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'Demography and Finance-Finance and Growth'

- **An Overview and Survey of Selected Literature**

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Abstract

This paper provides an overview and survey of selected literature on two economic topics that have recently been subject to much academic debate. First, the effects of demographic change on financial markets and secondly, the role of financial intermediaries in promoting economic growth. This paper also provides a brief survey of the literature on pension reform and its implications on promoting 'financial depth' and subsequent growth. Pension reform may constitute a direct link from demography to economic growth through the mechanism of financial intermediaries.

Swedish Summary

Denna uppsats ger en översikt av utvald litteratur tillämplig på två ämnesområden inom ekonomisk forskning vilka under senare tid har åtnjutit åtskillig uppmärksamhet inom den akademiska litteraturen. Den första delen av uppsatsen behandlar hur demografisk förändring påverkar de finansiella marknaderna. Den andra delen analyserar hur finans kan påverka ekonomisk tillväxt. Uppsatsen avslutas med en kort analys av hur reform av pensionssystem kan utgöra en länk mellan demografin, finansmarknaderna och den ekonomiska tillväxten.

Demografin och Finansmarknaderna

Trots marknadsnedgångar under senare tid har världens börser stigit markant under de senaste tjugo åren. Åtskilliga förklaringar har framförts till detta fenomen. En förklaring som vann gehör, framförallt i populärpressen, under mitten av 1990-talet var att stigande börser kunde förklaras av pensionssparandet av den s.k. Baby-Boom-generationen som föddes under 40- och 50-talen. Från detta resonemang följde farhågan att när Baby-Boom-generationen nådde pensionsålder kunde detta få svåra följder på finansmarknaderna. Efterfrågan på värdehandlingar förväntades då minska markant medan utbudet skulle öka då 40-talisterna började sälja av värdepapper för att finansiera sin pension.

Profetian om en framtida demografiskt orsakad börsnedgång initierade ett ökat utbud av akademisk litteratur som sökte att närmare undersöka i vilken grad demografi kan kopplas till finansiell avkastning och prissättning. Att det finns ett starkt samband mellan ålder och sparande är känt sedan länge genom s.k. livscykelteorier. I ett viktigt arbete från 1994 belyste Bakshi och Chen andra aspekter av relationen mellan demografi och finansiella tillgångar. En aspekt är att efterfrågan på specifika tillgångar ändras under en livstid från investeringar i boende till ett mer renodlat pensionssparande när individen blir äldre. Bakshi och Chen påvisade också att när individen blir äldre tenderar riskaversionen att öka. Som ett resultat därav borde efterfrågan på värdepapper med låg risk (så som obligationer) öka mer än efterfrågan på finansiella papper med högre risk (t.ex. aktier) när individen har nått en viss ålder. Inom ramen för sambandet mellan prissättning/avkastning av finansiella värdepapper och attityd till risk verkar olika mekanismer. Somliga hävdar att individen blir mer avvisande gentemot risk med åldern. Det finns med andra ord en *ålderseffekt*. Andra har uppmärksammat möjligheten att en viss generation eller ålderskohort uppvisar ett visst riskbeteende som är generellt och ej ändras över tid. Detta är känt som en *kohorteffekt*. Mycket av den senare litteraturen har uppmärksammat en tredje effekt: *tidseffekten*. Det är möjligt att attityden till risk och efterfrågan på värdepapper inte har ändrats främst som ett resultat av åldersstrukturen utan på grund av en generell förändring av riskaversionen inom ett samhälle. En stor del av den senare litteraturen undersöker vilka faktorer som ligger till grund för en sådan allmän förändring av attityden till risk.

Inom litteraturen råder det stor oenighet om hur stor påverkan demografi egentligen har på finansiella värdepapper. Få bestrider att demografi spelar roll, men i vilken grad finns det ännu ej någon konsensus kring. Rent metodiskt finns det stora svårigheter med att beräkna demografins inflytande på finansmarknaderna. Två centrala problem är att demografisk påverkan är lågfrekvent över långa tidsperioder och därför svår att beräkna, samt svårigheten att isolera ålders-, kohort- och tidseffekter.

Ett viktigt teoretiskt argument mot en demografiskt initierad börsnedgång är vikten av de internationella kapitalmarknaderna. Då dagens kapitalmarknader är i hög grad internationella, borde de globala marknaderna kunna absorbera det kapital som frigörs när en stor ålderskohort pensioneras. Konsekvensen av detta resonemang är att för att demografin skall

initiera en generell börsnedgång, måste den globala demografin vara likartad. Många modeller indikerar också att i länder som genomgår den demografiska transitionen borde teoretiskt sett kapitalet strömma till marknader vars demografiska cykel är annorlunda. Att internationella kapitalflöden skulle lösa den demografiska problematiken ifrågasätts dock ofta. Typiska motargument är att många utvecklingsländer ej är attraktiva att investera i på grund av riskfaktorer samt att aktieavkastningen i G7 marknaderna generellt är högre än i utvecklingsländerna, trots att de unga ekonomierna växer snabbare. Empiriska studier visar också att kapital inte är så internationellt rörligt som teoretiska modeller indikerar att det borde vara. Den mest kända studien i detta sammanhang är Feldstein och Horioka (1980). Det finns med andra ord ett ’home bias’ både i konsumtion och aktieval. Mycket litteratur har försökt förklara orsakerna till ’home bias’ i valet av värdepapper. De flesta förklaringar relaterar till de kostnader som uppstår på grund av bristfällig och asymmetrisk information, men ännu finns ingen allmänt accepterad förklaring. Mycket ny forskning undersöker också troliga effekter av mer integrerade finansiella och ekonomiska regioner (så som EMU) och huruvida sådana regioner i högre grad skulle underminera ’home bias’ i valet av värdepapper.

Demografin och Bostadsmarknaden

Denna uppsats behandlar också demografi och fastighetsägande. Denna fråga behandlas av två skäl. För det första kan fastighetsmarknaden anses vara en finansiell marknad som ger möjlighet till riskspridning. För det andra är fastighetsägandet den viktigaste komponenten av personlig rikedom och därigenom viktig för den aggregerade konsumtionen och makroekonomiska variabler som i sin tur påverkar finansiella instrument. Demografi- och fastighetsdebatten har rasat sedan 1989 vid publiceringen av Mankiw och Weils artikel vilken förutspådde dramatiskt fallande fastighetspriser när Baby-Boom-generationen når en ålder då efterfrågan på boende avtar. Senare litteratur har försökt motbevisa denna slutsats. De tre vanligaste argumenten mot Mankiw och Weils analys är som följer.

(i) Empiriska studier visar att utbudet av fastigheter på lång sikt är elastisk. Minskad efterfrågan borde därför leda till mindre utbud men inte till lägre priser.
(ii) Relationen mellan efterfrågan och prissättning borde framför allt reflekteras i nivån på hyrespriser och inte i den absoluta nivån på fastigheter.
(iii) Mankiw och Weils studie uppvisar metodiska misstag vilka leder till felaktiga slutsatser.

Många studier pekar också på nödvändigheten av en bättre förståelse av hur demografin påverkar makroekonomiska variabler (framför allt inflation och ränta) och hur dessa i sin tur påverkar efterfrågan och utbud av fastigheter.

Demografin och Makroekonomin

Historiskt sett har demografin spelat en viktig roll i den ekonomiska litteraturen (tidiga exempel är t.ex. Malthus och Smith). Senare forskning har mer systematiskt undersökt hur demografi påverkar makroekonomiska variabler så som inflation, ränta och tillväxt. Empirisk forskning visar på signifikanta korrelationer mellan åldersstrukturen och inflationsnivån. De mest centrala teoretiska mekanismerna vilka binder dessa variabler samman kan sammanfattas som följer.

(i) Inom en traditionell IS-LM modell kan en demografiskt initierad förändring av sparandet flytta IS-kurvan och därmed påverka den aggregerade efterfrågan och prisnivån.
(ii) Inom en humankapitalmodell kan produktiviteten av arbetskraft öka med ålder, vilket förskjuter den aggregerade utbudskurvan och reducerar inflationstrycket.
(iii) Inom Solows traditionella tillväxtmodell påverkar demografin proportionen av kapital till arbetskraft, vilket har konsekvenser på produktiviteten och därför också på inflationstrycket.
(iv) En äldre befolkning medför omkostnader för staten men mindre skatteintäkter, vilket kan leda till ett budgetunderskott med påverkan på inflation och ränta.
(v) Demografiskt initierade förändringar i sparandet kan påverka bytesbalansen, vilket får konsekvenser på den inhemska prisnivån.
(vi) Åldersstrukturen kan möjligen påverka de olika fackföreningarna och dess inflytande, vilket i sin tur påverkar NAIRU. Denna mekanism har ännu inte varit föremål för utbredd forskning.
(vii) Om attityden till risk förändras under livscykeln kan demografi påverka individens portfoliokomposition och därigenom omsättningen av pengar och inflationstrycket.

Ett flertal empiriska studier har funnit signifikanta korrelationer mellan demografisk struktur och inflation och ränta. Flera studier har funnit liknande korrelationer mellan åldersstruktur och tillväxt. Den snabba tillväxten i stora delar av Ostasien under åren 1965 till 1990 tillskrivs i hög grad den då rådande befolkningsstrukturen i dessa länder (med många arbetsföra och få beroende).

Ett antal viktiga frågor återstår att behandla inom ramen för demografi och finansmarknaderna. De största kan sammanfattas som följer.
Varför ser sparandet olika ut internationellt och vilka faktorer bestämmer sparandet? I detta sammanhang måste inte bara kulturella och sociologiska aspekter behandlas utan också institutionella. Studier visar att strategier för sparande och attityder till risk påverkas av institutionella faktorer så som tillgång till sjukvård och annan välfärd.
Hur särskiljer sig investeringsstrategier av institutionella och privata placerare? Litteraturen fokuserar generellt på privata investerare vars beteende behandlas av livscykelteorierna. I realiteten äger institutionella investerare ofta uppemot 50% av tillgängliga aktier på västerlandets börser. Privata och institutionella investerare har olika likviditetsbehov och deras investeringsstrategier borde därför vara olika.
I vilken grad underminerar globala kapitalmarknader länken mellan demografi och prissättning/avkastning av finansiella värdehandlingar inom en ekonomi? Ännu råder ingen konsensus kring orsakerna till ’home bias’ eller till betydelsen av integrerade finansiella och ekonomiska regioner.
Hur stor påverkan har demografi på makroekonomiska variabler vilka i sin tur påverkar finansmarknaderna? Mycket litteratur har undersökt demografins inverkan på makroekonomin, men ännu har få försök gjorts att direkt relatera detta till finansiella värdehandlingar.

Finans och Ekonomisk Tillväxt

Det teoretiska sambandet mellan finansiella institutioner (varvid menas både banker, finansiella marknader och andra institutioner) och ekonomisk tillväxt har länge figurerat i den akademiska litteraturen. Ett tidigt exempel är Schumpeter. Sedan tidigt 1970-tal har litteraturen inom detta ämnesområde vuxit snabbt. Ett stort antal empiriska studier visar

numera på starka samband mellan utbredning av finansiella institutioner och ekonomisk tillväxt.
Det är framför allt tre mekanismer som binder samman finans och tillväxt:

(i) Finansiella institutioner sammanför sparare och investerare. På detta sätt slussas kapital till investeringsprojekt, vilka i sin tur leder till tillväxt. I denna process uppstår emellertid läckage i form av t.ex. transaktionsavgifter varpå investeringarna är mindre än det faktiska sparandet. Ju effektivare finansmarknader, desto större investeringar och bättre möjligheter till ekonomisk tillväxt.
(ii) Finansiella institutioner möjliggör ett mer effektivt och produktivt tillhandatagande av tillgängligt kapital. Marknaden tillåter sparare och investerare att sprida och dela risk, vilket gör att idiosynkratiska risker kan reduceras. Som ett resultat kan mindre likvida men mer produktiva investeringsprojekt genomföras. Riskspridning tillåter också specialisering vilket i sin tur ökar produktiviteten.
(iii) Finansiella institutioner påverkar sparandet, vilket får konsekvenser på investeringar och tillväxt. Huruvida sparandet påverkas positivt eller negativt är emellertid bestämt av individens attityd till risk. Forskning visar dock att sparandet tenderar att minska när finansmarknaderna växer. Orsaken till detta är att med större möjligheter att sprida risk minskar behovet av att spara av försiktighetsskäl.

Trots konsensus av viktiga samband mellan finans och tillväxt återstår tre områden kring vilka det fortfarande råder oenighet: frågan om riktning, huruvida banker eller marknader är bättre på att skapa tillväxt samt hur man metodiskt sett skall mäta ’finans’.
Riktningsfrågan kan sammanfattas med huruvida korrelationen mellan finans och tillväxt går från finans till tillväxt eller den andra vägen runt. De flesta studier visar på att korrelationen i själva verket är dubbelriktad, d.v.s. finans och tillväxt påverkar båda varandra på ett positivt sätt. Andra oklarheter inom riktningsfrågan rör huruvida korrelationen mellan finans och tillväxt är linjär eller om det finns ’tröskelnivåer’ samt möjligheten av en tidsfördröjning mellan utbredningen av finansiella institutioner och den påföljande positiva tillväxten.
Bank kontra marknadsfrågan är en gammal akademisk trätofråga som har återuppstått inom ramen för hur man bäst positivt påverkar tillväxten. Det bankbaserade finansiella systemet dominerar traditionellt i t.ex. Tyskland och Japan, medan ett marknadsdominant system finns i England och USA. Kritiker av ett marknadsbaserat finansiellt system hävdar att det inom marknaden finns ett ’free-riding problem’ samt att systemet inte ger nog incitament för produktiva investeringar med hög risk eller till att kontrollera företag och styrelser. De som försvarar marknadssystemet hävdar ofta att marknader är mer flexibla än banker samt att banker tenderar att vara konservativa i ekonomisk rådgivning, vilket kan medföra negativa konsekvenser på tillväxten. Ett antal studier har försökt att isolera effekterna av banker respektive marknader. Sådana försök är dock metodiskt svåra på grund av brist på långa serier av tidsdata tillämpliga på marknaden. Flera av de senare studierna visar också att *både* banker och marknader är av stor vikt för tillväxten, då de fyller olika funktioner inom ekonomin.
En möjligen mindre kontroversiell frågeställning är hur på bästa sätt definiera och mäta ’finansiellt djup’ inom ekonomi (med andra ord den finansiella sektorns utbredning). Tidiga studier använde ofta aggregata monetära begrepp som M1 och M2. Senare studier använder ibland kredit given till den privata sektorn som måttstock. Båda dessa metoder lider av stora svagheter men ännu råder ingen konsensus om definitioner och beräkningar av ’finansiellt djup’.

Mycket av den senaste empiriska och teoretiska litteraturen söker förstå vilka faktorer som formar de finansiella institutionerna. Den viktigaste faktorn tycks vara det juridiska systemet

och framför allt ett väl utarbetat kontraktssystem som skyddar investerare. Försök har också gjorts för att förstå vilka länder som har de mest lämpade juridiska systemen och vilka kulturella och religiösa faktorer som ligger bakom detta.

Pensionsreform, Finans och Tillväxt

Ett flertal länder reformerar för närvarande sina respektive pensionssystem från det tidiga pay-as-you-go systemet till ett decentraliserat system, där pensionspengar förvaltas av privata fondkommissionärer. Empirisk forskning indikerar att en sådan reform kan leda till mer avancerade finansmarknader, vilket har positiva konsekvenser på tillväxten. På detta sätt kan en pensionsreform utgöra ett direkt samband mellan demografin, finansmarknaderna och tillväxten. Studier av Chile, som reformerade sitt pensionssystem under 1981, indikerar att så kan vara fallet. Fler institutionella investerare, vilket blir följden av övergången till ett privat förvaltande, skapar inte bara ett mer sofistikerat finansiellt system utan kan också ha en stabiliserande effekt på marknaden. En del litteratur visar dock på svagheten med många institutionella investerare och risken av hordbeteende, vilket kan skapa bubblor i marknaden.

Introduction

This paper provides a survey of selected literature on two economic topics that have recently been subject to much academic debate. First, the effects of demographic change on financial markets. Secondly, the role of financial intermediaries in promoting economic growth. The last section of this paper briefly investigates pension reform as a mechanism connecting demography with financial markets and consequently, growth. The motivation of this paper has been to provide an overview of the relevant literature and a sense of what direction empirical research is going. Less attention has therefore been granted to analysing the technical aspects of the literature. The literature on demography and finance, and finance and growth, is growing rapidly. The focus of this paper has been on the literature since 1996 but given the growing volume of literature, it does not claim to be exhaustive. Rather the ambition has been to indicate the main themes of debate and provide the reader with references for further reading.

The structure of this paper is as follow. Section one deals with the impact of demography on financial assets and markets. It provides a background to the literature as well as the theoretical underpinnings of this relationship. It further investigates some recent models linking demography to financial assets and explores the importance of integrated global capital markets in undermining the correlation between these two variables. Section one also investigates the link between demography and the housing market before discussing how demography may affect macro economic variables that in turn influence the financial markets. A brief investigation of alternative mechanisms and a discussion on outstanding questions and areas of future research conclude this section. Section two surveys the literature on how financial intermediaries may cause growth. It provides a brief background to the literature and explores the theoretical mechanisms by which finance may affect growth. It then moves on to some empirical and theoretical studies before investigating three topics of controversy in the literature: the question of causality, the bank versus markets debate and how 'financial depth' is best measured. This section also explores the literature on the determinants of finance itself, before concluding by outlining outstanding questions and future areas of research. This third and concluding section investigates some of the recent literature on the implications of pension reform. Many countries have recently reformed, or are in the process of reforming, their respective pension systems. Empirical work indicates that these reforms, by improving financial depth, may also have positive spill over effects on growth.

1. Demography and Financial Markets

Background to the Literature

Despite recent market corrections, the last twenty years have witnessed a dramatic increase in stock market indices across the globe. The causes of this have been a topic of great debate. The list of potential explanations is long but include factors such as improved productivity generating more profit and increasing demand for shares, corporate 'buy-backs' causing a shortage of shares in the market, and intense M&A activity driving up the price of shares[1]. In the pre-1994 literature, demography does not have a central role in explaining asset prices and returns ('assets' in this context meaning equity and bonds). Instead the early 1990s saw much debate on the impact of US demography on housing demand and prices. Early work more specifically linking demography to other financial assets was carried out by Peter S. Yoo[2]. In the mid 1990s a number of popular accounts were published emphasising the important role of the post-Second World War Baby Boom on stock market performance[3]. In short, these rather bleak prophecies argued that the large cohort of Baby Boomers had driven up share prices through savings for retirement. From this followed the concern that the approaching retirement of this age cohort could have a disastrous impact on financial markets as Baby Boomers were 'cashing in' and trying to sell off their equity. In academic circles, this predicted equity Armageddon has become known as the 'meltdown hypothesis'. The visions of imminent financial doom caught the public attention and also initiated intense academic research into the matter. There are very different interpretations as to how much impact demography and age structure have on asset prices and returns. No one disputes that demography does have some impact, but how much is still an open question. As we shall see, there are substantial difficulties in modelling demographic variables and isolating them from other factors that also influence asset performances. Furthermore, research has almost exclusively focused on the USA and as pointed out by some commentators, models calibrated on the American experience do not necessarily hold internationally. What follow is a survey of selected literature on demography and financial assets. In this discussion it may appear that demography only affects assets prices by changing the asset demand variable. Of course the mechanisms running between demography and asset prices and returns are more numerous than that. Demography indirectly affects financial assets through its impact on macro economic variables. Moreover, demography to a great extent drives the fundamentals that determine the profitability of companies and consequently the P/E ratios and asset pricing of those companies. This point is important but rarely explicitly stated in the literature. Before progressing to further investigating the literature, perhaps it would make sense to numerically indicate the magnitude of the Baby Boom following in the wake of the Second World War. Most parts of the developed world experienced large numbers of newborn babies in this period. Given that most empirical studies focus on the USA, however, the figures below apply to this experience[4].

A Few Short Facts on the American Baby Boom

The Baby Boom is generally acknowledged to have occurred between the years of 1946 and 1964. In 1945 there were approximately 86 births per 1000 women aged 15 to 44 years. In the following year this figure rose by 18.6% to 102. By 1957, which was the peak of the Baby

[1] For an analysis of potential explanations see e.g. Heaton and Lucas (1999)
[2] See Yoo (1994a and 1994b).
[3] See e.g. Passell in *New York Times*, March 1996 and Colvin in *Fortune*, August 1997.
[4] Figures according to Mankiw and Weil (1989), and Bergantino (1998).

Boom, the birth rate was 43% higher than in 1945 or 123 births per 1000 women. To put this in perspective, the year 1957 can be compared to 1976, which was the trough of the post-war baby bust. In the 1976 there were 66 births per 1000 women, which is 87% less than in 1957. In absolute numbers 4.3 million babies were born in the USA in 1957. In 1945 the corresponding figure had been 2.86 million. As a consequence of the Baby Boom, the age structure of the US population has changed drastically since the end of the Second World War. By 2003, the number of adults aged 40-59 is expected to exceed the number of adults aged 20-39 for the first time since 1900. This trend is expected to continue until approximately 2015. Furthermore, from the year 2006, the percentage of adults aged 60 years and over is expected to rise rapidly from 24% in that year to 34% in 2025. From 2023, the number of adults aged 60 years and above is expected to exceed the number of adults aged 40 to 59 years for the first time since 1900.

Theoretical Background

That saving and consumption patterns are closely linked to age has long been recognised through various life-cycle theories[5]. In an influential paper Bakshi and Chen (1994) more thoroughly examines the specific impact of demography on financial assets within the context of two hypotheses: the life-cycle investment hypothesis and the life-cycle risk aversion hypothesis. In brief, these are as follow:

1. The Life-Cycle Investment Hypothesis

The life-cycle investment hypothesis emphasises how the investment needs, in terms of assets held, differ though different stages in the agent's life. When investors are in their 20s-30s the demand for housing is great and consequently, the price of housing increases. It should be noted, however, that in the long run the extent of rising house prices is fundamentally determined by the construction costs and the supply of housing. A more permanent effect on the price of housing may occur if, for instance, housing is constructed in urban areas where supply is more inelastic and costs higher. As the agent grows older, the need to invest for retirement increases and demand switches away from housing to other assets. Housing prices now fall and asset prices increase.

2. The Life-Cycle Risk-Aversion Hypothesis

As the agent grows older risk aversion increases. Consequently, demand shifts from equity to less risky bonds. The age of the agent is therefore associated with a specific level of risk and rising share prices can be explained by age and corresponding attitudes to risk. There are a number of reasons why agents should become more risk averse with age. The three most commonly argued are as follow[6]:

(i) The risk normally associated with equity can be reduced by adopting a strategy of long-term ownership. Old agents do not have as many living years ahead of them as young. Therefore, they should switch their ownership from equity to bonds.

(ii) Equity holding, and the associated higher return, is necessary to facilitate for large spending in midlife (such as children's college fees in the USA). As the agent grows older, this need diminishes and it is now practically possible to switch to less risky assets.

[5] For a survey of relevant issues and literature see Bernheim (1999).

[6] Note that these explanations are not necessarily economically sound. Jagannathan and Kocherlakota (1996). have showed how in fact only the last argument economically makes sense.

(iii) Young agents can use future labour income to compensate for potential loss of risky equity. This is not an option for older agents who are approaching retirement. They should therefore rebalance their portfolios to incorporate assets associated with less risk.

An alternative risk interpretation is that Baby Boomers are intrinsically more tolerant of equity risk but for some reason less tolerant for risk associated with bonds. As argued by Campbell (2001), one explanation to this could be that Baby Boomers have personal experience of the American inflation during the 1970s, which had a very negative impact on nominal bonds. In contrast, the Baby Boom generation has no personal experience of the 1930s and the stock volatility associated with this period. Consequently, the immediate post-war generation is more sensitive to bond risk than to equity risk.

There has been a great deal of empirical work done to establish to what extent risk aversion increases with age. In a recent paper, Heaton and Lucas (2000a) find that risk aversion, as reflected in portfolio choice, does indeed increase with age. Interestingly, using cross-sectional data they find that if wealth is defined to include both liquid and illiquid assets, some wealthy households also *increase* their holdings of risky shares as they grow older. However, private business (which is an illiquid asset) is considered a more risky asset than shares. They therefore conclude that the substitution away from entrepreneurial ventures to equity is in fact consistent with the view that agents become more risk averse with age. One central argument in linking age with the type of asset holding is the importance of liquidity. As the agent grows older, there is an increase in demand for liquid or 'accessible' assets. In its purest form this is, of course, cash. The degree of liquidity is therefore of great importance in determining asset holding over the life cycle. A survey of some of the earlier empirical investigations on age and risk tolerance is provided by Yoo (1994a). Brugiavini (1999) surveys some of the literature especially applicable to precautionary saving in Europe.

Within the framework that explains rising share prices by attitudes to risk, there are two very different mechanisms at work. The argument that agents become risk averse with age relies on an *age effect*. That is, the age of the agent is associated with a specific attitude to risk. Attitudes to risk therefore change throughout life. The view that the Baby Boomers may have some intrinsic characteristic relies on a *cohort effect*. In other words, it is possible that there is some characteristic that is permanently attributable to a specific generation. This characteristic will follow the generation throughout life and does not change with age. Most of the recent literature emphasises the potential importance of a third effect in addition to age and cohort effects: the *time effect*. In short, it is possible that risk tolerance or risky asset demand has changed not because the age structure has changed, but because agents' general perception of risk has been altered over time. New financial hedging instruments such as options and warrants have also improved the possibilities of reducing insurable risk. Campbell (2001) argues that the dramatic increase in stock prices over the past twenty years is more likely to be attributable to time effects than to the impact of Baby Boomers. The literature is now moving on to more closely investigate the underlying factors of time-effects and alternative determinants of portfolio choice. Proposed explanations include factors such as the correction of 'mistaken' historical risk perceptions (Jagannathan *et al*., 2000), habit formation in utility (Campbell and Cochrane, 1999) and 'background risk' variables such as labour income and real estate (Heaton and Lucas, 2000b).
Much of the literature relating to potential time-effects on the stock market is within the context of the 'equity premium puzzle'. This puzzle refers to the observed, and arguably excessive, returns on equity over bonds. The US equity premium has averaged approximately

4 % over the last two decades. Premiums of such magnitude cannot be explained by standard asset pricing models and this observation has generated extensive research into potential explanations. The causes of the equity premium puzzle are beyond the scope of this paper. An early interpretation is provided by Mehra and Prescott (1985). The financial literature on the determinants of asset pricing is very extensive. An up-to-date and extensive survey is provided by Campbell (2000).

Data and the Life-cycle

Within consumption theory many studies draw attention to the apparent gap between micro theory and macro data. For example, many observers have noted that aggregate saving ratios for the Baby Boom generation in the USA are not in fact unusually large. The proponents of this view therefore question the validity of life-cycle hypotheses. This view is often held within the financial community where it is frequently argued that unlike Japan and Europe, the aging population in the USA actually save too little[7]. Given the falling saving rates, much financial literature emphasise that the rising stock market cannot be attributed to an age effect, but to changing attitudes towards risk or some other factor. In this respect, the view of the critics of the traditional life-cycle theory is consistent with the proponents of the importance of time-effects. Some studies have drawn attention to how misplaced definitions may obscure saving patterns that appear to contradict life-cycle predictions. Empirically, Gokhale *et al*. (1996) find that since 1980, the US net national saving has averaged less than half the rate observed in the 1950s and 60s. Most of this decline is argued to be explained by two factors. First, the government has redistributed resources toward the older generations with high propensities of consumption and away from the younger generation with less propensity to consume. This redistribution reflects the growth in Social Security and Medicare. Secondly, there has been a significant rise in consumption propensities of older Americans. One important objection to the view that theory and data square poorly therefore relates to faulty measurement and flawed definitions of what constitutes savings in data. For instance, Medicare in America is in fact a form of insurance and saving which is consumed with a time lag. In the absence of a market for Medicare, this product cannot be substituted away for another good but must be consumed. As a result, consumption of the elderly in America has increased. Miles (1999) further explains the importance of correct definitions and measurements in order to reconcile data with predicted life-cycle behaviour.

Recent Demography–Asset Models

Many recent papers have attempted to model the correlation between age structure and asset prices. As emphasised by Poterba (2000), however, the different effects of time, age and cohort on asset demand are linear combinations of one another and attempts to separate the individual effects tend to lead to severe theoretical restrictions. For example, difficulties in separating cohort-effects from time-effects have lead many economists to simply ignore potential cohort-effects. Another problem is that although theory predicts a relationship between demography and asset prices, changing age structure only generates low frequency movements in asset prices. In long time series, these movements are often very difficult to detect. The body of literature on demographic variables and their impact on asset prices and asset returns is growing rapidly. What follow is a brief summary of the main recent investigations and their empirical findings.

[7] See e.g. Roach (Morgan Stanley research, 1996 and 1997), Sterling and Waite (1998).

One of the earliest and most central papers in the demography-asset price controversy is a doctoral thesis by Bergantino (1998). Bergantino investigates the effect of changes in the age distribution of the US population on housing and stock and bond prices in the post Second World War period. The paper is a useful introduction to the topic and also provides a survey of earlier literature applicable to the field. Bergantino also raises some important issues and potential objections to the view that demography can affect asset prices. These objections tend to be ignored, or not dealt with explicitly, in many of the subsequent papers. In particular, Bergantino deals with the issues of rational expectations, integrated capital markets and bequest motives. Given the accuracy of predicting demographic change in the future and if there is an observable relation between demography and asset prices, rational agents should use demographic data to exploit arbitrage opportunities. Theoretically, this may undermine the meltdown-hypothesis. Bergantino argues that in the short run it is very difficult to use demography to make a financial gain, as assets will be volatile because of a whole range of other influencing variables. Empirically he finds no statistically significant correlation between the demographic demand for financial assets and real stock appreciation at time horizons less than two years. Nor is it necessarily possible to exploit arbitrage opportunities in the medium to long run if demography affects the demand for all assets in a similar manner. Consequently, Bergantino argues that it is possible to incorporate rational expectations with demographically driven movements in asset prices.

The view that integrated capital markets could weaken the link between demography and asset prices is accepted as a valid one. However, given the size and importance of the US market, Bergantino argues that the possibility of undermining the relationship should be greater outside the USA. The issue of integrated capital markets will be investigated more fully later in this paper.

In terms of the bequest motive, Bergantino draws attention to empirical studies that reveal that fewer than 25% of all households have ever received a substantial inheritance, trust or transfer. Intergenerational transfers appear to be of limited importance for most households and the bequest motive does not therefore undermine life cycle interpretations[8]. Methodologically, Bergantino uses data from the Survey of Consumer Finances (SCF) to analyse demographically changes in asset demand. His findings on a micro-level confirm a hump shaped life cycle where households under the age of 40 years dissave using credit and households above the age of 60 years dissave using old savings. Empirically he finds a statistically significant link between constructed demographic demand variables and observed long run movements in housing, stock and bond prices. This is true also when controlling for other potentially important variables such as fluctuations in real GDP. More specifically, using estimated elasticities Bergantino finds that demographic factors can account for approximately 59% of observed annual increase in real housing prices between 1960 and 1986. Similarly, demographically related factors can account for roughly 77% of the observed annual increase in real stock prices between 1986 and 1997 and approximately 81% of the real increase in bond prices.

Poterba (2000) investigates the historical relationship between demographic structure and real returns on Treasury Bills, long-term government bonds and corporate stock in the USA, Canada and the UK. His study uses cross-sectional SCF data and age specific asset demands to construct time varying 'projected asset demands' at different dates. Poterba finds it difficult to empirically establish any robust relationship between asset returns and the age-structure of the US population over the last 70 years. The correlations that do appear are stronger between long-term government bonds and Treasury Bill returns and demographic variables, than

[8] One objection, however, is that those households that do not receive any intergenerational transfers presumably do not hold any assets at all.

between stock returns and demographic variables. Poterba finds some evidence that the level of asset prices (measured as the price-dividend ratio) is correlated to the demographic structure. However, the 'projected asset demands' do not fall when the Baby Boomers retire as asset decumulation after retirement is much more gradual than asset accumulation during the working years. In this context Poterba points out that many recent theoretical models make the unrealistic assumption that Baby Boomers will sell *all* their assets during the years of retirement[9]. Given the slow decumulation of assets during retirement, Poterba rejects the meltdown-hypothesis and argue that the future effects of demography on asset demands are likely to be modest and difficult to disentangle from other variables that may influence the asset markets. In conclusion Poterba emphasises that future studies must pay greater attention to the potentially important role of integrated world capital markets in reducing the link between demography and asset prices. Another issue for future study is the timing of any market reaction to demographic shocks (i.e. to what degree the markets are rational in processing new information regarding demographic change).

Abel (2000) uses an OLG-model that incorporates convex adjustment costs and random population growth to determine the impact of Baby Boomers on the stock market and the price of capital. He finds that a baby boom will increase the price of capital as national saving and investment will be high when this age cohort is in the labour force. However, the price of capital also displays mean reversion such that it will eventually revert to its long-run mean. Consequently, the price of capital will rise when the Baby Boomers are in the labour force but decline when they reach retirement age. Abel also investigates how Social Security can be used to change saving and investment in the long run. In conclusion he argues that although Social Security can affect the investment-output ratio in the long run, it does not seem to affect the price of capital.
Abel (2001), in response to Poterba's paper of 2000, develops a rational expectations general equilibrium OLG-model with an aggregate supply curve for capital. In contrast to Abel (2000), the model also incorporates a bequest motive in order to account for the fact that all assets are not necessarily decumulated during the years of retirement. Abel argues that Poterba's conclusion that asset prices are unlikely to fall when Baby Boomers retire is not necessarily a logical consequence of continuous high levels of projected asset demand. The flaw of Poterba's interpretation is that the forecasted price of capital is a consequence of demand only, without taking the supply of capital into account. Notably, an economy with a bequest motive will always have a higher capital stock in each period than an otherwise identical economy without a bequest motive. In conclusion Abel therefore argues that there will be an anticipated decline in the price of capital when Baby Boomers retire. Importantly, the decline of the equilibrium price is not attenuated even if there is a bequest motive. The finding that the equilibrium price is invariant to the bequest motive is a consequence of the parametric specifications of the model. However, the central argument remains that the price of capital must be considered a function of both demand *and* supply. Forecasts focusing exclusively on demand are unlikely to yield correct results.

Brooks (2000) develops a stationary OLG-model that takes two assets into account: risky shares and risk less one-period bonds. Agents in the model only live in four periods and investors are rational and forward-looking. Agents are also assumed to grow more risk-averse with age such that their portfolio incorporates more bonds. The absence of a bequest-motive in the model is justified by Bergantino's research that indicates that intergenerational transfers are of minor importance for most households. Brooks finds that changes in the age

[9] Abel (2000) and Brooks (2000) assume that agents have no bequest motive and know exactly when they are to die such that there is zero wealth remaining at the time of death.

distribution may have significant effects on financial markets even if agents are rational and forward-looking. This result is derived from the fact that at any point in time, there are only a limited number of cohorts that can trade. More specifically, Brooks finds that during the boom returns on capital and risk less assets are pushed up. During the bust, this trend is reversed. Furthermore, the return differential between stocks and bonds changes over the demographic shift. Towards the turn of the boom-bust there will be a large cohort of older workers trading with a smaller number of younger investors. This in turn will create excess demand for bonds such that the returns fall relative to the returns on capital. Brooks also investigates the implications of these findings on policy-making. Pay-as-you-go pension schemes fail to reduce cohort-specific asset market effects. Consequently, Brooks' model suggests that governments should vary the supply of debt over time in order to smooth the risk-free rate. In essence, this policy would transfer wealth between generations.

Goyal (2002) argues that most studies linking demography to asset prices and returns are based on the intuition of age causing changes to asset demand, although this correlation is not necessarily tested empirically. To overcome this, Goyal builds an OLG-model and uses the *flow* of capital on US data to analyse the impact of demography on equity returns. His findings support traditional life-cycle models and indicate that outflows from the stock market are positively correlated with changes in the fraction of the population above the age of 65 years. Outflows are negatively correlated with changes in the fraction of the middle age population (45 to 64 years). Goyal predicts that stock market outflows will increase over the coming 25 years but the level of these outflows is not unprecedented. Similar outflows occurred in the latter half of the 1980s. Although there is an important correlation between demography and demand of financial assets, the approaching retirement of the Baby Boomers is no reason for concern.

International Studies

Most models linking demography to asset prices have been calibrated for the US experience. However, the conclusions drawn from these models do not necessarily apply internationally. Some recent papers suggest that the international situation may be different.[10].

Erb *et al*. (1997) test whether expected asset returns in any country is influenced by the average age of the global economy. Their findings indicate that there is little relation between changes in the world average age and the expected returns on equity. To this finding they propose two different interpretations. First, the findings of Bakshi and Chen that average age in the USA has been correlated with expected asset returns cannot be aggregated to an international level. Second, the world capital markets are not as integrated as conventionally presumed. Although global demography appears to have little impact on local markets, Erb *et al*. argues that international demography fills another important function. Demography has a signalling function because it reveals something about the riskiness of investing in a particular nation. High demography (i.e. a rapidly growing population) is associated with an underdeveloped nation and higher risk. Demography can therefore be used by investors as a screening mechanism to determine the riskiness of overseas investments.

In a more recent paper Ang and Maddaloni (2001) use a cross-sectional sample from a number of countries to test whether demographic change affect risk premiums internationally. Their findings indicate that demographic changes do predict risk premiums in an international context, but that the particular relationship between changes in the average age and risk premiums found by Bakshi and Chen is unique for the USA. Ang and Maddaloni argue that

[10] Note, of course, that international differences are not necessarily due to differences in behaviour, but may also be related to methodological issues. Demographic time series data used in the USA are for instance often very short which complicates detection of cohort behaviour.

internationally the average age of the population has no forecasting power. Instead the change in the proportion of retired adults is found to be a significant predictor of asset returns. Unlike the US experience, however, an increase in the retired *proportion* of adults is found to *decrease* risk premiums. In conclusion they argue that their data reveal large cross-sectional variations in demographic experience and expected returns.

Given the difficulty in generalising about international saving rates and attitudes to risk, it appears that more country specific studies are required in order to establish the exact impact of demography on asset prices and returns. Another important argument to be made in this context is that saving behaviour and attitudes to risk will be affected by factors such as the welfare system and tax policy. For instance, a generous welfare system may reduce precautionary savings and lead to greater risk tolerance. As welfare systems and taxation policies differ between nations, so should saving rates and tolerance of risk. Different international saving rates and attitudes to risk have been established by empirical studies. The implication of this finding is rarely considered in the literature linking demography to finance but implies that no general conclusions should be drawn regarding how demographic change may affect asset prices and returns. Guiso *et al*. (2002) provide a study of how household portfolios differ in five different nations. Their findings indicate that there are significant international differences both in attitudes to risk (especially in the wealthier segments of society) and in the participation rates in the stock market.

The Importance of International Capital Markets

One important objection to the meltdown hypothesis is that given the global integration of global capital markets, savings should be diversified internationally. As a result, the negative impact of retiring Baby Boomers should be attenuated, as the international markets would absorb some of the excess capital. For demography to have an impact on asset prices and returns it should therefore be a matter of global demography rather than local. Theoretical models frequently predict that as countries experience what is known as the demographic transition (i.e. falling mortality followed by decreasing birth rates causing an ageing population), capital should move abroad. This is possible because although the pattern of the demographic transition is similar internationally, the timing of it differs across nations. Börsch-Supan *et al*. (2001) investigate how the demographic transition will affect future international capital flows. Methodologically they develop a multi-country OLG model with long-term demographic projections over a 50-year period. The model suggests that capital flows from fast-ageing countries (e.g. Germany, Italy and Japan) to the rest of the world will be substantial in the future.

Some studies are more pessimistic regarding the possibility of 'beating demography' by international asset diversification. MacKellar and Reisen (1998) and Holzmann (2000) argue that investments in non-OECD nations can help at the margin but is unable to solve the demographic problem. Investments in these areas will only slightly attenuate, but not reverse, falling returns on capital. There are several reasons why investments in emerging markets may not solve the ageing problem in the OECD-nations. Blommestein (1998) surveys some of these reasons. The main arguments can be summarised as follow:

(i) Many emerging economies are not yet attractive to invest in because of factors related to political risk, poor financial infrastructure and corporate governance.

(ii) Although emerging economies tend to grow faster than most OECD-nations, this is not necessarily reflected in stock market returns. On average, G7 stock market returns have outperformed those of emerging economies over the past 10 years.

(iii) It is by no means *a priori* clear that portfolio reallocation to emerging markets would improve the financial situation in the OECD countries. In particular, shifting OECD funds *en masse* is likely to cause financial turbulence both in sending and receiving nations.

(iv) Empirically, negative market movements occur much more in parallel than upside ones. Consequently, the benefits of hedging absolute risk by international diversification are reduced.

However, although overseas investments are unlikely to solve the problem of an aging population and falling returns, such a strategy is still desirable for a number of other reasons. In particular, international diversification increases global GDP, raises wage-levels in receiving nations and improves the degree of financial depth in these nations. Furthermore, it is often argued that an open global economy has a positive impact on technological progress. For instance, a more open economy may close technological and knowledge 'gaps' and also stimulate R&D by increasing the total size of the market. Grossman and Helpman (1991) survey some of the ways by which international trade can cause growth through 'spill-over effects'.

Although integrated international capital markets could theoretically undermine the 'meltdown hypothesis', empirical evidence suggests that capital is not in fact very mobile internationally. Feldstein and Horioka (1980) in an important paper showed that national saving rates are highly correlated among OECD nations and that domestic saving is generally invested domestically. This observation has become known as the 'Feldstein-Horioka Puzzle' and implies that capital is imperfectly mobile. The fact that global capital markets do not appear to be perfectly integrated is frequently explained in the literature by the 'home bias' of investors. Over the last few decades technology has reduced the cost of international transactions and international investment procedures have been liberalised. Yet local investors favour local equity to a greater extent than is predicted by standard portfolio theory. There have been a number of proposed explanations to the observed home bias in portfolio choice. French and Poterba (1991) investigate 'explicit barriers' which may prevent international diversification. Such barriers are for instance legal restrictions on international transactions and tax policies which disfavours investments abroad. However, these barriers no longer appear to be large enough to explain asset allocation of domestic investors. Instead, 'home bias' is often attributed to 'implicit barriers'[11]. Implicit barriers apply to factors such as political risk and information asymmetries. Ahearne *et al*. (2001) emphasise the importance of different international accounting standards in explaining asymmetric information and home bias in equity selection. Another explanation is that there are cognitive biases such that local investors are more optimistic about the expected return in the local market. Obstfeld and Rogoff (2000) argue that the cost of international trade in goods (such as transport and various tariffs) can explain not only the equity home bias, but also a number of other empirical puzzles in international macroeconomics (including the 'Feldstein-Horioka Puzzle'). In a recent paper, Portes and Rey (2002) find that geographic distance has a significant negative impact on transaction flows. Intuitively this appear surprising as international diversification is frequently done with a hedging motive and distant markets are often less correlated with the volatility of the local market. However, distance is also associated with costs arising from informational asymmetries that explain this negative relationship. There is a large literature investigating potential explanations to the home bias puzzle. Lewis (1999) surveys some of

[11] See e.g. Kang and Stulz (1997).

the literature on home bias both in portfolio choice and consumption and concludes that no single explanation can account for these observations.

Given the importance of transaction costs in reducing international capital flows, there has recently been done much research on how financial integration may affect international portfolio choice. Martin and Rey (2000) build a three country macroeconomic model to investigate how financial integration affects asset returns. The model predicts that lowering transaction costs will improve diversification opportunities, reduce incompleteness of financial markets and increase asset prices within the integrated area. For countries outside the integrated area, however, the welfare impact is more ambiguous. Portes and Rey (1998) more specifically investigate the implications of the Euro and an integrated European financial market.
Although there is a general consensus that there is still a significant 'home bias' in portfolio choice, it remains to been seen to what extent this will be diminished by increasingly integrated financial markets. Many studies investigating demography and asset returns also emphasise that, in future research, greater attention should be paid to global capital markets as these may significantly weaken the link between local demography and asset prices.

Demography and the Housing Market

There are two main reasons why housing should be considered in a study of demography and financial assets. First, real estate is in many ways a financial asset just like equity in the sense that it is used as a long-term investment and a means of risk-diversification. Secondly, given that housing is often the most substantial component of personal wealth, falling house prices could have very severe implications on aggregate consumption. Consumption normally accounts for 55-75% of GDP[12]. Thus falling consumption could have substantial and negative effects on the macro-economy. Through the mechanism of housing prices, demographic change could therefore have a very important, but indirect, effect on both the economy as a whole and on the performance of financial assets.
There has been substantial empirical work done to test the mechanisms of demography and how they affect housing prices. In an early and influential study that gave rise to an intensive academic debate, Mankiw and Weil (1989) investigate the impact of the Baby Boomers on the US housing market. Empirical studies reveal that the demand for housing rises sharply between the age of 20 and 30. After the age of 30, demand remains relatively flat until the age of 40 after which demand falls by approximately one percent annually. Mankiw and Weil find that changes in demand can have dramatic effects on the real price of housing. More specifically they find that a one percent increase in housing demand will lead to a five percent increase in real price of housing. Empirically, it also appears that the housing market is not rational, nor is it forward-looking. Approximately between the years 1990 and 2010, the Baby Boom cohort has reached the age where demand for housing historically starts to fall. Consequently, Mankiw and Weil argue that in this period demand for housing will grow slower than at any time since the Second World War and that over the period 1990 to 2010 real house prices will fall by 47%.
The study and empirical findings by Mankiw and Weil have been attacked in a number of subsequent articles[13]. Criticisms have been raised both against the methodology used, the interpretation of available data, and Mankiw and Weil's suggestion that the housing market is

[12] See e.g. MacLennan, Muellbauer and Stephens (1998).
[13] See e.g. Engelhardt and Poterba (1991), Hamilton (1991), Hendershott (1991), and Woodward (1991). More recent studies include DiPasquale and Wheaton (1994) and Green and Hendershott (1996).

inefficient. Three common arguments of the opponents of the Mankiw-Weil interpretation are as follow:

(i) Much empirical evidence indicates that the long-run supply of housing is elastic. Consequently, fluctuations in demand for housing (caused by e.g. demographic change) should primarily manifest itself in changing stock of housing and only to a lesser extent in the pricing of housing. A more recent study of demographics and housing in Sweden by Lindh and Malmberg (2001) finds a robust statistical relation between age distribution and residential investment. Lindh and Malmberg fail to find a similarly stable relation between the age distribution and house prices (although a strong correlation is present).

(ii) If there is a relation between demand and housing, this should primarily be seen in rent-levels. Demand for housing should then depend on rental price rather than the asset price of housing.

(iii) Mankiw and Weil misinterpret the demand for housing variable, which leads to a flawed forecast of declining demand and falling real prices of housing.

In conclusion therefore, most empirical studies do find a correlation between demographic structure and demand for housing. Such findings are consistent with a hump shaped life-cycle of housing demand. However, it does appear that the correlation is significantly stronger for residential investment than for housing prices[14]. Given the demographic impact on inflation and interest rates, there is also evidence that demography may have important indirect effects on housing demand working through other macro economic variables. Many studies therefore emphasise the need for a better understanding of the different economic mechanisms through which demography may affect housing.

Demography and the Macro economy

Historically, demography has played a very important role in economic writing as evident in the works by e.g. Malthus and Smith. However, only more recently have there been more systematic attempts to empirically investigate the impact of demography on macro economic variables such as inflation, interest rate and GDP growth. Such variables have, of course, a fundamental impact also on financial markets. It is therefore possible that the indirect effects of demography on finance, working through macroeconomic variables, are of greater importance than the direct effect of aging Baby Boomers. No study has investigated this possibility more closely. Instead literature tends to focus either on demography and macroeconomics, or on a specific age cohort and its impact on financial assets through saving over the life-cycle.

Inflation and the Interest Rate

There are a number of mechanisms through which demography could theoretically influence inflation (and the interest rate). The main mechanisms can briefly be summarised as follow:

(i) Within a traditional IS-LM framework, a change to the saving rate, induced by e.g. the age structure, would shift the IS-curve and consequently influence both aggregate demand and price-level.

(ii) Within a Human Capital model, labour quality may improve with age consequently shifting the AS-curve and thereby reducing inflationary pressure.

[14] Engelhardt and Poterba (1991) find no significant impact of demography on housing prices in Canada in the 1970s. The causes of fluctuating prices in this period are undetermined but potential explanations include changing housing policies (rent control etc.) and the ratio of rental homes.

(iii) Within Solow's framework of economic growth, demography will affect the steady state capital-labour ratio and the productivity of the economy (which could reduce inflationary pressure).
(iv) An older generation is likely to generate more government expenditure (but less tax revenue) that will affect the budget deficit.
(v) An age-induced change in the savings rate can also have an impact on the current account such that the domestic price-level is influenced. Higgins (1998) and Higgins and Williamson (1997) investigate the effect of youth-dependency on international capital flows and the current account.
(vi) An alternative mechanism proposed by Lindh and Malmberg (2000b) is that the age composition may influence the structure and policies of Trade Unions. Implicitly, this would affect the NAIRU. Little research has yet been done on this mechanism.
(vii) Given varying risk aversion over the life cycle, demography may influence the portfolio choice and the velocity of money. Again this may have implications on the inflation.

Whether demographic change actually translates into inflation depends on many other variables and the policy response. However, empirical research indicates that demography often has a very significant effect on macroeconomic variables. In an early paper, Baesel and McMillan (1990) investigate the impact of the Baby Boom generation on a number of macroeconomic variables in post-war USA. They find that demography did influence many macro variables in this period, including the real interest rate and output growth.
A similar approach is taken by Lenehan (1996) who investigates the effect of the Baby Boom on the Australian economy. His findings are similar to those of Baesel and McMillan and confirm that demographic composition is a significant factor in explaining both inflation and real interest in the post-war period. However, Lenehan does not succeed in establishing a significant relationship between demographics and unemployment in Australia. This is explained by the peculiarities of the Australian labour market and policy responses to unemployment in the period.
More recent work on demography and inflation includes Lindh and Malmberg (1998 and 2000b). Using OECD panel data for the period 1960 to 1994, Lindh and Malmberg find a significant correlation between the age structure and inflation. This finding is consistent with the view that a large cohort of net consumers may cause inflation. Given the predictability of future demography, age composition could be a useful tool for forecasting medium to long-term inflation (given more country specific information). In particular, Lindh and Malmberg predict low inflation for most OECD nations over the next decade.

Economic Growth

Much of the work on the links between demography and growth has been done in the context of development economics. The literature since the late 1950s can roughly be divided into the views of the 'population pessimists' and the 'population optimists' (some would consider this a distinction between neo-Malthusians and Smithonians)[15]. The Pessimists argue that high youth dependency ratios in many developing countries reduce capital accumulation and consequently, slow technological progress and economic growth. The Optimists emphasise how a growing population may enable a country to capture economies of scale and also promote technological and institutional reform (notably education). Most of the more recent literature, however, emphasises how the impact of demography on growth varies across the

[15] For a pessimistic interpretation see e.g. Coale and Hoover (1958). For a more optimistic interpretation see e.g. Boserup (1975).

cycle of demographic transition. The demographic transition causes a bulge into the population pyramid. Over time this bulge will move, from being concentrated among the young, to the prime workers and then to the old. Importantly, the young and the old consume more than they generate which reduces output per capita[16]. Population growth therefore has a purely transitional effect on economic growth and what matters is the population structure rather than the absolute levels of each cohort. There is a two-way causality between economic growth and demographic transition. Consequently, it is possible to have a policy induced change of economic or demographic variables that can promote a virtuous cycle of cumulative causation in which demography and economics interact in a mutually reinforcing way. By the same logic it is possible to have persistent poverty traps that have been notorious in for instance many parts of Africa and South Asia. There are various explanations to why a large working age cohort may improve growth. First, this age group saves more causing capital accumulation. Secondly, growth of the working age population may stimulate greater division of labour and technological progress through R&D expenditure[17]. Recent research often subdivides the population to get a better understanding of what segment of the labour force that has the most positive impact on growth. Research indicates that the proportion of the population aged 50 to 64 years contributes the most to growth. Two main explanations have been proposed to this observation. First, it is possible that the accumulated human capital of this age group may improve productivity. Secondly, this age cohort tends to be less mobile than younger workers. Perhaps paradoxically, this may have a positive impact on productivity as workers become more efficient by 'learning by doing' as companies dare trusting older worker with long-term productive projects.

In two empirical studies Bloom *et al*. (1998a and 1999) find that the demographic transition contributed substantially to the 'economic miracle' of East Asia. Very high growth rates in the period of 1965 to 1990 can partly be explained by the fact that the working age population grew much faster than the dependent population. Bloom and Williamson (1998a) estimate that population dynamics account for as much as 1/3 of the observed GDP growth per capita in the period. This suggest that population dynamics may have been the single most important determinant of economic growth in East Asia between 1965 and 1990. Moreover, there is a strong correlation between life expectancy and growth. One explanation to this is that higher life expectancy improves the incentive to save for old age that in turn increases capital accumulation. Given the transitory nature of demographic impact on growth, Bloom and Williamson predict that future demography will depress growth in East Asia but promote it in Southeast and South Asia.

Notoriously slow growth in most parts of Africa has been explained by numerous factors including dependency on a small number of primary exports and outside protectionism. Bloom and Sachs (1998b), however, attribute slow growth to unfavourable geography and the negative impact of the demographic structure. Dependency ratios in Africa are predicted to remain high for decades as the children of today reach childbearing age and as a result, growth rates will remain slow.

Andersson (2001) empirically investigates the influence of age variables on growth in Denmark, Norway, Finland and Sweden. His findings indicate that age structure does have an important effect on economic growth. In particular, prime and middle age agents have a positive effect on growth whereas the retired have a negative. The pattern is similar across Scandinavia but not identical. One main reason for this is different institutional features within each nation. Social security and tax policy, for instance, will affect the way in which the impact of age structure is propagated through the economy and hence also growth.

[16] The same mechanism does, of course, also affect other macro variables such as inflation and interest.
[17] See e.g. Kögel (2001) and Kögel and Prskawetz (2000).

Alternative Mechanisms

Some literature has explored alternative channels through which an aging population can affect the financial markets and the macroeconomic climate at large. Empirically, however, many of these mechanisms remain very difficult to test. Sterling and Waite (1998) argue that people tend to become more conservative as they age and that older people have a higher participation ratio in elections when compared to the young. In the 1990 congressional elections in the USA for instance, more than 70% of those aged 45 years voted. The figure for those aged between 18 and 24 years was less than 40%. The argued implication of this is that an aging population may well lead to more conservative economic policies. This in turn would lead to low inflation and a healthy financial climate[18]. On the other hand, there are other potential difficulties arising from an aging population in the context of political turbulence and international conflict. Sterling and Waite argue that the financial problems in the wake of retiring Baby Boomers may trigger international conflict and political upheavals. Similarly, an aging population may well cause energy shortages that could have negative political and economic consequences. Another potential cause of macro economic shock and political disturbance is related to ethnicity and immigration. In the USA minority groups have significantly higher birth rates than the 'white' population. In 1990, the 'white' share of the population was approximately 75%. By the year 2050 this is expected to fall to roughly 50%. Consequently, the older, primarily white, population will be supported by the younger, primarily ethnic, population. As the Baby Boomers grow older there is also expected to be a labour shortage. To compensate for this there must be an increase in immigration, which again could lead to ethnic tension with negative spillover effects on the economy. Macunovich (1998) investigates the impact of a changing age structure on inequality and relative wage structure in the USA.

Outstanding Questions

There are a number of issues on the links between demography and financial markets that remain unsolved or are subject to controversy. This section will conclude with a brief overview of the main issues and potential topics for future research.

One of the most central issues is saving and its determinants. Why do saving rates differ internationally and what are the determining factors? In this context not only cultural and sociological factors should be explored, but also the role of institutions and fiscal policy. Evidence indicates that precautionary savings are affected by factors such as the extent of provided welfare, but more work is required to further explore the role of institutions in determining saving rates and attitudes to risk. More work is also required on a micro level to gain a better understanding of how portfolio composition and market participation differ both over time (i.e. time effects), and between countries. One important fact, which is rarely mentioned in the literature, is that on an aggregate level very few agents hold positive wealth in equity and bonds at all. Most empirical studies simply aggregate data from the SCF in order to get a profile for each age cohort. More sophisticated methods, such as the application of conditional probabilities, are required in this context. Given the established fact that savings and risk tolerance differ between nations, more country specific studies are needed. Most of the previous work on demography and financial markets has been focused on the American experience. The conclusions drawn from these studies should not necessarily be applied generally or to other countries.

Secondly, how do the investment strategies of institutional investors differ from those of private individuals? Literature has almost exclusively focused on the saving behaviour of

[18] Note, however, that empirically an aging population is associated with higher inflationary pressure. See e.g. Lindh and Malmberg (1998 and 2000b).

individuals as predicted by various life-cycle theories. In reality, institutional investors control roughly half of the outstanding equity in many western markets. Given the size of these institutions, the ability to hedge is much greater than that of an individual investor. On the other hand, an institutional investor faces a different type of liquidity dilemma, as it *has* to exit the market as its clients approach retirement age. Surprisingly little work has been done on how individual and institutional investors differ in their investment strategies. These differences and their implications on financial markets are also topics in need of further research.

Thirdly, to what extent does the global economy undermine the link between demography and financial markets? This is likely to differ between large and small economies, which again highlight the need for country specific investigations. Empirically, an international home bias in portfolio choice has been established in a number of studies. Many explanations have been proposed to this phenomenon but the issue still remains open to debate and in need of further examination. Another question in this context is to what extent more integrated economic areas may reduce the home bias.

Fourthly, what are the mechanisms between demography and macroeconomic variables and to what extent do those mechanisms affect the financial markets? Recently there has been much work done on the impact of demography on the macro economy but very limited research explicitly linking this to finance. More work is needed on this topic as macro economic variables such as inflation and interest have fundamental consequences for the performance of both financial markets and the housing market.

2. Finance and Growth

Background to the Literature

The theoretical underpinnings of the relation between financial development and economic growth can be traced back to the writings of Schumpeter in the early 1900s. Schumpeter argued that the services provided by financial intermediaries were essential for efficient allocations of savings, technological progress and economic development. Since the early 1970s there has been a rapidly growing body of theoretical and empirical literature applicable to the field of finance and growth. Early but influential empirical studies that support the positive correlation between finance and economic growth include Goldsmith (1969), McKinnon (1973) and Shaw (1973). The main policy implication of what has become known as the 'McKinnon-Shaw School' is that government restrictions on the banking sector (such as high reserve requirements and interest rate ceilings) reduces financial development and hence, growth. Liberalisation of the markets is therefore argued to positively affect growth rates. Subsequent theoretical and empirical literature on the links between financial development and growth is extensive. A very useful survey of the literature and the main issues is to be found in Levine (1997). A more recent survey is to be found in Khan and Senhadji (2000).

Mechanisms of Finance and Growth

There are essentially three ways in which financial intermediaries may have a positive impact on economic growth. First, through funnelling savings into investment. Secondly, it may increase the marginal productivity of capital. Thirdly, it can increase the private saving rate and therefore long-term growth. An early interpretation of these mechanisms is to be found in. Hick's 'A Theory of Economic History' (1969). In short, Hicks argued that financial intermediaries that allowed for risk diversification and improved liquidity were crucial causes for the Industrial Revolution in England. The technology applied in the Industrial Revolution had been known for long. However, development and application of these innovations required long-term commitment of capital. This could not have been undertaken unless financial intermediaries had made these investments more liquid. More recent useful interpretations of the mechanisms are to be found in Bencivenga *et al*. (1995) and Pagano (1993). The operations of these mechanisms can briefly be summarised as follow.

1. Funnelling of savings to investment

By connecting saving agents with investors, financial intermediaries facilitate the funnelling of savings to investments. In this process, however, financial intermediaries absorb resources such that investment is less than actual saving. These leakages arise from fees, brokerage commissions and other expenses associated with financial transactions. Notably, transaction fees are the reward to financial intermediaries for a service provided. However, they also reflect X-inefficiencies and imperfect competition within the sector. Typical X-inefficiencies include transaction tax and high reserve requirements. The more efficient the financial market, the less the leakages and consequently, the greater the proportions of savings funnelled into investments leading to economic growth.

2. Efficient capital allocation

Financial intermediaries enable agents to share risk. Through portfolio diversification, the securities market enable investors to share the otherwise uninsurable risk of idiosyncratic

risks[19]. In the absence of banks and securities markets, agents can only insure against idiosyncratic liquidity shocks by investing in assets that can be liquidated quickly. This is potentially inefficient because money is not necessarily invested in projects with high productivity. Instead investment decisions will be determined by the degree of liquidity of the project. In the presence of stock markets on the other hand, agents can buffer idiosyncratic liquidity shocks by selling shares. Through portfolio diversification it is therefore possible to hedge against rate of return risk. Consequently, there is greater willingness to invest in less liquid (but potentially more productive) projects. An alternative interpretation is that firms can increase production by specialising. However, specialisation increases the risk arising from sector demand and supply shocks. If this risk can be shared on the stock market, specialisation can be implemented which will increase productivity and therefore growth. Yet another interpretation is provided by Greenwood and Smith (1997) who argue that specialisation requires more transactions. Because each transaction is associated with a cost, financial intermediaries that lower transaction costs will facilitate specialisation. Some literature has also emphasised the importance of information and management control in improving the allocation of capital. Financial intermediaries tend to have substantial research facilities and arguably greater insight into the market than individual investors. Consequently, these institutions can successfully exploit shocks to the market and invest savings in industries with higher marginal productivity.

3. Effects on saving

The relation between financial markets and savings is theoretically ambiguous and will depend on the agent's attitude to risk. More specifically, if the agent has a utility function with a positive third derivative, then introducing an insurance market will reduce precautionary savings. Similarly, if endowment risk is shared on international capital markets, there will be less precautionary savings. On the other hand, as highlighted by Jacobson *et al*. (1998), development of financial markets may increase the rate of return to savings and therefore boost saving itself. Although the effect on saving is theoretically ambiguous there is empirical evidence indicating that as financial markets are expanded, the level of savings tends to fall. Lindh and Lindström (1997) investigate structural breaks in the financial sector of the seven largest OECD nations and find that breaks typically coincide with downturns in savings. Lindh (2000) studies US data covering the period 1929 to 1996 to find that financial sector expansion seems associated with a decrease in the savings rate.

Empirical and Theoretical Studies

Although there are still unanswered questions, within the academic literature there is now a general consensus regarding the importance of markets and intermediaries in promoting economic growth. This view is confirmed by a number of empirical studies out of which a large number can be attributed to Ross Levine and Levine *et al*.[20] However, for a more cautious interpretation, see for instance Lucas (1988) who emphasises that finance has been

[19] In an interesting paper Acemoglul and Zilibotti (1997) use a growth model with micro-level non-convexities and uncertainty to successfully show how the process of development goes hand in hand with better diversification opportunities and more productive use of funds. They argue that economies at early stages of development are subject to an important element of chance because of their inability to diversify production. What is more, there is a pecuniary externality due to missing financial markets. Because of risk aversion and the difficulties of diversifying idiosyncratic risk, capital accumulation will be slow and potentially productive investments will not be undertaken. Consequently, countries will go through a period of 'primitive accumulation' with a highly variable output before they reach take-off, financial deepening and subsequent steady growth.

[20] See e.g. Levine (1997 and 1998), Beck and Levine (2001) and Beck, Levine and Loayza (1999a and 1999b).

badly overstressed in explaining economic growth. Most empirical investigations survey cross-section data from a large number of countries (frequently up to 80 different nations). Some studies take a more focused geographical approach or attempt country case studies. The case studies, in particular, tend to investigate financial development and economic growth in a more historical context. Rousseau and Wachtel (1998) investigate the strength and timing of the links between the financial and real sectors in the USA, the UK, Canada, Norway and Sweden in the period 1870 to 1929. They find that although the exact nature of the links between finance and growth differ between countries, certain common features of these nations emerge. In particular, financial intermediation appears to increase real output. However, there is little evidence of feedback from output to intermediation. Secondly, increased intensity of intermediation improves real output growth. Consequently, Rousseau and Wachtel conclude that financial intermediation has been a causal factor for economic growth in these nations.

Haber (1991) investigates industrial and capital market developments in Brazil, Mexico and the USA in the period 1830 to 1930. He finds evidence that capital market development affected industrial composition and also macro economic performance. In particular, financial liberalisation improved access to external capital for small firms and consequently, reduced industrial concentration. This in turn had positive implications on industrial productivity. Moreover, like many current research reports, Haber emphasises how politics and legal structure were important determinants of the development of financial intermediaries in these regions.

Cameron *et al*. (1967) study the relationship between the development of banking and the early Industrial Revolution in a number of European countries and Russia and Japan. These case studies rely less on statistical data and methods, but carefully investigate various legal, financial and economic linkages between financial intermediaries and industrial progress. Cameron concludes that especially in Scotland and Japan, but also in England, Belgium, Germany and Russia, the development of a banking system played a very positive role in advancing industry.

A geographically specific study is provided by Gelbard and Pereira (1999) who investigate financial progress in 38 sub-Saharan African countries. Their findings indicate that these countries have generally made good progress in improving and modernising financial systems although substantial improvements are still required. In particular, banks still suffer from a high share of non-performing loans and the interest rate is widely spread (indicating an imperfect market). Gelbard and Pereira also test for the impact of financial development on growth in the region and find that both the level and the change in financial development have an effect on per capita GDP growth.

The Question of Causality

Although there is now consensus that there is a significant correlation between financial development and economic growth, there is still a continuous debate regarding the direction of causality. In other words, does the observed correlation between financial development and growth reflect causality flowing from growth to finance or the other way around? The most common theoretical objections to macro-economic models that predict that finance causes growth are as follow:

(i) It is possible that both financial development and growth could be driven by a common variable. One such variable could for example be the propensity of households in an economy to save. If endogenous savings affect the long-term

growth rate, then it should not come as a surprise that growth and initial financial development are correlated.

(ii) Financial development may predict economic growth merely because financial markets anticipate growth. In such a scenario, financial institutions would lend more to a specific sector simply because they think that that sector is likely to grow. If this is the case, financial development may only be a leading indicator but not a causal factor to growth.

Hardly any one disputes that there are important elements of bi-directionality between finance and growth. However, Robinson (1979) in a classical paper argues that finance to a greater extent is a function of enterprise. In particular: "*There is a general tendency for the supply of finance to move with the demand for it*."[21]

Khan and Senhadji (2000) point out the necessity of taking the important issue of simultaneity bias into account when modelling the relation between financial development and growth. King and Levine (1993b) try to control for simultaneity bias by regressing average future growth on *initial* development. More recent empirical work by for instance Beck, Levine and Loayza (1999a and 1999b) and Beck and Levine (2001) use GMM (generalised methods of moments) techniques to avoid simultaneity bias.

Some studies take a micro-approach to attempt to resolve the causality controversy. Here it is argued that by empirically investigating the theoretical mechanisms through which financial development is expected to affect growth, it should be possible to establish the direction of causality. Jayaratne and Strahan (1996) study the deregulation of bank branch restrictions in the USA in the 1970s. The estimated change in economic growth rates before and after deregulation is compared to growth rates of those states that did not experience reform. Empirical findings show that bank deregulation significantly increased the real, per Capita growth in income and output. 'Financial deepening' is therefore a cause of growth.

Rajan and Zingales (1998) focus their study on different industries and their respective dependence on external finance. They ask whether industries that require a high degree of external capital (such as the Drug and Pharmaceutical sector), develop disproportionately faster in countries with more developed financial markets. They find this to be true, and conclude that financial development has a significant supportive influence on economic growth. Moreover, they suggest that financial development may play a particularly important role in the rise of new firms and consequently, may determine the size and concentration of a specific industry within a nation.

Demirgüç-Kunt and Maksimovic (1998) use a sample of 30 developing and developed countries and firm-level data to establish a positive impact of financial intermediaries on economic growth. They estimate for each firm a predicted rate at which it can grow if it relies only on retained earnings and short-term credit. They successfully show that the proportion of firms that grow faster than the predicted rate is associated with specific features of the legal system, financial market and financial intermediaries. Specifically, firms in nations with active stock markets and well-developed legal systems obtain external capital more easily and consequently, grow faster. There is therefore a causal impact of financial development and economic growth.

The Question of Linearity

Some studies have questioned the linearity in the relationship between finance and growth. Berthelemy and Varoudakis (1996) argue that given the reciprocal interaction between the

[21] Robinson, Joan in The Generalisation of the General Theory and Other Essays, p. 20, The MacMillan Press, London, 1979, 2nd edition.

real and the financial sector, there may be poverty traps preventing financial deepening to take place. Furthermore, it is possible that there is a threshold effect in the relationship between finance and growth. That is, it is possible that nations need to reach a certain level of financial depth before there is a significant positive effect on economic growth. Given this, Berthelemy and Varoudakis argue that policy reform is likely to have very different effects in different countries.

Another aspect of the relation between financial intermediaries and economic growth is the possibility of time lags arising between financial development and economic growth. Empirically, the share of the financial sector in most industrialised nations has doubled over the last decades. Nevertheless, with the exception of the last decade, productivity growth has generally decreased. A tentative explanation to this phenomenon is that the extension of financial markets is associated with fixed costs. These costs are often related to the establishment of new information networks. As a result of the costs, resources are diverted from production to financial services. Consequently, growth temporarily slows down. However, as risk sharing over financial markets favours industrial specialisation, the economy adapts and growth once again resumes. Eventually the benefits of pooling risks will outweigh the cost of once again extending the financial market. As a result, the cycle will be repeated. The theoretical cycle is outlined in Lindh (2000). In an empirical study of the seven largest OECD countries in the period 1960 to 1992, Lindh and Lindström (1997) find evidence of several structural breaks in the financial sector share of GDP. Over time these breaks add up to a major shift in the level of financial share. Furthermore, breaks coincide in time with institutional reform to the financial sector. A selective list of such institutional reforms include in the collapse of the Bretton Woods system and the abolition in important money market instruments (USA, 1973), the Canadian Bank Act (1980) codifying previously informal regulations in response to changes in the financial markets and the similar Banking Act in the UK (1979). In a later paper Jacobson *et al*. (2002) investigates regime shifts in the USA over the period 1948 to 1996. The findings are based on vector auto regressions on quarterly data from the NIPA (National Income and Product Accounts) that allow for Markov switching regimes. The findings support the view that the relation between financial development and economic growth evolves in a stepwise fashion. Once again regime switches are found to coincide with major changes in legislation and financial market structure in the USA.

Banks versus Markets

Empirical literature has recently returned to the old debate regarding the relative merits of bank-based financial systems (notably in Germany and Japan) versus a market-based system (such as in the UK and the USA). Advocates of a bank-based system argue that[22]:(i) within a liquid market-based system, information is quickly revealed to investors at large which creates a free-riding problem and potentially under-investment in accumulating new information; (ii) small investors are unable to exercise pressure on management, nor are they able to exert corporate control; (iii) liquid markets enable shareholders to simply sell shares rather than coordinate pressure on managers and thereby improve efficiency. These market failures lead to an inefficient allocation of savings and thus inhibit growth. Banks on the other hand, primarily through long-term relations with respective clients, tend to reduce these market failures and hence improve efficient allocations. Proponents of a market-based financial system focus their critique on the weaknesses of a bank-based system[23]. Typical

[22] See e.g. Stiglitz (1985) and Bhide (1993).
[23] See e.g. Weinstein and Yafeh (1998), and Black and Moersch (1998).

arguments include: (i) market-based systems deliver a more extensive and flexible set of financial instruments than the standardised tools provided by banks, (ii) shareholders have little control over bank management who control both the bank itself but also indirectly (through provision of capital) other firms and (iii), banks tend to favour conservative financial advice and also demand large fees that reduce profit and inhibit incentives of firms to develop alternative products. In particular, there has been extensive debate regarding to what extent financial intermediaries can exert corporate control such that managers run the company in the best interest of the owners. Shleifer and Vishny (1997) provide a useful survey of this literature.

Some of the most recent empirical literature has attempted to isolate the impact of markets and banks on economic growth in order to determine their relative merits. Investigations of the independent impact of banks and markets have been empirically difficult, however, as measurements of stock market development for a twenty-year period is only available for about 40 nations[24]. Arestis *et al*. (2001) also point out that empirical studies of stock markets, banks and economic growth often suffer from many econometric weaknesses. In particular, they argue that the frequent use of cross-country studies is not necessarily useful as this technique has a tendency to 'average-out' results. To avoid this, Arestis *et al*. use a time-series approach but consequently, because of lack of long time-series data, their study is confined to five developed economies (Germany, the USA, Japan, the UK and France). Their findings indicate that although development of both stock markets and the banking sector improve growth, the impact of the banking sector seems to be greater than that of the stock market. More specifically, they estimate that the positive impact of stock markets is only 1/7 to 1/3 of the positive impact of banks. However, as pointed out by Beck and Levine (2001) the sample size in this study is too narrow to allow for firm conclusions.
Levine (1997) suggests that it is not necessarily banks or markets, but banks *and* markets that together have a positive impact on growth because they provide complementary services. Similar conclusions are drawn by for instance Huybens and Smith (1999) and Demirgüç-Kunt and Levine (2001). Rousseau and Wachtel (2000) use a difference panel estimator to show that indeed *both* the banking sector and stock market development can explain subsequent economic growth (even when controlling for reverse causality). Beck and Levine (2001) use a panel data set for 1976-98 and apply GMM techniques to investigate the respective impact of stock markets and banking development in 40 countries. Their findings indicate that both markets and banks are important for growth and enter jointly significant in the model. However, there are some combinations of control variables in which only bank development or stock market liquidity comes out significantly.

Measurements of Financial Depth

Another unresolved controversy, which has not received as much attention as the causality and bank versus market dispute, is how exactly to define and measure financial 'depth' within a nation. Traditionally, financial depth is measured by investigating the size of the financial intermediary sector relative to general economic activity[25]. There is no general consensus, however, regarding exactly what constitutes the financial intermediary sector and how this should be measured. Most of the early studies use narrow monetary aggregates such as M1 and M2 as measurements, mainly as these measures are widely available. As emphasised by Khan and Senhadji (2000), however, narrow monetary measures are not necessarily adequate to estimate financial development. The main reason for this is that these measurements to a

[24] See Beck and Levine (2001).
[25] See e.g. Goldsmith (1969).

greater extent indicate the ability of the financial system to provide transaction services than the ability to channel funds from savers to borrowers. In particular, nations with underdeveloped financial systems may have a high ratio of liquid money to GDP because of the absence of viable alternatives of saving. Many of the more recent studies use credit to the private sector to measure financial intermediation in order to more accurately estimate the channelling of funds to the non-public sector. The weakness of this approach, however, is that it only reflects development in the banking sector but excludes the stock and bond markets. Furthermore, the availability of long time series data for stock and bond markets is very limited. Although not as controversial as the causality and bank versus market debates, there has yet to emerge a general consensus on how to best measure financial depth.

The Determinants of Finance

Given the now established view that financial intermediaries do affect long-term economic growth, there is currently a growing body of literature investigating what in turn determines financial development. There are essentially three established theories regarding the historical determinants of financial development. These are:

(i) The law and finance theory
(ii) The dynamic law and finance theory
(iii) The politics and finance theory.

The law and finance theory highlights how different legal traditions to different degrees emphasise the rights of the individual investor vis-à-vis the state and how this has implications on the financial system. The dynamic law and finance theory accepts the view expressed by the law and finance theory but also emphasises how legal traditions differ in their abilities to adapt to changing conditions. The politics and finance view emphasises how politics influences the development of institutions within society (including financial institutions) and argues that legal influences are of secondary importance in determining the institutional landscape. Institutions and policies will be shaped according to the needs of the social group who is in power. Not surprisingly, the most prominent exponent of the politics and finance view was Karl Marx.
Beck *et al*. (2001) survey some of the literature on the determinants of financial institutions and argue that the empirical results are most consistent with theories that stress the importance of legal structures.

Much of the recent literature on legal origin and financial development stems from Harvard and Chicago economists La Porta, Lopez-de-Silanes, Schleifer and Vishny[26]. They argue that since contractual agreements form the basis for financial activities, legal systems that protect investors and enforce legal contracts are more efficient in encouraging financial development and consequently, economic growth. More specifically, they find that common law countries have the strongest, and French civil law countries the weakest protection over investors. German and Scandinavian countries are found to be located in the middle. Furthermore, they suggest that whether investors are given sufficient legal protection or not may be determined by the level of 'trust' within a nation ('trust' being defined as the ability to successfully cooperate). They proceed to empirically 'test' their hypothesis of trust using the World Values Survey and argue that countries dominated by religions with strong hierarchical elements have less 'trust' and worse legal institutions. Consequently, these nations tend to have less

[26] See La Porta *et al*. (1997, 98, 99 and 2000).

developed financial markets. This in turn has negative implications on growth. In conclusion they argue that a legal approach is a more fruitful way to understand corporate governance and reform than the conventional distinction between a banking-based financial systems versus a market system.

Pistor *et al*. (2000), in an empirical extension of La Porta *et al*., investigate how legal change in the protection of shareholders and creditors in transition economies has affected the propensity of firms to raise external capital. Their findings suggest that legal reforms in this region have not evolved in response to specific challenges in the transition process. Rather legal reforms have largely been driven by external advice and the desire to rapidly catch up with the west. Consequently, there is a formally well developed legal system but persistent absence of affective legal institutions that prevents financial depth to occur. In this argument they draw attention to the fact that legal systems that are implemented on an *ad hoc* basis do not necessarily generate the desired financial development and growth.

Other empirical investigations on the relation between legal aspects and financial development include Levine (1998 and 1999) and Barth *et al*. (2000). Barth *et al*. (2000) reports cross-country data on commercial bank regulation and owner in more than 60 countries and evaluate potential links with financial performance and stability. Interestingly, they find no reliable statistical relationship between regulatory restrictions on the ability of commercial banks to engage in securities, insurance and real estate and: (i) the level of banking development, (ii) non-bank financial intermediary development and (iii) the degree of industrial development. However, they do find that countries with regulations that inhibit the ability of banks to engage in securities underwriting, brokering and dealing tend to have more fragile financial systems with higher probability of a financial crisis. Furthermore, in contradiction to common political arguments, restrictions on mixing banking and commercial activities are also associated with financial fragility, not with less. The operating mechanism between legal structure and growth is not therefore financial deepening, but the potential negative implications of financial fragility on growth.

Outstanding Questions

That financial development has a positive effect on economic growth is now generally acknowledged in the literature. As outlined in this paper, three main topics remain, at least partly, unresolved. First, although there appear to be strong elements of bi-directionality in the link between financial development and growth, more work is required for a better understanding of the direction of causality and the nature of linearity in this relationship. Secondly, the bank versus markets debate is still ongoing although evidence indicates that the mechanisms of these two institutions may in fact satisfy different functions. Thirdly, there is not yet consensus regarding how financial depth is best measured. Lack of reliable data and sufficiently long time series are important obstacles in this context.

Recent work has turned to the determinants of finance itself. It is generally acknowledged that protection of creditors and appropriate corporate governance is of great importance but more work is needed on how to design successful reforms. Another issue in need of more empirical work is how stock market volatility may affect growth, and to what extent this may diminish the positive impact of financial markets[27]. Hernández and Schmidt-Hebbel (2001) survey some of the literature on financial development, economic growth and the likelihood of boom-bust cycles and banking crises. There is a general theoretical understanding of the various ways in which financial development may cause growth. However, the relative importance of different mechanisms remains disputed. Is growth primarily caused by more

[27] See e.g. Arestis *et al*. (2001).

productive investments or higher saving rates, and what exactly are the features of financial intermediaries that spur growth? Some empirical work for instance suggests that it is not the actual size of the stock market that matters for growth, but the *intensity* of activity[28]. More work is therefore required to disentangle the different mechanisms and the exact nature of the link between financial institutions and growth. More work is also required on to what extent international financial institutions can compensate for poor domestic financial infrastructure in promoting growth. Perhaps a fruitful path of future work would be closer co-operation between economists and economic historians. Few empirical studies on finance and growth in the developing world acknowledge the important work done in a more historical context. Yet many historical studies, although often plagued by the lack of reliable data, have confirmed what econometric models indicate: that finance matters for growth.

[28] See e.g. Levine and Zervos (1998).

3. Pension Reform, Financial Markets and Growth

One potential link between demography, finance and economic growth runs through reform of pension systems. Many countries have recently reformed, or are in the process of reforming, their pension systems from a pay-as-you-go system (sometimes referred to as Pillar 1) to a decentralised system where contributions are mandatory and defined but managed by private fund mangers (sometimes referred to as Pillar 2). The relative merits of a pay-as-you-go system versus decentralised systems are beyond the scope of this paper. However, there is empirical evidence that suggests that introducing private pension forms improves financial depth and through this mechanism, also economic growth. Demography, through the mechanism of pension reform, could in this way provide a direct link to financial markets and growth. Although the literature on the merits of Pillar 1 versus Pillar 2 is extensive, more specific literature on the link to financial development and growth is still limited. Most literature in this area focuses on the Latin American experience and in particular, on Chile[29].

Gray and Weig (1999) provide a comprehensive survey of some of the main issues and argue that given the volatility of many emerging markets, countries with underdeveloped financial systems should wait with introducing a Pillar 2 system. Holzmann (1997) argue that legislative reforms together with the pension reform programme of 1981 contributed significantly to the development of financial markets in Chile. More specifically, it lead to a more diverse menu of investment instruments and a more competitive and sophisticated financial system. Holzmann estimates that financial market development contributed between 0.9 to 2.1 percentage points to economic growth. The impact on the private saving rate, however, is found to be negative. Corsetti and Schmidt-Hebbel (1995) on the other hand, suggest that the 1981 reform could be contributing to a private saving boom in Chile. Cifuentes (2000) further explores the effect of pension reform on wealth accumulation, welfare and precautionary savings.

Vittas (1999 and 2000) surveys some of the preconditions and likely benefits of pension reform. He emphasises that although pension reform carries many positive externalities, the primary objective for reform should not be to induce financial development but to provide adequate and sustainable benefits. Reform to a Pillar 2 system requires first, a small core of sound, prudent and efficient financial institutions and secondly, maintenance of macroeconomic stability and an adequate legal system. Institutional investors are likely to improve financial depth by stimulating financial innovation, enhance transparency and corporate governance. However, for these benefits to materialise, institutional investors need to attain a critical mass in ownership in order to exert pressure on corporations. The exact magnitude of the critical mass is difficult to define but is unlikely to be attained until institutional investors hold around 20% of outstanding equity in a market[30]. There is another important benefit of large domestic institutional investors in that they improve market stability and reduce price volatility in emerging markets. Empirically, the greater insulation of the Chilean and South African equity markets from the adverse impact of the international financial crisis of 1998 is partly attributable to the strong presence of significant domestic institutional investor. Another issue of importance is the degree of pluralistic structure of institutional investors. A pluralistic structure is more likely to stimulate competition and innovation. The number of players differs significantly internationally. At one end of the spectrum come the UK and the US with hundreds, if not thousands, of pension funds whereas most countries in Central Europe and Latin America accommodate between 5 and 30 pension

[29] Schmidt-Hebbel (1995) investigates the impact of the pension reform in Columbia in 1994.

[30] UK and US institutional investors own approximately 50% of their respective markets. The corresponding figure for Chilean institutional investors is roughly 10 to 12%.

funds. Even though pension reform is likely to improve financial depth, Vittas argues that pension funds are neither necessary nor sufficient for the development of capital markets. Other factors such as advancement of technology, deregulations, foreign direct investments and global economic integration may be of equal importance. Pension reforms are nevertheless an important player in 'symbiotic finance' where simultaneous and mutually reinforcing presence of different elements creates a positive spiral. In this way, pension funds may support VC-firms which in turn finance new firms leading to technological progress and subsequent economic growth.

Davis (2001) highlights how institutional investors generate a more stable financial climate for a number of reasons. First, institutional investors speed up the adjustment process of asset prices to fundamentals such that they should only entail price volatility to the extent that fundamentals themselves are volatile. Secondly, the global nature of large institutional investors should enhance cross-border portfolio investments and thereby improve the efficiency of global capital markets. Thirdly, the diversity in types and sizes of institutional investors is likely to be stabilising for financial markets. Davis and Steil (2001) provide a recent and very comprehensive study of both the background and implications of institutional investors. However, there is also the danger that institutional investors imitate one's strategies for reasons related to agency and information problems between the investors and asset managers. Historically, this behaviour has often been noted. If this is the case, there may be a significant risk of institutional 'herding' that could cause both bubbles and severe downturns to the financial markets[31]. Herd behaviour does not only affect price volatility, but may also cause prolonged problems of market liquidity and issuance when assets are shifted simultaneously. The risk tends to be the greatest for specific markets that rely on a narrow investor base (such as 'junk bonds'). In the context of herd behaviour, pension reform and a more prominent role of institutional investors may therefore prove a threat to financial markets and indirectly, to growth. Bikhchandani and Sharma (2000) provide an overview of recent theoretical and empirical research on herd behaviour in financial markets.

[31] The financial crises in Russia and South East Asia are often partly attributed to herd behaviour by institutional investors, so is the stock market crash of 1987.

References

Abel, Andrew B. (2001), 'Will Bequests Attenuate the Predicted Meltdown in Stock Prices when Baby Boomers Retire?', The Wharton School of the University of Pennsylvania, Mimeo

Abel, Andrew B. (2000), 'The Effects of a Baby Boom on Stock Prices and Capital Accumulation in the Presence of Social Security', The Wharton School of the University of Pennsylvania, Mimeo

Acemoglu, Daron and Zilibotti, Fabrizio. (1997), 'Was Prometheus Unbound by Chance? Risk, Diversification, and Growth', *Journal of Political Economy*, **105**, 709-751

Ahearne, Alan G.; Griever, William L. and Warnock, Francis E. (2001), ' Information Costs and Home Bias: An Analysis of U.S. Holdings of Foreign Equity', *International Finance Discussion Papers*, No. 691, Board of Governors of the Federal Reserve System

Andersson, Björn. (2001), 'Scandinavian Evidence on Growth and Age Structure', *Regional Studies*, **35**, 377-390

Ang, Andrew and Maddaloni, Angela. (2001), 'Do Demographic Changes Affect Risk Premiums? Evidence from International Data', Working Paper, Columbia University

Arestis, Philip; Demetriades, Panicos O. and Luintel, Kul B. (2001), 'Financial Development and Economic Growth: The Role of Stock Markets', *Journal of Money, Credit, and Banking*, **33**, 16-41

Auerbach, Alan J. and Herrmann, Heinz. (Ed.), (2002), 'Ageing, Financial Markets and Monetary Policy', Springer-Verlag, Berlin, Heidelberg and New York

Baesel, Jerome B. and McMillan, Henry M. (1990), 'The Macroeconomic Impact of the Baby Boom Generation', *Journal of Macroeconomics*, **12**, 167-195

Bakshi, Gurdip S. and Chen, Zhiwu. (1994), 'Baby Boom, Population Aging, and Capital Markets', *The Journal of Business*, **67**, 165-202

Barth, James; Caprio, Gerard and Levine, Ross. (2000), 'Banking Systems around the Globe: Do Regulation and Ownership Affect the Performance and Stability?', *Policy Research Working Paper,* No. 2325, World Bank, Washington DC

Beck, Thorsten; Demirgüç-Kunt, Asli and Levine, Ross. (2001), 'Law, Politics, and Finance', *Policy Research Working Paper*, No. 2585, World Bank, Washington DC

Beck, Thorsten and Levine, Ross. (2001). 'Stock Markets, Banks, and Growth. Correlation or Causality?', *Policy Research Working Paper*, No. 2670, World Bank, Washington DC

Beck, Thorsten; Levine, Ross and Loayza, Norman. (1999a), 'Finance and the Sources of Growth', *Policy Research Working Paper*, No. 2057, World Bank, Washington DC

Beck, Thorsten; Levine, Ross and Loayza, Norman. (1999b), 'Financial Intermediation and Growth: Causality and Causes', *Policy Research Working Paper*, No. 2059, World Bank, Washington DC

Bencivenga, Valerie R.; Smith, Bruce D. and Starr, Ross M. (1995), 'Transaction Costs, Technological Choice, and Endogenous Growth', *Journal of Economic Theory*, **67**, 153-177

Bergantino, Steven, M. (1998), 'Life Cycle Investment Behaviour, Demographics, and Asset Prices', PhD Dissertation, MIT, Cambridge, MA

Bernheim, Douglas B. (1999), 'Taxation and Saving', Stanford University, Mimeo,

Berthelemy, J.C. and Varoudakis A. (1996), 'Economic Growth, Convergence Clubs and the Role of Financial Development', *Oxford Economic Papers*, **48**, 300-328

Bhide, Amar. (1993), 'The Hidden Cost of Stock Market Liquidity', *Journal of Financial Economics*, **34**, 31-51

Bikhchandani, Sushil and Sharma, Sunil. (2000), 'Herd Behaviour in Financial Markets: A Review', *IMF Working Paper*, No. 00/48, International Monetary Fund, Washington DC

Black, Stanley and Moersch, Mathias. (Ed.), (1998), 'Competition and Convergence in Financial Markets: The German and Anglo-American Models', North Holland Press, New York

Blommestein, Hans and Funke, Norbert. (Ed.), (1998), 'Institutional Investors in the New Financial Landscape', OECD Proceedings, Paris

Bloom, David E.; Canning, David and Malaney, Pia N. (1999), 'Demographic Change and Economic Growth in Asia' *CID Working Paper*, No. 15, Center for International Development at Harvard University, Cambridge, MA

Bloom, David E. and Sachs, Jeffrey D. (1998), 'Geography, Demography, and Economic Growth in Africa', *Brookings Papers on Economic Activity*, **2**, 207-295

Bloom, David E. and Williamson, Jeffrey G. (1998), 'Demographic Transition and Economic Miracles in Emerging Asia', *World Bank Economic Review*, September, 419-455

Boserup, Ester. (1975), 'The Impact of Population Growth on Agricultural Output', *The Quarterly Journal of Economics,* **89**, 257-275

Börsch-Supan, Axel; Ludwig, Alexander and Winter, Joachim. (2001), 'Aging and International Capital Flows', *Bundesbank Conference Paper*, Eltville, Germany (May 4-5, 2001)

Brooks, Robin. (2000), 'What will Happen to Financial Markets when the Baby Boomers Retire?', *IMF Working Paper,* No. 00/18, International Monetary Fund, Washington DC

Brugiavini, Agar. (2001), 'Aging and Saving in Europe', *Bundesbank Conference Paper*, Eltville, Germany (May 4-5, 2001)

Cameron, Rondo. (Ed.) (1967) 'Banking in the early stages of industrialisation: A study in comparative economic history', New York. Oxford University Press

Campbell, John Y. (2001), 'A Comment on James M. Poterba's 'Demographic Structure and Asset Returns'', *The Review of Economics and Statistics*, **83**, 585-588

Campbell, John Y. (2000), 'Asset Pricing at the Millennium', *The Journal of Finance*, **55**, 1515-1567

Campbell, John Y. and Cochrane, John H. (1999), 'By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behaviour', *Journal of Political Economy*, **107**, 205-251

Cifuentes, Rodrigo. (2000), 'How Does Pension Reform Affect Savings and Welfare?', *Central Bank of Chile Working Papers*, No. 80

Coale, Ausley J. and Hoover, Edgar M. (1958), 'Population Growth and Economic Development in Low Income Countries: a Case Study of India's Prospects', Princeton University Press, Princeton, New Jersey

Colvin, Geoffrey. (1997), 'How to Beat the Boomer Rush', *Fortune*, August 18, 59-63

Corsetti, Giancarlo and Schmidt-Hebbel, Klaus. (1995), 'Pension Reform and Growth', *Policy Research Working Paper*, No. 1471, World Bank, Washington DC

Davis, Philip E. (2001), 'Ageing and Financial Stability', *Bundesbank Conference Paper*, Frankfurt, Germany (May 4-5, 2001)

Davis, Philip E. (2000), 'Implications of the Growth of Institutional Investors for the Financial Sectors', *Discussion Paper PI-0001*, The Pension Institute, Birkbeck College, University of London

Davis, Philip E. and Steil, Benn. (2001), 'Institutional Investors', MIT Press, Cambridge, MA and London, England

Demetriades, Panicos and Hussein, Khaled. (1996), 'Does Financial Development Cause Economic Growth? Time Series Data from 16 Countries', *Journal of Development Economics*, **51**, 387-409

Demirgüç-Kunt, Asli and Levine, Ross. (Ed.), (2001), 'Financial Structures and Economic Growth. A Cross-Country Comparison of Banks, Markets, and Development', MIT Press, Cambridge, MA and London, England

Demirgüç-Kunt, Asli and Maksimovic, Vojislav. (1998), 'Law, Finance and Firm Growth', *The Journal of Finance*, **53**, 2107-2137

DiPasquale, Denise and Wheaton, William C. (1994), 'Housing Market Dynamics and the Future of Housing Prices', *Journal of Urban Economics*, **35**, 1-27

Engelhardt, Gary V. and Poterba, James M. (1991), 'House Prices and Demographic Change: Canadian Evidence', *Regional Science of Urban Economics*, **21**, 539-546

Erb, Claude F; Campbell, Harvey R. and Tadas, Viskanta E. (1997), 'Demographics and International Investments', *Financial Analyst Journal*, July/August, 14-28

Feldstein, Martin and Horioka, Charles. (1980), 'Domestic Savings and International Capital Flows', *The Economic Journal*, **90**, 314-329

French, Kenneth and Poterba, James M. (1991), 'Investor Diversification and International Equity Markets', *The American Economic Review*, **81**, 222-226

Gelbard, Enrique and Pereira Leite, Sergio. (1999), 'Measuring Financial Development in Sub-Saharan Africa', *IMF Working Paper,* No. 99/105, International Monetary Fund, Washington DC

Gokhale, Jagadeesh; Kotlikoff, Laurence J. and Sabelhaus, John. (1996), 'Understanding the Postwar Decline in US Saving: A Cohort Analysis'*, NBER Working Paper,* No. 5571, National Bureau of Economic Research, Cambridge, MA

Goldsmith, Raymond W. (1969), 'Financial Structure and Development', Yale University Press, New York and London

Goyal, Amit. (2002), 'Demographics, Stock Market Flows, and Stock Returns', Anderson Graduate School of Management, UCLA, Mimeo

Gray, Clive and Weig, David. (1999), 'Pension System Issues and their Relation to Economic Growth', CAER II, *Discussion Paper*, No. 41, Center for International Development at Harvard University, Cambridge, MA

Green, Richard and Hendershott, Patric H. (1996), 'Age, Housing Demand, and Real House Prices', *Regional Science and Urban Economics*, **26**, 465-480

Greenwood, Jeremy and Smith, Bruce D. (1997), 'Financial Markets in Development and the Development of Financial Markets', *Journal of Economic Dynamics and Control*, **21**, 145-181

Grossman, Gene M. and Helpman, Elhanan. (1991), 'Trade, Knowledge Spillovers, and Growth', *European Economic Review*, **35**, 517-526

Guiso, Luigi; Halassos, Michael and Jappelli, Tullio. (Ed.), (2002), 'Household Portfolios', The MIT Press, Cambridge, Massachusetts and London, England

Haber, Stephen H. (1991), 'Industrial Concentration and the Capital Markets: A Comparative Study of Brazil, Mexico and the United States, 1830-1930', *Journal of Economic History*, **51**, 559-580

Hamilton, Bruce W. (1991), 'The Baby Boom, the Baby Bust, and the Housing Market: A Second Look', *Regional Science of Urban Economics*, **21**, 547-552

Heaton, John and Lucas, Deborah. (2000a), 'Portfolio Choice and Asset Prices: The Importance of Entrepreneurial Risk', *The Journal of Finance*, **55**, 1163-1198

Heaton, John and Lucas, Deborah. (2000b), 'Portfolio Choice in the Presence of Background Risk', *The Economic Journal*, **110**, 1-26

Heaton, John and Lucas, Deborah. (1999), 'Stock Prices and Fundamentals', *NBER Macroeconomics Annual*, 213-242, MIT Press, Cambridge. MA and London, England

Hendershott, Patric H. (1991), 'Are Real House Prices Likely to Decline by 47 Percent?', *Regional Science of Urban Economics*, **21**, 553-563

Hernández, Leonardo and Schmidt-Hebbel, Klaus. (2001), 'Banking, Financial Integration, and International Crises: An Overview', *Central Bank of Chile Working Papers*, No. 100

Hicks, J. R. (1969), 'A Theory of Economic History', Clarendon Press, Oxford

Higgins, Matthew. (1998), 'Demography, National Savings, and International Capital Flows', *International Economic Review*, **39**, 343-369

Higgins, Matthew and Williamson, Jeffrey G. (1997), 'Age Structure Dynamics and Dependence on Foreign Capital', *Population and Development Review*, **23**, 261-293

Holland, Steven A. (1991), 'The Baby Boom and the Housing Market: Another Look at the Evidence', *Regional Science of Urban Economics*, **21**, 565-571

Holzmann, Robert. (2000), 'Can Investments in Emerging Markets Help to Solve the Aging Problem?', *The World Bank Working Papers*, No. 23070, World Bank, Washington DC

Holzmann, Robert. (1996), 'Pension Reform, Financial Market Development and Economic Growth: Preliminary Evidence from Chile', *IMF Working Papers*, No. 96/94, International Monetary Fund, Washington DC

Huybens, Elisabeth and Smith, Bruce D. (1999), 'Inflation, Financial Markets, and Long-Run Real Activity', *Journal of Monetary Economics*, **43**, 283-315

Jacobson, Tor; Lindh, Thomas and Warne, Anders. (2002), 'Growth, Saving, Financial Markets, and Markov Switching Regimes', *Studies in Nonlinear Dynamics and Econometrics*, January, **5**, 241-259

Jagannathan, Ravi and Kocherlakota, R. Narayana, (1996), 'Why Should Older People Invest Less in Stocks than Younger People?', *Federal Reserve Bank of Minneapolis Quarterly Review*, No. 3, (Summer)

Jagannathan, Ravi; McGrattan, Ellen R. and Scherbina, Anna. (2001), 'The Declining US Equity Premium', *NBER Working Paper*, No. 8172, Cambridge, MA

Jayaratne, Jith and Strahan, Philip. (1996), 'The Finance-Growth Nexus: Evidence from Bank-Branch Deregulation' *The Quarterly Journal of Economics*, **111**, 639-670

Kang, Jun-Koo and Stulz, René M. (1997), 'Why is there a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan', *Journal of Financial Economics*, **46**, 3-28

Khan, Moshin, S. and Senhadji, Abdelhak S. (2000), 'Financial Development and Economic Growth: An Overview', *IMF Working Paper,* No. 00/209, International Monetary Fund, Washington DC

King, Robert G. and Levine, Ross. (1993a), 'Finance and Growth: Schumpeter Might Be Right', *The Quarterly Journal of Economics*, **108**, 717-733

King, Robert G. and Levine, Ross. (1993b), 'Finance, Entrepreneurship, and Growth: Theory and Evidence', *Journal of Monetary Economics*, **32**, 513-542

Kögel, Tomas. (2001), 'Youth Dependency and Total Factor Productivity', *MPIDR Working Paper*, No. 2001/030, Max Planck Institute for Demographic Research, Rostock, Germany

Kögel, Tomas and Prskawetz, Alexia. (2000), 'Agricultural Productivity Growth and Escape from the Malthusian Trap', *MPIDR Working Paper*, No. 2000/002, Max Planck Institute for Demographic Research, Rostock, Germany

La Porta, Rafael; Lopez-de-Silanes, Florencio; Shleifer, Andrei and Vishny, Robert W. (2000), 'Investor Protection and Corporate Governance', *Journal of Financial Economics*, **58**, 3-27

La Porta, Rafael; Lopez-de-Silanes, Florencio; Shleifer, Andrei and Vishny, Robert W. (1999), 'The Quality of Government', *Journal of Law, Economics, and Organization*, **15**, 222-279

La Porta, Rafael; Lopez-de-Silanes, Florencio; Shleifer, Andrei and Vishny, Robert W. (1998), ' Law and Finance', *Journal of Political Economy*, **106**, 1113-1155

La Porta, Rafael; Lopez-de-Silanes, Florencio; Shleifer, Andrei and Vishny, Robert W. (1997a), ' Legal Determinants of External Finance', *The Journal of Finance*, **52**, 1131-1150

La Porta, Rafael; Lopez-de-Silanes, Florencio; Shleifer, Andrei and Vishny, Robert W. (1997b), 'Trust in Large Organizations', *The American Economic Review*, **87**, Papers and Proceedings May 1997, 333-338

Lenehan, A.J. (1996), 'The Macroeconomic Effects of the Post-war Baby Boom: Evidence from Australia', *Journal of Macroeconomics*, **18**, 155-169

Levine, Ross. (1999), 'Law, Finance, and Economic Growth', *Journal of Financial Intermediation*, **8**, 8-35

Levine, Ross. (1998), ' The Legal Environment, Banks and Long-Run Economic Growth: Comment', *Journal of Money, Credit, and Banking*, **30**, 596-620

Levine, Ross. (1997),'Financial Development and Economic Growth: Views and Agenda', *Journal of Economic Literature*, **35**, 688-726

Levine, Ross and Zervos, Sara. (1998), 'Stock Markets, Banks, and Economic Growth', *The American Economic Review*, **88**, 537-558

Lewis, Karen K. (1999), 'Trying to Explain Home Bias in Equities and Consumption', *Journal of Economic Literature*, **37**, 571-608

Lindh, Thomas. (2000), 'Short-Run Costs of Financial Market Development in Industrialized Economies', *Eastern Economic Journal*, **26**, 221-239

Lindh, Thomas and Lindström, T. (1997), 'Structural Breaks in the Financial Sector Share, Savings and GDP Growth in OECD: 1960-1992', *Applied Economics*, **29**, 33-41

Lindh, Thomas and Malmberg, Bo. (2001) 'Demography and Housing Demand-What Can We Learn from Residential Construction Data?', Manuscript, Institute for Housing Research, Uppsala University

Lindh, Thomas and Malmberg, Bo. (2000a), '40-talisternas uttåg- en ESO-rapport om 2000-talets demografiska utmaningar', Regeringskansliet, Finansdepartementet

Lindh, Thomas and Malmberg, Bo. (2000b), 'Can Age Structure Forecast Inflation Trends?', *Journal of Economics and Business*, **52**, 31-49

Lindh, Thomas and Malmberg, Bo. (2000c), 'Population Change and Economic Growth in the Western World, 1850-1990', Working Paper, Uppsala University

Lindh, Thomas and Malmberg, Bo. (2000d). 'Swedish Post-War Economic Development -The Role of Age Structure', Working Paper, Uppsala University

Lindh, Thomas and Malmberg, Bo. (1998), 'Age Structure and Inflation-A Wicksellian Interpretation of the OECD Data', *Journal of Economic Behaviour and Organization*, **36**, 19-37

Lucas, Robert E. Jr. (1988), 'On the Mechanics of Economic Development', *Journal of Monetary Economics*, **22**, 3-42

MacKellar, Landis; Ermolieva, Tatiana and Reisen, Helmut. (2001), 'Globalization, Social Security, and Intergenerational Transfers', IIASA Report November 2001,

MacKellar, Landis and Reisen, Helmut. (1998), 'A Simulation Model of Global Pension Investment', OECD Development Centre, *Technical Papers*, No. 137

MacLennan, Duncan; Muellbauer, John and Stephens, Mark. (1998), 'Asymmetries in Housing and Financial Market Institutions and EMU', *Oxford Review of Economic Policy*, **14**, (Autumn), 54-80

Macunovich, Diane, J. (1998), 'Relative Cohort Size and Inequality in the United States', *The American Economic Review*, **88**, 259-264

Mankiw, Gregory N. and Weil, David N. (1989), 'The Baby Boom, the Baby Bust and the Housing Market', *Regional Science and Urban Economics*, **19**, 235-258

Martin, Philippe and Rey, Hélène. (2000), 'Financial Integration and Asset Returns', *European Economic Review*, **44**, 1327-1350

McKinnon, Ronald I. (1973), Money and Capital in Economic Development', Brookings Institution, Washington DC

Mehra, Rajnish and Prescott, Edward C. (1985), 'The Equity Premium: A Puzzle', *Journal of Monetary Economics*, **15**, 145-161

Miles, David. (1999), 'Modelling the Impact of Demographic Change Upon the Economy', *The Economic Journal*, **109**, 1-36

Obstfeld, Maurice and Rogoff, Kenneth. (2000), 'The Six Major Puzzles in International Macroeconomics: Is there a Common Cause?', NBER Macroeconomics Annual 2000, The MIT Press, Cambridge, Massachusetts and London, England

Pagano, Marco. (1993), 'Financial Markets and Growth: An Overview', *European Economic Review*, **37**, 613-622

Passell, Peter. (1996), 'The Year is 2010. Do You Know where Your Bull is?', *The Sunday New York Times*, March 10, 1996

Pistor, Katharina; Raiser, Martin and Gelfer, Stanislaw. (2000), 'Law and Finance in Transition Economies', *CID Working Paper,* No. 49, Center for International Development at Harvard University, Cambridge, MA

Portes, Richard and Rey, Hélène. (2002), 'The Determinants of Cross-Border Equity Flows', Princeton University, Mimeo

Portes, Richard and Rey, Hélène. (1998), 'The Emergence of the Euro as an International Currency', *Economic Policy*, **13**, 305-343

Poterba, James M. (2000), 'Demographic Structure and Asset Returns', MIT, Mimeo

Rajan, Raghuram G. and Zingales, Luigi. (1998), 'Financial Dependence and Growth', *The American Economic Review*, **88**, 559-586

Roach, Stephen. (August 1997), 'US: No Saving Grace', *Global Economic Forum* (Morgan Stanley Research)

Roach, Stephen. (September 1996), 'US: Demographics Unmasked', *Global Economic Forum* (Morgan Stanley Research)

Robinson, Joan. (1979), 'The Generalisation of the General Theory and Other Essays', The MacMillan Press, London, 2nd edition

Rousseau, Peter L. and Wachtel, Paul. (2000), 'Equity Market and Growth: Cross-Country Evidence on Timing and Outcomes, 1980-1995', *Journal of Banking and Finance*, **24**, 1903-1932

Rousseau, Peter L. and Wachtel, Paul. (1998), 'Financial Intermediation and Economic Performance: Historical Evidence from Five Industrial Countries', *Journal of Money, Credit, and Banking*, **30**, 657-678

Schmidt-Hebbel, Klaus. (1995), 'Colombia's Pension Reform. Fiscal and Monetary Effects', *World Bank Discussion Paper*, No. 314, World Bank, Washington DC

Schumpeter, Joseph A. (1983), 'The Theory of Economic Development', Transaction Publications, New Brunswick, USA, (Reprint)

Shaw, Edward S. (1973), 'Financial Deepening in Economic Growth', Oxford University Press, New York

Shleifer, Andrei and Vishny, Robert W. (1997), 'A Survey of Corporate Governance', *The Journal of Finance*, **52**, 737-783

Siegel, Jeremy. (1998), 'Stock for the long run: The definite guide to financial market returns and long-term investment strategies', McGraw-Hill, New York, 2nd ed.

Sterling, William and Waite, Stephen, (1998), 'Boomeronomics', The Ballantine Publishing Group, New York

Stiglitz, Joseph E. (1985), 'Credit Markets and the Control of Capital', *Journal of Money, Credit, and Banking*, **17**, 133-152

Swan, Craig. (1995), 'Demography and the Demand for Housing: A Reinterpretation of the Mankiw-Weil Demand variable', *Regional Science and Urban Economics*, **25**, 41-58

Vittas, Dimitri. (2000), 'Pension Reform and Capital Market Development: "Feasibility" and "Impact" Preconditions', *Policy Research Working Paper*, No. 2414, World Bank, Washington DC

Vittas, Dimitri. (1999), 'Pension Reform and Financial Markets', *Development Discussion Paper*, No. 697, Harvard Institute for International Development, Cambridge, MA

Weinstein, David E. and Yafeh, Yishay. (1998), ' On the Cost of Bank-Centered Financial System: Evidence from the Changing Main Bank Relations in Japan', *The Journal of Finance*, **53**, 635-672

Woodward, Susan E. (1991), 'Economists' Prejudices: Why the Mankiw-Weil Story is not Credible', *Regional Science of Urban Economics*, **21**, 531-537

Yoo, Peter S. (1997), 'Population Growth and Asset Prices', *Federal Reserve Bank of St. Louis Working Paper*, No. 97-016A

Yoo, Peter S. (1994a), 'Age Dependent Portfolio Selection'. *Federal Reserve Bank of St. Louis Working Paper*, No. 94-003A

Yoo, Peter S. (1994b), 'Age Distribution and Returns of Financial Assets', *Federal Reserve Bank of St. Louis Working Paper*, No. 94-002B

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