

SUMMARY OF ACADEMIC PAPERS RELATED TO PENSION ECONOMICS AND FINANCE

Madrian and Shea (2001)

This paper demonstrates that savings behaviour is affected significantly by behavioural issues such as inertia, procrastination, and anchoring. The paper studies the effect of automatic enrolment in a particular 401(k) pension plan in the US. After automatic enrolment was introduced, plan participation increased and individuals chose to retain the default contribution rate and default fund asset allocation. Employees who enrolled automatically had different contributions rates and allocated their assets differently to those who enrolled on their own. The paper implies that behavioural issues are an important consideration when designing schemes and scheme communication with members, especially default options.

Duflo and Saez (2004)

This paper tests the effectiveness of financial education as a means of changing individual savings and investment behaviour in the context of corporate pensions. They conduct an experiment whereby they invite half of the individuals from a selection of departments in a large university, chosen at random, to participate in a financial planning fair. They find that within the selected departments, participation rates in the retirement savings plan increase, and are higher than those in the other departments, even amongst those who did not attend the fair: financial behaviour is strongly influenced by peer group effects. They also find that the effect of financial education on behaviour is significant, but small.

Akerlof (1970)

This paper illustrates that asymmetric information between buyers and sellers in a market may lead to market failure in some cases, even when there are willing buyers and willing sellers who, if there were no asymmetric information, would want to trade. He builds a theoretical model in which asymmetric leads to an adverse selection “death spiral” and the market ultimately fails. The paper has been used to illustrate the effects of asymmetric information in insurance markets, such as medical insurance and annuities.

Rauh (2006)

This paper tests whether firms who are nearing default increase the risk they are exposed to in their pension plans – hence shifting value away from pensioners and the PBGC and toward the equity holders – or reduce the risk they are exposed to in their pension plans, in order to prevent the possibility that firms will be forced to make pension contributions at times which are extremely disadvantageous to them. The paper finds that the second behaviour dominates the first, suggesting that firms do not systematically alter their pension asset allocation to take advantage of the

PBGC put, and that the US system of mandatory pension contributions under ERISA reduces the pension risk-taking of firms that are near default.

Benartzi & Thaler (2004)

This paper shows how the tendency of individuals to procrastinate can be built into a pension scheme through their Save More Tomorrow™ (SMarT) scheme. This reduces the effect of behavioural factors such as bounded rationality, self-control, procrastination and nominal loss aversion on savings decisions. The plan defers increases in pension contribution rates until individuals receive pay rises, thereby minimising the subjective pain associated with increased pension contributions. They found that the plan significantly increased the savings rates of members who elected to join it.

Gruber and Wise (1997)

This paper looks at how the structure of a global sample of state pension systems encourages early retirement from the work force. The paper argues that state pension systems are creating unused productive capacity in labour markets by incentivising early withdrawal from the labour force. The paper looks at empirical evidence of the implicit tax on work faced by those reaching retirement age and shows how there are strong incentives to leave the workforce at the given 'normal' retirement ages. This is at a time when most developed economies are facing aging workforces and a declining participation rate in the labour-force.

Merton (1969)

Merton (1969) examines the combined problem of optimal portfolio selection and consumption rules for an individual in a continuous-time model where his income is generated by returns on assets and these returns are stochastic. He showed the conditions under which constant mix portfolio strategies are optimal. If risky asset prices follow geometric Brownian motion, there exists a risk-free asset paying a constant rate of interest, and portfolios can be rebalanced continuously without cost, then investors exhibiting constant relative risk aversion will find it optimal to maintain constant allocations between the risky and risk-free asset, with investment in the risky asset inversely related to the investors level of risk aversion. This is regardless of the time horizon of the investor.

Gustman and Steinmeier (1995)

When an employee leaves a company, there may be a loss associated with any reduction to pension benefits. The pension capital loss suffered is calculated as the reduction in benefits as a result from the removal of the (final) salary link to the member's pension. (Unlike the US, there is a requirement for indexation on a deferred pension in the UK which could act to reduce the extent of any loss suffered.) Any such loss would therefore act as a deterrent on an employee leaving a company. The loss is low for young employees, reaches a peak for middle-aged

employees and falls to zero once again as individuals reach retirement age. While Allen, Clarke and McDermed (1993) find that pension capital loss can explain 40% of job turnover, Gustman and Steinmeier found that while the pension capital loss appears noteworthy in dollar terms, the effect is much smaller in terms of percentage points of the remaining future working lifetime income, particularly for younger workers. Not only do they find that pension capital loss has little effect on job turnover, the effect on employees with a DC pension is statistically indistinguishable from those with DB pensions.

Ippolito (1997)

In this book, Ippolito explores the relationship between employees' preferences for certain types of pension plans and their productivity. Ippolito begins by reviewing how pensions influence workers' behaviour, helping employers reduce early quit rates and increase early retirement rates. Ippolito then shows how pensions can assist employers in attracting and retaining workers who have personal attributes valued by the firm. In particular, he shows how individuals with low subjective discount rates might make better employees – because they are more likely to invest in firm specific human capital – and might be attracted by a pay package which included a pension, with or without matching contributions from an employer.

Rauh (2006)

This paper examines the impact of contributions to occupational pension scheme on capital expenditure by U.S. companies. He finds that in the 1990s firms that made substantial contributions to pension schemes had a lower level of capital expenditure than others had and develops the theory that this is due to financing constraints (i.e. external finance is more expensive than internal finance obtained through underfunding pension schemes). This indicates that pension funds exert a considerable influence on firm investment and financing decisions in the US.

Blake, Lehmann and Timmermann (1992)

This paper looks at the asset allocation and performance of over 300 UK pension funds over the period 1986 and 1994. It found that UK asset management market was very concentrated; that asset managers were assessed on relative performance and so tended to follow portfolios that were very similar and that asset managers were not encouraged to outperform, because fee structures were related to the amount of assets under management rather than the performance. Overall, security selection had been “a zero expected return activity”, market timing had been a negative expected return activity and that most funds would have been better invested in passive funds rather than active funds over this period.

Choi et. al (2001)

In this paper Choi et. al study the impact of DC plan design and defaults on contribution rates and participation behaviour in the US. They find very strong

evidence that people make decisions based on a “path of least resistance” approach, so that they generally stick to default contribution rates and investment strategies long after joining the scheme because this is the easiest thing to do. Also whether a scheme has automatic enrolment or not has a big impact on membership numbers in the scheme, with an opt-out approach significantly increasing membership. They conclude that companies should be aware of the significant impact defaults and automatic enrolments have in DC pension schemes, and to tailor their scheme accordingly.

Bernheim et al (2001)

This paper tested the hypothesis that variation in retirement savings in the US can be explained by differences in time preference, risk tolerance, health and life expectancy, and lifetime earnings. They test by studying data on wealth, income and consumption, and assume rational, farsighted optimisation. They find that there is a pronounced fall in consumption on retirement across all wealth/income quartiles - more so for the lower wealth quartiles. They conclude that none of the variables above adequately explain the variation in wealth at retirement and question whether the life-cycle model’s “rationality” assumptions hold in practice.

Brown and Poterba (2000)

The paper summaries a range of annuity products available for married couples. They calculated the ‘Annuity Equivalent Wealth’ which is a measure of how much wealth couples would need in the absence of fair annuity markets in order to achieve the same satisfaction than if they could purchase actuarially fair annuities. Using US data they found that utility gain from annuitisation was smaller for married couples than for single individuals. However they still found a high demand for annuities in general and the circumstances before buying annuities were also significant.

Attanassio and Rohwedder (2003)

This paper tests the extent to which public pension wealth crowds out private savings by examining the effects of various UK pension reforms on private savings. The dataset they use is the Family Expenditure Survey, the limitations of which are that they have to estimate pension wealth and use savings flows instead of asset data. They discover that the introduction of SERPS (now S2P) is responsible for crowding out of private savings of up to 75% for the oldest and 35% for the youngest. The BSP had little effect.

Mitchell & Moore (1997)

This paper examined the asset holdings of US householders in the Health and Retirement Study. The paper found significant differences in the composition of poorer and richer household portfolios in the US. For the median wealth household, residential housing represented 20%, social security wealth 40%, pension

wealth 20% and financial wealth 20% of their total portfolios. For poorer households, social security wealth was the most important single asset. For richer households, pension wealth became more important. Financial wealth was the most important asset only for the richest 10% of households. The paper also found that household portfolio size was very skewly distributed.

Samuelson (1969)

This paper deals with the joint economic determination of optimal consumption and optimal asset allocation decisions in a discrete time dynamic programming framework. It concludes that if individuals have a constant relative risk aversion then the investment decision is completely independent of initial wealth and time to maturity. Furthermore, Samuelson obtains the result that the agent's consumption decision is independent of the investment decision and agent's consume each year a fraction of their wealth which is dependant upon remaining time to maturity.

Cocco and Volpin (2005)

This paper studies the governance of defined-benefit pension plans in the United Kingdom. They find that pension plans of indebted companies with a higher proportion of insider-trustees invest a higher proportion of the pension plan assets into equities, contribute less into the pension plan, and have a larger dividend payout ratio.

This evidence supports an agency view, whereby insider-trustees act in the interest of shareholders of the sponsoring company, and not necessarily pension plan members. However, the economic significance of the result is small, and there is no evidence that the effect is true for companies that are not heavily indebted.

Laibson (1997)

This paper shows that hyperbolic discount rates - characterized by a relatively high discount rate over a short period and relatively low discount rate over long periods - sets up a conflict between today's preferences and the preferences held in the future. It illustrates why consumers might use commitment devices to align short-term and long-term incentives. Illiquid assets – such as pension plans, life insurance policies, and residential houses are examples of commitment devices because the assets promise to generate substantial returns in the long run but these benefits are difficult if not impossible to realize immediately due to liquidity constraints. Trying to do so will result in a substantial financial loss.

Banks, Blundell and Tanner (1998)

This paper confirms the results of Bernheim et al (2001) in the United Kingdom, finding that there is an unanticipated fall in consumption as household heads retire, which cannot be fully explained by consumption smoothing or as a result of anticipated falls in labour income and changes in household demographics. They

argue that the only way to fully reconcile this with the life-cycle hypothesis is with the systematic arrival of unexpected adverse information, such as actual retirement income being less than expected. This raises serious questions about the ability of many households to optimally plan for retirement.

Poterba (2001)

This paper tests the hypothesis that demographic change and asset returns are related in a US context. He finds evidence that the historical relationship is weak, and, by analysing synthetic cohorts, concludes that an asset meltdown of the type often predicted is unlikely to occur when baby boomers begin to retire in the US.

Carroll (1997)

This paper demonstrates that, over 5-year periods, individual consumption closely tracks income in individuals up to middle age, after which income, on average exceeds consumption. He therefore finds evidence that the pure life-cycle hypothesis of Modigliani and Brumberg does not hold over longer time periods.

Zissimopoulos, Maestas and Karoly (2007)

This paper uses the variation in pensions and health insurance offered to older salaried and self-employed workers within and across the United States and England to analyze retirement patterns. Based on longitudinal data from the Health and Retirement Study (HRS) in the United States and the English Longitudinal Survey of Ageing (ELSA), the paper finds that the higher labour force exit rate of wage and salary workers compared to self-employed workers is due to defined benefit pension incentives created by the public and private pension systems. Higher rates of labour force exit at ages 55 and older in England compared to the United States are due in part to the availability of publicly provided health insurance.

Black (1980) & Tepper (1981)

Prior to these papers, practical and theoretical investigations tended to characterise the asset allocation decision in pension plans as one of choosing the optimal split between equities and bonds. These papers were the first to examine the optimal allocation of assets in corporate pension plans from the point of view of the firm, taking into account the role that pensions play on the balance sheet of firms and the tax structure of the US (and the UK). These papers show that the EET system of tax breaks give companies a strong incentive to fully fund their schemes and to hold assets that are taxed highly for other investors (i.e. bonds) because this approach will maximise corporate value. Black argues that investment in risky assets in a pension plan is a form of firm leverage, and that such leverage is tax inefficient.

Cairns, Blake & Dowd (2006)

In this paper the authors develop a two factor stochastic model for the development of the post 60 mortality curve. They use the model to examine the pricing of longevity bonds with different terms to maturity and referenced to different cohorts.

The first factor affects mortality rates for all ages in the same way, the second affects mortality rates at higher ages more than at lower ages.

In pricing the bonds they find longevity risk over relatively short time horizons is low but if the time horizon is greater than 10 years then the risk increases rapidly.

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This paper illustrates that asymmetric information between buyers and sellers in a market may lead to market failure in some cases, even when there are willing buyers and willing sellers who, if there were no asymmetric information, would want to trade. He builds a theoretical model in which asymmetric leads to an adverse selection “death spiral” and the market ultimately fails. The paper has been used to illustrate the effects of asymmetric information in insurance markets, such as medical insurance and annuities.

Rauh (2009)

This paper tests whether firms who are nearing default increase the risk they are exposed to in their pension plans – hence shifting value away from pensioners and the PBGC and toward the equity holders – or reduce the risk they are exposed to in their pension plans, in order to prevent the possibility that firms will be forced to make pension contributions at times which are extremely disadvantageous to them. The paper finds that the second behaviour dominates the first, suggesting that firms do not systematically alter their pension asset allocation to take advantage of the PBGC put, and that the US system of mandatory pension contributions under ERISA reduces the pension risk-taking of firms that are near default.

Yaari (1965)

The focus of the paper is the value to consumers of fairly priced life annuities. The insurance value of life annuities – and the effect of the removal of any unintended bequests - is so great that consumers in his world annuitise all of their wealth. This result makes the low voluntary purchase annuities in most countries very puzzling. His model assumes fair pricing, no bequest motives, no risky assets, no state pension wealth, and no risk sharing within families.

McCarthy and Neuberger (2004)

The authors price pension insurance such as offered by the PPF in the UK and the PBGC in the US by using a credit risk model of a pool of firms based on the

assumption that firms in practice have leverage ratios that are mean reverting. They find that the pension insurer is heavily exposed to systemic risk which makes the claims process extremely heavy-tailed and expensive to hedge. The root of the problem is that pension plans in the UK and US invest heavily in equities – which means that when equities are undervalued, pension plans are likely to be underfunded and insolvencies are likely to be frequent. They argue that the PPF should insist on full funding, should offer low benefits and should encourage firms to invest pension fund assets in bonds rather than in equities to lessen the severity of this problem. They question the likely practical effectiveness of risk-rated premiums in achieving behavioural change in pension schemes.

Merton (1974)

This paper is the first to apply options pricing techniques to the problem of how to price corporate securities such as equity and debt. The paper presents firm assets as following a stochastic process and then prices securities as options on these underlying assets. The model revolutionised the pricing of corporate securities, and gave birth to an entire field – structural credit models – which provides a way in which corporate credit risk can be rigorously analysed and quantified. In this paper, the firm assets are assumed to follow a geometric Brownian motion with constant volatility and the value of corporate equity is consequently found to be the value of a European call option on the firm's assets according to the Black-Scholes option pricing formula. Many extensions are possible.

Merton (1969)

Merton (1969) examines the combined problem of optimal portfolio selection and consumption rules for an individual in a continuous-time model where his income is generated by returns on assets and these returns are stochastic. He showed the conditions under which constant mix portfolio strategies are optimal. If risky asset prices follow geometric Brownian motion, there exists a risk-free asset paying a constant rate of interest, and portfolios can be rebalanced continuously without cost, then investors exhibiting constant relative risk aversion will find it optimal to maintain constant allocations between the risky and risk-free asset, with investment in the risky asset inversely related to the investors level of risk aversion. This is regardless of the time horizon of the investor.

Picconi (2004)

Picconi(2004) examines whether investors and analysts fully incorporate the information contained in pension footnotes. He finds evidence that analysts do not explicitly incorporate the information from pension plan parameter changes into their initial forecasts so that these changes predict future earnings surprises. He also finds that pension plan parameter changes predict returns in the year following the information release so that a portfolio constructed using these changes earns significant abnormal returns. Moreover, he provides evidence that the stock market

does not adjust for firms' aggressive discount rate and rate of return assumptions that are used in the calculation of the pension plan parameters.

Cairns, Blake and Dowd (2006)

Cairns, Blake and Dowd examine the optimal investment of a DC pension plan in continuous time using optimal stochastic control. They assume that individuals care either about the balance of their DC pension plan relative to their final salary, or they care about the replacement rate of their DC pension once it has been annuitised. They find that all investors would optimally invest in only three funds – the market portfolio, an interest rate hedging portfolio and a salary hedge portfolio to hedge future contribution risk. They do not derive results in the case where salary risk cannot be hedged by holding a portfolio of traded assets.

Cambell & Viceira (2002)

In this book, Cambell and Viceira provide a scientific foundation for the advice offered by financial planners to long-term investors. In particular, they examined DC pension investment using discrete-time stochastic dynamic programming, solved numerically. They showed how such a model of a DC pension plan could be built and solved, and that individuals would optimally reduce their holdings in equities as they aged, transferring more into bonds. The book also explains recent advances in both analytical and numerical methods, and shows how they can be used to understand the portfolio choice problems of long-term investors.

Mitchell et al (1999)

This paper examines the value of individual U.S. annuities to establish whether they are worth the money paid for them. They find that the prices vary widely and that the difference between the market price and the expected present value of payments is substantial. They also find that this difference, also referred to as transaction costs, has reduced between the early 1980s and the mid-1990s. Finally, they examine how much an average consumer would be willing to pay in terms of transaction costs to purchase insurance against outliving their assets and find that this is close the level of transaction costs present in the annuity market of the mid-1990s. The paper therefore places a limit on the extent to which adverse selection can explain the low voluntary purchase of life annuities in the US.

Rauh (2006)

This paper examines the impact of contributions to occupational pension scheme on capital expenditure by U.S. companies. He finds that in the 1990s firms that made substantial contributions to pension schemes had a lower level of capital expenditure than others had and develops the theory that this is due to financing constraints (i.e. external finance is more expensive than internal finance obtained through underfunding pension schemes). This indicates that pension funds exert a considerable influence on firm investment and financing decisions in the US.

Bulow (1982)

This paper discusses the correct valuation of corporate pension liabilities in the context of the presence or absence of implicit contracts. Under implicit contracts, the firm has an implicit obligation to pay all promised benefits, including those yet to be accrued, regardless of the firm's legal liabilities. Bulow suggests that the PBO method for valuing final salary DB pension liabilities only makes sense if there are implicit labour contracts overpaying old workers at the expense of young workers and the implicit liability is closely related to the PBO liability. Bulow argues that the correct measure of pension liabilities is the ABO because this represents the level of the firm's legal liabilities. In the UK, Bulow's ABO would need to reflect RPI revaluation in deferment.

Blake, Lehmann and Timmermann (1992)

This paper looks at the asset allocation and performance of over 300 UK pension funds over the period 1986 and 1994. It found that UK asset management market was very concentrated; that asset managers were assessed on relative performance and so tended to follow portfolios that were very similar and that asset managers were not encouraged to outperform, because fee structures were related to the amount of assets under management rather than the performance. Overall, security selection had been "a zero expected return activity", market timing had been a negative expected return activity and that most funds would have been better invested in passive funds rather than active funds over this period.

Carroll and Niehaus (1995)

The paper investigates the relationship between the credit rating of firms and the health status of firms' defined benefit pension plans. Their results from using empirical data show that credit ratings of firms deteriorate as the funding level of their pension plans deteriorate. However improvements in pension plan funding levels do not necessarily improve credit worthiness. Firms with a pension plan that has a funding surplus are not necessarily more credit worthy than similar firms that just have a fully funded plan. The explanation for this could be that surpluses can be 'trapped' in pension plans. Underfunded pension liabilities are treated as obligations for the firm. It is not always obvious that the firm can claim excess pension plan assets.

Brown and Poterba (2000)

The paper summaries a range of annuity products available for married couples. They calculated the 'Annuity Equivalent Wealth' which is a measure of how much wealth couples would need in the absence of fair annuity markets in order to achieve the same satisfaction than if they could purchase actuarially fair annuities. Using US data they found that utility gain from annuitisation was smaller for married

couples than for single individuals. However they still found a high demand for annuities in general and the circumstances before buying annuities were also significant.

Cardinale (2007)

Cardinale tests empirically whether pension information derived by accounting disclosures is priced in corporate bond spreads. He discovers that pension fund underfunding affects credit spreads, while overfunding is less insignificant. He finds that pension leverage is twice as expensive as other leverage. There is also a non-linear effect in that larger deficits are priced more than smaller ones and finally the presence of a pension fund in itself affects credit spreads.

Franzoni & Marin (2006)

Looks at how the market values pension liabilities and assets by examining the relative returns of portfolios constructed on the basis of pension plan funding status. The paper finds that investors do not appear to take into account the negative effects that pension under-funding can have on future dividends and earnings when valuing companies, resulting in the overvaluation of companies with pension debts. Future negative implications of pension underfunding come as a surprise to the market and cause a negative price adjustment on value of the company years after the underfunding arises. In contrast there never seems to be a price adjustment for companies with well funded pension schemes suggesting that surplus is trapped inside pension schemes.

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Coronado and Sharpe (2003)

The paper examines how DB pension plans affected the equity price valuation of the sponsoring firms using US data. They conclude that analysts seem to be applying the same earnings multiple to pensions earnings as they do to core earnings when valuing the firm's equity. They argue that this produced significant overvaluation in stock market values particularly after 2002 when the stock market bubble had ended.

Cocco and Volpin (2005)

This paper studies the governance of defined-benefit pension plans in the United Kingdom. They find that pension plans of indebted companies with a higher proportion of insider-trustees invest a higher proportion of the pension plan assets into equities, contribute less into the pension plan, and have a larger dividend payout ratio.

This evidence supports an agency view, whereby insider-trustees act in the interest of shareholders of the sponsoring company, and not necessarily pension plan members. However, the economic significance of the result is small, and there is no evidence that the effect is true for companies that are not heavily indebted.

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This paper demonstrates that, over 5-year periods, individual consumption closely

tracks income in individuals up to middle age, after which income, on average exceeds consumption. He therefore finds evidence that the pure life-cycle hypothesis of Modigliani and Brumberg does not hold over longer time periods.

Sharpe (1976)

This paper shows that if employees are perfectly rational, the pension funding and investment policy has no effect on firm value. Only if either employees are irrational – and do not demand higher wages in response to riskier pension promises – or the pension insurer charges premiums that are not equal in value to the insurance that is offered does pension funding and investment policy affect corporate value. The paper is an extension of the Miller-Modigliani proposition to include the firm's employees and a pension insurer as stakeholders in the firm.