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Funeral insurance*

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Abstract

Funeral insurance has existed at least since antiquity, and it remains popular in many parts of Africa today. Yet the study of funeral insurance as a distinct form of insurance has hitherto been neglected. This paper presents a model in which funeral insurance combines regular life insurance with a restriction on how the payout is spent. The model predicts that there is an intermediate range of income and wealth where funeral insurance is demanded. The prediction is tested on a nationally representative sample of black South African households, a setting where both life and funeral insurance are widely available. The model also gives conditions under which funeral insurance is not demanded at any level of income and wealth. This may explain why funeral insurance is less popular in developed countries, even among the relatively poor. *JEL codes: D81, G22, O12*

1 Introduction

Funeral insurance is one of the earliest documented forms of insurance. It seems to have existed through most of history and across the globe, and it is probably still the single most popular type of insurance in large parts of Africa. Yet the study of this phenomenon has until recently been largely neglected by economists. The purpose of this paper is to provide the first treatment of funeral insurance as a distinct form of insurance.

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Funeral insurance is not life insurance. What these two types of insurance have in common is that the covered event is the death of a specified individual. But it is a remarkably consistent feature of 'death-triggered insurance', both historically and in modern-day developing countries, that the payout takes the form of funeral-related goods and services. This is funeral insurance. In contrast, a life insurance policy typically pays out in cash or liquid assets, and there is no restriction on how the payout is spent. This paper claims that the distinction is fundamental, and that the type of insurance preferred will depend on the circumstances and characteristics of the decision-maker.

Today, formal funeral policies are offered by insurance companies in many parts of the world. But the history of funeral insurance, and insurance generally, is closely linked to that of *funeral associations*. From ancient Greece and Rome, via medieval Europe and Victorian Britain, to large parts of modern-day sub-Saharan Africa, the most common way to take out funeral insurance has been to join a funeral association. The primary function of these groups is to pool the risk associated with the death of members or their close relatives by using members' contributions to organise funerals. Historians have argued that funeral associations are the precursors of modern insurance companies (Fingland Jack 1912, Trenerry 1926). More recently, funeral associations have attracted the attention of economists as instances of informal or semi-formal risk-pooling groups.

South Africa may be unique in that both formal and informal funeral insurance, as well as life insurance, are widely held. Traditional funeral associations compete with modern insurance companies in providing funeral insurance, and the latter also offer standard life insurance. Traditional African communities co-exist with a fully industrialised modern economy and world-class formal-sector financial institutions. South Africa therefore provides a good context in which to test the ideas presented here.

The main contribution of the paper is to present and analyse funeral insurance as a distinct form of insurance. Its ancient roots and importance in the contemporary developing world are highlighted. It is also emphasised that even though the association between funeral insurance and funeral associations has been and continues to be important, the concept of funeral insurance should be be distinguished from its implementation.

A model is presented in which funeral insurance is contrasted with life insurance. Whereas previous work on informal insurance has focused on the sustainability of the contract, this paper abstracts from contractual form and asks under what circumstances funeral insurance will be preferred to general life insurance. In order to

focus on the mechanisms of interest, none of the two insurance types are presented with a cost or efficiency advantage over the other. Funeral insurance is modelled as life insurance bundled with a constraint on the use of the payout. Therefore funeral insurance can serve as an inter-generational commitment device when the preferences of the covered individual (the parent) differs from those of the beneficiary (the child). Conditions are derived under which each type of insurance is preferred.

The analysis also contributes to the literature on bequest motives by suggesting that even conventional life insurance is not necessarily motivated solely by altruism in the usual sense of the word.

The main theoretical prediction is that funeral insurance is demanded for intermediate wealth and income levels. The prediction is tested with data from South Africa. A large, nation-wide marketing survey is used here for the first time to econometrically analyse insurance choices as a function of personal and household characteristics. There is only binary information on insurance take-up in the survey, and only a very crude measure of wealth can be constructed, but the results of the analysis are consistent with the prediction of the model.

While not tested here, the model also provides conditions under which funeral insurance is not demanded for any level of wealth and income. This may help explain why funeral insurance is less popular in developed countries, even in unequal societies where segments of the population remain poor.

The rest of the paper is organised as follows. The next section provides an introduction to funeral associations and funeral insurance. Thereafter an overview of the relevant literature is given, before the model is presented, solved and interpreted. Next is the empirical section, and finally a brief conclusion.

2 Funeral associations and the history of insurance

Funeral associations are mutual risk-pooling groups designed to ensure decent funerals for members and/or other persons nominated by them, typically close relatives or household members. When a covered person dies, the group will provide some combination of cash, labour and goods towards the funeral. Many associations collect fixed cash premia at regular intervals, while others transact only when a death occurs.[1]

[1]Funeral associations are distinct from rotating and accumulating savings and credit associations (ROSCAs and ASCAs). In all these types of arrangements, a fixed amount of money is typically collected regularly from each member. But in a ROSCA payout rotates amongst the members in a systematic fashion, typically determined either randomly or by bidding. During a cycle of ROSCA

Funeral associations have a long history and global reach. Solon the Athenian statesman (ca. 638–558 BC) passed a law regulating their activity (Parrott 1985). They were widespread in the Roman empire, operating on same basic principles as they do today.[2] In medieval Europe they were linked to the professional guilds. In England around the time of the industrial revolution, funeral associations could be set up as local community groups, or organised as large friendly associations (Cordery 2003). For a vivid description of the importance of funeral associations in British working class life in the late 19th and early 20th centuries, see Johnson (1985). The history of funeral associations is yet to be written, but Van der Linden (1996) covers the history of mutual benefit associations more generally in 26 countries across Europe, North and South America and Asia. Though many of the institutions described also cover events other than death, funeral cover seems to have been the main, or one of the main, components of most of them, and not unfrequently the only covered event. The enduring popularity of funeral associations is probably in part due to the inherent insurability of death risk: moral hazard may be less of a problem than for many other types of risks.

Funeral associations still exist in many countries, though in rich countries their importance has declined relative to formal insurance. But it is not difficult to find contemporary academic references to funeral associations in the developing world, and in particular they are widespread in many parts of sub-Saharan Africa.

Funeral associations are often said to be informal insurance providers, but it is worth clarifying what is meant by 'informal' in this context. As Dercon, De Weerdt, Bold, & Pankhurst (2006) point out, funeral associations often operate according to a clearly defined, sometimes written, set of rules. The terms of the policy are specified in detail, including who is covered, conditions of cover and size of premia and payouts. Often there is also a system of fines for non-compliance with these rules, and at least in South Africa it is not uncommon for funeral associations to

operation, each member will receive the payout exactly once (Besley, Coate & Loury 1993). ASCAs operate on a similar principle but, as the name suggests, funds may be accumulated and held or invested jointly rather than being paid out immediately after collection. In contrast, funeral association payouts are triggered by random events (the death of a covered person) so there is no guaranteed relationship between contribution and payout over the the period of membership. Therefore, whereas ROSCAs and ASCAs are fundamentally savings and credit devices (though various other functions have been suggested in the literature), a funeral association is at the core a risk-pooling arrangement.

[2] 'Early in the Empire, associations were formed for the purpose of meeting the funeral expenses of their members [...] These co-operative associations (collēgia fūnerātīcia) started originally among members of the same guild [...] or among persons of the same occupation. [They] provided for the necessary funeral expenses by paying into the common fund weekly a small fixed sum, easily within the reach of the poorest of them. When a member died, a stated sum was drawn from the treasury for his funeral, a committee saw that the rites were decently performed, and at the proper seasons [...] the association made corporate offerings to the dead.' (Johnston 1903)

have a special uniform which is compulsorily worn by members at meetings and funerals.

It seems clear that well-defined and strictly enforced policy terms are the norm rather than exceptional. But most funeral associations are not registered with the authorities and not regulated. They are not part of the formal economy. In particular, it is uncertain whether a member of a funeral association who feels unjustly treated has recourse to the formal judiciary. This clearly distinguishes funeral association membership from policies offered by formal insurance companies.[3]

However, funeral insurance is not provided only by funeral associations. Formal insurance companies still offer explicit funeral policies in several rich countries including the USA, the UK, Spain and Germany.

A possible objection to the arguments presented in this paper is that funeral associations offer more than insurance. Whereas formal insurance is close to being a purely financial device, fellow funeral association members are often also friends, colleagues or relatives who may provide a sense of belonging and support, especially in times of grief. Nonetheless, virtually all writers on the subject agree that participants think of their funeral associations as a financial arrangement first and foremost. In support of this, a nationally representative South African survey asked funeral association members why they belonged to these groups. The three most popular responses were 'Help with funeral arrangements' (79%), 'To help when there is a death' (53%), and 'Provide funerals the family deserves' (24%). Many fewer selected the responses 'To provide comfort and support' (13%) or 'To socialise' (4%) (FinMark Trust 2003). Likewise, Dercon et al. (2006) report that in both in Ethiopia and Tanzania, the primary focus of funeral associations is to provide funeral cover. Funeral associations undeniably have social aspects, but these alone cannot explain their popularity.

The history of funeral insurance is closely linked with that of funeral associations, and even today funeral insurance is much more likely than life insurance to be offered informally. Nevertheless, formal-sector funeral insurance exists in many places (and is common in some, such as South Africa), and so does informal insurance groups that are not exclusively concerned with funeral cover. It is a key message of this paper that the type of insurance contract should be distinguished from the organisational form of the provider. Neither depends on the other, though funeral insurance appears to be popular in circumstances that favour informal insurance provision.

[3]It is possible that Bloch, Genicot & Ray (2008) have in mind another sense of the word 'informal' when they write that most informal insurance is bilateral and that 'our existing idea of insurance as taking place within an explicit "club" of several people may be misleading.'

3 Related literature

This paper relates to the literature on the demand for life insurance. Modern economic analysis of the problem starts with Yaari (1965), who introduced life insurance as a way of coping with an uncertain lifetime in a model with either a bequest motive or a credit market combined with a non-negative terminal wealth requirement. He derives differential equations for the evolution of consumption and savings, but does not have much to say about the properties of the demand function. Fischer (1973) characterises insurance demand functions in a discrete-time model. Campbell (1980) derives insurance demand functions by using Taylor expansion of the agent's problem in a short interval $(t, t + \Delta t)$, but relies on the present value of future income being exogenously given. Lewis (1989) was the first to consider the point of view of the insurance beneficiaries. He lets insurance demand be determined by the intended beneficiary. In this paper it will be shown that a conflict of interest between policy-holder and beneficiary may be the key driver of demand for funeral insurance.

Economists have long been interested in why people leave bequests. Some believe bequests are accidental and caused by the combination of uncertain lifetimes and imperfect insurance markets. On the other hand, Bernheim (1991) uses evidence on life insurance demand to argue that bequests are intentional. This paper nuances the discussion by positing that even if they are intentional, bequests are not necessarily altruistic in the usual sense. Life insurance may be motivated by a concern for specific types of post-mortem expenditure that have more to do with preserving one's own good name and afterlife than with either 'warm glow' or true altruism.

There is a large literature on informal arrangements for coping with risk in developing countries. Besley (1995), Morduch (1999) and Dercon (2002) provide overviews. Townsend (1994) tests for, and rejects, full risk-sharing in Indian villages. This finding has been verified by many later studies, and the robustness of the result has inspired a substantial body of theoretical work relating imperfect enforcement to bounds on the risk-sharing contracts that may be entered. Ligon, Thomas & Worrall (2002) is a more recent contribution to this tradition. This paper departs from that literature by focusing on the specifics of the insurance policy rather than whether full risk-sharing is achieved.

Arnott & Stiglitz (1991) is perhaps the best-known article on the interaction of formal and informal insurance. The authors find that in the presence of moral hazard and formal insurance, informal insurance is beneficial if the informal insurers have an information advantage, but can be harmful if not. The model presented here abstracts completely from moral hazard, arguing that death insurance is much

less likely to be subject to this problem than many other types of insurance. This is in line with Fafchamps & Lund (2003) who find that funerals are better insured with informal gifts and loans than other events such as crop failure and mild illness.

A small literature focuses on commitment devices in developing countries, a good example of which is Ashraf, Karlan & Yin (2006). These papers are related to the theoretical literature on hyperbolic discounting (Harris & Laibson 2003). But not much is known about devices that operate between generations.

Funeral associations have received relatively little attention from economists. Dercon et al. (2006) discuss funeral associations in Ethiopia and Tanzania, and Bold (2007) test for risk-sharing in Ethiopian associations. Bryant & Prohmmo (2002) ask why funeral association premia in a village in North-Eastern Thailand are equal for all households irrespective of risk. A good source of information on the workings and characteristics of funeral associations in South Africa (known locally as *burial societies*) is Thomson & Posel (2002). Roth (2001) is a case study of formal and informal funeral insurance in a rural South African township. Ardington & Leibbrandt (2004) find a strong correlation between formal employment and the take-up of funeral insurance. Keswell (2004) looks at the relationship between employment and membership of informal networks such as ROSCAs and funeral associations.

This paper parallels parts of the literature on rotating savings and credit associations (ROSCAs). In an early paper, Geertz (1962) saw ROSCAs as a 'middle rung' in the ladder of development, implying that they would eventually give way to formal institutions. This paper will show that funeral insurance is demanded for intermediate income and wealth. Moreover, if the survival probability is sufficiently high, as may be the case in developed societies, then there is no demand for funeral insurance at any level of income or wealth. Levenson & Besley (1996) look at the determinants of ROSCA participation in Taiwan. In a situation semblant of that of funeral associations in South Africa, they deem ROSCA membership in Thailand surprisingly high (at least a fifth of all households are members) for an industrialised country.

4 Theory

4.1 The model

There are two agents, a parent and a child, and two periods. In the first period the parent, endowed with wealth W, decides how much (if any) insurance cover to buy and pays the premium.

The parent survives to the second period with probability q. If she survives,

she receives labour income y and consumes everything before the game ends. If she dies, there is no labour income but the child inherits the parent's remaining wealth and receives any insurance payout. The child allocates her resources between the parent's funeral and her own consumption.

There are two types of funeral; basic ('pauper's funeral') and elaborate ('dignified funeral'). An elaborate funeral costs p, and the cost of a basic funeral is normalised to zero.

There are also two types of insurance. Both pay out if and only if the parent dies. The only difference between them is that a life insurance payout L can be spent as the beneficiary chooses, whereas a funeral insurance payout F can only be spent on the parent's funeral. In both cases the premium per unit of cover is $1 - q$, the actuarially fair rate.

In addition there is a fixed contract cost associated with each insurance type the parent buys. The contract cost is initially assumed to be positive but infinitesimal. This implies that it can be ignored for the purposes of determining the level of insurance cover demanded, and that the insurance premia are actuarially fair, but also that the parent is induced to prefer a single insurance contract whenever she is otherwise indifferent between a single contract and a mix of both types of insurance. The relaxation of the assumption of negligible contract cost is discussed in a later section.

The parent's consumption in period 1 is assumed to be static and netted out of the model by adjusting the endowment W and the parent's utility by a constant. Both parent and child have logarithmic consumption utilities. In case of survival, the parent derives utility from the consumption of all her resources, $U = \ln(C)$. In case of death she derives utility from (the anticipation of) her own funeral and, altruistically, the child's consumption,

$$U = BD + \ln(c).$$

Here, B is the fixed utility gain to the parent associated with an elaborate funeral, and D is an indicator equal to 1 if an elaborate funeral is held and 0 if not. c is the child's consumption. Without loss of generality the altruism coefficient (the weight of the child's consumption utility in the parent's utility) has been normalised to 1 by adjusting B.

The child's utility is given by

$$u = \mu BD + \ln(c).$$

The constant μ determines the relative importance of the funeral and consumption terms from the child's point of view. It is assumed that $\mu < 1$, so that although the parent and the child derive utility from the same two sources in the case of death (the parent's funeral and the child's consumption), in relative terms the funeral matters less to the child than it does to the parent. It is this conflict of interest that will drive the demand for funeral insurance.

The parent's problem is to determine the insurance portfolio that maximises her expected utility conditional on the child's decision function.

It is immediately clear that the parent will never take out a larger funeral insurance cover than p, the cost of an elaborate funeral, since doing so would be wasteful.

The child's problem is to allocate her available resources w (bequest plus any insurance payouts) between the funeral and her own consumption so as to maximise utility, subject to the restriction that a funeral insurance payout can only be spent on the funeral. Her choice is binary: she can either arrange a basic funeral and consume all her resources (except any funeral insurance payout), or she can arrange an elaborate funeral at cost p and consume $w - p$.

It is clear that the child will always arrange an elaborate funeral if she receives a funeral insurance payout of p.

4.2 Demand for life and funeral insurance

Proposition 1. If

$$\frac{1-q}{1-e^{-(1-q)B}} < \frac{1}{1-e^{-\mu B}} - q, \tag{1}$$

then the parent's insurance demand, represented by F and L, can be characterised as follows:

$F = 0$	$L = y$	if $\frac{W+qy}{p} < \frac{1-q}{1-e^{-(1-q)B}}$
$0 < F \leq p$	$L = y + p - F$	if $\frac{1-q}{1-e^{-(1-q)B}} < \frac{W+qy}{p} < \frac{1}{1-e^{-\mu B}} - q$
$F = 0$	$L = y + p$	if $\frac{W+qy}{p} > \frac{1}{1-e^{-\mu B}} - q$.

If (1) does not hold, then funeral insurance is not demanded for any combination of W, y and p.

Proof. Consider first the situation where only life insurance is available. Then the child's problem can be written:

$$\max_{D \in \{0,1\}} \mu B D + \ln(w - pD)$$

The solution to this problem is straight-forward: there is a critical level of child

resources

$$w^* = \frac{p}{1 - e^{-\mu B}}$$

such that the child arranges a basic funeral if $w < w^*$, is indifferent between the two types if $w = w^*$ and prefers an elaborate funeral if $w > w^*$. To emphasise that the child's decision depends on her available resources, the notation $D(w)$ is introduced.

In the absence of funeral insurance, the parent's problem can be written

$$\max_{L \geq 0} \{q \ln(C) + (1 - q)[BD(w) + \ln(w - pD(w))]\}$$

where

$$C = W - (1 - q)L + y$$
$$w = W - (1 - q)L + L$$

denote next-period wealth in case of survival and death, respectively. Recall that the parent consumes all resources in the case of survival.

To solve the parent's problem, first assume that the child decides to arrange a basic funeral, $D = 0$. Then the problem simplifies to

$$\max_{L \geq 0} \{q \ln(W - (1 - q)L + y) + (1 - q) \ln(W + qL)\}.$$

This is a standard insurance problem with an actuarially fair premium, so the solution is full insurance,

$$L = y.$$

It follows that, in this case:

$$C = w = W + qy$$
$$EU = \ln(W + qy)$$

Next assume that the child arranges an elaborate funeral ($D = 1$). Now the parent's problem is

$$\max_{L > 0} \{q \ln(W - (1 - q)L + y) + (1 - q)[B + \ln(W + qL - p)]\}.$$

The first-order condition yields

$$L = y + p,$$

and it follows that, in this case:

$$\begin{aligned} C &= W + qy - (1-q)p \\ w &= W + q(y+p) \\ EU &= (1-q)B + \ln(W + qy - (1-q)p) \end{aligned}$$

The parent prefers the solution candidate conditional on $D = 0$ over the solution candidate conditional on $D = 1$ when the expected utility associated with the former is greater, leading to the condition

$$W + qy < \frac{(1-q)p}{1 - e^{-(1-q)B}}. \tag{2}$$

However, the parent's preferred solution is only feasible if the assumption regarding D is justified, that is if the child 'agrees' with the parent in the choice of funeral type. When the parent sets $L = y$, the left-hand side of (2) is w, and it can be shown that the right-hand side is less than w^*. Hence, whenever the parent prefers $D = 0$, the child agrees.

But when $L = y + p$, the child only agrees with the parent's preference $D = 1$ if

$$w = W + q(y+p) > w^* = \frac{p}{1 - e^{-\mu B}},$$

leading to the condition

$$W + qy > \frac{p}{1 - e^{-\mu B}} - qp, \tag{3}$$

If (3) holds, the solution is $L = y + p$ and $D = 1$. However, if neither (2) nor (3) hold, the best the parent can do while achieving $D = 1$ is to set L such that $w = w^*$. The ultimate choice of life cover is then a matter of comparing the expected utility at this level, leading to $D = 1$, and $L = y$, implying $D = 0$.

Next consider how the introduction of funeral insurance will change the solution. It will not affect the case when parent and child agree on holding a basic funeral, since taking out funeral insurance is not in the parent's interest then. And when parent and child agree on holding an elaborate funeral, funeral insurance up to the level of p makes no difference except to introduce an additional contract cost. And a level of funeral insurance greater than p would be wasteful, so the parent takes out the whole amount of cover $y + p$ in life insurance.

Therefore, compared to the situation with only life insurance, funeral insurance is only of interest in the intermediate case that neither (2) nor (3) hold, i.e. when there is a conflict of interest between parent and child. In this case, funeral insurance

can be used to force an elaborate funeral while holding total insurance cover at the first-best level $y + p$. Here, both L and F are demanded at strictly positive levels, in such a way that their sum is $y + p$. $F = p$ and $L = y$ is always a solution, and F can never exceed p, but in general the critical level of F needed to enforce an elaborate funeral is positive but may be less than p. The critical level F^* is the one that makes the child indifferent between the two types of funeral, yielding

$$F^* = \min\left\{p, (W + qy)\left(1 - e^{\mu B}\right) + p\left(q + (1 - q)e^{\mu B}\right)\right\}.$$

Note that the critical level decreases as $W + qy$ increases, as the conflict of interests is attenuated.

If (1) does not hold, then the conflict of interest is reversed in the sense that there is a region in which the child wants an elaborate funeral but the parent does not. Funeral insurance is of no interest to the parent in this case, and hence is never demanded. ■

4.3 An alternative derivation using approximate CRRA

This section presents an alternative derivation of the main prediction. Rather than assuming logarithmic utility, the agents' consumption utility is of a general CRRA form, $\frac{x^{1-\rho}}{1-\rho}$, where x is consumption and ρ is the coefficient of relative risk aversion. A part from the form of the utility function, the setup is unchanged. Taylor approximations are used to arrive at an analytical solution.

With CRRA consumption utility, the child will choose an elaborate funeral if

$$\mu B + \frac{(w - p)^{1-\rho}}{1 - \rho} > \frac{w^{1-\rho}}{1 - \rho}$$

Using a Taylor approximation which assumes small p, this leads to the condition

$$w > \left(\frac{p}{\mu B}\right)^{\frac{1}{\rho}}.$$

Fair premia implies full insurance $L = y$ or $L = y + p$ as before. The parent prefers $D = 1$ over $D = 0$ when

$$(1 - q)B + \frac{(W + qy - (1 - q)p)^{1-\rho}}{1 - \rho} > \frac{(W + qy)^{1-\rho}}{1 - \rho}$$

A Taylor approximation that assumes $(1-q)p$ is small gives

$$W + qy > \left(\frac{p}{B}\right)^{\frac{1}{\rho}}$$

It is straight-forward to show that the $D = 1$ solution is feasible when

$$W + q(y+p) > \left(\frac{\mu B}{p}\right)^{-\frac{1}{\rho}}$$

$$W + qy > \left(\frac{\mu B}{p}\right)^{-\frac{1}{\rho}} - qp$$

So funeral insurance is demanded if and only if

$$\left(\frac{p}{B}\right)^{\frac{1}{\rho}} < W + qy < \left(\frac{p}{\mu B}\right)^{\frac{1}{\rho}} - qp.$$

Insurance can be ruled out for all levels of wealth W and income y when

$$\left(\frac{p}{\mu B}\right)^{\frac{1}{\rho}} - qp < \left(\frac{p}{B}\right)^{\frac{1}{\rho}}$$

or

$$q > \frac{\left(\frac{p}{\mu B}\right)^{\frac{1}{\rho}} - \left(\frac{p}{B}\right)^{\frac{1}{\rho}}}{p}.$$

4.4 Interpretation of the main result

The term $W + qy$ represents expected second-period resources in the absence of insurance. Dividing by p is just a price normalisation that expresses these resources in terms of the number of units of elaborate funerals that the expected resources can afford.

Proposition 1 says that for low expected resources, the parent buys full life insurance cover for the potential loss of labour income, but does not take out any funeral cover because both parent and child prefer a basic funeral. For high expected resources, the parent buys life insurance to cover both the income loss and the cost of an elaborate funeral. Since the child is in agreement concerning the type of funeral, funeral insurance is not required and a pure life policy avoids the extra contract cost of a mixed insurance portfolio.

For intermediate expected wealth, the parent prefers an elaborate funeral but the child does not. By buying a portfolio of funeral and life insurance, the parent can achieve an elaborate funeral at the first-best level of total cover, $y + p$. Funeral

insurance will not exceed p since that is wasteful, implying that the amount of life cover is strictly positive. The amount of funeral cover is also strictly positive, since otherwise the child would not hold an elaborate funeral. There is a critical level of funeral cover (between zero and p) above which an elaborate funeral is guaranteed. Any insurance portfolio satisfying these conditions is a valid solution. But setting funeral insurance equal to p, the full cost of an elaborate funeral, and life insurance equal to y, is always a valid solution in the intermediate case.

4.5 When is funeral insurance ruled out?

Equation (1) depends only on q, B and μ. That is, for certain combinations of these three parameters, there is no demand for funeral insurance irrespective of initial wealth, labour income and funeral cost. The equation can be regarded as defining an upper bound for μ, in terms of B and q.

The next result provides a more formal characterisation of the conditions that rule out a demand for funeral insurance. It will be shown that funeral insurance is ruled out if the parent's survival probability is too high.

Proposition 2. When $\mu + q > 1$, there is a B^* such that for $B > B^*$, there is no demand for funeral insurance irrespective of W, y and p. The critical value B^* is decreasing in μ and q. When $\mu + q \leq 1$ funeral insurance cannot be ruled out for any finite B.

Proof. From (1), the critical value B^* satisfies

$$\frac{1-q}{1-e^{-(1-q)B^*}} + q = \frac{1}{1-e^{-\mu B^*}}.$$

This can be solved in terms of μ to give

$$\mu = -\frac{\ln\left(1 - \frac{1}{\frac{1-q}{1-e^{-(1-q)B^*}}+q}\right)}{B^*}.$$

Using this expression it can be shown that:

$$\lim_{B^*\to 0} \mu = 1$$
$$\lim_{B^*\to \infty} \mu = 1-q$$
$$\frac{\partial \mu}{\partial B^*} < 0$$
$$\frac{\partial \mu}{\partial q} > 0$$

Then the single-crossing property implies that for any q and μ satisfying $\mu > 1 - q$, that is $\mu + q > 1$, there is a unique $B^* > 0$. For $B > B^*$, (1) does not hold and funeral insurance is ruled out. $\frac{\partial \mu}{\partial B^*} < 0$ and $\frac{\partial \mu}{\partial q} < 0$ imply that B^* depend negatively on μ as well as q.

For $\mu + q \leq 1$, there is no finite, positive solution for B^*, so funeral insurance cannot be ruled out. ■

Although this theoretical result cannot easily be tested with the data used in this paper, it is interesting to note that it may explain why funeral insurance is less popular in rich countries (even among the relatively poor) than in developing countries. Assuming μ and B are identically distributed across countries, there is a threshold for q above which there is no demand for funeral insurance irrespective of W and y. So if economic development raises general health levels (proxied by the theoretical survival probability q), then demand for funeral insurance may drop off even if the distribution of income is unchanged.

4.6 Non-negligible contract costs

The model presented above assumes positive but infinitesimal contract costs. This simplifies the analysis by retaining actuarially fair premia (ensuring a full-insurance solution) while implying that a single insurance contract is preferred over two insurance contracts when the agent is otherwise indifferent.

However, in reality transaction costs are likely to be important and the insurance premium greater than the actuarially fair rate, especially for the low-value contracts typically taken out by poor people. Introducing a non-negligible fixed cost per contract would capture a realistic cost structure for the insurance providers and also result in the net premium per unit of cover being higher for small transactions, which corresponds with anecdotal evidence.

An important effect of introducing a non-negligible contract fee in the above framework is that in some parameter regions it would become optimal not to take out any insurance at all.

Non-negligible transaction costs would not, however, change the main prediction of the model: funeral insurance would not be demanded outside an intermediate region of wealth and income. Denoting the contract cost by t, a similar argument to the above quickly establishes that there is no demand for funeral insurance unless

$$\frac{1-q}{1-e^{-(1-q)B}} < \frac{W + qy - t}{p} < \frac{1}{1-e^{-\mu B}} - q. \tag{4}$$

However, even when (4) holds, there might be parameter values for which only

funeral insurance, or only life insurance, is taken out.

Furthermore, demand for life insurance as a function of expected wealth is no longer necessarily increasing everywhere.

5 Empirics

5.1 Predictions from theory

The data used here provides only binary information on whether a respondent has life or funeral insurance. Therefore, only model predictions about the binary take-up function, rather than amount of insurance cover, are testable. Hence, the main testable prediction from the theory is that only agents with intermediate levels of expected resources $W + qy$ should demand funeral insurance. In other words, plotted as a function of expected resources, take-up of funeral insurance should be 'box-shaped': zero for low values, one for intermediate values and zero for high values of expected wealth.

However, this assumes that households are homogeneous with respect to model parameters and that there is no measurement error. Allowing for heterogeneity and measurement error, aggregate take-up of funeral insurance is expected to be hump-shaped rather than box-shaped: first rising and then falling as the levels of wealth and income increase.

The model also predicts that life insurance demand should be weakly increasing in wealth and income. The base model also predicts that all agents should have some life insurance, but the presence of non-negligible transaction costs would introduce a region of no insurance take-up for lower resource levels. Together with heterogeneity and measurement error, this could mean that the take-up of life insurance increases with wealth and income.

Studying take-up as a function of $W + qy$, taken as a single quantity, requires scaling income into wealth equivalents by fixing a time period over which the insurance policy is valid, q is the survival probability and the expected income is y.

An alternative approach is suggested by the fact that holding wealth fixed, funeral insurance take-up should be hump-shaped in income, and vice versa. This is the approach taken here.

5.2 Data

The household data are taken from the 2004 wave of the *All Media and Products Survey* (AMPS) published by the South African Advertising Research Foundation. AMPS is a long-running series of cross-sectional surveys covering South Africans aged 16 and over. The sample of 24,489 over-represents the higher income brackets, but weights inversely proportional to the probability of selection are provided to allow inferences about the underlying population.

The survey respondent is a randomly chosen person above the age of 16 in the selected household. The emphasis of the questionnaire is on commercial product usage, but there are also sections covering personal data, family and housing situation, and leisure activities.

For a number of the most relevant variables, only binary information is available. For instance, respondents are asked whether they have a life cover policy, but no further details on the policy are provided. Appendix A provides more detail on the construction of the variables used. It is worth noting that the constructed measure of wealth is crude: the household is asked whether they own each of a list of durable goods, and the simple count of goods present in the household is used here as the proxy for wealth.

Weighted summary statistics are provided in Table 1. They suggest that 27.8% of South Africans aged 16 or over belong to a funeral association. This is lower than earlier estimates. (It corresponds to 6.6 million members across South Africa rather than 8 million as suggested by Porteous & Hazelhurst (2004).) Furthermore, 6.8% personally have formal funeral insurance. Given the data it is not possible to distinguish those who do not personally have any formal or informal funeral insurance but is covered by someone else's policy, from those who are not covered at all. 5.5% of the population have life insurance.

One-year survival rates by sex and age in five-year bands were obtained from the WHO Life Tables for South Africa (World Health Organization 2011). The numbers for 2000 and 2009 were interpolated to provide an estimate for survival rates in 2004.

5.3 Results

As a graphical precursor to the results, consider Figures 1 and 2. Here the take-up of funeral insurance and life insurance are plotted against household assets and income, respectively. The general pattern is consistent with the theoretical prediction that the take-up of funeral insurance hump-shaped with respect to assets and income.

Life insurance take-up shows a strong positive relationship with income and

assets. This is consistent with there being significant transaction costs associated with taking out life insurance.

The empirical specification is

$$f_i = \alpha + \gamma W_i + \delta W_i^2 + \lambda q_i y_i + \nu (q_i y_i)^2 + \beta X_i + \epsilon_i,$$

where f_i is a binary take-up variable for funeral insurance for household i, W_i is household assets, $q_i y_i$ is expected (or 'life-expectancy-adjusted') personal income and X_i a vector of control variables.

The control variables are the sex, age, age squared and education of the respondent, dummies for whether he/she is married, has own children and lives in a rural area. Province dummies and house/car ownership are also included.

The main results are presented in Table 2. The indicator for take-up of funeral insurance is regressed on assets, assets squared, expected income and expected income squared using least squares and the survey weights. In column 1 there are no control variables. The coefficients on the linear asset and income terms are positive and significant, and the coefficients on the squared asset and income terms are negative and significant, indicating a hump-shaped relationship. Here and throughout, standard errors are robust and clustered at the province level.

Column 2 adds control variables for respondent sex, age, age squared, education (binary variables for having completed primary school and high school) and province dummies. Column 3 adds further controls: marital status, having children, living in a rural area, owning a 'proper' home and a binary indicator for having bought anything on credit over the past year. The qualitative finding is unchanged. Column 4 drops observations in seven highest income categories, corresponding to 0.54% of the sample. The purpose is to alleviate concerns that outliers at the upper end of the distribution are driving the results, but clearly there is also a danger that this will 'cut off the right leg of the hump'. Also, this avoids having to rely on an arbitrary 'midpoint' value for the highest income category which in principle is unbounded. The qualitative findings are unchanged.

Table 3 presents the results of a weighted probit regressions. The column order is the same as above, and again the coefficient on the squared asset and income terms are negative throughout.

Table 4 presents the results of an OLS regression. For this regression, the frequency weights supplied with the data are ignored. The qualitative findings are unchanged.

In the regressions presented in Table 5, the analysis is confined to respondents classified as household decision makers, i.e. heads of households and housewives. For

columns 1–3, the coefficients on the squared asset term becomes only marginally significant, but otherwise the qualitative findings remain the same. In column 4 (where the highest income respondents are dropped), the signs of the coefficients remain the same but both the linear and the squared asset terms lose significance.

In Table 6, raw income rather than life expectancy-adjusted income is used. The qualitative findings are significant and unchanged.

6 Conclusion

This paper is the first to present a model of funeral insurance as a distinct form of insurance. Funeral insurance is modelled as classic life insurance bundled with a constraint on how the payout is spent. When there is a conflict of interest between the insurance holder and the beneficiary on how a life insurance payout should be spent, funeral insurance can resolve the issue in favour of the parent by functioning as an inter-generational commitment device.

The theory predicts that take-up of funeral insurance should be hump-shaped in income and wealth. Using a nationally representative data on black households in South Africa, where both life and funeral insurance are widely available, this prediction is confirmed, although the data only allows a crude measure of household wealth to be constructed.

A second prediction, that there are conditions in which funeral insurance is not demanded at any level of income or wealth, is not testable with the data used here. But the prediction corresponds to a notion that general improvements in public health (proxied by an increase in the model's survival probability q) may reduce the demand for funeral insurance even holding the distribution of income and wealth constant. This may explain why funeral insurance is relatively unpopular in developed countries, even those characterised by high inequality in income and wealth.

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A Variable construction

Under the heading 'Financial Services', the survey asks: 'Here is a list of different types of policies and investment plans which you can take out with a financial services company. Can you please tell me which, if any, you *PERSONALLY* have? This excludes any cover or benefits provided by your employer/company' (original emphasis). Respondents who have indicate either 'Life cover policy' or 'Endowment, investment, savings or education plan/policy *with life cover*' (original emphasis) are coded as having life insurance. Those who indicate the option 'Funeral insurance', are coded as formal funeral policy holders.

In the 'Sport, entertainment and leisure' section, the following question is asked: 'For the activities listed below, please indicate your *personal frequency of each activity*, if at all' (original emphasis). The options given were 'weekly', 'monthly', 'yearly' and 'not at all'. Respondents reporting that they attend funeral association meetings 'weekly' or 'monthly' are coded as funeral association members. A respondent is coded as having funeral insurance if he/she has a formal funeral policy or is a member of a funeral association. No information on premia, cover or conditions is provided for either type of insurance.

There are several caveats to keep in mind when interpreting these variables. First, it appears to be quite common for people to get funeral cover through their employer in South Africa, but this is explicitly excluded from the question above and therefore is not recorded in the data. Second, it is also quite common for funeral parlours to sell a form of funeral cover (illegally). These may not be recorded in the data since the survey explicitly asks for funeral cover with a 'financial services company'. Third, some insurance companies masquerade as funeral associations. These may not be recorded in the data since they do not require their customers to attend regular association meetings, and it is not clear whether respondents would recognize them as a 'financial services company'.

In the survey, monthly household income is recorded not as a number but categorised as being in one of 33 income ranges. These are coded to a scalar income variable by using the midpoint of each band. The highest band, ZAR 40,000 and above, is coded as ZAR 45,000. 1% of households report this income band.

Information on assets is crude. The respondents were asked which of a list of durable goods 'are presently in the household'. The asset index used in this paper is a simple count of how many of these assets are reported by the respondent. It would be possible to obtain an approximate value for a typical good of each category, but the associated uncertainty makes it questionable whether this would substantially increase the quality of the index. The list of assets is: electric stove,

other (gas or coal) stove, electric hotplate, microwave oven, refrigerator or combined fridge/freezer, free standing deep freezer, vacuum cleaner/floor polisher, dishwasher, automatic front loading washing machine, automatic top loading washing machine, semi-automatic/twin tub washing machine, tumble dryer, sewing machine - electric or manual, television set, video cassette recorder, personal computer/personal laptop in home, hi-fi/music centre, DVD player.

A household was coded as owning a 'proper' home if all of the following are satisfied: It owns its dwelling. The dwelling is a 'House', 'Cluster House', 'Town House' or 'Flat', as opposed to a 'Matchbox House', 'Traditional Hut', 'Hostel', 'Hotel / Boarding House', 'Compound', 'Room in Backyard', 'Squatter Hut', 'Caravan' or 'Other'. The dwelling is electrified and has water on tap, a hot water tank, a toilet and a sink.

Clearly the value of a 'proper house' has the potential to dwarf the value of the asset index discussed above. But their values are not provided, and since the regression specification includes the square of assets, house ownership cannot be used in the main wealth metric but is included as a control variable.

There is no information on debts except a binary indicating whether the household has a 'home loan/mortgage bond', and whether the respondent has 'bought any durable items, such as appliances/furniture, on credit during the *PAST 12 MONTHS*? Credit includes hire purchase, instalment sale and payment on terms' (original emphasis). Clearly buying on credit could inflate the asset index used here, so a binary variable for having purchased items on credit is included as a control.

The 'Rural' indicator is set to 1 if the household's community size is 'Less than 500/Rural'.

The respondent is coded as having own children if he/she answered yes to the question: 'Do you have any young or unmarried children of your own?' There is no information on children more generally.

The respondent is coded as married/cohabiting if he/she reported 'Married or living together' under marital status.

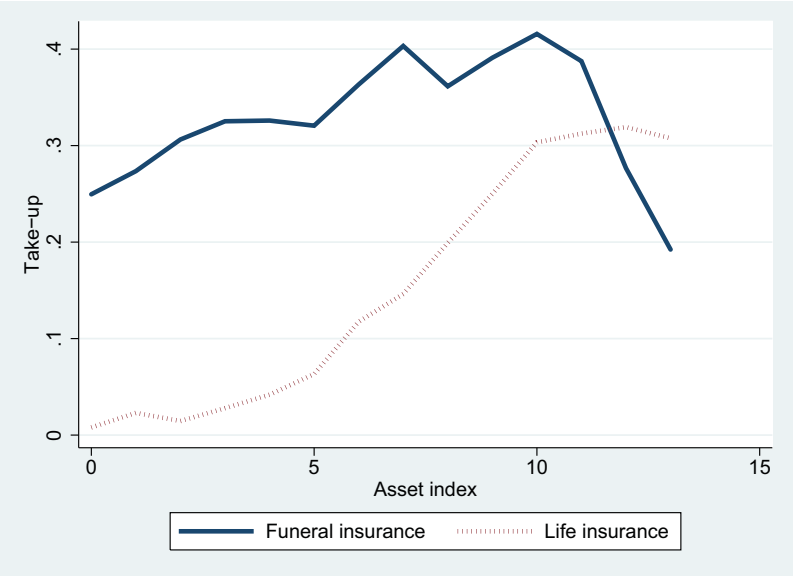

Figure 1: The take-up of life and funeral insurance as a function of household assets. Funeral insurance take-up is hump-shaped in assets, in accordance with the theory. Life insurance take-up is increasing with income, which is consistent with large transaction costs.

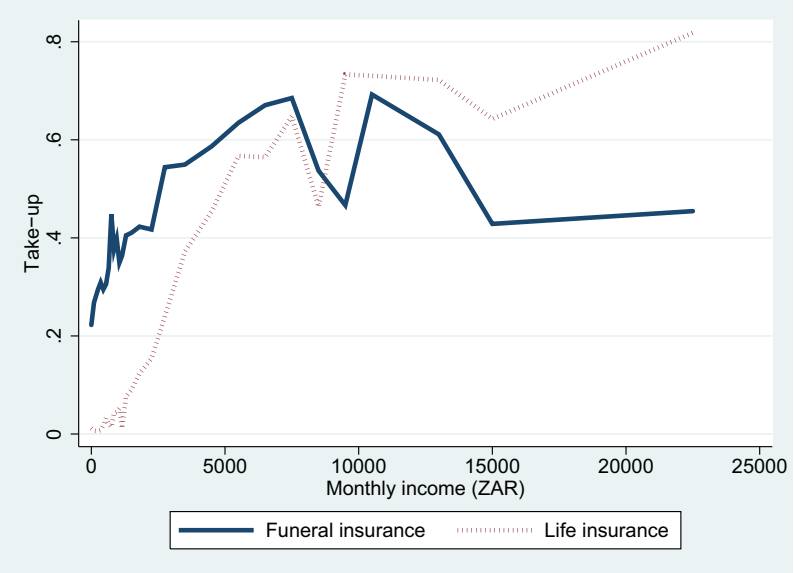

Figure 2: The take-up of life and funeral insurance as a function of personal income. Funeral insurance take-up is hump-shaped in income, in accordance with the theory. Life insurance take-up is increasing with income, which is consistent with large transaction costs.

Table 1: Descriptive statistics (weighted)

	Mean	StDev	Obs
Has funeral insurance (0/1)	0.321	0.467	11882
informal	0.278	0.448	11882
formal	0.068	0.251	11882
Has life insurance (0/1)	0.055	0.228	11882
Asset index (0-14)	3.226	2.485	11882
Personal income	809.696	1839.723	11735
Life expectancy-adjusted personal income	794.711	1810.518	11735
Household income	2412.013	3319.472	11882
Female	0.500	0.500	11882
Age	35.720	15.538	11882
Completed primary school	0.508	0.500	11882
Completed high school	0.270	0.444	11882
Married or co-habiting	0.363	0.481	11882
Has child	0.605	0.489	11882
Lives in rural area	0.509	0.500	11882
Owns 'proper' home	0.078	0.268	11882
Has purchased on credit in the last 12 months	0.057	0.232	11882
Is household decisionmaker	0.681	0.466	11882

Table 2: Main results: Weighted OLS

	(1) Funeral insurance	(2) Funeral insurance	(3) Funeral insurance	(4) Funeral insurance
Household assets	0.0361**	0.0261***	0.0239**	0.0223**
	(0.0123)	(0.00686)	(0.00719)	(0.00710)
Household assets squared	-0.00276**	-0.00188**	-0.00175**	-0.00152**
	(0.000957)	(0.000649)	(0.000627)	(0.000608)
Expected personal income	0.0000731***	0.0000520***	0.0000436***	0.0000547***
	(0.00000954)	(0.00000770)	(0.00000742)	(0.00000816)
Expected personal inc squared	-2.12e-09***	-1.46e-09***	-1.21e-09***	-2.44e-09**
	(4.95e-10)	(3.38e-10)	(3.18e-10)	(8.35e-10)
Controls	No	Yes	Yes	Yes
Observations	11735	11735	11735	11672

Weighted least squares regression results.

The dependent variable is a binary indicator for whether the respondent has funeral insurance.

Column 2 includes controls for respondent sex, age, age squared, education (binary variables for having completed primary school and high school) and province dummies.

Column 3 adds further controls for marital status, having children, living in a rural area, owning a 'proper' home and a binary indicator for having bought anything on credit over the past year.

Column 4 drops observations in the seven highest income categories.

Standard errors are robust and clustered at the province level.

* p¡0.10, ** p¡0.05, *** p¡0.01

Table 3: Weighted probit

	(1) Funeral insurance	(2) Funeral insurance	(3) Funeral insurance	(4) Funeral insurance
Funeral insurance				
Household assets	0.108**	0.0897***	0.0830***	0.0782***
	(0.0427)	(0.0292)	(0.0303)	(0.0300)
Household assets squared	-0.00838**	-0.00686**	-0.00643**	-0.00570**
	(0.00340)	(0.00269)	(0.00267)	(0.00260)
Expected personal income	0.000193***	0.000143***	0.000119***	0.000157***
	(0.0000275)	(0.0000241)	(0.0000224)	(0.0000271)
Expected personal inc squared	-5.41e-09***	-3.95e-09***	-3.27e-09***	-7.81e-09***
	(1.25e-09)	(8.90e-10)	(8.25e-10)	(2.55e-09)
Controls	No	Yes	Yes	Yes
Observations	11735	11735	11735	11672

Weighted probit regression results.

The dependent variable is a binary indicator for whether the respondent has funeral insurance.

Column 2 includes controls for respondent sex, age, age squared, education (binary variables for having completed primary school and high school) and province dummies.

Column 3 adds further controls for marital status, having children, living in a rural area, owning a 'proper' home and a binary indicator for having bought anything on credit over the past year.

Column 4 drops observations in the seven highest income categories.

Standard errors are robust and clustered at the province level.

* p¡0.10, ** p¡0.05, *** p¡0.01

Table 4: Unweighted OLS results

	(1) Funeral insurance	(2) Funeral insurance	(3) Funeral insurance	(4) Funeral insurance
Household assets	0.0270***	0.0225***	0.0207**	0.0187**
	(0.00774)	(0.00601)	(0.00630)	(0.00650)
Household assets squared	-0.00247***	-0.00175***	-0.00161***	-0.00132**
	(0.000541)	(0.000436)	(0.000426)	(0.000430)
Expected personal income	0.0000723***	0.0000489***	0.0000419***	0.0000683***
	(0.00000846)	(0.00000829)	(0.00000840)	(0.0000102)
Expected personal inc squared	-2.16e-09***	-1.45e-09***	-1.24e-09***	-4.34e-09***
	(4.17e-10)	(3.42e-10)	(3.38e-10)	(8.52e-10)
Controls	No	Yes	Yes	Yes
Observations	11735	11735	11735	11672

OLS regression results.

The dependent variable is a binary indicator for whether the respondent has funeral insurance.

Column 2 includes controls for respondent sex, age, age squared, education (binary variables for having completed primary school and high school) and province dummies.

Column 3 adds further controls for marital status, having children, living in a rural area, owning a 'proper' home and a binary indicator for having bought anything on credit over the past year.

Column 4 drops observations in the seven highest income categories.

Standard errors are robust and clustered at the province level.

* p¡0.10, ** p¡0.05, *** p¡0.01

Table 5: Results with only decision-maker respondents

	(1) Funeral insurance	(2) Funeral insurance	(3) Funeral insurance	(4) Funeral insurance
Household assets	0.0420**	0.0291**	0.0246**	0.0225*
	(0.0143)	(0.0100)	(0.0105)	(0.0104)
Household assets squared	-0.00252*	-0.00198*	-0.00187*	-0.00157
	(0.00122)	(0.001000)	(0.00100)	(0.000985)
Expected personal income	0.0000526***	0.0000475***	0.0000396***	0.0000544***
	(0.0000102)	(0.00000990)	(0.00000917)	(0.0000132)
Expected personal inc squared	-1.52e-09**	-1.35e-09***	-1.10e-09**	-2.75e-09**
	(4.63e-10)	(3.83e-10)	(3.53e-10)	(1.18e-09)
Controls	No	Yes	Yes	Yes
Observations	7641	7641	7641	7586

Weighted least squares regression results. Only household heads and housewives are included.
The dependent variable is a binary indicator for whether the respondent has funeral insurance.
Column 2 includes controls for respondent sex, age, age squared, education (binary variables for having completed primary school and high school) and province dummies.
Column 3 adds further controls for marital status, having children, living in a rural area, owning a 'proper' home and a binary indicator for having bought anything on credit over the past year.
Column 4 drops observations in the seven highest income categories.
Standard errors are robust and clustered at the province level.
* p¡0.10, ** p¡0.05, *** p¡0.01

Table 6: Results using raw income (not adjusted for survival probability)

	(1) Funeral insurance	(2) Funeral insurance	(3) Funeral insurance	(4) Funeral insurance
Household assets	0.0362**	0.0261***	0.0239**	0.0223**
	(0.0123)	(0.00686)	(0.00719)	(0.00710)
Household assets squared	-0.00277**	-0.00188**	-0.00176**	-0.00152**
	(0.000958)	(0.000649)	(0.000627)	(0.000608)
Personal income	0.0000722***	0.0000512***	0.0000429***	0.0000539***
	(0.00000949)	(0.00000760)	(0.00000731)	(0.00000794)
Personal income squared	-2.06e-09***	-1.42e-09***	-1.17e-09***	-2.37e-09**
	(4.90e-10)	(3.33e-10)	(3.13e-10)	(8.05e-10)
Controls	No	Yes	Yes	Yes
Observations	11735	11735	11735	11672

Weighted least squares regression results.

The dependent variable is a binary indicator for whether the respondent has funeral insurance.

Column 2 includes controls for respondent sex, age, age squared, education (binary variables for having completed primary school and high school) and province dummies.

Column 3 adds further controls for marital status, having children, living in a rural area, owning a 'proper' home and a binary indicator for having bought anything on credit over the past year.

Column 4 drops observations in the seven highest income categories.

Standard errors are robust and clustered at the province level.

* p¡0.10, ** p¡0.05, *** p¡0.01