

The effect of tenure security on land improvement decisions of smallholder farmers in Uganda

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Abstract

Permanent improvements on agricultural land by smallholder farmers have great potential to bolster agricultural productivity, enhance household food security and nutrition; while promoting environmental sustainability. Whereas demographic and socioeconomic factors have been demonstrated as important determinants of agricultural investment decisions, the type of land tenure and nature of its security enshrined therein can be critical, and in some instances more important than the other covariates. The objective of this study was to investigate the role of tenure security in permanent agricultural investments, aimed at land improvement in resource constrained smallholder farm settings in Uganda. We employed logistics regression analysis, using data from a random sample of 1,200 households and 2012 land parcels collected in 2012 from three districts (Amuru, Masaka and Pallisa). Results suggest that beyond formal tenure security, there are other socio-cultural confounding factors such as land ownership, land inheritance and land use cultural norms/expectations in terms of gender, age, social standing that impose constraints on land transactions and determine the nature of agricultural investments. Therefore, merely promoting institutions that improve tenure security, without addressing the above underlying socio-cultural aspects may not result in the desired permanent land improvements and the resultant enhancement of sustainable production.

Key words: Land tenure, permanent improvements, socio-cultural fabric

Introduction

Uganda has had a long standing quest for agricultural modernisation, understood to mean increased uptake and use of improved agricultural technology, increased use of external inputs and the attendant benefits of increased production, reduction in food prices and an increase in real rural incomes (MAAIF, 2000). The major objective of agricultural investment is to increase agricultural production to achieve food self-sufficiency, create surplus for sale and provide raw materials for agro-industries. Agricultural investments also have the biggest potential to address the growing problem of youth unemployment, especially in sub-Saharan African countries. Most recent research on agricultural investment has tended to focus on large scale agricultural investments ran by the state or foreign investors (Deininger and Byerlee, 2012; Mujenja and Wonani, 2012; Hall and Osorio, 2014). Yet, land investments by small scale farmers, especially those of a permanent nature entailing perennial crops and land improvements have great potential to meet the objectives of agricultural investment and even more in terms of gender equity and environmental sustainability.

There is a general assumption (perhaps correctly so), that smallholders are unable to undertake substantial agricultural investments. Whereas such inability is usually attributed to capital limitations due to limited agricultural financing (NPA, 2017; UBOS, 2018) and possible lack of skills among other factors, such as land ownership arrangements and socio-economic aspects that remain less understood. Some of these factors may be constraining, whereas others may in fact be opportunities. It is important that these factors are explored so that constraints are addressed, and the opportunities are enhanced to promote local agricultural investments.

Registered agricultural land is generally perceived to provide more tenure security compared to unregistered land as reflected in the higher land prices (Bashaasha *et al.*, 2008; Aloba *et al.*, 2012). Uganda has four recognized land tenure systems: namely; *freehold, leasehold, mailo land and customary land* (Land act, 1998). Ravnborg *et al.* (2013) give a concise summary of these tenure systems. Land tenure in Uganda is highly related with land prices and is a significant factor in determining agricultural land prices (Bashaasha *et al.*, 2008; Aloba *et al.*, 2012). Tenure systems vary by location: About 40 percent of the land in Uganda is customarily held and this system is dominant in the Northern, Eastern and part of the Western regions (NPA, 2015). Nearly 36 percent of the land is unregistered *mailo* land mostly found in the Central region. Leasehold land tenure accounts for nearly 15 percent distributed in the different regions of the country. Generally, only 12 to 15 percent of land in Uganda is titled/has a title deed. For *mailo* land, the double ownership structure where both the registered mailo owner and the statutory tenant have claims over the

same piece of land seems to discount its perceived market value (Alobo *et al.*, 2012).

The duration which a land user expects to exploit land may determine what kind of investments they put. The case is not different for farmers using land under different tenure systems: Place and Otsuka (2002), in a study on land tenure systems and their impacts on agricultural investments and productivity in Uganda, found that land users, especially those under customary tenure in central Uganda, use practices such as tree and coffee planting to enhance land rights and improve economics situations. The same authors argue that tenure implications are put into consideration when farmers make investments on land in central Uganda. However, empirical evidence on the impact of different land tenure systems and associated land rights on investment and productivity in Uganda is inconclusive (Pedersen *et al.*, 2013), and may not reflect the dynamics in different regions of the country. The objective of this study was to investigate the role of tenure security in permanent agricultural investments aimed at land improvement in resource constrained smallholder farm settings of Uganda.

Methodology

A household survey was conducted in the Amuru, Masaka and Pallisa areas in Uganda, during May and July 2012. These areas correspond to the 2001 Uganda district boundaries for Amuru, Masaka and Pallisa districts and entail Amuru and Nwoya districts (Amuru area); Bukomansimbi, Lwengo, Kalungu and Masaka districts (Masaka area); and Butebo and Pallisa districts (Pallisa area). A semi-structured questionnaire was administered to 1200 household heads by a team of trained enumerators.

Using information from the Uganda Bureau of Statistics (UBOS), a list of what was defined as Enumeration Areas (EAs) in all sub-counties of the study districts was compiled. In most cases, EAs corresponded to Local Councils (villages/ neighbourhoods). UBOS distinguishes between 'rural', 'urban' and 'up-coming' urban EAs. In each of the three districts we drew a random sample of 400 households from a sampling frame of all individuals with access to land, making a total of 1200 (400*3 districts) households. For each area, half of these 400 individuals were drawn from neighbourhoods or communities (EAs) classified as urban/peri-urban, while other half was drawn from the communities (EAs) classified as rural. This was done through a three-stages sampling procedure as follows:

Stage 1

From each area, 10 'urban' and '10' rural communities were randomly selected, using the lists from UBOS. The communities were selected through a proportionate stratified sampling procedure, based on the relative population weight of each sub-county, for the rural and urban population, respectively. Hence, the larger the population of a sub-county (rural or urban), the larger the share of the 10 communities that should be selected from that sub-county. In practical terms, in order not to exclude some sub-counties from having a community included among the sampled communities, some sub-counties were grouped during the sampling process.

Stage 2

For each group of sub-counties, lists of EAs were prepared and each EA was assigned a number randomly. Using the list of random numbers, the required number of EAs was then selected from each group.

Stage 3

Since the aim was to draw a sample of individuals having access to land, a list was prepared in consultation with the village leadership (LC 1 committees) for each of the selected communities/neighborhoods of individuals (men as well as women, heads of households as well as non-heads of households) having access to land inside or outside the particular community or neighbourhood. This list was prepared through interviews with community leaders. From this list, a sample of 20 individuals was drawn as a random sample. Table 1 shows the composition the sample with respect to area, residence and sex of respondent.

Data were collected on land tenure form, tenure security, economic behaviour, contact and access to institutions involved in land administration and tenure holder demographic and socioeconomic characteristics. The collected data were digitalised using Statistical Package for the Social Sciences (SPSS), and analysed using STATA computer programme.

We employed the logistic regression model to study the factors influencing permanent agricultural investments aimed at land improvement on primary land parcels. The logistic regression model is a generalised linear model with a random component (Agresti, 2015). With the random component, the response variable is binary; whereby $Y = 1$ or 0 (an event occurs or it does not). We are interested in the probability that $Y = 1, \pi(x_i)$; the distribution of Y_i is, hence binomial. With the systematic component, for a linear predictor such as $\alpha + \beta_1 x_{1i} + \dots + \beta_j x_{ji}$, the explanatory or predictor variables may be quantitative (continuous), qualitative (discrete), or both (mixed).

Table 1. Distribution of respondents by gender in Amuru, Masaka and Pallisa districts in Uganda

Area	Sex of respondent	Residence of respondent		
		All	Rural	Urban
Amuru	Male	111	110	221
	Female	89	89	178
	All	200	199	399
Masaka	Male	119	101	220
	Female	97	67	164
	All	216	168	384
Pallisa	Male	140	119	259
	Female	59	73	132
	All	199	192	391
All areas	Male	370	330	700
	Female	245	229	474
	All	620	580	1,174

The Link function is the log of the odds that an event occurs, otherwise known as the “logit”: $logit(\pi) = \log\left(\frac{\pi}{1-\pi}\right)$. Putting all this together, we obtain the following logistic regression model:

$$logit(\pi(x_i)) = \log\left(\frac{\pi(x_i)}{1-\pi(x_i)}\right) = \alpha + \beta_1 x_{1i} + \dots + \beta_j x_{ji} \dots \dots \dots (1)$$

The specification of the empirical model or reduced form that was estimated is as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \beta_{15} X_{15} + \beta_{16} X_{16} + \dots \dots \dots (2)$$

Where: Y_i = a dichotomous dependent variable (whether agricultural investments or permanent improvements were undertaken on the parcel during the past 5 years or not specified as yes=1, 0=otherwise). β_0 = the Y- intercept whereas $\beta_1 - \beta_{16}$ is a set of coefficients to be estimated. $X_1 - X_{16}$ are explanatory variables hypothesized to

influence the decision to undertake agricultural investments or permanent improvements on a particular land parcel.

According to economic theory, independent variables likely to affect smallholder agricultural investment decisions fall under 3 broad categories of (i) demographic factors such as sex of household head, marital status of household head, ethnicity, household size and age of household head; (ii) socioeconomic factors such as poverty category of the household, residence (rural versus urban), access to off-farm income; and (iii) land tenure attributes such as land acquisition method (inherited, purchased or donated), type of tenure, perception on tenure security (secure, somewhat secure or not secure), ability to bequeath the land, absence of land disputes, freedom to dispose-off (sell) the land parcel, type of land documentation, number of land parcels owned.

Table 2 presents a description of explanatory variables, their expected sign and reason for the sign expectation. The regression model was tested for multicollinearity and heteroscedasticity and both were rejected implying the results of the model are sound and can be relied on to draw reliable conclusions.

Results and Discussion

Results from the logistic regression analysis are presented in Table 3. For interpretation purposes, the estimated slope coefficients were converted into marginal effects. This was because, rather than being true marginal effects, the estimated coefficients are simply indications of the degree to which each independent variable adds to the likelihood that the dependent variable equals 1. Technically, the estimated slope coefficients are just the log-odds ratios of the independent variables that lack a simple intuitive economic meaning.

Table 3 shows that land tenure security attributes were significant in driving permanent agricultural investments, aimed at land improvement; supporting the literature that tenure security is associated with land-related investments (Place and Otsuka, 2002; Abdulai *et al.*, 2011; Fenske, 2011; Deininger *et al.*, 2011). More precisely, the following land tenure security attributes were significant: perception on tenure security (whether the land was secure or somewhat secure), existence of written tenure documentation (whether precise or somewhat precise); mode of land acquisition (whether it was inherited or hired); form of land tenure (freehold/mailo/leasehold arrangement); and the ability to dispose of the land parcel after consultation with family and local leaders.

Table 2. Description of explanatory variables considered in a study of the factors influencing permanent agricultural investments aimed at land improvement in Amuru, Masaka and Pallisa districts in Uganda

Variable	Variable name	Category
X ₁	Gender of the respondent	1=male, 0=female)
X ₂	Age range of the respondent (>25 years=0)	25-40 years 40-45 years >55 years
X ₃	Household size	Number of persons living in the household permanently
X ₄	Poverty category of the household (Poorest=0)	Less poor Non poor
X ₅	The respondent's household is in the rural category	(rural=1, urban=0)
X ₆	Location (district of the household) (Amuru=0)	Masaka Pallisa
X ₇	Total number of parcels owned by the household	Number of parcels
X ₈	Tenure security level of the household (Not that secure=0)	Somewhat secure Secure
X ₉	Tenure documentation level (No written documentation=0)	Respondent has some or imprecise written documentation Respondent has precise written documentation
X ₁₀	Mode of acquisition for the parcel (Purchased=0)	Inherited Donated from relative hired (paying rent) Others ¹
X ₁₁	Tenure form for the parcel of land (Customary=0) ²	Kibanja tenant Others (Freehold/mailo/leasehold)

Table 2. Contd.

Variable	Variable name	Category
X ₁₂	During the past 5 years, the household took out a loan/credit	(1=Yes, 0=no)
X ₁₃	The household has access to off farm income	(1=yes, 0=no)
X ₁₄	Ability of respondent to bequeath the land (0=no)*	Yes Yes but depends ³
X ₁₅	Ability of respondent to sell the parcel (no=0)	Yes Yes but it depends ³
X ₁₆	Any claim/dispute on the parcel over last 5 years	(yes = 1, no=0)

¹ includes mortgage arrangement, borrowed, contract farming agreement, cleaning the land with/without permission, allocation from clan; ² We compared registered land under the three tenure forms of freehold, mailo and leasehold which are the most secure, with unregistered land under customary tenure. We combined the registered forms of tenure, despite the minor variation that freehold and mailo offer ownership in perpetuity whereas leasehold does not; ³on approval from others (spouse, relatives, in laws, clan, LC1); LC1= Local Council 1, the smallest administrative unit in Uganda.

Table 3. Determinants of permanent agricultural investments aimed at land improvement in Amuru, Masaka and Pallisa districts in Uganda

Variable name	Category	Marginal effects	P>z
Gender of the respondent	1=male, 0=female	0.021	0.203
Age range of the respondent (>25 years=0)	25-40 years	0.046	0.141
	40-45 years	0.102	0.001***
	>55 years	0.019	0.607
Household size (Number of persons)		-0.001	0.458
Poverty category of the household (Poorest=0)	Less poor	0.041	0.077*
	Non poor	0.091	0.000***
The respondent's household is in the rural category (rural=1, urban=0)		0.061	0.000***
Location (district of the household) (Amuru=0)	Masaka	0.473	0.000***
	Pallisa	0.500	0.000***
Total number of parcels owned by the household		0.005	0.020**
Tenure security level of the household (Not that secure=0)	Somewhat secure	0.061	0.069*
	Secure	0.061	0.082*
Respondent has written tenure documentation (No written documentation=0)	has some or unprecise written documentation	0.050	0.036**
	has precise written documentation	0.075	0.004***

Table 3. Contd.

Variable name	Category	Marginal effects	P>z
Mode of acquisition for the parcel (Purchased=0).	Inherited	0.075	0.001***
	Donated from relative	0.061	0.118
	hired (paying rent)	-0.179	0.000***
	Others (mortgage arrangement, borrowed, contract farming agreement, cleaning the land with/without permission, allocation from clan)	0.012	0.855
Tenure form for the land (Customary==0)	Kibanja tenant	0.013	0.672
	Others (Freehold/mailo/leasehold)	0.061	0.027**
During the past 5 years, the household took out a loan/credit (1=Yes, 0=no)		0.013	0.484
Household has access to off farm income (1=yes, 0=no)		0.041	0.091*
The respondent expects to be able to pass the primary parcel on to children or close relatives (0=no)*	Yes	0.073	0.222
	Yes but it depends on approval from others (spouse, relatives, in laws, clan, LC1, land owner)	0.069	0.278

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Table 3. Contd.

Variable name	Category	Marginal effects	P>z
In case the respondent needs to raise money or wish to start cultivating elsewhere, the respondent expects to be able to sell your parcel (no=0)	Yes	-0.003	0.891
	Yes but it depends on approval from others (spouse, relatives, in laws, clan, LC1, land owner)	0.148	0.000***
Table 3. Contd.			
During the past five years, somebody else made a claim with respect to the primary parcel/a dispute occurred over the ownership of the primary parcel (0=no)		-0.028	0.365
Number of observations		2142	
Wald chi2 (30)		330.9	
Prob > chi2		0.000	
Pseudo R2		0.380	
Log pseudo likelihood		-826.6	
Multicollinearity diagnostics	Mean variance inflation factor	4.5	
	Condition number	10.5	

Dependent variable = whether any permanent agricultural investments aimed at land improvement were carried out on the land primary land parcel in the last 5 years (1=yes, 0=no). ***significant at the 1% probability level; ** significant at 5% probability level and * significant at 10% probability level

Results further indicate that permanent agricultural investments aimed at land improvement were driven by the number of parcels owned by the household; age of household head (being in the 40-45 year age bracket); poverty status (being non-poor or less poor); location variables (residence of the household in a rural area, and location of the household in Masaka or Pallisa district); and having access to off farm income (Table 3). The details of each of these factors is expounded in the subsequent discussion.

Perception on tenure security

Holding all other factors constant, households that believed having tenure security and those that felt their tenure was somewhat secure were both more likely to undertake agricultural investments aimed at land improvement (Table 3). The level of confidence was, however, lower ($p=10\%$ level of significance) in both categories. These results suggests that perceptions clearly matter with regard to agricultural investment decisions. It should, therefore, not come as a surprise that households with positive feelings of tenure security have a higher likelihood of engaging in long-term investment on the land. A study done in Mozambique (Hagos, 2012) to assess the determinants of tenure security and implications of such tenure security on observed behavior in undertaking long-term land-related investments, found that households' perception of tenure security contributed to enhance long-term land-related investment in the form of soil conservation structure and parcel boundary demarcations.

Tenure documentation

Holding all other variables constant, respondents with precise written land documentation such as land titles, certificates of occupancy, among others, were more likely to undertake permanent agricultural investments on their land (statistically significant at 1% level). More specifically, these households were 8 percent more likely to undertake permanent agricultural investments (Table 3). This category is followed by those households holding some not so precise form of written documentation (statistically significant at the 5 percent level). The importance of tenure documentation on land investments has also been mentioned by other studies (Smith (2004; Deininger *et al.*, 2011). Smith (2004), used data from Zambia, to test the hypothesis that farmers with leases or titles had superior fixed investment and productivity compared to those without documentation. The study showed that documentation was indeed associated with greater fixed investment independently of an array of control variables. Deininger *et al.* (2011) investigated the impact of a land certification programme in the Amhara region in Ethiopia and found that it had a positive economic effect of and increasing tenure security, land-related investment, and rental market participation.

Mode of acquisition of the parcel

Holding all other variables constant, relative to purchasing the land (comparison category), inherited parcels were more likely to be put to agricultural investments or permanent improvements ($p=1\%$). The underlying explanation here could be linked to the ability to recoup the benefits of the permanent investments that accrue at a future date. The results suggest that inherited parcels are better secured for owners to confidentially undertake long-term agricultural investments. The results also suggest that hired/rented plots are generally put to temporary agricultural usage.

Form of land tenure

Holding all other variables constant, relative to customary tenure (the comparison category), registered land (whether freehold or mailo or leasehold tenure) was 6 percent more likely to be put under agricultural investments or permanent improvements ($p=5\%$) (Table 3). Similar to these findings, Feder and Feeny (1991) examined how property rights in land affect resource allocation in agriculture in developing countries. Their results indicated that secure individual property rights over land, or secure long-term use rights on land induce usage of higher levels of labour and management effort and higher levels of investment to protect or enhance land fertility. Relatedly, Pedersen *et al.* (2013) found that tenure insecurity discourages investment and leads to lower productivity in Uganda.

Ease of selling off the parcel

Holding all other variables constant, households able to sell off the parcel in consultation with their family and local leaders were 15 percent more likely to undertake permanent agricultural investments on that parcel ($p=1\%$) (Table 3). Even though not a legal obligation, the current land sale conditions prevailing in rural Uganda require a spouse's consent and the involvement of the local leadership (Local Council chairperson) to endorse the transaction, ascertain the boundaries and be party to the land documentation.

Number of land parcels

It is common for Ugandan households to own and cultivate more than one parcel of land. This analysis focused on the main or primary parcel of land. Aware that households with more land parcels tend to have other resources as well, we investigated the likely relationship between number of land parcels and permanent agricultural investments on the land. Holding other variables constant, households that owned more land parcels were 0.5 percent more likely to undertake permanent agricultural investments on the land. Land ownership and ability to operate land are considered as a sign of wealth (Nkonya, 2002; Turinawe, 2015). It is therefore not surprising that households with more parcels of land are more likely to invest in land.

Age of household head

Holding all other independent variables constant, relative to being less than 25 years of age, household heads in the 40-45 years age bracket are significantly (1 percent level) more likely to undertake agricultural investments or permanent improvements on land (Table 3). This suggests that relatively older household heads were more likely to undertake permanent agricultural investments compared to younger household heads. This result suggests an element of stability and security of land tenure by the time household heads attain this age group. Age is also expected to be associated with availability of the necessary resources to invest on land. Nkonya (2002) and Amsalu and De Graaf (2007) found that older farmers were more likely to adopt land improvement technologies than younger farmers.

Poverty status

We constructed a well-being index and used it to disaggregate households into three poverty categories namely, the poor, the less poor and the non-poor. We used the poor category of households as the comparison category. As would be expected, holding all other variables constant, non-poor households were 9 percent more likely to undertake permanent agricultural investments on the land (significantly (at 1 percent level)). Whereas the less poor households had a likelihood of 4 percent. Size of land ownership is one of the key indicators of household wealth; implying that non-poor households would have more economic resources to make permanent agricultural investments. Non-poor households also have more capacity to mobilise the necessary financial and human resources compared to poor households.

Location of residence

Residence of the household is also an important factor in the decision to undertake permanent agriculture investments. Compared to urban, rural residents were 6 percent more likely to engage in permanent agriculture investments ($p=1\%$) (Table 3). This result could point to the fact that rural households invest more in agriculture, due to the fact that it is the sole source of livelihood for many of them. Seventy percent of Uganda's rural households depend on agriculture for livelihood (UBOS, 2016) Uganda. Compared to the rural households, urban households are more likely to have other sources of income and sectors other than agriculture where they invest.

Mother district

The district in which a household is located can be a proxy for various aspects, including agro-ecology, policy, environment, economic opportunities and even the predominant land tenure structure, as these aspects are very much location specific in the Ugandan context. Holding other independent variables constant, relative to Amuru district (the comparison/omitted district), respondents resident in Pallisa and Masaka districts were more ($p=1\%$) likely to undertake permanent agricultural

investments on the land. The likelihood was high in Pallisa (50%), followed by Masaka (47%). Masaka is located in central Uganda with a good road network and fairly good economic opportunities and market access. The district is fairly multi ethnic (compared to Pallisa and Amuru), and the predominant land tenure system is mailo and freehold with some remnants of Kibanja (tenant) holders. According to a recent report, poverty levels are lowest in Masaka among the three districts we investigated, while Pallisa in eastern Uganda ranks economically poorest (Ravnborg *et al.*, 2013). According to recent poverty statistics, Pallisa is among the districts in Uganda with over 80 percent of households categorised as poor or insecure non poor (MFPED, 2014; Xinhua, 2006). Furthermore, the land tenure system in Pallisa is a mixture of customary and freehold compared to Amuru district with a predominant customary land tenure (Ravnborg *et al.*, 2013). From the results, it is possible that Pallisa's higher investment in agriculture is due to the fact that the population relies more on farming than the comparison districts of Masaka and Amuru.

Access to off farm income

Holding all other variables constant, households with access to off farm income were more likely to undertake permanent agricultural investments in the land (p=10%) (Table 3). Off farm income usually serves as an important source of supplementary or buffer income for both consumption and investment by rural households (Alobo Loison, 2015). Examples of off farm income generating activities in rural Uganda include, paid government jobs (civil service), small and medium-scale businesses, petty trade, masonry, brick making, charcoal burning, and several others.

Conclusions

The land tenure issue in Uganda is a pertinent subject, with emerging challenges and dynamics with respect to tenure systems, land rights and ownership. This study has contributed in demonstrating the complexity of the factors that come into play with land tenure systems to determine whether agricultural investments aimed at land improvement are done on land. Given the enormity of the population engaged in and depending on agricultural land for survival in Uganda, land tenure and tenure security attributes may influence the rate of growth of the entire sector. Findings of this study underscore the case for policy refocus on promoting smallholder agricultural investment, through creating a conducive environment, among which is the streamlining of the tenure structure.

Much as demographic, socio-economic and land related factors interact to influence the choice of permanent agricultural investments, land related factors are the key drivers warranting increased and adequate policy focus in terms of priority. Similarly, socio-economic factors that emphasise household capacity, empowerment and the

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local policy environment constitute the second most important category of agricultural investment drivers. Though important contributing factors, demographics turn out not that much critical in as far as permanent agricultural investments on land are concerned.

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