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A Theoretical and Empirical Analysis of Bequest Motives

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A Theoretical and Empirical Analysis of Bequest Motives

MLitt Dissertation

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Graham Stull

Declaration

I declare that the following is being submitted as a thesis for the degree of Masters of Letters in Economics at the University of Dublin, Trinity College and that it is entirely my own work. I further declare that I agree that the Library may lend or copy the thesis upon request.

Signed,



Graham Stull

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CHAPTER I

Introduction

The Life-Cycle Model (LCM) of consumption represents an important workhorse in consumption theory. First developed by Modigliani and Brumberg (1954) and by Friedman (1957) it has, despite its theoretically appealing construction, often been criticised for predictions that do not match empirical findings. For example, testing the LCM with micro panel data, Courant, Gramlich and Laitner (1984) find that it does not perform well, in particular consumption smoothing does not take place to the degree the model would predict. Related to this, the model fails to adequately explain why individuals in the final phase of the life cycle do not dissave to a sufficient extent.

The failure of the LCM has severe implications for the application of consumer theory in wider contexts. Many macroeconomic models, such as overlapping generations models used to gauge the impact of changes in aggregate savings and pensions on output, depend on the neat, analytical expression for the representative agent that the LCM provides. Where the theoretical underpinnings of these applications are unsound, the results which depend upon them may be drawn into question.

Myriad explanations for the discrepancy between observed dissavings and the level implied by the LCM have been advanced; many of which focus on the important role of a bequest motive in estate planning.

In its simplest form, the Life-Cycle Model of consumption is predicated on the assumption that individual economic actors, being self-interested, will attempt to maximise their own utility of consumption, using all of the wealth and resources they have accumulated during their lifetimes. Taking this narrow view of how people behave, we would expect that bequests would be rather the exception than the rule. People would attempt to spend everything before they died. But such a simplistic explanation neither appeals to our intuition, nor is it matched by the empirical reality. Studies reveal that those who have the means almost always make some kind of wealth transfer; either as a bequest or as an *inter*

vivos transfer (see for example, Hurd and Smith (2001)). In some cases, estates are in excess of wealth at retirement.

The literature provides four general explanations for why this might occur:¹ Dynasticism, Altruism, Exchange, Accidental. In Chapter II, we will look at these standard bequest motives each in turn. Where possible, we will derive an explicit form model for each motivation and use the explicit form models to establish a predicted ratio of bequest to retirement wealth. In so doing, we will evaluate the models in terms of theoretical consistency and their application to the empirical reality of observed bequest. This will provide us with the necessary perspective on each motive to meaningfully probe the data and construct the battery of tests with which we hope to find evidence of one or more motives in our sample. The time and space devoted to the various bequest motives differs, and this reflects their relative prominence in the literature. Thus, considerable attention is given to Altruism and to Accident, both in the theoretical exposition and in the testing, because these are also treated at great length in the literature at large. Dynasty and Exchange, on the other hand, are less prominent in the literature, and hence receive less attention in this thesis.

In Chapter III, we present new data obtained from Irish Probate records, being over 1,000 random observations covering the period 1990 – 1999. These data were manually collected from the archives of the Probate Office in Dublin, and in themselves represent a unique and interesting empirical artefact. It is for this reason, and for the sake of illuminating the particular qualities of the Irish sample, that we devote a section to the presentation of a series of stylised facts concerning the data. By and large, these facts are consistent with findings from other Probate samples; however, a number of facets particular to the Irish sample are observed, and these are highlighted in this section.

In Chapter IV, we present a series of original tests on a cross-section of data that, under weak assumptions, can provide evidence for – and to a lesser extent against – the standard bequest motives discussed above. The application of these tests to the Irish sample reveals that there is virtually no evidence in support of an altruistic bequest motive, no evidence in support of an exchange bequest motive, and only some limited evidence in support of accidental bequest.

¹ A very thorough, though now somewhat dated, literature review of bequest motivations can be found at Masson A and Pestieau, (1997) *op cit*.

Finally, in the concluding chapter, we review the findings of the previous sections and discuss their implications. In general, while retirees typically retain, then bequeath half or more of their wealth, the theoretical models have difficulty explaining this phenomenon. Our analysis has led us to conclude that agents appear to be primarily motivated by a desire to shore up precautionary savings in the face of uncertainty about their remaining lifetime and the uncertain cost of core consumption bundles required in old age. In this, the failure both of conventional insurance markets and markets for life annuities may play a deciding role. This is not to suggest that agents derive *no* altruistic or ‘vicarious’ utility from bequest, but rather that it is not motivating their behaviour. In other words, altruism from bequest may well exist, but it seems unlikely to be a *motivating* factor in the determination of the actual extent of bequest, rather a relic of other considerations. This finding is consistent with previous studies using panel data, particularly Hurd (1989), in which an altruistic bequest motive is found to be statistically significant, but not economically significant.

In spite of the evidence in favour of accidental bequest, the theory is not entirely satisfactory. Our tests show only bare statistical significance, and a number of theoretical concerns remain. At the end of Chapter V, we will argue that the literature has thus far missed an important component of the LCM. This is the cost associated with the confrontation of one’s own mortality, which the buyer of a private life annuity is forced to face, in the form of search costs, if she wishes to completely maximise consumption in the Yaari sense. Here a new bequest motive is advanced, and a LCM model is introduced along the lines of those presented in the first paper, to illustrate the principle and demonstrate its potential in predicting levels of bequest more in line with what is observed in empirical studies.

The appendices represent the full solution methods to the Theoretical Analyses undertaken in Chapter II, which it was felt were too long-winded to include in the main body of the dissertation. The exception is Appendix B, which is a model previously derived in Stull (2004). This is included because, without it, it would not be possible to follow the construction of the Mortality Confrontation Cost model presented in Chapter V, Section 2.

This research makes a number of contributions to the literature on bequest motives and life cycle consumption modelling in general. While explicit models for lifetime consumption

with bequest assumptions have been constructed for all bequest motives in previous papers,² the specific focus on the bequest to initial wealth ratio for retirement dissavings is original to this work.

The compilation of the data sample is also original, and represents a valuable resource. This is so because, although suffering from the disadvantages of being only cross-sectional, the Irish Probate data are an unbiased sample. Unlike the AHEAD and TIAA-CREF panels used in most of the American studies, there is no issue of sample selection bias, because all Irish estates, regardless of size or possible tax liability, must be filed in Probate, in order that the legal transfer of ownership from decedent to beneficiary may take place. Furthermore, the inclusion of a Revenue affidavit, and the legal repercussions associated with its execution, ensure the data is of the most accurate kind. This overcomes the problem, not only of potential dishonesty on the part of the survey respondent, but also of honest misconceptions respondents might have with regard to the value of certain assets they hold. In particular, there is no guarantee when asked that a property-holder will know the value of her own real estate. The Irish Probate sample used here establishes the value of real estate assets by way of a third-party valuation report conducted by a professional valuer. The general procedure is that the administrator or executor of the estate contracts a valuer to examine all and any real property assets within the estate and these reports are included with the Revenue affidavit in the Probate.

A further unique contribution to the literature is the construction of tests designed to make use of the Probate records. Using cross-sectional data to test for bequest motives suffers from the obvious drawback of lacking any length at all in an attempt to understand the evolution of a consumption path, which is fundamentally a *long* phenomenon. The alternative panel method typically used for this purpose can track observations over time, but in general does not have the same high degree of quality. The design of our tests must make use of the excellent data quality to compensate for the static nature of the observation. For example, we have chosen to collect data around a key and uniquely relevant tax change – the abrupt introduction of a Probate Tax in 1993, which was charged at a rate of 2% on virtually all estates – in order to draw inference from the behaviour of individuals around this event.

² See Hurd (2003), for an example of such a paper.

A further contribution to the literature is the introduction of a new bequest motive, as an extension of the traditional accidental bequest motive advanced by Yaari and Davies. This is the theory of mortality confrontation cost. In essence, this theory holds that there is a cost to knowing with greater certainty one's remaining lifetime. This knowledge is in turn a necessary condition for consumption planning in order to exhaust remaining wealth, even in the utter absence of any other bequest motive. Where mortality confrontation cost is sufficiently high, agents prefer to hold a surplus stock of wealth in order that they don't have to think about their own death, even if this means foregoing utility of consumption during the life cycle. We present the general model without solution at the end of the final chapter, but do include a solution for the special case in which mortality confrontation cost is everywhere excessive.

In some respects, more could have been made from the methodology employed herein were the sample large enough to allow for the inclusion of certain variables that were omitted from a substantial number of observations, such as occupation of decedent. This would have allowed for a greater degree of control and precision in the tests. Unfortunately the process of collecting the data, which had to be manually inputted from paper records, was too time consuming to allow for the inclusion of more than about 1,000 observations, given the limited resources at my disposal.

There are a number of interest implications for retirement planning, particularly in the context of concerns policymakers have about insufficient retirement planning and the various measures governments are making to encourage retirement savings. In effect, economic agents who undersave during their working lives may nevertheless underspend during their retirements. Policymakers concerned with improving the welfare of retirees could therefore do as well to concentrate on improving those markets that facilitate a smoother consumption path (i.e. markets for insurance and life annuities) as on efforts which encourage a higher level of saving in the early part of the life cycle.

CHAPTER II

Chapter II, Section 1

Dynasty

This is the notion that the economic actor is not confined to the biological entity (i.e. one generation), but rather consists of a dynasty. Put differently, the parent ‘lives’ on through the child. In this case, the intergenerational transfer is as natural as the process of savings and wealth accumulation itself. This model has been advanced in several different forms in the literature: Firstly as the ‘restrospective’ bequest model of Bevan and Stiglitz (1979), which holds simply that parents attempt to pass on that which they have received from their parents. More recently, Chu (1991) recasts the idea of socially optimal bequest to analyse the effects of primogeniture on income distribution. It is fair to say, though, that these models are neither explicitly dynastic, nor are their conclusions widely appreciated in the field. Dynasty remains the most unexplored of the obvious bequest motivations.

In essence the defining characteristic of dynasticism can be thought of as economic behaviour – usually of the form of some kind of optimisation – which traverses the bounds of a single generation. In other words, the agent is no longer an individual, but a *lineage* which passes through a series of individuals; from father to son to grandson and so on down the line. The fact that the son is a different person to the father is not of concern to the greater dynastic entity that is seen to control economic decisions. A concrete illustration of this principle could be seen in the feudalistic conception of a monarchy. The ‘king’ is commonly thought to be simply a powerful individual, but can be seen as a mere office-holder within a power structure to which he is subservient. As the Jewish historian Rav Moshe Taragin wrote:³

Another concept of malkhut [monarchy] exists: a dynasty which passes through the generations as a political institution which continues independently of any particular monarch who may come from that dynasty. For example, the Tudor dynasty was an independent political entity which happened to be represented by various kings in particular eras. Thus, the king and the dynasty he represents are NOT the same.

³ “Jewish Monarchy” by Rav Moshe Taragin, op cit.

Note that the subtle but vital distinction between dynastic bequest behaviour and altruistic bequest behaviour lies in the possibility that a king might wish to disinherit his son; to spend the wealth of his kingdom on present consumption to maximise his own utility or that of his contemporaries, but is constrained by the dynasty to which he is subordinate. An altruistic parent, on the other hand, deliberately chooses to hold back wealth for the sole purpose of vicarious utility of consumption through the child beneficiary. She maximises her own utility, but does so taking account of the utility of her beneficiaries.

The extent to which this distinction becomes important in terms of modelling the consumption path depends on how we choose to represent the vicarious utility. It seems natural to assume the altruistic parent's vicarious utility is some well-behaved function of the beneficiary's own utility of consumption. In this case, there is indeed a considerable difference between altruism and dynasty: The king will structure his bequest so that it is in the interests of the dynasty, not to maximise the utility of the prince. He may hold back the estate in trust; he may bequeath directly to the prince's own son; or he may invest in the dynasty in other ways that do not immediately benefit the prince. The altruistic parent, however, will be much more likely to transfer *inter vivos*, in order to smooth vicarious consumption, since the child-beneficiary will want to consumption-smooth as much as possible, too.

If we choose to represent the vicarious utility as being unrelated to the beneficiary's own consumption utility function, we have what has been called by some theorists 'Parentalistic Altruism',⁴ in which the parent acts on behalf of the child with regard to intergenerational transfers, but does not necessarily heed the child's own wishes in doing so. In a multiple generational model in which every parent so behaves, it should be obvious that we have, in essence, reproduced the concept of dynasty, but in a slightly different form.

Stepping back from the representation of the dynastic bequest motivation, as seen from the point of view of the individual (i.e. ignoring completely the fact that there are generations within the 'lifespan' of a dynasty), we can think of the dynasty as being on a cycle of its own. Dynasties will rise from the point of their genesis, to reach an optimum point (peak) after

⁴ See Masson, A and Pestieau M. (1997) for a full account of Parentalistic Altruism

which they will begin to decline until the lineage is expired and the dynasty ‘dies off’. In this, they should exhibit something like the wealth path we would expect from any LCM.

The important implication of such a perspective is that it need not necessarily follow that there be an exact symmetry between the size of bequest received by an individual representative of the dynasty and that which he, in turn, bequeaths on to the next representative. If a dynasty is flourishing (chronologically before its peak), we should, for any given generation, observe an inheritance to bequest ratio in excess of unity; if the dynasty is fading (chronologically after its peak) we should observe an inheritance to bequest ratio between zero and unity.

We can demonstrate this effect in a simple model of dynasty, assuming four generations and log utility. Then the dynasty faces a social value function of:

$$(II.1.1) \quad V = \ln(y_1 - a) + \ln(y_2 - b + a) + \ln(y_3 - c + b) + \ln(y_4 + c)$$

with bequests of a , b , c , and incomes of y_1 , y_2 , y_3 , y_4 for the generations, respectively (the final generation leaves no bequest). This is of course assuming incomes are exogenous (specifically, not dependent on bequest), and the solution we obtain is:

$$(II.1.2) \quad a = \frac{3}{4}y_1 - \frac{1}{4}y_2 - \frac{1}{4}y_3 - \frac{1}{4}y_4, \quad b = \frac{1}{2}y_1 + \frac{1}{2}y_2 - \frac{1}{2}y_3 - \frac{1}{2}y_4, \quad c = \frac{1}{4}y_1 + \frac{1}{4}y_2 + \frac{1}{4}y_3 - \frac{3}{4}y_4$$

i.e. the dynasty merely uses bequests to smooth consumption across generations. In the special case where all generations’ earnings are equal, the dynasty’s optimum is found by setting all bequest to zero.

The more interesting, and more realistic, case is where each generation’s income is a function of the bequest it receives. For illustrative purposes, let us assume each generation i ’s earnings are a function of their inheritance $f(b_{i-1})$, which we will assume to be a well-behaved convex function with the logical initial condition $f(0) = 0$ (i.e. and so the dynasty’s ‘seed’ generation has base income k). For a four-generation dynasty, we would then have value function:

$$(II.1.3) \quad V = \ln(k - a) + \ln(f(a) - b) + \ln(f(b) - c) + \ln(f(c))$$

Which yields the following set of solutions:⁵

$$(II.1.4) \quad \begin{aligned} a &= k - \frac{f(c)}{f'(a)f'(b)f'(c)} \\ b &= f(a) - \frac{f(c)}{f'(b)f'(c)} \\ c &= f(b) - \frac{f(c)}{f'(c)} \end{aligned}$$

Equations (II.1.4) tell us that bequest as a percentage of each generation's income will be falling for each generation provided the change in the next generation's wage premium from bequest is greater than one; or – to put it in more conventional economic terms – if the following generation's income is 'inheritance elastic'. Whether this always happens or not will depend, of course, on the structure of the wage premium function, but for well-behaved functions and given enough generations, the model implies dynastic bequest will tend towards a steady state ratio of bequest to income (see Appendix A).

This is not to suggest that the dynasty attempts to 'utility smooth' across generations *per se*; but to maximise the utility to the dynasty as a whole. In this, the sacrifice of founding generations (which we may think of as any generation i for which $\frac{df(b_{i-1})}{db_{i-1}} > 1$) may be an acceptable cost to securing the welfare of the dynasty later on. Even in steady state, there is no guarantee that trans-generational utility is constant.⁶

A conclusive test for the presence of dynastic bequest would be difficult for a number of obvious reasons. Firstly it would require a very long and wide panel of data indeed. One would need to know the value of estates passing across multiple generations, to see if they did indeed fit into this profile. Then, fitting the bequests along the dynasty's wealth path to a

⁵ See Appendix A

⁶ As a rule, it will only be constant where the wage premiums remain constant across generations. See Appendix A.

hump-shaped function should show the extent to which dynasty is important. But such a data set might prove difficult, if not impossible, to find.

Even given such excellent data, the theory does not allow us to define a structure for a dynasty solidly enough to test for its presence. It may be, for instance, that a fading dynasty collapses, but that it runs into a new, related dynasty, which flourishes. Perhaps there exists such a thing as a macro-dynasty, having multiple peaks and troughs. And again it may be that the dynasty exists, but is weak and works only in conjunction with other bequest motives to influence the consumption paths of its representatives.

It may, however, be possible to rule out – or at least, provide evidence against – dynastic bequest if we can construct simpler tests by which it can be shown that the necessary conditions have not been met. Such tests might be achieved using data much simpler and easier to obtain, such as a simple cross-section of bequests, for example a sample of probate records.

To this end, one possible necessary condition we might consider is that a dynasty should be stronger (flourishing with a higher probability) if there are direct heirs, such as children, while a dynasty should be weaker (fading with a higher probability) if there are only indirect heirs, such as nephews and nieces. To test even this, though, we would need to know at least the size of every disponent's own inheritance. Such testing is beyond the scope of this analysis, which relies on much more limited data.

Chapter II, Section 2

Altruism

This is the classic and most commonly accepted explanation for bequest behaviour. As an explicit argument, it is generally accepted that altruism was first formulated by Becker and Tomes (1979) and by Barro (1974), but references to altruistic bequest can be found in the works of theorists as early as Marshall (see Yaari, 1965). The idea is simply that disponers 'care' about the beneficiaries to whom they bequeath. In economic terms, we can think of this as meaning disponers internalise the consumption functions of their loved ones, thus deriving utility from the gratuitous transfer. In general, the altruism category embraces a wide gambit of theories; for to 'care' can mean many things. At one extreme, parentalistic altruism can be seen as a motive separate and apart from the satisfaction accruing to, say, a charitable giver. This explains the sub-categorization evident in, for example, Masson and Pestieau (1997).

However, there is a sense in which this division is artificial. Schervish and Havens (2003) argue that all intended bequest stems from the same "array of perceived needs", and that a variety of environmental and social conditions persistent in the life experiences of the giver combine to determine the relative magnitudes within this array.⁷ One can widen the field even further, and think of dynasticism not as a separate bequest motive, but rather as a special case of parentalistic altruism, in which the disponent is constrained in her enjoyment of the vicarious utility gained from the transfer by the social conditions which define the dynasty. Hurd and Smith's (2001) interpretation of the nature of an intended bequest motive can be seen in this light.

No less subject to debate is the formal specification of an intended bequest motive. If one is to retain LCM and all commensurate assumptions of separability and additivity of intertemporal utility, an immediate challenge facing the theorist is how to disentangle utility of bequest from consumption utility gained at any point in the life cycle. After all, if the main result of the LCM is to suggest consumption smoothing, it becomes difficult to

⁷ We could think of this array as a series of 'care' weights attached to each category of beneficiary – child, other relation, museum, etc. In this sense, it is possible to reinterpret the works of those bequest theorists who focus on, for instance, unequal bequest (see, for example McGarry (1997)), as attempts to estimate the determinants of these weights.

reconcile this with a phenomenon defined around a lump transfer occurring at the very end of the cycle.

The most obvious LCM specification involves the inclusion of a scrap value term to the present value Hamiltonian for lifetime utility of consumption implied by the maximisation of the dynamic programming problem. This approach is owing to Yaari (1965) and is adopted again by Hurd (1989) and Hurd and Smith (2001). Indeed, it is so analytically neat that it has found its way into core macroeconomics textbooks as an expression for utility of bequest by a representative agent used in, for example, overlapping generations models.⁸ And yet, despite its straightforward appeal, there is a very real sense in which the scrap value of bequest is forcing a preconceived conclusion upon the LCM. This will be explored in more detail below.

Of course, there is no reason why we cannot operate outside the LCM framework entirely. An alternative theory is provided by the behavioural life-cycle works of Shefrin and Thaler (1988), in which it is held that consumers operate mental accounts supporting different discounting regimes for their various consumption decisions. Allocating between accounts enables consumers to engage in *income smoothing*, something impossible to recover from the present-value dynamic programming problem suggested by the LCM. To my knowledge, there have been no formal attempts to model bequest in such a framework, and in spite of the obvious difficulty of defining the parameters of these rather nebulous mental accounts, it does seem possible to explain bequest in this way, though not without appealing to a further assumption of altruism. This might be conceived of as a so-called ‘bequest account’. Such an approach may indeed bear the fruits of further research.

To see more clearly the nature of the assumptions underlying the Altruistic Bequest motive, it helps to develop an explicit framework in which to model such bequests. For this, we will rely on the approach first developed by Yaari (1965) and later by Davies (1981), which assumes an intertemporal optimisation framework with constant relative risk aversion (CRRA), constant impatience parameters and constant income.⁹

⁸ See for example Romer (2000)

⁹ This analysis chooses not to jeopardise the parsimony of the model through the introduction of stochastic processes in any of the parameters, as the conventional wisdom on randomness in LCMs suggests results are largely unaffected by such complications. It is worthy of note, however, that in a recent paper, Chamberlain and Wilson (2000) consider an infinite horizon consumption path with stochastic r and y , and find that with a sufficient degree of uncertainty, consumption grows without bound *even when* $E(r) = \rho$. When applied to

$$(II.2.1) \int_0^T e^{-\rho\tau} u(c(\tau)) d\tau + e^{-\rho T} v(w(T))$$

The symbols are defined as follows:

r – market rate of interest

ρ – subjective discount factor

γ – coefficient of relative risk aversion

τ – current time period

c – consumption

w – wealth

g – defined as $\frac{r - \rho}{\gamma}$

T – time of (certain) death

This is a straightforward optimal control problem, which implies a level of bequest which is a linear function of initial wealth,¹⁰ as in:

$$(II.2.2) B(T) \equiv w(T) = \frac{e^{rT} w(0)}{1 + \frac{1}{g-r} - \frac{1}{g-r} e^{(r-g)T}}$$

provided we are prepared to make explicit the scrap value function by assuming the disponent internalises the beneficiary's utility of consumption function, as in:

$$(II.2.3) u(c(\tau)) = v(w(T))$$

Equation (II.2.2) is strictly positive, indicating the wealth constraint (no borrowing) commonly imposed on such problems is not binding. But for most realistic parameter values

bequest, this has the potential to explain higher levels of residual wealth in both intended and accidental bequest frameworks than constant parameter models. An analysis of this kind may represent a useful – if somewhat mathematically obtuse – addition to the literature.

¹⁰ see Appendix B for the solution method.

(II.2.2) implies that $\frac{B(T)}{w(0)}$, that is the ratio of bequest to initial wealth, will be of the order of 0.01 to 0.15, implying only about 1 - 15% of retirement wealth is still held at death¹¹.

Even so, (II.2.3) is a strong assumption, because it implies that there is no penalty, in an impatient world, to the disponent of structuring the transfer so that it takes place at the very last moment of her life. And yet, if she wishes to transfer to the next generation because she cares about her beneficiaries, it is only consistent to assume she also must take into account their impatience. In this case, we should add an additional penalty to such vicarious consumption arising from transfers which take place ‘at the death bed’, as in

$$(II.2.4) \quad PV(c(\tau))^{\text{beneficiary}} = e^{-\theta\tau} \frac{c(\tau)^{1-\gamma}}{1-\gamma}$$

i.e. the present value of the beneficiary’s consumption utility reflects her impatience, through the additional subjective discount factor θ . In this case, provided the disponent internalises her beneficiary’s impatience, the solution for altruistic bequest, though still strictly positive, is even further reduced:

$$(II.2.5) \quad B(T) \equiv w(T) = \frac{e^{rT} w(0)}{1 + \frac{1}{g-r} e^{\frac{\theta}{\gamma} T} - \frac{1}{g-r} e^{\left(r-g+\frac{\theta}{\gamma}\right)T}}$$

and $\frac{B(T)}{w(0)}$ should be expected to be of the order of only .01 to .05.¹² However, surveys

show that even the higher percentages are still way too low. For example, using data from the HRS, AHEAD and CODA surveys, Hurd and Smith (2001) estimate US bequest (intended and actual) as a proportion of total wealth held at survey age (59-61) to be between 53.8% and 87.9%, depending on the age cohort; while for Japan Horioka et al (2003) estimate planned bequest to be 61% of total household wealth (assuming $r=.02$).¹³

¹¹ See Appendix C

¹² See Appendix B

¹³ See Hurd M. and Smith J. (2001) *op cit.*; also Horioka C., Yamashita K., Nishikawa M.,

Finally, it is through the explicit modelling of the altruistic bequest motive as a scrap value argument that we can see most clearly the theoretical fallacy of the assumption; namely that the motive implies there is some special bonus to consumption enjoyed vicariously at the very end of the life-cycle, which cannot be attained during the life-cycle of the disponent via a transfer to the beneficiary *inter vivos*. This can be easily appreciated by considering exactly what is the agent's instantaneous utility of consumption enjoyed at period T :

$$(II.2.6) \quad u(c(T))^{Altruism} = e^{-\rho T} \frac{c(T)^{1-\gamma}}{1-\gamma} + e^{-\rho T} \frac{w(T)^{1-\gamma}}{1-\gamma}$$

But were the same agent to structure the transfer at any moment prior to T , the second term drops out altogether, lessening her utility considerable. In this way, it should be clear to the reader that there is nothing natural about the altruism assumption, despite its popularity in the literature. Further, as will be shown in Part II, tests based on empirical evidence presented in this paper show, under very weak assumptions, very little support for the altruistic bequest motive.

Chapter II, Section 3

Exchange Bequest

In this case, the disponent extracts a service or particular behaviour from the beneficiary, with the promised ‘payment’ or reward for such behaviour being the inheritance to be received. The foundation paper is by Bernheim, Summers and Shleifer (1985). The ‘service’ could be anything from caregiving for an elderly parent, to acquiescence in marrying a spouse from a particular social class. Recent empirical studies have not lent much credence to the exchange motivation (see, for example, McGarry (2001), or Light and McGarry (2003)), and it is easy to see why. In any bequest game, the bequeathing parent ‘moves’ last and therefore has a unilateral ability to deviate from any agreement. The child, knowing this, should not be so gullible as to render the service, and so the model collapses. It is only by imposing an underlying assumption of altruism and asymmetric information that exchange bequest models can force an equilibrium in positive bequest space.

Like altruism itself, the theoretical foundations of the exchange bequest model, based on underlying altruism, leave us with the impression of a certain degree of artificiality. Because in all likelihood the consideration will occur *inter vivos*,¹⁴ we would expect the commensurate transfer to do likewise. It is only in circumstances in which the transfer is manifest in an indivisible asset, such as a family home, that this asymmetric chronology of exchange seems plausible.

Even so, the inherent paradox of the underlying altruism assumption is not easily dispelled. If it is the case that the transfer occurs primarily because the parent cares about the child, and only under particular circumstances can she credibly threaten her with disinheritance, we cannot expect the strategic motivation to assert itself as a *general* motive, but much more as a special case.

In Chapter IV two simple tests for exchange bequest using the cross-section of Irish Probate data are suggested based on weak assumptions of the likely nature of an exchange bequest.

¹⁴ Of course, this need not *necessarily* be so. We did come across individual wills in which the disposition of an estate held in trust was made conditional on some *future* form of consideration. In particular, one estate was recorded in which the decedent left a gift to a beneficiary conditional on his marriage before his 50th birthday. While this may not have been permissible under Probate Law, it nevertheless illustrates an *intended* motivation.

Chapter II, Section 4

Accidental Bequest

In the case of Accidental Bequest we needn't assume the disponent cares at all about her beneficiaries, but rather we allow in a typical life-cycle model for the possibility that an individual's lifetime may be uncertain. Cautious agents are unwilling to let assets run to zero and the residual wealth left over upon death is an 'accident'. Unless the agent lives much longer than expected, this residue could be a substantial amount. In his seminal paper, Yaari (1965) first introduced an intertemporal optimisation model in which uncertainty of life expectancy effects consumer behaviour. He showed that, under certain assumptions, and in the absence of actuarially fair insurance (in the form of life annuities), the effect of uncertainty is to slow the growth of consumption throughout the life cycle. Davies (1981) extended this analysis to formally model the individuals' lifetime consumption path under conditions of both certainty and uncertainty, and showed that, given higher levels of relative risk aversion (generally greater than unity), the need to hold 'precautionary' wealth in the life cycle may help explain the phenomenon of slow dissavings.

It is worth devoting rather more attention to the formal, explicit modelling of the accidental bequest motive in the LCM framework, though at the risk of repetition of previous work (Yaari (1965), Stull (2004)), because the bequest motivation introduced at the end of this paper, that of mortality confrontation costs, is modelled as an extension of the life-cycle model with uncertain lifetime. We note the value function for a dissaver under uncertain remaining lifetime becomes:

$$(II.4.1) \quad V = \int_0^{\infty} P(\tau|0) e^{-\rho\tau} u(c(\tau)) d\tau$$

where $P(\tau|0) < 1$ is the survival function (giving probability of survival to age τ). In effect, the agent is infinitely lived, but survives to age infinity with probability zero. An appropriate functional form for $P(\tau|0)$ is found in the Weibull function; in particular it is convenient to

normalize the shape parameter to unity to obtain a closed-form solution.¹⁵ Then (II.4.1) becomes:

$$(II.4.2) \quad V = \int_0^{\infty} e^{-b\tau} e^{-\rho\tau} u(c(\tau)) d\tau$$

This is a simple optimal control problem, the solution to which is readily found to be:¹⁶

$$(II.4.3) \quad \frac{\dot{c}}{c} = \frac{r - \rho}{\gamma} - \frac{b}{\tau}$$

for the optimal consumption path. Note that consumption growth is everywhere slower than under certainty; as intuition would suggest: Agents are more reluctant to spend given uncertainty of remaining lifetime. Making use of our state equation, and evaluating the wealth path at expected lifetime,¹⁷ we can obtain an expression for expected bequest:

$$(II.4.4) \quad B(\bar{T}) = w(0)e^{\left(\frac{g-r}{b} - \frac{1}{\gamma}\right)\bar{T}}$$

In contrast to the bequest prediction of the altruism assumption, this ‘residual’ or ‘accidental’ bequest has the potential to explain a higher ratio of bequest to initial earnings, perhaps as

high as $\frac{B(\bar{T})}{w(0)} = 0.2$, depending on parameter values. This is particularly relevant when we

explore the possibility of combining altruism with uncertain lifetime, because it can be shown that, except in the case of very low risk aversion (i.e. gamma of the order of only about 0.5), it is this precautionary savings motive that informs the bequest decision.¹⁸ In other words, even if altruism is a legitimate feature of agents’ behaviour, these models imply that it is unlikely to actually influence their level of bequest.

¹⁵ This is largely done for expositional purposes. In order to truly utilise the model for econometric testing, the shape parameter is indispensable, in which case the reduced form solution to the model can only be found through numerical methods. Such an exercise is beyond the scope of this paper.

¹⁶ See Stull (2004, op cit)

¹⁷ see Appendix D

¹⁸ This is to say that, in expectation, the presence of uncertainty ensures the disponent will leave more than enough of a bequest in order to act in a way that is ‘altruistically’ optimal. See Stull (2004, pp 35).

And there again, if we match even these models, with their higher $\frac{B(\bar{T})}{w(0)}$, against empirical reality we find they still come up short.

Nor is the theoretical framework employed entirely satisfactory. It should be remembered that the accidental bequest model, as evoked above, rules out *ex hypothesi* the possibility of agents purchasing life annuities to insure against the risk of living ‘too long’. This represents a theoretical shortcoming that cannot be fully resolved. Davies, who first confronted the possibility in his 1980 paper, was content to dismiss *a priori* the possible role of life annuities based on the observation that “they do not generally occur”. In doing so he is specifically not taking full account of the implications of life annuities, as Yaari’s main conclusion was that rational consumers with von Neumann-Morgenstern preferences should, in the absence of a bequest motive, wish to hold all of their wealth in the form of such assets. Instead, Davies points to the poor performance of life annuities markets to justify the assumption that regular savings instruments strictly dominated annuities. Davidhoff et al. (2003), who show that under weak assumptions (and – as always – assuming no bequest motive) annuities should dominate conventional savings instruments, as long as the rate of return on the former is greater than that on the latter.

Even in the absence of such a critique, it should be clear that Davies’ dismissal of life annuities is *circulus in probando*. He observes that life annuities are not chosen, based upon which he constructs a theory in which life annuities are not chosen to explain why life annuities are not chosen. Here the accidental bequest model has come full circle. As before, neither the pure life-cycle dissavings conclusion nor the Yaari-modified annuitisation conclusion describes the behaviour of pensioners in the real world. As Davidoff et al. (2003) notes-

...few people voluntarily annuitize outside of Social Security and formal benefit plans

This ‘annuity puzzle’ remains the most forceful result of the entire discussion. It would seem, therefore, that in order to explain non-bequest motivated wealth holdings by individuals in the life-cycle end-phase, we need a richer understanding of annuities markets. Milevsky and Young (2001) point to the importance of *option value* of holding liquid assets over (irreversible) annuities in determining the optimal timing for annuitisation. This is an

appealing argument, but it is unlikely to completely explain the annuity puzzle, especially when we consider that the problem of adverse selection is only aggravated by this delay. Specifically, their analysis holds the return on annuities constant over different potential investment periods, but the problems of adverse selection might mean this return would be sensitive to investors' age.¹⁹ Davidoff et al. (2003) advance a number of possible explanations, which may work in concert to explain 'underannuitisation'. Specifically, an incomplete market for other types of insurance may bear some of the responsibility, while at the same time, by allowing for habit formation in the consumption models they show a reduced value in annuitisation for those consumers whose initial standard of living is high relative to their stock of wealth at retirement (i.e. the 'bad planners').

While all of these explanations are plausible, there is at least one major facet of empirical reality that is not explained, and that is the relative success of state pension schemes over private life annuities. If non-variable life annuities were as unappealing a prospect as the above solutions to the annuities puzzle suggest, it seems unlikely that virtually every democratically elected government in the developed world could put into place a *compulsory* retirement system around which a large majority of retired persons structure their estate planning. The theorist is therefore faced with an even more perplexing problem; namely how to explain the unpopularity of private life annuities, given the outstanding popularity of public pension schemes which play a role similar to that of the private life annuity. It is this theoretical flaw in the accidental bequest argument that leads us to consider a more rigorous alternative, that of Mortality Confrontation Costs, to be discussed in Chapter V.

In conclusion, it is certainly reasonable to augment any LCM to allow for the inherent uncertainty of the individual's lifetime, and the possible consequences this may have for her estate planning. But it is by no means clear that such a model, on its own, will provide us with a plausible theoretical foundation for the study of bequest behaviour in the main. The accidental bequest motive poses as many questions as it answers.

In Chapter VI, we explore further tests of the accidental bequest motive making use of the cross-section of Irish Probate data, and find weak evidence in support of an accidental bequest motive.

¹⁹ This result is owed to Brugiavini, A (1993) op cit.

CHAPTER III

Section 1

Description of the Data

The data gathered for the purposes of testing bequest motives consists of a cross-section of 1,069 observations on Irish estates filed in the Dublin Probate Office between January 1991 and October 1999.²⁰ The sample contains only records in which the disponent (decedent) was primarily resident in the State,²¹ held positive Irish assets, was of age, and was unmarried or widowed. Records were drawn at random and disregarded if any of these criteria were not met.

The requirement that disponents held positive Irish assets was largely designed to ensure the omission of obvious outliers from the data set. In theory, there is no real incentive for Probate to be filed on an estate with no positive assets, and so such records seemed often to be related to extraneous legal contingencies, such as the discharge of a stipulation in the will of a different estate, or the discharge of an encumbrance on a piece of family property. Often for such records, the gap between the Probate filing and the date of death of the decedent was substantial, again throwing off the data set.

Likewise, records for which the decedent was not yet of age were taken as obvious (and tragic) outliers; disregarded because such decedents have no legal prerogative to dispose of their assets, and hence cannot have a bequest preference, as such.

The need to disregard the estates of married persons arises from the provisions of the Irish Succession Act of 1967, in which a disinheritance of the Spouse is *de jure* disallowed, and in general surviving spouses are guaranteed a two-thirds share of the estate, regardless of the provisions of the testament.²² This law is the only *prescribed* case in which the Irish Courts

²⁰ Manual data collection took place in March and April of 2004 at the Probate Office in Smithfield, Dublin 7. Special thanks to Deirdre Farrell and the entire Probate team for their excellent assistance.

²¹ The 'State' is given to mean the territories of the 26 counties of the Republic of Ireland. A number of records for decedents residing in Northern Ireland (the 'six counties') but possessing Republic of Ireland assets, were disregarded to avoid difficulties of interpreting the effects of various Inheritance Law and Probate Administration.

²² See http://www.solicitor.net/wills_and_probate.asp for a brief summary of the relevant act.

legally interfere with the disposition of an estate. As such, we consider that the estates affected by this law may not accurately reflect the bequest intentions of the disponent, and hence are to be disregarded. In effect, we are choosing to view a married couple as one legal and economic entity entirely; the death of one spouse does not yet constitute an actual bequest, in our sense of the word.

The extent to which this assumption may introduce some bias into our analysis of bequest motivation is unclear. As we are concerned with *motivations*, elements of the law that constrain behaviour distort the empirics. It may well be that married spouses would – in the absence of such laws – happily leave their better half with *less than half*, not to mention the requisite two-thirds. In such a case, the fact of a legal constraint may alter their behaviour in various ways; for instance by encouraging a steeper consumption path to front-load utility where spousal bequest is unwanted. Then the (ultimately) observed bequest of the final surviving spouse is associated with a consumption path that was structurally broken at the point of death of her husband.

In gathering the sample, special attention was paid to ensuring randomness. The records were stored alphabetically by year of Probate application, regardless of whether the file contained an estate by will or intestate. This was convenient, in that it allowed us to draw records at random from the shelves, and so establish a natural randomness between these two types of estates, which will prove important for some of the tests that follow.

A good faith effort was made to select records based on the first letter of the surname found *in rough proportion* to that letter's prevalence. Hence, for example, twice as many records for surnames beginning with 'M' or 'O' were selected as for surnames beginning with 'B' or 'A', because these former letters are roughly twice as prevalent in Irish estates as the latter. Failure to do this could bias the sample in a number of ways, the most obvious being that ethnicities are in part reflected by the first letter of the surname. For example, were we to take as many Z's as O's, we might end up with a disproportionate number of records for Zimmerman and Zucker, relative to O'Reilly and O'Mahoney. These former decedents, being German or perhaps Jewish, are unrepresentative of the Irish population as a whole, and may well evince different wealth and bequest profiles. In an Irish context, the most important ethnic distinction is no doubt between Protestants (Church of Ireland) and

Catholics, with the former sect seeming overrepresented, particularly in the A's, B's and C's, while the latter sect was overrepresented in the K's, M's and O's.²³

Each record included two substantial documents from which data could be drawn:

1) A copy of the will (for testatacies) OR a copy of the Letters of Administration (for intestacies): This document stipulates the disposition of the property (though not its value) and also contains the names and addresses of the beneficiaries. It is dated, so that it is possible to know – for a will – how much time had passed between the drafting of the will and the death of the disponent. In certain cases, explicit information about disinheritance, exchange bequest and other facets of estate planning were included extraneously in the testament.

2) An Inland Revenue Affidavit: Because of the presence of an Inheritance Tax, namely, Capital Acquisition Tax (CAT), Irish Probate Law requires that every estate for which Probate is filed must include said Inland Revenue Affidavit.²⁴ This Affidavit is to be completed, in general, by the Executor of an estate by will; or by the Administrator of an estate intestate. It includes a large amount of information pertaining to the decedent, the composition and value of the estate, the names of and relationship of the beneficiaries to the decedent. This, combined with the information gleaned from the will itself, provides the variables for each observation.

Table 1 below lists some of the main variables used in the tests and the corresponding mean value for that variable.

The sample dramatically overrepresents female disponents (over 60%). This is a reflection of the provision to exclude all records for which there is a surviving spouse. As a result of the fact that wives generally outlive their husbands; and also the fact that men tend to marry women younger than themselves, we have in effect disregarded a larger proportion of male records than female records from this sample. How important this may be in terms of drawing inference from the data is not altogether clear, but McGarry (2001) finds no evidence of bequest motives differing by sex and, for this data set at least, there doesn't

²³ It was almost always possible to determine the religious persuasion of the decedent, based on information about the Parish, and I conducted a number of quick surveys to ensure I wasn't biasing for or against a particular letter or ethnicity.

²⁴ See Appendix E.

appear to be major differences by sex in other respects (the composition of the estate, number of beneficiaries, propensity to cohabitate with beneficiary).

Table 1 - Variables and Mean Values, Irish Probate Records

Variable		Mean Value
Male=1	(SEX)	.393
Age at Death	(AAD)	77.1
Dublin=1	(DUB)	.518
Value of Estate*	(VAL)	£73,662
Value of Property*	(PRO)	£42,345
Value of Liquid*	(LIQ)	£29,824
Value of Insurance*	(INS)	£446
Value of Inheritance*	(I)	£27,508
Number of Beneficiaries	(NUMB)	3.84
Testament=1	(TES)	0.801
No. of children	(NUMK)	1.96
Occupation (207 observations only)		-
Disinherit=1	(DIS)	0.145
Cohabitate=1	(LIV)	0.231

*constant 1988 Irish punts

The mean age at death of the sample dramatically overstates the statistical life expectancy at birth for the relevant cohort,²⁵ for two obvious reasons. Firstly, the aforementioned overrepresentation of women (who live longer), and secondly, because the filing of Probate is biased towards ‘established’ decedents, who have lived long enough to accumulate substantial assets.

The variable *DUB* assigns a dummy to estates for which the address of the disponent was in County Dublin. It may seem surprising that this is ‘only’ at 51.8%, given that all of the records were drawn from the Dublin Probate Office, and that there are 13 regional offices at which Probates can also be filed. The Probate officials who helped with the record collection

²⁵ Life expectancy at birth for the cohort 1925-1927 was 57 years old for men and 58 years old for women. (Source: CSO, 2000)

speculated that this may be attributed to two factors; one, that the solicitors charged with the administration tended to be based in the capital city, and two, that in some cases executors and administrators may have wished, for whatever local motives, to create a physical distance between the neighbourhood of the estate and the public record governing its dissolution. Clearly, it would have been better to obtain records in equal proportions from all Probate offices, but this was not a practical option available to this researcher. The extent to which this facet of the record collection may create a regional bias is hence unclear, and so the following analysis will refrain from drawing any inferences from the geographic distribution of the estates.

The 'Value' variables provide information in constant 1988 Irish Pounds of several key variables. A number of points should be noted here. The Value of Inheritance variable contains only an average for beneficiaries who received an 'inheritance' as opposed to a 'gift' or 'remembrance', which I have defined to be any transfer valued below £1,000. Liquid assets were any bank account holdings, stock certificates, bonds or cash holdings. There was another category listed on the Revenue Affidavit – Value of Effects, which includes personal items such as jewellery or house wares – but these are not included because they were deemed to be sufficiently small as to be unimportant. Furthermore, as the inclusion of such items is difficult to audit, there is evidence that only some Executors and Administrators took these into account; in many cases effects were inexplicably zero. A few observations for which the Value of Effects was very large were dropped altogether during the compilation phase. All assets are those held in the Republic of Ireland. There were a number of cases of foreign assets filed (especially UK stock holdings), but these observations were dropped for consistency's sake.

The breakdown of the Number of Beneficiaries variable by testate and intestate revealed that the averages were almost the same, (intestate was slightly higher), but the former had a much lower standard deviation (1.01 for testate versus 1.63 for intestate). This was largely owing to a small number of intestacies for which no close relatives were found, and the estate was divided among myriad distant relatives.

The Number of Children variable describes the number of children (biological and adoptive) who survive the decedent. The data derives mostly from a question on the Affidavit, though in some cases data from the wills themselves was manually used to augment the record. In

only one case of testacy was this data point unrecoverable, though it is unclear to what extent entries of zero might actually reflect lack of information, as opposed to absence of children. In all cases of intestacy for which observations were recorded the data point was included; the small number of intestacies for which this was not so were omitted as being incomplete Probates.

There was a question on the Affidavit relating to Occupation, a variable which would have proved extremely useful in creating controls for the various tests, however, the information was unfortunately not provided for a large number of observation. Either the field was ignored completely, or in many cases for men the occupation was listed as 'Retired' or else as 'Gentleman'; while for women it was often listed as 'Housewife'. Consequently, there were only 207 observations for which occupation could be usefully and reliably ascertained. This notwithstanding, the occupations for the 207 recorded entries are listed in Appendix F and are classified according to whether they are "Professional" or "Non-professional".

The variable *DIS* (*disinherit*=1) is a dummy to describe situations in which a clear disinheritance of a direct heir (such as a son or daughter) has taken place, to the benefit of an equal or inferior heir. For example, it could be a case where one son is disinherited in favour of another son, or both children are disinherited in favour of a nephew (inferior heir). Situations in which one direct heir received only a nominal gift (of £1,000 or less) was considered a disinheritance, but where inheritances were unequal yet substantial (over £1,000) for all direct heirs, the *DIS* dummy recorded 0.5. In so rigidly defining the criteria for disinheritance, I have deliberately leaned on the side of caution. This may prejudice the analysis towards underrepresentation of the extent of actual disinheritance, but – on the other hand – family circumstances can often be quite complicated, and what may appear to be an inequitable disinheritance from the evidence of the Probate records can, when the actual circumstances are known, in fact be quite a deal more equitable. For instance, it may be the case that a particular child receives the family home as benefit, but it may equally well be that that child had purchased the same property for the enjoyment of the parent a number of years earlier; which fact is nowhere recorded in the Probate.

Under Irish Law, beyond the Spouse, there is 'freedom of testation', by which is meant there are no prescribed provisions to protect the Inheritance interest of any heirs except those of the Spouse. This situation contrasts markedly with that of other European states, such as

France or Germany, in which disinheritance of a direct heir is possible only in part, if at all.²⁶ It is however possible in Ireland for disinherited direct heirs to contest the will, which results in court proceedings. But such cases seem to be quite rare; in over a 1,000 records, not a single such contested will was encountered. In light of this, the very fact that nearly 15% of estates in the sample exhibit evidence of disinheritance is quite remarkable, and would seem to call into question the wisdom of those countries' legal frameworks, in which freedom of testation is not practiced.

The variable *LIV* cohabitate=1 is a dummy created to describe situations in which at least one of the named beneficiaries has the same listed address as the decedent. In many cases, beneficiaries' addresses were either incomplete or omitted entirely, and hence the mean of .231 may well understate the extent of cohabitation between disponers and beneficiaries.

²⁶ This difference in laws governing disinheritance may well have a practical dimension. Land holdings in Ireland are typically very small, and a legal system which forces the further subdivision of these holdings may have been anathema to the interests of the land-owning classes of the past.

Chapter III, Section 2

Stylised Facts about the data

The data reveal a number of interesting stylised facts that may help put Irish bequest in a clearer context.

Correlation between number of children and the value of the estate

There was virtually no simple correlation between the number of children and the value of the estate, these two variables having a Pearson's Coefficient of Correlation of only 0.01. This result may seem somewhat surprising for bequest theories predicated on an assumption of Paternalistic Altruism, as it would seem to indicate, at first glance, that parents are indeed no more likely to care about leaving money to their children than are their unattached peers. There are a number of potentially confounding factors at work here, however. In the first place, it may be that persons without children or with smaller family may have belonged to higher income cohorts during their working careers, and hence had more money to spend. Additionally, it may be that the presence of a large family encouraged more transfers *inter vivos*, so that there is less in the way of wealth left over for bequest. For this reason, a Pearson's Coefficient of Correlation was also calculated for the variables Value of Estate and Children=1, a dummy for having any children whatsoever. Here the result was even less correlative, at 0.004. So while it may not be possible to say there is evidence against Paternalistic Altruism, there is at least no clear evidence for it.

In all events, this result is important, since this lack of correlation will allow us to conduct several tests for which a strong correlation between family size and value of estate could prove confounding.

Value of Dublin estates versus non-Dublin estates

Dublin Estates were worth more than country estates. The average value of a Dublin estate was about £89,000 (in constant 1988 prices), while the average value of a country estate was only £56,000. This is not a surprising result, and is more than likely owing to the higher value of residential dwellings in Dublin relative to the rest of the country. Moreover, the sharp spike in property values, which affected Dublin properties to a greater extent, tended to

accentuate this discrepancy for observations from later years of the sample, so that by 1999 Dublin estates were actually worth twice what country estates were worth.

Charitable giving

Charitable Giving was low. Only 2.5% of all beneficiaries were recorded as 'Charity', these being mostly local parishes or charities associated with the Church or various religious orders. Broken down by estate as opposed to by beneficiary, the figure is slightly higher at 4.5%, but this still contrasts markedly with the situation in other countries, for instance in the United States, where – according to IRS statistics – 16.8% of all 1998 estate tax decedents, and 12.5% of all Probate decedents, left charitable bequests.²⁷ This relative lack of emphasis on charitable bequest in Ireland seems surprising, given the fact that the Irish non-profit sector was, in 1995, proportionately the second largest in the world (Keane, 2003).

However, it is worth noting that while the number of bequests to charities was quite small, the amount of each bequest made was relatively large, being £35,341 in constant 1988 prices. This compares with an overall Value of Inheritance of £27,508.

Gifts to non-consanguine beneficiaries

Gifts to non-consanguine beneficiaries were a relatively prominent feature of the data. In contrast to charitable bequests, the number of beneficiaries being private persons but listed as having no blood relation to the disponent was a surprisingly high 7.2%. Further, the *value* of these gifts was higher on average, at £47,919, in constant 1988 prices. This may have been so largely because the average number of beneficiaries for estates bequeathing to non-consanguine beneficiaries was significantly below the average (2.11 as opposed to 3.84), rather than implying any fundamental difference between the underlying bequest behaviour.

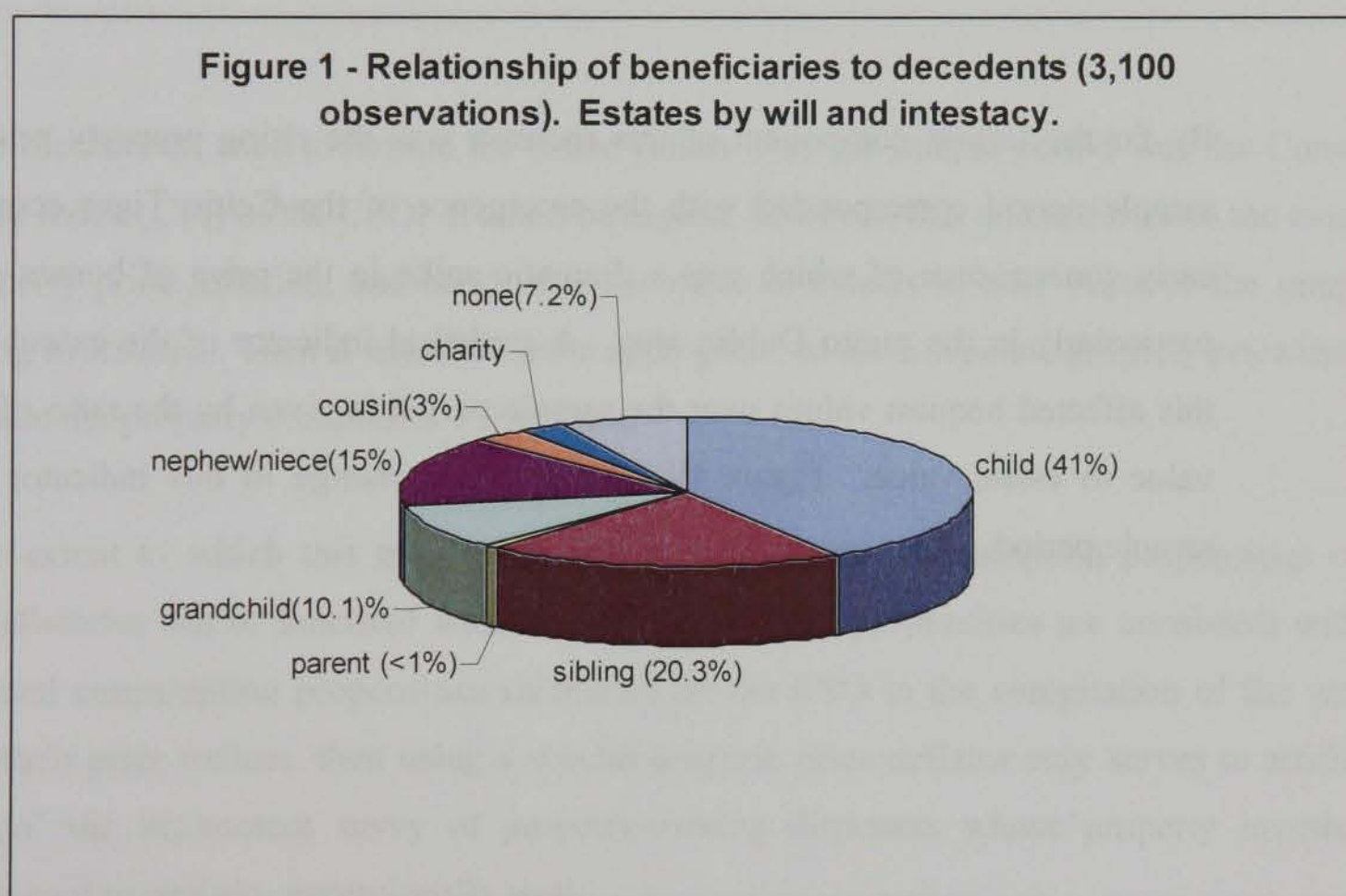
In many cases, it was impossible to ascertain the nature of the relationship between disponent and non-consanguine beneficiary (friendship, romantic attachment, perhaps even children born outside of marriage), but in a limited number of cases there was evidence that bequests

²⁷ In this context, estate tax decedents are the subsample of probate decedents whose estates exceeded the estate tax threshold. In 1998 this threshold was \$625,000. See: "Federal estate tax returns, 1998-2000 - Statistical Data Included", *Statistics of Income Bulletin*, Spring (2002) available online at: http://www.findarticles.com/p/articles/mi_m2893/is_4_21/ai_90116650/pg_9

were made in an exchange bequest sense, with ‘acts of kindness’ being stated as an explicit motive in the will. It should also be noted that the 7.2% is for all estates, including intestacies. If these are excluded, the figure jumps to 9%.

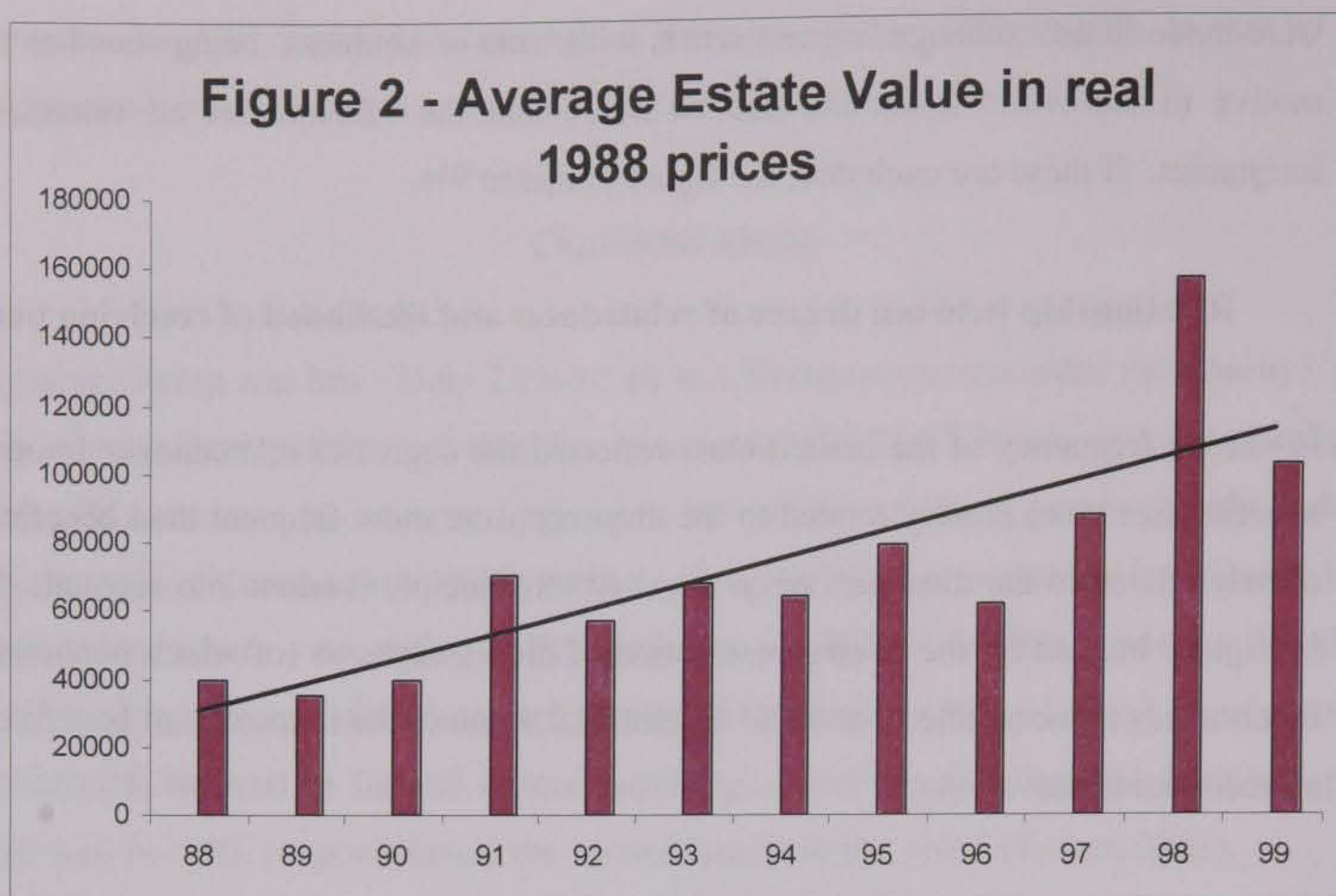
Relationship between degree of relatedness and likelihood of receiving benefit

In all, the frequency of the benefit class reflected the degree of relatedness. In other words, beneficiaries more closely related to the disponer were more frequent than beneficiaries less closely related to the disponer, when the survival principle is taken into account. This trend is slightly bucked by the overrepresentation of nieces/nephews (of which nephews received inheritances twice as often), at 15%. Figure III.2.1 shows the frequency of benefit classes for all recorded observations.

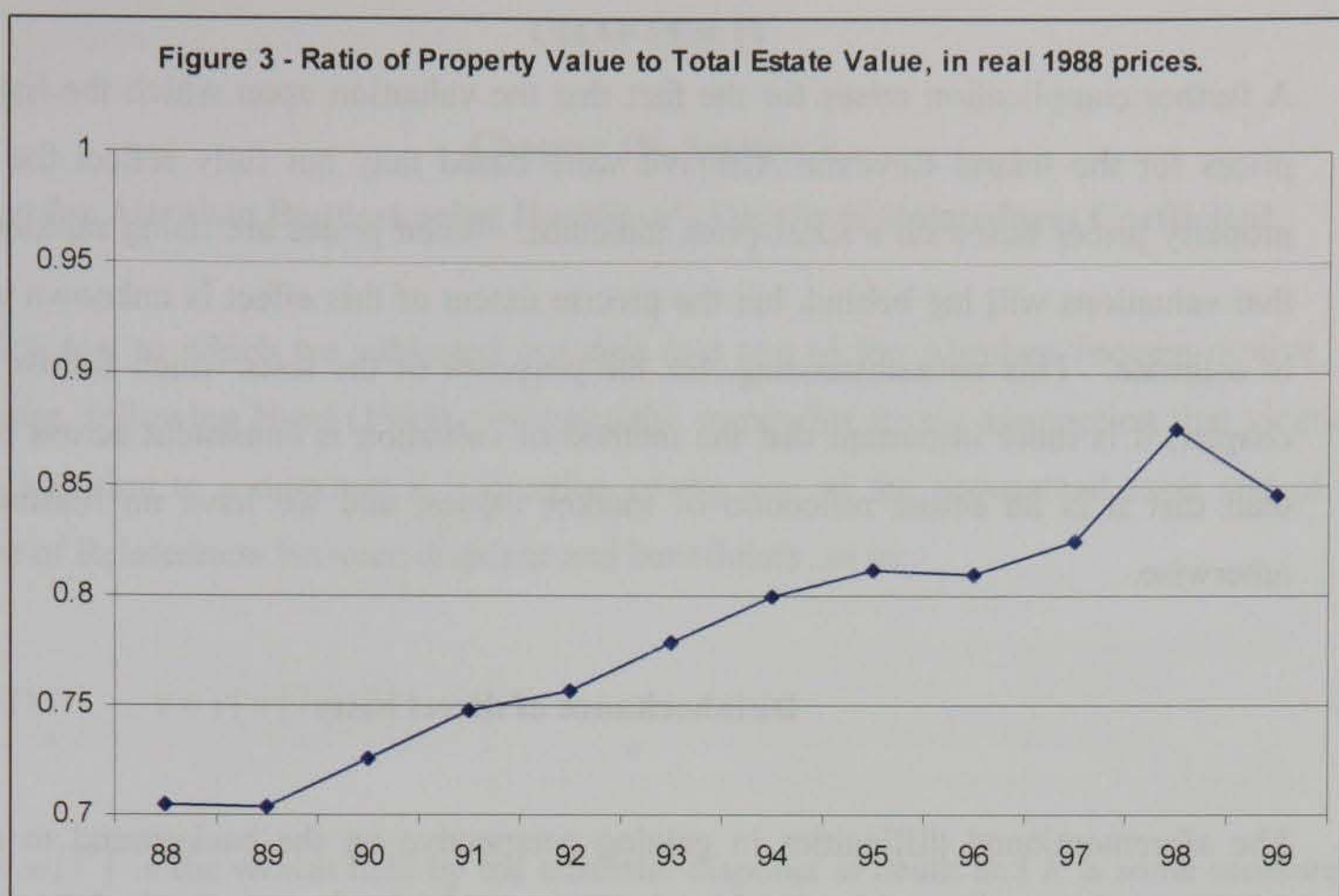


Evolution of estate values over the sample period

The rise in estate values in the 1990s was considerable, even once inflation is taken into account. Figure III.2.2 shows the increase in average estate value in constant, 1988 prices over the sample period.



By far the largest component of this increase was the rising property prices. The sample period corresponded with the emergence of the Celtic Tiger economy, an early consequence of which was a dramatic spike in the price of homes and land, particularly in the metro Dublin area. A statistical indicator of the extent to which this affected bequest values over the sample period is given by the ratio of property value to estate value. Figure III.2.3 shows the change in this indicator over the sample period:



The mechanism used to deflate the estate values over the sample period was the Consumer Price Index (CPI) of the CSO. It could be argued, however, that this understates the extent of property price inflation, and hence that the value of estates in later years of the sample is being overstated. Then it would be more appropriate to use a separate property price index to deflate the property component of the estate.

The extent to which this may be so will depend on the consumption propensities of the beneficiaries out of inherited wealth. Insofar as these propensities are consistent with the general consumption propensities calculated by the CSO in the compilation of the weights for their price indices, then using a special property price deflator only serves to artificially ‘undo’ the investment savvy of property-owning disponers whose property investments happened to perform exceptionally well.

It is, however, likely that the average propensity to consume property *out of inherited wealth* is greater than the average propensity to consume property *out of all wealth*. Many beneficiaries may for instance simply hold on to the property they inherited, which is an APC of 1. But in the absence of a clear indicator of what these propensities might be, we adjudge it better to retain the general CPI deflator, and simply make note of the role played by rising property prices in the sample.

Table IV.1.2 - Hamilton Coefficients

Degree of Relatedness	Child	Sibling	Grandchild	Nephew	Niece	Cousin	Second Cousin
<i>R</i>	0.5	0.5	0.25	0.25	0.25	0.125	0.0625

Now we wish to ascertain whether the value of an inheritance was related to *R*. In order to do this, we may adopt two approaches, the calculation of the simple Coefficient of Correlation and a more rigorous Multiple Regression approach.

Pearson’s Coefficient of Correlation:

A straightforward method of determining a relationship between kinship and inheritance value is arrived at by means of a simple coefficient of correlation. In doing this, we calculate the statistic for two samples; the sample as a whole and the subsample of observations for which beneficiaries are consanguine (i.e. relations only). This should help isolate confounding factors such as discrepancies in the wealth path or number of beneficiaries between disponers with and without benefiting relations. The results of this test are as follows:

Whole Sample	(n=2373):	<i>r</i> = -0.01
Sub-sample (relations only)	(n=2127):	<i>r</i> = 0.07

Here, in fact, the whole sample correlation is slightly negative, while the sub-sample correlation is positive. A negative correlation indicates a lower value of inheritance for closer relations, while a positive correlation indicates relatedness is associated with higher values of inheritance. But in both cases, the correlation is slight, indicating only a weak relationship between the two variables, if at all.

Multiple Regression:

have very real consequences for the values of bequest motive testing based on *R*, particularly for rural, tradition populations in Ireland, and speaks for an inclusion of the DUB dummy in the D-o-R altruism test.

The technique of multiple regression allows for the simultaneous control of various potentially confounding factors, and thereby enables the researcher to isolate the partial effects of each given cause.

Here we wish to estimate the regression equation:

$$(IV.1.2) \qquad I_i = \beta_0 + \beta_1 R_i + \beta_2 NUMB_i + \beta_3 TES_i + \beta_4 DUB_i + \beta_5 AAD_i + u_i$$

The results of the multiple regression are listed in Table 3.

Table IV.3 – Results for the multiple regression, Equation (IV.1.2)

X	Coefficient	Standard Error	P-value
β_0	3195	13,537	0.8134
<i>R</i>	977	9,703	0.9198
<i>NUMB</i>	1062	431	0.0138
<i>TES</i>	14,203	4,159	0.0007
<i>DUB</i>	9947	3,241	0.0022
<i>AAD</i>	27	162	0.8657

As can be seen, the *R* coefficient is not even close to statistical significance, indicating no evidence of a relationship between kinship and value of inheritance. In order to check whether this might be owing to differences in underlying wealth paths for the respective groups, we referenced the 207 observations for which occupation (as a proxy for lifetime income) was available, to check for potential discrepancies between those decedents who had close relatives and those who did not. The mean *R* for disponers classed as non-professional was .368 (165 observations); for professionals (admittedly only 41 observations) the number was only slightly lower, at .346. The relative proximity of these two coefficients suggests that lifetime income did not differ with respect to degree of relatedness, and supports the application of this method for testing Altruism.

In summary the results of the two tests on Degree-of-Relatedness show that there is no visible evidence in the sample that altruistic bequest is taking place, based on the assumption that altruistic disponers' vicarious utility is a function of their kinship.

These tests are certainly not a conclusive disproof of the Altruism bequest motive, however. We cannot know the extent to which wealth paths differ across disponers with different kinship profiles; nor can we ever fully convince ourselves that the vicarious utility underlying the altruism assumption is any lessened by a lack of consanguinity. After all, the most prominent category of beneficiary (omitted from our analysis) is by far the spouse, a party we hope and expect to be largely – if not entirely – non-consanguine.

In order to shed some more light on the Altruism case, we shall now turn to a test that does not require strong assumptions about the nature of the vicarious utility enjoyed by the disponent, but depends rather on the weaker assumption of preference ordering, with which we no doubt feel much more comfortable.

Chapter IV, Section 2

Testing for an Altruistic Bequest motive using Tax Elasticity of Bequest

Whatever the relationship between kinship and vicarious utility may or may not be, it seems entirely plausible to assume that vicarious utility for the altruistic disponent will be a function of value of the bequeathed asset to the beneficiary. This value, in turn, will be reduced, depending on the level of death duty charged to the transfer. One would expect therefore, that a necessary condition for altruistic bequest to take place is that disponents must be sensitive to changes in the death duty. Such test based on the 'Tax Elasticity of Bequest' – to coin a phrase – represent a necessary condition for altruistic bequest. As such, they may serve us to test *against* the possibility of altruism, but not *for* it; for even in the event of sensitivity to estate taxation on the part of disponents, we cannot rule out other bequest motives, such as Exchange Bequest.

There have been two main forms of death duty in Ireland in recent years: Probate Tax and Capital Acquisitions Tax (CAT). In principle, ascertaining changes to either of these taxes should help isolate the necessary condition for Altruistic Bequest. In practice, however, CAT is a much more elusive system, which has been subject to frequent alteration. Appendix E provides a timeline for major changes to legislation governing estate tax in Ireland in recent years.

Effective the 18th June 1993, apparently as a stopgap measure to avoid a fiscal shortfall, the Government of Ireland announced the introduction of Probate Tax. It was to take effect immediately, thereby making the impact of its introduction largely unexpected for estate planners. The tax was calculated at a rate of 2% on a large percentage of virtually all estates passing through Probate. Although there was a nil threshold, this was initially set at only £10,000. The thresholds were raised in line with inflation, but at least until 1999, over 95% of estates in the sample paid Probate tax. Table II.4.4 shows how the nil thresholds were increased over the period 1993 to 1999.

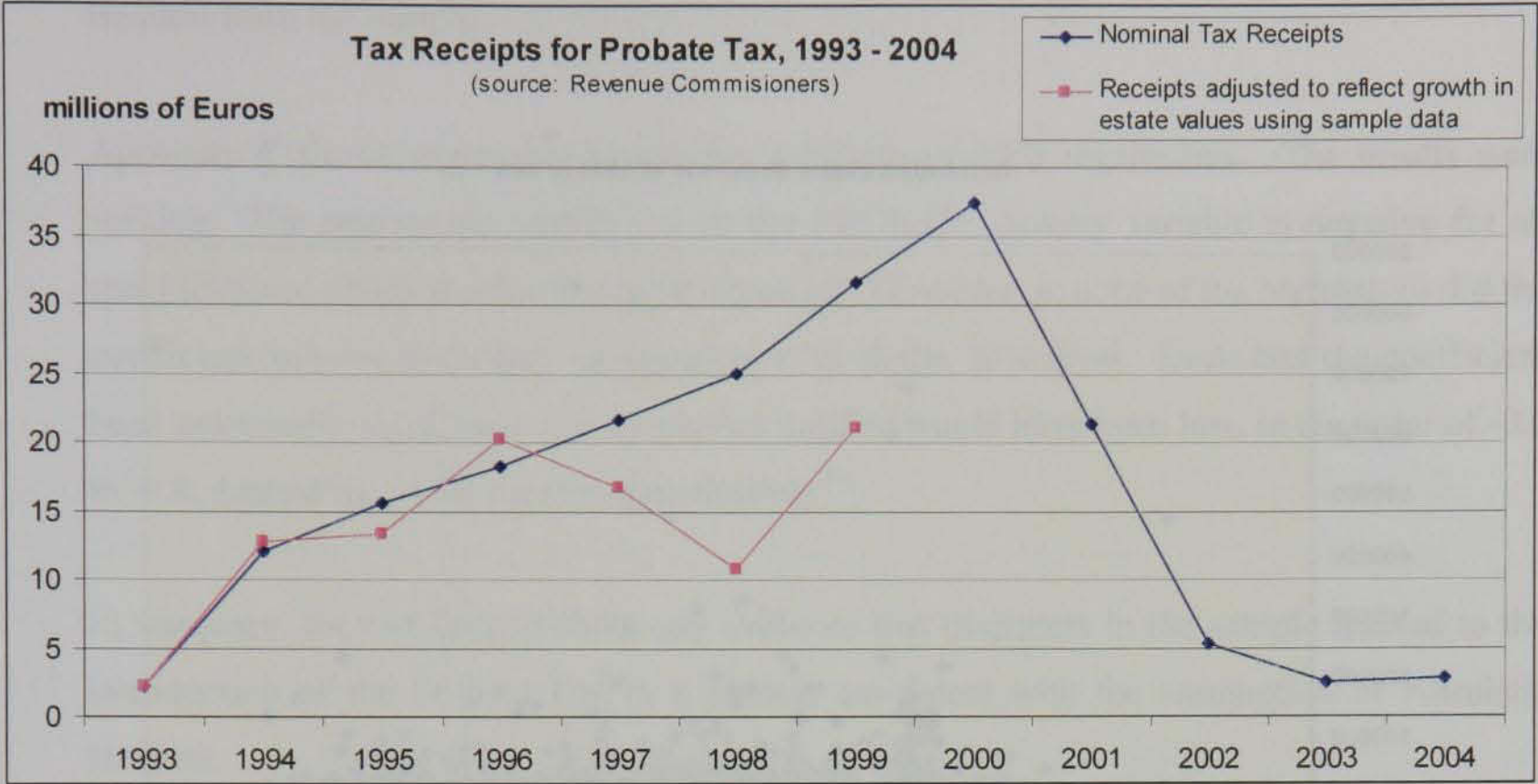
Table IV.2.4 – Nil thresholds evolving over the relevant sample period. Probate Tax charged at 2% on all excess. (source: Revenue Commissioners)

Year	Index Factor	Exemption Threshold (£)
1993	1	10,000
1994	1.015	10,150
1995	1.039	10,390
1996	1.065	10,650
1997	1.082	10,820
1998	1.098	10,980
to 30/11/99	1.125	11,250
from 1/12/99	1.015	40,000

Unlike Capital Acquisition Tax (CAT), Probate Tax was much more straightforward and could be reliably assumed to affect all estates in rough proportion to the estate value. Unlike CAT, there was no complicated structure of thresholds and exemptions making it near impossible to anticipate the extent to which changes may or may not impact upon bequest behaviour. Additionally, CAT is an *inheritance* tax; in that it is charged to the beneficiary on the sum of her lifetime benefits – whether through inheritance or gift – while Probate Tax was a *bequest* tax, in that it was charged to the Estate of the disposer, irrespective of the beneficiaries.

Figure IV.2.4 shows the evolution of Probate Tax receipts. As an overall trend, the tax take to the Revenue from Probate Tax remained roughly constant over the initial 5-year period of its incidence, if we control for the growth in estate values. Note that the initial spike in tax receipts is owing to the fact that the tax took effect more than halfway through the 1993 Fiscal Year. But from 1994 to 1999, we can see that the receipts adjusted for estate value increase remain roughly constant. Adjusted data for 2000 and beyond is not available, since this is out of sample, but the sudden downwards spike in 2000 clearly reflects the abolition of Probate Tax. Receipts, however, do not drop to zero, since the Revenue still requires Probate Tax payment on estates *filed* after 2000, but for which the decedent died between 1993 and 2000

Figure IV.2.4



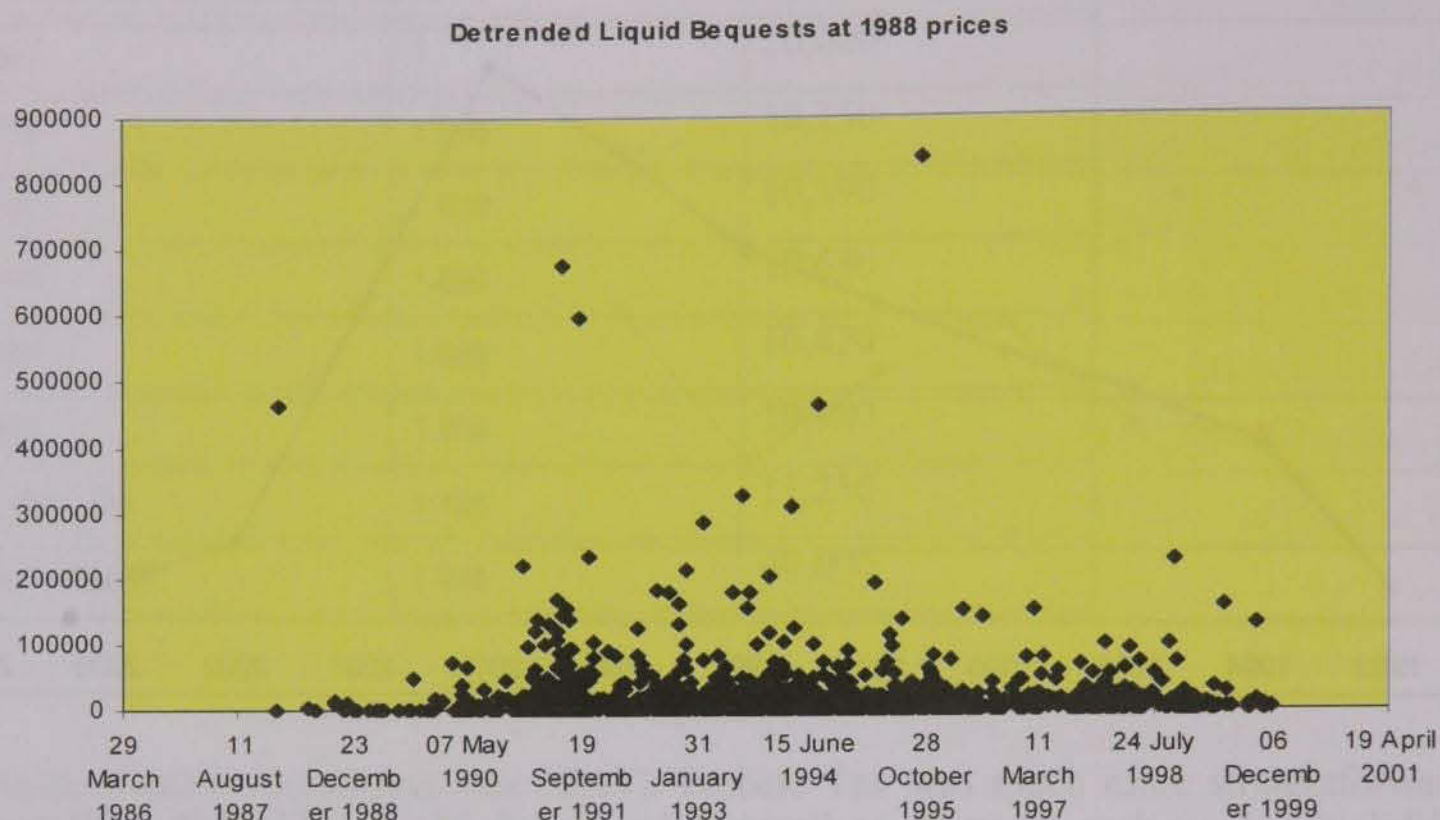
While the above does not prove or disprove the strength of a Tax Elasticity of Bequest, it is reassuring to see such a large degree of constancy in the tax over the period of its incidence. The presence of large and sudden jumps would complicate the interpretation of the elasticity calculations.

In order to calculate the effect of the introduction of the tax on the behaviour of the decedents in sample, we must first detrend the data. To do this, we choose a simple method of detrending by regressing the log of the estate value on the year of death of the decedent, as in:

(IV.2.1) $\ln(VAL) = \beta_0 + \beta_1 YOD + \varepsilon$

The estimation of 4.1 for the sample of all observations yields us $\beta_1 = 0.05$; implying a 5% annual growth rate for estates.

Figure IV.2.5 shows the scattergram of value of (detrended) liquid assets over time. As can be seen above, there is no discernible pattern in the distribution of liquid asset values in the sample estates over time.



To test this more formally, we first create a new dummy variable, *PROBATE* to describe the structural break implied by the imposition of the tax in late June 1993. This dummy returns 0 for estates for whom the decedent died prior to the introduction of the Probate Tax, and 1 for all estates thereafter. We then proceed to estimate the equation

$$(IV.2.2) \quad LIQ_i = \beta_0 + \beta_1 PROBATE_i + \gamma' \mathbf{X} + \varepsilon_i$$

where $\mathbf{X}$ is a vector of variables that may include any of the following auxiliary variables: *DUB*, *NUMB*, *NUMK*, *SEX*, *AAD*, *DIS* and *LIV*. The dependent variable is the value of the liquid estate, detrended (as described above) and deflated to 1988 prices. Note we concern ourselves only with liquid assets, which include cash in the bank, stocks, bonds and other financial instruments that could – in theory – be readily disposed of in response to an unfavourable tax change. The disposition of Property and Effects is considered to be too rigid for an observable elasticity to emerge in response to a sudden – and relatively small – tax change of this nature. In this way, we hope to isolate any possible evidence of elasticity, and hence demonstrate a necessary condition for Altruistic bequest. Conversely, in the

absence of any evidence, we suggest that this constitutes some evidence against Altruistic Bequest from the sample.

Appendix F shows regression results for a battery of TEB regressions. The results were striking. The sign on the coefficient on the *PROBATE* dummy variable is negative for all specifications, which is what would be expected. However, in none of the regressions did the coefficient achieve statistical significance, even at the 90% level. Even *had* the coefficient been statistically significant, the elasticities implied would have been low, in the order of -0.6 to -0.8, depending on the precise specification.³⁰

In summary, the test fails to show any evidence that disponers in the sample reacted to the introduction of the Probate Tax in a manner consistent with the assumption of Altruistic Bequest.

It should be stressed that this is by no means a conclusive test of altruism. There are a number of potential criticisms that could be made. In the first place, it is uncertain the extent to which disponers may have been unaware of the introduction of the Probate Tax. Perhaps the sensitivity to the change emerged in a latent fashion for some disponers, and so the calculations of the elasticities for what might be genuinely responsive estates are confounded by an unobserved lag effect for other observations.

Also, there is some question around the assumption that agents nearing their final moments are in a position to recalibrate their consumption decisions as prices change; whether these be with regard to personal consumption or vicarious consumption. In many cases, dying estate planners may be physically incapacitated, mentally unfit or otherwise unable to engage in the optimal planning they may otherwise desire. Indeed, it may be that perfectly altruistic estate planners actually base their bequest decisions on projected beliefs about the future cost of bequeathing, made at a much earlier (and healthier) point in the life-cycle. If such were the case, it should come as no surprise to us that elasticities for estate taxes are low.

³⁰ Tax Elasticity of Bequest here is calculated as

$$TEB = \frac{\overline{TAX}}{\overline{LIQ}} \cdot \frac{\% \Delta LIQ}{\% \Delta TAX} \Rightarrow \frac{0.02(26,270)}{26,270} \cdot \frac{\beta_1}{0.02} \Rightarrow \frac{\beta_1}{26,270}$$

Chapter IV, Section 3

Testing for Exchange Bequest

In many ways, testing for the possible presence of exchange bequest in the sample is the most difficult task of all. This is because we cannot know the precise nature of the exchange, and therefore it is difficult to determine which observations may have engaged in exchange behaviour and which not.

It may help first to look at those observations for which explicit evidence of an exchange bequest was provided. This usually occurred through statements in the will in which the disposition of a benefit was specifically related to some action or behaviour on the part of the beneficiary.³¹ Not surprisingly, there were only a limited number of observations for which this evidence was present, 23 to be precise; representing less than 1% of all estates in the sample. This sub-sample is by no means large, making statistical inference difficult. However, it is at least worth noting that such ‘reward’ beneficiaries received a mean benefit of only £3,451 (1988 punts), well below the overall mean benefit of £27,508.

Another potential indicator of the presence of exchange bequest is the extent to which cohabitation with the disponent may have impacted the disponent’s propensity to bequeath. Whatever the precise nature of the exchange, it seems at least reasonable to presume that it is more likely to take place for disponent/beneficiary pairs who are in close proximity to one another, than for those who live far apart.

To test this, we made use of the *LIV* dummy variable discussed earlier. But the value of a simple binomial variable was questionable, given that the issue is not that exchange bequeathers necessarily reside *with* beneficiaries, but rather that they reside *near* them. It then made sense to modify the variable to allow for scoring in the manner laid out in Table IV.3.5.

³¹ The most usual phrasing was “For her many acts of kindness shown to me I hereby bequest to my neighbour

Table IV.3.5 – Modified Cohabitate Variable for Exchange Bequest testing

Description	LIV =
Beneficiary lives with disponder	1
Beneficiary lives in same county as disponder	0.5
Beneficiary lives outside county / different country	0

Equipped with this, the Pearson’s Correlation Coefficient for the variables Inheritance and (Modified) Cohabitate were calculated. The result was a Coefficient of 0.12. While this has the expected sign, suggesting positive correlation between proximity and value of inheritance, the score is relatively low, and does not provide much in the way of evidence for exchange bequest.

Of course, this test is extremely limited. We cannot control for a variety of potentially relevant factors, such as the extent to which proximity may be an indicator of lifetime income.

Another potential test relies on a comparison of the benefit values within a given estate for the subsample of observations for which there was at least two daughters, one of which cohabitated with the decedent. The restriction of daughters is for the purposes of comparing like with like. Although one cannot know the precise nature of the exchange bequest, we may assume a prominent form of exchange bequest involves some form of lifetime care for the parent,³² for which cohabitation is a likely proxy. Generalising, it is likely to be daughters, not sons, who might provide or not provide this kind of exchange benefit.

Table II.5.6:

Subsample n=90	Number	Mean Benefit	Mean <i>DIS</i>
Cohabiting sister	90	£35,890	0.225
Non-cohabiting sister	121	£31,002	0.225
All such sisters	211	£33,087	0.225

³² Indeed, Light and McGarry (2003) explicitly point to care as the main form of exchange bequest.

The size of this subsample was unfortunately only 90 observations. For these estates, the mean value of *DIS* was 0.225. Rather surprisingly, this was lower than for the whole sample of direct heir, multi-sibling estates, implying a lower propensity to disinherit among the multiple sister, one-sister-cohabitating subsample. However, as Table II.5.6 shows, the value of benefit for the cohabitating sister *was* higher, albeit not significantly so. It was not possible to control for income in this (already small) subsample, because for only 12 of the 90 observations was the Occupation variable given.

In summary, while we must acknowledge that these tests are at best rudimentary, it is nevertheless true that they fail to provide evidence for exchange bequest in the sample. Indeed, while it may be possible to draw no real inference from the tests at all, their inclusion serves at least to indicate the direction such testing might take, given more complete data and a larger number of observations.

Subsample n=90	Number	Mean Benefit	Mean DIS
Cohabitating sister	90	0.225	0.225
One-sister-cohabitating sister	11	0.200	0.212
All main sisters	114	0.228	0.225

Chapter IV, Section 4

Testing for an Accidental Bequest motive using an Asset Ratio test

From the mathematical modelling of Accidental Bequest in a life cycle framework, as discussed in the first section, it should be clear that the bequest predictions are subject to a number of parameter specifications. This creates a degree of difficulty in testing the theory, regardless of the quality of the data at hand, because changing assumptions about parameters which are difficult to pin down will allow a researcher to justify virtually any level of observed bequest – from zero to 100% of wealth at retirement or more – in terms of the model.

In particular, the Accidental Bequest model is especially sensitive to specifications of the parameter governing risk aversion, γ . This makes sense, since the crucial aspect of accidental bequest is that disponers hold precautionary savings to ensure against the risk of living too long. The more risk averse they are, the higher they rate the risk of outliving their savings, the more they will insure against this. But estimates of γ in the literature vary quite substantially, as Hurd (1999) points out, and so there is the temptation to indulge in *circulus in probando* insofar as we define observations for which there is below average estate savings to be less risk-averse than those who shore up a disproportionate wealth of retirement assets.

Even with a panel long and wide enough to control for these effects, there is the problem that Accidental Bequest is *expected* bequest, while data can only ever yield us *actual* bequest. But even in the event of good estate planning, an ‘unlucky’ disponent might live twenty years longer than anticipated, and end up throwing herself on the Parish doorstep in a manner that would seem to contradict bequest theory altogether, when in fact the theory was correct. In other words, for every observation there are two error terms; that relating to the general error of omitted variables and measurement imprecision, etc.; and that relating to the standard deviation of the survival function.

Given this, it may prove more fruitful to attempt to test for Accidental Bequest based on a different design than that of the straightforward wealth path. That can be accomplished using our cross-section, if we are prepared to make some additional assumptions.

1) That expected lifetime is constant across observations. This may be taken to mean, in particular, that estate planners themselves have no better idea of the parameters of their survival function than the non-specific statistics relating to their cohort as a whole. The strength of this assumption is perhaps a matter of debate, but it is at least reasonable to presume that the assumption grows weaker as the age of the cohorts approaches the mean life expectancy, and the sample age standard deviation approaches zero. For our sample, average age was 77.1 years, and the standard deviation was not high, at 11.

2) That retirement dissavers spend liquid assets before property. Again, how strong this assumption might be is not entirely clear. Certainly, there is a country-specific aspect to the assumption that seems highly relevant in light of the Irish data in use here. A propensity to own and invest in one's own home is a clear feature of Irish life and portfolio composition, with Ireland having some of the highest rates of home ownership in Europe³³.

The strongest part about this assumption is the case in which a retiree may spend down her liquid assets to a certain point, then sell her property, amass a new stock of liquid assets and proceed to spend these down as her retirement advances. In such cases it becomes difficult to test for accidental bequest using asset-class ratios. However, we may be able to eliminate many such cases by restricting our analysis to those observations for which property represents at least some of the value of the estate at death. This, in particular, will apply to decedents who may have been forced to liquidate the family home to discharge debts or nursing home costs incurred in their later years. Their plight – though sad – must be ignored due to its discontinuous effect on the asset ratio.

If assumption (2) holds, then it should be the case that disponers whose sole plan for retirement wealth is to hold precautionary savings for the remainder of their (uncertain) lifespan will hold a larger proportion of their assets in property as they advance in age. Furthermore, if assumption (1) holds, then we can infer that older decedents in the sample will have a lower ratio of liquid assets to total assets than younger ones.

³³ see, for example: *Home Ownership and Social Inequality in Comparative Perspective* Edited by Karin Kurz and Hans-Peter Blossfeld (eds.) Stanford University Press (2004)

In order to conduct the asset ratio test, we first construct a new variable, $\left(\frac{LIQ}{VAL}\right)_i$, which is the ratio of liquid assets to total assets held by the i^{th} estate, in constant 1988 prices. Then, restricting ourselves to the subset of property-holding observations only³⁴ we estimate the model

$$(IV.4.1) \qquad \left(\frac{LIQ}{VAL}\right)_i = \alpha_0 + \alpha_1 AAD_i + \beta' X + \varepsilon_i$$

with **X** being a matrix of explanatory variables.

The results of the estimation are given in Table 6

Table IV.4.6 - Results of Asset Ratio Test (final specification)

X	Coefficient	Standard Error	P-value
α_0	0.3045	0.0681	0.0001
AAD	-0.0015	0.0009	0.0908
NUMK	-0.0015	0.0036	0.0001
NUMB	0.0174	0.0034	0.0001

n=722, R²=0.07

In this, the final specification, the AAD variable is barely significant at the 10% level. The sign is negative, as expected, indicating that decedents of greater age held a smaller percentage of their estate in liquid form. Thus, the test indicates some measure of support for the Accidental Bequest motive in the data. It should be noted, however, that the results were sensitive to specification, and the inclusion of other explanatory variables destroyed the statistical significance of the AAD variable altogether.

Criticisms of the test remain, even given acceptance of the two assumptions mentioned above. Most obviously, it is not clear to what extent differences in lifetime income (unobserved in the sample) may be affecting both length of life and asset composition. It

³⁴ It goes without saying that we also eliminate observations for which *LIQ* was zero; since we cannot cope with variables that have infinite values. In all, we are reduced to 722 observations for this test.

may be that higher earners live longer and hold more of their assets in stocks and bonds, in which case the test is understating the extent of accidental bequest.

CHAPTER V

Chapter V, Section 1

Summary of Findings

The examination of bequest motives conducted in Chapter II of this paper reveals a number of inconsistencies – both theoretical and empirical – associated with each of the motives standard in the literature. The concept of dynasty is a conceptually appealing paradigm within which we can seek to understand the interrelationships of successive generations, but it is too vague that we might harness any real predictive power from it. A dynasty can exist in so many potential manifestations it is difficult to isolate a particular behaviour for modelling and hence testing. Furthermore, in order to test such a multi-generational phenomenon, we would need a very long panel indeed. To my knowledge, no such data exists. In this paper, we present only a general model for dynasty to illustrate the principle, but we cannot test for it using our data.

Altruism is the classic and most commonsensical of bequest motives. In some papers, in fact, it is referred to merely as ‘the bequest motive’. Unfortunately, this popularity equates neither to theoretical consistency nor to empirical reality. Under the weakest of assumptions about how rational consumers behave, the presence of altruistically motivated vicarious utility should generally lead to a higher instance of *inter vivos* transfers, not to bequest. Modelling altruistic bequest in the life cycle model as a scrap value term leads to a predicted level of bequest well below what is commonly found among disponers. In terms of the tests presented in this paper, we find no evidence of altruism as a bequest motive in our sample.

Likewise, the exchange bequest motive convinces us neither in theory nor in practice. The Nash Equilibrium required to sustain an exchange strategy is not fundamentally stable, and the dependence on an underlying assumption of altruism is equally questionable. In Chapter IV, we conducted two brief tests based on an assumption of cohabitation as a proxy for likelihood of exchange. While we acknowledge that these tests are by no means conclusive, the sample nevertheless fails to provide any clear evidence that exchange has played a role in the bequest decisions of our decedents.

Accidental bequest seems to have the strongest theoretical foundation and, as the model developed in Chapter II illustrates, has the potential to predict levels of bequest more in line with what has been observed. The Asset Ratio test constructed in Chapter IV reveals some evidence of accidental bequest in the sample, although statistical significance is only barely achieved.

This success notwithstanding, there remain serious concerns about the completeness of this theory. The most forceful criticism remains the under-annuitisation of dissavers in the (uncertain) life cycle. If it is the case that agents only fail to dissave because of the risk of living too long, then an annuity would seem like the obvious choice, even if this instrument were to carry a heavy load. A further criticism, related to the theory presented in the next section, is the assumption that certainty of lifetime is a costless benefit to a life cycle planner. It is far from certain that agents would, if given the choice, wish to know the precise day, hour, minute of their death. But the simple LCM implies such perfect knowledge would be a strict utility improvement.

In the next section we explore a version of the uncertain lifetime LCM that allows for a information about ones remaining lifetime to be costly, by making the standard deviation of the survival function a choice variable in the intertemporal optimisation problem. This model is presented in the concluding section in order to highlight its role as an indicator of future possible work, and the fact that the model is neither fully solved nor tested.

Chapter V, Section 2

Mortality Confrontation Cost

Reconsider equation (II.4.1):

$$(II.4.1) \quad V = \int_0^{\infty} P(\tau|0) e^{-\rho\tau} u(c(\tau)) d\tau$$

as a special case of a more general specification:

$$(V.2.1) \quad V = \int_t^{\infty} P(\tau|t) \cdot \beta \cdot u(c(\tau)) d\tau - \frac{\alpha}{\sigma}$$

where α is defined as the (exogenous) parameter controlling Mortality Confrontation Cost (MCC), the cost to an estate planner of knowing with greater precision the timing of her own death. So for $\alpha = 0$, the two value functions above are the same and mortality confrontation is always costless. This is in effect the standard LCM specification discussed in Chapter II, Section 4.

Now, for the sake of exposition, let us assume a logistic survival function as in:

$$(V.2.2) \quad S(t) = 1 - CDF \Rightarrow \frac{e^{-\frac{t-\bar{T}}{\sigma}}}{1 + e^{-\frac{t-\bar{T}}{\sigma}}}$$

so decreasing σ will cause the *PDF* to collapse to $\bar{T}$, the mean of life expectancy. In other words, as sigma is decreased, the standard deviation of the survival function tends towards zero, and the agent knows the timing of her own death with certainty.

But this knowledge is not costless, as an inspection of equation (V.2.1) reveals. For any finite α , as σ tends towards zero, MCC tends towards infinity. In this way, an agent may know for certain her remaining lifetime and optimise her estate planning accordingly, but only at the expense of infinite utility lost on mortality confrontation. Prosaically, she may spend her every cent on whatever whims she may entertain in the certain knowledge that she

cannot outlive her assets, but is so haunted by the spectre of her pending death, that her life is nevertheless utterly miserable.

Conversely, as σ is increased, MCC tends towards zero for any finite α . But this too comes at a cost, as the agent's knowledge of remaining lifetime becomes progressively worse, with the value function flattening out to an infinite horizon. In this way, the agent behaves as if she were infinitely lived, but must maintain a high wealth path and thereby forego any utility benefit from dissavings.

If we make σ be a choice variable, it should be possible to determine a vector of optimal solution paths, $(c(t)^*, \sigma^* | w(0))$, through intertemporal optimisation. Of course, the solution set must then be constrained, as in

$$(V.2.3) \quad \sigma^* \geq \bar{\sigma}$$

where $\bar{\sigma}$ is the lowest possible standard deviation nature will allow.³⁵ If σ^* is everywhere below $\bar{\sigma}$, then the MCC constraint is not binding and (V.2.1) is just a monotonic transformation of (II.4.1).

The general solution of this model involves numerical differentiation methods and simulation that takes us beyond the scope of this paper. However, we may consider the special cases of 'extreme' MCC. The first of these is the case where $\alpha = 0$, which is in effect the model we have already discussed in Chapter II, Section 4.

The second is the case of absolute unwillingness to accept mortality, i.e. $\alpha = \infty$. In this case, the only way an agent can avoid utter misery (defined as $V(c, t, \sigma) = -\infty$) is by choosing $\sigma^* = \infty$, so every optimal solution set must include this value. At $\sigma^* = \infty$, the probability of surviving to the next period, $P(\tau | t)$, equals a trivial constant, k , which does not exert influence on the value function.

³⁵ In the absence of intervention from the supernatural, it cannot be that an agent chooses to know the timing of her death with greater precision than the inherent uncertainty of the universe and the state of technology permit.

The solution is:³⁶

(V.2.4) $B(\bar{T}) = w(0)e^{g\bar{T}}$

Which can be written directly as a ratio of bequest to initial wealth:

(V.2.5) $\frac{B(\bar{T})}{w(0)} = e^{g\bar{T}}$

Recalling that g is defined as $\frac{r-\rho}{\gamma}$, it is clear that only discrepancies between the market and subjective impatience parameters allow for any divergence from 1 in this ratio. In any case, the potential for high bequests to occur is evidently provided for in this specification

³⁶ See Appendix I

Chapter V, Section 3

Policy Implications and Further Work

The implementation of an efficient taxation policy for inheritance will necessarily imply different rates of taxation for different transfer motivations. For dynasticism, a tax on capital transfer is exactly equivalent to a tax on wealth holdings, as the recipient (beneficiary) is in effect an *extension* of the donor (disponer). It can be argued that tax on wealth is inefficient and undesirable for a number of reasons; not least of which that it is widely perceived to impinge on property rights in a way that taxation of economic *activity* (i.e. *generation* of income, *transfer* of wealth, *appreciation* of capital, *consumption*) does not.

In Ireland, the tax system is already predicated to an extreme degree on the notion of dynasticism. For example there is an enormous difference between the tax-free threshold for an inheritance from a parent (for 2003: €402,253.02) to that for an inheritance from a non-relation (for 2003: €20,112.65). To the extent that dynasticism is not informing the bequest decision this bias against non-consanguine bequests may be inappropriate.

Furthermore, there are perhaps good reasons to discourage dynastic bequest, should it truly exist. Disadvantages of dynasticism include equity concerns, and productivity gains through greater within-generation meritocracy.

We can conceive of altruistic transfers as a form of consumption on the part of the disponer. As such, it seems appropriate to relate the level of tax on altruistically transferred assets to the current schedules for consumption taxes. But this is difficult to do in practice, especially when, as I have made clear, only a small proportion of transfers under the assumptions of altruism will take place as bequest. Other, *inter vivos*, transfers are indistinguishable to the Revenue from transfers made under other motivations.

Exchange bequest is essentially a form of income on the part of the beneficiary; therefore logic dictates it should be taxed as income. However, as previously discussed, exchange seems unlikely to represent a significant part of bequest behaviour.

The Accidental motive provides the widest scope for the efficient taxation of bequests. Since we consider only the disponer's welfare loss, it follows one could tax these bequests at

100%, with no loss to efficiency. The difficulty lies in ensuring the bequest motivation is truly accidental. Fortunately, intestacy provides a clear mechanism for signalling indifference to the disposition of an estate on the part of the decedent. If disponers *knew* their estates would be taxed at 100% were they to die *in testate*, the default division feature of Probate law could no longer be relied upon by altruistically motivated disponers as a mechanism for ensuring disposition, and all remaining intestacies would represent true indifference towards the fate of the estate. Incumbent estate planners would of course need an opportunity to transition to this policy, which might be accomplished through the imposition of a run-up period, in which disponers would be made aware of the changes in taxation.

Based on what has been discussed under the other motivations above, it is realistic to expect bequests to contain an increasing degree of accident as the values rise, as other motivations drop out by default. This effect can be encouraged by a tax regime that penalises disponers who opt to rely on Probate as a mechanism to allocate their wealth.

Further work in this area could include the application of the tests proposed in this paper to a wider cross-section of Probate records. It would be useful to compare the cross-sectional approach for Irish data to that of another country. The construction and inclusion of a test for mortality confrontation cost, either in the cross-section or in a panel, would also represent a logical extension of this work.

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Appendix A

For the derivation of the dynastic bequest model we have value function:

$$(II.1.3) \quad V = \ln(k - a) + \ln(f(a) - b) + \ln(f(b) - c) + \ln(f(c))$$

with First Order Conditions from the maximisation with respect to the choice variables:

$$(A4) \quad \frac{dV}{da} = 0 = \frac{-1}{k - a} + \frac{f'(a)}{f(a) - b}$$

$$(A5) \quad \frac{dV}{db} = 0 = \frac{-1}{f(a) - b} + \frac{f'(b)}{f(b) - c}$$

$$(A6) \quad \frac{dV}{dc} = 0 = \frac{-1}{f(b) - c} + \frac{f'(c) - c}{f(c)}$$

and from here we can simplify and substitute to obtain:

$$(II.1.4) \quad \begin{aligned} a &= k - \frac{f(c)}{f'(a)f'(b)f'(c)} \\ b &= f(a) - \frac{f(c)}{f'(b)f'(c)} \\ c &= f(b) - \frac{f(c)}{f'(c)} \end{aligned}$$

which implies that the ratio of bequest to lifetime earnings will be falling from the first generation to the next whenever:

$$(A7) \quad \frac{a}{k} = 1 - \frac{f(c)}{f'(a)f'(b)f'(c)k} > \frac{b}{f(a)} = 1 - \frac{f(c)}{f'(b)f'(c)k}$$

which simplifies to:

$$(A8) \quad f'(a) > 1$$

and, conversely, rising whenever

$$(A9) \quad f'(a) < 1$$

In steady state, we have that

$$(A10) \quad f'(\cdot) = 1$$

and

$$(A11) \quad \frac{x_t}{f(x_{t-1})} = \frac{x_{t+1}}{f(x_t)}$$

where x is the bequest for a steady state generation. Note this is not to suggest that bequests are constant in the steady state; rather that a constant portion of lifetime income is bequeathed for every generation.

In general, we might expect dynasties to start out relatively poor, and so the steady state should be reached from a successive reduction in the size of bequests, from the initial position. This is consistent with a conception of early generations sacrificing greatly to ensure the prosperity of future generations.

Appendix B

The expression for utility for retirement dissavings is

$$(II.2.1) \quad \int_0^T e^{-\rho\tau} u(c(\tau)) d\tau + e^{-\rho T} v(w(T))$$

For intertemporal optimisation, we consider the integrand

$$(B.1) \quad H = e^{-\rho(\tau)} \frac{c^{1-\gamma}}{1-\gamma} + \lambda (rw(\tau) - c(\tau))$$

The first order conditions are³⁷:

$$(B.2) \quad \frac{dH}{dc} = 0 \equiv e^{-\rho\tau} c(\tau)^{-\gamma} - \lambda = 0$$

$$(B.3) \quad -\frac{dH}{dw} = \dot{\lambda} \Rightarrow \lambda r + \dot{\lambda} = 0$$

Differentiating (B.2) with respect to time:

$$(B.4) \quad \dot{\lambda} = -\rho e^{-\rho\tau} c(\tau)^{-\gamma} - e^{-\rho\tau} \dot{c} \gamma c^{-\gamma-1}$$

And substituting (B.4) and (B.2) into (B.3):

$$(B.5) \quad e^{-\rho\tau} c(\tau)^{-\gamma} r + \left(-\rho e^{-\rho\tau} c(\tau)^{-\gamma} - e^{-\rho\tau} \dot{c} \gamma c^{-\gamma-1} \right) = 0$$

Simplifying:

$$(B.6) \quad \frac{\dot{c}}{c} = \frac{r - \rho}{\gamma}$$

³⁷ Here, we are assuming the rate of interest and the subjective discount factor(s) are constant over time. These, along with the intertemporal separability of utility, are the strong assumptions required to make the problem tractable.

which is a standard result in optimal control theory. It says that the growth rate of consumption is positive whenever the market is more impatient than the consumer. The denominator tells us that, given a positive (negative) discrepancy between market impatience and consumer impatience, the pace of consumption growth (shrinkage) will be slower the more risk averse the consumer.

The solution to (B.6) is

$$(B.7) \quad \dot{c} - \frac{r - \rho}{\gamma} c = 0$$

Let $g = \frac{r - \rho}{\gamma}$, which is constant, then we have:

$$(B.8) \quad \dot{c} - gc = 0$$

$$(B.9) \quad c(\tau) = e^{g\tau} c(0)$$

While equation (B.9) gives us an optimal wealth path, it tells us nothing about the optimal level of bequest. This is because initial consumption is arbitrarily determined, and so there are as many possible bequests as there are permissible initial consumption levels. In order to definitize the consumption path, we require transversality conditions associated with the inclusion of the scrap value argument. These are³⁸:

$$(B.10) \quad \lambda(T) \geq \frac{\partial [e^{-\rho T} v(w(T))]}{\partial w(T)}, \quad w(T) \geq 0, \quad \left(\lambda(T) - \frac{\partial [e^{-\rho T} v(w(T))]}{\partial w(T)} \right) w(T) = 0:$$

Now consider the state equation:

$$(B.11) \quad \dot{w} = rw - c(\tau)$$

³⁸ See Léonard and Van Long (1992, p228-231) for derivations of scrap-value transversality conditions

Its solution is

$$(B.12) \quad w(\tau) = e^{r\tau} \left[w(0) - \int_0^\tau c(t) e^{-rt} dt \right]$$

Substituting (B.9) into (B.12) and solving we obtain:

$$(B.13) \quad w(\tau) = e^{r\tau} \left[w(0) - \int_0^\tau c(0) e^{(g-r)t} dt \right]$$

$$(B.14) \quad w(\tau) = e^{r\tau} \left[w(0) - c(0) \int_0^\tau e^{(g-r)t} dt \right]$$

$$(B.15) \quad w(\tau) = e^{r\tau} \left[w(0) - \frac{1}{g-r} c(0) (e^{(g-r)\tau} - 1) \right]$$

Evaluating (B.15) at T gives us:

$$(B.16) \quad w(T) = e^{rT} w(0) - \frac{1}{g-r} c(0) e^{gT} + \frac{1}{g-r} e^{rT} c(0)$$

The solution to (B.3) is:

$$(B.17) \quad \lambda(\tau) = \lambda(0) e^{-r\tau}$$

Note that (B.2) and (B.17) imply:

$$(B.18) \quad \lambda(\tau) = e^{-\rho\tau} c(\tau)^{-\gamma} = \lambda(0) e^{-r\tau} = [c(0)]^{-\gamma} e^{-r\tau}$$

Assuming that:

$$(B.19) \quad u(c(\tau)) = v(w(T))$$

i.e. utility of bequest is the same as utility of consumption, then for non-negative wealth (B.10) yields:

$$(B.20) \quad [c(0)^*]^{-\gamma} e^{-rT} = \frac{\partial [e^{-\rho T} v(w(T))]}{\partial w(T)} = e^{-\rho T} w(T)^{-\gamma}$$

And this simplifies to;

$$(B.21) \quad c(0)^* = w(T)e^{-gT}$$

Substituting (B.21) into (B.16) gives us an expression for the level of bequest:

$$(II.2.2) \quad B(T) \equiv w(T) = \frac{e^{rT} w(0)}{1 + \frac{1}{g-r} - \frac{1}{g-r} e^{(r-g)T}}$$

Note that this expression is positive for any specification, indicating the wealth constraint is not binding and bequest occurs.

Appendix C

Predicted bequest to initial wealth ratios for Equations (II.2.2) and (II.2.3)

Table C.1: EQUATION (II.2.2) Bequest-to-initial wealth ratios for various time horizons; market=own impatience

(All levels Of Risk Aversion)	Patient Market & Agent			Average Patience of Market and Agent			Impatient Market and Agent		
	T	$r=\rho$	$B(T):w(0)$	T	$r=\rho$	$B(T):w(0)$	T	$r=\rho$	$B(T):w(0)$
Poor planners	5	0.02	0.176586	5	0.05	0.1922	5	0.1	0.220205
	6	0.02	0.152884	6	0.05	0.16879	6	0.1	0.197601
	7	0.02	0.135109	7	0.05	0.15126	7	0.1	0.180808
	8	0.02	0.121286	8	0.05	0.13767	8	0.1	0.167897
	9	0.02	0.110232	9	0.05	0.12682	9	0.1	0.157707
Normal planners	10	0.02	0.101192	10	0.05	0.11798	10	0.1	0.149497
	11	0.02	0.093663	11	0.05	0.11064	11	0.1	0.142772
	12	0.02	0.087296	12	0.05	0.10447	12	0.1	0.137188
	13	0.02	0.081843	13	0.05	0.0992	13	0.1	0.132499
	14	0.02	0.077121	14	0.05	0.09465	14	0.1	0.128524
	15	0.02	0.072993	15	0.05	0.0907	15	0.1	0.125128
Good planners	16	0.02	0.069354	16	0.05	0.08724	16	0.1	0.122206
	17	0.02	0.066123	17	0.05	0.08418	17	0.1	0.119677
	18	0.02	0.063236	18	0.05	0.08147	18	0.1	0.117477
	19	0.02	0.06064	19	0.05	0.07904	19	0.1	0.115555
	20	0.02	0.058294	20	0.05	0.07686	20	0.1	0.11387

Table C.2: EQUATION (II.2.2) Bequest-to-initial wealth ratios for various time horizons; market $\neq$ own impatience, low risk aversion

(Low Risk Aversion)					
	T	r	ρ	γ	$B(T):w(0)$
Poor planners	5	0.05	0.02	0.5	0.0150718
	6	0.05	0.02	0.5	0.0158154
	7	0.05	0.02	0.5	0.016596
	8	0.05	0.02	0.5	0.0174155
	9	0.05	0.02	0.5	0.0182758
Normal planners	10	0.05	0.02	0.5	0.0191791
	11	0.05	0.02	0.5	0.0201274
	12	0.05	0.02	0.5	0.021123
	13	0.05	0.02	0.5	0.0221683
	14	0.05	0.02	0.5	0.0232658
	15	0.05	0.02	0.5	0.0244181
Good planners	16	0.05	0.02	0.5	0.025628
	17	0.05	0.02	0.5	0.0268983
	18	0.05	0.02	0.5	0.0282322
	19	0.05	0.02	0.5	0.0296327
	20	0.05	0.02	0.5	0.0311033

Table C.3: EQUATION (II.2.2) Bequest-to-initial wealth ratios for various time horizons; market≠own impatience (low impatience), low risk aversion.

(Low Risk Aversion)					
	T	r	ρ	γ	B(T):w(0)
Poor planners	5	0.02	0.05	0.5	0.154617
	6	0.02	0.05	0.5	0.129583
	7	0.02	0.05	0.5	0.11078
	8	0.02	0.05	0.5	0.096142
	9	0.02	0.05	0.5	0.084428
Normal planners	10	0.02	0.05	0.5	0.074844
	11	0.02	0.05	0.5	0.066863
	12	0.02	0.05	0.5	0.060117
	13	0.02	0.05	0.5	0.054344
	14	0.02	0.05	0.5	0.049351
	15	0.02	0.05	0.5	0.044993
Good planners	16	0.02	0.05	0.5	0.04116
	17	0.02	0.05	0.5	0.037765
	18	0.02	0.05	0.5	0.03474
	19	0.02	0.05	0.5	0.032031
	20	0.02	0.05	0.5	0.029592

Table C.4: EQUATION (II.2.2) Bequest-to-initial wealth ratios for various time horizons; market≠own impatience (high impatience), log risk aversion.

(Log Risk Aversion)					
	T	r	ρ	γ	B(T):w(0)
Poor planners	5	0.1	0.11	1	0.2150711
	6	0.1	0.11	1	0.1918401
	7	0.1	0.11	1	0.1744516
	8	0.1	0.11	1	0.1609636
	9	0.1	0.11	1	0.1502061
Normal planners	10	0.1	0.11	1	0.1414321
	11	0.1	0.11	1	0.1341426
	12	0.1	0.11	1	0.1279912
	13	0.1	0.11	1	0.1227302
	14	0.1	0.11	1	0.1181776
	15	0.1	0.11	1	0.1141969
Good planners	16	0.1	0.11	1	0.1106837
	17	0.1	0.11	1	0.1075567
	18	0.1	0.11	1	0.1047518
	19	0.1	0.11	1	0.1022178
	20	0.1	0.11	1	0.0999133

Table C.5: EQUATION (II.2.5) Bequest-to-initial wealth ratios for various time horizons; market=own impatience (low own and vicarious impatience), low risk aversion.

(Low Risk Aversion)						
	T	r	ρ	γ	θ	$B(T):w(0)$
Poor planners	5	0.05	0.02	0.5	0.02	0.01237
	6	0.05	0.02	0.5	0.02	0.01247
	7	0.05	0.02	0.5	0.02	0.01258
	8	0.05	0.02	0.5	0.02	0.01269
	9	0.05	0.02	0.5	0.02	0.0128
Normal planners	10	0.05	0.02	0.5	0.02	0.01291
	11	0.05	0.02	0.5	0.02	0.01302
	12	0.05	0.02	0.5	0.02	0.01313
	13	0.05	0.02	0.5	0.02	0.01324
	14	0.05	0.02	0.5	0.02	0.01336
	15	0.05	0.02	0.5	0.02	0.01347
Good planners	16	0.05	0.02	0.5	0.02	0.01359
	17	0.05	0.02	0.5	0.02	0.0137
	18	0.05	0.02	0.5	0.02	0.01382
	19	0.05	0.02	0.5	0.02	0.01394
	20	0.05	0.02	0.5	0.02	0.01406

Appendix D

We have that the optimal consumption path is:

$$(II.4.3) \quad \frac{\dot{c}}{c} = \frac{r - \rho}{\gamma} - \frac{b}{\tau}$$

Note that, as one might expect, the strength of the uncertainty effect on consumption growth is increasing in the decay parameter b , but at a decreasing rate over time.

The solution to (I.4.3) is:

$$(D.1) \quad c(\tau) = c(0)e^{\left(g - \frac{b}{\gamma}\right)\tau}$$

The wealth path evolves according to:

$$(D.2) \quad \dot{w} = rw - c(\tau)$$

Which has the solution:

$$(D.3) \quad w(\tau) = e^{r\tau} \left[w(0) - \int_0^\tau c(t)e^{-rt} dt \right]$$

We may substitute (D.1) into this:

$$(D.4) \quad w(\tau) = e^{r\tau} \left[w(0) - c(0) \int_0^\tau e^{\left(g - \frac{b}{\gamma} - r\right)t} dt \right]$$

the solution to (D.4) is:

$$(D.5) \quad w(\tau) = e^{r\tau} \left[w(0) - c(0) \frac{e^{\left(g - r - \frac{b}{\gamma}\right)\tau} - 1}{g - r - \frac{b}{\gamma}} \right]$$

Or:

$$(D.6) \quad w(\tau)e^{-r\tau} = w(0) - c(0) \frac{1 - e^{\left(g - r - \frac{b}{\gamma}\right)\tau}}{r - g + \frac{b}{\gamma}}$$

Letting $\tau \rightarrow \infty$, the left-hand side of (D.6) quickly goes to zero, because, since agents survive until infinity with zero probability, wealth at infinity is imposed to be zero; and in any event the exponential on the l.h.s. will also go to zero. The exponential term on the r.h.s. also goes to zero, in line with our previous assumption that $r > g$. We are left with:

$$(D.7) \quad 0 = w(0) - \frac{c(0)}{r - g + \frac{b}{\gamma}}$$

which allows us to express initial consumption as a constant function of initial wealth:

$$(D.8) \quad c(0) = w(0) \left(r - g + \frac{b}{\gamma} \right)$$

Equation (D.8) is reassuringly intuitive: It states that the proportion of initial consumption out of initial wealth which an optimising dissaver chooses (for a given optimal consumption path) is rising unambiguously in the decay parameter, but that the extent of this effect will diminish the more risk averse she is. Substituting (D.8) into (D.6) we obtain:

$$(D.9) \quad w(\tau)e^{-r\tau} = w(0)e^{\left(g - r - \frac{b}{\gamma}\right)\tau}$$

Now, we evaluate (D.9) at expected lifetime; which, given our assumption that the Weibull shape parameter, a , equals 1, is simply:

$$(D.10) \quad \bar{T} = E(\tau) = \frac{1}{b}$$

And so we have:

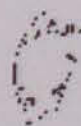
$$(II.4.4) \quad w(\overline{T}) = w(0)e^{\left(\frac{g-r}{b} \frac{1}{\gamma}\right)}$$

Appendix E

Inland Revenue Affidavit included in Probate records

PPS No. of the Deceased
must be inserted before Affidavit is sworn

□ □ □ □ □ □ □ □ - □ □



INLAND REVENUE AFFIDAVIT

CAPITAL ACQUISITIONS TAX ACT, 1978

(to be used where the deceased died on or after 1 December, 1999)

The High Court

(PROBATE)

THE PROBATE OFFICE
DISTRICT PROBATE REGISTRY AT _____

} delete where not applicable

PART 1 GENERAL INFORMATION

- Name of Deceased (BLOCK CAPITALS) _____
 - Address _____
 - Date of death _____
 - Date of Birth _____
 - Place of death _____
 - Occupation _____
 - Domicile at death _____
 - Domicile of origin _____
- If domiciled outside the state attach a full supporting statement*
- Was the disposer resident or ordinarily resident in the State at the date of death? (✓) ☐ Yes ☐ No
 - Marital status (✓) ☐ Married ☐ Widowed ☐ Single ☐ Legally separated ☐ Divorced
 - Relatives surviving (✓) ☐ Child(ren) (No. of _____) ☐ Parent(s) ☐ Grandparent(s) ☐ Remoter issue

PART 2 SWORN DECLARATION

We, the personal representative(s)

- Name _____ Occupation _____
Address _____ Relationship to deceased _____
- Name _____ Occupation _____
Address _____ Relationship to deceased _____

make oath and say as follows:-

- We desire to obtain a grant of (✓) ☐ Probate of the Deceased's will ☐ Administration intestate of the Deceased's estate.
☐ Administration with will annexed of the deceased's estate.
- We have fully and correctly completed this form and given all the particulars requested therein. The information given is true to the best of my/our knowledge and belief, and no property has been omitted because of uncertainty as to its amount, value etc. We undertake to furnish an additional affidavit if at any time it shall appear that a material error or omission has been made.

SWORN by _____
at _____
on _____ 20 _____ before me, and I know the deponent.
_____ a Commissioner for Oaths/Practising Solicitor/Court Clerk.

Signature _____

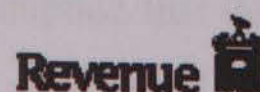
SWORN by _____
at _____
on _____ 20 _____ before me, and I know the deponent.
_____ a Commissioner for Oaths/Practising Solicitor/Court Clerk.

Signature _____

Insert here the
name and address of the
person to whom this affidavit
is to be returned:

Agent's Ref. no: _____

Agent's Code: _____



WARNING: IF THE EXECUTORS OR INTENDING ADMINISTRATORS SWEAR TO THIS AFFIDAVIT WITHOUT PERSONALLY VERIFYING THAT THE STATEMENTS IN IT ARE TRUE, THEY MAY MAKE THEMSELVES LIABLE TO PENALTIES.

Appendix F

List of Occupations for 207 Observations for which an occupation other than 'retired' or 'housewife' was given.

Non-professional		Professional	
farmer	37	teacher	13
housekeeper	7	priest	9
civil servant	6	company director	5
clerk	6	accountant	2
nurse	6	businessman	2
shop assistant	5	doctor	2
carpenter	4	quantity surveyor	2
city/county council worker	4	engineer	1
secretary	4	lecturer	1
ESB meter reader	3	personnel manager	1
garda	3	sales manager	1
painter	3	colonel	1
		security	1
builder	2	manager	
bus conductor	2	Total	41
butcher	2		
CIE worker	2		
electrician	2		
factory employee	2		
forestry labourer	2		
labourer	2		
mechanic	2		
seamstress	2		
social worker	2		
unemployed	2		
barman	1		
bookkeeper	1		
bricklayer	1		
builder's labourer	1		
car assembler	1		
car upholsterer	1		
caretaker	1		
cleaner	1		
coal delivery man	1		
cooper	1		
docker	1		
dockworker	1		
domestic	1		
draper	1		
dressmaker	1		
driver	1		
empl. Telecom Eireann	1		
engineer/truck driver	1		
ERHA employee	1		
fitter	1		
foreman	1		
gardener	1		
Gas company employee	1		

**Non-professional
(continued)**

hospital attendant	1
insurance clerk	1
lab technician - UCD	1
legal secretary	1
librarian	1
lorry driver	1
Lt. Col. (Irish Army)	1
machine operator	1
merchant seaman	1
musician	1
nun	1
park attendant	1
porter and filekeeper	1
print operative	1
printer	1
prison officer	1
publican	1
rent receiver	1
sales assistant	1
sales rep.	1
saw mill worker	1
self-employed retailer	1
shipbuilder	1
signmaker	1
telecom worker	1
tiler	1
upholsterer	1
van salesman	1
wood-cutting machinist	1
woodworker	1
Total	165

Appendix G

A Timeline of Estate Tax in Ireland

Pre 1974:

Three types of death duty in place:

Estate Duty (90% of revenue)

- levied on aggregate value of estate of deceased

Legacy Duty

- levied on inherited personal property

Succession Duty

- levied on inherited real property

Estate Duty follows the 'slab' principle

Max rate of 55% on estates > £200,000

1974-1976:

Capital Acquisitions Tax Act 1976 (**eff. 1 Apr. 1975**)

uses '**slice**' principle

inter vivos Gifts charged at 75% of tax rate. The first £250 exempt.

Effective 28 February 1974

Introduces **four classes** with graduating rates:

Class I: Spouse/child: first £150k exempt, max. \$400k + charged 50%.

Class II: Lineal descendant: first £15k exempt, max. £223k+ charged 50%.

Class III: Sibling/children of sibling first £10k exempt, max. £123k 50%.

Class IV: All others: first £5k exempt, max 83k + charged at 50%. (see table 1)

1978:

- *inter vivos* gifts exemption doubled to £500.

- Exemption thresholds for classes II, III, IV, doubled.

1982:

Effective June 2nd:

Aggregation of benefits from **different** disponers to beneficiaries *within* a given class

1984:

1984 Finance Act (effective March 26)

- aggregation expanded to include benefits from *all* classes.

- 4 classes reduced to 3 (classes II and III combined into class (b) – threshold £20k)

- Introduction of graduated scales

1985:

January 30: Spouses are now made exempt from inheritance tax.

1990-1991:

31 January '90: Spouses exempt from *i.v.* gift tax

Finance Act 1991: class (a) for parent of disponent where 'absolute interest'.

30 January '91: Tax Table modified to reduce max. rate from 55% (£200k+) to 40% (£100k+). No. of scales reduced from 6 to 4.

- Indexation takes effect.

1993:

Effective 17 June. Introduction of **Probate Tax** – 2% of market value of estate. A nil threshold is set at £10,000, but is index-linked to the Consumer Price Index.

1994-1995:

Probate Tax exemptions for spouses, primary dwellings for children; indexed, nil threshold raised to £30,000 - €50,790 in 2000

Further Exemptions for charities, heritage property, unit trusts, certain government securities.

1999:

Effective 1 Dec.: Class thresholds increased to:

Class (a) becomes 'group threshold I'. Raised to £300,000.

Class (b) becomes 'group threshold II' Raised to £30,000

Class (c) becomes 'group threshold III' raised to £15,000

Thresholds remain index-linked.

Progressive rate system abolished. New flat rate of 20%. Aggregation across groups abolished. Now only agg. within a group.

Gifts after 1 Dec. now charged at full inheritance tax amount (i.e. now also at 20%)

Effective 6 December: Nil Threshold for Probate Tax dramatically increased from £11,250 to £40,000

2000:

Budget 2001: Probate Tax abolished

Appendix H **Regression Results for a battery of multiple regressions relating to the Tax Elasticity of** **Bequest test for Altruism**

Regression H.1 – Detrended Value of Estate on PROBATE and (Sex, Dublin, Number of Beneficiaries, No of Children, and Disinheritance)

Regression Statistics				
Multiple R	0.22264			
R Square	0.049569			
Adjusted R Square	0.041629			
Standard Error	57641.23			
Observations	846			

	Coefficients	Standard Error	t Stat	P-value
Intercept	1372.521	15163.54	0.090515	0.9279
PROBATE	-1989.12	3989.897	-0.49854	0.618235
AAD	107.7725	186.7287	0.577161	0.563986
SEX	6934.043	4271.472	1.623338	0.104893
DUB	12216.71	4125.459	2.961296	0.00315
NUMB	2917.414	541.651	5.386151	9.36E-08
NUMK	-2443.89	970.2602	-2.51879	0.011961
DIS	3853.972	8164.278	0.472053	0.637012

Regression H.2 – Detrended Value of Estate on PROBATE and (Sex, Dublin, Number of Beneficiaries and No of Children)

Regression Statistics				
Multiple R	0.222072			
R Square	0.049316			
Adjusted R Square	0.042517			
Standard Error	57614.52			
Observations	846			

	Coefficients	Standard Error	t Stat	P-value
Intercept	1415.499	15156.25	0.093394	0.925613
PROBATE	-2056.54	3985.493	-0.51601	0.605987
AAD	110.6261	186.5444	0.593028	0.553322
SEX	7014.379	4266.103	1.644212	0.100507
DUB	12176.75	4122.68	2.953601	0.003229
NUMB	2884.647	536.9361	5.372423	1.01E-07
NUMK	-2220.72	846.9006	-2.62217	0.008895

Regression H.3 – Detrended Value of Estate on PROBATE and (Dublin and Number of Beneficiaries)

Regression Statistics	
Multiple R	0.194919
R Square	0.037993
Adjusted R Square	0.034566
Standard Error	57853.26
Observations	846

	Coefficients	Standard Error	t Stat	P-value
Intercept	10403.24	4177.857	2.49009	0.012963
PROBATE	-1325.37	3987.365	-0.33239	0.739676
DUB	9397.825	3996.513	2.351506	0.018927
NUMB	2772.164	535.1738	5.179932	2.78E-07

Appendix J

We begin the solution method by assuming any terminal for the Value integrand T . Since the survival function has reduced to a trivial constant, it will drop out in the optimisation. Then we have essentially replicated the solution method covered in Appendix B and arrive at the equation for the optimal consumption path:

$$(B.9) \quad c(\tau) = e^{g\tau} c(0)$$

Since the specification of the value function permits no utility of bequest, we can assume the optimal wealth path to be such that terminal wealth equals zero:

$$(J.1) \quad w(T) = 0$$

Recall that the solution to the state equation was found to be:

$$(D.3) \quad w(\tau) = e^{r\tau} \left[w(0) - \int_0^\tau c(t) e^{-rt} dt \right]$$

Substituting (B.9) into (D.3) and solving we obtain:

$$(J.2) \quad w(\tau) = e^{r\tau} \left[w(0) - \int_0^\tau c(0) e^{(g-r)t} dt \right]$$

$$(J.3) \quad w(\tau) = e^{r\tau} \left[w(0) - c(0) \int_0^\tau e^{(g-r)t} dt \right]$$

$$(J.4) \quad w(\tau) = e^{r\tau} \left[w(0) - \frac{1}{g-r} c(0) (e^{(g-r)\tau} - 1) \right]$$

Evaluating (J.4) at T gives us:

$$(J.5) \quad w(T) = e^{rT} w(0) - \frac{1}{g-r} c(0) e^{gT} + \frac{1}{g-r} e^{rT} c(0)$$

Now we make use of our new transversality condition (J.1):

$$(J.6) \quad w(0) = \frac{1}{g-r} c(0) e^{(g-r)T} - \frac{1}{g-r} c(0)$$

$$(J.7) \quad c(0) = \frac{(g-r) w(0)}{e^{(g-r)T} - 1}$$

Given that we have specified our agent to behave as if she were infinitely lived agent, we have:

$$(J.8) \quad \lim_{T \rightarrow \infty} c(0) = (r-g) w(0)$$

whenever $g < r$, which always holds under risk aversion (i.e. whenever $\gamma > 0$).

So given that $B(\tau) = w(\tau)$ we have, for any untimely death at, say, $\bar{T}$:

$$(J.9) \quad B(\bar{T}) = w(\bar{T}) = e^{r\bar{T}} w(0) - \frac{1}{g-r} (r-g) w(0) e^{g\bar{T}} + \frac{1}{g-r} e^{r\bar{T}} (r-g) w(0)$$

$$(V.2.4) \quad B(\bar{T}) = w(0) e^{g\bar{T}}$$

