of healthcare. Another explanation could be the dynamic of the different markets. Investments in China is largely based on manual labor, which is very demography-dependent, while investment in Sweden is more into knowledge- and capital-intensive industries not as dependent on demography. If this holds true China will stagnate at a later point in the demographic development than Sweden.

This situation is true for most countries in 3 different categories. More developed countries have strong correlation between FDI inflows and working-age share of population, least developed country quite a small correlation and most developed countries somewhere in between. For the least developed country it is likely that a combination of commodity dependency and a bad health situation undermines the benefits of a large working-age share. Commodities would attract investment regardless of demography and health issues turn people of working-age into dependents regardless of their age. Countries categorized most developed countries tend to have a large service sector and technology-intensive sector. This makes their investment level less dependent on workers since skilled workers can employ more capital. There are also significant complementarities between labor and skilled workers (Borjas 1995) Services can often not be exported and would hence cause migration flows instead of capital flows. The more developed countries are largely emerging markets, which often means a somewhat educated workforce but still largely employed in manual labor and

low-skilled work. More developed countries are therefore the most dependants on demography to attract investment.

**4.1.2 Regression – FDI inflow**

To test the effect of the demographic dividend on investment flows the following regression will be run.

FDI Inflow per capita = $f(\text{Working-Age share, Old-age dependency ratio, Institutional Quality, Educational level, Openness to trade})$						
	<i>Least Developed Countries</i>		<i>More developed Countries</i>		<i>Most Developed Countries</i>	
<i>Variable</i>	<i>Coefficient</i>	<i>F-test</i>	<i>Coefficient</i>	<i>F-test</i>	<i>Coefficient</i>	<i>F-test</i>
<i>Working-Age Share</i>	<b>919.4</b>	<b>0.000</b>	<b>271.9</b>	<b>0.000</b>	<b>-3772.8</b>	<b>0.061</b>
<i>Old-Age dependency</i>	<b>8.33</b>	<b>0.037</b>	<b>-5.9</b>	<b>0.000</b>	<b>-74.3</b>	<b>0.016</b>
<i>Openness to trade</i>	.31	0.127	<b>.86</b>	<b>0.000</b>	<b>11.9</b>	<b>0.000</b>
<i>Educational level</i>	1.04	0.693	<b>12.3</b>	<b>0.018</b>	<b>137.3</b>	<b>0.000</b>
<i>Institutional Quality</i>	.35	0.785	<b>8.9</b>	<b>0.000</b>	19.3	0.40
<i>Constant</i>	<b>-515.4</b>	<b>0.000</b>	<b>-181.9</b>	<b>0.000</b>	854.4	0.67
	N = 98 R-squared = 0.40		N = 147 R-squared = 0.57		N=165 R-squared =0.28	

**4.1.3 Coefficient Analysis**

The hypothesis presented was that we expected the more and least developed countries to attract the most FDI per capita since these are the ones that have a growing share of workers and a decreasing capital/labor ratio. Therefore we expected the most significant result for all variables in the more developed country group. The regression for least developed countries was largely inconclusive. Significance levels for the more developed countries are high; all of them are significant on the 5% level, all but one on the 1% level. This could be a result of educational level and institutional quality being highly correlated, which should not be surprising since a good public education system is in essence a good institution. The correlation with openness to trade is not as striking which could be surprising but it should be remembered that it is not a measure of red tape or that kind of restraint but measured as ratio of international trade and GDP. This means that the variable can be biased by countries being so attractive to investment that they attract large amounts of capital in spite of having a lot of restrictions on capital flow. China is a good example of this were potentially limiting policies such as forcing international corporations to enter joint ventures with local firms in order to set up shop in the country, but still attracting large amount of capital due to positive factors overpowering such obstacles. Looking at the R-squared measure of explanatory power it is also the more developed countries that have the strongest correlation, with the least developed countries coming in second despite overall lower levels of significance, which is somewhat surprising. The least developed countries have a really high significance of working-age share, which is somewhat surprising since investment was largely expected to be channeled into demography-independent commodity industries. But it should be mentioned that not all of the developing countries in the dataset have are highly dependent on commodities. This could still imply that working-age share is still an important factor of investment demand in the least developed countries.

As for the most developed countries, the working-age share has a statistically significant

(10%) negative effect on FDI inflows. While not interpreting the negative sign of the coefficient one could read from the estimation that working-age share has a less significant impact on FDI inflows than in the more and least developed countries. This would be in line with the theory that since the most developed countries have very capital-intensive and knowledge-based industries the impact of working age share is smaller. In an estimation of the working-age share impact on economic growth the most developed countries would also be sensitive to demography via its support ratios. But when looking at FDI it seems investments are rather detached from demography in a knowledge- and technology intensive environment.

The variable for old-age dependency was added as an addition the working-age share to differ between countries with a high share of youth dependents and a high share of elderly dependents. Therefore it is in line with the expectations that the most developed country has the strongest negative influence of elderly dependency ratio. The more developed countries also have statistically significant negative influence, but not to as large degree as the most developed countries. Since the most developed countries has a larger share of elderly, it is known that it hurts economic growth due to transfers from younger generations that otherwise might be invested. This burden on the overall growth could by proxy lessen the incentives to invest into the most developed countries. For the most developed countries the result is also slightly less significant, this could be an effect of the developed economies being so capital-intensive that the impact by population age structure in general is diminished, so also the old-age support ratio. For the more developed countries you have a significant negative impact, but not so large, which could be a result of elderly relying on family for support, something that might hurt domestic savings rate and growth but not have a major impact on FDI inflows. In the least developed countries old-age dependency ratio has a positive effect on FDI on the 5% level. This is definitely strange and could mean a number of things. It is possible that although a person belongs to a dependant age, the person might still produce if the circumstances does not allow for retirement. It could even be that under harsher material circumstances, elderly to sick to work will pass away faster than their developed-country counterparts. Also it should be remembered that the share of elderly is far smaller in the least developed countries, further dampening the importance of the variable in that particular estimation.

As for the openness variable it has a positive impact in all three country groups, and is statistically significant in all but the least developed country. The most developed countries seem to be more dependent on openness for their investment. A part of that difference could be through countries like China and India who as discussed earlier are very attractive for investment in spite of not having the best record for openness. That would mean that a lot of the countries make up for lack of openness through other variables. Since the openness variable is measured as import and export divided by GDP, it also gives higher scores to countries that both import and export large quantities. Some of the emerging economies are very export dependent and still has quite a small capital stock. Which would mean that even if the country is open for trade in theory the domestic demand might not be big enough to generate a large amount of imports. Openness being statistically insignificant for the least developed countries might be an effect of commodity dependency. A lot of least developed countries scored rather high, which might a result of the commodity exports. It would seem that much like the more developed countries, the sensitivity for openness is smaller in the least developed countries, maybe because the attraction of the investments in the commodity sector is stronger than the deterrents. For a complete analysis of this variable a sector perspective would be desirable, since there might be a threshold of openness that only

multinational corporations can cross, thus deterring the smaller scale SME-investment common between developed countries. The limitations of the variable openness for trade make it a hard to interpret. There are a lot of things despite the restrictions to trade that it is suppose to measure that can influence the variable.

Educational level increases in significance and size as a country becomes wealthier according to the estimation. This is an indication of the increasing productivity when moving from subsistence economy and farming to manual labor and to skilled labor. For the least developed countries it is positive but highly insignificant, which could be a sign of commodity dependency. In an economy based on commodities there are few employees and skilled labor is often foreign, rendering domestic education unimportant for investment flows. This is somewhat counterevidence to the large impact of the working-age share for the least developed countries. If the working-age share is an important factor for FDI inflow it would according to theory be really important that this workforce is educated. The 2 factors that estimate the importance of the population, working-age share and educational level, therefore seem ambiguous for the least developed countries. For the more developed countries it has a statistically significant positive impact on FDI inflows. This together with the importance of the working-age share would imply that investors into more developed countries invest in people to a larger extent than in least developed countries. In the most developed countries however, the working-age share was insignificant, but the educational level far more important than in the more developed countries. It's possible, that in the most developed country, due to the knowledge-intensive nature of their industries, the amount or share of working age doesn't affect willingness to invest as much as the level of education of the workers. The more developing countries in the data during the period the study covers have been largely dependent on manual labor. While manual labor does get more efficient with education, the amount and share of workers are more important than in the most developed countries, since a lot of their competitive advantages build upon the low prices derived from masses of unskilled or semiskilled labor. It could be expressed the importance of quantity over quality is larger in the more developing countries than in the most developed countries, were the quality of the workers is of bigger importance due to the nature of the industries.

The institutional quality variable was expected and confirmed to be positive and significant only for the more developing countries. Its high correlation with educational level could be on explanation for low significance levels but it could also be due to the nature of investment. For the least developed countries, it could be argued that similar to openness, the attraction of natural resources is stronger than the deterrence of bad institutions. Large corporations might offer benefits even to corrupt governments and could therefore overcome domestic obstacles. Commodity investments are dominated by large corporations and therefore commodity dependent economies depend less on good institution for creating FDI demand. This would hold true for commodity dependent economies but as said before not all of the least developed countries are, to investigate that some sort of variable for commodity dependency would have to be defined. For the most developing countries as well the quality of institutions was surprisingly estimated as insignificant. This could be a result of the country classifications. The scale for institutional quality was 0-12 and the most developed country almost exclusively hovers around 11 or 12 score making the material for any correlation slim. Since this variable is of major importance to growth it becomes almost a condition to score highly on institutions to be classified as a most developed country. Hence the variable becomes almost tautological in saying most developed countries have high scores for their institutions, but those same scores is a condition to be counted most developed in the first place.

Originally the variable life expectancy was included to capture the effect of health on the economy and indirectly on investment demand. The variable yielded highly insignificant estimations, possibly because it was highly correlated with institutional quality and educational level, likely because stable institutions also include public welfare, schooling and health, and was therefore rendered insignificant. The health variable also does not have a clear-cut causality since a healthy population causes growth and growth causes a healthy population. Investments also are a cause of growth, so the question is whether investment via growth is a driver for health or if health via productivity is a cause of increased FDI. From the high correlation with institutions this study assumed that the effect of health patterns was partly captured in the variable of institutional quality and educational level.

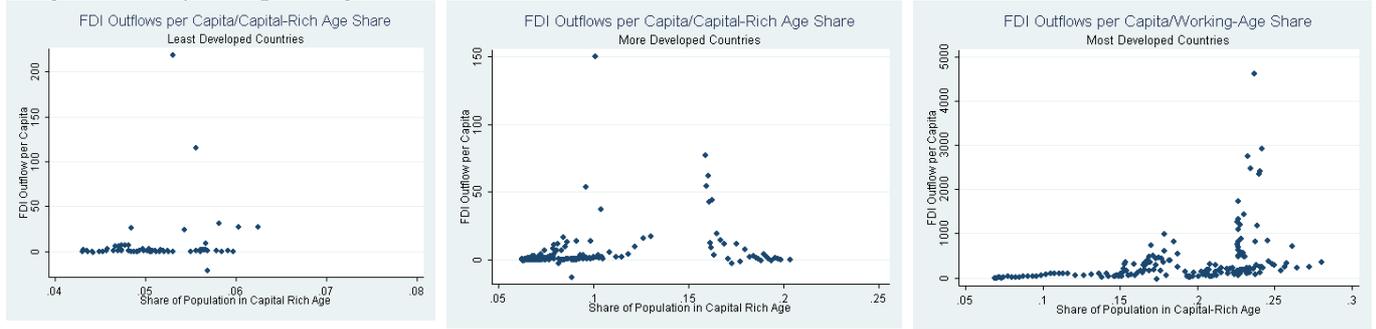
Another variable that was dropped for the estimations of the inflows was GDP growth. The theory behind it was that it could be too blunt of a tool in measuring the attraction of a market. A more successful economy should be more attractive for investors to invest in. But there is a lot of problems with using the variable. For example, certain sectors could be so attractive to investors that the overall GDP is rendered insignificant in the investment decision. An investor is likely to believe in the particular project he is investing in and although that project might be affected by the GDP there are a lot of sectors that are not dependent on the cyclical variations in the economy. The other problem is that investment attraction would be very different on different levels of absolute GDP. By measuring the growth rate the information whether it's a growth from a small or a big base is lost, something that is likely important. Finally, there is a lot of issues with causality, GDP might be too much a result rather than a cause of investment. The argument could be that GDP growth attracts investment and investment causes growth, but where does it start? GDP growth is also made public with a considerable time lag, putting the effects of the investment decisions further into the future.

## **4.2 Outflow**

### **4.2.1 Preliminary Results**

In order to have a preliminary look at the FDI outflow situation in the different groups of countries, the FDI outflow per capita has been plotted against the capital-rich age share. Capital-rich age share is the total population from 40 and onwards, as these are expected to be the age in which individuals are accumulating and consuming retirement funds, making it the age in which they dispose of the most capital. According to the hypothesis an increase in capital-rich age share would increase capital supply and therefore the capital/labor ratio of the country, increasing the demand for labor. If the domestic labor supply or capital deepening is not sufficient to absorb the growing capital stock, the capital will move across borders to countries where it is demanded.

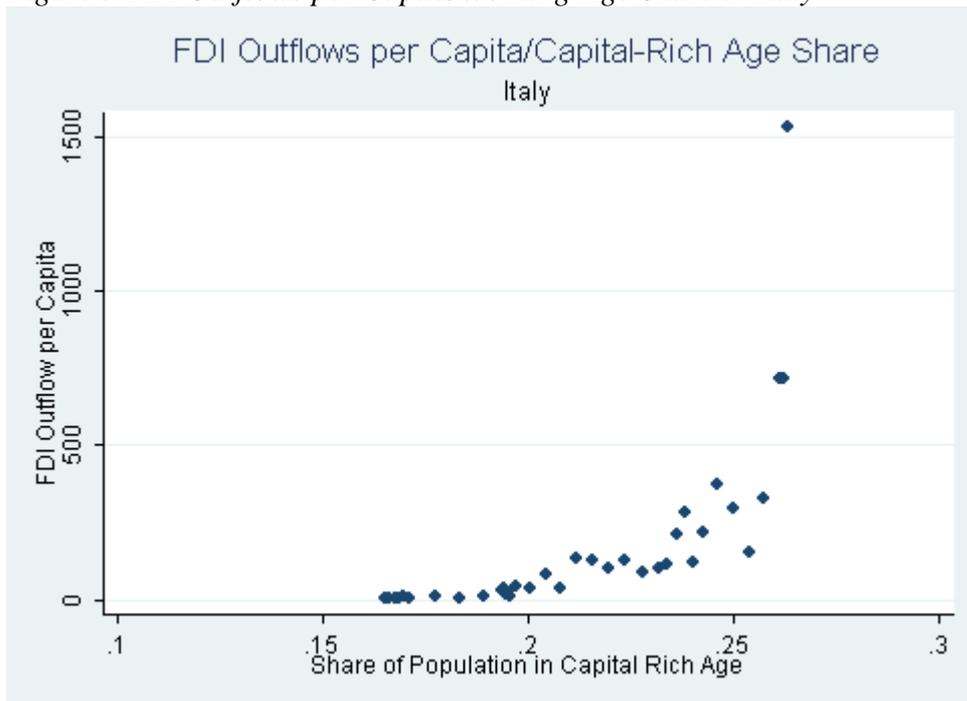
Figure 6 Outflows per region



The pattern of a population with an increasing share of people in capital-rich age leading to an increasing amount of FDI outflow is here most obvious in the most developed countries. This is according to expectations since it is largely in these countries where the majority of people are able to save up for their own pensions rather than relying on their offspring. Also, it is in these countries that the working-age share is on the decline, spurring further investment into labor-rich countries abroad.

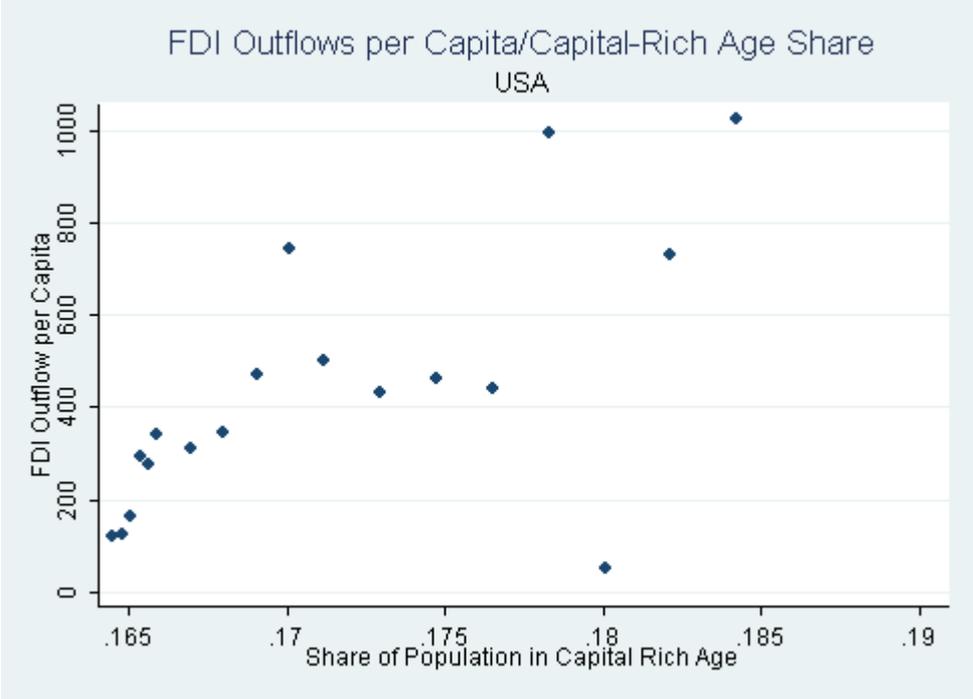
On a single country, Italy, one of the countries in Europe with the lowest fertility and advanced ageing process, has a rather expected curve.

Figure 7 FDI Outflows per Capita/Working-Age Share in Italy



It seems that an ageing population with a lot of savings has caused a substantial increase in FDI outflows. Another developed country with a much younger age structure is the US. The increase could be an effect of economic growth coinciding with population ageing. That would be consistent with figure 1 where inflows and outflows of FDI increase simultaneously with economic growth.

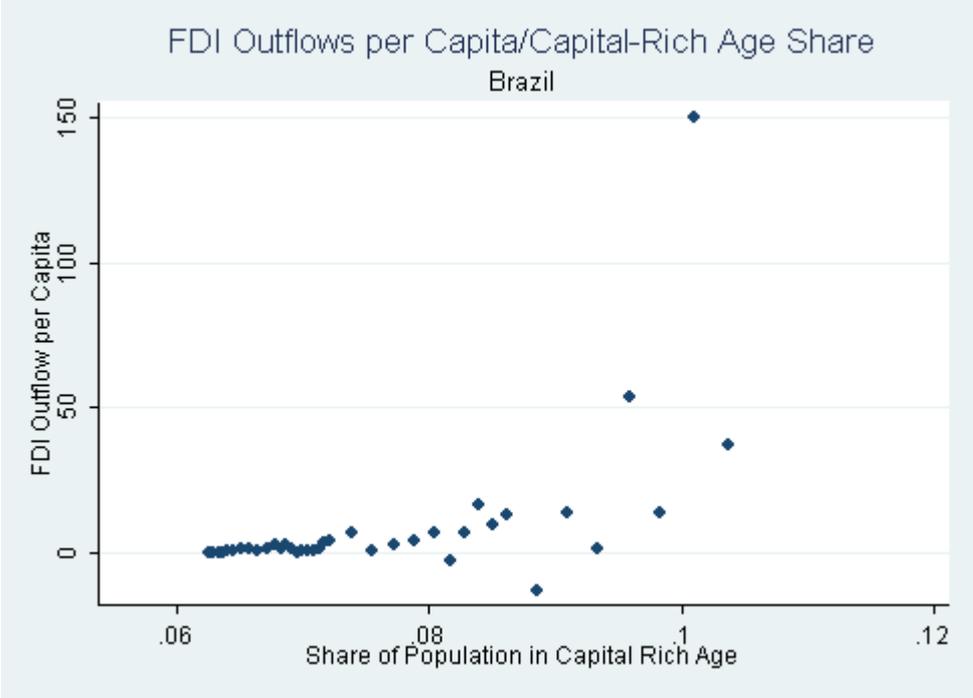
Figure 8 FDI Outflows per Capita/Working-Age Share in the USA



Here development has taken another shape but noting how the US has a substantially smaller share of capital-rich age people, Italy also had a more flat development at those levels.

Brazil is one of the more developed countries and is expected to have a FDI outflow rather indifferent from demography.

Figure 9 FDI Outflows per Capita/Working-Age Share in Brazil



## 4.2.2 Regression – FDI Outflow

In order to measure the outflow, the growth of FDI is expected to depend on the share of people of prime savings age and old age, as these are the ages where capital accumulated. This is however not expected to be the case in the least developed countries, where the tendency is to depend on children instead of saving up for old age.

FDI Outflow per capita = $f(\text{Capital-rich Age share, Openness to trade, Institutional Quality, GDP Growth})$						
Variable	Least Developed Countries		More developed Countries		Most Developed Countries	
	Coefficient	F-test	Coefficient	F-test	Coefficient	F-test
Capital-Rich Age Share	1997.2	0.151	<b>44.2</b>	<b>0.000</b>	<b>4069.3</b>	<b>0.000</b>
Openness to trade	.32	0.311	.03	0.179	<b>12</b>	<b>0.001</b>
GDP Growth	-.79	0.607	-.03	0.819	<b>43.6</b>	<b>0.009</b>
Institutional Quality	1.9	0.469	<b>.50</b>	<b>0.006</b>	<b>73.5</b>	<b>0.001</b>
Constant	-128.8	0.108	<b>-5.7</b>	<b>0.007</b>	<b>-1918.2</b>	<b>0.000</b>
	N = 51 R-squared = 0.08		N = 144 R-squared = 0.16		N=165 R-squared = 0.28	

## 4.2.3 Coefficient Analysis

The capital-rich age, which is the share of the population over 40, the time when saving up for and spending retirement funds, was expected to be of major importance in the most developed countries. This proved true with a large positive impact and statistical significance for the variable. For the more developed countries, it proved positive and significant as well, something that could indicate the growing middle class saving up for their retirement in the emerging markets. It is however a possibility that economic growth is the cause of both increased outflows in FDI and an ageing population and therefore causality could be questioned. For the least developed countries the entire estimation yielded insignificant results. It seems like the FDI that flows out of the least developed countries have completely different drivers than the capital flowing out of the most developed countries, which can be explained by at least 28% by the model according to the R-square figure.

Openness to trade was expected to have a greater impact on all 3 country groups. In the estimation it was solely for the most developed countries it had a positive and significant impact. The measure is supposed to capture obstacles to trade, often institutional ones, by measuring imports and exports as share of GDP. But exports, due to its benefits to domestic economy, tend to be less regulated than imports. This could possibly inflate the measure.

This might explain why it is a more important variable in explain the inflows than the outflows. When it comes to capital there might be limitations from local government to take it out of the country, but since the measure includes the movement of merchandise as well as capital the openness to capital movements' portion cannot be excluded.

GDP growth, positive and significant in only most developed countries like openness to trade, suffers from the same causality problems that caused it to be dropped in the estimation for inflow. Investments here seem to be a result of growth as much as growth causes investment as seen previously in studying the net FDI across the board. This could be why the

significance level is low for the more developed countries and the least developed countries. The idea though that a positive GDP development would create accumulated capital that partly is invested abroad, should have a stronger correlation in all groups of countries. The low significance of the variable is likely a result of correlations with other variables as well as the issues with causality.

In the case of inflow of FDI institutional quality it was expected to be a major factor, not so in the case of FDI outflow since the sending of capital should be far more dependent on the institutional quality of the receiving country than the sending. One could even speculate that poor institutions in the sending country would spur capital flight to countries with more stable institutions. As far as the most developed country concerns, it is a similar issue as in the estimation for inflow. The fact that they are classified as most developed country is largely based on the fact that they score so highly on institutional quality. This makes the variation of the score in the group of countries in this particular time period very low. The institutions of the sending country are assumed to be stable, given that its only countries with somewhat stable institutions that develop an ageing population. Therefore it is surprising and possibly an effect of biased estimations that institutional quality has a higher impact in the most developed countries rather than the more developed countries.

### 4.3 Comparing Capital-rich Age and Prime Savers Age

The term capital-rich age is new to this study, to express the share of the population that has capital to invest. Most existing literature focuses on the prime savings age, roughly from 40-60, since this is when the savings are the highest with people saving up for their own old age. But since the capital is not all consumed at once on retirement this study uses the added ages of retirement and prime savings age as the age when a lot of capital is accumulated, whether increasing or decreasing. When estimating the same regression as earlier on, but switching the first dependent variable between the 2, the result is as follows:

<i>Variable</i>	<i>Coefficient</i>	<i>F-test</i>	<i>Coefficient</i>	<i>F-test</i>
<i>Prime-savers Age Share</i>	5326.9	0.176		
<i>Capital-Rich Age Share</i>			<b>4069.3</b>	<b>0.000</b>
Openness to trade	.33	0.300	<b>12</b>	<b>0.001</b>
GDP Growth	-1.3	0.409	<b>43.6</b>	<b>0.009</b>
Institutional Quality	2.7	0.318	<b>73.5</b>	<b>0.001</b>
Constant	-149.3	0.133	<b>-1918.2</b>	<b>0.000</b>
	N = 165 R-squared = 0.08		N=165 R-squared = 0.28	

In this particular dataset the significance level of capital-rich age as opposed to prime-savings age is much higher when measuring the effect on FDI outflow. The R-square measurement of explanatory power is also boosted by using the latter variable in the regression. Further estimations with a more narrowed down capital rich age, such as 50-70 or something similar could be an interesting topic for further research.

## 5 Conclusion

The hypothesis for this thesis was that the first demographic dividend would cause increased demand in emerging markets while the second dividend would cause increased supply in the developed world. This would shift the capital/labor ratios in both type of countries and spur

capital movements from the country experiencing the second dividend to the country experiencing the first dividend simultaneously.

There is clearly a lot of correlation between capital flows across borders and demography. Were there is a large share of working age population, capital is the scarce resource and demand therefore increases. Simultaneously, the demand for investments abroad increases in the country of origin as the working-age share in decreases. In this study the correlation of FDI inflow and high working-age share has been perceived as stronger than the correlation between FDI outflow and high share in capital-rich age. The demographic dividend hence seems like a stronger force on the demand side in the developing society than the post-dividend ageing is a force on the supply side in the developed country.

In general, the regression for outflow proved somewhat weaker than the regression for the inflow. The regression for inflow is basically a measure of the impact of the demographic dividend on investment, and the regression of outflow basically a measure of the impact of the second dividend. The second dividend is by nature more complex and ambiguous and to large degree theoretical. It depends on attitudes and expectations for its impact and size unlike the first dividend which is more straightforward to measure as it's a pure demographic effect. The first demographic transition has a behavioral aspect but not to as large extent as the second. This could explain why the results were stronger for the first rather than the second dividend. One problem to recognize concerning the comparison between the different country groups is that the variables used were chosen from to the expectations. That is one of the reasons that the country groups fulfilled their expectations in terms of significance, and that country groups not expected to yield significant results. But the hypothesis was that those capital flows would occur and that is what was estimated.

## **5.1 The Effect of Working-Age Share on FDI Inflows**

The regressions quite strongly suggest that the FDI actually to a large degree depends on demography. One could question however the causality in a lot of these relationships, and this goes for the whole study. Economic and demographic development in either direction is a result of virtuous spirals and spirals by definition contain circular causality. When looking at for instance health it is clear that improved health leads to improved mortality, which leads to lower fertility and more beneficial dependency ratios. Improved dependency in turn leads to an increase in investment levels, which leads to economic growth. Growth in turn is a cause for improved health, which completes the circle. These relationships are not all clear cut. Improved dependency ratios do lead to an increase in investment, but it could also be argued that dependency ratios cause economic growth, which in turn attracts further investment. This way there is not only circular causality but also sub-circles within the larger circles.

A result that could be drawn from the regressions as a whole would be that the group of countries that yields the most significant regressions is the one most sensitive to demography. Demography sensitivity would hence be how much of investment flows or indeed growth is affected by demography. The results of the 2 population-oriented variables would give a good picture of demography sensitivity. The least developed countries yielded somewhat inconclusive results here, working-age share showed a very large and significant impact while oddly enough old-age dependency showed a positive impact as well, although with a lower significance level. It should be remembered that the least developed countries are the ones least represented in the dataset and regressions for them are likely the least robust. The

educational level yielded highly insignificant result which would suggest that the working-age share matters greatly, while the educational level of the same workers does not, something that does not seem plausible. These countries are believed to be more dependent on commodities, and since there is no variable for that present in the dataset the results are believed to be biased for the least developed countries. The more developed countries have as expected the most robust estimations, and are therefore deemed to be the most sensitive to demography in terms of capital flows. This is likely because these countries are to a higher extent dependent on manual labor, unlike most developed countries that are dependent on skilled labor which I seem to be less sensitive to demography in terms of attracting investment. The most developed countries yielded low significance for working-age share, which could be a result of the mentioned insensitivity to demography. The reason why working-age share would matter less in terms of attracting investment is because the economies are knowledge intensive, and each worker can employ more capital. Therefore most developed countries can attract investment because of the demand for capital deepening, i.e. a demand for more capital per worker. In this situation, it is not the number or share of workers that makes a country competitive but rather the educational level of the same workers. This would also explain the higher significance of the educational level variable for the most developed countries than for the least developed countries. Therefore the demographic dividend might have an impact on FDI flows in both groups of countries, but it seems to have a bigger impact on the more developed countries. The most developed countries likely have more FDI by volume, but this depends to a lesser extent on the demographic situation.

As for the impact on FDI inflows of the post-dividend ageing populations, it seems to be indicated by the variable old-age dependency ratio. As economies move from least to most developed countries the negative impact of old-age dependency seems to increase. This is likely a result of a non-linear impact where the negative impact on investment is more felt at higher levels of dependency. This is likely to be through its impact on the economy in general and not so much influencing the investment decision. Institutional quality was only statistically significant for the more developed countries. This would be expected to be important in all 3 groups. The reason it's not significant in the least developed could be that for commodity investment the impact of institutions is not as great. For the most developed countries is likely a result of the 1-12 score was that almost all countries score the top score in this group, rendering the regression unreliable. As for the openness variable it was positive and significant in the more and most developed burger. The least developed countries likely have their openness variable warped by commodity dependence.

This study gave only indications for the impact of demography on capital flows in the more developed countries. To get conclusive results for the least developed countries, one would have to look at the investments in different sectors to separate between investments in commodities and investments in population. As for the most developed countries it seems like it's the quality rather than quantity of workers that have an impact on FDI. The main demographic effect on capital flows here seems to be through the negative impact old-age dependency has on economic growth. The demographic dividend hence is most beneficial in a labor-intensive economy, something that seems to be always the case since the demographic transition often runs parallel to economic growth.

## **5.2 The Effect of Capital-Rich Age Share on FDI Outflows**

The term capital-rich age was here created as a combination of what is often in literature is

describes as prime savings age (40-65) and old age (65- ). Prime savings age being the time when individuals accumulate capital for their retirement and old age being when they retire and become net consumers. The reasoning behind the term is that even though elderly become net consumers, they do not consume it all the first year of retirement. Hence the capital accumulated will diminish gradually over the years. Therefore the savings and old age together are the age in which there is a lot of capital accumulated and therefore a demand for investment. This is basically testing the effects of the second demographic on FDI outflow.

The results of the effect of this capital-rich age on FDI outflows showed some signs of accuracy but not as strongly as the working-age share impact on FDI inflows. One reason for this could be that in the developed countries educational levels are higher, and with higher education more capital can be utilized for every worker, and therefore technical improvement and capital accumulation can replace workers instead of creating demand for more. There are also rather few measurable variables in the sending origin, since the choice to invest is based so much on circumstances in the receiving country. According to Higgins (1998) an increasing elderly share puts more strain on the economy, which reduces savings rate which in turn reduces investment. This works as a force to weaken investments as more people enter the capital-rich age. Even though that force is counteracted by the fact the increasing number of people in working age augments the investment demand. The result in this study is that the net effect is still positive, but not as strong as the demand effect in the dividend country. The impact of the capital-rich age variable was positive in all country groups and significant in all but the least developed countries. This was according to the expectations for the most developed countries, since they are known to accumulate capital for their future. For the more developed countries, it could be an indication of the growing middle class that an increasing number of people are accumulating capital for their retirement and therefore increasing capital supply and spurring investments abroad. The variable for openness to trade proved significant only for the most developed countries, in what might be more of a result of the validity of the variable than the actual situation.

For the least developed countries the entire estimation yielded insignificant results, indicating that the FDI outflows that do occur have very little to do with demographic factors. Openness to trade and GDP was insignificant in the more developed countries as well, leaving only the most developed countries with a robust regression. This would indicate that the level of sensitivity to demographic circumstances is the highest among these for FDI outflow. These contrasts to the results in FDI inflow where the more developed countries were the most affected, partially confirming the hypothesis.

### **5.3 Suggestions for Further Research**

It has been mentioned how the least developed country can attract investment, but in its capital-intensive sectors based on commodities. The aspect of sector dependency and the role that would play in demographic impact on investment flows is an area that could be studied further. When looking at FDI and demography it would also be interesting to compare it to total investments in a particular country. The relationship between foreign and domestic investments is highly intertwined and would require complex data. Also data on FDI as a share of GDP could be used as an alternative to the FDI per capita used in this study.

Another interesting area would be to use demographic projections and predict future investment flows. In this study time and data was inadequate for predictions but with widely available demographic projections it should be possible.

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