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Willingness to participate in a cocoa pension scheme in Ghana: An application of discrete choice experiment

Richard Kwasi Bannor^{1*}, Helena Oppong-Kyeremeh¹, Bismark Amfo^{1,2}, John K.M. Kuwornu¹, Edward Martey^{1,3}, Samuel Kwabena Chaa Kyire¹, Daniel Okorley¹ and Lydia Nkansah¹

Abstract: Studies on involuntary pension participation in general and among farmers, in particular, are scanty. Therefore, this paper aims at investigating cocoa farmers' awareness of pension schemes as well as assessing their willingness to participate in a cocoa pension scheme. A sample of 450 cocoa farmers were interviewed using a structured questionnaire. The discrete choice experiment (DCE) comprising conditional logit (CL) and random parameter logit (RPL) models were used to analyse farmers' willingness to pay for pension schemes. From the study, only 43 percent of farmers were aware of the cocoa pension scheme. The results of DCE analysis revealed that farmers' decision and willingness to pay for pension scheme were influenced by the scheme attributes such as premium, payment period, payment method and pension pay. For pension institutions, the revelation that farmers are less likely to participate in a pension scheme that takes longer years to realise the benefits should be crucial in developing schemes for cocoa farmers. Therefore, it is suggested that actuarial calculations should relax the cap for being declared due for pension and reduce the premium payment period for pension benefits.

Subjects: Finance; Business, Management and Accounting; Industry & Industrial Studies

Keywords: Cocoa; choice experiment; pension scheme; conditional logit; random parameter logit

1. Introduction

The majority of working Ghanaians are into agriculture and related activities (Ghana Statistical Service [GSS], 2019). As such, the sector is ascribed as fundamental towards Gross Domestic Product (GDP) contribution in the country. Again, agriculture can help achieve Sustainable Development Goals One and Two, thus, eradicating poverty and hunger in Ghana. For instance, in 2019, the agricultural sector contributed 19% to the country's GDP and employed more than half of Ghanaians (Service, 2019). It should be emphasised that cocoa production continues to cushion agriculture's contribution to economic growth in Ghana. Globally, Ghana is ranked as the second-largest cocoa producer, trailing only Côte d'Ivoire (Bakang et al., 2021). In 2019, cocoa production contributed 1.4% to agriculture's share of GDP (Service, 2019a). It is further underscored that cocoa is the largest export earner of the country (Avane et al., 2021). In terms of income, cocoa production is estimated to contribute 60–90% of producers' household revenue (World Cocoa Foundation, 2014).

Despite the aforementioned fortunes of the cocoa subsector, it is acknowledged that production is mainly undertaken by aged smallholder farmers with an average age of 50 years (Ali et al., 2018; Akrofi-Atitianti et al., 2018; Kos and Lensink, 2017; Lowe, 2017). This situation—coupled with old plantations, low-yielding varieties, climate change, amongst others—threatens the projected potential of the cocoa sector (Onyeiwu et al., 2011). In most cases, these aged farmers do not continuously invest in their cocoa farms, and they usually employ farmhands to practise share-cropping (Bymolt et al., 2018). Simultaneously, these aged farmers are likely to be in poverty or poor (Agyeman-Boaten & Fumey, 2021; Wongnaa et al., 2021). Age, in correlation with poverty among farmers, even goes beyond cocoa, and the same is acknowledged in other jurisdictions (see, Garza-Rodríguez, 2016; Sekhampu, 2013; Tuyen, 2015).

The Organisation (2017) revealed that poverty incidence among the aged in sub-Saharan Africa could be attributed to lack of pension benefits. Likewise, United Nations Development Programme (2012) espoused that the pension system can eradicate income insecurity among individuals when they retire—a possible strategy to support aged cocoa farmers and reduce poverty. As such, several studies have probed pension schemes for farmers across the globe, in Africa (Miti et al., 2021; Ning et al., 2016; Walczak & Pieńkowska-Kamieniecka, 2015) and particularly in Ghana (Asare, 2019; Kos and Lensink, 2017; Mensah, 2016; Adzawla et al., 2015; Yeboah, 2015; Afenyadu, 2014). A section of these studies investigated farmers' willingness to enrol into pension systems and their habits towards pension contribution (Kos and Lensink, 2017; Mensah, 2016) with none on the use of DCE in analysing the willingness to partake in cocoa pension schemes.

Meanwhile, the Government of Ghana (GoG) launched a pension scheme for cocoa farmers. The scheme is expected to enrol over a 1.5million cocoa farmers and also foresee the provision of retirement payments for beneficiaries(Cocoa Health and Extension Division, 2020). Thus, despite the GoG's effort to roll out a pension scheme for cocoa farmers, there is scanty literary evidence to support the decision. Additionally, among all the pension studies on informal sector only Kos and Lensink (2017) studied the cocoa subsector. As such, findings from the previous works might be very generic when used for decision-making. Moreover, currently, there is not enough evidence in the literature on the potential factors that will stimulate participation in a cocoa pension scheme or the modalities of the pension scheme preferred. Also, most pension studies among farmers on the reasons for participation in pension schemes relied on qualitative case studies (Miti et al., 2021), subject literature and secondary research analysis (Walczak & Pieńkowska-Kamieniecka, 2015), qualitative and descriptive statistics (Yeboah, 2015), and dichotomy choice questions (Mensah, 2016). However, the present study used the Discrete Choice Experiment (DCE) method to improve the robustness of the results. Further, though, the pioneer study on contribution towards a cocoa pension in Ghana was done by Kos and Lensink (2017) using Randomised Control Trial (RCT). Nevertheless, the study considered only fixed (pension) or flexible (part of the money can be withdrawn to take care of emergency financial situation) savings as a precursor for contribution without considering the payment period, premium, payment method and maturity, as done in this study. Additionally, in this study, the authors used DCE which, to the best of their knowledge, had not been used by any study on pension in the subsector. Hence, the following questions remain largely unanswered (i) what is cocoa farmers' level of awareness of the cocoa pension scheme? (ii) what attributes of the pension scheme will the cocoa farmers prefer? (iii) are farmers' decisions to join contingent on the pension scheme attributes? Given these, the present study seeks to analyse farmers' awareness of the cocoa pension scheme and to use the DCE to assess cocoa farmers' willingness to join cocoa pension schemes.

2. Literature review

2.1. Determinants of participation in pension schemes among informal workers and farmers

Synthesised literature suggests that various factors influence an individual's decision to partake in a pension scheme or otherwise. These factors span from the individual's socioeconomic characteristics, institutional factors and pension product characteristics (Mensah, 2016). For instance,

Collins-Sowa (2013) investigated the drivers of pension contribution among informal workers and found that age, education, marital status, household size, pension type and multiple streams of income significantly influence respondents' willingness to pay for a pension scheme. The study further explained that farm location and possession of assets negatively influence payment for a pension scheme. Again, FBO membership, payment mode, household size and knowledge of the pension system significantly drive farmers' willingness to participate in the micro-pension scheme (Collins-Sowa, 2013). Consistently, a study by Adzawla et al. (2015) further affirmed that age, education, marital status (single), income and household size significantly and positively determine informal sector workers' willingness to contribute to pension schemes. The authors expatiated that aged, educated, single and, workers with larger family sizes have a higher tendency to partake in pension schemes.

Moreover, a study by Castel (2008) found that pension packages, saving capacity, access to credit, education, and knowledge about the pension system significantly and positively determine workers' willingness to contribute towards pension. Furthermore, it was observed that gender, number of children, education and income were statistically significant in determining farmers' readiness to contribute towards pension scheme (Zhang, 2015). Relatively, individuals with higher income and access to credit have enough disposable income to save a portion for future uncertainties. Likewise, Karamcheva and Sanzenbacher (2014) elaborated that married and educated workers are more likely to participate in pension schemes whilst younger workers and women are unlikely to participate in the same. Probably, educated workers are well informed and knowledgeable about the benefits of pension packages, thereby influencing their decision to partake in the scheme.

A similar study by Withanage et al. (2000) in Sri Lanka indicated that farmers who are older, single with full-time employment, members of an insurance scheme and who have higher farm sizes are more willing to partake in pension schemes. The authors further underscore that married individuals' unwillingness to partake in insurance schemes could be attributed to their higher household income expenditure, leaving a token or no revenue to contribute towards pension. Recently, Miti et al. (2021) looked into factors influencing informal sector workers to pay for insurance and pension schemes in developing countries. Their study concluded that income, trust, family size, age, education and the residential area are statistically significant in explaining workers' willingness to pay for pension and insurance schemes. The authors further specified that low and flexible contribution rates, benefits packages, government subsidies and quality of the schemes influenced participation and payment for pension schemes.

A more specific study on pension savings by Ghanaian cocoa farmers highlighted that education and old age are positively correlated to contribution toward pension schemes (Kos and Lensink, 2017). Thus, educated and aged cocoa farmers are more likely to save for their retirement. The study further probed the determinants of farmers' choice of flexible pension savings and underlined that younger, female and non-remittance receiving cocoa farmers prefer flexible pension saving modality.

Given these, the following two hypotheses have been developed for the study;

Hypothesis 1: Pension attributes influence the willingness of farmers to participate in cocoa pension schemes.

2.2. Informal voluntary pension scheme in Ghana and cocoa pension

A pension scheme is a financial arrangement for the old-aged to enjoy some benefits after retirement (Boyetey et al., 2021; Summers et al., 2005). It is, therefore, recognised as an investment approach to enjoying future benefits till death. Thus, the pension scheme is regarded as

a social protection tool against the risk of post-retirement poverty. Globally, the pension system in the formal sector is well organised, relative to the informal sector where there are challenges to its implementation. It is said that the informal sector workers are generally poor, and lack access to a resource pool and adequate knowledge and information about pension systems (Mensah, 2016). Also, universally, the majority of workers are in the informal economy, most especially in low and middle-income countries (Organisation, 2017; Patankar & Patwardhan, 2016). Yet, just like mainstream financial exclusion, voluntary pension schemes have been limited to a few workers (Guyen, 2019; Park et al., 2019; Sharma, 2016). Thus, pension coverage in the informal sector has been steadily slow over the years despite its 30%-40% contribution to Ghana's economic growth (Adzawla et al., 2015; International Monetary Fund, 2017). The GoG, in 1965, passed Act 27 which requires all workers (both formal and informal sector workers) to join a contributory pension scheme.

The National Pension Act 766 was passed in 2008 to ensure that every working Ghanaian enjoy pension benefit after retirement. The contribution is mandatory for both private and public sector organisations. The Act mandates contributions to be in a three-tier system. The first two tiers are compulsory for formal workers while the third tier is non-restrictive; meaning both formal and informal workers can take advantage of it to secure their future (Agbobi, 2011). All the tiers are regulated by the Government through the National Pensions Regulatory Authority (NPRA) and managed by private entities. A key difference between formal and informal voluntary pension schemes in Ghana is the absence of floors and ceilings for informal contributors. Thus, depending on the strength of the informal contributor, the person is allowed to save any amount at any time (no cap on amount and frequency of payment) Also, this regulation is optional for self-employed individuals like farmers (National Pensions Regulatory Authority, 2008). Thus, farmers do not need to contribute any percentage of their earnings to the national pension scheme. However, farm owners who have employees working on their farms are mandated to contribute a quota (18.5%) of their workers' basic salary to the national pension scheme (National Pensions Regulatory Authority, 2008).

Nevertheless, Collins-Sowa (2013) reported that Ghana's social security policies have not lived up to expectations of providing inclusive social protection for the population, especially the labour force in the informal sector, and seem to have secluded informal workers from any form of social protection. This is because Ghana's state-based pension scheme tends not to favour the majority of the populace as it leans towards the participation of formal workers (Asante, 2017).

As mentioned previously, aside from the generalised voluntary informal pension scheme in Ghana, there is currently no dedicated pension initiative for farmers. Therefore, to secure the future of farmers, the GoG has begun rolling out a farmer pension scheme programme in segments starting with cocoa farmers. It is also envisaged that the Pension Scheme for cocoa farmers in the country will enable them to make voluntary contributions towards their retirement, while COCOBOD makes a supplementary contribution on behalf of the farmers (CHED, 2020). Currently, the piloting of the project is ongoing in some selective cocoa-producing communities in the country. It is expected that the actual implementation will follow right after the piloting. To this end, the COCOBOD and the NPRA will together have to vigorously embark on an education and sensitisation programme to bring all cocoa farmers as individuals and as groupings to enrol on the scheme (CHED, 2020).

2.3. Theoretical framework

The design and conceptualisation of pension products are rooted in economic theories. Ergo, many theories have been used to explain pension schemes according to relevant literature. Some of these theories include the rational prodigality theory, permanent income and life-cycle hypothesis, retirement insurance theory, overlapping generation theory, and random utility theory. However, the scope of this study is concentrated on the need for pension uptake because cocoa farmers are ageing, hence, the need to secure their future. In lieu of this, the Overlapping Generation Theory

(OLG) is regarded as relatively suitable to underpin this work. Thus, the model considers why people save presently for future benefits. However, an underlying principle of the theory is the factor of age and demographic factors which influence savings.

The theory is acknowledged as a classical economic growth theory to explain the habit of savings and to analyse pension schemes (Miyazaki, 2013). A glut of studies has similarly used the theory in population dynamic change and its influence on social security, savings and pension schemes (Cipriani & Fioroni, 2021; Cremers, 2005; Hualei et al., 2018; Miles, 1999; Tosun, 2003; Wolf & Caridad Yocerin, 2021). Theoretical as well as applied OLG models have since proved particularly widespread in analysing the long-term economic consequences of the gradual ageing of nations, a demographic process characterised by the increasing population share of the elderly. As the world population continues to increase with a corresponding increase in aged people, modelling of demographics within the OLG framework became increasingly realistic.

In relation, the population of aged cocoa farmers in Ghana is projected to increase, making it very prudent to model this expected change within the OLG framework. In application, the model assumes a cocoa farmer's life in two phases. The first phase considers a younger and economically active farmer while the second phase involves an aged and economically inactive farmer (Mensah, 2016). During phase one, the farmer is expected to work and earn income for consumption and savings. But in the second phase, the farmer becomes inactive and anticipates depending on the accumulated capital during phase one for survival. In essence, the OLG model—in part—encapsulates the random utility theory in the sense that, farmers will prefer saving in anticipation of better future benefits. This model suggests that farmers are faced with a utility function (Fanti, 2014), which shows that how farmers spend their income during their youthful stage determines resources available at their disposal when they retire. In other words, farmers must spread their farm income and the return on their assets over their lifetime such that they can continue to consume even after they are too old to work.

3. Methodology

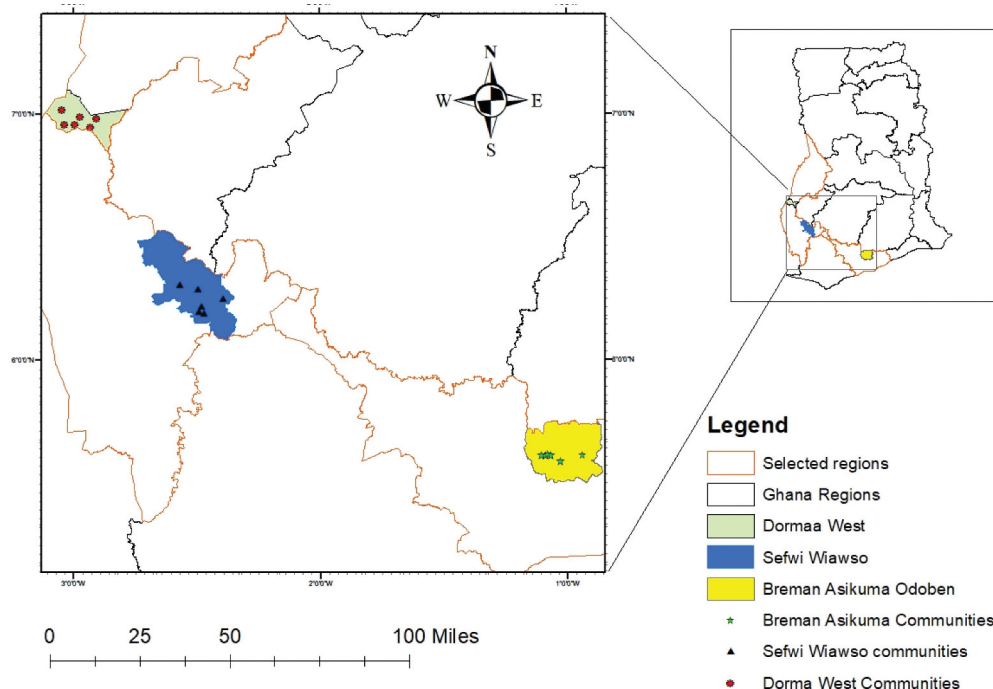
3.1. Study area and sampling

The study was conducted in Ghana's Central, Western North and Bono Regions. The major cocoa-producing districts in these regions were selected (see, Figure 1 for the geographical location of the study areas). For instance, about 54% of cocoa production is from the Western North Region (Bannor et al., 2019; Ghana Cocoa Board, 2018), while Central Region is known for its increasing cocoa production, particularly the study area Asikuma-Odoben-Brakwa District. One of the critical reasons supporting cocoa production in these regions is the fertile lands amidst cocoa production incentives (subsidised inputs, mass spraying, cocoa rehabilitation programme, hand pollination) provided by government and other NGOs (COCOBOD, 2018; Abbey et al., 2016). The Sefwi-Wiaawso, Dormaa East and Asikuma-Odoben-Brakwa districts were purposively selected from the Western North, Bono and Central regions of Ghana, respectively. These districts were selected because of their known intense production of cocoa in Ghana. Next, six cocoa-producing communities were randomly selected. One hundred and fifty farmers (150) apiece were selected from six communities within each region. Lastly, based on the list of cocoa farmers in these communities from purchasing clerks of Licensed Cocoa Buying Companies (LBCs), 25 farmers were randomly selected from each community. Cumulatively, 450 farmers were interviewed across Ghana for this study. The study was done from May 2020 to January 2021.

3.2. Method of data analysis

Descriptive statistics, Conditional Logit (CL) and Random Parameter Logit (RPL) models were used in the analysis.

Figure 1. Map of the study area.



3.3. Choice experiment design

In this study, the mean willingness to pay (WTP) and preferences of cocoa farmers for pension were analysed using the discrete choice experiment (DCE) approach, based on farmers' stated preferences. This technique was utilised because it is frequently used to analyse situations where market data is unreliable or non-existent (Asante-Addo & Weible, 2020; Tonsor et al., 2009), such as the cocoa farmers' pension scheme in Ghana. Furthermore, in literature for agriculture, marketing, health and environmental studies, the choice experiment approach has been applied extensively (Hensher, 2010; Holmes et al., 2017; Martey et al., 2021). Additionally, respective authors have employed the DCE in empirical studies. For example, Ruto and Garrod (2009) used DCE in determining farmers' preferences for agri-environment schemes. Sarfo et al. (2021) examined farmers' willingness to pay for digital and conventional credit using the discrete choice experiment. Asante-Addo and Weible (2020) adopted the choice experiment approach to assess consumers' willingness to pay (WTP) and preferences for domestic or imported chicken meat attributes. Applying the discrete choice experiment, Martey et al. (2021) investigated average willingness to pay and farmers' preferences for attributes of cowpea varieties. The willingness to pay for retirement benefits among teachers was analysed using a stated preferences experiment from national data (Fuchsman et al., 2020). Ragasa et al. (2020) investigated competition among local and imported products using this method.

In choice experiments, researchers stimulate and present hypothetical scenarios of marketing and production settings to individuals. Basically, two or three alternatives consisting of several attributes having different levels make up each scenario. Through multiple decision making, respondents select their preferred alternative from the choice set presented. This study presented cocoa farmers pension attributes with their respective levels in an experimental design obtained from expert consultations and literature review. The attributes included premium, period, payment method, maturity and pension pay. Table 1 gives a summary of the attributes with their respective levels applied in the choice experiment. It is important to note that the few attributes in the choice set ensure that the farmer makes the actual decision, thereby eliminating attribute non-attendance (ANA), where one or more attributes are disregarded (Hensher & Greene, 2010).

Table 1. Attributes and level for cocoa pension scheme






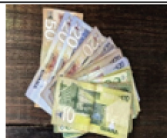



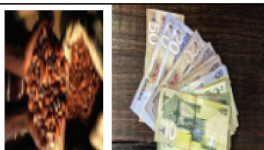
Attribute	Level 1	Level 2	Level 3	Description/ Preference
Premium	1 bag	2 bags		Premium contributions towards pension scheme, equivalent to the number of bags (US \$119.78 per bag). Usually, one (1) bag is preferred.
Period	Annual	Biannual		The duration within which premium contributions on pension is made until maturity. Annual is often preferred.
Payment Method	Cash	In-kind		Type of payment method to contribute towards pension. In-kind (cocoa bags) is preferred.
Maturity (years)	1–5	6–10	11–15	Years of contribution towards a pension scheme before receiving the benefits. Contributions for a few years (1–5) is preferred mostly.
Pension pay	Regular	Lump-sum	Both	The method of receiving benefits from pension contribution after maturity. Both regular and lump-sum payment are mainly preferred.

The premium attribute refers to the amount farmers contribute towards the pension scheme, equivalent to the cost of a bag of cocoa as US\$119.78 (GH¢660). Also, the period attribute is the timeframe for a farmer to contribute a premium for a pension until reaching maturity. The mode of payment farmers use in making their contributions towards a pension scheme is attributed to the payment method. Similarly, the maturity attribute explains the payment duration qualifying a farmer to start enjoying benefits, which is represented by annual and biannual. However, the minimum contribution for maturity in the public sector is 15 years. Likewise, the pension pay attribute describes how farmers can receive pension benefits after maturity. Pension benefits received in the public sector are regular monthly payments and lump-sum payments.

From [Table 1](#), the explained levels and attributes are presented. The OPTEX procedure in SAS was employed to determine the optimal experimental design for this study. In effect, the possible combination of attributes and levels from two attributes differing across three levels, and three attributes differing across two levels were determined as 72; that is, $3^2 \times 2^3$. As a result, two blocks comprising eight choice sets were established using the D-optimal design with an adjusted Federov search algorithm having a complete factorial design. Consequently, three categories of choice set scenarios were attained for each block, including the opt-out (none of these) option.

Figure 2. A sample of choice set presented to respondents.

Please check (✓) the option (A, B or C) that you are most likely to choose

Attributes	Option A	Option B	Option C
Premium	 1Bag	 2Bags	Do not like neither option A nor option B (Opt-out)
Period	 Biannual	 Biannual	
Payment Method	 In-Kind	 Cash	
Maturity	 15Years	 10Years	
Pension Pay	 Lump-Sum	 Both	
I will choose...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Each cocoa farmer was assigned randomly to a block comprising three independent choice sets. An example of a choice set presented to cocoa farmers is shown in Figure 2 below.

3.4. Econometric modelling

In understanding studies related to choices, researchers used the random utility theory (McFadden, 1973) as the theoretical context for this study. Following the utility framework, the most derived utility among several alternatives is chosen by an individual. Supposing a cocoa farmer is to select a pension package among several schemes to secure his old age in the future, and considering his budget constraints, he will choose the one from which he expects to attain maximum utility. In line with the random utility theory, it is stated as follows, assuming a poultry farmer p selects pension option f :

$$EU_{pf} = J(S_f, Z_{ef}) + \varepsilon_{pf} \quad (1)$$

where S_f denotes the vector for pension attributes associated with alternatives (premium, period, payment method, maturity and pension pay) Z_{ef} signifies the vector interacting with farmer characteristics and choice variables, whiles ε_{pf} is the random error term. The models employed in this study for cocoa farmer's preferences for pension attributes were the conditional logit (CL)

and random parameter logit (RPL). Subsequently, the RPL model was preferred to the CL model since the CL model is associated with the assumption of independence of irrelevant alternatives (IIA); preference homogeneity and independent error over time (Asante-Addo & Weible, 2020; Benson et al., 2016; Martey et al., 2021; Train, 2009). The RPL model, on the contrary, permits random variation within a specified distribution sample while estimating preference heterogeneity (Martey et al., 2021; McFadden & Train, 2000). As a result, this study proposed heterogeneity among cocoa farmers; hence, they are likely to have varied preferences for pension attributes.

Following studies of Martey et al. (2021) and Krah et al. (2019), the utility framework permits interaction between pension attributes and key demographic characteristics. Therefore, the expected utility of a cocoa farmer p in selecting pension attributes f is specified as:

$$EU_{pf} = \beta S_{pf} + \delta G_{pf} + \omega_n S_{pf} + \alpha R_{pf} + \varepsilon_{pf} \quad (2)$$

where S_{pf} is the vector for pension attributes that are previously defined δ is the marginal utility of money (price for a bag of cocoa) ω_n represents smallholder-specific random terms capturing the heterogeneity preference of pension attributes; β are the coefficients of each pension attribute to be estimated involving an alternative specific constant (ASC) α represents the coefficients to be estimated related to the interacting terms R and ε_{pf} is the independently and identically distributed error term (Train, 2009).

In estimating a specific attribute's average marginal willingness to pay (WTP), we calculate the ratio of the marginal utility of income to the coefficient of the attribute (Martey et al., 2021). Assuming the random parameter having a normal distribution is well known, the distribution expected to fit the parameters determined could be selected in principle (Nahuelhual et al., 2004). However, a normal distribution was assumed since the pension attributes used in this study are not predictable, permitting positive as well as negative coefficients. The model is empirically specified as follows:

$$EU_{pf} = \beta_1 Prem + \beta_2 Perd + \beta_3 Payt + \beta_4 Matu + \beta_5 Pens + \varepsilon_{pf} \quad (3)$$

where $Prem$ is premium $Perd$ represents period $Payt$ signifies payment method; $Matu$ denotes maturity period; and $Pens$ means pension pay. These pension attributes are presented and described in Table 1.

4. Results and discussion

4.1. Personal and household characteristics of cocoa farmers

Table 2 presents cocoa farmers' demographic characteristics. Cocoa production is dominated by men in the study area. Cocoa production in Ghana is highly manual with little or no use of mechanisation. Men usually have the required strength and production resources like land for cocoa farming. Most women assist their husbands in cocoa cultivation. On average, a cocoa farmer was close to 50 years. Therefore, cocoa production is dominated by farmers of advanced ages. About 40% of the respondents were native cocoa farmers while the rest were either permanent (54%) or temporary (4%) migrants. This implies that migrant cocoa farmers dominate in the area. Due to differences in weather conditions and soil fertility, many people migrate from northern Ghana to the southern part to either farm or serve as farm labour. Most of these migrants end up settling permanently in the receiving communities. Close to 60% of the cocoa farmers had completed basic education (Junior High School) while a quarter had no formal education. The majority of the cocoa farmers had married and were household heads. On average, a household comprised seven members.

Also, Table 3 presents cocoa farmers' production characteristics. The main economic activity for more than 90% of the respondents is farming. According to GSS (2019), the majority of rural households in Ghana are crop farmers of which cocoa is a major perennial/tree crop cultivated. However,

Table 2. Cocoa farmers' demographic characteristics

Variable	Description	Percentage/value
Sex (%)	Male	66.96
	Female	33.04
Age (years)	Mean	48.18
	Standard deviation	11.59
	Minimum	24.00
	Maximum	92.00
Residence (%)	Indigene/native	41.29
	Settler/permanent	54.24
	Migrant/temporary	4.46
Education (years)	None	26.56
	Basic	57.81
	Secondary	14.29
	Tertiary	1.34
Marital status (%)	Single	6.92
	Married	79.46
	Divorced	6.70
	Widowed/widower	6.70
	Separated	0.22
Household head (%)	Yes	78.79
Household size (number)	Mean	6.85
	Standard deviation	3.37
	Minimum	1.00
	Maximum	21.00

few of the respondents had farming (cocoa production) as a secondary source of income. On average, a farmer had 20 years of experience in cocoa production. This implies that the farmers have amassed ample knowledge in cocoa production and understand dynamics in the industry. About 80% of the farmers received extension visits in the 2020/2021 cocoa season, and about a third belonged to Farmer Based Organisations (FBOs). This means that about two-thirds of the cocoa farmers lack benefits associated with FBOs like group loans, extension education, training services and knowledge sharing among group members. This could have adverse impacts on cocoa production.

Land ownership for half of the cocoa farmers is inheritance (Table 3). In this case, some of the farmers inherited cocoa farms while others cultivated cocoa on inherited lands. About 60% of the farmers produce cocoa through the sharecropping system. This is done by farmers who do not own farmlands. The average number of cocoa farms owned by the respondents is three, with a maximum of 10. Due to land fragmentation, many farmers have multiple farms which could be a mixture of land ownerships: inheritance, purchase and/or sharecropping. The average cocoa farm size was three and a half hectares. Cocoa production in Ghana is predominantly on small-scale basis and ranges between two and five hectares (Aneani & Padi, 2016). Also, productivity (yield per hectare) was 147 kg. According to Aneani and Padi (2016), cocoa productivity is low in Ghana, with a mean of 234 kg per hectare. This could be due to inadequate management of cocoa farms, pest and disease infestations, low soil fertility, and climate change. Less than half of the cocoa farmers have off-farm economic activities, which contributes an average of US\$755 to their income annually.

Table 3. Cocoa farmers' production characteristics

Variable	Description	Percentage/value
Main economic activity (%)	Farming	92.19
	Fishing	1.34
	Teaching	1.12
	Trading	3.13
	Handicraft	2.23
Farming experience (years)	Mean	20.05
	Standard deviation	11.00
	Minimum	1.00
	Maximum	60.00
Extension contact (%)	Yes	80.58
FBO membership	Yes	30.13
Land ownership (%)	Inheritance	52.01
	Purchase	3.35
	Sharecropping	59.38
Number of cocoa farms (number)	Mean	2.76
	Standard deviation	1.81
	Minimum	1.00
	Maximum	10.00
Farm size (hectares)	Mean	3.35
	Standard deviation	2.43
	Minimum	0.20
	Maximum	16.79
Yield (kg)	Mean	996.48
	Standard deviation	917.12
	Minimum	32.00
	Maximum	8320.00
Productivity (yield per hectare, kg)	Mean	146.56
	Standard deviation	158.72
	Minimum	3.20
	Maximum	600.00
Off-farm income (%)	Yes	40.18
Annual income from off-farm (US \$)*	Mean	754.83
	Standard deviation	1853.28
	Minimum	90.74
	Maximum	11,778.58

*Exchange rate: US\$1 = GH¢5.51; GH¢ is Ghana cedis, the currency of Ghana.

4.2. Farmers' awareness and willingness to join cocoa pension schemes in Ghana

Table 4 presents farmers' awareness of cocoa pension schemes in Ghana, and their willingness to join. About 60% of the cocoa farmers had bank accounts for their transactions, and only 13% were members of Village Savings and Loans Associations (VSLAs). VSLA boosts farmers' off-farm income (Bannor et al., 2020a), food security (Ksoll et al., 2016), household consumption expenditure and empowerment of women (Mwansakilwa et al., 2017). Saving with banks and participation in VSLA enable farmers and the rural poor to obtain loans in times of financial crises (Brannen & Sheehan-Connor, 2016). Thus, VSLA enables the rural poor to mitigate the volatility of farm income and improve their welfare (Cameron & Ananga, 2015). Furthermore, one-third of the cocoa farmers had

Table 4. Farmers' awareness and willingness to join cocoa pension schemes in Ghana

Variable	Description	Percentage
Bank account	Yes	59.15
Membership of VSLA	Yes	12.50
Savings for retirement	Yes	31.47
What cocoa farmers have been doing to take care of themselves when old	Investment in children	89.29
	Investment in farms	61.38
	Investment in off-farm business	17.00
	Savings with bank	30.58
	Life insurance	9.15
	Pension contribution	5.58
Awareness of general pension scheme	Yes	50.56
Awareness of cocoa pension scheme	Yes	42.86
Source of awareness	Radio	62.70
	Television	10.34
	Insurance companies	0.63
	COCOBOD	14.11
	Licensed Buying Companies	1.88
	NGOs	1.88
	Colleague farmers	8.46
Willingness to join pension scheme from the formal sector	Yes	96.65
Willingness to join a cocoa pension scheme	Yes	97.32
Pension scheme organisation cocoa farmers want to join	Pension scheme by SSNIT	58.07
	Pension scheme by insurance companies	31.69
	Pension scheme by farmer organisations	44.27
	Pension scheme by Licensed Buying Companies	42.47

savings towards their retirements (old age). These farmers save a portion of their income with banks, VSLAs or other financial institutions to provide them with a means of living when they are old and do not have the strength to farm.

Cocoa farmers have multiple engagements to take care of themselves during their old ages: investment in children (89%), investment in farms (61%), savings with a bank (31%), investment in an off-farm business (17%), life insurance (9%), and pension contribution (6%). Cocoa farmers invest in their children by providing them with quality education, apprenticeship and other means of securing a better future for them. Farmers invest in farms by cultivating perennial/tree crops like cocoa, oil palm, coconut, citrus (orange) and cashew to provide them with a lasting source of income. Others train their children to take over management of their farms at old ages. Savings with a bank, life insurance and pension contribution enable cocoa farmers to withdraw from the contributions when old and cannot work. However, few of the cocoa farmers are into these.

Half of the cocoa farmers were aware of the general pension scheme for formal sector workers in Ghana (Table 4). Awareness of the cocoa pension scheme was generally low in the study area (43%). Cocoa farmers become aware of pension schemes through the media (radio and television),

insurance companies, Ghana Cocoa Board (COCOBOD), Licensed Buying Companies, non-governmental organisations (NGOs) and colleague farmers, with radio (63%) forming the majority. Almost all the farmers were willing to join pension schemes from the formal sector or cocoa pension scheme. This implies that cocoa farmers have anticipated the adverse effects of not saving ample money towards their old age. Cocoa farmers would want to join pension schemes by the Social Security and National Insurance Trust (SSNIT), insurance companies, farmer organisations or Licensed Buying Companies. SSNIT is a Government of Ghana agency in charge of the administration of national pension schemes, making it a popular and trusted pension company in Ghana. Though not in existence, some cocoa farmers would want farmer organisations and Licensed Buying Companies to manage pension schemes for cocoa farmers in Ghana.

4.3. Results from the choice experiment

The findings obtained from conditional logit (CL) as well as random parameter logit (RPL) are shown in Table 5. To generate stable results, the 1000 Halton draws was used to estimate the simulations of the RPL model. The results for the conditional logit model are shown in Model 1. The results for RPL models are presented from Model 2 to Model 5. Models 2 and 3 estimates are from the RPL model without non-random parameters. However, in Model 2, the estimates do not correlate with attributes, whereas in Model 3, the estimates correlate with attributes. Again, models 4 and 5 are RPL estimates having non-random parameters; even though Model 4 does not consider the correlation between attributes, Model 5 reports for the correlation among attributes.

From the results, CL and RPL display consistent signs for the coefficients of all the attributes in the respective models and are statistically significant, suggesting that the choice of attributes is suitable for this study. Meanwhile, variations in the average values exist since the mean estimates for the CL model are lower than those of the RPL models (Revelt & Train, 1998). This result suggests possible underestimation effects in the CL model (Martey et al., 2021). Also, the results of the standard deviations for the RPL were significant. This supports the preference for heterogeneity hypothesis of variation among the preferences for pension attributes among cocoa farmers. Under conditions where heterogeneity in the attributes of pension preferences were not accounted for, possible invalid assumptions about cocoa farmers' preferences for pension attributes can occur.

The log-likelihood and Akaike Information Criterion (AIC) estimates for the RPL models reveal that they were relatively low in Model 5, thus, they fit best for the data. Therefore, we focus our discussion on Model 5. Regarding Model 5, cocoa farmers consider premium (i.e. one bag vs two bags), period (i.e. annual vs biannual), payment method (i.e. cash vs in-kind) and pension pay (i.e. regular vs lump-sum vs both) as important attributes in selecting pension packages. It is worth noting that, the maturity (i.e. 1–5 vs 6–10 vs 11–15) attribute was not statistically significant. This concurs with the finding of Kitamura and Nakashima (2021) who found that people, especially males, have an insignificant preference for long-term pension schemes (deferred annuities). They highlighted that long-term pension schemes are regarded as a gamble, making such schemes unattractive to a segment of contributors. The results for the payment method are contrary to findings, suggesting that respondents will delay claiming benefits if lump-sum were offered to them as incentives (Maurer & Mitchell, 2021). Meanwhile, the findings for the payment period are consistent with a study that suggests that contribution periods are very important in pension schemes (Bonnet et al., 2019). Relatively, the coefficient on payment method is of higher magnitude compared to all the other attributes. Usually, payments towards pension schemes are in cash; however, cocoa production is seasonal, hence, farmers might not be able to make monthly contributions towards the scheme. Likewise, it is asserted that farmers prefer in-kind transactions to in-cash (Grima et al., 2016; Navrud & Vondolia, 2020). Given this, it would be appropriate for farmers to provide the price equivalent of the number of bags for premium payment during harvest, spread annually, ergo, their preference for in-kind. Also, cocoa farmers' average willingness to pay (WTP) for a pension scheme is US\$ 55.19 (GH¢ 304.11), which is lower than a bag of cocoa. One plausible reason could be that cocoa farmers are predominantly smallholder farmers who get their income seasonally, and are, therefore, unlikely to pay premiums beyond the mean WTP.

Table 5. Estimates of CL and RPL models for choice of cocoa pension

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
ASC	-0.703*** (0.065)	0.008 (0.204)	-0.516** (0.239)	0.749 (0.912)	-0.405 (0.806)
Premium	0.329*** (0.551)	0.452*** (0.073)	0.491*** (0.086)	0.450*** (0.072)	0.458*** (0.083)
Period	0.113** (0.055)	0.0211 (0.068)	0.181** (0.082)	0.030 (0.068)	0.285*** (0.081)
Payment method	0.387*** (0.055)	0.483*** (0.083)	0.710*** (0.107)	0.455*** (0.081)	0.670*** (0.108)
Maturity	-0.185*** (0.058)	-0.169** (0.075)	-0.225** (0.094)	-0.161** (0.074)	0.103 (0.122)
Pension pay	0.207*** (0.058)	0.365*** (0.080)	-0.689*** (0.101)	0.343*** (0.076)	0.238** (0.104)
Non-random parameters					
Age				-0.043** (0.018)	-0.019 (0.015)
Sex				0.106 (0.352)	0.123 (0.300)
Experience				0.012 (0.345)	0.013 (0.018)
Educational level				-0.192 (0.247)	-0.224 (0.214)
Per capita expenditure				0.000*** (0.000)	0.000*** (0.500)
Standard deviation					
ASC		0.476*** (0.138)	4.382*** (0.244)	0.471*** (0.145)	3.595*** (0.237)
Premium		3.460*** (0.203)	0.610*** (0.135)	3.116*** (0.193)	0.354 (0.237)

(Continued)

Table 5. (Continued)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Period		0.042 (0.199)	0.316*** (0.102)	0.034 (0.171)	0.393*** (0.116)
Payment method		0.878*** (0.120)	1.228*** (0.136)	0.848*** (0.119)	1.332*** (0.148)
Maturity		0.441** (0.186)	0.737** (0.369)	0.387** (0.192)	1.298*** (0.255)
Pension pay		0.611*** (0.149)	1.133*** (0.129)	0.417*** (0.186)	1.067*** (0.152)
Observations	3608	3608	3608	3608	3608
AIC	7758.3	6008.6	5903.3	5886.7	5849.5
Log likelihood	-3873.14	-2990.29	-2924.65	-2926.34	-2892.73

Significance: 1%==***, 5%==**, 10%==*

The non-random parameters used in the RPL model were age, sex, experience, educational level and per capita expenditure. Among the non-random parameters, only age and per capita expenditure were significant determinants of pension participation. The per capita expenditure was positive and significant, indicating that with higher per capita expenditure farmers are likely to contribute towards a pension scheme. Farmers within this criterion are likely to have a large farm size which generates more income (R. K. Bannor et al., 2020b; Bannor & Oppong-Kyeremeh, 2018; Kos and Lensink, 2017)—therefore, they can contribute to a pension scheme to their benefit in future. In detail, the results of the per capita expenditure as a proxy for poverty revealed that, with an increase in the per capita expenditure of a farmer, the farmers are more likely to participate in the cocoa pension scheme. Similarly, Miti et al. (2021) and Zhang (2015) reported that informal workers' willingness to participate in pension schemes was based on their income. The result suggests that, the cocoa pension scheme should be in tandem with other poverty alleviation programmes and policies to better the lives of cocoa farmers lest the necessary impact may not be achieved. Moreover, aged farmers are less likely to participate in a pension scheme. Inconsistently, Adzawla et al. (2015) reported that age is a significant and positive predictor of willingness to participate in pension schemes. However, the results on age and per capita from this study buttresses the Overlapping Generation Theory (OLG). Thus, cocoa farmers' pension contribution should be done from an early and youthful age to when old. This is because it is at their early ages that they can generate enough income with the knowledge and physical strength to increase farm size and increase production and productivity. The results also mean that, for a specific pension scheme for cocoa farmers to be sustainable, there is a need to have several young cocoa farmers participate as the aged are less likely to save for a pension. Thus, OLG theory seems to explain farmers' willingness to participate in a cocoa pension scheme.

5. Conclusions and recommendations

This study investigated farmers' awareness of cocoa pension schemes in Ghana and their willingness to pay for a pension scheme. About half of the cocoa farmers knew the formal workers' general pension scheme. However, only about 43% of farmers were aware of the cocoa pension scheme yet to be scaled up, suggesting a low level of awareness in the study area. Almost all (97%) farmers were willing to join pension schemes from the formal sector or cocoa pension scheme. Specifically, cocoa farmers preferred joining pension schemes of the Social Security and National Insurance Trust (SSNIT) and insurance companies. Also, the discrete choice experiment (DCE) was used to analyse cocoa farmers' preferences and willingness to pay for pension schemes. The findings of this study revealed significant heterogeneity among cocoa farmers' preferences for pension schemes, suggesting the importance of permitting preference heterogeneity in choice modelling. Empirically, the results demonstrated that premium, period, payment method and pension pay were significant attributes considered by cocoa farmers in choosing a pension scheme. Also, socioeconomic characteristics such as per capita expenditure positively influence willingness to participate in the cocoa pension scheme whereas influence negatively. Notably, cocoa farmers showed high preferences for a pension scheme with an equivalent cost of one cocoa bag as premium, annual payment, in-kind payment method, and regular and lump-sum payment methods. These attributes are crucial for developing any pension scheme for cocoa farmers. However, the maturity period attribute did not significantly influence farmers' choice for the pension scheme, indicating that farmers are indifferent to the years of maturity of the premium paid for pension schemes in the choice experiment. Comparing the attributes for pension, the payment method had the highest effect over premium, period and pension pay whereas pension pay had the lowest effect over the other attributes. On average, cocoa farmers were willing to pay (WTP) US\$ 55.19 (GH¢ 304.11) as a premium for pension schemes.

Also, per capita expenditure as a non-random parameter was significant. This finding signifies that most cocoa farmers are poor and willing to make small contributions towards a pension scheme to secure their future in old age. This and the age factor result bolster the application of the Overlapping Generation Theory (OLG) in developing the cocoa pension scheme.

6. Implication for policy

The finding that most farmers are not aware of the cocoa pension scheme suggests that the Government of Ghana, through the Ghana COCOBOD, should educate and sensitise cocoa farmers on the new pension scheme to enable them to make informed decisions towards securing their old age. Although most cocoa farmers are ageing, they are willing to join the pension scheme; therefore, policymakers should find seed money to top up for fewer farmers who meet the allowable pension age to qualify for the same. Also, the Government should lobby pension scheme institutions to relax the age due for pension, given the average age of farmers.

7. Implication for practice

For pension institutions, the revelation that farmers are less likely to participate in a pension scheme that takes longer years to realise the benefits should be crucial in developing schemes for cocoa farmers. Therefore, it is suggested that actuarial calculations should relax the cap for being declared due for pension and reduce the premium payment period for pension benefits. Also, pension institutions in developing pension schemes for cocoa farmers should find possible means of attracting the contribution of the farmers (in-kind payment) during the sales of cocoa at various LBCs to ensure consistency in payment and reliable pension payment. Additionally, as evidenced in the results, unlike formal workers, farmers do not draw monthly salaries and wouldn't be able to contribute monthly pension scheme. Therefore, actuarial calculations should consider possible ways of deducting appropriate premium (in-kind payment from cocoa beans), which can be spread for the whole year.

8. Implication for theory

Participation in cocoa pension schemes among cocoa farmers can be explained by the Overlapping Generation Theory (OLG). Therefore, pension practitioners should endeavour to have more young cocoa farmers in the pension scheme to ensure the sustainability of the scheme.

9. Implication for future research

One limitation of the study is the inability to calculate the exact benefit (amount of money) farmers are likely to have given the amount they are willing to pay. Therefore, future studies should undertake the actuarial analysis of the possible benefit both in a lump sum and monthly pension given the payment period, the premium and maturity date to add to this study. Such a study will be more revealing if the authors use non-hypothetical choice experiments, such as experimental auctions, to validate WTP estimates in this study since hypothetical bias cannot be ruled out completely.

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