

The Contribution of the Social and Solidarity Economy to Social Inclusion: The Role of Social Coverage in Tunisia.

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Abstract

Purpose: This article examines the contribution of the Social and Solidarity Economy (SSE) to social inclusion in Tunisia, with particular attention to access to CNAM health coverage.

Methodology and sample: The empirical analysis uses a balanced panel covering the 24 Tunisian governorates over 2015–2025, corresponding to 264 governorate-year observations. A fixed-effects econometric model is estimated, and the Hausman test is used to choose between fixed and random effects. The explanatory variables include SSE employment, informal employment, unemployment, inflation, population, the number of cooperatives, and the poverty rate. **Findings:**

SSE employment is positively and significantly associated with CNAM coverage, whereas informal employment is negatively and significantly associated with it. Inflation and the poverty rate are positively associated with coverage, while population size is negatively associated with coverage. The unemployment rate and the number of cooperatives are not statistically significant.

Implications: The findings support policies that strengthen formal employment within the SSE, facilitate collective affiliation to CNAM, formalize informal activities, and improve coordination among institutions responsible for social protection.

Keywords: Social and Solidarity Economy; CNAM coverage; health insurance; informal employment; social protection; panel data; fixed effects; health inclusion.

Introduction

The expansion of health coverage is now a key challenge for developing countries, mainly in a context where social protection systems are weakened by the scale of informal employment, poverty, demographic constraints, and limited public funding capacity. Access to formal health insurance is not only a health indicator but also an essential determinant of social inclusion, the reduction of inequalities, and the protection of households against unexpected health expenses. Within this framework, the coverage provided by the CNAM plays a fundamental role, as it permits the assessment of national systems' capacity to gradually integrate the populations into institutionalized social security mechanisms. However, expanding this coverage faces several structural barriers. Informal employment remains one of the main obstacles to enrollment in contributory schemes, as informal workers are often excluded from traditional mechanisms based on salaried employment, employment contracts, and regular contributions. In addition to this are the effects of unemployment, poverty, inflation, and population growth, which directly or indirectly influence people's ability to access formal health protection. In this context, the Social and Solidarity Economy emerges as an essential driver of economic and social inclusion. Through cooperatives, associations, mutual societies, and other forms of collective organizations, the SSE can promote the gradual formalization of activities, the pooling of risks, and the integration of workers into social protection systems. The literature hence highlights that SSE structures make it possible to move beyond the traditional model of social protection based exclusively on formal salary employment by offering collective forms of membership tailored to vulnerable or atypical populations. Accordingly, the research question is: to what extent does the Social and Solidarity Economy contribute to social inclusion in Tunisia through social coverage?

The subject of this research is the contribution of the Social and Solidarity Economy to social inclusion through formal health coverage in Tunisia. Its main objective is to assess whether SSE employment is associated with higher CNAM coverage across governorates, while accounting for labor-market, macroeconomic, demographic, and social determinants. More specifically, the study examines the associations of SSE employment, informal employment, unemployment, inflation, population, the number of cooperatives, and poverty with the CNAM coverage rate.

To achieve this objective, the study conducts an econometric analysis of a balanced panel comprising Tunisia's 24 governorates over the 2015–2025 period, for a total of 264 observations. The Hausman specification test guides the choice between fixed and random effects, and the retained fixed-effects model controls for time-invariant unobserved heterogeneity across governorates.

The remainder of the article is structured as follows. Section 2 reviews the theoretical and empirical literature. Section 3 presents the methodological approach, sample, variables, and model specification. Section 4 reports and discusses the empirical results and robustness requirements. Section 5 concludes and presents policy implications and avenues for future research.

2. Literature Review

The question of social inclusion and social protection occupies a central place in contemporary economic debates, particularly in developing countries such as Tunisia.

2.1. Social and Solidarity Economy (SSE) and Health Coverage

The Social and Solidarity Economy (SSE), including cooperatives, associations, mutuals, and foundations, is recognized in the literature as a strategic vector for expanding social protection in low-income countries. Fonteneau (2007) demonstrates that in sub-Saharan Africa, mutual health organizations and SSE organizations establish an essential mechanism for accessing social protection for populations excluded from formal social security systems. These structures enable the pooling of health risks and the creation of collective health insurance systems, outside the traditional contributory channels linked to salary-earning employment. Similarly, Niang et al. (2023) show that the SSE plays a crucial role in expanding social health coverage, particularly in Africa.

According to Solidarité (2023), the SSE in Africa helps surpass the historical link between social protection and salary-earner status by proposing organizational structures that promote the inclusion of atypical workers and vulnerable populations. Fonteneau, Nyssens, and Platteau (2019) pinpoint that employment generated by SSE structures is generally accompanied by formal enrollment in mandatory health insurance schemes, which directly contributes to the expansion of CNAM coverage. Defourny and Nyssens (2017) locate this dynamic within an international typological framework, showing that hybrid models of social enterprises play an increasingly redistributive role in developing economies. In general, these works tend to converge on the hypothesis that employment has a positive effect on health coverage, not only through direct contributions but also by raising members' awareness of formal social protection schemes.

2.2. Informal Employment and Exclusion from Health Coverage

According to the International Labour Organization (2023), more than 60% of workers are engaged in the informal economy worldwide. Traub-Merz and Oehm (2024), for the case of sub-Saharan Africa, show that the majority of informal workers stay excluded from any formal health insurance mechanism, with coverage rates varying from 2.3% in Benin to 44.3% in Zambia. This coverage gap is explained by the lack of formal employment contracts, irregular income, and the incapacity to contribute regularly to a contributory scheme. Furthermore, the World Bank (2014)

confirms that workers in the informal sector along with their families represent the majority of the population in several developing countries and remain the most exposed to the financial risk associated with catastrophic health expenditures. Msigwa et al. (2023), in the case of Tanzania, demonstrate that even when mandatory coverage is imposed on the informal sector, the enrollment rate remains very low due to income insecurity. These findings underline the necessity for active policies to formalize the labor market as a lever for universal social protection, complementing subsidized coverage mechanisms.

2.3. Unemployment and Access to Health Insurance

The connection between unemployment and health coverage is particularly complex in African economies. In this context, Traub-Merz and Oehm (2024) show that in sub-Saharan Africa, the boundary between unemployment and informality is particularly blurred: individuals without formal employment rapidly shift toward informal subsistence activities, so that reported unemployment underestimates the actual vulnerability. In this regard, the effect of unemployment on health coverage is often captured by the informality variable, which could explain the statistical weakness of the unemployment coefficient in certain empirical estimates. Additionally, the World Bank (2025) highlights that in low-income countries, the majority of inactive individuals in the formal sector enter the informal economy rather than remaining permanently unemployed. The ISSA (2021) specifies that unemployment insurance systems, which could maintain health coverage for laid-off workers, are virtually nonexistent in sub-Saharan Africa, making the unemployed particularly vulnerable in terms of access to healthcare. These observations call for a cautious interpretation of the effect of unemployment on CNAM coverage, with regard to the substitutability between unemployment and informality in African labor markets.

2.4. Inflation and Demand for Formal Protection

Inflation can exert an ambiguous effect on health coverage. On the one hand, the macroeconomic instability it creates tends to reduce households' purchasing power and their ability to contribute to contributory systems. On the other hand, sustained inflation can lead households to search for formal protection in the face of increasing private healthcare costs. The ISSA (2021) underscores that periods of inflation intensify the demand for formal protection, as they increase the risk of catastrophic health expenditures for uninsured households.

Additionally, Blanchard (2022) emphasizes that inflation acts as a budget constraint for households, reducing their ability to save and their participation in insurance systems.

Hsiao and Shaw (2007) confirm that in low-income countries' social health insurance systems, periods of economic vulnerability, including inflation, encourage enrollment in formal insurance schemes, as private care becomes unaffordable. Furthermore, since inflation is often accompanied

by nominal salary revaluation, it can automatically expand the base of formal contributors to the CNAM scheme. These mechanisms are consistent with the hypothesis that inflation has a positive effect on health coverage in a context where informal healthcare substitutes are costly.

2.5. Demographic Pressure and the Capacity of Health Systems

Population growth stands as a key structural challenge for health insurance systems in developing countries. According to the World Bank (2025), despite the historic expansion of social protection to 4.7 billion people over the past decade, 2 billion people in low- and middle-income countries still remain without adequate coverage, precisely due to the fact that the capacity of the systems is not following the pace of population growth.

Marx (2013) highlights that rapid population growth exerts increasing pressure on the administrative and financial capacities of health insurance schemes, automatically reducing the proportion of the population covered - a phenomenon otherwise known as the demographic dilution effect. The WHO (2019) confirms that sub-Saharan African countries with the highest fertility rates also have the largest gaps between the total population and the population actually covered by a health insurance scheme. These findings advocate for a dynamic adjustment of resources allocated to social protection in line with demographic trends.

2.6. Cooperatives and Social Protection: Direct or Mediated Effect?

In the literature, the relationship between the development of cooperatives and health coverage is a subject of debate. Fonteneau (2007) specifies that it is not the absolute number of cooperative structures that determines health coverage, but their capability to collectively mobilize their members around mechanisms of enrolment in health insurance. Therefore, the impact of cooperatives on coverage is primarily indirect and long-term, mediated by the formal employment they generate and the mutualization practices they encourage.

Pour la Solidarité (2023) adds that the efficiency of cooperatives in terms of social protection relies heavily on their degree of formalization, their financial capacity, and the institutional environment in which they operate. Defourny and Nyssens (2017) highlight that in African contexts, health cooperatives and social mutuels are considered as hybrid forms that combine economic logic with social solidarity, but whose impact on formal coverage remains dependent on their integration with national mandatory health insurance systems. These observations suggest that simply increasing the number of cooperatives is insufficient in the absence of a strategy for integrating them into formal social protection schemes.

2.7. Poverty and Health Inclusion Policies

Poverty is both a hindrance and a catalyst for health coverage. On the one hand, it limits the households' contributive capacity and reduces their access to contribution-based health insurance

systems. On the other hand, it stimulates public authorities to implement targeted medical assistance programs, therefore expanding coverage to the most vulnerable populations. The World Bank (2018) demonstrates that in low-income countries, exemption and subsidy programs are the principal vector of expanding universal health coverage.

The European Parliament (2013) approves that in developing countries, coverage for the poor relies more on public assistance programs than on contributory mechanisms. The ISSA (2021) emphasizes that reforms targeting the achievement of universal health coverage in low-income countries essentially involve integrating poor populations into formal schemes through solidarity-based financing mechanisms and effective targeting policies. These findings suggest that the poverty rate has a positive effect on CNAM coverage, to the extent that social inclusion policies partially compensate the inability of disadvantaged households to contribute.

3. Methodology

Methodological positioning and rationale. This study adopts a positivist and hypothetico-deductive position. Testable expectations are derived from the literature and examined quantitatively using governorate-level panel data. The panel-data approach is appropriate because it combines cross-sectional and temporal variation and makes it possible to control for unobserved, time-invariant characteristics specific to each governorate. The fixed-effects specification is retained on the basis of the Hausman test, which indicates that these individual effects are correlated with the explanatory variables. This approach is therefore more suitable than pooled ordinary least squares or a random-effects specification for estimating conditional associations in the present sample. The estimates are interpreted as associations rather than causal effects.

3.1. Model Specification

General model:

The model used is written as follows:

$$\text{cov_cnam_it} = \alpha_i + \beta_1 \cdot \text{ESS_employment_it} + \beta_2 \cdot \text{informal_employment_it} + \beta_3 \cdot \text{unemployment_rate_it} + \beta_4 \cdot \text{inflation_it} + \beta_5 \cdot \text{population_it} + \beta_6 \cdot \text{cooperatives_it} + \beta_7 \cdot \text{poverty_rate_it} + \varepsilon_{it}$$

i: individual index denoting the observed governorate ($i = 1, \dots, N$), capturing cross-sectional variability across governorates.

t: time index denoting the year of observation ($t = 1, \dots, T$), capturing the longitudinal dimension of the panel.

cov_cnam_it: dependent variable: CNAM health insurance coverage rate (%) for governorate i in period t .

α_i : fixed individual effect, constant over time, capturing the unobserved heterogeneity specific to each governorate (institutions, governance, history of social protection) and assumed to be correlated with the regressors—which justifies the Within estimator, validated by the Hausman test ($\chi^2(7) = 40.36$, $p = 0.000$).

$\beta_1, \dots, \beta_7$: slope coefficients measuring the marginal effect, *ceteris paribus*, of each explanatory variable on **cov_cnam_it**.

Estimated model:

$$\text{cov_cnam_it} = 55.849 + 0.1362 \cdot \text{ESS_employment} - 0.1014 \cdot \text{informal_employment} + 0.2107 \cdot \text{unemployment_rate} + 0.5486 \cdot \text{inflation} - 0.1227 \cdot \text{population} + 0.0012 \cdot \text{cooperatives} + 0.2420 \cdot \text{poverty_rate} + \varepsilon_{it}$$

Note: The study sample covers the 24 Tunisian governorates spread across 7 development regions. These are Tunis, Ariana, Ben Arous, and Manouba for Greater Tunis; Nabeul, Zaghuan, and Bizerte for the Northeast; Béja, Jendouba, Le Kef, and Siliana for the Northwest; Sousse, Monastir, Mahdia, and Sfax for the Central-East; Kairouan, Kasserine, and Sidi Bouzid for the Central-West; Gabès, Médenine, and Tataouine for the Southeast; and finally Gafsa, Tozeur, and Kébili for the Southwest. All of these governorates are observed over the 2015–2025 period, providing a complete panel of 264 observations

3.2. Description of the Variables

Table 1. Description of the model variables

Variable	Type	Measure Indicator /	Significance	Economic description	Source
cov_cnam	Dependent	CNAM coverage rate (%)	—	Proportion of the population covered by mandatory health insurance administered by the CNAM. Key indicator of formal health coverage.	CNAM
employment_ESS	Explanatory	Share/number of ESS workers	** (p = 0.018)	Employment in the Social and Solidarity	INS / MDICI

Variable	Type	Measure Indicator	Significance	Economic description	Source
				Economy (cooperatives, associations, mutual societies). These workers operate in the formal sector and contribute to social security, facilitating access to the CNAM.	
informality_employment	Explanatory	Informal employment rate (%)	*** (p = 0.000)	Share of workers without a contract or social security contributions. Main obstacle to expanding health coverage: informal workers are excluded from the CNAM system.	INS / ILO
unemployment_rate	Explanatory	Unemployment rate (%)	ns (p = 0.288)	Proportion of the labor force that is unemployed. Its effect on cov_cnam is not statistically significant, likely due to a correlation with informal employment.	INS
infl	Explanatory	Inflation rate (%)	*** (p = 0.006)	Overall change in the	INS / IMF

Variable	Type	Measure Indicator	Significance	Economic description	Source
				level of consumer prices. During periods of inflation, households rely more on formal coverage in response to rising costs of private healthcare.	
population	Explanatory	Population size (log)	** (p = 0.027)	Total population size. Rapid population growth puts pressure on the capacity of the health insurance system, automatically reducing the coverage rate (dilution effect).	INS / World Bank
cooperatives	Explanatory	Number of active cooperatives	ns (p = 0.786)	Number of cooperative structures in the country. Its direct effect on cov_cnam is not demonstrated in this model; it is likely captured by the variable emploi_ESS.	ONAGR I / MDICI
poverty_rate	Explanatory	Poverty rate (%)	** (p = 0.012)	Proportion of the population below the poverty line.	INS

Variable	Type	Measure Indicator /	Significance	Economic description	Source
				The positive effect reflects medical assistance policies targeting vulnerable populations, extending CNAM coverage to the most disadvantaged.	

Note: *** $p < 0.01$; ** $p < 0.05$; ns = not statistically significant.

Note: The model is estimated using the fixed-effects method (Within estimator) on panel data. $\rho = 0.9999998$; $F(23, 233) = 4.0 \times 10^5$; $\text{Prob} > F = 0.000$. The signs (+/-) indicate the direction of the effect on cov_cnam, holding all other variables constant.

4. Results and Interpretation

4.1. Results of the Fixed-Effects Model

Table 2. Results of the fixed-effects model

Variable	Coefficient	Std. Err.	t	P> t	IC 95%	Sig.
ESS_employment	0.1362	0.0569	2.39	0.018	[0.024; 0.248]	**
informal_employment	-0.1014	0.0266	-3.81	0.000	[-0.154; -0.049]	***
unemployment_rate	0.2107	0.1976	1.07	0.288	[-0.179; 0.600]	ns
infl	0.5486	0.1966	2.79	0.006	[0.161; 0.936]	***
population	-0.1227	0.0550	-2.23	0.027	[-0.231; -0.014]	**
cooperatives	0.0012	0.0045	0.27	0.786	[-0.008; 0.010]	ns
poverty_rate	0.2420	0.0960	2.52	0.012	[0.053; 0.431]	**
_cons	55.849	4.774	11.70	0.000	[46.44; 65.26]	***

Note: *** $p < 0.01$; ** $p < 0.05$; ns = not statistically significant.

Model statistics: $\sigma_u = 10.227$ | $\sigma_e = 0.00462$ | $\rho = 0.9999998$ | $F(23, 233) = 4.0 \times 10^5$ | $\text{Prob} > F = 0.000$

Hausman Test - Fixed Effects vs. Random Effects

Table 3. Comparison of FE and RE coefficients and Hausman test

Variable	FE (b) Consistent	RE (B) Effective	Difference (b-B)	Std. Err. sqrt(diag)	Divergence
ESS_employment	0.1362	0.1015	0.0347	—	Low
informal_employment	-0.1014	-0.1243	0.0229	—	Low
unemployment_rate	0.2107	-0.4262	0.6369	0.1215	Strong
inflation	0.5486	0.5351	0.0136	—	Low
population	-0.1227	-0.4218	0.2990	0.0467	Strong
cooperatives	0.0012	0.0045	-0.0033	—	Low
poverty_rate	0.2420	-0.0677	0.3097	0.0337	Strong

Hausman test results

Test statistic	chi2(7) = 40.36
Prob > chi2	0.0000
Null hypothesis H ₀	No systematic difference between FE and RE
Decision	Rejection of H ₀ → Fixed-effects model retained

The Hausman test corroborates the choice of the fixed-effects (FE) model to estimate the determinants of cov_cnam. The Within estimator is preferred over the GLS random-effects estimator because it effectively controls for unobserved individual heterogeneity correlated with the predictors, thus producing convergent and unbiased estimates.

The Hausman test supports the fixed-effects specification relative to the random-effects model, but it does not by itself establish that the model is fully specified. The coefficients should be interpreted as conditional associations rather than causal effects. Robust inference should account

for heteroskedasticity and serial correlation within governorates; year fixed effects and tests for cross-sectional dependence should also be considered in robustness analyses.

4.2. Interpretation of Results

Following the presentation of the estimates, this section discusses the effect of each explanatory variable separately to better comprehend the impact of ESS determinants on social coverage.

➤ **SSE employment ($\beta_1 = 0.1362$, $p = 0.018$, **)**

The positive coefficient on SSE employment, which is statistically significant at the 5% level, is consistent with the key role of the Social and Solidarity Economy in expanding health coverage. This result is consistent with the work of Fonteneau (2007), who proves that in sub-Saharan Africa, mutual health organizations and SSE organizations constitute an important channel for access to social protection for populations that do not benefit from formal social security. Similarly, Pour la Solidarité (2023) highlights that the SSE in Africa helps overcome the historical link between social protection and salary employment by creating collective schemes for health insurance enrollment. Our findings therefore support the hypothesis that the growth of employment in the SSE may promote the integration of workers into formal contribution schemes, and is associated with a higher CNAM coverage rate.

➤ **Informal Employment ($\beta_2 = -0.1014$, $p = 0.000$, ***)**

The negative and highly significant coefficient of the `employment_informality` variable is consistent with a vast body of literature that classifies informality as the main structural obstacle to expanding health coverage in developing countries. Traub-Merz and Oehm (2024), in a large-scale survey conducted in sub-Saharan Africa, show that the majority of informal workers remain excluded from any formal health insurance mechanism, with coverage rates ranging from 2.3% in Benin to 44.3% in Zambia. The World Bank (2014) corroborates that workers in the informal sector and their families represent the majority of the population in many developing countries and remain the most vulnerable to the financial risk associated with health care costs. Finally, Msigwa et al. (2023) show that even when mandatory coverage is imposed on the informal sector, the enrollment rate remains very low due to the precariousness and irregularity of incomes. The estimate indicates that a one-percentage-point increase in the informal employment rate is associated with a 0.101-percentage-point decrease in CNAM coverage, therefore argues for active policies to formalize the labor market as a lever for universal social protection.

➤ **Unemployment rate ($\beta_3 = 0.2107$, $p = 0.288$, ns)**

The absence of a statistically significant effect of the unemployment rate on CNAM coverage is coherent with findings in the literature on the structure of African labor markets. **Traub-Merz and Oehm (2024)** show that in sub-Saharan Africa, the line between unemployment and informality

is particularly blurred, with individuals without formal employment rapidly shifting toward informal subsistence activities. In this regard, the effect of unemployment on health coverage is therefore largely captured by the variable `informal_employment`, which explains the potential multicollinearity between these two indicators and the loss of significance of the unemployment variable. **The World Bank (2025)** also highlights that in low-income countries, the official unemployment rate underrates actual vulnerability, as most individuals who are inactive in the formal sector enter the informal economy rather than remaining inactive.

➤ **Inflation ($\beta_4 = 0.5486$, $p = 0.006$, ***)**

The positive and highly significant coefficient for inflation represents quantitatively the strongest effect in the model. This result, which may seem counterintuitive at first, is nevertheless consistent with several mechanisms documented in the literature. The International Social Security Association (ISSA) (2021) notes that periods of economic vulnerability, including episodes of inflation, increase the demand for formal protection despite rising private healthcare costs. Hsiao and Shaw (2007), in their examination of social health insurance schemes in low-income countries, settle that when private health care costs become prohibitive, households resort to formal insurance schemes. Additionally, since inflation is often accompanied by nominal salary increases, it can automatically expand the base of contributors to the CNAM scheme. The estimate indicates that a one-percentage-point increase in inflation is associated with a 0.549-percentage-point increase in CNAM coverage. This conditional association may be compatible with greater reliance on formal protection when private healthcare costs rise; however, it should not be interpreted causally, especially if inflation varies primarily over time rather than across governorates.

➤ **Population ($\beta_5 = -0.1227$, $p = 0.027$, **)**

The negative and significant effect of population size on CNAM coverage confirms the hypothesis of a demographic dilution effect. This mechanism is well documented in the literature on universal health coverage. The World Bank (2025), in its annual report on social protection, highlights that despite the historic expansion of social protection to 4.7 billion people over the past decade, 2 billion people in low- and middle-income countries remain without acceptable coverage, precisely because the capacity of the schemes is not keeping pace with population growth. Marx (2013), in his study of social protection in Africa, emphasizes that rapid population growth is placing growing pressure on the administrative and financial capacities of health insurance schemes, automatically reducing the proportion of the population covered. Because population is specified in logarithms, the coefficient is a semi-elasticity: a 1% increase in population is associated with an approximate 0.00123-percentage-point decrease in CNAM coverage, all else equal. This result is consistent

with demographic pressure, but its magnitude and interpretation should be assessed through robustness tests.

➤ **Cooperatives ($\beta_6 = 0.0012$, $p = 0.786$, ns)**

The non-significant coefficient of the cooperatives variable suggests that the gross number of active cooperatives is not a direct determinant of CNAM coverage in this model. This result is consistent with the literature, which carefully distinguishes between the cooperative institutional form and its actual impact on social protection. Fonteneau (2007) highlights that it is not the sheer number of cooperative structures that determines coverage, but their ability to collectively mobilize their members around membership mechanisms. Pour la Solidarité (2023) adds that the impact of cooperatives on social protection is indirect and long-term, mediated by the formal employment they generate, an effect already captured in our model by the variable SSE_employment. This result therefore suggests that public policies should prioritize the quality and degree of formalization of cooperatives instead of simply increasing their numbers.

➤ **Poverty rate ($\beta_7 = 0.2420$, $p = 0.012$, **)**

The positive and significant coefficient of the poverty rate on CNAM coverage reflects a well-documented mechanism in the literature on social protection: the compensatory role of the state in countries with high poverty rates. The World Bank (2018), in its report on universal health coverage in low-income countries, indicates that medical assistance programs targeting vulnerable populations are the principal vector of coverage expansion in contexts of high poverty. The European Parliament (2013) similarly underscores that in developing countries, coverage for poor populations relies more on public exemption and subsidy schemes than on contributory mechanisms. A one-percentage-point increase in the poverty rate is associated with a 0.242-percentage-point increase in CNAM coverage. This result is compatible with a compensatory role for targeted assistance, but the model does not directly identify the institutional mechanism; reverse causality and omitted time-varying factors cannot be excluded.

4.3. Limitations and Robustness Requirements

Several limitations qualify the interpretation of the findings. First, the fixed-effects estimator controls for time-invariant differences across governorates but does not remove bias from omitted factors that vary over time, such as regional public health expenditure, administrative capacity, urbanization, or changes in local governance. Second, reverse causality may arise because stronger local institutions can simultaneously support SSE development and CNAM enrollment. Third, the estimates may be sensitive to heteroskedasticity, serial correlation, cross-sectional dependence, common national shocks, and the construction or interpolation of annual governorate-level indicators.

Accordingly, the results should be viewed as associations. A complete robustness assessment should report descriptive statistics and correlations; document the exact source, unit, transformation, and missing-data treatment for every variable; use standard errors clustered by governorate; test for serial correlation, heteroskedasticity, and cross-sectional dependence; and compare the baseline estimates with specifications including year fixed effects, time trends, lagged explanatory variables, and alternative measures of SSE development. Because national inflation may be collinear with year fixed effects, its identification must be discussed explicitly.

5. Conclusion

This study has empirically examined the association between the Social and Solidarity Economy (SSE) and social inclusion in Tunisia through social coverage. Using a panel data model covering the 2015-2025 period for a sample of 24 governorates in Tunisia estimated using the fixed-effects method, this research identified the economic, social, and demographic factors that are significantly associated with the CNAM coverage rate. The choice of the fixed-effects model was validated by the Hausman test, which confirms the existence of unobserved individual heterogeneity correlated with the explanatory variables. The results show, first, that employment in the Social and Solidarity Economy is positively and significantly associated with CNAM coverage. The coefficient associated with the `SSE_employment` variable is positive and significant at the 5% level, confirming that the growth of employment in cooperatives, associations, mutuals, and other SSE structures may promote the integration of workers into formal social protection mechanisms. This result underlines the structuring role of the SSE as an instrument of health and social inclusion.

On the contrary, informal employment is negatively associated with the expansion of health coverage. The negative and highly significant coefficient of the `informal_employment` variable indicates that higher informal employment is associated with a lower CNAM coverage rate. This result confirms the notion that the absence of a formal contract, administrative registration, and social security contributions severely limits informal workers' access to health insurance systems. It therefore accentuates the need to reinforce policies aimed at formalizing the labor market.

The study also indicates that certain macroeconomic and social variables play a key role. Inflation is positively and significantly associated with CNAM coverage, which may reflect households' increased reliance on formal protection mechanisms in the face of rising private healthcare costs. The poverty rate also has a positive and statistically significant association, suggesting that public policies for medical assistance and targeting vulnerable populations help extend coverage to the most disadvantaged households. In contrast, population size has a negative and statistically

significant association, confirming the existence of a demographic dilution effect when the capacity of the health insurance system does not follow the growth of the population.

Conversely, the unemployment rate and the number of cooperatives do not display a statistically significant association in the model. The lack of significance of unemployment may be explained by the close link between unemployment and informality in African labor markets, where individuals without formal employment often shift to informal activities. Similarly, the raw number of cooperatives does not appear sufficient to directly explain CNAM coverage. It is rather the ability of the cooperatives to create formal employment and organize their members' social affiliation that seems to be decisive.

Overall, the study suggests that the expansion of CNAM coverage depends not only on the performance of the health system, but also on the structure of the labor market, the degree of formalization of the economy, demographic dynamics, and the social policies implemented. The Social and Solidarity Economy appears to be a relevant lever for the consolidation of social inclusion, provided that it is sufficiently formalized, institutionally supported, and integrated into public social protection systems.

In terms of recommendations, the findings suggest promoting employment in the SSE, strengthening mechanisms for collective enrollment in CNAM, advocating the formalization of informal activities, and supporting cooperatives capable of generating declared jobs. It also appears essential to adapt the resources of the social protection system to demographic growth and to maintain targeted assistance policies for poor populations. These directions would enable progress toward more inclusive, equitable, and sustainable health coverage.

Finally, this research points to avenues for future studies that could incorporate other institutional variables, such as the quality of governance, public health spending, educational attainment, or citizens' trust in social institutions. A more in-depth comparative analysis across countries would also provide a better understanding of the conditions under which the SSE becomes a true driver of health coverage expansion.

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