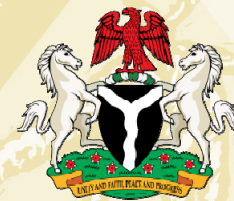




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Farmers' Preferences on Seed Purchase Timing - Rice, Cowpea, and Maize Growers in Nigeria

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The timely availability of seeds at planting time is considered one of the important factors for faster improved seed adoption in Nigeria. There is a lack of empirical information on how much more farmers are willing to pay (WTP) for seeds at planting time compared to a few months before planting time. The information on such WTP can help assess the feasibility of public sector support for the timely delivery of improved seeds. This study estimates how farmers' WTP for rice, cowpea and maize seeds varies depending on the purchase timing, using information on both farmers' observed purchase behaviors and their stated preferences. Results indicate that low-income farmers may prefer to pay higher prices for cowpea seeds if those seeds can be bought closer to planting season. Policy implications and future research needs are discussed.

Background

Improved seed adoption has been slow in Nigeria. The constraints for distributing improved seeds are on both the supply and demand sides. Farmers' demand for seeds has complex characteristics, and empirical information for how this is determined is scarce. One less-studied issue is the farmers' preference for obtaining seeds at planting time, when seed prices tend to be higher. While the formal seed sector is often constrained by the capacity for distributing improved seeds to farmers, there are times when improved seeds may be available before but not at planting time. Knowing whether farmers are willing to pay higher prices at planting time can provide potentially useful information to assess how much the formal seed sector can significantly raise improved seed adoption by providing timely seed delivery around planting time.

This study estimates how much premium farmers are willing to pay for seeds if they can buy them one month closer to planting time, and how the premium varies across different income levels and crops. This study looks at rice, cowpea and maize as the productivity growth for all these crops has important implications for food security not only in Nigeria, which is one of the largest rice importers and the biggest producer of cowpea in the world, but in other countries that produce and consume these crops.

Identifying the importance of timing for the distribution of rice, cowpea and maize seeds is crucial for understanding how food security in Nigeria can be improved through improved seed adoption.

Lower income farmers and higher WTP for seeds at planting time

Low-income farmers who are often associated with smaller harvests are more likely to exhaust their grain stock (and thus seed stock) during the lean season, and are thus likely to purchase seeds for the coming planting season. Wealthier farmers usually do not exhaust their grain stock because they tend to have enough harvests. Farmers tend to buy seeds around planting time, despite the fact that seed prices are often higher then. While the correlation between high seed prices at planting time and low-income farmers' tendency to buy seeds at planting time is not as clear, their coexistence indicates that low-income farmers are likely to be paying higher prices than they would before planting time. The literature suggests at least four potential reasons for why lower income farmers may be willing to pay higher prices for seeds at planting time, and such increase in willingness to pay is greater particularly for cowpea compared to rice and maize.

1. *Low-income farmers may be afraid of losing seeds during storage.* Stored seeds are subject to various types of risks, including pests, wildfires, thefts or civil conflicts. Low-income farmers often lack the resources to access good storage facilities or agrochemicals to save seeds from such risks.

2. *Low-income farmers may have fewer opportunities to resell seeds at planting time.* Some wealthier farmers may purchase seeds ahead of time at lower prices and resell some of them at higher prices at planting time. Lower income farmers, however, may lack the resources for using such opportunities because of higher transaction costs.

3. *Low-income farmers may face higher risks in obtaining goods other than seeds before planting time.* Farmers often reportedly postpone the purchase of seeds until they obtain enough fertilizer, possibly because of uncertainties regarding price and availability of fertilizer. Obtaining seeds may be, on the other hand, less risky either because farmers may have some seed stock or have a farmer-to-farmer network as a last resort for obtaining traditional seeds. In such cases, farmers may prefer to lower their expenditure on seeds before planting time, thereby allocating extra resources for the purchase of fertilizer. On the other hand, farmers may be willing to pay higher prices at planting time to get seeds so that they could plant at the right time, as yields often depend on the planting date. This may be more so for low-income farmers who have less resources (fertilizer, agrochemicals or irrigation) to make yields less susceptible to the timing of planting. Importantly, low-income farmers often have to compare these relative risks because they are financially constrained and without access to sufficient credits or proper insurance. In the particular case of seed purchase, these liquidity constraints of low-income farmers may be another cause of higher WTP for seeds at planting time.

4. *Cowpea farmers may be willing to pay even higher at planting time than at another time, while less so for rice and maize.* Higher WTP for seeds at planting time may be more pronounced for cowpea than rice and maize because cowpea seeds are more susceptible to pests and require more resources during storage in the form of airtight containers or agrochemicals, which farmers may not have easy access to.

Empirical methods

While it is difficult to measure directly how each of the above factors influence the WTP for seeds, hypotheses can be tested by investigating whether WTP varies at different timing and whether the difference is more pronounced for low-income farmers and for cowpeas. This study thus tests the following hypotheses:

1. Lower income farmers are willing to pay a higher premium for obtaining seeds closer to planting time.
2. The premium for cowpea seeds is greater compared to maize and rice.

The study estimates farmers' WTP using revealed preference (RP) and stated preference (SP) models. The RP model relies on farmers' actual seed purchase behavior (when and how much they pay for certain seeds). The SP model relies on farmers' imaginary behaviors in hypothetical situations. More specifically, in the SP model, farmers are asked to choose among various imaginary options, such as (1) you can buy the same seeds you are growing for 25 percent less but at three months before planting time and (2) you can buy the same seeds you are growing at the same price but one month before planting time. Since both models are characterized by their strengths and weaknesses, using both could improve the reliability of the estimated results.

A total of 420 producers growing rice, cowpea and maize were surveyed in Kano, Kaduna and Ebonyi states. As shown in Table 1, the typical farmer household has an income of about US\$2000, has about 10 household members, is usually male-headed with the household head having seven years of education, cultivates four hectares of land, with storage space of around six tons of grains, located five kilometers from the nearest food market and two kilometers from the nearest all-weather road.

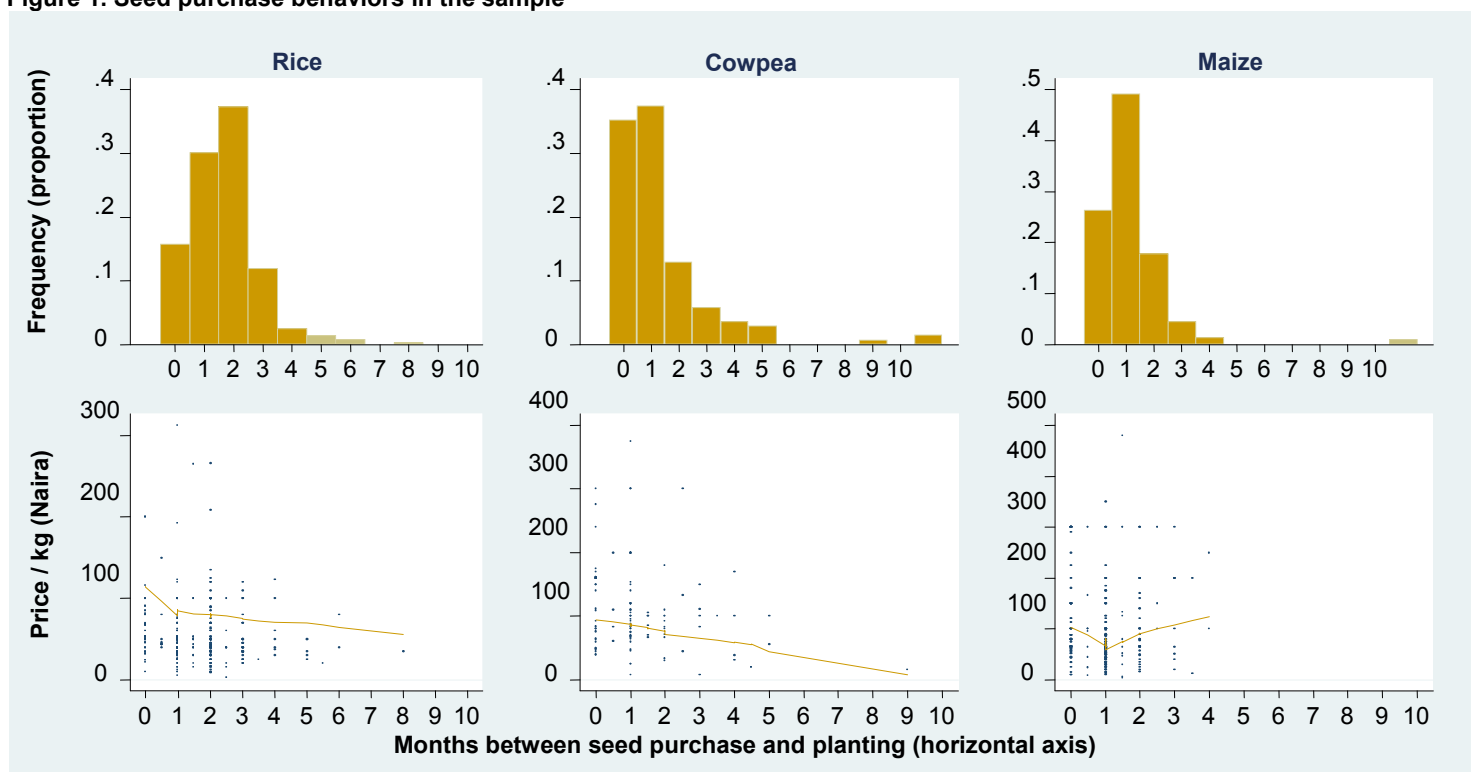
While the sample is not nationally representative, various important features of seed purchase behaviors are observed (Figure 1). Seeds in the dataset are purchased often within two months before planting time. In particular, many cowpea seed purchases occur in the same planting month, while maize and rice are purchased one or two months before the planting month. The closer the planting time, the higher the seed prices are, particularly for cowpea and rice.

Table 1. Key descriptive statistics (household characteristics at the median of the dataset)

State	Kano	Kaduna	Ebonyi	Total
Agroecology	Dry-Savannah	Moist-Savannah	Humid tropics	
Observations (household)	150	150	120	420
Household Income (US\$/year)	1667	2400	2500	2000
Household size	15	10	10	12
Percent of female-headed households	5	5	18	10
Household head education (years, formal and Koranic combined)	7	7	6	7
Farmsize (ha)	4	3	4	4
Storage space (ton)	3	5	9	6
Nearest food market (km)	6	4	5	5
Nearest all-weather road (km)	2	1	2	2

Source: author

Figure 1. Seed purchase behaviors in the sample



^aThe red line shows the mean of the price at different timing.

Key Findings

Lower income farmers generally are willing to pay higher prices for cowpea seeds if they can buy them closer to planting time. Figure 2 shows the estimated premium WTP in percentage, which indicates the higher price farmers may pay if they receive seeds one month closer to planting time, and how the premium varies across different annual household income levels.

The results from the RP model indicate that farmers with an annual household income of US\$2000 (the median of the sample) may be willing to pay a 5 ~ 10 percent higher price for cowpea seeds if they can be obtained one month closer to planting time and lower income farmers may even be willing to pay from 10 up

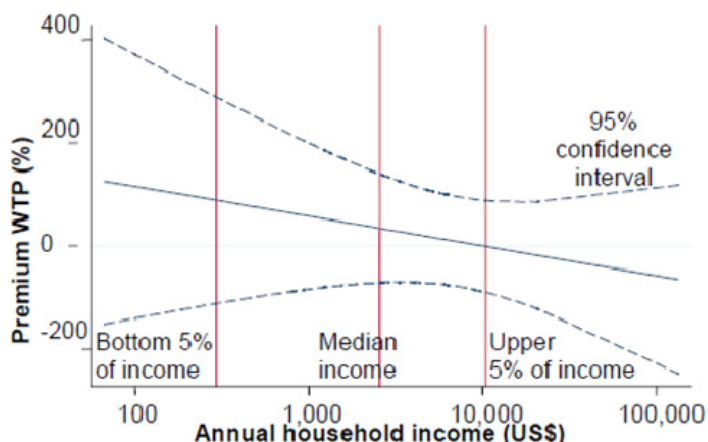
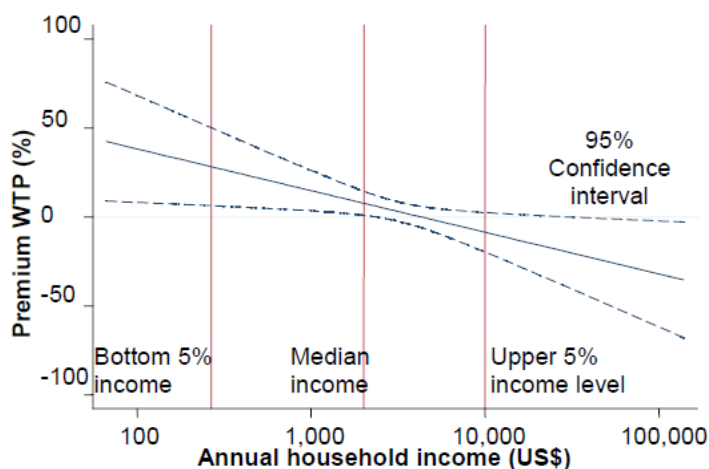
to 40 percent more, although the accuracy of such numbers drops for lower income farmers (as indicated by the widening confidence interval towards the end). While less accurate, results from the SP model also indicate that lower income farmers' have a preference for obtaining seeds closer to planting time. On the other hand, farmers' preferences for rice and maize seeds seem unchanged across different timing and income levels, consistent with the fact that rice and maize seeds may be relatively easier to store until planting time. In addition, seed purchase timing seems relatively rigid for all three crops, and seems less affected by the price of

seeds or income level. This indicates that farmers are relatively inflexible in their purchase timing and seed supply side factors, such as the availability of seed sellers, still determine the purchase timing. Such inflexibility indicates that some farmers currently buy seeds ahead of time because sellers are there, although farmers may prefer to wait until planting time and even pay higher prices, and they may buy improved seeds if they are available at planting time though seed prices may be higher. Building supply side capacity by the formal seed sector for timely seed distribution is as important as mitigating various constraints on demand side by farmers.

Figure 2. Premium WTP at different household income of producers (revealed preference and stated preference models)

(a) Premium WTP (%) for obtaining cowpea seed one month closer to planting time – from revealed preference model

(b) Premium WTP (%) for obtaining seed one month closer to planting time – from stated preference model



Policy implications and conclusions

The findings of this study provide several important research and policy implications, although the findings should be interpreted with caution because the data used are not nationally representative.

Seed prices tend to go up at planting time in Nigeria albeit they exhibit variations across crops. At the same time, farmers buying seeds for the upcoming production season tend to buy them closer to planting time. These conditions seem to apply across different seed varieties. These results indicate that farmers may prefer to pay

higher prices for seeds that are accessible at planting time. Similarly, lower income farmers may be willing to pay higher prices, particularly for cowpea that is accessible at planting time.

As a result of these findings, the formal seed sector can potentially take advantage of such premiums in farmers' WTP in its effort for raising the improved seed adoption among low-income farmers. Whether such premiums are high enough to attract private sectors and have substantial impacts on the adoption rates of improved seeds need to be assessed with more information about the functions of the market, such as the price elasticity

of seed supply in seed markets. In addition, studies based on nationally representative surveys may be needed to obtain robust results and to identify how the difference in WTP may be attributed to different factors, such as the risks associated with seed storage between

purchase and planting, absence of resale opportunities at planting time, and the risks of higher expenditures needed on other agricultural inputs, in order to better target the farmers when distributing the improved seeds at planting time

This brief is excerpted from the NSSP Working Paper "Farmers' Preferences on Seed Purchase Timing - Rice, Cowpea, and Maize Growers in Nigeria." It is intended to promote discussion; it has not been formally peer reviewed, but its content has been reviewed by at least one internal and/or external reviewer.

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