From Entry to Mobility: Understanding the Dynamics of Nonfarm Diversification in Ethiopia

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Article

From Entry to Mobility: Understanding the Dynamics of Nonfarm Diversification in Ethiopia

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Abstract: This study examines the dynamics of nonfarm diversification among rural households in Ethiopia, focusing on the patterns of upward, downward, and lateral mobility across economic activities. Rural households face persistent challenges, including low agricultural productivity, climatic shocks, and constrained access to resources, which have driven many to diversify into nonfarm activities. Nonfarm diversification is critical for mitigating risks and enhancing rural livelihoods, yet its outcomes vary significantly depending on access to resources, education, and infrastructure. Using panel data from the Ethiopian Socioeconomic Survey (ESS) for 2018/19 and 2021/22, this study employs multinomial logit models to analyze transitions between pure agriculture, low return, and high return nonfarm activities. The findings reveal that upward mobility into high return activities is driven by education, infrastructure access, and access to financial, while downward mobility is often triggered by shocks such as climate and livestock loss. Lateral mobility, characterized by shifts between pure agriculture and low-return activities, reflects survival strategies in response to agricultural constraints. The study underscores the importance of addressing systemic barriers, such as infrastructural deficits and gender disparities, to promote sustainable and inclusive rural development. Targeted policies that enhance resilience, expand educational opportunities, and improve market access are essential for maximizing the potential of nonfarm diversification and improve the pathway for upward mobility in Ethiopia.

Keywords: Nonfarm Diversification, Rural Livelihoods, Upward Mobility, Downward Mobility, Lateral Mobility, Climatic Shocks, Smallholder Farmers

1. Introduction

Rural households in Ethiopia face a confluence of challenges that undermine their economic security and long-term resilience. Agriculture, which remains the backbone of rural livelihoods, is burdened by systemic constraints, including land fragmentation, soil degradation, and recurrent droughts. Over 80% of Ethiopia's population depends on agriculture for subsistence, yet productivity remains inadequate due to limited access to modern inputs, irrigation, and market infrastructure [1,2]. Despite decades of policy interventions aimed at modernizing agriculture and boosting productivity, the sector continues to fall short of supporting the growing rural population. Seasonal fluctuations and external shocks, such as climatic disruptions, further exacerbate the precarity of agricultural incomes [3,4]. These persistent challenges compel rural households to seek alternative income sources, with nonfarm activities emerging as a critical strategy to diversify earnings, stabilize livelihoods, and mitigate risks. This shift is reflective of broader trends observed across Sub-Saharan Africa, where nonfarm diversification has become an essential component of rural economic resilience [5].

Nonfarm activities provide a vital buffer against agricultural vulnerabilities, offering rural households opportunities to reduce their reliance on farming and adapt to economic and environmental shocks. In Ethiopia, the frequency of droughts, floods, and pest outbreaks has increased due to climate change, further destabilizing agricultural systems. Nonfarm diversification,

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encompassing activities such as petty trading, manufacturing, and skilled labor, offers households a chance to insulate themselves from these unpredictable disruptions [6,7]. Recognizing the significance of nonfarm employment, Ethiopia's Ten-Year Development Plan (2021–2030) emphasizes economic diversification and rural employment creation as key pillars for achieving inclusive growth and poverty reduction [8]. However, despite the growing importance of nonfarm activities, participation remains constrained by structural barriers, including inadequate infrastructure, limited access to education, and weak market integration. For many rural households, these barriers restrict access to lucrative nonfarm opportunities, compelling them to engage in low-return activities that serve as survival strategies rather than pathways for upward economic mobility.

High return nonfarm activities, such as skilled labor and entrepreneurship, offer significant potential for economic advancement. These ventures allow households to break free from the constraints of subsistence farming, achieve long-term stability, and accumulate wealth. However, they often require substantial initial investments in education, financial resources, and infrastructure. Without access to these enablers, many rural households are effectively locked out of high-return opportunities [9,10]. Conversely, low return activities, including casual labor and informal petty trading, have low entry barriers but provide limited income growth and security. Such activities are predominantly survival-driven, enabling households to address immediate needs rather than build sustainable economic pathways [11,12]. This duality within nonfarm activities highlights the importance of addressing systemic inequities and creating an enabling environment that allows rural households to transition into and sustain participation in high-return nonfarm activities.

Infrastructure, particularly electrification and road networks, plays a transformative role in facilitating nonfarm diversification, yet remains underdeveloped in rural Ethiopia. Electrification enhances productivity, reduces operational costs, and enables households to engage in value-added activities, such as food processing and tailoring. Similarly, road networks improve market connectivity, reduce transportation costs, and expand access to urban centers for goods and services [13,14]. These infrastructural investments not only lower the entry barriers for nonfarm activities but also enhance their sustainability by improving profitability and market integration [15]. However, the uneven distribution of infrastructure across Ethiopia disproportionately affects rural areas, where access to basic services remains limited. For households in remote regions, the lack of infrastructure exacerbates existing inequalities and restricts their ability to participate meaningfully in nonfarm activities, leaving them further marginalized.

Household characteristics, such as size and composition, significantly influence the likelihood and nature of nonfarm diversification. Larger households with surplus labor are better positioned to diversify into low-return nonfarm activities, which often require additional workforce but minimal financial investment. This capacity to mobilize labor provides a critical buffer during periods of agricultural downturns or shocks [6]. Conversely, households with high dependency ratios face considerable constraints, as the financial and labor demands of dependents limit their ability to engage in or sustain nonfarm ventures [4]. These dynamics underscore the importance of designing policies that address household-specific vulnerabilities, ensuring that marginalized families have equal opportunities to benefit from nonfarm diversification. Tailored interventions that provide access to training, credit, and social protection can enable vulnerable households to overcome these barriers and participate effectively in nonfarm activities.

External shocks, such as climate variability, crop damage, and livestock loss, further complicate the dynamics of nonfarm diversification. Climate shocks disrupt farming operations and destabilize nonfarm ventures by limiting market access, increasing operational costs, and reducing household liquidity. These disruptions force many households to abandon high-return ventures and revert to low-return activities or agriculture as a fallback option [4,16,17]. Livestock loss, a particularly devastating shock in rural Ethiopia, erodes household assets and financial buffers, leaving families vulnerable to economic precarity. In response, many households engage in low-return activities to recover their income, though such strategies rarely offer sustainable pathways out of poverty [8]. Addressing these vulnerabilities requires the implementation of social protection mechanisms, such

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as livestock insurance and climate-resilient infrastructure, to stabilize household incomes and support recovery.

Education emerges as one of the most significant factors influencing nonfarm participation and upward mobility. Households with higher levels of education are better equipped to access high-return opportunities, as education provides the skills, knowledge, and networks needed to succeed in entrepreneurship or skilled labor. Additionally, education enhances household resilience, enabling individuals to adapt to shocks, explore alternative income sources, and innovate within their existing ventures [18]. These findings are consistent with global evidence that highlights education as a transformative force in fostering economic resilience and mobility [6,13]. However, disparities in access to education, particularly for women and marginalized communities, remain a persistent barrier, limiting the inclusivity of nonfarm opportunities and perpetuating structural inequalities.

Gender dynamics play a critical role in shaping nonfarm diversification in Ethiopia. Female-headed households face systemic constraints, such as limited access to credit, restricted mobility, and entrenched sociocultural norms, that confine them to low-return activities. These barriers not only limit women's economic potential but also exacerbate household vulnerabilities by reducing overall income diversification [6,19]. Addressing these inequities is essential for fostering inclusive rural development. Targeted interventions, such as gender-sensitive credit schemes, training programs, and support for female entrepreneurship, can empower women to engage in high-return activities and contribute more effectively to household resilience and economic growth.

Youth engagement in nonfarm activities presents a dual challenge and opportunity. Declining landholdings and rising educational attainment have left many young people seeking alternatives to traditional farming, yet structural barriers often confine them to low-return activities. Programs that support youth entrepreneurship, provide access to microfinance, and foster skill development can unlock this demographic's potential to drive rural economic transformation [8,18]. However, failure to address the challenges faced by rural youth risks perpetuating cycles of underemployment and poverty. Ensuring that young people have equitable access to resources and opportunities is critical for leveraging their potential as agents of rural development.

Lateral mobility, defined as transitions between pure agriculture and low-return nonfarm activities, reflects the adaptive strategies of households navigating economic uncertainty. These shifts are often driven by agricultural constraints, such as declining productivity or land fragmentation, which compel households to seek supplemental income in nonfarm sectors. Conversely, reversion to agriculture highlights the fragility of nonfarm opportunities, particularly when external shocks disrupt market access or profitability [4,16]. Understanding the drivers of these transitions is crucial for designing policies that stabilize rural livelihoods and reduce the precarity associated with both agricultural and nonfarm activities.

Downward mobility, or transitions out of high-return nonfarm activities, underscores the vulnerabilities households face in sustaining these ventures. High return activities are often reliant on stable infrastructure, predictable market conditions, and access to credit. In their absence, households are vulnerable to shocks that force them to abandon these ventures and revert to subsistence strategies or low return options [15,20]. Addressing the systemic vulnerabilities that drive downward mobility is essential for ensuring the sustainability and inclusivity of high-return nonfarm activities.

Upward mobility, or transitions into high-return nonfarm activities, represents a significant opportunity for rural households to achieve long-term economic stability and resilience. These transitions are often facilitated by access to education, infrastructure, and credit, which enable households to overcome entry barriers and sustain high return ventures. By leveraging these resources, households can achieve upward mobility and contribute to broader rural economic growth and poverty reduction [11,13]. However, disparities in access to these resources persist, necessitating targeted interventions to promote equity and inclusivity in nonfarm diversification.

Understanding the dynamics of nonfarm diversification in Ethiopia is critical for designing effective policies and programs that address systemic inequities and enhance rural resilience. By

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exploring patterns of upward, downward, and lateral mobility, this study identifies the factors that enable or hinder transitions within the nonfarm sector. These insights provide a foundation for crafting interventions that foster inclusive economic growth while mitigating the risks and vulnerabilities faced by rural households. Targeted support for marginalized groups, such as women and youth, is essential to ensure that the benefits of nonfarm diversification are equitably distributed. Furthermore, addressing structural barriers, such as infrastructural deficits and disparities in access to education and credit, can create an enabling environment for households to achieve economic mobility.

This research contributes to the growing body of literature on rural nonfarm diversification by providing a nuanced analysis of Ethiopia's unique context. It underscores the transformative potential of nonfarm activities when supported by an enabling environment that prioritizes inclusivity, resilience, and equitable access to resources. The findings emphasize that while nonfarm diversification offers a critical pathway for economic transformation, its benefits are not automatic or evenly distributed. Policymakers must adopt a holistic approach that addresses both systemic challenges and context-specific needs to unlock the full potential of nonfarm activities as drivers of sustainable rural development.

2. Materials and Methods

2.1. Data Source

This study draws on data from the Ethiopian Socioeconomic Survey (ESS), a large-scale, nationally representative survey. Conducted in partnership between Ethiopia's Central Statistical Agency (CSA) and the World Bank's Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA), the ESS aims to provide a comprehensive understanding of household and agricultural data, foster inter-institutional collaboration, and enhance the socioeconomic landscape in Ethiopia. The ESS also supports evidence-based policy-making by tracking key indicators such as income, welfare, food security, and access to resources over time.

The fourth and fifth waves (ESS4 and ESS5) were conducted in 2018/19 and 2021/22 by the Ethiopian Statistical Service (EtSS), with technical support from the LSMS-ISA team at the World Bank. ESS 4 and ESS5 provided additional insights into household well-being across regions, covering all areas (except Tigray during ESS5 due to ongoing conflict). The survey collected data from 4,999 households across 438 enumeration areas (EAs) and maintains continuity with the ESS4 sample, offering new insights on the economic and social impacts of evolving policies, programmatic changes, economic shocks, and household resilience. ESS4 and ESS5 enable researchers to analyze national issues such as poverty, employment, human capital development, and access to services, while also providing regional estimates on household welfare and agricultural productivity.

The sampling methodology across all ESS waves uses a two-stage, stratified probability design. In the first stage, EAs are selected, with rural EAs sampled from the Agricultural Sample Survey (AgSS) frame. For rural areas, 10 agricultural households were selected per EA, with an additional 2 non-agricultural households included where feasible. For urban EAs, 15 households were sampled per EA, without distinction by economic activity, providing comprehensive representation of both agricultural and non-agricultural households. The ESS4 and ESS5 samples incorporated a revised sampling frame based on Ethiopia's 2018 pre-census cartographic data to enhance accuracy and geographic coverage.

The ESS is Ethiopia's first panel survey to merge multi-topic household data with detailed agricultural data, creating a valuable resource for analyzing trends in household and agricultural welfare over time. The survey collects data on income, education, health, social services, and food security, enabling analysis of how households accumulate human and physical capital, respond to policy changes, and adapt to economic shifts. Designed to support Ethiopia's policy and program evaluation needs, the ESS tracks key indicators and contributes to understanding the impact of both agricultural and non-agricultural activities on household welfare. Through collaboration with LSMS-

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ISA, the ESS also strengthens Ethiopia's capacity for survey design and implementation, fostering sustainable practices for collecting high-quality data in low-resource settings. For further information about the ESS's scope, sampling procedures, survey instruments, and data collection methods, please refer to the Ethiopian Statistical Service and World Bank websites.

2.1. Method of Data Analysis

This study employs a comprehensive mixed-methods approach, integrating descriptive analysis and econometric model examine the transitions of households from each of the initial states of farm and nonfarm activity participation into a different activity status in the next period in rural Ethiopia.

The study estimates multinomial logit models based on the familiar random utility model [21]. Households are assumed to choose the activity - pure agriculture, low-return or high-return nonfarm activities - that maximizes expected utility associated with participation, given initial human and physical capital, shocks the households experienced between the two periods, and controlling for household characteristics such as age and gender of household head.

The study estimates multinomial logit models to predict occupational transition probabilities and then use those predicted values in place of observed transitions in estimating equation (1) below. The multinomial logit is a form of random utility model, based on the premise that an individual compares his/her expected utility under different occupations and his/her constrained conditions:

$$U_t^e = U(O_{tj}, lny_{t-1}, Z, \Delta V | O_{t-1,j}) \quad (1)$$

Where O_{tj} is an indicator variable for occupation in period t and j = 0, 1, 2 indicate pure agriculture, low-return nonfarm activities, and high-return nonfarm activities, respectively. The variable lny_{t-1} represents the log earnings reported in the previous year, indicating whether individuals might consider a change in occupation according to their past income draw in last period's occupation, $O_{t-1,j}$. Z denotes observed individual and household characteristics. ΔV is included in the multinomial logit regressions in order to capture changes in community variables. Since the data is available for 2018/19 and 2021/22, the study will explore occupational transitions between 2018/19 and 2021/22.

Hence, given the initial occupation, the study will estimate the multinomial logit:

$$Pr(y = j|m) = \frac{exp(X\Gamma(j))}{1 + \sum_{j=1}^{2} exp(X\Gamma(j))} \quad (2)$$

Where $X\Gamma(j)_i = \gamma_0 + \gamma_1 y_{t-1,i} + Z_i\gamma_2 + \Delta V_c\gamma_3 + v_i$. To ensure model identification, $\Gamma(j)_i$ is set to zero when households stay in their previous occupation, choice m. In particular, if the base case is 0 = staying as a farmer (pure agriculture), then j = 1, 2 refer to the shift from farm to low-return nonfarm activities, and the shift from farm to high-return nonfarm activities, respectively. The coefficients are then interpreted with respect to staying in one's initial occupation, the base category. Therefore, this study employs three multinomial logit models, each corresponding to a specific initial activity participation status: pure agriculture, low-return nonfarm, and high-return nonfarm activities. Each model is estimated progressively using three specifications to expand the range of covariates. The first model (Model 1) incorporates initial asset endowments, access, and distance variables. Model 2 adds shock variables, and Model 3 introduces interactions between selected shocks and assets. Results demonstrate consistency across specifications, with models that include shock variables and interaction terms showing significantly better fit compared to those relying solely on initial asset endowments. This underscores the critical role of shocks in explaining transitions to nonfarm activities. Consequently, the findings from Model 3 serve as the basis for the analysis and discussion in this study.

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3. Results and Discussion

3.1. Descriptive Statistics

The data reveals that over 30% of households participated in nonfarm activities in both 2018/19 and 2021/22, reflecting the significant role of nonfarm diversification in rural livelihoods. However, the transition patterns indicate notable fluidity, with households moving between activity types, exiting the nonfarm sector, or entering it for the first time. Table 1 highlights these transitions between pure agriculture, low return nonfarm activities, and high return nonfarm activities, measured over the three-year period.

The top panel of Table 1 shows the transition frequencies. Households in pure agriculture exhibited the highest persistence, with 80.1% remaining in this category between 2018/19 and 2021/22. Only 14.2% transitioned to low return nonfarm activities, and a mere 5.7% moved into high return nonfarm activities. This reflects the structural constraints and barriers that limit mobility out of agricultural livelihoods, consistent with findings in other rural contexts, such as Sub-Saharan Africa, where agricultural households face high risks and limited access to resources for nonfarm transitions [6].

Households initially engaged in low return nonfarm activities demonstrated moderate stability, with 45.2% remaining in this category, 41.6% reverting to pure agriculture, and 13.2% transitioning into high return nonfarm activities. These results suggest that while nonfarm diversification provides a buffer against agricultural shocks, the low profitability and instability of low-return activities often force households back into farming. Similar trends are observed in Ghana and Uganda, where low-return activities are primarily used as survival strategies rather than pathways for upward mobility [22].

High return nonfarm activities had the lowest stability, with only 22.6% of households maintaining their position in this sector. Over half (50.9%) reverted to pure agriculture, and 26.5% transitioned to low return nonfarm activities. This high exit rate likely reflects the challenges of sustaining high-return enterprises, such as limited capital, market access, and vulnerability to shocks. These findings align with studies that highlight the precarious nature of high-return activities in developing economies, where small-scale operations often struggle to survive in the face of systemic barriers [3,11].

Table 1. Disaggregated transition probabilities for nonfarm activity participants (in %).

2018/19 nonfarm activity status	**2021/22 nonfarm activity status**			
	Pure Agriculture	Low Return Activities	High Return Activities	Total % (N)
Pure Agriculture/Only Farming	80.1	14.2	5.7	100 (3625)
Low Return Activities	41.6	45.2	13.2	100 (880)
High Return Activities	50.9	26.5	22.6	100 (344)
Total % (P_j)	71.0	20.7	8.3	100 (4849)
Standardized probability $(P_{ij}/P_j)/(P_{jj}/P_j)$				
Pure Agriculture/Only Farming	1.00	0.31	0.25	
Low Return Activities	0.52	1.00	0.58	
High Return Activities	0.64	0.59	1.00	

Source: Computed based on the data from Ethiopian Statistical Service, Ethiopia Socioeconomic Panel Survey, Wave 4&5 (ESPS-4&5) 2018/19 & 2021/22.

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The standardized probabilities (bottom panel of Table 1) reveal the likelihood of moving into an activity type relative to remaining in the same category. For instance, the standardized probability of transitioning from pure agriculture to low return nonfarm activities and high return nonfarm activities is 0.31 and 0.25, respectively. This reinforces the observation that most households in pure agriculture remain locked in this category, consistent with findings by Barrett et al. (2001) on the persistence of agricultural livelihoods in resource-constrained settings.

For low return nonfarm activities, the probability of transitioning to high return nonfarm activities is 0.58, suggesting considerable upward mobility for households in this category. Conversely, high return nonfarm activities, despite their potential for economic transformation, show high instability, with a standardized probabilities of 0.64 for reverting to pure agriculture and 0.59 for moving to low return nonfarm activities.

These findings align with global evidence that highlights the challenges of sustaining high-return nonfarm enterprises in rural areas. For example, studies in Latin America and Southeast Asia emphasize the importance of education, access to credit, and infrastructure in enabling households to transition into and remain in high-return activities [11,18]. Similarly, research in Ethiopia has shown that structural barriers, such as limited market access and climatic shocks, often force households to revert to farming or low-return activities despite their initial nonfarm participation [4,8].

In conclusion, while nonfarm diversification provides opportunities for income generation and risk mitigation, the observed transitions reveal significant vulnerabilities, particularly for high-return activities. Addressing these barriers is essential for ensuring that nonfarm diversification contributes to inclusive and sustainable rural development in Ethiopia.

3.2. Econometric Results

3.2.1 Upward Mobility: Transition into High Return Nonfarm Activities

Participation in high-return nonfarm activities is widely regarded as the most desirable transition, given its significant potential to enhance household welfare and economic resilience. Recognizing the importance of these transitions, this study focuses on understanding the dynamics of movement towards high return rural nonfarm activities. To this end, two multinomial logit models were estimated: the first examines the transition from pure agriculture to high-return nonfarm activity, while the second explores the shift from low-return nonfarm activity to high-return nonfarm activity. These models allow for a nuanced analysis of the factors driving these transitions, including household characteristics, asset endowments, shocks, and enabling conditions. The results, presented in Table 2, highlight the estimation outcomes for households initially engaged in pure agriculture or low-return nonfarm activities who successfully transitioned into high-return nonfarm activities during the 2021/22 period. This transition not only reflects the pull of better economic opportunities but also underscores the critical role of factors such as initial asset base, access to markets, and adaptive strategies in facilitating upward mobility within the nonfarm sector.

The transition from pure agriculture to high-return nonfarm activities (the first estimation result in Table 2) presents a detailed narrative of structural challenges and opportunities in rural Ethiopia. Household size plays a significant positive role. Larger households often have surplus labor, enabling members to participate in nonfarm activities while maintaining agricultural productivity. This aligns with findings in Ghana, where labor availability drives diversification into nonfarm sectors [23]. However, the relationship is not universally linear. In contexts like Thailand, excess household size sometimes reduces per capita investments in high-return activities, as household resources are spread thinly across more members [24]. This divergence highlights the importance of assessing household-specific dynamics when designing interventions.

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Table 2. Determinants of Transition for Households into High Return Nonfarm Activities.

Variables	Enter High Return Activities vs Stay in Pure Agriculture		Enter High Return Activities vs Stay in Low Return Activities	
	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.
Age	0.005	0.006	-0.011	0.010
Household Size	0.073**	0.034	-0.040	0.055
Female Head	0.074	0.159	0.049	0.237
Dependence Ratio	-2.715***	0.817	-0.536	1.604
Education of HHD Head	0.295	0.474	1.010**	0.683
Highest Years of Education	-0.006	0.007	0.027	0.011
Land Ownership, Hectare	-0.002	0.017	-0.029	0.052
Livestock Ownership	-0.001	0.007	-0.015	0.031
Access to Finance	0.303	0.185	-0.098	0.337
Mobile Phone	0.225	0.161	0.336	0.252
Electricity	0.938***	0.236	0.045	0.425
Media Access	0.284	0.174	0.151	0.276
Distance to Road, km	0.006	0.005	0.005	0.008
Distance to Market, km	-0.001	0.002	-0.003	0.003
Shock Experience				
Climate	-0.444	0.470	0.519	1.247
Death	-0.169	0.400	-0.697	0.789
Illness	-0.416	0.269	-0.076	0.337
Crop Damage	-13.942***	0.486	-25.343***	1.229
Livestock Loss	-1.498	1.356	-2.665	2.799
Interaction Variables				
Land*Crop Damage	-0.008	0.087	0.032	0.107
Land* Climate	0.114	0.073	-620.01***	81.210
Livestock* Climate	-0.024	0.020	0.212***	0.072
Electricity* Climate	-0.851	1.134	-24.154***	1.385
Education* Climate	-13.900***	0.705	-20.366***	1.619
Education* Illness	0.394	0.810	0.359	0.823
Education* Finance	-0.487	0.513	-1.197*	0.719
Access				
Education* Livestock	0.387	0.784	-25.122***	1.943
Loss				
Education* Crop	14.099***	1.492	124.5***	14.302
Damage				
HHD Size*Crop Damage	-0.039	0.079	0.459*	0.252
HHD Size*Livestock	0.154	0.165	0.423	0.420
Loss				
Constant	-4.107***	0.448	-1.409*	0.778
Log likelihood	-2137.6453		-803.34289	
Prob > Chi^2	0		0	
Pseudo R^2	0.0476		0.0787	

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Number of observations	3,623	880
*** p<.01, ** p<.05, * p<.1		

Conversely, a high dependence ratio significantly hinders the transition. Households with more dependents face limited disposable income and constrained labor availability, which restricts their ability to invest in and sustain nonfarm ventures. Similar challenges are documented in Tanzania, where higher dependency ratios limit diversification options due to financial and time constraints [15]. This persistent trend underscores the vulnerability of dependency-burdened households and their reliance on external support to break cycles of agricultural dependence.

Access to electricity is another transformative factor, as the strong positive coefficient indicates. Electricity access reduces operational costs and enhances productivity for nonfarm enterprises, enabling households to engage in activities such as food processing, retail, and skilled trades. Evidence from Senegal and Ethiopia corroborates these findings, where electrification improved household incomes and expanded nonfarm opportunities [8,13]. However, infrastructure inequalities often exacerbate regional disparities, with remote areas struggling to benefit from such advancements. This limitation highlights the importance of equitable infrastructure distribution.

Agricultural shocks, particularly crop damage, show a substantial negative impact. Such shocks often force households to divert resources from investment in nonfarm ventures to meet immediate needs. This finding aligns with research from Sub-Saharan Africa and the Andes, where agricultural shocks disproportionately affect households with limited savings or access to insurance [6,20]. Moreover, the interaction of education with crop damage reveals a nuanced dynamic. Educated households are better equipped to adapt and recover, as indicated by the positive and significant interaction coefficient. Education enhances financial literacy, strategic decision-making, and access to information, which collectively strengthen resilience. Comparable evidence from Southeast Asia highlights that education enables households to innovate and diversify effectively, even in the face of adversity [18].

The transition from low-return to high-return nonfarm activities (the second estimation result in Table 2) highlights the importance of resource accumulation and strategic adaptation. Education emerges as a critical determinant, with significant positive coefficient reflecting its role in enabling households to access high-value opportunities. Education facilitates entry into skilled labor markets and equips individuals with entrepreneurial acumen, as seen in Ethiopia and Kenya, where educational attainment correlates strongly with participation in high-return sectors [4,7,15]. However, the broader challenge lies in making education accessible to marginalized groups, as resource disparities often hinder equitable educational outcomes.

Agricultural shocks, such as crop damage, continue to impede transitions, even for households already engaged in nonfarm activities. These findings reflect the precarious nature of low return activities, which often provide insufficient income to cushion against shocks. Research in the West African Sahel supports this observation, highlighting that many households revert to subsistence agriculture after experiencing significant losses in their nonfarm ventures [16]. This dynamic underscore the need for risk mitigation mechanisms, such as insurance or savings programs, to stabilize household incomes.

Interestingly, the interaction effects provide deeper insights into resilience mechanisms. For instance, the positive interaction between livestock ownership and climate shocks suggests that livestock acts as a financial buffer, enabling households to maintain their nonfarm activities during adverse conditions. Similar patterns are documented in Ethiopia, where livestock ownership supports households during periods of economic stress [25,26]. However, this buffering capacity varies by region, as livestock productivity is influenced by local climatic and market conditions.

These findings on the determinants of transition into high return nonfarm activities align with global research on nonfarm diversification, while also highlighting unique regional dynamics in Ethiopia. The importance of education, for example, resonates across contexts. Studies in Southeast Asia, such as those by [18], consistently emphasize education as a gateway to high return

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opportunities. Similarly, electrification as a driver of diversification echoes findings from Senegal and Ghana, where infrastructure investments catalyze rural entrepreneurship [13,23].

However, Ethiopia's context amplifies the challenges posed by agricultural shocks. Unlike regions with robust financial systems, Ethiopian households often lack access to credit or insurance, leaving them vulnerable to climatic and economic disruptions. This vulnerability mirrors patterns in the Sahel, where weak institutional frameworks exacerbate the impact of shocks on rural livelihoods [16]. Addressing these systemic barriers requires a multi-pronged approach that combines infrastructure development, financial inclusion, and targeted education programs.

The gender dimension is notably absent from significant effects in this analysis, diverging from studies in other regions, such as the Andes and Southeast Asia, where gender-based disparities in access to resources significantly shape nonfarm participation [6,20]. This suggests that while gender constraints exist, they may be context-specific or underrepresented in this dataset, warranting further investigation into sociocultural norms and systemic barriers affecting women in transitioning into high return nonfarm activities.

3.2.2. Downward Mobility: Transition out of High Return Nonfarm Activities

This section examines the dynamics of transitioning out of high return nonfarm activities, which are often associated with significant income and welfare advantages. To better understand the drivers behind such transitions, two multinomial logit models were estimated. The first model analyzes the shift from high return nonfarm activity to pure agriculture, while the second investigates transitions from high return nonfarm activity to low return nonfarm activity. These models facilitate a detailed exploration of the underlying factors influencing these movements, such as household characteristics, asset endowments, external shocks, and access to resources.

The estimation results, presented in Table 3, reveal the key determinants of transitions during the 2021/22 period for households that initially engaged in high return nonfarm activities but subsequently moved into either pure agriculture or low-return nonfarm activities. These transitions often reflect the interplay of various push and pull factors, such as economic shocks, loss of critical assets, or declining profitability within high return nonfarm ventures. Additionally, external constraints like limited market access or insufficient financial buffers could contribute to households' downward mobility. By examining these transitions, the analysis provides valuable insights into the vulnerabilities faced by households within high return nonfarm activities and the conditions that drive them toward less remunerative livelihood options.

The transition out of high-return nonfarm activities presents a nuanced picture of rural economic vulnerabilities and the interplay between shocks, resources, and systemic barriers. The first pathway examined is the transition from high-return nonfarm activities to pure agriculture. Climate shocks stand out as a dominant factor, with a highly significant positive coefficient. This result, though counterintuitive, can be understood in the context of rural Ethiopia, where high-return activities often require stable infrastructure and markets to thrive. High-return nonfarm activities often rely heavily on stable conditions, including market access, infrastructure functionality, and predictable consumer demand. Climate shocks, such as droughts or floods, disrupt these conditions, particularly in rural areas where infrastructure is already underdeveloped. These disruptions can lead to decreased profitability in high-return sectors like skilled trades, manufacturing, or tourism, forcing households to abandon such activities. The positive effect arises because households often view pure agriculture as a fallback option during crises. Agriculture, though less profitable, provides subsistence, which becomes critical when high-return ventures falter. This finding aligns with studies in Sub-Saharan Africa and Latin America, where households revert to agricultural production during periods of economic instability [3,15,20]. Additionally, climate shocks might directly impact nonfarm activities reliant on agricultural inputs (e.g., food processing or agribusiness), thereby creating a feedback loop that forces households to return to farming.

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Table 3. Determinants of Transition for Households out of High Return Nonfarm Activities.

Variables	Enter Pure Agriculture vs Stay in High Return Activities		Enter Low Return Activities vs Stay in High Return Activities	
	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.
Age	0.005	0.014	-0.001	0.016
Household Size	0.061	0.088	0.174*	0.097
Female Head	0.397	0.348	0.929**	0.385
Dependence Ratio	1.584	2.545	0.372	2.650
Education of HHD Head	-0.579	1.042	1.665	1.017
Highest Years of Education	-0.006	0.015	-0.026	0.017
Land Ownership, Hectare	0.392	0.322	0.325	0.321
Livestock Ownership	-0.027	0.026	-0.026	0.032
Access to Finance	-0.224	0.541	0.796	0.586
Mobile Phone	0.532	0.382	0.135	0.430
Electricity	0.143	0.619	0.210	0.668
Media Access	-0.557	0.422	-0.985**	0.464
Distance to Road, km	0.013	0.010	-0.002	0.010
Distance to Market, km	-0.005	0.004	0.005	0.003
Shock Experience				
Climate	13.82***	0.787	12.54***	1.529
Death	1.303	1.089	1.427	1.243
Illness	0.249	0.599	-0.101	0.626
Crop Damage	-49.21***	2.055	-61.36***	3.090
Livestock Loss	36.48***	1.624	35.15***	2.417
Interaction Variables				
Land*Crop Damage	27.20***	1.329	25.71***	1.619
Land* Climate	-0.914	0.584	-0.972*	0.566
Livestock* Climate	0.066*	0.036	0.025	0.038
Electricity* Climate	2.836***	1.082	4.657**	1.854
Education* Climate	4.010***	1.335	-13.71***	1.643
Education* Illness	1.099	1.316	-16.19***	1.409
Education* Finance	0.609	1.087	-2.415**	1.121
Access				
Education* Livestock	-35.56***	1.706	-13.11***	2.704
Loss				
Education* Crop	8.74***	2.789	39.14***	3.372
Damage				
Constant	-0.027	0.939	-0.920	0.977
Log likelihood	-302.65221		-302.65221	
Prob > Chi^2	0		0	
Pseudo R^2	0.1475		0.1475	
Number of observations	344		344	
*** p<.01, ** p<.05, * p<.1				

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The effect of livestock loss on this transition is also significantly positive. Livestock serves as a critical financial buffer in rural Ethiopia, offering households a means to manage risks or invest in high-return ventures. When livestock is lost due to disease, theft, or climatic shocks, households are often forced to reallocate their efforts to agriculture to recover from asset depletion. This finding is consistent with research in Kenya and Ethiopia, where livestock loss frequently triggers shifts in household livelihood strategies, particularly during times of crisis [8,13].

In contrast, crop damage negatively affects transitions to pure agriculture. This suggests that households suffering from severe agricultural shocks may avoid returning to farming due to depleted resources like seeds, labor, and working capital. These households are more likely to seek alternative income sources in nonfarm sectors. Similar findings in the Sahel indicate that severe agricultural losses discourage reentry into farming and push households toward nonfarm diversification [16]. Land ownership moderates this relationship, as indicated by the positive and significant interaction between land ownership and crop damage. Larger landholdings provide households with the resilience to absorb agricultural shocks and pivot back to farming when nonfarm activities become unviable. Similar observations in Tanzania suggest that land acts as a vital safety net, stabilizing household income during economic disruptions [6].

The interaction between education and climate shocks reveals the buffering effect of human capital. Educated households are better equipped to manage the challenges posed by environmental shocks, leveraging their skills and knowledge to sustain livelihoods even when transitioning back to agriculture. This finding aligns with evidence from Kenya, Ghana and Southeast Asia, where education enhances household resilience and adaptability during crises [13,18,23]. Electrification also plays a role in moderating the effects of climate shocks, as evidenced by the positive interaction between electricity access and climate shocks. Electrified households can use modern technologies to adapt their farming operations or improve productivity, making the transition to agriculture more viable. This finding aligns with evidence from Senegal, where electrification enhances resilience and diversification in rural livelihoods [13].

The second pathway, transitioning from high-return to low-return nonfarm activities, provides insights into the economic vulnerabilities faced by households unable to sustain high-return ventures. Household size emerges as a significant factor, with a significant positive coefficient, suggesting that larger households are more likely to transition into low return activities. This could be attributed to the labor flexibility of larger households, allowing members to engage in less lucrative but accessible ventures during periods of economic downturn. Evidence from Ethiopia and Sub-Saharan Africa supports this dynamic, where labor-rich households use low-return activities as temporary buffers against income losses [4].

Female-headed households also show a higher likelihood of transitioning into low-return activities, as reflected in the significant coefficient. This highlights persistent gender disparities, where women face systemic barriers such as limited access to credit, markets, and mobility, confining them to less profitable sectors. Similar patterns are documented in Southeast Asia and Sub-Saharan Africa, emphasizing the need for targeted interventions to enhance women's participation in high-return opportunities [6,19].

Shocks, particularly climate shocks, continue to play a pivotal role in driving transitions out of high return activities. The strong positive coefficients for climate shocks reflect their destabilizing impact on rural livelihoods. High return nonfarm activities, often reliant on external markets and infrastructure, are particularly vulnerable to disruptions caused by extreme weather events. This vulnerability is evident across Sub-Saharan Africa, where climate shocks disproportionately affect nonfarm sectors, forcing households to adopt less profitable strategies [15,20].

Livestock loss also emerges as a critical factor, with highly significant positive effects. Livestock serves as a crucial economic asset and risk buffer in rural Ethiopia, and its loss exacerbates household vulnerability, forcing transitions into less remunerative activities. Research in Ethiopia and Kenya confirms the importance of livestock in stabilizing rural incomes, with its loss often pushing households into precarious livelihoods [8,13].

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Media access, on the other hand, demonstrates a negative relationship, underscoring the role of information in sustaining high-return activities. Households with better media access are likely to be more informed about market trends, financial opportunities, and policy changes, enabling them to adapt their strategies and avoid downward mobility. This aligns with research from Senegal, where improved information access enhances entrepreneurial success in rural areas [13].

Several interaction terms provide deeper insights into the dynamics of these transitions. The interaction between electricity access and climate shocks highlights the moderating role of infrastructure. Electrification supports households in maintaining nonfarm ventures during crises, reducing the need for downward mobility. Similarly, the education-finance interaction indicates that educated households with access to financial resources are better positioned to avoid transitions into low-return activities. This finding is consistent with global evidence emphasizing the importance of financial inclusion in stabilizing rural livelihoods during crises [11,18]. Moreover, the education-crop damage interaction further underscores the role of human capital in mitigating the adverse effects of shocks. Educated households are more likely to leverage alternative income streams or adapt their strategies to recover from agricultural losses, enabling them to navigate transitions more effectively. This is supported by evidence from Southeast Asia, where education enhances household resilience and adaptive capacity [18].

The transitions from high-return nonfarm activities to both pure agriculture and low-return nonfarm activities underscore the multifaceted vulnerabilities faced by households in Ethiopia. Climate shocks, livestock loss, and crop damage emerge as critical drivers, each influencing transitions in distinct ways depending on the specific pathway. These shocks not only destabilize high return nonfarm activities but also highlight the interconnected nature of rural livelihoods, where disruptions in one sector often cascade into others. For instance, while climate shocks and livestock loss increase the likelihood of households shifting into lower-return or subsistence activities, crop damage often depletes the resources necessary to sustain even these transitions. The interaction effects further underscore the moderating role of education, infrastructure, and financial access in shaping household responses to these challenges. Educated households demonstrate greater adaptability, leveraging their skills to buffer against shocks and navigate more stable economic pathways. Similarly, access to infrastructure, such as electricity, and financial resources provides households with the means to sustain or adapt their livelihoods during periods of instability. These findings provide critical insights for designing targeted interventions aimed at addressing systemic vulnerabilities. Policies that strengthen household resilience, enhance access to education and financial services, and improve rural infrastructure are essential not only for mitigating the impacts of shocks but also for promoting economic stability and enabling upward mobility in Ethiopia. Such interventions hold the potential to transform rural livelihoods by ensuring that households are better equipped to weather adversities and sustain their engagement in high return activities.

3.2.3. Lateral Mobility: Transition into and out of Low Return Nonfarm Activities

The transitions between pure agriculture and low-return nonfarm activities represent a critical dimension of rural livelihood dynamics in Ethiopia, which can be characterized as "Lateral Mobility". Unlike the upward mobility associated with transitions into high-return nonfarm activities or the downward mobility tied to exits from these sectors, lateral mobility reflects shifts within subsistence-oriented or survival-driven livelihood categories. These transitions are often driven by a mix of push and pull factors. Households may move from pure agriculture to low-return nonfarm activities in search of diversification or as a response to agricultural shocks, limited landholding, or declining agricultural productivity. Conversely, transitions back to pure agriculture can occur when nonfarm opportunities fail to provide stable income or when agricultural subsistence becomes the default option during periods of economic distress. Understanding the drivers and constraints of these transitions is essential, as they play a significant role in shaping the livelihoods of a substantial proportion of rural households.

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This section examines the dynamics of lateral mobility, exploring how factors such as household characteristics, resource endowments, external shocks, and enabling conditions influence these movements and their implications for rural livelihoods. To better understand the drivers behind such transitions, two multinomial logit models were estimated. The first model analyzes the shift from pure agriculture to low return nonfarm activity, while the second investigates transitions from low return nonfarm activity to pure agriculture.

The results presented in Table 4 illuminate the dynamics of lateral mobility, capturing the factors driving transitions between pure agriculture and low-return nonfarm activities. These shifts represent survival strategies or adjustments to changing household and environmental conditions rather than clear economic advancement or decline. By examining these transitions, key insights emerge into the vulnerabilities, resources, and external factors shaping rural livelihood choices.

Table 4. Determinants of Transition into and out of Low Return Nonfarm Activities.

Variables	Enter Low Return Activities vs Stay in Pure Agriculture		Enter Pure Agriculture vs Stay in Low Return Activities	
	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.
Age	-0.007*	0.004	-0.002	0.008
Household Size	0.104***	0.023	-0.065*	0.039
Female Head	0.013	0.110	0.111	0.175
Dependence Ratio	0.147	0.329	1.530*	0.928
Education of HHD Head	-0.202	0.359	0.001	0.527
Highest Years of Education	-0.015***	0.005	0.020**	0.008
Land Ownership, Hectare	-0.014	0.015	0.001	0.023
Livestock Ownership	-0.007*	0.004	0.006	0.012
Access to Finance	-0.064	0.118	-0.326	0.206
Mobile Phone	-0.150	0.113	0.443**	0.175
Electricity	0.602***	0.155	-0.817***	0.234
Media Access	0.270**	0.127	-0.312*	0.185
Distance to Road, km	-0.007**	0.003	0.010*	0.005
Distance to Market, km	0.002***	0.001	-0.001	0.002
Shock Experience				
Climate	-0.791**	0.329	-0.401	0.589
Death	0.450**	0.205	0.445	0.345
Illness	-0.107	0.150	-0.511**	0.243
Crop Damage	0.813	0.991	-2.427	2.015
Livestock Loss	0.930	0.634	-0.317	1.564
Interaction Variables				
Land*Crop Damage	-0.228	0.229	0.073	0.109
Land* Climate	0.213***	0.077	0.169	0.172
Livestock* Climate	-0.052	0.034	0.022	0.035
Electricity* Climate	0.333	0.554	-0.055	0.893
Education* Climate	-14.249***	0.571	0.164	1.008
Education* Illness	-0.139	0.647	-0.601	0.747
Education* Finance	-0.207	0.390	0.077	0.556
Access				

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Education* Livestock Loss	21.884***	1.152	0.702	1.561
Education* Crop Damage	-20.514***	1.775	-27.56***	1.695
HHD Size*Crop Damage	-0.234	0.183	0.588**	0.298
HHD Size*Livestock Loss	-0.206**	0.103	0.136	0.260
Constant	-1.747***	0.320	0.292	0.478
Log likelihood	-2137.6453		-803.34289	
Prob > Chi^2	0		0	
Pseudo R^2	0.0476		0.0787	
Number of observations	3,623		880	

*** p<.01, ** p<.05, * p<.1

The first pathway, movement from pure agriculture to low-return nonfarm activities, often reflects a response to agricultural constraints or a need for income diversification. Household size has a positive and highly significant effect, suggesting that larger households are more likely to transition into low return activities. This may be due to the availability of surplus labor, which can be directed toward casual work or petty trading while maintaining agricultural production. Similar findings in Ethiopia and Sub-Saharan Africa indicate that labor-rich households use low-return activities as supplemental income sources to buffer against agricultural shocks [4,6].

The negative effect of livestock ownership highlights the role of livestock as a financial buffer. Households with significant livestock assets are less likely to engage in low-return activities, as livestock offers a more stable and higher-value source of income or can be sold to meet immediate financial needs. This is consistent with evidence from Ethiopia and Kenya, where livestock plays a critical role in stabilizing rural incomes [8,13].

Access to infrastructure and information significantly influences transitions. Electricity access shows a strong positive effect, indicating that electrification lowers entry barriers to low-return activities by enabling enterprises such as food vending or small-scale processing. Media access also plays a key role, likely by providing households with information on market opportunities and nonfarm work availability. Studies in Senegal and Tanzania similarly emphasize the role of electrification and information in facilitating nonfarm diversification [8,13]. Conversely, longer distances to roads negatively impact the likelihood of transitioning to low-return activities. Poor connectivity raises transportation costs and limits market access, deterring households from engaging in such ventures. This aligns with findings across Sub-Saharan Africa, where infrastructure deficits are a significant barrier to nonfarm employment [6,11,27].

Interestingly, climate shocks exert a significant negative effect (-0.791**). While climate shocks often push households out of farming, they may simultaneously constrain the ability to engage in low-return activities by reducing household assets or increasing the need for labor in agriculture. Evidence from Ethiopia confirms that such shocks often limit diversification opportunities, particularly for resource-poor households [4].

The reverse transition, from low-return nonfarm activities back to pure agriculture, highlights the precariousness of nonfarm livelihoods. Dependence ratio emerges as a significant factor, with higher dependency burdens pushing households back into agriculture. This reflects the limited ability of low return activities to support large, dependent households, forcing them to rely on subsistence farming. Studies in the Sahel suggest that households with higher dependency ratios often prioritize activities that provide food security over cash income [16].

The role of infrastructure shows contrasting effects in this pathway. Electricity access demonstrates a significant negative effect, suggesting that electrified households are more likely to remain in low-return activities, possibly due to reduced operational costs and enhanced productivity.

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Media access also has a negative effect, likely reflecting the role of information in sustaining nonfarm ventures. These findings align with evidence from Senegal and Tanzania, where infrastructure improvements reduce the likelihood of reverting to agriculture [13,15].

Education emerges as a significant driver of this transition. The highest years of education positively affect the likelihood of returning to agriculture, indicating that educated households may use their skills to improve agricultural productivity or adopt innovative farming techniques. This contrasts with transitions to low-return activities, where higher education negatively influences participation. These findings reflect the dual role of education, enabling households to navigate both nonfarm and agricultural opportunities effectively, depending on their context [18,23].

Illness within the household negatively impacts transitions to agriculture. This likely reflects the labor-intensive nature of farming, which becomes less feasible for households facing health challenges. Similar dynamics are observed in Ethiopia, where health shocks often force households to remain in less labor-intensive nonfarm activities despite their lower profitability [4].

The interaction between land ownership and crop damage underscores the moderating role of land in shaping these transitions. Households with larger landholdings are less likely to move into low-return activities after agricultural shocks but are more likely to re-engage in farming when conditions stabilize. This aligns with findings in Tanzania, where land ownership enhances resilience and supports reentry into agriculture [6].

The interaction between education and crop damage shows strong negative effects in both pathways (for entry into low return activities and return to agriculture). Educated households are less likely to engage in lateral mobility following agricultural shocks, as they may have better access to alternative income sources or recovery mechanisms. This finding aligns with studies in Southeast Asia and Sub-Saharan Africa, which highlight education as a key factor in mitigating the impacts of shocks [13,18,27].

The interaction between household size and livestock loss highlights the importance of labor availability. Larger households are less likely to move into low-return activities after losing livestock, as their labor is often redirected to recovering agricultural productivity. Conversely, these households are more likely to return to farming when livestock loss disrupts nonfarm income streams, reflecting the adaptability of labor-rich households in rural Ethiopia [4,8].

The transitions between pure agriculture and low-return nonfarm activities underscore the complex interplay of household characteristics, resource endowments, external shocks, and enabling conditions in shaping rural livelihood choices. These movements, often driven by necessity rather than strategic planning, reveal the fragility of rural economies and the adaptive strategies households employ to navigate economic uncertainties. Infrastructure and education emerge as critical enablers, facilitating access to low-return opportunities or enhancing the productivity and viability of agriculture. Electrification, for example, supports small-scale enterprises by lowering operational barriers, while education equips households with the skills and knowledge needed to diversify income sources or adopt innovative agricultural practices.

Conversely, the role of shocks such as climate events, livestock loss, and illness highlights the vulnerabilities that compel households to shift between these sectors. Climate shocks can destabilize farming operations or disrupt nonfarm ventures, forcing lateral mobility as households seek immediate, albeit less secure, income alternatives. Similarly, livestock loss deprives households of a crucial financial buffer, pushing them to either enter low-return activities for subsistence or re-engage in agriculture as a fallback. Illness further exacerbates these vulnerabilities, particularly for labor-intensive activities like farming, leading to constrained livelihood choices.

These findings provide valuable insights for designing policies and programs that address the root causes of lateral mobility and enhance rural resilience. Targeted interventions should focus on improving access to infrastructure, such as roads and electrification, to reduce the barriers to nonfarm participation while enabling better market integration for agricultural products. Expanding educational opportunities can foster both immediate adaptability and long-term economic mobility by equipping households with the tools to respond proactively to shocks. Additionally, social

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protection mechanisms, such as livestock insurance and health coverage, can mitigate the impacts of shocks and stabilize household livelihoods. By addressing these systemic vulnerabilities, policymakers can create a more stable and supportive environment, reducing the prevalence of lateral mobility and fostering sustainable rural development.

4. Conclusions

This study provides a comprehensive analysis of the dynamics of nonfarm diversification in rural Ethiopia, shedding light on the factors driving upward, downward, and lateral mobility across economic activities. The findings reveal a highly fluid rural economy, shaped by systemic constraints, household characteristics, and external shocks. High return nonfarm activities offer significant potential for upward mobility but remain constrained by barriers such as limited access to education, infrastructure, and financial resources. Households transitioning into high return activities often benefit from their larger size and resource base, but their success depends heavily on enabling conditions such as electrification and market access. Conversely, those lacking these advantages face significant challenges in accessing and sustaining high return opportunities, underscoring the need for targeted support to bridge these gaps.

Downward mobility, or transitions out of high return nonfarm activities, reflects the vulnerabilities inherent in sustaining these ventures in the face of economic shocks. Climate shocks, livestock loss, and resource depletion emerge as critical drivers, pushing households back into subsistence-oriented or lower return activities. However, this pathway is moderated by key resilience factors, including education and infrastructure, which enable households to adapt their strategies and mitigate the impact of shocks. These findings highlight the precariousness of high return activities in resource-constrained environments and the importance of strengthening rural safety nets to support households in maintaining their economic gains.

Lateral mobility, or transitions between pure agriculture and low return nonfarm activities, illustrates the survival strategies employed by households navigating subsistence-based livelihoods. Larger households, often with surplus labor, are more likely to diversify into low return nonfarm activities as a buffer against agricultural shocks. Conversely, households with greater dependency ratios or limited resources are often compelled to revert to farming, particularly when nonfarm opportunities fail to provide stable income. This dynamic underscore the critical role of infrastructure, such as electrification and market connectivity, in facilitating more stable and sustainable diversification.

The role of shocks, including climate events, livestock loss, and health crises, infuses all forms of mobility. These shocks disrupt household livelihoods, compelling shifts that are often driven by necessity rather than opportunity. However, the analysis also reveals the mitigating role of education, infrastructure, and financial inclusion in buffering against these shocks. Educated households are consistently shown to exhibit greater adaptability, leveraging their knowledge and skills to recover from disruptions and navigating transitions more effectively. Similarly, access to electrification and media enhances households' capacity to sustain nonfarm ventures by providing information, connectivity, and lower operational costs.

Overall, this study underscores the interconnectedness of rural livelihoods and the systemic challenges that perpetuate economic vulnerability. While nonfarm diversification offers a pathway for income generation and resilience, its potential is often constrained by structural barriers that limit equitable access. To address the systemic vulnerabilities and maximize the potential of nonfarm diversification, several targeted interventions are necessary. Policymakers should focus on improving rural infrastructure, including electrification and road networks, to reduce transaction costs and enhance market access for both agricultural and nonfarm enterprises. Expanding educational opportunities, particularly vocational training, can equip rural households with the skills needed to engage in high-return nonfarm activities. Financial inclusion should be prioritized by promoting microfinance and insurance schemes, particularly livestock and health coverage, to mitigate the impacts of shocks and stabilize household incomes. Additionally, gender-focused

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interventions are essential to address the unique challenges faced by women, such as limited mobility and credit access, thereby enabling their participation in higher-value economic activities. By implementing these strategies, policymakers can create an enabling environment for rural households to achieve economic mobility, reduce vulnerability, and contribute to sustainable development in Ethiopia.

6. Patents

This section is not mandatory but may be added if there are patents resulting from the work reported in this manuscript.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/doi/s1, Figure S1: title; Table S1: title; Video S1: title.

Author Contributions: A.M.A. generated the idea and study design, collected data, carried out data analysis and writeup. A.S.T. and W.T.B. provided constructive suggestions, statistical assistance, read, edit and revised and shape the manuscript. All authors have read and agreed to the published version of the manuscript.

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