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Understanding employment and shocks in Ethiopia: 1999-2021

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Contents

Executive summary

The Ethiopian economy is vulnerable to several shocks. In this report, we explore the impacts of two major shocks -- dryness and conflict – on employment. We use non-parametric analysis to study the association between these variables. The evidence therefore is only suggestive and should be supported by further research.

- We find that employment tends to fall in years that are either very dry or very wet. This fall is mostly driven by a reduction in agricultural employment. Manufacturing employment remains relatively stable. Service employment, on the other hand, rises in very dry years, but by an insufficient amount to prevent an overall contraction in employment.

- For conflict, we find that years with intense conflict are associated with falls in employment in manufacturing and services. At the same time, agricultural employment rises. And impacts on overall employment are less clear.

There are three important initial policy implications:

- The economy's capacity to respond to climate shocks is likely to be imperfect. These shocks are likely become more frequent and intense in the future. Policymakers should thus consider experimenting with different effective ways of boosting the economy's ability to preserve employment in the face of shocks. This may include policies that strengthen agricultural resilient, policies that boost the service sector's ability to provide jobs in years with bad agricultural output, and safety nets.

- The economy's capacity to respond to conflict shocks is also likely to be imperfect (since the agricultural jobs that people fall back on in time of conflict are likely to be less productive than the service sector and manufacturing jobs that are lost). Policies that facilitate the return to workers to more productive activities once hostilities are over should be considered.

- Climate and conflict shocks may occur at the same time. Ethiopia is particularly vulnerable to this combination of shocks, since all sectors would be affected contemporaneously and hence employment falls are likely to be very large. When a combination of shocks occurs, labour market policies may need to be complemented by strong social protection responses.

1. Introduction – Jobs and shocks

Shocks caused by weather and political conflict significantly disrupt economic activity through various channels, often with severe implications for labour markets. In low-income countries, where economic activity heavily depends on favourable weather conditions, climate-related stocks such as increased temperatures and reduced precipitation have profound effects. For instance, higher temperatures in developing countries decrease agricultural output, suppress worker productivity, hinder investment, and negatively impact health outcomes (Acevedo et al., 2020). Weather shocks can also directly influence employment, as negative precipitation shocks reduce local labour market opportunities (Gray et.al, 2023; Mostafavi-Dehzooei & Asadi, 2024) and trigger shifts in occupational patterns from severely impacted sectors to those less affected (Ayenew, 2017). In response of these shocks, migration often serves as a coping mechanism, altering labour market dynamics in both origin and host communities (Kleemans & Magruder, 2017).

Similarly, political conflicts have far-reaching economic implications. Conflicts destroy productive capacity by damaging infrastructure and assets, displacing populations, and altering labour market dynamics in affected regions (Gimenez-Nadal et al., 2019). Violent conflicts also disproportionately affect vulnerable groups, such as women, by reducing their labour force participation (Cerda et al., 2023).

Ethiopia, a country highly susceptible to weather shocks and conflicts, has faced recurring droughts and violent conflicts over the past decades. Drought episodes, often marked by negative precipitation shocks, have occurred with increasing frequency and affected previously unaffected regions in the country. Since 1970, the country has experienced more than 10 significant drought episodes, with recent ones primarily impacting the southern and eastern regions (Mera, 2018). These shocks have exacerbated food insecurity and disrupted livelihoods for millions. At the same time, the incidence of violent conflict has surged, particularly since 2015, further compounding economic instability and displacing large populations. Despite the scale of these disruptions, the impact of weather shocks and conflict on Ethiopia's labour market structure remains less understood.

This report explores how recent episodes of weather shocks and conflicts have reshaped labour market trends and employment structures in Ethiopia. The analysis combines

data from the Ethiopia Labor Force Surveys (ELFS) with the Standardized Precipitation-Evapotranspiration Index (SPEI) to spatially map weather shocks and their correlation with employment patterns. Additionally, data from the Emergency Events Database (EM-DAT) is used to assess the impact of very dry and very wet years. For conflict analysis, information from the Armed Conflict Location and Event Data (ACLED) database is integrated with labour market surveys. Other labour market datasets from non-Ethiopian Statistical Surveys (non-ESS) sources are also utilized.

By leveraging exogenous weather shocks and conflict data, this report provides a spatial and temporal analysis of labour market disruptions. It aligns with Ethiopia's sustainable growth agenda, particularly the integration of sustainability principles in understanding labour market dynamics. Through this report, we aim to inform policy discussions on building resilience in Ethiopia's labour market to mitigate the adverse effects of weather shocks and conflicts.

2. Employment rates by sector over time

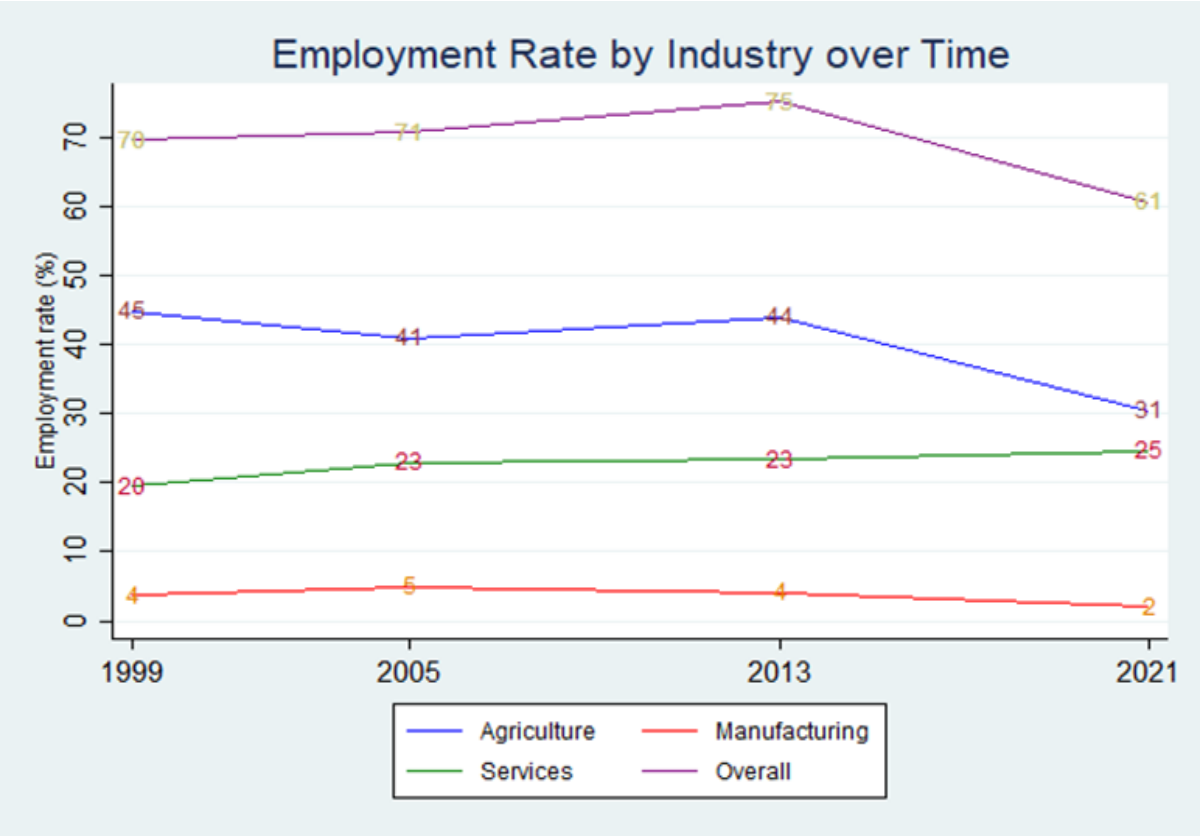
2.1. National employment rate

Ethiopia's employment rate has seen significant fluctuations over the past two decades. From 1999 to 2013, there was a modest rise in the overall employment rate, growing from 70 percent to 75 percent. However, this trend reversed sharply by 2021, with the employment rate plummeting to 61 percent. At the heart of this decline lies the agricultural sector, which has traditionally been the cornerstone of the Ethiopian economy and its largest employer (Figure 1).

Agriculture, which employed 45 percent of the labour force in 1999, saw its share drop to just 31 percent by 2021. This decline reflects a combination of climate-induced shocks and broader economic shifts. While some workers transitioned to other sectors, the capacity of these sectors to absorb the displaced labour force remained limited. The service sector, for example, grew slightly during the same period, increasing its share of employment from 20 percent in 1999 to 25 percent in 2021. However, this growth was insufficient to offset the steep losses in agriculture. Manufacturing, which holds the potential to drive industrialization

and structural transformation, remained stagnant, consistently employing only 4 to 5 percent of the labour force.

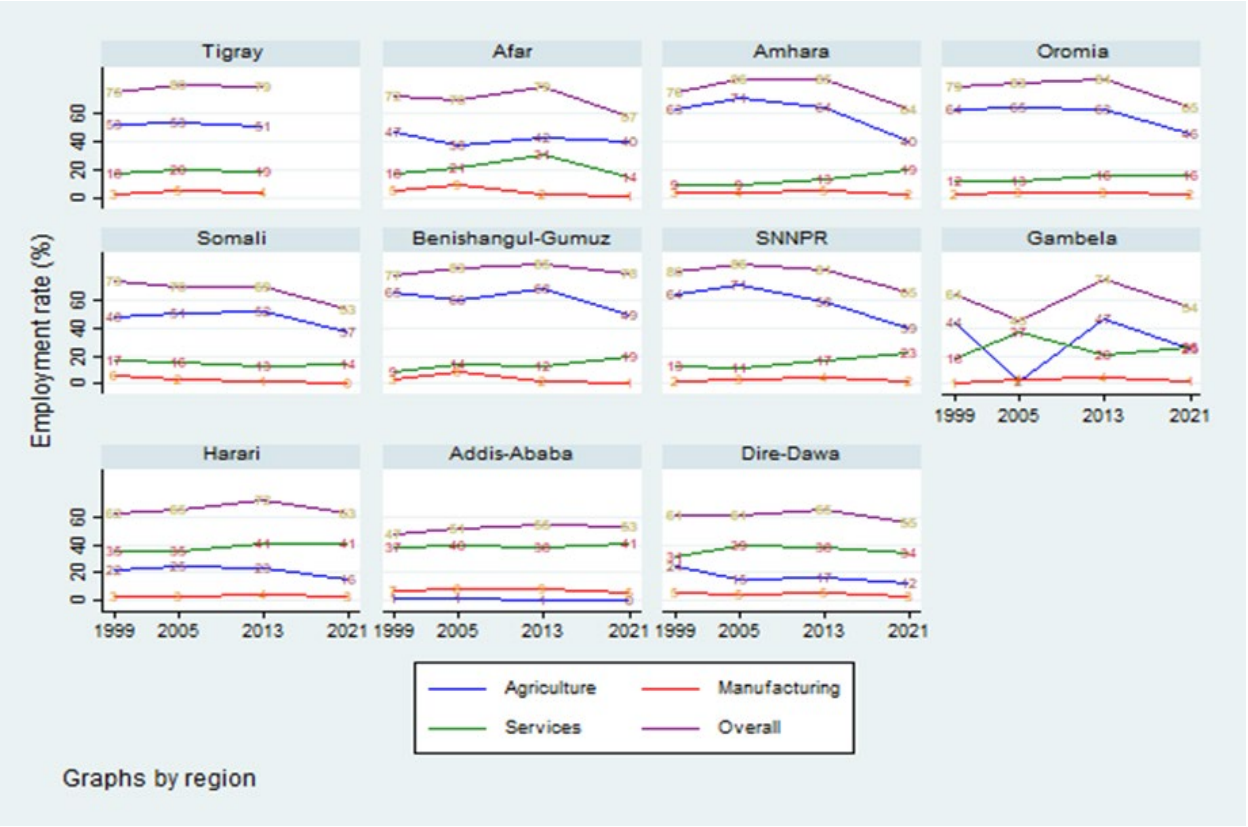
FIGURE 1: National employment rates by sector over time



2.2. Regional employment rate

By region, agriculture-dominant regions such as Tigray, Amhara, and Oromia and the former SNNPR show high reliance on agriculture with employment rates often exceeding 50% in the early years of the study period. However, there is a noticeable decline in agricultural employment in these regions over time. Manufacturing employment remains relatively low across all regions, with Addis Ababa and Dire Dawa showing slightly higher rates. The service sector shows varying trends. In some regions like SNNPR and Gambella, it sees growth, while in others like Harari, it remains relatively stable. Figure 2 suggests that employment patterns are linked to regional economic structures.

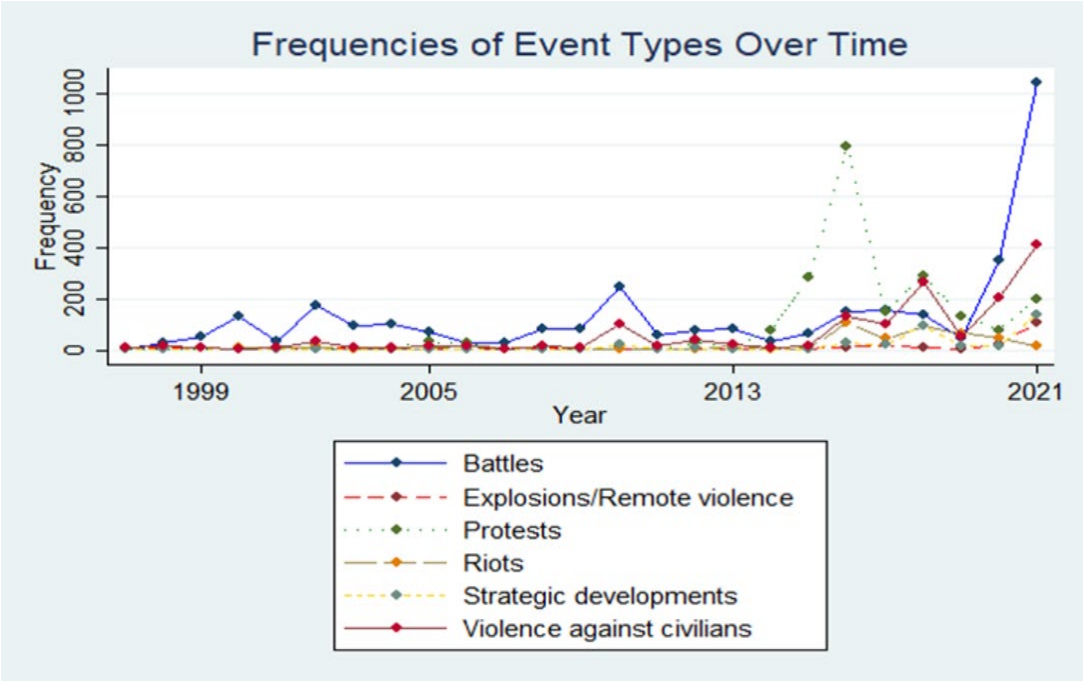
Figure 2: Regional employment rates by sector over time



3. Conflict in Ethiopia

Ethiopia has experienced a significant increase in conflict events over time, with a sharp escalation from 2020 onward (Figure 3). While battles were initially more common, recent years have seen a rise in explosions, remote violence, protests, and riots. This trend reflects broader challenges including economic and unresolved historical tensions (Blattman & Miguel, 2010; Collier & Hoeffler, 2004). The rise in remote violence follows global patterns where non-state actors exploit instability (Kaldor, 2012). Similarly, protests and riots in Ethiopia are linked to governance concerns and economic hardships (Woldesenbet et al., 2022).

Figure 3: Frequencies of conflict event type

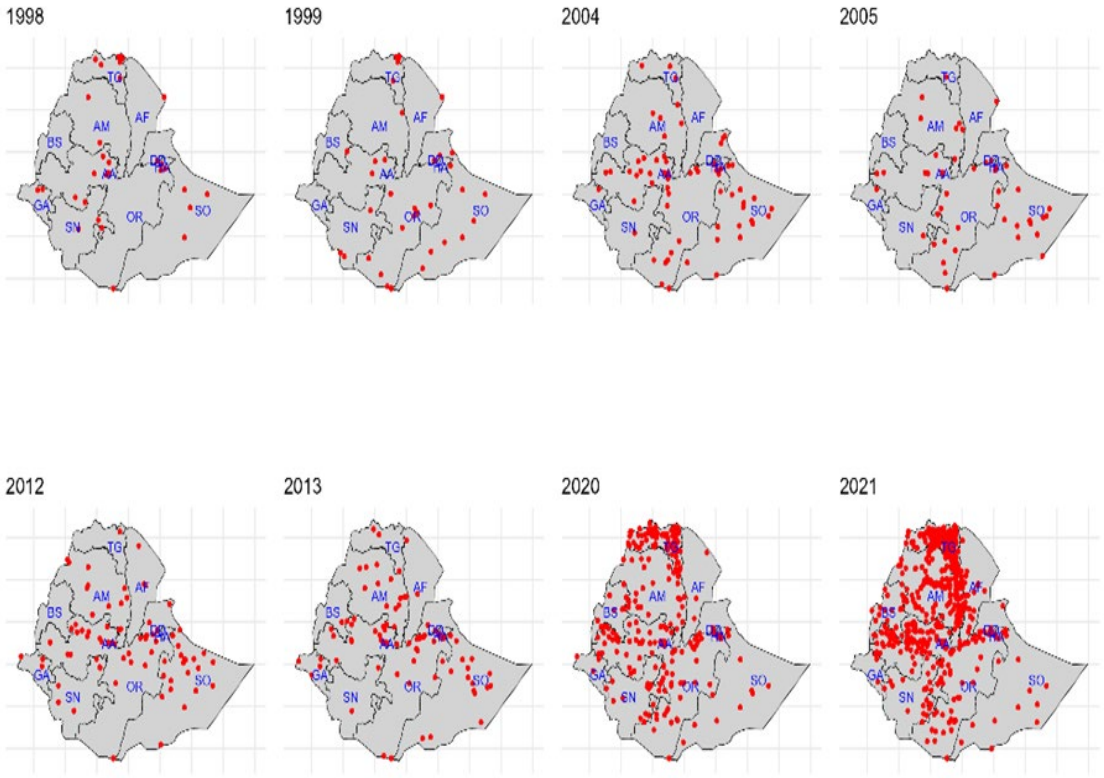


Ethiopia's post-2018 political transition has particularly intensified ethnic and regional conflicts, exacerbated by weak institutions and resource competition (Bayeh, 2022). As seen in Figure 4, while conflicts were initially scattered and limited to specific regions like Tigray and Afar in the late 1990s and early 2000s, they have become more widespread and intensified by 2020 and 2021. Specifically, the northern regions (Tigray, Amhara, Afar) show a dramatic surge in conflict events[1], with the situation appearing particularly severe in Tigray.

FIGURE 4: Distribution of conflict events for selected periods

[1]In our conflict data, we measure only the number of events, not their intensity, which is an important caveat to note. In contrast, our weather data captures both magnitude and frequency

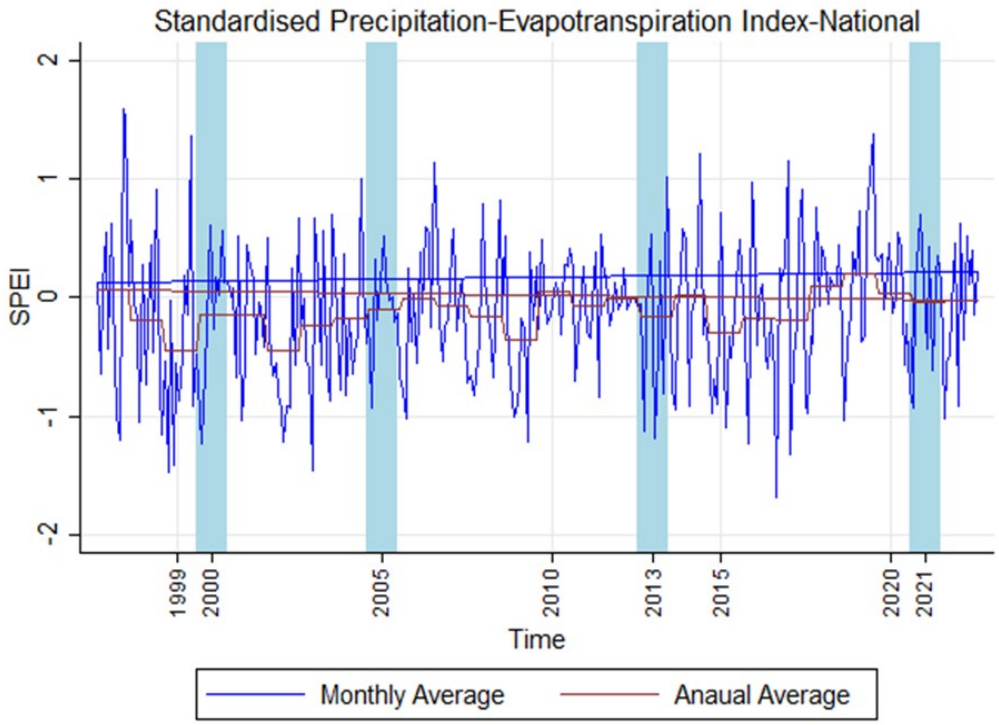
Conflict Events in Ethiopia for Selected Periods



4. Precipitation (SPEI) in Ethiopia

In addition to conflicts, Ethiopia has been severely impacted by climate change, resulting in widespread food insecurity. Figure 5 reports an index for standardized precipitation-Evapotranspiration (SPEI) at national level both monthly and annually level. Both the monthly and annual SPEI values fluctuate around zero, indicating alternating periods of wetter and drier conditions. While there is variability, the annual average SPEI shows a slightly upward trend in recent years, suggesting a possible shift towards slightly wetter overall conditions, although drought events still occur. In essence, Ethiopia experiences considerable variability in moisture availability, with recurring dry events, as highlighted by the negative SPEI values.

FIGURE 5: Standardized Precipitation-Evapotranspiration index at national level.



5. Data and methodology

5.1. Data

We used the nationally representative Labour Force Survey[2], collected over 20 years (1999, 2005, 2013, 2021), covering all regions except Tigray in the 2021 survey, due to the violent conflict occurring at the time of data collection. As a labour market outcome, we used the employment rate instead of total employment, as the former adjusts for regional population differences. The employment rate, typically defined as the number of employed individuals as a percentage of the working-age population (15-64), accounts for changes in

[2] *It is also important to note that our current data is at the regional level, with limited information on migration and job displacement within and across regions. This highlights the need for further data analysis to gain more precise insights. In this regard, the emerging Labour Market Information System (LMIS), which already contains detailed information on more than 2 million job seekers or workers (as of 2024), will be highly valuable in the future. Particularly, it will enhance our understanding of temporary and permanent migration shocks, as well as the role of absorbing service sectors in mitigating employment disruptions. Since LMIS allows for tracking job patterns over time and monitoring job transitions, it presents a significant opportunity for analysing labour market dynamics with better estimates.*

population size. The share of employment by sector[3] is calculated as the number of employed individuals in each sector divided by the total number of employed individuals.

Conflict event data, obtained from the Armed Conflict Location & Event Data Project (ACLED) for Ethiopia, has been geocoded and analysed to assess regional variations in conflict events. In our analysis, we classify areas with a high incidence of conflict as those in the top 25th percentile (p25) of the distribution of conflict events. Conversely, areas in the bottom 25th percentile (p25) are considered to have low conflict events or no significant conflict activity. Outliers in conflict event data were identified and handled using the Interquartile Range (IQR[4]) method.

Similarly, climate shock data, derived from the Standardized Precipitation-Evapotranspiration Index (SPEI), has been analysed to classify years based on dryness and wetness levels. In our analysis, we define particularly dry years as those falling below the 25th percentile (p25) of the SPEI distribution. On the other end, wet years are identified as those above the 75th percentile (p75) of the SPEI distribution. Overall, SPEI values between the 25th and 75th percentiles (p25–p75) of the distribution are classified as moderate, while SPEI value outside this range is considered an extreme weather event (or climate sock).

5.2. Estimation Approach

To examine the impact of climate and conflict shocks on employment outcomes, we employ a Locally Weighted Smoothed Regression (Lpoly), a non-parametric method that allows for a flexible estimation of relationships between shocks and employment indicators (see Cleveland,1979). Specifically, we assess how sectoral employment rates (agriculture, manufacturing, and services) respond to variations in climate shocks, measured using the Standardized Precipitation-Evapotranspiration Index (SPEI), and conflict shocks, measured using conflict events from the Armed Conflict Location & Event Data Project (ACLED). The locally weighted regression function can be expressed as:

$$\boldsymbol{E_i = m(X_i) + \varepsilon_i} \qquad (1)$$

Where

[3] Economic Activities are categorized into Agriculture, manufacturing and service following the International Standard Industrial Classification (ISIC).

[4] The IQR is calculated as the difference between the 75th percentile (Q3) and the 25th percentile (Q1) of the data. Data points were flagged as outliers if they fell below Q1 − 3 × IQR or above Q3 + 3 × IQR.

- E_i is employment rate in sector *i* (agriculture, manufacturing, or services)
- $m(X_i)$ is the unknown smooth function estimated using locally weighted regression,
- X_i includes climate and conflict shocks,
- ε_i is the error term.

In addition to the non-parametric approach, we estimated a simple pooled regression model to identify a strong association of the observed shocks with employment rate. Our baseline specification is as follows:

$$\boldsymbol{E_{i,t} = \beta_0 + \beta_1 Climate\_shock_{i,t} + \beta_2 Conflcit\_shock_{i,t} + \beta_3 Climate_{i.t} XConflcit\_shcok_{i,t} + \sum_{i-1}^{n} \beta_j Region_i + \lambda_t + \varepsilon_{i,t}} \quad \textbf{(2)}$$

Were

- $E_{i,t}$ is represents the employment rate in region *i at* time *t*,
- $Climate\_shock_{i,t}$ is a dummy variable indicating the occurrence of an extreme weather event (SPEI below or above critical thresholds).
- $Conflict\_shock_{i,t}$ is s a dummy variable capturing conflict incidence (based on ACLED conflict events and fatalities),
- $Conflict\_shock_{i,t}$ is a dummy variable capturing conflict incidence (based on ACLED conflict events and fatalities),
- $Climate\_shock_{i,t}\ XConflict\_shock_{i,t}$ is an interaction term accounting for the compounded effects of climate and conflict shocks.
- $\sum_{j=1}^{n} \beta_j \text{Region}_i$ represents regional fixed effects, and
- λ_t accounts for year-specific effects (common shocks across all regions) for 2005, 2013 and 2021, taking 1999 as a baseline.
- $\epsilon_{i,t}$ is the error term.

6. Results

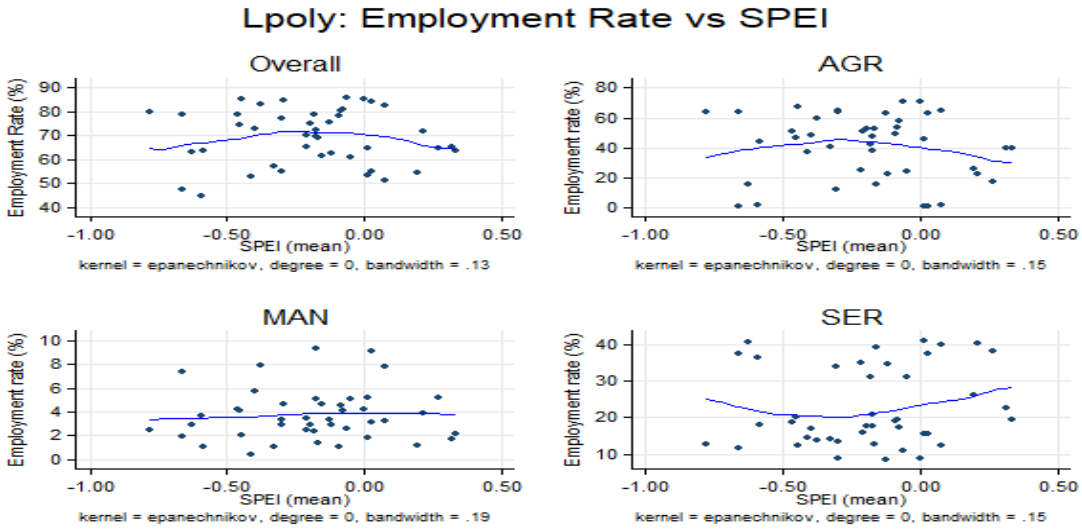
6.1. The impact of weather shocks on employment

Figure 6 reports results obtained from the Locally Weighted Smoothed Regression (Lpoly) method. The results show that climate variability plays a significant role in shaping labour market in Ethiopia. Weather conditions, as measured by the Standardized Precipitation-Evapotranspiration Index (SPEI), exhibit a strong correlation with employment trends, particularly in the agricultural sector. Moderate moisture levels are crucial for optimal agricultural employment, but extreme weather events—whether very dry or very wet years—have devastating effects.

Agriculture is particularly vulnerable to these shocks due to its dependence on stable weather patterns. Very dry years, which are characterized by low SPEI values, reduce agricultural output and, consequently, employment. Similarly, very wet years (high SPEI values) disrupt planting cycles and damage crops, further compounding employment losses. This pattern of vulnerability underscores the need for resilience in agricultural practices and infrastructure.

While the service sector absorbs some of the labour displaced from agriculture during moderate climate shocks, its capacity to respond diminishes during extreme events. Manufacturing, on the other hand, appears relatively insulated from weather variability.

Figure 6: Impact of Weather Shocks on Employment Dynamics



In addition to the results from the non-parametric method discussed above**,** we conducted a fixed effect analysis, controlling for regional and year effects (Table A1). Our estimates indicate that agriculture has been significantly affected by climate shocks over the years. Specifically, extreme weather events, such as very dry or very wet years, are associated with an approximate 9.1perenatge points decline in agricultural employment although the statistical significance of this estimate is somewhat at the margin, maybe due to a limited degree of freedom (small observation).

At the same time, the service sector appears to absorb some of the displaced workers during extreme weather events. Our estimates suggest that employment in the service sector

increases by approximately 5.3% during climate shocks, partially offsetting the job losses in agriculture.

Furthermore, employment trends across sectors reveal structural shifts. Controlling for common shocks across all regions, employment in the agriculture sector declined by 16.6 percentage points in 2021 when compared to our baseline year (1999), while the manufacturing sector experienced a smaller decline of 1.8 percentage points. In contrast, employment in the service sector increased by 4.7 percentage points, reflecting its growing role in the Ethiopian labour market.

6.2. Conflict and its disruptive impact on employment

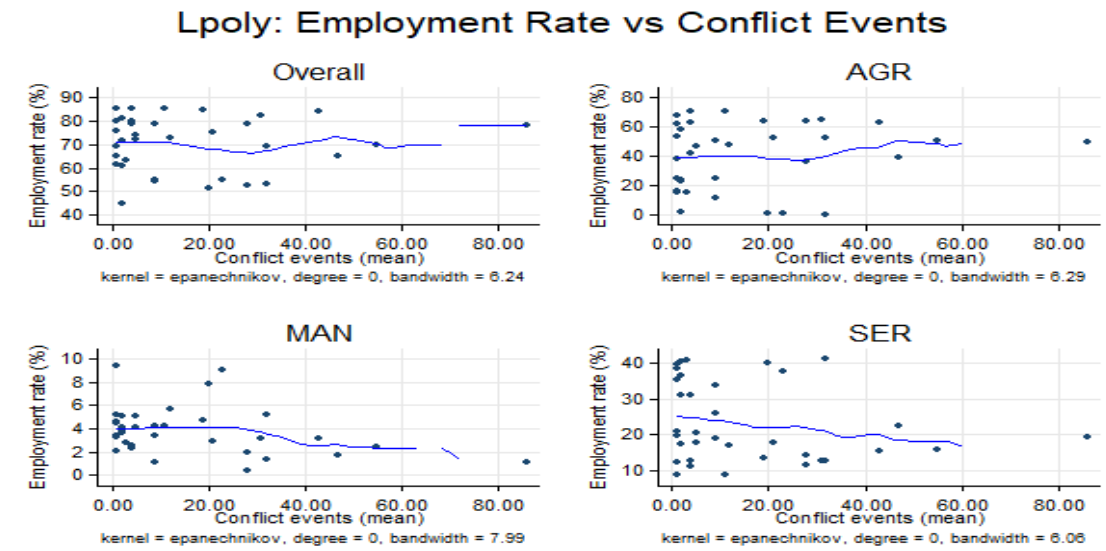
Ethiopia's conflict landscape has grown increasingly complex over the years (as seen in Figures 3-4 above). Since 2015, the frequency and intensity of conflicts have surged, particularly in the northern regions of Tigray, Amhara, and Afar. These conflicts have far-reaching implications for employment, as they destroy physical infrastructure, displace populations, and destabilize local economies.

The labour market impacts of conflict are both immediate and long-lasting as demonstrated by the decline of employment after the 2015, where conflict started to escalate across the country (Figure 3). In regions (such as Afar, Amhara and Oromia) affected by violence, employment rates decline across all sectors (see Figure 2). The service and manufacturing sectors, which rely on urban stability and infrastructure, are particularly hard hit (Figure 7). Likewise, with the Lploy estimate, agricultural employment, while somewhat more resilient relatively to the other sectors, also suffers as conflict disrupts access to land, labour, and markets. This contrasts with other economic shocks to the manufacturing sectors where temporary transition back to agricultural and rural employment had been a coping strategy (Weeden et.al., 2022; Caria et.al., 2022).

While this exercise only measured direct effects, other analysis has shown that conflict drives migration, further straining labour markets in both origin and host regions. Other research is underway to better understand impact of displaced populations on destination labour market and extent to which barriers to employment, including lack of resources, skills mismatches, and social exclusion, can be overcome. These dynamic highlights the complex

interplay between conflict and labour market stability, posing a significant challenge for policymakers.[5]

Figure 7: Impact of Conflicts on Employment Dynamics



Extreme values outside 3 times the interquartile Range (IQR) are considered outliers

Unlike the results from the non-parametric analysis (Figure 7), our simple regression estimates do not show statistically significant effects of conflict shocks on the manufacturing and service sectors (maybe due to small observation). However, conflict shocks remain significant in the agricultural sector, where their occurrence is associated with an approximate 9.9 percentage point decline in agricultural employment rate.

7. Addressing the Challenges: A Call for Action

There are three important initial policy implications of these findings:

- The economy's capacity to respond to climate shocks is likely to be imperfect. These shocks are likely become more frequent and intense in the future. Policymakers should therefore explore and experiment with effective ways to enhance the economy's capacity to sustain employment during such disruptions. This may include policies that strengthen agricultural resilience, measures to improve the service sector's role in absorbing labour during periods of poor agricultural output, and the reinforcement of social safety nets.

[5] For example, IGC-supported research on Direct Effects of Refugee Work Permits and Refugee and Host Integration through Safety Net.

- The economy's response to conflict shocks is also likely to be constrained, as the fallback option—agricultural jobs—tends to be less productive than the service and manufacturing jobs that are lost. Policymakers should consider strategies that facilitate the transition of workers back into more productive employment once hostilities subside.
- Climate and conflict shocks may occur at the same time. Ethiopia is particularly vulnerable to this combination of shocks, since all sectors would be affected contemporaneously and hence employment falls are likely to be very large. When a combination of shocks occurs, labour market policies may need to be complemented by strong social protection responses.

Finally, data-driven policymaking will be essential in navigating the dual challenges. This analysis on jobs and shocks has been limited by the absence of sufficiently disaggregated data, both by employment sub-sectors and by location. Tools such as the SPEI and the Armed Conflict Location and Event Data (ACLED) database can not only help identify vulnerable regions and target interventions effectively but also better understand coping mechanisms and job responses that can be strengthened. The emerging Labor Market Information System (LMIS) launched by the government is a game changer in the Ethiopian labour market, where more than 2 million young people are currently registered to match with potential employers through the portal. Integrating these tools into a comprehensive labour market information system would provide valuable insights for policymakers, enabling them to design and implement evidence-based solutions.

8. Conclusion

Ethiopia's labour market stands at the intersection of climate variability and conflict, two powerful forces that shape the economic trajectory of the country. While agriculture remains the most vulnerable sector, its role as a stabilizing force during crises underscores its importance. The service and manufacturing sectors hold promise but require deliberate investment and policy support to realize their potential. Addressing these challenges will require bold, coordinated action across multiple fronts. By strengthening resilience in agriculture, promoting economic diversification, mitigating conflict, and leveraging data for

informed policymaking such as the new Labour Market information system (LMIS), Ethiopia can build a more stable and sustainable future.

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References

Abay, K. A., Tafere, K., Berhane, G., Chamberlin, J., & Abay, M. H. (2023). Near-real-time welfare and livelihood impacts of an active war: Evidence from Ethiopia. *Food Policy*, *119*, 102526.

Acevedo, S., Mrkaic, M., Novta, N., Pugacheva, E., & Topalova, P. (2020). The effects of weather shocks on economic activity: what are the channels of impact? *Journal of Macroeconomics*, *65*, 103207.

Ayenew, A. B. (2017). Labor adaptation to weather shocks. In The Fourth Annual Bank Conference on Africa (ABCA), Berkeley, California: June 1-2, 2017.

Bartels, F. L., Alladina, S. N., & Lederer, S. (2009). Foreign direct investment in Sub-Saharan Africa: Motivating factors and policy issues. Journal of African Business, 10(2), 141-162.

Bayeh, E. (2022). Post-2018 Ethiopia: state fragility, failure, or collapse? *Humanities and Social Sciences Communications*, *9*(1), 1-8. https://doi.org/10.1057/s41599-022-01490-0

Blair, G., Christensen, D., & Wirtschafter, V. (2022). How does armed conflict shape investment? Evidence from the mining sector. The Journal of Politics, 84(1), 116-133. https://doi.org/10.1086/715255

Blattman, C., & Miguel, E. (2010). Civil war. Journal of Economic literature, 48(1), 3-57.

Caria, S., Tefera, G. A., & Hensel, L. (2022). *The Welfare and Labor Market Effects of Job-Displacement Insurance*. The Abdul Latif Jameel Poverty Action Lab. Retrieved from

https://www.povertyactionlab.org/initiative-project/welfare-and-labor-market-effects-job-displacement-insurance

Cleveland, W. S. (1979). Robust locally weighted regression and smoothing scatterplots. *Journal of the American statistical association*, *74*(368), 829-836. http://www.jstor.org/stable/2286407

Collier, P., & Hoeffler, A. (2004). Greed and grievance in civil war. *Oxford economic papers*, *56*(4), 563-595.

Gimenez-Nadal, J. I., Molina, J. A., & Silva-Quintero, E. (2019). On the relationship between violent conflict and wages in Colombia. *The Journal of Development Studies*, *55*(4), 473-489.

Gray, H. B., Taraz, V., & Halliday, S. D. (2023). The impact of weather shocks on employment outcomes: evidence from South Africa. Environment and Development Economics, 28(3), 285-305.

Kaldor, M., Moore, H. L., & Selchow, S. (2012). Global civil society 2012. *Ten Years of Critical Reflection*.

Kleemans, M., & Magruder, J. (2018). Labour market responses to immigration: Evidence from internal migration driven by weather shocks. The Economic Journal, 128(613), 2032-2065.

Mera, G. A. (2018). Drought and its impacts in Ethiopia. Weather and climate extremes, 22, 24-35. https://doi.org/10.1016/j.wace.2018.10.002

Morales Cerda, M., López-Acevedo, G., & Robertson, R. (2023). The relationship between female labor force participation and violent conflicts in South Asia. *Contemporary South Asia*, *31*(3), 371-389.

Mostafavi-Dehzooei, M. H., & Asadi, G. (2024). The effects of precipitation shocks on rural labour markets and migration. Climate and Development, 1-13.

Viste, E., Korecha, D. & Sorteberg, A. Recent drought and precipitation tendencies in Ethiopia. *Theor Appl Climatol* 112, 535–551 (2013). https://doi.org/10.1007/s00704-012-0746-3

Weeden, S. A., Hardy, J., & Foster, K. (2022). Urban flight and rural rights in a pandemic: exploring narratives of place, displacement, and “the right to be rural” in the context of COVID-19. *Annals of the American Association of Geographers*, *112*(3), 732-741. *Working Paper*, *145*.

Woldesenbet, E., Gebreluel, G., & Bedasso, B. (2022). Economic Development and Political Violence in Ethiopia. *The Global Economic Governance Programme, Blavatnik School of Government, University of Oxford,*

Table A1: Dependent variable: Employment rate by region/sector (OLS)

VARIABLES	(1) AGR	(2) MAN	(3) SER
Climate_shock	-9.105*	0.140	5.260*
	(5.213)	(0.999)	(3.036)
Conflict_shock	-9.905**	0.675	2.547
	(4.022)	(0.771)	(2.342)
Climate*Conflict	7.851	0.003	-4.060
	(11.615)	(2.226)	(6.764)
2005.year	-4.258	0.310	3.780
	(4.278)	(0.820)	(2.491)
2013.year	-2.763	0.002	4.310
	(4.373)	(0.838)	(2.546)
2021.year	-16.615***	-1.769**	4.724*
	(4.333)	(0.830)	(2.523)
1.region	49.198***	-4.263***	-20.215***
	(6.614)	(1.267)	(3.851)
2.region	41.761***	-3.142**	-18.239***
	(6.133)	(1.175)	(3.571)
3.region	61.514***	-4.059***	-27.947***
	(6.257)	(1.199)	(3.643)
4.region	59.001***	-4.978***	-26.023***
	(6.153)	(1.179)	(3.583)
5.region	44.233***	-4.950***	-23.542***
	(6.069)	(1.163)	(3.534)
6.region	64.514***	-5.695***	-25.301***
	(7.655)	(1.467)	(4.458)
7.region	62.221***	-4.974***	-25.953***
	(6.639)	(1.272)	(3.866)
12.region	27.102***	-4.593***	-12.741***
	(6.553)	(1.256)	(3.816)
13.region	30.019***	-4.451***	-4.236
	(7.292)	(1.397)	(4.246)
15.region	21.938***	-3.407**	-5.025
	(7.058)	(1.352)	(4.110)
Constant	8.649	7.825***	35.319***
	(5.821)	(1.115)	(3.390)
Observations	38	38	38
R-squared	0.924	0.691	0.897

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1=Tigray:Base 2=Afar 3=Amhara 4=Oromia 5=Somalie 6= Benishangul 7=SNNPR 12=Gambela 13=Harari 14=Addis Ababa 15=Dire-Dawa; Climate_shock=1 if too dry or too wet 0 otherwise; Conflict_shock=1 if conflict, 0 otherwise; 1999; baseline year

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