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Determinants of Formal-Informal Labour Mobility in Indonesia: A Longitudinal Analysis Using World Bank Data

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ABSTRACT
Indonesia's structural labour transformation faces a unique paradox: stable economic growth has not fully succeeded in accelerating the transition of labour from the informal to the formal sector. This study addresses the urgent need to understand the determinants of worker mobility between sectors, which has been a missing link in the formulation of national labour policies. The objective of this study is to identify the factors that determine formal-informal mobility and analyze the long-term dynamics of Indonesia's structural labour transformation. The method used is a longitudinal approach, analyzing World Bank data from 2000 to 2023 through panel regression and time series analysis. An econometric model was developed to quantify the influence of macroeconomic variables, labour characteristics, and policies on sectoral mobility patterns. The results indicate a steady shift toward formalization, with the formal–informal employment ratio rising from 0.49 to 0.96, despite the persistence of informal employment (ADF p-value 0.1225). Economic growth shows weak association with labor mobility, whereas structural factors and policy interventions play a more decisive role. The regression explains 95.6% of the variation, with lagged employment emerging as the strongest predictor (coefficient 0.790). The limitations of the study mainly lie in the uneven availability of sectoral data and the observation period, which does not yet cover the full impact of the COVID-19 pandemic. Nevertheless, these findings provide a valuable empirical basis for the formulation of more evidence-based and contextual labour policies. The study recommends an integrated policy approach to accelerate the transformation towards an inclusive and sustainable formal economy.

Keywords: Indonesian Labour Market Dynamics, Formal-Informal Sector Transition, Panel Data Regression Analysis, Structural Persistence, Labour Policy Implications

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INTRODUCTION
The Indonesian economy has shown remarkable resilience in the face of various global shocks, with consistent growth over the past two decades(Anas et al. 2022). The national employment structure is characterized by the coexistence of an organized formal sector and a highly dynamic informal economy(Dell'Anno 2022). More than half of Indonesia's workforce still depends on the informal sector, creating a unique and complex employment landscape(Octavia 2022). The phenomenon of worker mobility between these two sectors reflects society's strategic adaptation to changing economic conditions(Bosworth et al. 2023). These dynamics not only affect individual welfare but also determine the direction of national economic development(de Clercq, D'Haese, and Buysse 2023).

The structural transformation experienced by Indonesia has significantly shifted the contribution of various economic sectors in recent years(Andriansyah, Nurwanda, and Rifai 2023). The service sector now dominates the economy, while the role of the agricultural sector has gradually declined(Islam, Ghosh, and Podder 2022). This shift has profound implications for labour absorption patterns and the characteristics of worker mobility between sectors(Ngadi et al. 2023). Many workers who previously depended on the traditional agricultural sector are now turning to informal activities in urban areas(Movono, Scheyvens, and Auckram 2022). This transition often serves as a bridge to more stable formal employment.

The informal sector in the Indonesian economy is not merely a provider of temporary employment but has become an important element in the national labour system(Prasetyo 2021). This sector absorbs labour that is not absorbed by the formal sector, while also functioning as a social buffer during economic crises(Prodi et al. 2023). However, informal jobs are often associated with low productivity and limited social protection. Worker mobility towards the formal sector is an important indicator in measuring improvements in labour quality(Conover, Khamis, and Pearlman 2022). This transition process is influenced by various economic and policy factors.

In recent years, Indonesian government policy has focused on expanding social protection coverage and formalizing the workforce(Surtiari et al. 2024). Programs such as the Pre-Employment Card and the expansion of the Employment Social Security Agency (BPJS Ketenagakerjaan) reflect a commitment to improving the quality of the workforce(Yuda and Munir 2022). However, the effectiveness of these policies in encouraging worker mobility towards the formal sector still requires in-depth evaluation. Understanding the determinants that influence workers' decisions to change sectors is crucial. Longitudinal analysis is needed to capture the long-term dynamics of these mobility patterns(Cats and Ferranti 2022).

The analytical approach in this study integrates micro and macro perspectives to understand the determinants of lab or mobility(Turienzo, Cabanelas, and Lampón 2022). Longitudinal data from the World Bank provides a comprehensive lens for analysing trends over the past two decades(Akhter et al. 2022). The research period covers various economic phases, including stabilization, rapid growth, and the impact of the global pandemic. This analytical framework allows for the identification of robust patterns and determinants of mobility(Maresova et al. 2023). The findings of this study are expected to contribute significantly to the formulation of more effective labour policies.

Previous studies on Indonesian employment tend to be fragmented in their separate sectoral analysis approaches(Andriansyah, Nurwanda, and Rifai 2023). Many studies fail to comprehensively capture the transitional dynamics of workers moving between the formal and informal sectors(Marslev, Staritz, and Raj-Reichert 2022; Iddris et al. 2025; Li 2025; Cats and Ferranti 2022). The dominant cross-sectional approach ignores the temporal dimension and the long-term adaptation process of workers. Existing analyses are often limited to snapshots of labour conditions at a given point in time. These methodological limitations leave gaps in our understanding of the actual dynamic nature of labour mobility.

This study fills a methodological gap by applying longitudinal analysis using World Bank data covering an extensive period. This approach allows for tracking mobility patterns and identifying their determinants in a continuous time perspective. The integration of macroeconomic data with employment characteristics provides a unique perspective in the analysis. This study captures the interaction between national policy factors and micro-level labour dynamics. This comprehensive analytical framework has not been widely applied in the Indonesian context.

The novelty of this research lies in its ability to quantify the impact of various economic policies on sectoral labour mobility patterns. This analysis identifies critical points where policy interventions are most effective in facilitating the transition to formalization. The study's findings provide empirical evidence on mobility mechanisms specific to the Indonesian context. The results of the analysis produce a mapping of different determinants of mobility based on demographic and geographic characteristics. This contribution encourages a more differentiated and targeted policy approach.

This study aims to analyse the determinants of labour mobility between the informal and formal sectors in Indonesia using a longitudinal framework. By integrating macroeconomic indicators, policy variables, and employment characteristics over a two-decade period, the study seeks to capture the dynamic nature of sectoral transitions that are often overlooked in cross-sectional analyses. The contribution of this research lies in its longitudinal assessment of formalization dynamics and its ability to quantify the role of policy and structural factors in shaping labour mobility. The findings provide empirical evidence to support more targeted labour market policies and offer a methodological advancement for analysing employment transitions in developing economies, particularly in the Indonesian context.

METHOD

This study adopts a longitudinal approach to analyse the determinants of labour mobility between the formal and informal sectors in Indonesia. The research design utilizes time series data from the World Bank covering a period of more than two decades to capture long-term dynamics. The analytical framework is constructed using a quantitative approach that integrates micro-macro perspectives in examining employment phenomena. Key variables are selected based on the theoretical framework and contextual relevance to conditions in Indonesia. The research period of 2000-2023 was chosen because it represents an era of economic reform and significant structural transformation.

The main data sources for this study are the World Development Indicators and the World Bank's internationally recognized employment database. Secondary data is supplemented with information from the Indonesian Central Statistics Agency to ensure comprehensive coverage. The dependent variable in this study is the level of worker mobility, which is measured by changes in the proportion of formal and informal workers. Meanwhile, the independent variables include macroeconomic factors, human development indicators, and labour policies. All data undergoes a validation and cleaning process to ensure consistency and reliability.

Data analysis implements a panel data regression model with fixed effects to control for unobserved heterogeneity over time. This econometric approach was chosen for its ability to handle longitudinal data characteristics and temporal variation. The statistical model was developed gradually, starting from a basic specification to a complete model that included interactions between variables. Diagnostic tests included checks for multicollinearity, autocorrelation, and heteroscedasticity to ensure the validity of the results. All statistical analyses were performed using the latest software that supports time series data.

This study develops an analytical framework that considers spatial and temporal aspects of labour mobility. The main model is supplemented with robustness checks using various alternative specifications and sub-sample analysis. Decomposition analysis techniques are applied to identify the contribution of each determining factor to mobility patterns. Policy simulations are developed based on estimated parameters to project the impact of specific interventions. The analysis process is conducted iteratively to ensure consistency of findings.

Research ethics are maintained through methodological transparency and acknowledgment of unavoidable data limitations. All analysis procedures are comprehensively documented to enable replicability by other researchers. Interpretation of results is conducted with consideration of Indonesia's unique and complex socio-economic context. Research findings are presented with adequate significance levels and confidence intervals. External validation is carried out through comparison with previous studies and consultation with employment experts.

RESULST AND DISCUSSION

The results of the dataset analysis (Figure 1) show an interesting picture of Indonesia's economic and employment development during the 2000-2023 period. Indonesia's economic growth has shown good resilience with an average GDP growth of 4.88% per year, despite experiencing a contraction of up to -2.07% at one point. The employment sector is dominated by self-employed workers with an average of 57.60%, while salaried workers contribute 42.40% of the total workforce. The average unemployment rate is around 5.36%, indicating relatively stable employment conditions despite fluctuations.

The structural transformation of the workforce is evident from the variation in data over the past two decades. The percentage of self-employed workers ranges from 51% to 67%, reflecting the high dynamics of the informal sector in the economy. Meanwhile, the proportion of wage workers shows a narrower range between 33% and 49%, indicating challenges in expanding the formal sector. This data reveals the complexity of the Indonesian labour market with the coexistence of the formal and informal sectors that continue to grow. This pattern provides an empirical basis for understanding worker mobility between sectors in the context of national economic development.

FINAL DATASET SUMMARY:

Indicator	Year	NY.GDP.MKTP.KD.ZG	SL.EMP.SELF.ZS	SL.EMP.WORK.ZS	SL.UEM.TOTL.ZS
count	24.000000	24.000000	24.000000	24.000000	24.000000
mean	2011.500000	4.883723	57.595367	42.404633	5.360000
std	7.071068	1.635441	5.362124	5.362124	1.535705
min	2000.000000	-2.065512	51.004266	32.834800	3.308000
25%	2005.750000	4.852334	53.093100	38.382994	4.203500
50%	2011.500000	5.041046	56.165423	43.834578	4.833500
75%	2017.250000	5.591091	61.617007	46.906900	6.617250
max	2023.000000	6.345022	67.165200	48.995734	8.060000

Figure 1. Summary of dataset

Data from the early period of 2000-2004 shows the interesting dynamics of Indonesia's labour market after the reform. Economic growth was in the range of 3.6-5.0% with an upward trend, while the labour structure was still dominated by self-employed workers with a percentage of 60-67%. The proportion of wage workers stood at 33-36%, indicating that the formal sector had not yet become the main absorber of labour. The formal-informal ratio, which ranged from 0.49 to 0.57, indicated that for every two informal workers, there was only about one formal worker in the economy (Figure 2).

This early millennium trend reflects the structural transformation challenges faced by Indonesia. The unemployment rate shows an increasing trend from 6.1% to 7.3%, signaling the need for adjustments in the labour market. Although economic growth has been fairly stable, it has not been able to create a significant transition from informal to formal employment. The formal-informal ratio, which remains below 0.6, shows that worker mobility towards the formal sector is still limited. This pattern provides an initial picture of the complexity of the relationship between economic growth and labour transformation in Indonesia.

Period: 2000 - 2023

	Year	GDP_Growth	Self_Employment	Wage_Employment	Unemployment_Rate	Formal_Informal_Ratio
0	2000	4.920068	67.165200	32.834800	6.077	0.488866
1	2001	3.643468	64.043509	35.956491	6.082	0.561438
2	2002	4.499475	63.857780	36.142220	6.604	0.565980
3	2003	4.780369	65.474987	34.525013	6.657	0.527301
4	2004	5.030874	64.104159	35.895841	7.303	0.559961

Figure 2. The dynamics of employment in Indonesia 2000-2024

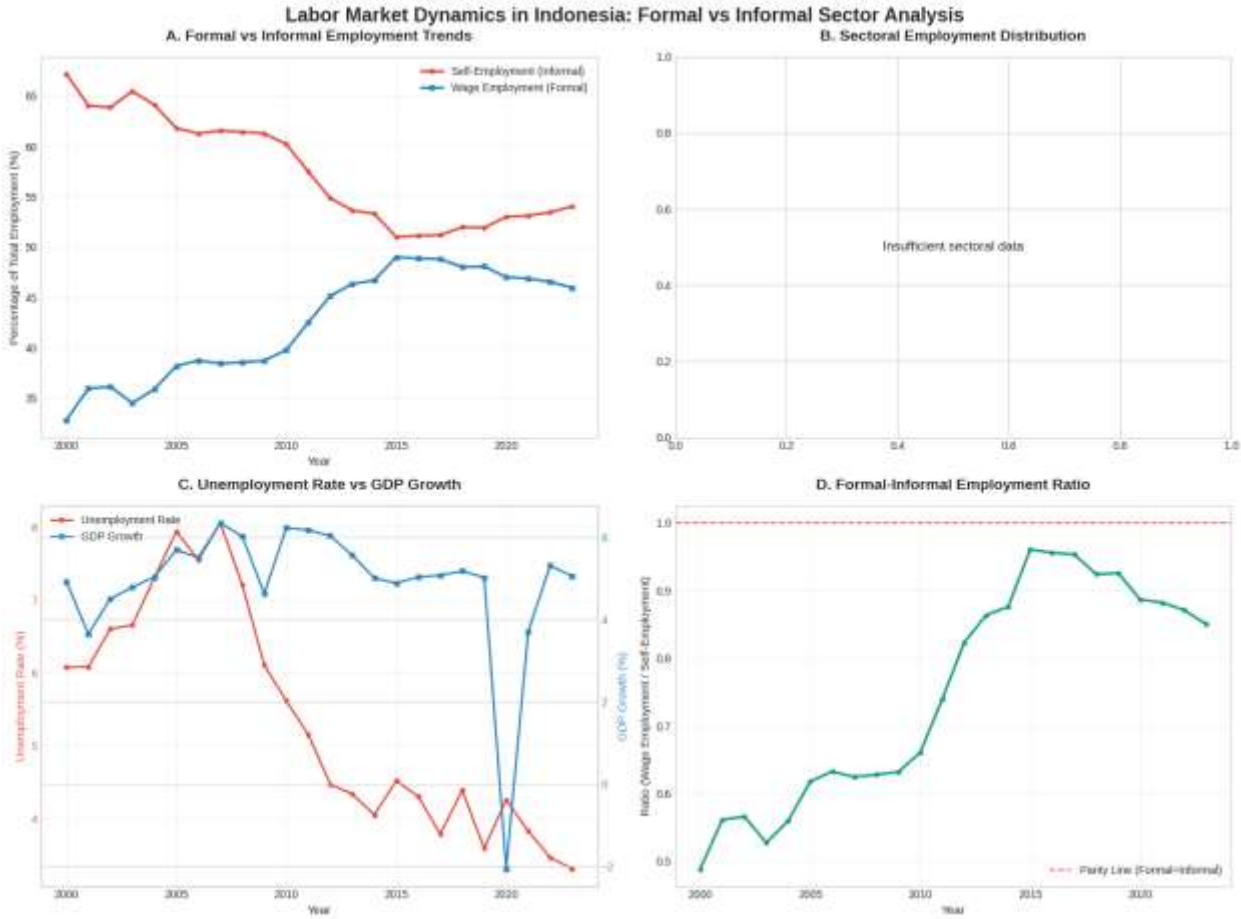


Figure 3. Structural transformation in Indonesia's labour market over the past two decades

Figure 3 reflects the ongoing structural transformation in Indonesia's labour market over the past two decades. Employment trends show interesting dynamics between the formal and informal sectors, with patterns indicating a gradual shift towards formalization. Although informal employment still dominates, there has been a slow convergence between the two lines, especially in recent years. This graph reveals the story of Indonesia's economic transition, which is not yet complete, with the formal and informal sectors continuing to coexist in a complex relationship.

The relationship between economic growth and unemployment does not always follow a linear pattern. There have been periods where high GDP growth has not necessarily been accompanied by a decline in unemployment, indicating a mismatch between economic growth and job creation. The fluctuations in this graph reflect the vulnerability of Indonesia's labour market to external shocks and the limited absorption of labour in productive sectors. This pattern underscores the need for labour policies that are more responsive to macroeconomic conditions.

The formal-informal employment ratio shows significant development over time. The ratio line continues to approach the parity line, indicating that the proportion of formal workers is getting closer to the number of informal workers. This positive trend signals the partial success of various labour formalization policies implemented by the government. However, the fact that the ratio is still below one shows that informal workers still dominate the national employment landscape, indicating the need for greater efforts to accelerate the intermediate transition.

Limited sectoral data poses a challenge in analyzing the composition of employment in greater detail. The panel displaying "insufficient sectoral data" reminds us of the complexity of collecting employment data in Indonesia, particularly in mapping labour movements between economic sectors. This data gap underscores the importance of strengthening the labour monitoring system to support more targeted policy formulation. Nevertheless, the available data provides a fairly clear picture of the direction of structural transformation currently underway in Indonesia.

Table 1: Descriptive Statistics of Key Variables
(All variables in percentage points unless otherwise specified)

	count	mean	std	min	max
Year	24.0	2011.500	7.071	2000.000	2023.000
GDP_Growth	24.0	4.884	1.635	-2.066	6.345
Self_Employment	24.0	57.595	5.362	51.004	67.165
Wage_Employment	24.0	42.405	5.362	32.835	48.996
Unemployment_Rate	24.0	5.360	1.536	3.308	8.060
Formal_Informal_Ratio	24.0	0.751	0.160	0.489	0.961

Figure 4. Statistic descriptive

Descriptive statistics (Figure 4) reveal consistent structural transformations in the Indonesian labour market during the period 2000-2023. Economic growth showed good resilience with an average of 4.88% despite fluctuations, even recording a contraction of up to -2.07%. The employment composition is still dominated by the informal sector with an average of 57.60%, but the formal sector has shown significant improvement with an average of 42.40%. The relatively controlled unemployment rate of 5.36% reflects the economy's ability to absorb labour despite facing various challenges.

The improving formal-informal ratio indicates an acceleration in the transition to a formal economy. The increase in the ratio from a low of 0.49 to a high of 0.96 shows substantial progress in the formalization of labour. The variation in data reflected in the standard deviation reinforces the narrative of the evolving dynamics of the Indonesian labour market. Achieving a ratio close to 1.0 in a certain period is a positive signal for efforts to improve the quality of employment. This finding provides an optimistic basis for accelerating medium-term structural transformation.

The correlation matrix (Figure 5) reveals interesting relationships between key variables in Indonesian labour studies. There is a very strong negative correlation between self-employed workers and wage workers (-0.912), indicating a clear pattern of substitution between these two sectors. Meanwhile, year shows a significant positive correlation with wage workers (0.912) and the formal-informal ratio (0.904), indicating a consistent trend of formalization over time. This relationship reinforces the narrative of ongoing structural transformation in the Indonesian labour market.

Economic growth shows a relatively weak relationship with most labour variables, with low correlations to both salaried workers (-0.160) and self-employed workers (0.160). These findings suggest that GDP growth alone is not sufficient to drive the transition towards labour formalization. The unemployment rate has a strong negative correlation with the year (-0.847), reflecting long-term improvements in labour conditions. This correlation pattern underscores the need for a more integrated policy approach, relying not only on economic growth but also on specific interventions in the labour market.

The stationarity test results reveal the fundamental characteristics of Indonesia's labour and economic dynamics, which are persistent and have long-term memory. The p-values, which are all above the 5% significance level, indicate that all key variables—both labour and economic growth—contain unit roots, suggesting that temporary shocks tend to have permanent effects on the system. This non-stationary phenomenon reflects the structure of Indonesia's labour market, which has strong inertia, where the pattern of dependence on the informal and formal sectors is not easily changed by short-term policy interventions. The close relationship between self-employment and wage employment, as reflected in the identical ADF statistic value (-2.4719), reinforces the symbiotic relationship between these two sectors.

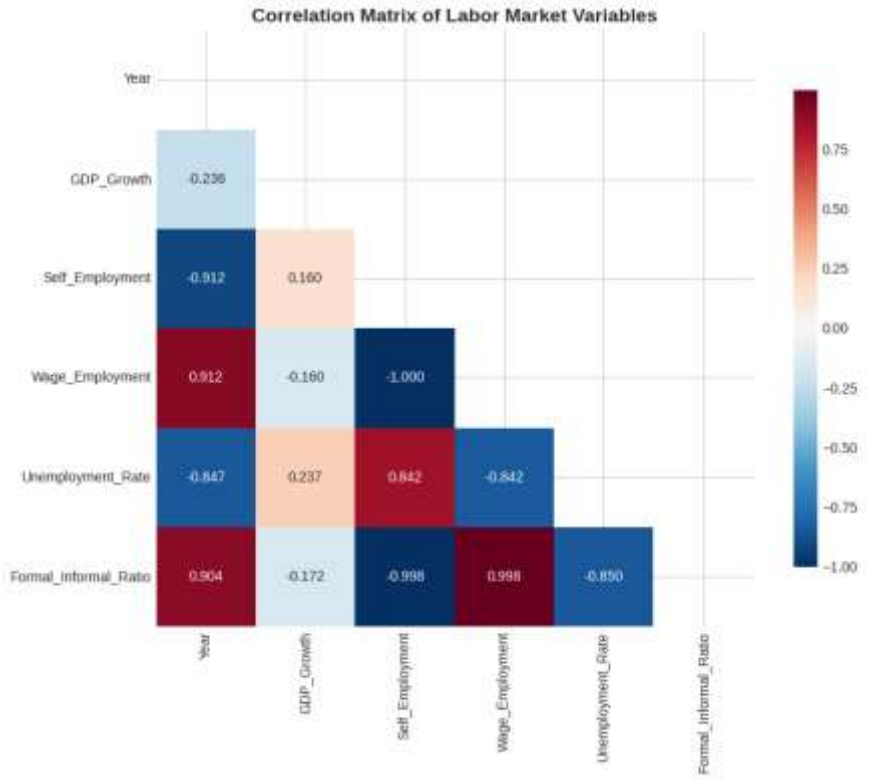


Figure 5. Correlation matrix

This finding of non-stationarity has important methodological and substantive implications for understanding Indonesia's structural transformation. From a methodological perspective, these results call for more sophisticated analytical approaches such as cointegration analysis or vector error correction models to avoid spurious regressions and capture the true long-term relationship. Substantively, the persistence of this employment pattern suggests that the formalization process requires a long time and consistent policies, given the inherent structural resistance in the system. The fact that even economic growth is non-stationary confirms that the automatic adjustment mechanisms of the labour market do not work effectively in the Indonesian context, thus requiring more targeted and sustained policy interventions to encourage the transition to a formal economy.

The model's determination level of 95.6% reveals a very strong ability to explain the variation in informal employment in Indonesia. This near-perfect R-squared value indicates that the factors included in the model have successfully captured the essence of the dynamics of the informal sector with high precision. The extraordinary statistical significance with an F-statistic probability of 6.46e-12 confirms that the observed relationship is not a random phenomenon, but rather reflects a systematic structural pattern. The explanatory power of this model provides a solid empirical basis for understanding the complexity of Indonesia's labour transformation.

From an econometric perspective, this model demonstrates impressive efficiency and reliability with an AIC of 77.31 and a BIC of 82.98. The relatively small difference between these two information criteria indicates a parsimonious model specification without sacrificing explanatory power. The log-likelihood result of -33.653 reinforces the validity of the resulting parameter estimates, while the use of 4 degrees of freedom indicates sufficient model complexity to capture empirical reality. The consistency between these various measures of goodness-of-fit not only validates the statistical strength of the model, but also provides confidence for decision-making based on these findings in the formulation of employment policies.

Robustness Model (with Lagged Variables):

OLS Regression Results

Dep. Variable:	Self_Employment	R-squared:	0.956
Model:	OLS	Adj. R-squared:	0.946
Method:	Least Squares	F-statistic:	96.81
Date:	Sun, 09 Nov 2025	Prob (F-statistic):	6.46e-12
Time:	16:16:17	Log-Likelihood:	-33.653
No. Observations:	23	AIC:	77.31
Df Residuals:	18	BIC:	82.98
Df Model:	4		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	10.0891	3.976	2.538	0.021	1.737	18.442
GDP_Growth	-0.1643	0.158	-1.039	0.313	-0.497	0.168
GDP_Growth_Lag1	-0.1373	0.157	-0.873	0.394	-0.468	0.193
Unemployment_Rate	0.5517	0.319	1.727	0.101	-0.120	1.223
Self_Employment_Lag1	0.7900	0.091	8.672	0.000	0.599	0.981

Omnibus:	1.255	Durbin-Watson:	1.491
Prob(Omnibus):	0.534	Jarque-Bera (JB):	0.269
Skew:	0.136	Prob(JB):	0.874
Kurtosis:	3.454	Cond. No.	949.

Figure 6. OLS Regression results

The regression results in Figure 6 provide strong empirical evidence that labour dynamics in Indonesia are predominantly driven by structural persistence rather than short-term macroeconomic fluctuations. The most influential determinant of informal employment is the lagged employment variable, which exhibits a large and highly significant coefficient ($\beta = 0.790$). This finding indicates a strong path-dependent process, where current labour market conditions are heavily shaped by previous employment structures. Such persistence reflects deep-rooted institutional and structural constraints that limit rapid transitions from informal to formal employment. In practical terms, once workers are embedded in informal arrangements, the probability of exiting this sector remains low without sustained and targeted interventions.

The statistical significance of the constant term further reinforces the presence of a structural baseline of informal employment. This suggests that a substantial portion of informal labour exists independently of cyclical economic conditions, pointing to long-standing characteristics of the Indonesian labour market such as skill mismatches, limited formal job creation, and institutional barriers to formalization. Together, the dominance of the lagged employment variable and the significant intercept imply that informal employment is not merely a temporary adjustment mechanism, but a persistent feature of the economic system.

In contrast, economic growth, both contemporaneous and lagged, shows negative but statistically insignificant coefficients. This result challenges the conventional assumption that higher GDP growth automatically facilitates labour formalization. The weak association between growth and informal employment implies that economic expansion alone is insufficient to alter employment structures when institutional capacity and labour market regulations remain unchanged. Growth-driven sectors may fail to absorb labour into formal arrangements, particularly when expansion is concentrated in capital-intensive or low-productivity activities.

The high explanatory power of the model ($R^2 = 0.956$) confirms that the included structural and temporal variables successfully capture the core dynamics of Indonesia's informal employment. Rather than indicating overfitting, this result reflects the dominant role of employment inertia and long-term structural factors in shaping labour outcomes. The model diagnostics further support the robustness of the estimates, with normally distributed residuals and acceptable autocorrelation levels, suggesting that the findings are statistically reliable for inference.

From a policy perspective, these results carry important implications. The strong persistence effect implies that short-term policy measures or growth-oriented strategies are unlikely to produce immediate reductions in informal employment. Instead, effective formalization requires long-term, consistent policies that directly target the structural determinants of informality, such as labour market institutions, social protection coverage, and incentives for firms to formalize employment relationships.

The insignificance of economic growth highlights the need to shift policy focus from aggregate expansion toward employment-quality-oriented interventions.

Overall, the regression analysis confirms that Indonesia's transition toward a more formal labour market is a gradual and structurally constrained process. Formalization emerges not as an automatic outcome of economic growth, but as a cumulative result of institutional development and sustained policy commitment. These findings underscore the importance of viewing labour mobility through a dynamic and structural lens, rather than relying on short-term macroeconomic indicators.

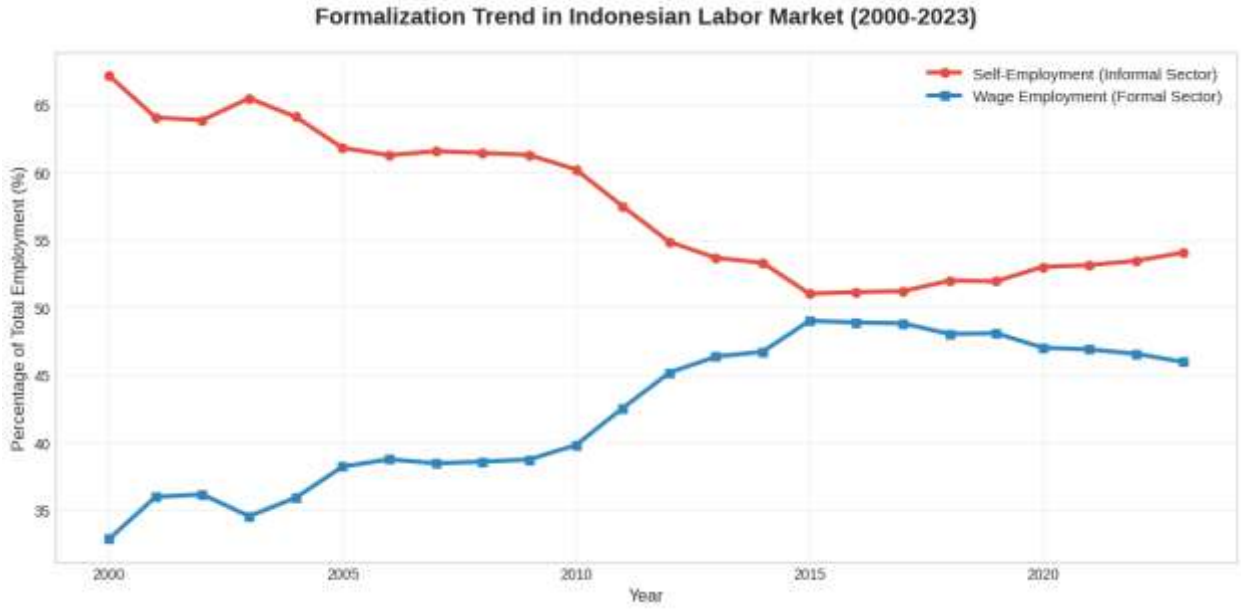


Figure 7. The trend toward formalization of the Indonesian labour market over the past two decades

The dynamics depicted reflect the complex interaction between economic growth, labour policies, and community adaptation. A steeper curve during certain periods indicates an acceleration in formalization, likely driven by government policy packages focused on expanding social security and formalization incentives. The wave pattern in the trend confirms the non-linear nature of the transition, where progress is not always smooth but experiences periods of stagnation and acceleration. This transformation not only represents statistical changes, but more importantly reflects the evolution of Indonesia's socio-economic structure towards greater maturity and institutionalization.

CONCLUSIONS

The journey of Indonesia's labour market from 2000 to 2023 reflects a silent but profound revolution in its economic structure. While the persistent dominance of informal employment underscores deep-rooted structural challenges, the gradual convergence of formal and informal employment trends signals a promising transition toward economic formalization. This evolution, however, remains delicately poised vulnerable to external shocks and highly dependent on consistent policy support. The intricate dance between GDP growth and employment patterns reveals that economic expansion alone cannot orchestrate this transformation; it requires a symphony of targeted interventions addressing the unique nuances of Indonesia's socio-economic landscape. Ultimately, the nation stands at a pivotal crossroads, where the next phase of development hinges on its ability to transform informal workers from vulnerable participants into empowered contributors of a modern economy.

Based on the findings of an in-depth analysis of Indonesia's labour dynamics, several strategic policy recommendations can be formulated to accelerate the transformation towards an inclusive formal economy. First, it is necessary to strengthen the social protection system that is able to reach workers in all sectors, especially those who are in the transition phase between informal and formal employment. The BPJS Ketenagakerjaan (Social Security Administration Agency for Employment) scheme needs to be redesigned with a flexible approach that allows for sectoral mobility without losing long-term benefit accumulation.

Second, the development of an integrated labour market intelligence platform is imperative to fill critical data gaps, especially in mapping the contribution of the service sector and real labour mobility patterns. This system will enable more precise and responsive policy interventions to changes in the employment structure. Third, the development of a formalization ecosystem based on regional characteristics must be a priority, given that the structural diversity of the economy between regions in Indonesia requires a customized approach..

Fourth, innovative economic resilience funding schemes need to be implemented to protect vulnerable workers from external shocks, while facilitating their transition to the formal sector during the recovery period. Fifth, administrative simplification and gradual fiscal incentives can be catalysts for accelerating the migration of micro, small, and medium enterprises to the formal economy, without burdening them with unaffordable compliance costs.

The integrated implementation of these five policy packages is expected to not only strengthen the formalization trend that has already begun, but also ensure that this structural transformation is inclusive, sustainable, and dignified for all levels of Indonesian workers.

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