Pathways of change: Understanding livelihood choices in the era of financial inclusion

Theodora Kuntembwe*[ρ],Farai Chigaru[ρ]

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Abstract

What if credit markets aren't playing a positive role in shaping adaptable pathways but entrenching them deeper into narrow pathways weakening household's resilience? As climate shocks intensify in sub-Saharan Africa and other developing economies, agriculture still remains a primary source of livelihood vulnerable to shocks. Using fractional logit model to investigate the extent of credit access on livelihood diversification, the results illustrate a shift of concentration towards more agriculture assets and income share by 17 and 37 percentage points. This dual shift suggests the reinforcement of households' dependence on agriculture related investments for both assets and income generation reflecting a more constrained and narrow diversification and raises a serious concern about the design and targeting of rural credit markets, which may be failing to support the transition into higher productivity activities. For credit to facilitate diversification sector linked credit products targeted for non-agriculture economic activities must be made available and policies must aim to pair credit with mandatory non-financial support such as skill training and market access to unlock more inclusive and resilient household-level economic transitions.

Keywords: Financial inclusion ; credit access ; rural economy; sub-Saharan Africa ; resilience ; climatic shocks
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***Corresponding author:** All correspondence can be addressed to (theodorakuntembwe@gmail.com)

1 Introduction

Financial inclusion identified as a key enabler for extreme poverty alleviation under the sustainable development goals by the United nations is when adults have access to and can effectively use a range of appropriate financial services. Borrowing a common source of access to credit developed economies only stands at 46 percent in developing economies. With 69 percent of adults now participating in the formal financial system globally Demirguc-Kunt et al. (2022) one would assume that substantial progress has been made in terms of advancing financial inclusion however according to UNSGSA (2018) persistent gaps in access have undercut progress on the SDGs, for the poor and women. In Sub-Saharan Africa, there has been significant growth in financial inclusion however wide gap still exists due to lack of money, distance to the nearest financial institution, and insufficient documentation according to World Bank (2021) In order to promote holistic development, inclusive financial service systems that facilitate the social uplifting of the underprivileged are required. Financial inclusion is not only considered as an important indicator of the health of an economy but it is seen as a catalyst that paves the way for economy to achieve sustainable growth, increase efficiency, and maintain stability according to Sharma and Changkakati (2022)

Significant strides have been made in the adoption of financial services such as mobile money and micro finance products. However, despite this low developed countries, have continued to face challenges when it comes to utilizing the financial services to expand their livelihoods. Gaps between those who have accounts and those who are actively using them are limiting progress UNSGSA (2018). Resolving this gap is critical because it not only enhances the effectiveness of financial systems but also strengthens household resilience limiting vulnerability. It supports productive asset accumulation and wider income sources which contributes to poverty reduction. By isolating credit access This study will investigate the conditional effect that financial inclusion may have, focusing on different measures of structural transformation that facilitate the adoption of diverse livelihoods.

Addressing this gap, will ensure that optimized and targeted interventions can be introduced to promote resilience and reduce poverty Financial inclusion is a phenomenon that is dynamic, the extent and impact it has specifically on livelihood diversification is still being accessed. However, these studies will aid in investigating the role of financial inclusion on livelihood diversification.

Majority of the existing literature‘highlight a positive relationship between financial inclusion and livelihood diversification. From this, we are able to deduce that some findings are context specific showing a strong correlation between forms of financial services and diversification A study conducted by Arowolo and Aminu (2022) explored the effect of financial inclusion on Livelihood Diversification among Smallholder Farming Households in Oyo State and in Ghana Fiador and Amidu (2020) study utilized four indicators of financial inclusion namely usage of account to save, frequency of withdrawal, access to credit and using a bank account for payment and the two proxies used to measure livelihood diversification were level of income and employment status whilst by Atta-Ankomah et al. (2024) investigated the effects of digital financial services and livelihood concluding that access to digital financial services facilitates a transition to more diversified sources of income. It was noted that livestock holding, market distance and credit access allowed households

to explore new forms livelihood that would diversify their income sources without the fear financial setback by Abera et al. (2021).While other findings revealed that the relationship between credit access and non-farm economic activities is negative suggesting that credit access has a negative effect diversification Tsegay et al. (2021).

Moreover, other studies have concentrated on financial inclusion's positive impact on a macro-economic level by exploring the role it has on economic growth and poverty reduction (Tran et al. (2022), Pal et al. (2025), Sharma (2020)). While other studies have explored the social, institutional and economic challenges and barriers influenced by financial inclusion that affect livelihood diversification (Grohmann et al. (2021) and Duale (2024))

However, there is limited research on the how financial inclusion interacts with different forms of structural transformation to promote sustainable livelihood diversification in areas where climatic shocks intensify.

While financial inclusion has been promoted as a catalyst for development, its link to structural transformation is rarely examined at the household level. Having established credit access' a primary form of financial inclusion impact on livelihood diversification we are able to explore a micro level perspective on structural change offering more targeted policy recommendations.

This study's importance stems from its alignment to both the sustainable development goals and the Agenda 2063 catered to delivering a more inclusive and sustainable development. In order to arrive at policy objective and targeted interventions, we assess the role of credit access as a proxy of financial inclusion in facilitating livelihood diversification. From this study the results displayed that credit access increases the concentration of agriculture assets by 33 percentage points and income sources by 13.2 percentage points suggesting that there is reduced diversification and insignificant negative change away from non-agriculture labour hours by 8.2 percentage points.These findings suggest that credit is reinforcing dependence on agriculture which is counterintuitive to it acting as a catalyst for structural change.

For policies we recommend pairing credit with financial literacy training and market access to support the development of less vulnerable livelihoods since credit as a stand alone product does not yield positive outcomes. Additionally, investing in complementary infrastructure s in the areas where exclusion is prominent in order to support the development of digital credit systems.

2 Data

2.1 Outcome variables

2.1.1 Asset Transformation Ratio

This is a ratio ranging from 0 to 1 that measures the shift of assets from non- agriculture assets to agriculture -assets calculated by dividing the total of non-agriculture assets share by the total of non-agriculture and agriculture asset share

2.1.2 Share of Labour hours

This is a ratio ranges from 0 to 1 that measures the amount of hours allocated to agriculture, calculated by dividing the total share of agriculture labour hours by the total share of labour hours.

2.1.3 Share of Income

This is a ratio that ranges from 0 to 1 that illustrates the concentration of income sources, a high SDI indicates a higher concentration.

2.2 The treatment variable

Credit Access This is a proxy of Financial inclusion taking on the values 0 if the household does not have access to credit and 1 if the household have access to credit making this a dummy variable.

2.3 Control variables

2.3.1 Gender of the household head

This is a dummy variable that also serves as a control variable that takes on the value of 1 if the household head is female and 0 if the household head is male.

2.3.2 Residence of the household

This is a dummy variable that takes on the value 0 if the resident resides in an urban area and 1 if the household resides in a rural area.

2.3.3 Household Income

This is a continuous variable that has been transformed using the logarithmic function in order to control skewness in distribution.

2.3.4 Education of the household head

Education is categorical dummy variable with 5 categories namely; no education, primary education the junior certificate (JCE), Secondary/ high school education Malawi school certificate of education and tertiary education also known as post-secondary education which takes on the values 0,1,2,3,4 and 5.

2.3.5 Marital status

This is a categorical dummy variable that takes on the values 1,2,3 and 4 indicating those who are married (monogamous or polygamous), not married (separated or divorced), widow or widower and those who have never been married.

2.3.6 Household Size

This is a continuous variable that shows the number of individuals in a household where the minimum is 1 and the maximum is 22.

2.4 Descriptive Statistics

In this section descriptive statistics will be used to provide a summary of the main variables used in this study. The table below contains summary statistics.

Table 1: Summary Statistics with Credit Comparison

Variable	Obs	Mean	Std. Dev.	Min	Max	Credit	No Credit	Diff.
Household Characteristics								
household size	6574	4.52	2.07	1.00	22.00	4.635	4.399	−0.236***
Location								
location	6574	0.80	0.40	0.00	1.00	0.831	0.768	−0.063**
rural	6574	0.20	0.40	0.00	1.00	0.169	0.232	0.063**
urban	6574	0.80	0.40	0.00	1.00	0.831	0.768	−0.063**
Independent Variable								
credit access	6574	0.50	0.50	0.00	1.00	–	–	–
Outcome Variables								
non agriculture labor hour share	6161	0.52	0.40	0.00	1.00	–	–	–
asset transform ratio	5310	0.65	0.33	0.00	1.00	–	–	–
Income share (SID_normalized)	5294	0.31	0.35	0.00	1.00	–	–	–
Economic Variables								
Log of income (lINC)	6574	6.31	3.95	0.00	15.83	5.757	6.856	1.098***
Marital Status								
marital status	6574	2.12	1.63	1.00	6.00	–	–	–
married	6574	0.70	0.46	0.00	1.00	0.732	0.660	−0.071**
Not married	6574	0.15	0.36	0.00	1.00	–	–	–
widow	6574	0.12	0.32	0.00	1.00	0.094	0.141	0.047*
never married	6574	0.04	0.19	0.00	1.00	–	–	–
Parent Education								
parent education	6574	1.33	0.72	1.00	4.00	–	–	–
none or dont know	6574	0.80	0.40	0.00	1.00	0.824	0.780	−0.044*
primary	6574	0.08	0.28	0.00	1.00	0.081	0.084	0.003
secondary	6574	0.10	0.30	0.00	1.00	0.084	0.112	0.027*
postsecondary	6574	0.02	0.13	0.00	1.00	0.011	0.024	0.013*
Gender								
gender	6574	0.30	0.46	0.00	1.00	0.293	0.315	0.022*
female	6574	0.30	0.46	0.00	1.00	0.293	0.315	0.022*
male	6574	0.70	0.46	0.00	1.00	0.707	0.685	−0.022*

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. The table presents summary statistics for the full sample and compares means between households with and without credit. Dashes indicate variables not used in the comparison.

Credit access captures financial inclusion as a proxy with a mean value of 0.50 and standard deviation of 0.50 indicating that the sample is evenly split between credit-access and non-access households.

The proportion of household labour allocated to non-agriculture labour activities was captured. With a mean of 0.53 and a standard deviation of 0.4, this illustrated that more than half of household labour is directed towards non-agricultural sectors though there's variability across households.

Asset transformation ratio captures the extent at which households have transformed

agriculture assets into non agriculture assets with a mean of 0.62 this implies that a significant portion of households are transitioning away from non- agriculture asset accumulation.

Share of income calculated using the Simpson diversification index with a mean of 0.31 suggests that there's low levels of income diversification and the standard deviation of 0.35 shows that there's considerable variation among the diversification patterns.

3 Methodology

3.1 Empirical Strategy

This study uses both descriptive statistical analysis followed by econometric models where propensity score matching and control function approach were used to solve for selection bias and endogeneity before employing the Factor logit regression to analyze the influence of credit access a proxy of financial inclusion on livelihood diversification. Livelihood diversification is captured using three measures, Asset transformation ratio, share of labour hour allocated and income share calculated by the Simpson diversification index which measures how evenly household income is spread across variety of livelihood.

3.1.1 Factor logit regression

The relationship between livelihood diversification and financial inclusion will be analyzed using factor logit regression where, asset transformation ratio, share of labour hours allocated and income share will be used to quantify livelihood diversification. The use of factor logit regression comes about due to the nature of the dependent variables. Asset transformation ratio, share of labour hour allocated and income share are fractional proportional and this model respects the use of bounded proportions accommodating non-linear relationships. A general model will be used to illustrate this relationship where Y the dependent variable is livelihood diversification, independent variable is credit access with gender, household income, education level and where respondents reside as the control variables.

$$Y_{\text{diversification}} = \beta_0 + \beta_1 \text{CreditAccess} + \beta_2 \text{Gender} + \beta_3 \log(\text{HouseholdIncome}) + \beta_4 \text{EduLevel} + \beta_5 \text{Reside} + \varepsilon$$

The fractional logit model was employed as follows:

$$\begin{aligned}
\text{Model 1: Share of Labour Hours} \quad & E(Y_i^{lab} \mid X_i) = \frac{\exp(X_i\delta)}{1+\exp(X_i\delta)} \\
\text{Model 2: Asset Transformation Ratio} \quad & E(Y_i^{asset} \mid X_i) = \frac{\exp(X_i\delta)}{1+\exp(X_i\delta)} \\
\text{Model 3: Share of Income} \quad & E(Y_i^{inc} \mid X_i) = \frac{\exp(X_i\delta)}{1+\exp(X_i\delta)}
\end{aligned}$$

Where:

- Y_i is the outcome variable for each respective model,
- X_i is the vector of independent variables,
- δ are the coefficients to be estimated, indicating the effect of X_i on Y_i.

3.2 Identification

Treated and untreated variables may differ systematically, to solve for selection bias propensity score matching was employed. Propensity score is a matching score where treated and untreated subjects have the same distribution of observed baseline characteristics according to Austin, (2009). Households were matched using the nearest neighbour matching without replacement which yielded a sample of 3283 treated and 3283 control households.

$$P_i = \Pr(D_i = 1 \mid X_i) = \frac{1}{1 + \exp(-X_i^T \beta)}$$

Where Y_i is credit access, $D_i = 1$ if the household has access to credit (0 otherwise), and X_i represents the covariates.

3.2.1 Sample selection

This study utilised secondary data from the integrated household survey IHS5 from 2019-2020, a primary tool used by the National statistical office and the Malawian government to access the changes in the conditions of Malawian households. The IHS is conducted after every 3 years making it possible to capture significant changes in ways of living including welfare and socio-economic status of the households, all while taking into account various decompositions such as rural-urban, sex, region and age. The IHS5 surveys spans through 12,288 households however due to COVID 19 as the survey was implement in 2019-2020 the survey only spans through 11,434 leaving 854 households.

3.2.2 Endogeneity

To address potential endogeneity distance to micro finance was used as an instrument in the control function approach. This approach helps correct any bias-ness that may arise due to reverse causality or unobserved co-founders. The first stage involves predicting access to credit where credit is regressed on the instrumental variable and the control variables. From this model we obtain the residuals which capture the part of credit access that is not explained by the instrument and controls.

$$\text{Credit}_i = \pi_0 + \pi_1 Z_i + \pi_2 X_i + u_i \tag{1}$$

where Z_i is the instrumental variable (distance to microfinance), X_i is the vector of control variables, and u_i is the residual.

The second stage involves the outcome of interest e.g. asset transformation ratio regressed on the credit access, control variables and the residual.

$$\text{logit}(Y_i) = \beta_0 + \beta_1 \text{Credit}_i + \beta_2 X_i + \beta_3 u_i + \varepsilon_i \tag{2}$$

where Y_i is the fractional outcome variable (e.g., asset transformation ratio), X_i are the control variables, u_i is the residual from the first stage, and ε_i is the error term.

4 Results

4.1 Fractional Logit Model Results: Labour Hour Share

This section presents the results of the fractional logit regression model on how credit access affects the share of non-agriculture labour hour share. Credit access is positive in both models, Naïve (0.059) and CFA (0.058) however there is a lack of significance

Table 2: Comparison of Naive vs. Control Function Approach (CFA) Results

	Naive Model		CFA Model	
Variable	Coeff.	(p)	Coeff.	(p)
Intercept	1.192***	(<0.001)	1.103***	(<0.001)
Credit Access	0.059	(0.176)	0.058	(0.262)
Gender	-0.109*	(0.052)	-0.022	(0.741)
Log Income	0.097***	(<0.001)	0.109***	(<0.001)
Parent Education	0.142***	(<0.001)	0.135***	(0.001)
Location	-1.925***	(<0.001)	-1.881***	(<0.001)
Household Size	-0.086***	(<0.001)	-0.088***	(<0.001)
Marital Status	0.072**	(0.029)	0.041	(0.287)
Residual (ρ)	–	–	-0.006	(0.903)
Clustered at the household (HHID) level				

Notes: Significance levels: *** p<0.001, ** p<0.01, * p<0.05, * p<0.1. The residual coefficient (ρ) of -0.006 suggests no endogeneity was detected.

4.2 Asset Transformation Results

The regression results show that credit access has a significant negative effect on asset transformation ratio in both models. This illustrates that credit access leads to a shift of concentration towards more agriculture assets by 17 percentage points. The residual term is statistically insignificant suggesting no evidence of endogeneity

Table 3: Comparison of Naive vs. Control Function Approach (CFA) Results for Asset Transformation

	Naive Model		CFA Model	
Variable	Coeff.	(p)	Coeff.	(p)
Intercept	1.798***	(<0.001)	1.556***	(<0.001)
Credit Access	-0.175***	(<0.001)	-0.164***	(<0.001)
Gender	-0.419***	(<0.001)	-0.418***	(<0.001)
Log Income	-0.022***	(<0.001)	-0.023***	(<0.001)
Parent Education	0.259***	(<0.001)	0.332***	(<0.001)
Location	-1.212***	(<0.001)	-1.131***	(<0.001)
Household Size	0.036***	(<0.001)	0.040***	(<0.001)
Marital Status	-0.143***	(<0.001)	-0.128***	(<0.001)
Residual (ρ)	–	–	-0.013	(0.792)
Clustered at the household (HHID) level				

Notes: Significance levels: *** p<0.001, ** p<0.01, * p<0.05. The CFA model includes residuals from the first-stage propensity score model. The negative residual coefficient (ρ = -0.013) suggests no endogeneity was detected.

4.3 Income Diversification Results

In both models of the regression credit access has a significant negative effect on income diversification, this indicates that credit access reduces the likelihood of diversifying income sources by 34 percentage points. The residual is insignificant suggesting that there was no endogeneity detected

Table 4: Comparison of Naive vs. Control Function Approach (CFA) Results for Income Diversification

	Naive Model		CFA Model	
Variable	Coeff.	(p)	Coeff.	(p)
Intercept	-0.512***	(<0.001)	-0.473***	(0.003)
Credit Access	-0.342***	(<0.001)	-0.374***	(<0.001)
Gender	0.368***	(<0.001)	0.359***	(<0.001)
Log Income	0.018***	(0.004)	0.024***	(0.002)
Parent Education	0.030	(0.417)	0.010	(0.825)
Location	-0.087	(0.248)	-0.191*	(0.044)
Household Size	-0.042***	(<0.001)	-0.038***	(0.007)
Marital Status	-0.093*	(0.012)	-0.083·	(0.059)
Residual (ρ)	–	–	-0.035	(0.535)
Clustered at the household (HHID) level				

Notes: Significance levels: *** p<0.001, ** p<0.01, * p<0.05. The CFA model includes residuals from the first-stage propensity score model. The insignificant residual coefficient (ρ = -0.035) indicates that endogeneity is unlikely.

5 Discussion

This study aimed to assess the effect financial inclusion had on livelihood diversification. To clearly address the objective, Fractional logit model was employed with propensity score matching and the control function approach executed to solve for selection bias and potential endogeneity. The main findings of this study showed that credit access has contributed to reinforcing the dependence on agriculture with a dual negative and significant shift on the ownership of assets, moving towards agriculture related investments measured as asset transformation ratio at 17 percentage points and a decreasing the number of income generating activities measured as income share using the Simpson diversification index at 34 percentage points. Contrary to existing literature, our results suggested that financial inclusion is associated with a decrease in livelihood diversification. Specifically, the results indicated a statistically significant negative relationship across all two of the three measures, asset transformation ratio and non-agriculture labour hour share. This indicated that households with access to credit are more likely to invest in agriculture assets relative to non-agriculture assets which then contributes to the heavy reliance on agriculture income sources relative to non -agriculture income sources meaning that they spend more time indulging in agriculture related activities.

As mentioned prior these findings are not consistent with studies carried out by Atta-Ankomah et al. (2024), Fiador and Amidu (2020), Arowolo and Aminu (2022), Abera et al. (2021) where livelihood diversification was defined as a method for reducing the risk of shocks and increasing livelihood security revealing a consistent and positive impact of financial inclusion on their diversification measures.

A potential transmission mechanism for this outcome lies in the nature of credit access and the economic environment of households within rural areas. Because many households obtain credit that is directed and tailored towards agriculture linked activities such as input loans, seasonal loans and farm subsidies according to Kariuki and Ayuya (2025) there is no or weak support into the entry of non-agricultural enterprises. These types of financial services are not flexible as they are typically earmarked for agriculture production. As a result, households may concentrate labor and capital within agriculture, explaining the observed negative impact on income diversification and asset transformation ratio.

Moreover, rural households have often perceived agriculture related investments as familiar and risk-less especially when alternative income generating opportunities are uncertain or require a certain level of skill and capital. This is risk aversion behavior contributes to the demand side constraints and they can play an important role in the functioning of rural credit markets and credit rationing Balana and Oyeyemi (2022). This can further be explained by the fact that many households have faced significant barriers when trying to enter into non agriculture activities. Resulting in households reinforcing their dependence on agriculture related investments instead of diversifying when provided with credit.

While credit is promoted as a catalyst for driving diversification and development according to the Khan et al. (2024) our findings offer a different perspective on the role of credit access and financial inclusion as a whole. This is that credit access is detrimental to structural transformation at the micro-level. As households dive deeper into agriculture dependence they are more reluctant to transition into non-farm activities. This pattern

delays and in some cases may stall the structural transformation process. Several studies have emphasized on the role of financial inclusion specifically; credit access and bank account usage in promoting livelihood diversification. For instance, non- agriculture credit and agriculture credit both promote livelihood diversification according to Musumba et al. (2022). Similarly, findings by Arowolo and Aminu (2022) that argue that access to credit and bank account ownership or lack thereof is a constraint on livelihood diversification opportunities. In a similar wayFiador and Amidu (2020) concluded that usage of account to save, frequency of withdrawal, access to credit and bank account usage contributes significantly to higher income diversification which was used as a proxy to measure livelihood diversification. Whilst these studies highlight the positive relationship between financial inclusion and diversification this study explores a different avenue which is the possibility that financial inclusion may be contributing to unsustainable agriculture patterns due to contextual factors.

In hindsight this paper has contributed to existing literature from a different angle that sought to explain why financial inclusion may sometimes entrench, rather than promote transformation. This is reflected across our two outcome variables; income share and asset transformation. These all collectively suggested what has been emphasized throughout the paper, that financial inclusion has a negative effect on diversification. This challenges the dominant narrative surrounding financial inclusion by offering a micro-level perspective on structural transformation.

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6 Conclusion and Recommendations

Making use of the Integrated Household survey 5 (IHS5), this study sought to examine the impact of financial inclusion particularly credit access on livelihood diversification by employing fractional logit model on the following outcomes variables, Asset transformation ratio, Income share and labour hour share and propensity score matching and control function were utilized to complement the analysis. The analysis exemplified a negative and significant effect on two out of three outcome variables namely Asset transformation ratio and Income share. This is to say that households with access to credit, are less likely to diversify their livelihoods which is counterintuitive and many socio-economic factors such as income, location and Parent education has an impact on households' credit accessibility. Specifically households with access to credit tend to shift towards ownership of agriculture assets relative to non-agriculture assets. This may promote lower diversification outside agriculture. A similar effect was noted with income share, where households with access to credit are less likely to diversify their income sources. This displays a more constrained livelihood.

Despite the findings there are several limitations to this paper. The use of panel data can also be explored so as to establish long term or dynamic causal effects. This data relies on IHS 5 from which Asset transformation was calculated however it excludes asset productivity and informal assets, which may have overstated the agriculture lock-in.

Potential areas of future research could include asset productivity and informal assets when calculating asset transformation so as to assess the full effect of the shift between non-agricultural assets and agriculture assets .Furthermore researchers could expand the scope of financial services beyond credit access' effect on livelihood diversification exploring them jointly or independently. This is useful because financial inclusion encompasses more than just one type of financial service, the level of usage and availability of these services in or to be fully included.

Our study has implications for the government in promoting livelihood diversification. In order to achieve this the government's policies should encourage households to use financial products and services beyond the scope of agriculture related investments. Policies should be implemented to promote diversification, so that households are less vulnerable and susceptible to shocks.

In this paper we can deduce from the findings that widening the scope of credit products is essential. In doing so credit and other financial products become flexible and multi-purposeful. They will be able to support non- farm entrepreneurship, services and small scale trade. This will allow households to be better positioned to diversify their assets and income, transitioning away from agriculture related investments. lastly, Financial inclusion should not be treated as a standalone solution. Instead it should be paired with complementary services that aid in the transition to non-agriculture investments. These may include skills development and market access which may reduce the barriers that limit productive diversification.

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