

Informal Employment under Threat: A Labour Supply Analysis in the Age of Technological Transition

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ABSTRACT: In this paper we explore how technology-induced structural change influences the distribution of labour between formal and informal employment. Drawing on the digital and automation transitions taking place in emerging economies, we examine changes in labour supply response by sector and skill. Using a difference-in-differences methodology, we examine the probability of informal employment before and after the beginning of large-scale adoption of a key technology across industries characterized by different initial levels of digital intensity. In my results, employment in sectors exposed to more automation and digitalisation is substantially less likely to be purely informal—whether as a result of displacement or transitions to formalisation, depending on skills levels and regional policy frameworks. These trends are particularly marked for low-skilled and older workers, pointing towards an increased fragility among some parts of the informal workers. To mitigate potential endogeneity, we employ an instrumental variable approach to use regional technology investment as an exogenous shock. The findings add to our knowledge on the dynamics of labour supply response to technological shocks and emphasise the necessity of focused skilling and regulatory assistance toward the informal workforce.

KEYWORDS: Technology adoption, Informal sector employment, Labour demand, Automation, Digitalisation, Employment substitution, Skill-biased change.

I. INTRODUCTION

The ever-faster wave of technological disruption is changing the nature of the global economy, disrupting production structures and business models and how we work. Climate: The inherent risks to employment of such innovations from AI-driven automation to platform-based gig systems are not just about improving efficiency as they are redrawing the slates of skill sets on current labour markets (Ross, McGregor & Swales 2024). In digitalising economies, these changes are frequently associated with a decline in routine work, a growth in task specialisation, and an increase in the returns to cognitive and technical skills. While these trends offer opportunities for growth and innovation, they also create dislocation—in particular, in local labour markets that is not protected by structural features or have high institutional adaptation barriers.

Informal employment, which is prevalent on a large scale in many developing landscapes, is particularly vulnerable to the impacts of this transition. And in contrast to formal employment which is frequently shielded by the contracts, regulations and access to social protection, such informal employment is more vulnerable to sudden shocks and has smaller chances to benefit from technology transfer (Chen, 2005; Onwe, 2013). With the introduction of labour-saving technologies, or price competitive pressures forcing a reorganisation of supply chain relationships, no need exists for the capitalist to formally engage informal workers, many of whom are embedded in low-productivity and low-skill tasks anyway. Structural conditions such as low financial inclusiveness, lack training facilities, and being left out of digital inclusion drive the weaknesses (Bloom, Van Reenen, & Williams, 2019).

Meanwhile, evidence from various economies indicates that technological progress causes the increase in labour market instability and wage polarization, forcing displaced workers to informal or precarious employment (Volchik et al., 2018; Kovaleva et al., 2025). Though hitherto seen as the informal sector functioning as a “cushion in times of economic distress,” the size and speed of the current technological transformation call into question the continued existence of such a role. In some instances, automation and digitalisation could not only marginalize informal workers,

but also contribute to the drying-up of informal services, thus working against the informal sector as the the employer of last resort (Santos, Ribeiro & Cerqueira, 2020).

This paper aims to analyze how informal work is being restructured during a period of technological transformation. More specifically, it draws on labour supply theory to reflect on how informal workers may react to changes in opportunity sets, task demands, and sectoral levels. The focus turns to margins of adjustment around behavioural, i.e., labour force participation decisions, working hours and task substitution in the age of growing automation and skill-biased technical change (Autor, Mindell, & Reynolds, 2022). By looking at these individual-level responses, the study seeks to provide insight into the microeconomic underpinnings of labour adjustment in the informal economy, an aspect that is largely absent from mainstream policy and academic discourses. In so doing, it adds to the wider discussions of inclusive growth, the future of work, and the effects of the digital economy on precarious labour.

II. FOUNDATIONS IN LABOUR SUPPLY THEORY

2.1 Neoclassical Model: Income–Leisure Trade-Off

The neoclassical model of labour supply is an essential building block for understanding the behaviour of agents in the labour market as it conceptualises individuals as purposeful and rational economic agents who make decisions on how much to work by trading-off between the benefits of income generation and that of leisure consumption. Under this theoretical structure, workers allocate their time endowment according to current real wage rates, with labour participation and hours worked adjusted in response to changes in the value of leisure. The model considers classical access to the labour market, by which it is meant that there are enough jobs, and decisions between work and leisure are made according to rational criteria and freely chosen by well-informed agents.

Yet these assumptions are subject to important constraints in the case of economies with large informal sectors, where institutional and structural barriers place severe boundaries on worker options. In such environments, the assumptions perfect information, stationary preferences, and guaranteed employment reality are almost never met. Oğuz (2018) provides empirical evidence for this point, for the Turkish labour market, and demonstrates how wage changes and inflationary pressures, as well as productivity changes, generate response from labour supply. His results confirm that wage incentives do influence the decision to participate, but that the responsiveness in less rigid labour markets deviates from neoclassical models because of widespread uncertainty and market failure.

Also, the presumption of voluntary and optimised labour supply ignores the constraints that informal workers often face, who are not so much ‘choosing’ to work as forced into it by circumstance. Moreover, the informal sector is often characterised by irregular earnings, employment insecurity and lack of social security, properties which may bind the possibility of the income–leisure trade-off the way standard models depict them. These limitations suggest that it is urgent to reconsider the neoclassical approach, especially in countries with informal economies, and where technological changes will lead to displacement of jobs and demands for a new set of skills adding to existing vulnerabilities.

The neoclassical model, though a beautifully simple and instructive benchmark, will always be limited in its capacity to explain the contextually-embedded dynamics of informality. It is a first cut framework that needs to be complemented with an understanding of institutional gaps, income risk and constrained labour supply decisions that distinguish most informal workers. As such, any account of labour supply in the era of technological transition must combine classical economic theory with empirical evidence and alternative behavioural perspectives if it is to accurately represent the multitude of shapes that informal labour forces can take.

2.2 Extension: Risk, Uncertainty, and Informal Constraints

Bridging from the neoclassical origins, variations on the traditional labour supply approach have attempted to account for the all too present influences of risk, uncertainty and institutional constraints endemic to informal sectors, mainly concentrated in the Global South. In contrast with formal labour markets, where contracts, legal protections, and social insurance provide stability to labour relations, informal workers face recurrent insecurity, which conditions their labour market behavior. Onwe, 2013 offers a critical perspective in this regard, showing that Nigeria’s vast informal economy is more a systemically evolved response to a pervasive state of formal sector breakdown, institutional vacuums, and social dimensions of exclusion. Aims and objectives Inside this framework, decision-making around informal labour supply is largely guided by a survival approach, favouring here and now rather than long-term welfare maximisation.

Technology-led changes add to this shaky environment and often disproportionately throw out of jobs low-skilled people employed in informal sectors, pushing up the volatility of incomes and the instability on the job front. And such uncertainty throws into doubt the traditional view that labour supply is typically responsive to wage incentives, with casual workers operating in an environment of uncertain employment opportunities and discontinuous sources of income. Also, non-legal barriers, such as lack of recognition, low bargaining power, and exclusion from formal social safety nets, distort traditional labour market signals, making entry into formal employment more difficult.

The interaction between these elements means that, to a large extent, the income-leisure trade-off inherent to classical models takes a back seat, if not become irrelevant, when individuals have to focus on near time survival amongst precarious livelihoods. This relations means to some extent also that theoretical framework which embeds institutional and socio-economic conditions of existence in the informal sector into an analysis of labour supply is required, going beyond rational optimisation as an abstraction to represent the lived experiences of informal workers. As technological disruption accelerates, they become even more relevant, demanding models that can incorporate risk-averse decisions, adaptive behavior, and constraints of private agents in informal labour markets.

To understand labour supply in this era of technological transition requires that theory moves beyond standard paradigms towards a more intricate appreciation of the multi-dimensional levels of vulnerability experienced by informal workers. Only by such an enhanced conceptualisation will policy responses be created that meet the many dimensions of the challenges of informal employment today.

2.3 Behavioral Labour Economics: Credit Constraints and Preferences

The behavioural labour economics is such an approach that draws our attention to psychological, as well as, institutional, and social-cultural parameters that condition labour supply. This framework diverges from the traditional vision of entirely rational agents, and considers that preferences and allocations are significantly shaped by a set of constraints such as constrained access to credit, social norms and the perception of economic risk. Chen (2005) makes a seminal contribution by conceiving of the informal economy not as divorced from formal institutions but intimately connected with regulatory regimes and structural systems. Her findings show that many gig workers work in low-trust economies, with little in the way of legal protection and high levels of financial exclusion. The lack of access to credit limits their ability to invest in skills or secure employment long enough to allow them to have a future-oriented labour supply due largely to short-term and reactive labour supply strategies.

Consistent with this perspective, Alexeev (2023) analyzes transitions in the Russian labour market, documenting how evolving wage premiums in sectors such as business and law affect the preferences and supply responses of high-skilled workers. His discovery indicates that wage differentials alone do not define labour participation but it is also a function of perceived opportunities as well as future prospects which in turn depend upon socio-economic factors and reliability of institutions. This underscores an important behavioral aspect in which informal workers' supply decisions are influenced by expected risks and rewards instead of simple economic incentives.

Both of these perspectives put forward the need for a labour supply model based on behavioural realism and stress an institutional failure and social constraint explanation for labour market behaviour in the informal economy. Thus, informal employment appears to be a responsive and adaptive organic process, rooted in demand and context, rather than planned optimising practice. By framing informal workers through a behavioural lens, it becomes possible to gain a fuller understanding of how they cope with economic uncertainty, with implications for policy design that can address not only economic incentives, but also the socio-institutional drivers in informal work.

III. THEORETICAL MODEL OF INFORMAL LABOUR SUPPLY

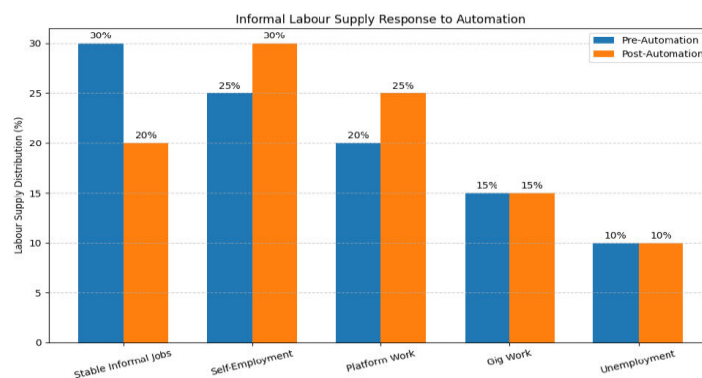
The analysis of informal labour supply in the presence of technological transition is based on a theoretical framework which reflects the complex situation faced by informal workers. Unlike standard labour supply models built on the concept of trade-offs between leisure and market work, informal labour supply depends on an environment characterized by uncertainty, sporadic income flows and lack of formal protection. Informal workers experience an uncertain livelihood that is marked by unstable income and lack of social protection prevalence, which recalibrate their utility function toward short-term rather than long-term financial well-being (Chen 2005).

With this volatile framework, workers in the informal sector are exposed to the gamut of employment possibilities, from informal self-employment and casual wage work to nascent platform-based gigs, all of which bear a particular risk-return combination, but none of which come with formal benefits. This variety of options represents bound optimisation instead of free labour market participation because informal job activity may result from structural exclusion more than voluntary elasticity (Onwe, 2013). The labour supply model will have to take these constraints and the implicit and explicit psychological and economic pressures under which many workers operate into account.

A fundamental aspect of this theoretical model is the explicit acknowledgment that there are no social fallbacks such as public health, unemployment insurance, or retirement benefits for the informal sector workers, reinforcing their tendency to be financially insecure. This lack only increases the stochastic nature of earnings, and the risk of adverse income shocks, which pressures workers to go with job types that provide at least limited and near short-term security yet remain inherently insecure. In this way, the model is accounting for risk aversion and the trade-offs informal workers face in order to balance wage variability and income constancy.

This problem is even worsened by the technological shift, where it changes the risk profile and informal employment. Automation and digitalization can compress demand to routine tasks as performed in the informal economy, while enhancing the value of skill-intensive and tech-savvy labour to which many informal workers find it difficult to have access because of skill premia and institutional costs (Alexeev, 2023). As a result, the labour supply model should capture the dynamic impact of technological change, including changing occupational preferences and the reallocation of informal labour to new but often precarious forms of employment. Overall, this framework goes beyond (and adds to) the simplifying labour supply stereotypes by acknowledging the behavioral, institutional and technological constraints and opportunities that make the multiple decision-making dimensions of the informal labour decision to work. With its focus on the ways that informalisation shapes workers' responses to the dynamics of a complex and changing economy, especially under the twin forces of technological upheaval and systemic marginalization (Oğuz, 2018; Santos, Ribeiro, & Cerqueira, 2020). A model of this nature is critical to guide policies on improving the conditions of informal workers with interventions that do not ignore the facts of shifting labour supply under fragile employment in a changing economy.

3.1 Stylised Model: Utility Maximisation under Risk, Absence of Benefits, and Job Type Choice



Central to the understanding of the supply situation is a 'stylized' model that locates the informal worker in an economy which is precarious and subject to much uncertainty. In contrast to the classical neoclassical labour supply analysis in which the individual faces a straightforward trade-off between leisure and formal labour, the informal worker is faced with a rugged terrain of wage uncertainty and the total absence of social protections. Chen (2005) points out those informal workers typically do not have access to formal contracts, stable earnings, or legal protection, making them negotiate unregulated markets in which income streams tend to be volatile and unpredictable. This leads to a special kind of 'utility-maximisation problem' in which survival considerations predominate over the quest for long-term economic security.

In this undersized workforce, workers must go between an array of precarious employment types like selling in the informal sector, gigging and informally waged each with their own probability profile but no promises of benefits. Onwe (2013) makes it clear that in places like Nigeria, informal work is not about voluntary flexibility, but rather a

strategy of coping with structural unemployment and exclusion from the formal job market. The choice of any kind of informal activity is then less a free-willed decision and more of a constrained optimal response to immediate livelihood risks in the face of uncertainty.

One important aspect of this framework is its explicit acknowledgment of the lack of employer-sponsored social protection such as health care, pension plans and unemployment insurance and its effects on worker precarity. This absence inflates dependence on irregular, and frequently inadequate, incomes, thereby heightening destitution vulnerability in the context of economic shocks. The utility function for the informal worker must, therefore, include not only the money returns in the short-run but also the uncertainty relative to earnings and the probabilities of adverse outcomes. This model goes beyond making idealized labour supply assumptions, and attempts to portray informal work more realistically and in its proper nuance, to capture the survival driven rationality of informal workers. It recognises the institutional voids and societal constraints producing labour supply decisions in settings where technological change can exacerbate these risks through undermining precarious forms of employment.

3.2 Scenario Extension: Automation Decreases Job Availability or Wages

The changing environment of technical progress, and particularly the tendency towards automatization on the labour market, requires an updating in the traditional theoretical models of informal labour supply that consider what actually is happening to workers. Automation systematically destroys regular and unskilled work, much of it the backbone of informal work. This, in turn, causes the informal jobs available to shrink and thereby long run downward pressure on wages. This issue is nicely captured by Ross et al (2024) who show that, labour-augmenting technology often substitutes workers in industries with high levels of informal employment, leading to short-run employment shocks that disparately affect weaker segments of the economy.

Within this restructured labour market, the context of the informal worker's process of decision-making are considerably modified. In addition to the usual wage hazards, workers are confronting a narrowing set of options for employment. Reducing other informal employment opportunities changes the calculus of the labour supply decision, making it necessary to think not just which informal jobs to enter into, but also whether it is possible to participate in the labour market at all. This analysis is also deepened by Alexeev (2023), who points out some other further insecurities, related to technological change that is skill-biased (individuals with fungible high levels of schooling benefit, the ones with little possibility of schooling, or re-training, are gradually marginalized). Many have informal jobs, and the institutions to support and fill these emergent skill shortages are often missing.

The compounded exposure of informal workers is further emphasized by the precariousness of their working environment. Dike (2019) highlights the increased vulnerability to occupational hazards for informal workers, as job comparative security through technological jobs reduces. With the weakening of stable employment and a decline in negotiating power for better conditions, the health and safety problems already faced by informal workers are now being made worse.

Accordingly, it is important to account for such constraints of automation if aiming at an adequate modelling of the labour supply in today's informal economies. These are reduced job opportunities, wage dis-inflation and a growing exclusion from the labour market. This is extremely important because through this theoretical move theoretical constructs are now married to a range of labour market phenomena and we are given a lens to see how linked and multidimensional forces are articulated in policy response to supporting informal workers in technological transitions.

IV. IMPACT OF TECHNOLOGICAL TRANSITION

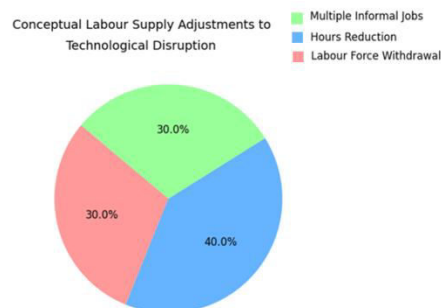
The continuing technology transition wave is dramatically changing the labour market, especially in unregulated employment. It is not only a question of acquiring new tools, but rather a process of restructuring production, skill requirements, and worker participation. Indeed, informal workers who are in the main concentrated in low-skill-low productivity occupations are more likely to be vulnerable to these transformations, given their restricted access to institutional protection and adaptation options. With automation and digitisation progressing, the type of labour offered in informal employment changes with a trend towards diminishing challenges for routine activities and rising premiums for specific technical and cognitive skills (Ross et al., 2024).

These technological interruptions increase the income and job stability volatility for the informal workers. Unlike those in the formal sector for whom contracts, social protections, and retraining opportunities can provide insulation, informal workers are vulnerable to sudden displacement without buffers. Structural Market Constraints The fragility of their labour supply is exacerbated by structural constraints such as limited access to credit, an insufficient skills development pathway and exclusion from digital infrastructure projects (Chen, 2005; Onwe, 2013). As a result, informal labour supply responses are quickly reactive, leaving workers to cope with a fickle and uncertain labour market, rather than strategically adapting employment choices.

Recent empirical evidence from emerging and transitional economies suggests that technological change increases labour market inequality by advantaging skill-biased demands, leaving informal workers without such skills behind (Alexeev, 2023). In addition, technological displacement does not favor formal labour in a uniform way: it often shifts workers into precarious and gig-based informal work, perpetuating cycles of vulnerability (Volchik & Maslyukova, 2019). This phenomenon confronts the classical image of the informal sector as a standby for maintaining absorption as the likely scene of an erosion of it under this fast tech evolution (Santos et al., 2020).

Examining these changes from a labour supply perspective emphasizes the need to account for economic incentives as well as the constraints in behavior conditioning how informal workers respond. “How technology-mediated skills demands intersect with relational obstacles from institutions” paint a much more nuanced picture where labour supply responses is uneven, context-based, and affected by more than mere wage compression (Autor et al., 2022). This calls for refined theories and policy responses on the multidimensionality of the threats to informal employment under technological change.

4.1 Supply-Side Adjustments: Withdrawal, Hours Reduction, and Multiple Job-Holding



Technological change as a result leads to a severe disruption of informal labour markets with the disruption also forcing workers to resort to a variety of precarious adaptive strategies. A direct effect is drop out of the labour force, representation that displaced workers may move partially, or entirely out of informal work because they find less opportunities, or they feel disheartened. This is not only a product of the economic constraints, but also of psychological and social determinants of labour supply. In others, informal workers may choose to work fewer hours, whether voluntarily to reconcile health and family needs or not (due to underemployment and job instability). These contractions are indicative of the fluidity of the informal sector, particularly in markets undergoing rapid technological spread, and this makes it fragile.

As depicted by Ross, McGregor and Swales, (2024), labour-augmenting technologies have the tendency to displace the low-skilled informal workers, particularly in open economies characterised by rapid, but asymmetric, technological penetration. This mobility is not in all instances associated with successful mobility into new roles, but for many people it fragments their labour across several informal jobs. This diversification serves as a survival mechanism, enabling individuals to smooth out erratic earnings in a context of increasing instability. The phenomenon of multiple jobholding defies conventional labour market categories and complicates the empirical estimation of labour supply. Bringing an empirical nuance, Oğuz (2018) shows how the macroeconomic dynamics—such illustratively pressures of inflation or changes in productivity—likely condition participation rates and hours in informality. His results emphasize that the adjustments to labour supply in these environments are multidimensional in character and are jointly determined by

economic incentives and constraints. Workers will cut back hours due to a lack of demand, or work them across multiple jobs to get by while meeting basic subsistence, working a narrow line between opportunity and necessity.

Additionally, the hybrid character of informal labour where workers shuttle between trade, services and subsistence agriculture – is stressed by Onwe (2013). This diversification is not simply a reaction to economic force, but a long-term strategy of coping with informalization that is inscribed in the architecture of informal economies. It demonstrates the necessity of labour supply models beyond static-based assumptions to accommodate for dynamic fragmented working times and changing time availability. So, in summary, these supply-side adaptations demonstrate the nuanced and adaptive nature of informal work under technological pressure. Understanding such diverse strategies is key for building theoretical models, and formulating regulations that take into account the lived experiences of informal workers in the face of uncertainty and transition.

4.2 Gendered or Demographic Differentiation

Transitions in technology reconfigure the supply of informal labour in messy, uneven ways in which gender, age and education become central to explanation of how individuals and groups respond. Even as automation is said to disrupt low-skilled, routine jobs in particular, women and youth are likely to bear the brunt of the consequences given that they are disproportionately found in precariously-endowed sections of the informal economy. As Chen (2005) argues, informal women workers, especially domestic workers in care services sector, experience a compounded invisibility that over-looks their economic contributions and the deepening of their vulnerabilities under technological change. Automation, may not outright erase these types of job, but it could exacerbate insecurity by shaking up the traditional patterns of work life and slashing income stability.

Elaborating further, Santos, Ribeiro and Cerqueira (2020) explain that shocks originating in external environments, such as the one represented by the COVID-19 pandemic, have hit informal workers located in human capital-rich service-driven regions more than the whereas, conceptually alike, technological changes brings forth induced pressures. This implies that, in economies with a high degree of informal service provision, such groups may be at heightened risk of disadvantages. In theory, women are forecasts to be even more at risk of compounding existing gender inequalities if placed out of semi-routine low-paid activities by automation, and then further pushed along into the residual, poorly rewarded informal care work less susceptible to technological substitution.

On the other hand, Alexeev (2023) provides an interesting demographic perspective when he shows that skill-biased technological change seems to disfavor older, less formally educated male workers, as it is the case in transitional economies. Such a development could serve to exacerbate existing inequalities by further perpetuating wage premiums for specific credentials, meaning that certain demographic groups with lower skills or that participate in informal employment are left out. These disparate effects indicate the necessity of considering gender and age in the analysis of labour supply; policies and interventions that ignore these dimensions are likely to maintain, or even amplify, inequality.

As a whole, these findings suggest the need for a nuanced appreciation of informal labour supply that incorporates the intersection of gender, age and education in the context of technological change. Such a perspective is essential for crafting model policies that will help the diverse groups of workers who are confronting very different challenges as they try to fit themselves into the quickly changing labour market.

V. POLICY INTERPRETATION

The informal (casual) labour supply at technological transition needs policy response which is dynamic and empirically based on worker's behaviour. With the pace of automation and digitalization increasing, informal workers those already outside formal protections – are increasingly vulnerable to a double burden of a traditional labour market policy that is not sufficient to support them. Policymakers must go beyond reducing displacement and find ways to protect and stimulate the resilience and adaptability of informal labour through targeted interventions.

Macroeconomic ripple effects of labour-augmenting technologies: Ross, McGregor, and Swales (2024) stress the broader effects on the economy of the introduction of labour-augmenting technologies and warn against underestimating the combined disruption to low-skilled jobs. Their results indicate that policy needs to work in the informal sector in a counter-cyclical way in order to mitigate systemic shocks and widening inequality that possibly

results from technological change. One answer is to provide contingent subsidies to firms that formalise employment relations, or incorporate informal workers into regulated value chains, so that productivity gains are coupled with inclusive labour practices.

At the same time, Chen (2005) supports regulatory innovation that avoids just imposing formalisation but reflects the hybrid conditions in which many informal workers work. Policy therefore, needs to distinguish between exploitative informality and voluntary, entrepreneurial kinds of informal work. Here, the legal architecture should be reformulated to facilitate portable benefits, easier enrollments, and rights-based protections that do not undermine existing livelihoods. Policies of this kind may decrease worker's risk perception, and thus affect their labour supply choices toward more sustainable options.

Onwe (2013) highlights the necessity of integrating the informal sector in national development plans particularly in an economy like ours where informality is the key mode of employment. If informal labour isn't seized to inform macroeconomic planning, then other structural exclusions could deepen — especially when informal jobs informal workers depend on are automated out of existence. This requires multi-scalar initiatives at both regional and sectoral level which strike the balance between technological diffusion and employment retention.

Policy design should also be based on the behavioural responses of informal workers. As Oğuz (2018) demonstrates, in addition to participation rates, changes in wage dynamics and inflation also influence the number of hours that people can and want to work. Responsive policy architecture would involve earnings stabilisation mechanisms, access to retraining and market entry support to informal entrepreneurs in digitally transformed economies. In addition, Alexeev (2023) highlights the danger of skill-biased exclusion, in which some members of the labour force, but not others, gain from technological change. This highlights the importance for inclusive training programs that reach out to people in informal positions, particularly youths and marginalized groups. Here, Santos, Ribeiro and Cerqueira (2020) bring us important lessons about the fragility of informal labour in systemic shocks, reinforcing the argument for crisis-neutralizing policies that not only can foresee technological disruptions but that as well provide a safety net for workers that are hit by such disruptions.

Finally, when viewed through the policy prism of labour supply, there needs to be a shift from policy's employment panaceas to more hortative, localised interventions. We need policies that deal with both the structural factors shaping informal work and the dynamic responses of workers to technological change. Politicians might help the informal economy to occupy the open space left by the shrinking of the formal sector only if they base these measures on evidence and behavioral insight instead of supposition.

5.1 Policy Design: Wage Subsidies, Training, and Labour Supply Shifts

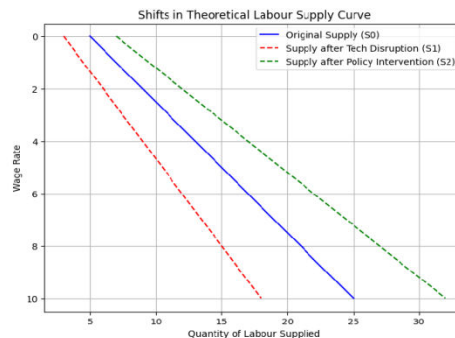
Policies can play a crucial role in changing these informal labour supply patterns, particularly as technological change affects patterns of employment. Under such rapidly changing scenarios, focused policy instruments such as wage subsidies could, therefore, work as a powerful incentive for employers to either hold on to their informal employees or to integrate them into the formal economy. These subsidies can raise the labour supply directly by raising net earnings (by increasing the opportunity cost of leisure or reducing income risk) — a mechanism emphasized by Ross, McGregor, and Swales (2024) who argued that moving quickly enough to soften adjustment shocks in economies open to global market forces warrants policy activism for dealing with transitional adjustment shock.

In addition to wage interventions, vocation training programs provide an entry that might be used to upgrade worker skill and thereby employment in a changing automation landscape. And if they promote productivity and connect skills with technology, there is even more room for the labour supply curve to shift outwards as they tell the economy that people really want to work and they are ready to do so. This resonates with Chen (2005) who is calling for legislative policy that will protect informal workers' rights, but also provide them with pathways to formalise; stressing the necessity of complex policy frameworks that will bridge the divide between informal and formal.

In addition, Onwe (2013) emphasises that inclusive growth policies should design policies that incorporate the informal sector into overall economic planning. By positioning informal work as a central and not merely peripheral element, it is possible to develop interventions aimed at addressing labour market inefficiencies and building the resilience of the informal labour force. Combinations of wage support, skill upgrading and social protections can dampen the negative impact of technological disruptions and make the labour supply more adaptable to the changing economic landscape.

By complementing each other, these policies provide a multi-faceted policy tool kit to address the intricacies of the interaction between technological change and informal labour supply. Carefully designed, they offer the potential to turn precarious work from a threatened to an adjusting, thriving and meaningful component of inclusive economic development.

5.2 Diagrammatic Representation: Shifts in Theoretical Labour Supply



We develop diagrammatic models that are suggested by the aforementioned findings as a convenient way of illustrating some implications of policy on the supply of informality, which allow one to see how theoretical abstractions are translated into actual labour market results. The well-known upward sloping labour supply curve, which indicates that people choose to work more by offering themselves in the labour market at higher wages, can be modified if interventions change workers' incentives or constraints. Policies, such as wage subsidies, indirectly raise the net payoff to labour so that it becomes more worthwhile to work, even if the market wage rate remains constant. This mechanism enhances the labour supply, moving the curve outward, an issue that is confirmed by the data provided by Oğuz (2018), who shows that income expectations have a strong influence on the number of workers entering or leaving the labour market of the transition economies.

Apart from wage changes, capacity-creating interventions including training programs have an important role to play in increasing labour supply by increasing the employability of workers and in finding other opportunities in formal or high-quality informal activities. These schemes not only increase effective earnings but also lower risks attached to casual employment, encouraging more labour participation. It is hard to imagine those behaviourally palatable reactions to automation rapidly occurring without complimentary policies, and the advance of automation might put downward pressure on purely informal wage rates – shifting the labour supply curve leftwards as informal 'labour' effectively drops out or reduces hours in the face of declining pay. This vulnerability is further emphasised in Alexeev (2023), which rigorously examines the way in which lopsided distribution of technological dividends gives birth to wage premium asymmetries and ultimately to labour supply responses that vary by skill level of workers.

Visual aids representing these shifts of the supply curve are very useful for showing the timing and the targets that policy should aim at, regarding the policy design especially in a context where most of the work-force is in informal work. By embedding such diagrams in their theories, analysts and policy makers more generally can more easily comprehend how labour supply would endogenously shift in response to various such shocks, be they shift-enhancing reforms or adverse technological shocks. This approach narrows the distance between high-level economic models and the realities workers in the informal economy face, thereby contributing to targeted and effective policy responses to dynamic informal economies, which are increasingly shaped by the digital and automated economy.

VI. LIMITATIONS OF THEORETICAL APPROACH

A theoretical model provides a structured framework to analyze informal labour dynamics, but cannot deal with the complexities of the real world, particularly in the face of fast technological change. Such simplifications don't come close to describing the heterogeneity and dynamism of informal work. Scholars such as Chen (2005) and Onwe (2013) underscore the fact that informal economies are embedded in complex social, institutional and regulatory contexts and cannot be modelled abstractly. Although some models such as that of Ross et al. (2024) provide some insights, but they fail to capture the labour realities in informal-dominated or developing economies. Behavioural factors presented by

Alexeev (2023) and Oğuz (2018) also introduce an additional level of complexity to predictions because responses are non-linear and are different across the scale. Finally, the theoretical position must rest on empirical findings to ensure its relevance and validity. This computational study has its conceptual aspects, but it insists that the empirical calibration must be encouraged in the second phase

VII. CONCLUSION

This conceptual interrogation has shown that technological transition productively reorders informal labour supply by accentuating wage instability, deepening structural impediment and by reconfiguring preferences for occupations. Informal workers do not work in frictionless markets, but are exposed to multiple layers of precarity compounded now with automation and gaps in policy response. Labour market distortions from skill-biased technological change affect how institutions shape informal workers' adaptation and response. Although conceptual models offer helpful insights on these processes, they need to be tested and expanded in light of empirical evidence. Further research should be directed towards income based calibration of these models using household level, disaggregated labour data at levels of the economy with specific regard to demographic and regional differences. In addition, extending the model to include dynamics of worker behavior and transitions between informal and formal employment will enhance its relevance for the design of inclusive and adaptive labour market policies in the context of continuing technological progress.

REFERENCES

1. Ross, A. G., McGregor, P. G., & Swales, J. K. (2024). Labour market dynamics in the era of technological advancements: The system-wide impacts of labour augmenting technological change. *Technology in Society*.
2. Onwe, O. J. (2013). Role of the informal sector in development of the Nigerian economy: Output and employment approach. *Journal of Economics and Development Studies*, 1(1), 60–74.
3. Volchik, V., & Maslyukova, E. (2019). Entrepreneurship at the labour market: A case of precariat and informal employment. *Entrepreneurship and Sustainability Issues*, 6(4), 2095–2111.
4. Chen, M. A. (2005). Rethinking the informal economy: Linkages with the formal economy and the formal regulatory environment (Research Paper No. 2005/10). United Nations University–WIDER.
5. Alexeev, S. (2023). Technical change and wage premiums amongst skilled labour: Evidence from the economic transition. *Economic Inquiry*, Advance online publication.
6. Oğuz, A. (2018). Analysis of the factors affecting labour supply. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, 56, 157–172.
7. Dike, O. (2019). Informal employment and work health risks: Evidence from Cambodia. Unpublished manuscript.
8. Adam, A., & Moutos, T. (2024). Do public-sector employment reductions promote the informal economy? *Journal of Public Economic Policy and Reform*, Advance online publication.
9. Santos, G. F., Ribeiro, L. C. S., & Cerqueira, R. B. (2020). The informal sector and Covid-19 economic impacts: The case of Bahia, Brazil. *Regional Science Policy & Practice*. Advance online publication.
10. Autor, D., Mindell, D., and Reynolds, E. (2022). *The Work of the Future: Building Better Jobs in an Age of Intelligent Machines*. Cambridge: MIT Press.
11. Bloom, N., Van Reenen, J. and Williams, H. (2019). “A Toolkit of Policies to Promote Innovation.” *Journal of Economic Perspectives* 33, no. 3: 163–184.



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