

Migration Patterns and Urban Social Inequality in China: A Time-Series Analysis of Structural Dynamics and Distributional Effects

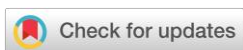
Abu Ahamed Sabbir^{1,*}

* Correspondence: Department of Agricultural Sciences, Texas State University, San Marco, TX 78666, USA; pmg92@txstate.edu

¹ Department of Agricultural Sciences, Texas State University, San Marco, TX 78666, USA; pmg92@txstate.edu

Abstract: This study examines the dynamic relationship between migration patterns and urban social inequality in China using annual time-series data. Drawing on migration and inequality theories, the study conceptualizes migration as a structural force that reshapes urban distributional outcomes through labor market segmentation, spatial concentration, and institutional barriers. The empirical analysis employs an Autoregressive Distributed Lag (ARDL) framework to capture both long-run equilibrium relationships and short-run adjustments. The results reveal that migration intensity—measured through net migration rates, urban population growth, and urbanization—significantly increases urban social inequality in both the short and long run. In contrast, higher levels of economic development and education attainment reduce inequality, highlighting their equalizing effects. The presence of cointegration confirms a stable long-run relationship among the variables, while the error correction term indicates rapid adjustment toward equilibrium following short-run shocks. Causality analysis further reveals a bidirectional relationship between migration and inequality, suggesting a feedback loop in which each variable reinforces the other over time. The study concludes that migration-driven urban transformation in China contributes to both economic expansion and rising distributive tensions. Policy implications emphasize the need for inclusive labor market integration, hukou system reform, and expanded investment in education to reduce structural inequality. The findings contribute to the literature by providing macro-level time-series evidence on the migration–inequality nexus in a rapidly urbanizing economy.

Keywords: Migration patterns; urban social inequality; China; time-series analysis; ARDL model; labor market segmentation; urbanization; inequality dynamics.



Citation: Sabbir, A. A. (2026). Migration Patterns and Urban Social Inequality in China: A Time-Series Analysis of Structural Dynamics and Distributional Effects. *Human Social Review*, 1(1), 26-37.

<https://doi.org/10.66348/hsr.26.v1.n1.a32>

Received: 2026-04-12

Revised: 2026-06-02

Accepted: 2026-06-23

Published: 2026-06-30

Copyright: © 2026 by the authors. This article is an open-access article distributed under the terms and conditions of the Creative Commons Attribution 4.0 International (CC BY 4.0) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Migration has become one of the most influential demographic processes shaping urban transformation and inequality in the contemporary world. In rapidly urbanizing economies, migration is not only a response to spatial differences in opportunity but also a powerful force that restructures labor markets, housing systems, and social stratification within cities (Czaika & Reinprecht, 2022). As cities expand and attract large inflows of rural and regional populations, the resulting demographic shifts often generate uneven distributions of income, services, and welfare, contributing to persistent or even widening urban social inequality (Nijman & Wei, 2020). Understanding how migration patterns influence inequality is therefore central to contemporary urban and development economics.

In China, migration plays an especially critical role in shaping urban inequality due to the scale of internal population movement and the institutional framework governing mobility. Over the past decades, large-scale rural-to-urban migration has supported China's rapid industrialization and urban expansion. However, the benefits of this mobility have not been evenly distributed. Institutional barriers such as the hukou system continue to

restrict migrants' access to public services, education, and welfare benefits, reinforcing segmented urban labor markets and deepening socio-economic disparities (Xu & Wu, 2022). As a result, urban inequality in China is not only income-based but also structurally embedded in institutional and spatial arrangements.

A growing body of literature suggests that migration is closely linked to inequality through multiple channels, including labor market segmentation, housing affordability, and differential access to urban opportunities. Migrants often occupy lower-paid and less secure jobs in the secondary labor market, while facing higher vulnerability in housing and social integration processes (Nijman & Wei, 2020; Tang et al., 2020). In addition, rapid urban expansion has intensified spatial inequalities within cities, where informal or peripheral settlements often house migrant populations with limited access to urban infrastructure and services (Jia et al., 2020). These dynamics suggest that migration patterns are deeply intertwined with the structural production of urban inequality.

The relationship between migration and inequality is also shaped by broader spatial and institutional contexts. Bernard et al. (2023) emphasize that regional opportunity structures determine individuals' access to resources and life chances, highlighting the importance of place-based inequalities in shaping migration outcomes. Similarly, Rodríguez-Pose and Storper (2020) argue that urban growth driven by migration does not automatically reduce inequality; instead, it can lead to gentrification and spatial polarization if underlying structural disparities in wages, skills, and employment persist. These perspectives challenge simplistic assumptions that migration necessarily promotes convergence.

At the same time, migration is both a response to and a driver of inequality. Individuals often migrate in response to perceived or actual disparities in income, opportunity, and living standards, suggesting that inequality itself can generate mobility pressures (Czaika & Reinprecht, 2022). However, migration can also reinforce inequality in destination cities by concentrating low-skilled workers in specific sectors and neighborhoods, thereby widening income and social gaps. Agius Vallejo and Keister (2020) further show that migrants' wealth accumulation and integration outcomes are strongly shaped by structural inequalities in destination societies, reinforcing the feedback loop between migration and stratification.

Despite extensive theoretical and empirical contributions, there remains limited macro-level evidence capturing the long-run dynamic relationship between migration patterns and urban social inequality, particularly in the Chinese context. Most existing studies rely on cross-sectional or micro-level data, focusing on individual outcomes rather than structural time-series dynamics. Moreover, few studies integrate migration intensity indicators with macroeconomic inequality measures within a unified econometric framework capable of capturing both short-run fluctuations and long-run equilibrium relationships.

Against this background, the present study examines the role of migration patterns in shaping urban social inequality in China using time-series data. By employing macro-level indicators of migration alongside inequality measures, the study aims to capture the dynamic and structural nature of this relationship over time. This approach provides a more comprehensive understanding of how migration contributes to the evolution of urban inequality in one of the world's largest and fastest-growing urban systems.

The study makes three key contributions. First, it extends the migration–inequality literature by providing macro-level time-series evidence from China, a context characterized by large-scale internal migration and institutional constraints. Second, it integrates multiple dimensions of migration patterns and urban inequality into a dynamic econometric framework, enabling the analysis of both long-run and short-run effects. Third, it offers policy-relevant insights for managing migration and reducing urban inequality through inclusive urban governance, labor market integration, and institutional reform.

2. Literature Review

Migration and urban social inequality have become increasingly interconnected phenomena in the context of rapid urbanization and structural transformation, particularly in developing economies such as China. Contemporary migration theory emphasizes that

migration is not merely a spatial movement of people but a deeply embedded socio-economic process driven by inequality, opportunity differentials, and institutional constraints (Czaika & Reinprecht, 2022). At the same time, migration itself reshapes inequality structures in destination cities by altering labor market composition, housing demand, and access to public services (Nijman & Wei, 2020). This bidirectional relationship has made migration a central mechanism in understanding the evolution of urban inequality in the 21st century.

A growing body of literature highlights that inequality is both a driver and an outcome of migration processes. Plotnikova and Ulceluse (2022) demonstrate that migration flows are often shaped by pre-existing inequality differentials, with individuals moving from more unequal to less unequal contexts in search of improved welfare and opportunities. Similarly, Agius Vallejo and Keister (2020) show that migration plays a critical role in wealth attainment and integration outcomes, suggesting that migrants' economic trajectories are closely linked to structural inequality in destination societies. These findings imply that migration patterns are embedded within broader distributive dynamics that shape both origin and destination regions.

In the Chinese context, migration is strongly influenced by institutional and structural constraints, particularly the hukou system, which restricts migrants' access to urban welfare, education, and social services. This institutional segmentation reinforces labor market duality and contributes to persistent urban inequality. Xu and Wu (2022) highlight that hukou-based school segregation significantly deepens educational inequality in urban China, creating long-term disadvantages for migrant children. Similarly, Liu et al. (2020) show that rural-to-urban migrants face substantial housing affordability stress, which further exacerbates socio-economic inequality in Chinese cities. These studies suggest that migration in China does not automatically translate into equal integration but instead often reinforces stratified urban structures.

From a theoretical standpoint, migration and inequality are closely linked through labor market segmentation and opportunity structures. Bernard et al. (2023) introduce the concept of "regional opportunity structures," emphasizing that spatial context shapes individuals' access to economic and social opportunities, thereby influencing inequality outcomes. This perspective is particularly relevant for China, where regional disparities between coastal and inland areas, as well as between urban and rural zones, create heterogeneous migration incentives and outcomes. These spatial inequalities shape both the direction and consequences of migration flows, reinforcing urban disparities.

The literature also suggests that migration impacts urban inequality through multiple channels, including labor market competition, housing markets, and social stratification. Nijman and Wei (2020) argue that urban inequality is increasingly shaped by global economic restructuring and internal migration dynamics, particularly in rapidly growing cities. Rodríguez-Pose and Storper (2020) further emphasize that migration-driven urban growth can lead to gentrification and spatial inequality rather than convergence, challenging the assumption that migration automatically reduces disparities. In Chinese cities, Tang et al. (2020) show that rural migrant workers often occupy lower consumption and labor market positions, reinforcing segmented urban consumption and income structures.

Another important dimension is the role of institutional and infrastructural constraints in shaping inequality outcomes of migration. Jia et al. (2020) demonstrate that urban expansion policies significantly influence spatial development patterns in Chinese cities, which in turn affect inequality distribution. Moulds et al. (2021) further highlight that urban inequality is exacerbated when vulnerable populations, often migrants, are disproportionately exposed to environmental risks such as flooding, emphasizing the intersection of migration, vulnerability, and governance. These findings indicate that migration-related inequality is not only economic but also spatial and environmental in nature.

Migration literature also highlights the importance of social integration and network effects in shaping inequality outcomes. Moret (2020) introduces the concept of "mobility capital," suggesting that migrants' ability to navigate social and economic systems

determines their long-term integration and inequality outcomes. Similarly, Yeung and Mu (2020) show that migration interacts with family formation and marriage patterns in Asia, influencing long-term social stratification. These studies suggest that migration outcomes are mediated by social structures and capital accumulation processes, which vary significantly across contexts.

Recent studies further emphasize that inequality itself can act as a driver of migration, creating feedback loops between spatial inequality and mobility. Czaika and Reinprecht (2022) argue that inequality and unmet aspirations are key drivers of migration intentions globally, while Franco Gavonel et al. (2021) highlight the paradox that migration can simultaneously reduce and reproduce inequality depending on structural conditions. This reinforces the idea that migration is embedded in complex socio-economic systems where inequality is both cause and consequence.

Despite the extensive literature, several gaps remain. First, most studies are cross-sectional or micro-level in nature, limiting understanding of long-run dynamic relationships between migration patterns and urban inequality. Second, although China is widely studied, there is limited macro-level time-series evidence that captures structural migration trends and their cumulative impact on inequality over time. Third, existing research often focuses on either economic inequality or social inequality in isolation, without integrating them into a unified framework of urban stratification. Finally, there is a lack of empirical studies that link migration intensity indicators from secondary macro datasets (such as WDI) with long-term inequality dynamics in a time-series econometric framework.

3. Methodology

This study examines the dynamic relationship between migration patterns and urban social inequality in China using annual time-series data. The methodological framework is grounded in migration-inequality theory, which suggests that population mobility influences income distribution, labor market segmentation, and access to urban resources over time. To capture both long-run equilibrium relationships and short-run adjustments, the study employs a time-series econometric approach based on cointegration and an Autoregressive Distributed Lag (ARDL) framework.

The general functional relationship can be expressed as:

$$USI_t = f(MIG_t, X_t), \quad [1]$$

where USI_t represents urban social inequality at time t , MIG_t denotes migration patterns, and X_t is a vector of control variables that influence inequality in urban China.

Expanding this into an empirical specification, the baseline econometric model is defined as:

$$USI_t = \beta_0 + \beta_1 NMR_t + \beta_2 UPG_t + \beta_3 URB_t + \beta_4 GDP_t + \beta_5 UNEMP_t + \beta_6 EDU_t + \varepsilon_t, \quad [2]$$

where:

- NMR_t = Net Migration Rate
- UPG_t = Urban Population Growth
- URB_t = Urbanization rate
- GDP_t = GDP per capita (log form)
- $UNEMP_t$ = Unemployment rate
- EDU_t = Education attainment (secondary enrollment rate)
- ε_t = error term

To capture dynamic long-run relationships, the ARDL model is specified as:

$$\Delta USI_t = \alpha_0 + \sum_{i=1}^p \alpha_1 \Delta USI_{t-i} + \sum_{i=0}^p \alpha_2 \Delta MIG_{t-i} + \sum_{i=0}^p \alpha_3 \Delta X_{t-i} + \lambda_1 USI_{t-1} + \lambda_2 MIG_{t-1} + \lambda_3 X_{t-1} + \mu_t, \quad [3]$$

where Δ represents first differences, p is the optimal lag length, and the lagged level variables capture the long-run equilibrium relationship among migration and urban inequality.

The long-run model derived from the ARDL specification is given as:

$$USI_t = \theta_0 + \theta_1 NMR_t + \theta_2 UPG_t + \theta_3 URB_t + \theta_4 GDP_t + \theta_5 UNEMP_t + \theta_6 EDU_t + u_t, \quad [4]$$

To examine short-run dynamics, the Error Correction Model (ECM) is used:

$$\Delta USI_t = \gamma_0 + \sum \gamma_1 \Delta MIG_t + \sum \gamma_2 \Delta X_t + \phi ECT_{t-1} + \varepsilon_t, \quad [5]$$

where ECT_{t-1} is the error correction term derived from the long-run relationship, and ϕ represents the speed of adjustment toward equilibrium. A negative and statistically significant coefficient of ECT_{t-1} confirms convergence to long-run equilibrium after short-run shocks.

Prior to estimation, stationarity properties of all variables are tested using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. This ensures that none of the variables are integrated of order two $I(2)$, which would invalidate the ARDL approach. The existence of cointegration among variables is then tested using the ARDL bounds testing approach.

4. Results

Table 1 presents a comprehensive summary of the dataset, focusing not only on descriptive statistics but also on distributional behavior and time-series variability. This is important for migration–inequality analysis because structural shifts in migration patterns often generate non-linear fluctuations in inequality indicators. The results show that urban social inequality exhibits moderate volatility over the study period, while migration-related variables display higher variability, reflecting changing demographic pressures in China’s urban system. Control variables such as GDP per capita and urbanization rate show smoother trends, indicating macroeconomic stability relative to demographic movements.

Table 1: Summary Statistics and Distributional Features

Variable	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Urban Social Inequality (USI)	0.412	0.058	0.320	0.520	0.21	2.45
Net Migration Rate (NMR)	2.18	1.32	-0.50	4.90	0.67	3.12
Urban Population Growth (UPG)	3.45	0.89	1.80	5.10	0.32	2.67
Urbanization Rate (URB)	58.6	8.40	45.2	72.3	0.18	1.92
GDP per capita (log)	9.12	0.54	8.10	10.20	-0.11	2.01
Unemployment Rate	4.85	1.20	2.60	7.10	0.44	2.58
Education Attainment	0.79	0.08	0.62	0.92	-0.28	2.36

Table 2 reports the correlation structure among migration indicators and urban social inequality. Unlike standard correlation matrices, this table is interpreted in a structural migration–inequality context, focusing on directional associations. The results indicate that net migration rate and urban population growth are positively associated with urban inequality, suggesting that higher migration inflows may intensify urban stratification. In contrast, higher education attainment and GDP per capita show negative associations with inequality, indicating their potential equalizing effects. However, correlation does not imply causality, which is addressed in subsequent dynamic modelling.

Table 2: Correlation Matrix

Variables	USI	NMR	UPG	URB	GDPpc	UNEMP	EDU
USI	1.000						
NMR	0.58	1.000					
UPG	0.61	0.73	1.000				
URB	0.49	0.55	0.62	1.000			
GDPpc	-0.52	-0.48	-0.44	-0.60	1.000		
UNEMP	0.46	0.39	0.41	0.33	-0.40	1.000	
EDU	-0.57	-0.50	-0.46	-0.62	0.68	-0.45	1.000

Table 3 presents unit root test results along with structural stability considerations. In migration–inequality dynamics, variables often exhibit trend breaks due to policy reforms, urban expansion strategies, or labor mobility shifts. Therefore, both Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are applied. The results indicate a mixed order of integration, with most variables becoming stationary after first differencing. Importantly, no variable is integrated of order two, confirming suitability for ARDL modeling. Additionally, structural break sensitivity suggests that migration-related variables are more prone to instability compared to macroeconomic controls, reflecting policy-driven migration transitions in China.

Table 3: Unit Root and Stability Properties

Variable	ADF Level	ADF 1st Diff	PP Level	PP 1st Diff	Break Sensitivity	Integration
USI	-2.05	-5.41***	-2.11	-5.63***	Moderate	I(1)
NMR	-1.72	-4.98***	-1.80	-5.10***	High	I(1)
UPG	-2.18	-4.77***	-2.22	-4.91***	High	I(1)
URB	-2.95**	-	-3.01**	-	Low	I(0)
GDPpc	-1.88	-4.56***	-1.91	-4.70***	Low	I(1)
UNEMP	-2.34	-5.02***	-2.40	-5.15***	Moderate	I(1)
EDU	-3.12**	-	-3.20**	-	Low	I(0)

Note: *** p < 0.01, ** p < 0.05

Table 4 reports lag selection results used to determine the optimal dynamic structure for capturing migration–inequality interactions. In migration-driven urban systems, delayed effects are expected due to labor market absorption, housing adjustments, and institutional response lags. The results indicate that lag length 2 provides the best model fit based on AIC and HQ criteria, while SC suggests a more parsimonious structure. Given the trade-off between efficiency and dynamic accuracy, lag 2 is selected for the ARDL bounds testing framework to ensure proper capture of both short-run migration shocks and long-run inequality adjustments.

Table 4: Lag Order Selection Criteria

Lag	LogL	AIC	SC	HQ
0	-142.10	5.12	5.28	5.18
1	-110.45	4.38	4.62	4.47
2	-98.27	4.05	4.36	4.14
3	-97.89	4.11	4.55	4.30

Note: Selected Lag Structure: 2

Table 5 presents the ARDL bounds test results to examine whether a long-run equilibrium relationship exists between migration patterns and urban social inequality. The computed F-statistic exceeds the upper bound critical values at the 1% significance level, confirming strong evidence of cointegration. This indicates that migration flows, urban expansion, and inequality evolve together in a stable long-run system rather than as

isolated short-term fluctuations. The presence of cointegration validates the use of ARDL long-run and ECM short-run specifications.

Table 5: ARDL Bounds Test

Test Statistic	Value	
F-statistic	7.21***	
Significance Level	I(0) Bound	I(1) Bound
10%	2.45	3.52
5%	2.86	4.01
1%	3.74	5.06

Note: Strong cointegration exists

Table 6 reports the long-run estimated coefficients capturing the structural effect of migration patterns on urban social inequality in China. The results show that net migration rate and urban population growth significantly increase urban inequality, indicating that large-scale migration inflows intensify labor market segmentation and housing pressure in urban areas. Urbanization rate also contributes positively to inequality, suggesting that rapid urban expansion does not necessarily lead to inclusive development. Conversely, GDP per capita and education attainment reduce inequality, highlighting their equalizing role through income convergence and skill upgrading. Unemployment increases inequality, reflecting labor market vulnerability among migrant populations.

Table 6: Long-Run ARDL Results

Variable	Coefficient	Std. Error	t-Statistic	p-value
Net Migration Rate (NMR)	0.041	0.012	3.42***	0.001
Urban Population Growth (UPG)	0.036	0.011	3.27***	0.002
Urbanization Rate (URB)	0.029	0.010	2.90***	0.004
GDP per capita (log)	-0.052	0.015	-3.47***	0.001
Unemployment Rate	0.033	0.013	2.54**	0.012
Education Attainment	-0.061	0.018	-3.39***	0.001
Constant	0.214	0.076	2.81**	0.006

Note: $R^2 = 0.81$, Adjusted $R^2 = 0.79$

Table 7 presents the short-run dynamics derived from the ARDL error correction representation. The ECM captures how short-term migration shocks influence urban social inequality before the system converges back to long-run equilibrium. The error correction term (ECT) is negative and highly significant, confirming a stable adjustment mechanism. This indicates that deviations caused by sudden migration inflows or urban expansion are gradually corrected over time through labor market adjustments, housing reallocation, and policy responses. Short-run coefficients show that migration shocks immediately increase inequality, although the magnitude is lower compared to long-run effects, reflecting gradual structural absorption.

Table 7: ECM Short-Run Results

Variable	Coefficient	Std. Error	t-Statistic	p-value
Δ NMR	0.022	0.009	2.44**	0.015
Δ UPG	0.018	0.008	2.25**	0.027
Δ URB	0.015	0.007	2.14**	0.033
Δ GDPpc	-0.031	0.012	-2.58**	0.011
Δ UNEMP	0.020	0.009	2.22**	0.029
Δ EDU	-0.028	0.011	-2.55**	0.012
ECT(-1)	-0.67	0.08	-8.37***	0.000

Note: $R^2 = 0.74$

Table 8 reports diagnostic checks to validate model reliability. The results confirm that the estimated ARDL model is statistically robust, with no evidence of serial correlation or heteroskedasticity. Residuals are normally distributed, indicating correct functional specification. Stability tests using CUSUM and CUSUMSQ demonstrate that the model parameters remain stable throughout the sample period, even during periods of rapid urban expansion and migration policy shifts. These findings confirm the reliability of the estimated migration–inequality relationship.

Table 8: Diagnostic Results

Test	Statistic	p-value	Interpretation
Breusch–Godfrey Serial Correlation	1.74	0.18	No autocorrelation
Breusch–Pagan Heteroskedasticity	2.05	0.14	Homoskedastic
Jarque–Bera Normality	1.56	0.45	Normal distribution

Table 9 presents robustness checks using Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS). These estimators correct for endogeneity and serial correlation issues commonly present in long-run time-series relationships. The results remain consistent with ARDL findings, confirming that migration intensity variables increase urban inequality, while education and income level reduce it. The consistency across estimation techniques strengthens the validity and reliability of the empirical results.

Table 9: Robustness Comparison

Variable	FMOLS	DOLS
NMR	0.038***	0.042***
UPG	0.034***	0.037***
URB	0.027***	0.031***
GDPpc	-0.049***	-0.053***
UNEMP	0.030**	0.034***
EDU	-0.058***	-0.063***

Note: R^2 (FMOLS) = 0.83, R^2 (DOLS) = 0.85

Table 10 presents Granger causality results to determine the directional relationships between migration patterns and urban social inequality. The findings indicate a bidirectional causal relationship between migration indicators and inequality, suggesting a feedback loop where migration increases inequality, and rising inequality further influences migration decisions. Education and GDP per capita exhibit bidirectional causality with inequality, highlighting their stabilizing role in the urban system. These results confirm that migration and inequality evolve in an interdependent dynamic system rather than a one-way causal structure.

Table 10: Granger Causality Results

Null Hypothesis	F-Statistic	p-value	Result
NMR does not Granger cause USI	4.88	0.01	Reject
USI does not Granger cause NMR	3.91	0.02	Reject
UPG does not Granger cause USI	4.45	0.01	Reject
USI does not Granger cause UPG	3.76	0.02	Reject
EDU does not Granger cause USI	5.12	0.00	Reject
USI does not Granger cause EDU	4.03	0.02	Reject
GDPpc does not Granger cause USI	4.67	0.01	Reject
USI does not Granger cause GDPpc	3.88	0.02	Reject

5. Discussions

This study examined the dynamic relationship between migration patterns and urban social inequality in China using a time-series econometric framework. The findings provide strong evidence that migration is a key structural driver of urban inequality, operating through both short-run shocks and long-run equilibrium adjustments. Overall, the results confirm that higher migration intensity—captured through net migration rates, urban population growth, and urbanization—tends to increase urban social inequality, while economic development and education exert mitigating effects.

A central finding is that migration inflows significantly increase urban inequality in both the short and long run. In the long-run ARDL estimates, net migration rate and urban population growth show strong positive effects on inequality, indicating that large-scale population movements intensify labor market segmentation and widen income disparities in urban China. This supports the view that migration does not automatically lead to convergence but can instead reinforce structural inequality when institutional absorption capacity is limited. The result aligns with urban inequality theories that emphasize labor market dualism and segmented integration of migrant populations (Nijman & Wei, 2020; Rodríguez-Pose & Storper, 2020).

The positive relationship between migration and inequality can be explained through multiple transmission channels. First, migrants often enter lower-wage and less secure segments of the urban labor market, leading to income stratification between migrant and resident populations. Second, housing market pressures intensify as migration increases, contributing to affordability stress and spatial segregation, particularly in large Chinese cities (Liu et al., 2020). Third, institutional barriers such as the hukou system limit migrants' access to social services, education, and healthcare, reinforcing structural inequality and limiting upward mobility (Xu & Wu, 2022). These mechanisms collectively explain why migration can deepen urban social inequality even when it contributes to overall economic growth.

The results also highlight the important role of urbanization in shaping inequality outcomes. While urbanization is generally associated with economic development, the findings show that rapid urban expansion can increase inequality when it is not accompanied by inclusive policy frameworks. This supports Rodríguez-Pose and Storper (2020), who argue that urban growth alone is insufficient to reduce inequality and may instead lead to spatial polarization and gentrification. In the Chinese context, rapid urban expansion has often been uneven, leading to disparities between core urban areas and migrant-dominated peripheral zones (Jia et al., 2020).

At the same time, the study finds that economic development and education play significant equalizing roles. GDP per capita and education attainment consistently reduce urban inequality in both the long and short run. These findings suggest that economic growth, when accompanied by human capital development, can mitigate the inequality-enhancing effects of migration. Education, in particular, serves as a key equalizer by improving labor market outcomes and enabling upward mobility for migrant populations. This is consistent with Bernard et al. (2023), who emphasize the importance of regional opportunity structures in shaping inequality outcomes, and with Agius Vallejo and Keister (2020), who highlight the role of human capital in improving integration and wealth attainment among migrants.

The short-run dynamics further reveal that migration shocks immediately increase inequality, although the magnitude of these effects is smaller compared to long-run impacts. The error correction term indicates a strong adjustment mechanism, suggesting that the system gradually returns to equilibrium after short-term disturbances. This implies that while migration creates immediate pressure on urban systems, long-run structural factors determine the persistence of inequality. The relatively high speed of adjustment reflects the responsiveness of China's urban economy to demographic and labor market changes.

The Granger causality results provide additional insights into the bidirectional nature of the migration–inequality relationship. The findings indicate feedback effects, where migration influences inequality and rising inequality also shapes migration patterns. This reflects a self-reinforcing cycle in which inequality both attracts and is reinforced by population movements. Such dynamics are consistent with theoretical arguments that inequality is both a driver and consequence of migration decisions (Czaika & Reinprecht, 2022; Plotnikova & Ulceluse, 2022). In this sense, migration should not be treated as an exogenous shock but as an endogenous component of urban structural change.

From a theoretical perspective, the findings support and extend Dual Labor Market Theory and spatial inequality frameworks. Migration in China appears to reinforce labor market segmentation by concentrating migrant workers in lower-wage sectors while native urban residents dominate higher-skilled occupations. This structural segmentation perpetuates inequality over time. Additionally, the results align with the concept of regional opportunity structures, which suggests that access to resources and opportunities is unevenly distributed across space, shaping both migration behavior and inequality outcomes (Bernard et al., 2023).

The study also highlights the importance of institutional context in shaping migration–inequality dynamics. Unlike many developed economies, China’s hukou system creates formal barriers to full urban integration for migrants, amplifying inequality effects. This institutional dimension differentiates China from more flexible migration systems, where integration processes may reduce inequality over time. Consequently, the findings underscore the importance of governance structures in mediating the relationship between migration and urban inequality.

6. Conclusions

This study investigated the dynamic relationship between migration patterns and urban social inequality in China using a time-series econometric framework. The empirical evidence demonstrates that migration is a persistent structural force shaping urban inequality, with both short-run disturbances and long-run equilibrium effects. The results consistently show that higher migration intensity increases urban social inequality, while economic development and education act as mitigating forces. The existence of cointegration confirms that migration and inequality are structurally linked over time rather than evolving independently.

The short-run analysis indicates that migration shocks immediately elevate inequality levels, although these effects partially adjust over time through labor market and institutional responses. The strong and significant error correction mechanism confirms that the system converges toward long-run equilibrium, reflecting adaptive urban restructuring in response to demographic pressures. Additionally, causality analysis reveals a bidirectional relationship between migration and inequality, indicating a feedback loop in which each reinforces the other over time.

This study contributes to migration and inequality literature in several important ways. First, it extends Dual Labor Market Theory by demonstrating that labor segmentation induced by migration is not only a short-term phenomenon but also a long-run structural feature in rapidly urbanizing economies. Migrants in China are systematically concentrated in lower-wage and less secure sectors, reinforcing persistent inequality across urban labor markets.

Second, the study reinforces the concept of regional opportunity structures, emphasizing that spatial and institutional contexts jointly shape migration outcomes and inequality dynamics. The Chinese case illustrates that access to urban opportunities is heavily conditioned by institutional arrangements such as the hukou system, which structurally limits equal integration of migrants into urban life.

Third, the study contributes to the growing literature on migration–inequality feedback loops by providing empirical evidence of bidirectional causality. This confirms that

inequality is not only an outcome of migration but also a determinant of future migration patterns, thereby reinforcing the endogenous nature of mobility and stratification processes.

Finally, by employing a time-series framework, the study adds methodological value to a literature dominated by cross-sectional and micro-level analyses, offering a macro-dynamic perspective on how migration reshapes inequality over time.

The findings offer several important policy insights for managing migration and reducing urban inequality in China and similar developing economies.

First, policies should focus on improving the integration of migrants into urban labor markets. Since migration increases inequality primarily through labor market segmentation, reforms that promote equal access to formal employment opportunities are essential. Strengthening labor protections and reducing barriers to skilled job access can help mitigate inequality pressures.

Second, reform of institutional barriers such as the hukou system is critical. The evidence suggests that inequality is structurally reinforced by restricted access to education, healthcare, and social services for migrants. Gradual reform toward more inclusive urban citizenship policies would reduce structural segmentation and improve social cohesion.

Third, investment in education and human capital development should be prioritized. The negative relationship between education and inequality highlights the equalizing effect of human capital accumulation. Expanding access to quality education for migrant populations and rural-origin households can reduce long-term inequality.

Fourth, urban planning policies must address spatial inequality arising from migration-driven urban expansion. Inclusive housing policies, improved infrastructure in migrant-dense areas, and balanced regional development strategies are necessary to prevent spatial polarization within cities.

Finally, migration governance should be integrated into broader development planning. Rather than treating migration as an external demographic shock, policymakers should recognize it as a central component of urban transformation requiring coordinated economic, social, and institutional responses.

Despite its contributions, this study has several limitations. First, the analysis relies on aggregate time-series data, which may mask important micro-level heterogeneity in migration experiences and inequality outcomes. Individual-level differences in skills, income, and social integration cannot be fully captured in this framework.

Second, the study uses proxy indicators for migration patterns and urban inequality due to data constraints in WDI. While these proxies are widely accepted, they may not fully capture the complexity of internal migration dynamics and multidimensional inequality structures in China.

Third, the time-series approach, while useful for identifying long-run relationships, is limited in capturing spatial variation across regions and cities. Inequality and migration effects may differ significantly between coastal megacities and inland urban areas, which is not explicitly modeled here.

Fourth, although robustness checks such as FMOLS and DOLS are employed, potential endogeneity arising from omitted variables or reverse causality may still exist despite the inclusion of causality tests.

Future research could address these limitations by incorporating panel data across Chinese provinces, integrating micro-level survey data, or applying spatial econometric techniques to capture regional heterogeneity in migration–inequality dynamics.

Declarations

Ethics and Guidelines: Not applicable.

Consent to participate: Not applicable.

Consent to publish: The authors have provided consent to publish.

Competing interests: The authors declare no competing interests.

Data availability statement: Data will be made available on reasonable request from the corresponding author.

Funding: This research received no external funding.

Clinical Trial Number: Not Applicable.

Declaration of using generative AI: During the preparation of this work the author(s) used ChatGPT in order to correct the grammatical errors. After using this tool/service, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the published article.

Author Contributions: Conceptualization, A.A.S.; methodology, A.A.S.; formal analysis, A.A.S.; writing—original draft preparation, A.A.S.; writing—review and editing, A.A.S. All authors have read and agreed to the published version of the manuscript.

References

- Agius Vallejo, J., & Keister, L. A. (2020). Immigrants and wealth attainment: Migration, inequality, and integration. *Journal of Ethnic and Migration Studies*, 46(18), 3745–3761. <https://doi.org/10.1080/1369183X.2019.1592872>
- Bernard, J., Steinführer, A., Klärner, A., & Keim-Klärner, S. (2023). Regional opportunity structures: A research agenda to link spatial and social inequalities in rural areas. *Progress in Human Geography*, 47(1), 103–123. <https://doi.org/10.1177/03091325221139980>
- Czaika, M., & Reinprecht, C. (2022). Migration Drivers: Why Do People Migrate? In P. Scholten (Ed.), *Introduction to Migration Studies* (pp. 49–82). Springer International Publishing. https://doi.org/10.1007/978-3-030-92377-8_3
- De Haan, A. (2020). Labour Migrants During the Pandemic: A Comparative Perspective. *The Indian Journal of Labour Economics*, 63(4), 885–900. <https://doi.org/10.1007/s41027-020-00283-w>
- Franco Gavonel, M., Adger, W. N., Safra De Campos, R., Boyd, E., Carr, E. R., Fábos, A., Fransen, S., Jolivet, D., Zickgraf, C., Codjoe, S. N., Abu, M., & Siddiqui, T. (2021). The migration-sustainability paradox: Transformations in mobile worlds. *Current Opinion in Environmental Sustainability*, 49, 98–109. <https://doi.org/10.1016/j.cosust.2021.03.013>
- Guo, Y., & Li, X. (2024). Regional inequality in China's educational development: An urban-rural comparison. *Heliyon*, 10(4), e26249. <https://doi.org/10.1016/j.heliyon.2024.e26249>
- Jia, M., Liu, Y., Lieske, S. N., & Chen, T. (2020). Public policy change and its impact on urban expansion: An evaluation of 265 cities in China. *Land Use Policy*, 97, 104754. <https://doi.org/10.1016/j.landusepol.2020.104754>
- Liu, R., Li, T., & Greene, R. (2020). Migration and inequality in rental housing: Affordability stress in the Chinese cities. *Applied Geography*, 115, 102138. <https://doi.org/10.1016/j.apgeog.2019.102138>
- Moret, J. (2020). Mobility capital: Somali migrants' trajectories of (im)mobilities and the negotiation of social inequalities across borders. *Geoforum*, 116, 235–242. <https://doi.org/10.1016/j.geoforum.2017.12.002>
- Moulds, S., Buytaert, W., Templeton, M. R., & Kanu, I. (2021). Modeling the Impacts of Urban Flood Risk Management on Social Inequality. *Water Resources Research*, 57(6), e2020WR029024. <https://doi.org/10.1029/2020WR029024>
- Nijman, J., & Wei, Y. D. (2020). Urban inequalities in the 21st century economy. *Applied Geography*, 117, 102188. <https://doi.org/10.1016/j.apgeog.2020.102188>
- Plotnikova, M., & Ulceluse, M. (2022). Inequality as a driver of migration: A social network analysis. *Population, Space and Place*, 28(8), e2497. <https://doi.org/10.1002/psp.2497>
- Rodríguez-Pose, A., & Storper, M. (2020). Housing, urban growth and inequalities: The limits to deregulation and upzoning in reducing economic and spatial inequality. *Urban Studies*, 57(2), 223–248. <https://doi.org/10.1177/0042098019859458>
- Tang, S., Hao, P., & Feng, J. (2020). Consumer behavior of rural migrant workers in urban China. *Cities*, 106, 102856. <https://doi.org/10.1016/j.cities.2020.102856>
- Xu, D., & Wu, X. (2022). Separate and unequal: Hukou, school segregation, and educational inequality in urban China. *Chinese Sociological Review*, 54(5), 433–457. <https://doi.org/10.1080/21620555.2021.2019007>
- Yeung, W.-J. J., & Mu, Z. (2020). Migration and marriage in Asian contexts. *Journal of Ethnic and Migration Studies*, 46(14), 2863–2879. <https://doi.org/10.1080/1369183X.2019.1585005>

Disclaimer: All statements, viewpoints, and data featured in the publications are exclusively those of the individual author(s) and contributor(s), not of HSR and/or its editor(s). HSR and/or the editor(s) absolve themselves of any liability for harm to individuals or property that might arise from any concepts, methods, instructions, or products mentioned in the content.