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Breaking Barriers to Sustainable and Decent Jobs: How Do Different Regulatory Areas Shape Informal Employment for Persons with Disabilities Under SDG 8?

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Abstract

Breaking barriers to sustainable jobs and promoting inclusive employment are key goals of the 2030 Agenda, with SDG8 Target 8.5 aiming to achieve decent work for all, including persons with disabilities (PWDs). This paper contributes to the scholarly debate by empirically examining how various regulatory areas, including credit market regulation, labor market regulation, business regulation, and the freedom to compete, influence the informal employment of PWDs in 15 countries between 2007 and 2022. The empirical investigation is conducted for the entire population with disabilities, as well as for adults and youth with disabilities. The analysis employs a dynamic labor demand function estimated through the two-step system GMM method to account for adjustment costs within the labor market. In addition, the Feasible Generalized Least Squares method is employed to assess the robustness of the results. The findings reveal significant heterogeneity in the effects of regulation on the informal employment of PWDs, with substantial differences between adults and youth. At the aggregate level, greater flexibility in most regulatory areas reduces informal employment of PWDs, except for labor market regulation. Upon examining age cohorts, the outcomes for adults exhibit similarities to the aggregate analysis. In contrast, more flexible regulations increase informal employment among young people with disabilities, except for business regulations, which exert negative impacts, and credit market regulations, which demonstrate no significant effects. This study recommends that policymakers support formal business development for PWDs and implement anti-discrimination laws. For youth with disabilities, targeted initiatives, including financial inclusion and wage subsidies, are essential to convert regulatory flexibility into formal employment opportunities.

Keywords: SDG 8; persons with disabilities; regulation; informal employment; labor market; age cohort; GMM



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1. Introduction

Unemployment and informal employment continue to be major socio-economic issues worldwide, disproportionately impacting marginalized groups, including persons with

disabilities [1–3]. Persons with disabilities (PWDs) are defined as “those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others” [4]. Disability can be seen as a social construct shaped by a person’s environment, resulting from societal barriers that limit personal growth. From this perspective, society plays a crucial role in discussions about disability. Growing attention has been particularly focused on protecting employment rights for PWDs [5–8]. A key document in this area is the Convention on the Rights of Persons with Disabilities, adopted by the United Nations in 2006. This international treaty includes specific provisions to guarantee the right to healthcare, education, employment, social protection, and other essential human rights for PWDs. Article 27 of the same convention highlights the importance of giving PWDs access to technical, vocational training, professional opportunities, and placement services. Additionally, the Sustainable Development Goals (SDGs), adopted in 2015, acknowledged the need to ensure PWDs can access decent job opportunities. SDG 8, especially Target 8.5, emphasizes providing decent work for everyone, including PWDs.

Despite extensive efforts to improve employment outcomes for PWDs, a considerable gap still exists. Ref. [9] reports that over half of the countries with available disability data have higher unemployment rates among PWDs compared to those without disabilities. For example, the unemployment rate for PWDs in the United States was 7.5% in 2024, representing an increase of 3.7 percentage points compared to the 3.8% unemployment rate among persons without disabilities [10]. According to statistics from [11], about 15% of the global population has some form of disability, and these people often encounter significant barriers to entering and maintaining employment in the formal labor market. For example, the employment rate in the European Union is 50.6% for PWDs, compared to 74.8% for the overall population [12]. When formal employment is unavailable, PWDs rely on informal work as a primary source of income. Although informal employment can offer immediate income, it falls short in providing job security, social protection, and equitable wages, thereby exposing them to increased vulnerabilities [13–15].

Addressing employment challenges is vital for promoting the empowerment and inclusion of PWDs, emphasizing the importance of effective regulations to enhance labor market outcomes. A substantial body of the literature identified barriers that push PWDs into the informal labor market. Ref. [16] reports that 64.93% of persons with mild disabilities and 75.80% of those with severe disabilities in Indonesia are employed in informal jobs. These high rates may be attributed to systemic barriers in the formal sector, including inaccessible workplaces, credit market obstacles, and weak enforcement of disability-inclusive policies. Informal employment, despite being less secure and offering lower compensation, frequently represents the only viable option for PWDs encountering challenges within the formal labor market. It is essential to recognize the significant diversity among PWDs, which can result in different experiences in the informal labor market. The type of disability is perhaps the primary factor differentiating experiences among PWDs. For example, individuals with psychosocial or intellectual disabilities often encounter more barriers than those with physical disabilities, which can further limit their opportunities in both formal and informal sectors [17]. Furthermore, gender may hold significance concerning the experience of PWDs within the labor market. Women with disabilities are often overrepresented in low-wage informal employment and encounter compounded barriers [18]. Regarding this issue, Ref. [19] revealed that the informal sector lacks both decent work conditions and gender equality, with women being less likely to access opportunities within the informal economy. Despite the recognized role of regulations in influencing the informal employment of PWDs, empirical research on this topic remains limited.

Building on the previous discussion, the present study aims to examine the effects of regulations on the informal employment of PWDs in 15 countries over the period 2007–2022. Compared to the scarce prior literature, this study holds significant importance for several reasons. First and foremost, this research is among pioneering studies, if not the first, to empirically explore the impact of regulations on the employment of PWDs within the informal economy. Indeed, some previous studies have investigated the role of regulations on the informal economy [20–22]. Some other studies, albeit scarce, have instead concentrated on the impacts of regulations on employment [23–26]. Nevertheless, no previous studies have investigated empirically the implications of regulatory frameworks on the informal employment of PWDs. This study aims to bridge this gap by providing new evidence on how the informal employment of PWDs responds to regulations using a recent dataset developed by the International Labour Organization. In doing so, this study seeks to identify how regulations act as either barriers or facilitators in the transition of PWDs from the informal to the formal economy. This shift towards formal employment can contribute to reducing inequality, empowering PWDs, and fostering their full participation in economic life.

Second, the research conducts both aggregate and disaggregate analyses when estimating the impact of regulation on the informal employment of PWDs. At the aggregate level, we use a composite index capturing overall regulatory intensity. At the disaggregate level, we examine four specific regulatory domains, i.e., credit market regulation, labor market regulation, business regulation, and freedom to compete. This allows us to gain a better understanding of how different dimensions of the regulatory environment influence the informal labor market outcomes for PWDs. By moving beyond the single regulatory index employed in prior research, including [27–30], the disaggregate analysis offers a more detailed insight into the different effects of various regulatory areas on the informal employment of PWDs.

Third, this study examines the impacts of regulations on the informal employment of PWDs, both for the overall population and across specific age cohorts, namely, youth and adults. Although existing studies often consider PWDs as a homogenous group, this research recognizes the importance of accounting for age-related differences in informal labor market experiences. Several studies, including [31,32], have suggested that youth and adults may respond differently to social, economic, and institutional factors. Youth with disabilities, for instance, may face various barriers, including limited work experience and lower access to vocational training, which could cause them to respond differently to regulatory environments compared to adults. By incorporating this age-based disaggregation, the analysis allows us to assess whether regulatory policies influence informal employment outcomes for PWDs across the life course and offer age-specific policy recommendations.

The remainder of this paper proceeds as follows. Section 2 outlines the related literature. Section 3 describes materials and methods, while Section 4 presents empirical results. Section 5 discusses the findings, and, finally, Section 6 concludes with policy implications and limitations.

2. Literature Review

Regulations, including laws, policies, and institutional frameworks, play a significant role in shaping labor market dynamics for the different segments of the population, including PWDs [33–35]. The regulatory framework can either support or hinder employment opportunities for PWDs, depending on how it is designed and implemented. For example, labor market regulations related to workplace accommodations, anti-discrimination laws, and minimum wage policies significantly impact employment outcomes [36–38]. On the one hand, anti-discrimination laws may reduce bias in hiring procedures by prohibiting

the exclusion of PWDs, while hiring quotas can directly increase employment levels for PWDs [39]. On the other hand, anti-discrimination laws and hiring quotas may raise the perceived costs of hiring PWDs by exposing employers to potential legal or financial repercussions if regulations are not followed. This change in perceived risk can influence employers' cost-benefit analysis, potentially discouraging hiring PWDs [40]. Furthermore, reducing barriers that prevent PWDs from effectively performing job-related tasks through appropriate workplace accommodations, such as assistive technologies and flexible working hours, can improve their productivity and promote sustainable employment opportunities. However, such accommodations, especially assistive technologies, may unintentionally reinforce stigmatizing perceptions if not implemented carefully, highlighting the importance of inclusive workplace cultures.

Despite the various regulatory initiatives aimed at enhancing the inclusion of PWDs in the formal labor market, they continue to be disproportionately represented in informal employment owing to persistent structural, societal, and policy-related obstacles [41]. Regulations may influence not only access to the formal sector but also the extent of informal employment, where labor protection is minimal or absent [17,42]. Effective labor market regulations are, therefore, crucial for improving job creation for PWDs, particularly in countries with a large informal sector.

The existing literature highlights the potential of policies and regulatory frameworks to promote inclusion and economic independence for PWDs in the labor market. Ref. [43] investigated the effects of anti-discrimination laws and hiring quotas on the employability of PWDs in China. The authors concluded that the lack of a definition of disability, discrimination, and the absence of effective enforcement mechanisms led to the failure of anti-discrimination laws. Furthermore, inconsistencies between the legal frameworks governing the labor market and the quota scheme led some employers to opt for paying penalties rather than hiring PWDs. In addition, Ref. [44] examined the impacts of the Americans with Disabilities Act (ADA) on the employment of PWDs. The analysis concluded that the implementation of the ADA initially reduced employment after its enactment but increased it when using a broader definition of disability. These findings have been confirmed by [45], who examined data from the Current Population Survey between 1988 and 2012. The authors revealed significant disparities in employment and earnings between persons with and without disabilities. Ref. [46] investigated the impact of hiring quotas. The author found that labor markets with higher exposure to quota reforms have recorded a notable improvement in wages and employment of PWDs. However, the study highlights that firms tend to comply with the quotas by hiring PWDs into lower-wage and less-skilled roles. The results also indicate that while hiring quotas create job opportunities for PWDs, they do not negatively impact wages or employment for non-disabled workers, nor do they lead to business closures.

Ref. [47] explored how business process outsourcing (BPO) companies in India can promote sustainable employment for PWDs through impact sourcing. By leveraging effective training systems and operational strategies, these companies may facilitate the transition of PWDs from the informal to the formal sector. The study also highlights the importance of replicating successful management models to expand these initiatives, emphasizing the catalytic role of social enterprises in fostering economic inclusion. Furthermore, Ref. [48] analyzed employment disparities faced by Sri Lankans with disabilities, attributing high unemployment rates to insufficient legal protections and discriminatory organizational practices. The study emphasized that the existing regulatory environment fails to enforce inclusivity, perpetuating the exclusion of PWDs from the formal labor market. Based on these results, the study underscores the importance of revising labor laws to mandate reasonable accommodation and promote the employment of PWDs, which could decrease

their reliance on the informal sector. Recently, Ref. [49] conducted semi-structured expert interviews to explore the challenges faced by PWDs in the labor market. The findings highlight that bureaucratic barriers associated with business regulations are among the most significant obstacles. Furthermore, human resources managers have reported that it is impossible to meet the mandated hiring quota for PWDs. Finally, Ref. [50] examined the impacts of hiring quotas on the employment of PWDs in South Korea. The quasi-experimental regression analysis indicates that hiring quotas positively influenced the employment of PWDs. However, these effects are not uniform across all population groups, as benefits are more concentrated among males, full-time workers, and workers with mild disabilities.

It is worth noting that employed PWDs often face longer working hours, lower wages, and limited promotion opportunities. The effectiveness of labor market regulation in addressing the challenges faced by PWDs in the informal sector may vary across regions and income levels. In low- and middle-income countries, where informal employment is prevalent, regulatory frameworks are frequently inadequate or insufficiently enforced. Ref. [51] highlighted this dynamic in Brazil, noting that targeted enforcement strategies can yield substantial benefits. However, the effectiveness of initiatives depends on several factors, including the government's ability to implement and enforce regulations, the political commitment to supporting these efforts, and the overall prevalence of informal employment within the economy. High-income countries, on the other hand, usually have stronger labor protection and enforcement mechanisms, leading to less informal employment among PWDs. Nevertheless, even in these countries, significant gaps in employment opportunities for PWDs persist. Regarding this issue, Ref. [23] indicated that gig work, a rapidly expanding segment of the informal economy, has created new challenges for labor market regulation. Given the evolving nature of the labor market, policymakers in high-income countries are continually adjusting policies to ensure fair employment opportunities for PWDs.

3. Materials and Methods

This section presents the dataset used to examine the impact of regulation on informal employment among PWDs, along with descriptive statistics, correlation analysis, and multicollinearity diagnostics. It then introduces the empirical model, followed by an overview of econometric methods.

3.1. Data Description

This study empirically examines the effects of regulation (*REG*) on the informal employment of persons with disabilities (*IED*) in an unbalanced panel of 15 countries (Armenia, Costa Rica, Denmark, Estonia, France, Greece, Italy, Latvia, Luxembourg, Mongolia, Peru, Poland, Portugal, Spain, and the United Kingdom) between 2007 and 2022. The selection of countries was exclusively determined by the availability and consistency of data related to regulatory environments and the informal employment of PWDs, thereby ensuring a reliable basis for cross-country comparison. The study period extends up to 2022 due to limitations in data availability, particularly regarding regulatory variables. The study period begins in 2007, as the ILOSTAT database provides data on informal employment of PWDs only from this year onwards. The informal employment among PWDs, denoted *IED*, is measured via the number of individuals with disabilities (in thousands) engaged in informal economic activities. Moreover, informal employment of youth with disabilities (*IED*^{15–24}) and informal employment of adults with disabilities (*IED*²⁵⁺) are considered in empirical analysis. The dataset on informal employment of PWDs is obtained from ILO-STAT, provided by the International Labour Organization. With reference to regulations, five distinct yet interrelated regulatory indicators are employed in this study: (i) aggre-

gate regulation (*REG*), (ii) credit market regulation (*CREG*), (iii) labor market regulation (*LREG*), (iv) business regulation (*BREG*), and (v) freedom to compete (*FREG*). Table A1 in Appendix A provides details on the construction of the different areas of regulation. An increase in the value of these indices signifies a greater degree of flexibility/freedom. Data on regulations are obtained from the Economic Freedom of the World dataset developed by the Fraser Institute. In addition to the interest variable, the empirical specification includes four control variables: (i) economic activity (*GDP*), proxied by gross domestic product (in constant 2015 US\$); (ii) inflation rate (*INF*), measured by the annual growth rate of the consumer price index; (iii) urbanization rate (*URB*) measured via the population living in urban areas as a share of total population; and (iv) Human capital (*HC*), measured by the Human Capital Index, which considers years of schooling and the economic returns to education. Data on GDP, inflation, and urbanization are sourced from the World Development Indicators developed by [52]. Finally, data on human capital is extracted from the Penn World Table (version 10.0), provided by [53].

Table 1 presents the descriptive statistics for both the dependent and independent variables in logarithmic forms. The sample statistics show that the mean value of *IED* is 9.363, with a standard deviation of 1.772. Moreover, the mean values of *IED*^{15–24} and *IED*²⁵⁺ are 7.173 and 9.331, respectively, indicating that adults are more engaged in the informal sector compared to youth. According to the same table, the mean aggregate regulation index is about 1.981. When considering the different areas of regulation, the credit market regulation exhibits the highest mean value (2.140), reflecting the most flexible regulatory environment. This is followed by freedom to compete (2.104), labor market regulation (1.907), and finally, business regulation (1.812). Figure 1 presents the data distribution using a scatter plot matrix along with Kendall’s rank correlation coefficients, providing an initial overview of the association among the variables, indicating whether they are positive or negative. This analysis particularly focuses on the association between the dependent variable (*IED*) and the explanatory variables (regulatory framework variables and control variables). The results indicate that informal employment among PWDs is negatively associated with regulatory indicators. However, a notable exception is observed with labor market regulation, which exhibits a positive correlation with *IED*. These findings provide preliminary evidence on the connection between regulations and informal employment among PWDs. Additionally, it is important to highlight that none of the covariates exhibit a strong correlation exceeding 0.8, indicating the absence of multicollinearity issues.

Table 1. Descriptive statistics.

Variables	Abb.	Mean	Std. Dev.	Min	Max
Dependent variables					
Informal employment of persons with disabilities	<i>IED</i>	9.363	1.772	4.532	13.092
Informal employment of youth with disabilities	<i>IED</i> ^{15–24}	7.173	1.820	0.000	10.813
Informal employment of adults with disabilities	<i>IED</i> ²⁵⁺	9.331	1.743	4.532	13.000
Regulation					
Aggregate regulation index	<i>REG</i>	1.981	0.090	1.711	2.152
Credit market regulation index	<i>CREG</i>	2.140	0.138	1.612	2.302
Labor market regulation index	<i>LREG</i>	1.907	0.123	1.518	2.135
Business regulation index	<i>BREG</i>	1.812	0.186	1.161	2.155
Freedom to enter markets and compete	<i>FREG</i>	2.014	0.116	1.788	2.214
Control variables					
Gross domestic product	<i>GDP</i>	25.886	1.860	22.556	28.797
Inflation rate	<i>INF</i>	4.635	0.035	4.587	4.851
Urbanization rate	<i>URB</i>	4.297	0.119	4.073	4.520
Human capital	<i>HC</i>	1.118	0.117	0.824	1.328

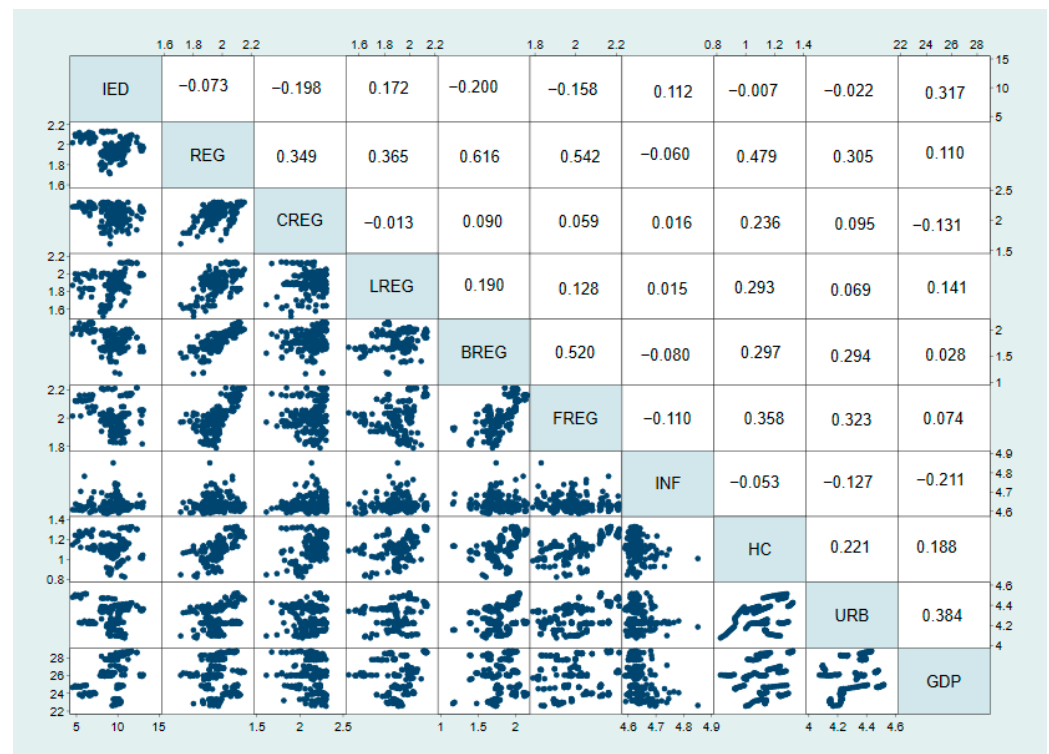


Figure 1. Scatter plot matrix and Kendall's rank correlation matrix.

In addition, variance inflation factor (VIF) and tolerance tests are conducted to identify potential multicollinearity among the explanatory variables. These diagnostics are essential to ensure that the estimated coefficients are reliable and not inflated due to correlation among the explanatory variables. The results presented in Table 2 suggest that VIF values for all models are below 5, and the tolerance values exceed 0.2, thereby confirming the absence of multicollinearity for all models under study.

Table 2. Multicollinearity matrix.

	Dep. Variable	Model 1	Model 2	Model 3	Model 4	Model 5
VIF	<i>IED</i>	1.55	1.28	1.33	1.31	1.49
	<i>IED</i> ^{15–24}	1.81	1.29	1.40	1.40	1.63
	<i>IED</i> ²⁵⁺	1.54	1.27	1.34	1.31	1.49
Tolerance	<i>IED</i>	0.64	0.78	0.75	0.76	0.67
	<i>IED</i> ^{15–24}	0.55	0.77	0.71	0.71	0.61
	<i>IED</i> ²⁵⁺	0.47	0.79	0.75	0.76	0.67

3.2. Model Specification

To estimate the impact of regulation on the informal employment of PWDs, the following baseline model is estimated:

$$IED_{i,t}^m = \alpha_0 + \alpha_1 REG_{i,t} + \alpha_2 GDP_{i,t} + \alpha_3 INF_{i,t} + \alpha_4 URB_{i,t} + \alpha_5 HC_{i,t} + \omega_{i,t} \quad (1)$$

where $IED_{i,t}$ stands for informal employment of PWDs in country i at time t . REG , GDP , INF , URB , and HC represent regulations, gross domestic product, inflation rate, urbanization, and human capital, respectively. $\omega_{i,t}$ is the error term. In addition, m represents the different age groups (aggregate, youth, and adults). REG is measured here using five regulatory frameworks (aggregate regulation, credit market regulation, labor market

regulation, business regulation, and freedom to compete). Therefore, the following five models are estimated:

Model 1: Aggregate regulation

$$IED_{i,t}^m = \beta_0 + \beta_1 REG_{i,t} + \beta_2 GDP_{i,t} + \beta_3 INF_{i,t} + \beta_4 URB_{i,t} + \beta_5 HC_{i,t} + \varphi_{i,t}^m \quad (2)$$

Model 2: Credit market regulation

$$IED_{i,t}^m = \gamma_0 + \gamma_1 CREG_{i,t} + \gamma_2 GDP_{i,t} + \gamma_3 INF_{i,t} + \gamma_4 URB_{i,t} + \gamma_5 HC_{i,t} + \sigma_{i,t}^m \quad (3)$$

Model 3: Labor market regulation

$$IED_{i,t}^m = \theta_0 + \theta_1 LREG_{i,t} + \theta_2 GDP_{i,t} + \theta_3 INF_{i,t} + \theta_4 URB_{i,t} + \theta_5 HC_{i,t} + \tau_{i,t}^m \quad (4)$$

Model 4: Business regulation

$$IED_{i,t}^m = \delta_0 + \delta_1 BREG_{i,t} + \delta_2 GDP_{i,t} + \delta_3 INF_{i,t} + \delta_4 URB_{i,t} + \delta_5 HC_{i,t} + \varsigma_{i,t}^m \quad (5)$$

Model 5: Freedom to compete

$$IED_{i,t}^m = \rho_0 + \rho_1 FREG_{i,t} + \rho_2 GDP_{i,t} + \rho_3 INF_{i,t} + \rho_4 URB_{i,t} + \rho_5 HC_{i,t} + \psi_{i,t}^m \quad (6)$$

where *REG*, *CREG*, *LREG*, *BREG*, and *FREG* stand for aggregate regulation, credit market regulation, labor market regulation, business regulation, and freedom to compete.

3.3. Econometric Methodology

To estimate the impacts of regulation on the employment of PWDs, the present study employs a dynamic specification by accounting for adjustment processes in the labor market. In this framework, employment in year *t* is modeled as a function of employment in the preceding year (*t* − 1), capturing the persistence and gradual adjustment of labor outcomes over time. Regarding this issue, Ref. [54] confirmed the dynamic nature of many economic relationships. This dynamic nature is particularly pronounced in the labor demand function, as demonstrated by [55,56]. Incorporating the lagged dependent variable as a regressor allows capturing the dynamic behavior of the dependent variable over time. Therefore, we employ a dynamic specification, incorporating the lagged dependent variable (informal employment of PWDs at *t* − 1) among the explanatory variables. The inclusion of the lagged dependent variable enables capturing and testing the dynamic behavior of employment creation. The dynamic employment specification derived from Equation (1) may be formulated as follows:

$$IED_{i,t}^m = \alpha_0 + \alpha_1 IED_{i,t-1}^m + \alpha_2 REG_{i,t} + \alpha_3 GDP_{i,t} + \alpha_4 INF_{i,t} + \alpha_5 URB_{i,t} + \alpha_6 HC_{i,t} + \varsigma_i + \kappa_t + \omega_{i,t}^m \quad (7)$$

where *i* = 1, . . . , *N* represents each country in the panel, *t* = 1, . . . , *T* denotes the time. The coefficients α_k (*k* = 1, 2, . . . , 6) are the parameters to be estimated. The terms ς_i and κ_t represent the country-specific and time-specific effects, respectively, while $\omega_{i,t}$ denotes the random error term.

The inclusion of the lagged dependent variable among the regressors introduces dynamic panel bias and endogeneity concerns. Indeed, conventional estimation techniques, such as ordinary least squares, yield inconsistent and inefficient estimates in this case, as they fail to account for the persistence and adjustment mechanisms in employment over time [57]. To overcome this limitation, Ref. [58] proposed the first difference generalized method of moments (GMM) estimator, while Ref. [59] developed the system GMM esti-

mator as an alternative. This method eliminates country-specific effects by differencing the equation. Then, it employs lagged levels of explanatory variables as instruments, thereby avoiding the problem of endogeneity induced by the inclusion of the lagged dependent variable.

This paper employs the two-step system GMM technique to estimate the dynamic specification in Equation (7), while addressing potential endogeneity issues, serial correlations, and parameter-related concerns [60]. This technique also provides solutions to the problems of bias, simultaneity, reverse causality, and omitted variables. Furthermore, the GMM estimator has been shown to be the most appropriate for addressing heteroscedasticity when one or more regressors are endogenous. Finally, the GMM estimator outperforms the Instrumental Variables in the presence of heteroscedasticity and endogeneity problems. Two tests are suggested to check the validity of the dynamic panel GMM results: (i) Sargan/Hansen overidentification test, which allows testing the validity of lagged variables as instruments, and (ii) Arellano and Bond autocorrelation test, which allows testing the absence of second-order autocorrelation of the errors. The dynamic panel data analysis was conducted using the *xtabond2* statistical package developed by [61].

4. Results

The empirical analysis proceeds in three main stages. First, we estimate the effects of the five regulatory areas on informal employment among the overall population with disabilities. Second, we re-estimate the different models for disaggregated age groups, specifically adults and youth. Finally, we assess the robustness of the two-step system GMM estimator findings by employing the Feasible Generalized Least Squares estimator.

4.1. Regulation and Aggregate Informal Employment of PWDs

Table 3 reports the effects of regulations on the informal employment of PWDs using the two-step system GMM estimator. In this table, Models 1–5 represent the impacts of the different regulation areas. The estimated coefficients on the lagged dependent variable are positive and statistically significant in all specifications, ranging from 0.327 in Model 3 to 0.505 in Model 2. This means that informal employment among PWDs in the current year is influenced by their employment levels in the previous year. These findings provide strong economic evidence for the presence of adjustment costs within the informal labor market, justifying the use of a dynamic specification. Furthermore, they highlight the persistent nature of informal employment, which aligns with the findings of some existing studies, including [62,63]. The results further indicate that inflation exerts a statistically significant positive effect on the informal employment of PWDs. Indeed, Inflation contributes to the rise in informal employment among PWDs by diminishing purchasing power and increasing living costs. Given the persistent barriers PWDs face in formal employment, the accessible and flexible nature of the informal sector represents a potential alternative for them. The estimated coefficient of human capital suggests a generally insignificant relationship with informal employment for PWDs. Therefore, enhancing human capital may not influence their employment in the informal sector. The only exception is observed in Model 3, where the coefficient for human capital is negative and statistically significant. These findings indicate that an improvement in human capital is associated with a decrease in informal employment for PWDs and facilitates their integration into the formal labor market. The table also shows a significant positive relationship between GDP and the informal employment of PWDs. The estimated coefficients, ranging from 0.188 to 0.249, indicate that a 1% increase in economic growth corresponds to a 0.188–0.249% increase in the informal employment of PWDs. Finally, urbanization exerts a statistically significant negative impact on the informal employment of PWDs in all models. These results may be

attributed to urbanization being linked to a decrease in informal employment opportunities for PWDs. Indeed, urban areas may offer enhanced infrastructure for PWDs and a greater abundance of formal employment opportunities, potentially incentivizing their transition from the informal to the formal economy [64].

Table 3. Regulation and aggregate informal employment of PWDs.

Variables	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5
	REG	CREG	LREG	BREG	FREG
IET_{t-1}	0.461 *** (0.178)	0.505 *** (0.175)	0.327 * (0.204)	0.448 ** (0.207)	0.394 ** (0.189)
INF	6.448 ** (2.782)	6.320 ** (2.825)	6.523 ** (2.627)	5.881 ** (2.816)	6.605 ** (2.737)
HC	0.322 (0.416)	0.109 (0.426)	−2.347 *** (0.859)	0.178 (0.352)	−0.030 (0.425)
GDP	0.213 ** (0.085)	0.188 ** (0.084)	0.249 *** (0.090)	0.218 ** (0.096)	0.239 *** (0.089)
URB	−1.001 ** (0.488)	−1.064 ** (0.528)	−0.927 ** (0.465)	−0.742 * (0.431)	−0.852 * (0.495)
REG	−1.526 ** (0.777)	-	-	-	-
CREG	-	−0.867 ** (0.338)	-	-	-
LREG	-	-	2.928 *** (0.755)	-	-
BREG	-	-	-	−1.360 * (0.699)	-
FREG	-	-	-	-	−1.417 *** (0.542)
Constant	−23.363 ** (11.520)	−23.179 * (11.880)	−29.245 ** (11.828)	−22.237 * (11.869)	−24.543 ** (11.539)
AR (1) test	0.020	0.017	0.067	0.020	0.035
AR (2) test	0.741	0.800	0.531	0.748	0.635
Sargan test	0.525	0.507	0.484	0.418	0.474

Standard errors are reported in parentheses. For the AR (1), AR (2), and Sargan tests, *p*-values are reported. *** *p* < 0.01, ** *p* < 0.05, * *p* < 0.1.

The table shows that the aggregate regulation index has a significant negative effect on the informal employment of PWDs. Specifically, a 1% improvement in regulatory flexibility leads to a 1.625% decrease in informal employment for PWDs. This implies that more flexible regulations play a vital role in decreasing informal employment among PWDs by encouraging formalization and fostering inclusive labor practices. As mentioned previously, this study also assesses the impacts of the different areas of regulation (CREG, LREG, BREG, and FREG) on the informal employment of PWDs. The two-step system GMM estimator suggests a negative and statistically significant coefficient for CREG, indicating that more flexible credit market regulations are associated with lower informal employment among PWDs. The estimated coefficient of −0.867 indicates that a 1% increase in the flexibility of credit market regulations leads to a 0.867% reduction in the informal employment of PWDs. This significant negative impact suggests that increasing flexibility in credit market regulation could be a key policy lever for promoting financial inclusion among PWDs, ultimately providing more financial resources and contributing to their integration

into the formal labor market. Indeed, flexible credit market regulations can mitigate barriers, enabling PWDs to access loans and other financial products needed to start formal businesses. By doing so, increased access to the credit market equips PWDs with the financial resources to overcome barriers to formal entrepreneurship. This fosters economic independence and reduces the prevalence of informal employment, often characterized by high instability.

The empirical results of Model 3 show a positive and significant coefficient for labor market regulations, indicating that greater flexibility in the labor market contributes to increased informal employment among PWDs. The estimated coefficient of 2.928 indicates that a 1% increase in the flexibility of labor market regulation leads to about a 2.928% increase in the informal employment of PWDs. Indeed, flexible labor market regulations can lower overall unemployment and boost formal sector labor demand. However, without inclusive hiring practices, these regulations may disadvantage PWDs, leading employers to favor workers without disabilities and pushing PWDs into informal employment, exacerbating labor market inequalities. In Model 4, the estimated coefficient for flexible business regulation is negative and statistically significant at the 10% level, suggesting that flexible business regulation is associated with lower informal employment among PWDs. Specifically, a 1% increase in business regulation decreases informal employment among PWDs by 1.360%. Finally, we estimate the impact of freedom to compete on the informal employment of PWDs in Model 5. Table 3 suggests a negative and statistically significant coefficient for *FREG*. Indeed, policies promoting greater market competition, including increased market openness, simplified business permits, and reduced business environment distortions, can decrease informal employment for PWDs and encourage their integration into the formal economic sector. Higher freedom to compete, designed to foster market efficiency, can lead to the creation of new formal businesses, the expansion of existing ones, and a reduction in informal employment among PWDs.

4.2. Regulation and Informal Employment of PWDs by Age Cohort

In this section, we examine how regulation affects informal employment for youth and adults with disabilities. The results, reported in Table 4, indicate that the impact of regulations on informal employment among PWDs differs when comparing youth and adults. For youth with disabilities, the coefficient of *REG* is positive and statistically significant at the 5% level, implying that flexible regulations lead to higher informal employment of young people. This result implies that while a more flexible regulatory framework might reduce barriers for youth without disabilities entering the formal labor market, it may simultaneously exacerbate existing challenges for youth with disabilities. This could be linked to a lack of specific skills required for young people with disabilities to enter the formal labor market. In this case, increased regulatory flexibility might not lead to their integration into the formal economy, potentially leading them to remain in the informal sector. Unlike youth, the results show that increased regulatory flexibility reduces informal employment for adults with disabilities. These findings are like those reported in Table 3 and indicate that more flexible regulation encourages employers to formalize employment relationships and create jobs for adults with disabilities. Additionally, flexible regulation can create a more favorable environment for adults with disabilities, who typically possess more experience than young people, encouraging them to launch and manage their own businesses. Consequently, the introduction of a flexible regulatory framework may lead to more stable and secure employment opportunities for adults with disabilities. It is worth noting that *REG* is a composite regulation measure that combines all regulation areas (*CREG*, *LREG*, *BREG*, and *FREG*). Therefore, considering the different regulation areas may provide better insights into the impact of regulations on the informal

employment of youth and adults with disabilities. The analysis of credit market regulations (Model 2) demonstrates a divergent impact on the informal employment of PWDs across age groups. The findings suggest that *CMR* has no statistically significant effect on informal employment among youth, but it does reduce informal employment among adults with disabilities. Increased credit market flexibility reduces informal employment among adults with disabilities, likely due to their higher levels of financial literacy. This enables them to take advantage of improved credit access, facilitating their shift from informal to formal employment. In contrast, young PWDs may face challenges due to limited financial literacy, a lack of collateral, and higher perceived risk, making it difficult for them to access the credit market. Consequently, while flexible credit market regulations can decrease informal employment among adults with disabilities by promoting entrepreneurship and formal jobs, it has an insignificant impact on young PWDs. Furthermore, Model 3 indicates a positive correlation between flexible labor regulations and informal employment among both groups. The coefficient of *LREG* is positive in both groups and is significant at 1% level. For adults, greater flexibility in work arrangements, such as remote work and flexible hours, helps accommodate health-related needs and mobility challenges, leading to higher workforce participation and job retention [23]. For youth with disabilities, flexible labor market policies ease the school-to-work transition by offering part-time roles, internships, and vocational training, which enhance skill development and future employability [65].

Table 4. Regulation and informal employment of PWDs by age cohort.

Variables	Youth					Adult				
	<i>REG</i>	<i>CREG</i>	<i>LREG</i>	<i>BREG</i>	<i>FREG</i>	<i>REG</i>	<i>CREG</i>	<i>LREG</i>	<i>BREG</i>	<i>FREG</i>
<i>IET_{t-1}</i>	−0.406 (0.275)	−0.224 (0.265)	−0.081 (0.336)	−0.311 (0.394)	−0.199 (0.358)	0.479 ** (0.194)	0.530 *** (0.191)	0.439 ** (0.215)	0.447 ** (0.223)	0.347 (0.250)
<i>INF</i>	15.120 *** (3.177)	17.424 *** (3.964)	12.025 *** (3.728)	16.359 *** (4.249)	16.632 *** (4.160)	8.415 *** (3.028)	8.256 *** (3.079)	7.266 *** (2.810)	8.010 *** (2.975)	9.828 *** (3.534)
<i>HC</i>	−7.978 *** (2.184)	−4.436 *** (1.201)	−6.188 *** (2.002)	−3.608 *** (1.377)	−7.570 *** (2.317)	0.649 (0.402)	0.452 (0.386)	−1.329 * (0.776)	0.415 (0.332)	0.088 (0.424)
<i>GDP</i>	0.526 *** (0.088)	0.477 *** (0.089)	0.344 *** (0.076)	0.515 *** (0.120)	0.502 *** (0.118)	0.196 ** (0.087)	0.169 * (0.086)	0.198 ** (0.093)	0.211 ** (0.099)	0.256 ** (0.113)
<i>URB</i>	2.759 ** (1.123)	3.047 ** (1.336)	2.824 * (1.703)	4.745 ** (2.077)	−0.354 (1.144)	−1.149 ** (0.558)	−1.171 * (0.605)	−1.001 * (0.551)	−0.991 ** (0.493)	−1.373 ** (0.680)
<i>REG</i>	6.119 ** (3.008)	-	-	-	-	−1.427 * (0.806)	-	-	-	-
<i>CREG</i>	-	−0.695 (0.709)	-	-	-	-	−0.833 ** (0.345)	-	-	-
<i>LREG</i>	-	-	6.067 ** (2.558)	-	-	-	-	2.034 *** (0.695)	-	-
<i>BREG</i>	-	-	-	−2.432 ** (0.988)	-	-	-	-	−1.166 * (0.703)	-
<i>FREG</i>	-	-	-	-	6.407 ** (2.561)	-	-	-	-	−0.856 * (0.509)
<i>Constant</i>	−87.863 *** (17.509)	−90.336 *** (20.976)	−73.272 *** (21.048)	−91.081 *** (24.511)	−83.659 *** (22.421)	−32.100 *** (12.228)	−31.871 ** (12.645)	−31.541 ** (12.300)	−31.436 ** (12.245)	−38.461 *** (14.242)
AR (1) test	0.296	0.801	0.898	0.682	0.705	0.018	0.014	0.030	0.022	0.100
AR (2) test	0.012	0.103	0.051	0.039	0.100	0.811	0.896	0.731	0.793	0.647
Sargan test	0.216	0.101	0.139	0.388	0.298	0.459	0.423	0.479	0.427	0.620

Standard errors are reported in parentheses. For the AR (1), AR (2), and Sargan tests, *p*-values are reported. *** *p* < 0.01, ** *p* < 0.05, * *p* < 0.1.

The results indicate that flexible business regulations have a significant negative effect on informal employment for both adults and youth with disabilities. A 1% flexibility in business regulation reduces informal employment of adults and youth with disabilities by 2.432% and 1.166%, respectively. Therefore, despite some disparities, these findings align with previous results and suggest that easier business regulations facilitate the transition from the informal to the formal sector for PWDs. Finally, Model 5 shows that increased

freedom to compete negatively affects informal employment among adults with disabilities, while positively affecting it among youth. Indeed, a 1% increase in the freedom to compete index reduces the informal employment among adults with disabilities by 0.856%. This suggests that increased market competition, specifically through greater market openness and simplified business permits, can lower informal employment for this group. In contrast, a 1% rise in the freedom to compete index led to a 6.407% increase in informal employment among youth with disabilities. The results can be explained by the lack of experience among youth. A more open market creates informal opportunities where experience is less necessary, allowing them to enter the informal economy.

4.3. Robustness Checks

This section assesses the robustness of the two-step GMM estimator results using the Feasible Generalized Least Squares (FGLS) estimation technique, which accounts for potential heteroscedasticity and serial correlation in the data [56,66]. Table 5 reports the results for the aggregate population of PWDs, as well as for youth and adults, across the five models considered. The aggregate analysis indicates that overall regulations, credit market regulations, business regulations, and the freedom to compete have negative and statistically significant coefficients, whereas labor market regulations show a positive coefficient. These findings suggest that all regulatory areas, except labor market regulations, reduce the employment of PWDs in the informal sector. The FGLS results totally corroborate the findings obtained from the two-step system GMM estimator, providing evidence on the robustness of the previous conclusions. Although the two methodologies differ in nature—with the two-step system GMM addressing endogeneity in a dynamic panel data framework, and FGLS correcting for autocorrelation and heteroscedasticity—both approaches yield consistent findings. Once disaggregating the overall population by age group, the FGLS provides findings like the two-step system GMM regarding the impacts of regulation on adults with disabilities across the five considered models. Specifically, it shows negative effects in all regulatory areas, except for labor market regulations. These findings provide compelling evidence that the conclusions regarding adults are robust to the choice of estimation technique. Nevertheless, the results related to youth show some differences from those obtained previously. Among the five considered models, only labor market regulations and business regulations have statistically significant coefficients, with positive coefficients for *LREG* and negative coefficients for *BREG*. These findings are in line with the previously obtained coefficients for youth. In addition, the FGLS estimator confirms the insignificant effects of credit market regulations on the informal employment of youth with disabilities. The main differences between the two-step system GMM and FGLS results are evident in the overall regulation index and the freedom to compete index, both of which are found to be statistically insignificant. The insignificance of the overall regulation index may be due to its composite structure, as it combines four regulation areas. Conversely, the absence of statistically significant effects of *FREG* on informal employment among youth with disabilities under the FGLS estimation suggests that the earlier findings obtained using the two-step system GMM are sensitive to violations of classical assumptions, particularly autocorrelation and heteroscedasticity. Overall, the robustness analysis confirms that the results are generally insensitive to methodological issues, confirming that the two-step system GMM findings are robust.

Table 5. Regulation and informal employment of PWDs: FGLS estimation results.

Panel A. Aggregate Population										
Variables	REG		CREG		LREG		BREG		FREG	
INF	13.771 *** (3.416)		14.722 *** (3.389)		9.595 *** (2.803)		11.680 *** (3.194)		12.445 *** (3.420)	
HC	1.469 * (0.856)		1.110 (0.788)		−2.926 *** (0.849)		1.019 * (0.545)		0.801 (0.646)	
GDP	0.534 *** (0.061)		0.517 *** (0.060)		0.481 *** (0.058)		0.515 *** (0.059)		0.555 *** (0.061)	
URB	−2.456 *** (0.633)		−2.656 *** (0.547)		−2.435 *** (0.451)		−2.428 *** (0.632)		−2.472 *** (0.651)	
REG	−2.559 * (1.342)		-		-		-		-	
CREG	-		−1.716 *** (0.650)		-		-		-	
LREG	-		-		3.466 *** (0.583)		-		-	
BREG	-		-		-		−2.503 *** (0.531)		-	
FREG	-		-		-		-		−1.816 * (0.972)	
Constant	−54.332 *** (16.872)		−58.435 *** (16.636)		−40.353 *** (13.775)		−44.353 *** (15.649)		−49.373 *** (16.856)	
Panel B. Population by Age Group										
Variables	Youth					Adult				
	REG	CREG	LREG	BREG	FREG	REG	CREG	LREG	BREG	FREG
INF	12.955 *** (3.390)	14.189 *** (3.283)	10.956 *** (2.909)	13.544 *** (3.299)	12.552 *** (3.346)	14.353 *** (3.366)	15.185 *** (3.312)	10.263 *** (2.776)	12.598 *** (3.152)	13.278 *** (3.397)
HC	−2.172 (1.355)	−2.361 *** (0.868)	−4.190 *** (0.794)	−2.134 ** (0.925)	−1.921 (1.217)	1.424 * (0.828)	1.067 (0.756)	−2.724 *** (0.828)	0.893 * (0.527)	0.711 (0.648)
GDP	0.346 *** (0.056)	0.366 *** (0.054)	0.381 *** (0.056)	0.385 *** (0.057)	0.334 *** (0.058)	0.548 *** (0.060)	0.531 *** (0.058)	0.506 *** (0.057)	0.540 *** (0.057)	0.571 *** (0.060)
URB	2.519 ** (1.012)	2.229 ** (0.963)	2.780 *** (0.948)	3.368 *** (1.015)	2.615 ** (1.171)	−2.589 *** (0.613)	−2.809 *** (0.517)	−2.704 *** (0.426)	−2.527 *** (0.601)	−2.743 *** (0.636)
REG	−0.471 (2.144)	-	-	-	-	−2.586 ** (1.300)	-	-	-	-
CREG	-	−0.398 (0.508)	-	-	-	-	−1.712 *** (0.630)	-	-	-
LREG	-	-	4.560 *** (0.982)	-	-	-	-	3.100 *** (0.551)	-	-
BREG	-	-	-	−1.600 ** (0.695)	-	-	-	-	−2.520 *** (0.514)	-
FREG	-	-	-	-	−0.948 (1.604)	-	-	-	-	−1.652 * (0.943)
Constant	−69.197 *** (16.998)	−74.075 *** (16.808)	−69.345 *** (15.177)	−74.738 *** (16.781)	−66.777 *** (17.213)	−56.777 *** (16.619)	−60.305 *** (16.260)	−42.566 *** (13.612)	−48.728 *** (15.431)	−53.189 *** (16.710)

Standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5. Discussion

The results reveal heterogeneous effects of different regulatory areas on the aggregate population of PWDs and across the different age groups. The analysis indicates that both aggregate regulations and specific regulatory areas, namely, credit market regulations, business regulations, and freedom to compete, are associated with lower levels of informal employment among PWDs and adults. Indeed, reducing the overall stringency of regulations governing the formal economy can significantly decrease informal employment for PWDs and induce their integration into the formal economy. A flexible regulatory framework that addresses issues like regulatory burden, tax compliance, redundancy procedures, and related costs can enable PWDs to establish their own businesses within the formal sector. The negative association between credit market flexibility and informal employment aligns with evidence suggesting that financial inclusion and access to credit

reduce informality by facilitating formal entrepreneurship [67,68]. For adults with disabilities, easier access to credit may enable business creation and self-employment within the formal economy, mitigating dependence on informal work. The results may be attributed to the better financial literacy of adults with disabilities, which enables them to effectively leverage the increased flexibility and easy access to the credit market to start businesses, thereby facilitating their transition from the informal to the formal economy. Conversely, for youth with disabilities, limited financial literacy hinders the translation of credit market opportunities into formal employment, explaining the insignificant effects observed [69]. This idea gains support from findings that emphasize the role of adaptive financial technologies and non-discriminatory financial services in promoting economic participation among PWDs [70].

The results also indicate that labor market regulations significantly contribute to higher levels of informal employment for both youth and adults with disabilities. The positive correlation between labor market regulation and informal employment among PWDs corroborates previous findings by [71–73], who revealed a positive relationship between labor market regulations and the expansion of the informal economy. Indeed, flexible labor market regulations, including minimum wage setting, hiring and firing procedures, and adaptable wage determination, help reduce unemployment rates and increase demand for labor within the formal economy [74]. While a rise in formal sector labor demand presents opportunities for people without disabilities, it could induce employment challenges for PWDs. This is because employers, potentially driven by a lack of inclusive practices and flexible labor market regulations, may prioritize hiring people without disabilities. Accordingly, both youth and adults with disabilities may find themselves in the informal labor market due to flexible labor market regulations. This underscores the need for inclusive labor market reforms that balance flexibility with employment protection for vulnerable populations [75].

The negative and significant impact of business regulations on informal employment among PWDs suggests that greater business flexibility is associated with reduced informal employment among both youth and adults with disabilities. These findings contrast with the findings of [76], who reported no significant relationship between business regulation and informal employment. These outcomes may be explained by the fact that a flexible business regulatory environment, characterized by lower regulatory burden, bureaucracy costs, fair public administration, and easier tax compliance, may encourage PWDs to create formal businesses and engage in entrepreneurial activities. Simplified business registration and lower compliance costs create opportunities for PWDs to participate in formal economic activities, either as entrepreneurs or wage workers. This, in turn, could reduce the informal employment of PWDs and foster their integration into the formal economy. Similarly, the two-step system GMM results suggest that greater freedom to compete is associated with a reduction in informal employment among adults with disabilities, but an increase among youth with disabilities. This finding partially aligns with [77,78], who concluded that economic freedom generally reduces the size of the informal economy. However, robustness checks reveal that these effects are not statistically significant for youth with disabilities, indicating that the initial results lack robustness.

The findings also highlight significant age-based disparities. Adults with disabilities benefit more from flexible credit and business regulations, whereas youth remain more exposed to the informal sector. These findings are in line with [79], who notes that youth with disabilities may face greater barriers in transitioning from education to work, even in more open labor markets. Therefore, policy interventions should adopt an age-sensitive and capability-based approach, ensuring that regulatory reforms do not deepen inequalities for some vulnerable populations. These results differ from those of the aggregate

population and adults with disabilities, as they suggest that competition regulations do not allow attracting youth with disabilities to the formal labor market but instead increase their participation in the informal labor market. This could be attributed to the fact that growing market competition may favor adults with disabilities in joining the formal labor market, potentially at the expense of youth with disabilities, who will seek employment opportunities in the informal economy. The distinct ways in which informal employment responds to regulations among youth and adults could be a consequence of underlying differences in the skills and experience profiles of each group.

Finally, the empirical findings suggest that rising inflation contributes to higher levels of informal employment among PWDs by affecting both employers and employees. The deterioration of purchasing power and increased cost of living due to inflation push PWDs, who often face barriers to formal employment, towards informal jobs for immediate income. Ref. [80] noted that high inflation often compels individuals to seek additional income via informal employment. At the same time, employers may reduce formal hiring and shift to the informal sector to reduce costs in the presence of high inflation rates and rising input costs. The informal sector, characterized by low barriers to entry and flexibility, serves as a source of jobs and income, particularly for vulnerable groups such as PWDs. Finally, inflation can place pressure on public budgets, leading to cuts in government programs or subsidies that promote formal employment, thereby driving PWDs toward the informal sector [81].

6. Conclusions

6.1. Summary of the Findings

This study examined the impact of various market regulation areas on the informal employment of PWDs across 15 countries from 2007 to 2022, utilizing the dynamic two-step system GMM technique. Five market regulation areas were considered in the analysis: aggregate regulation, credit market regulation, labor market regulation, business regulation, and freedom to compete. This empirical investigation extends beyond analyzing the impact of regulation on the overall informal employment of PWDs by accounting for different age cohorts (adults and youth).

The results indicate a notable heterogeneity in the effect of different regulation areas on the informal employment of PWDs, observed both at the aggregate level and across the different age groups. At the aggregate level, the system GMM technique shows that the flexibility in aggregate regulation, credit market regulation, business regulation, and freedom to compete reduces the informal employment of PWDs. This suggests that greater regulatory flexibility is crucial for reducing informal employment among PWDs and encouraging their integration into the formal economy. On the other hand, labor market regulation is found to increase the informal employment of PWDs. Upon disaggregating the population by age cohort, the analysis yields findings for adults with disabilities that are consistent with the aggregate analysis. In contrast, for youths with disabilities, the results highlight that more flexibility in the aggregate regulation, labor market regulation, and freedom to compete increases the informal employment of youth with disabilities, reflecting how certain frameworks may open up informal opportunities for younger individuals. Conversely, business regulation has a negative influence on youth with disabilities, while credit market regulation has no significant effects. The robustness analysis conducted using the FGLS estimator generally confirmed the validity of the two-step system GMM for all regulatory areas and population groups, reinforcing confidence in the conclusions.

6.2. Policy Implications

The findings of this study contribute to the existing body of knowledge regarding the impacts of regulatory frameworks on the informal employment of PWDs, while also providing significant policy implications. The results highlight the varying relationship between the different regulatory areas and the informal employment of PWDs, emphasizing the need for targeted policy interventions. First, the observed effects of business regulation, credit market regulation, and freedom to compete on informal employment suggest that reducing regulatory burdens in these areas may decrease engagement in the informal economy and facilitate integration into the formal labor market. This could be achieved by simplifying business registration, lowering licensing costs, and providing tax incentives to enhance the business environment. These measures can reduce barriers to formalization for PWDs in the informal sector and facilitate their integration into the formal sector. At the same time, expanding access to microcredit and reducing financing costs can help PWDs in the informal sector secure the resources needed to transition into the formal sector. Enhancing the freedom to compete through the enforcement of antitrust laws, the elimination of preferential treatments, and the opening of restricted sectors may further promote opportunities for PWDs. Second, although more flexibility within the credit market gives advantages to adults with disabilities, youth PWDs are less likely to experience comparable benefits due to structural disadvantages, including limited financial literacy. Therefore, targeted interventions are needed to ensure that youth PWDs can also benefit from credit market flexibility to integrate into the formal labor market. These could include financial literacy initiatives, subsidized lending schemes, and mentorship, along with business development services customized to their needs. Furthermore, incorporating inclusive finance courses into youth academic programs can help bridge the gap, thereby enabling them to shift into formal employment. Third, the findings indicate that labor market flexibility results in more informal employment among PWDs, as employers might be less willing to hire them, considering them higher-risk and less productive workers. To address this issue, labor market reforms should be inclusive by incorporating specific measures to protect the economic rights of PWDs. This includes enforcing anti-discrimination laws, providing suitable accommodation within the workplace, and offering incentives to employers, such as wage subsidies or tax benefits. Finally, implementing employment quotas in both the public and private sectors can aid in preserving formal employment opportunities for PWDs. Together, these reforms may reduce the informal employment of PWDs and support their integration into the formal economy.

6.3. Limitations and Future Research

While this study is among the first to explore the impact of regulations on the employment of PWDs in the informal sector and provides novel empirical evidence, there are still several areas for improvement. First, this study only examined 15 countries, which may limit the generalizability of the findings to other geographic regions, especially low-income countries with weaker enforcement capabilities. Future research could utilize survey datasets that cover a broader geographic area. Second, the regulatory indicators used in this study are broad and may not fully capture disability-specific legislation or how well it is implemented. In future research, it is better to analyze the effects of disability laws, such as anti-discrimination policies or hiring quotas, on the informal employment of PWDs. Third, the analysis is limited to youth and adult groups, without considering gender or educational level, which is important for assessing how regulation affects informal employment among PWDs. Finally, although the present research distinguishes between youth and adults, it does not account for the significant heterogeneity within the disability population. People with different types of disabilities, such as physical,

intellectual, and psychosocial, are likely to face different challenges in the labor market. Due to data limitations, this dimension has not been examined in the present study. Future research using survey-based datasets could provide deeper insights into how regulations affect job creation for people with specific types of disabilities.

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Appendix A

Table A1. Components of the different areas of regulation.

Area of Regulation	Components
A. Credit market regulation	Ownership of banks
	Private sector credit
	Interest rate controls/negative real interest rates
B. Labor market regulation	Labor regulations and minimum wage
	Hiring and firing regulations
	Flexible wage determination
	Hours' regulation
	Costs of worker dismissal
	Conscription
C. Business regulation	Foreign labor
	Regulatory burden
	Bureaucracy costs
	Impartial public administration
D. Freedom to compete	Tax compliance
	Market openness
	Business permits
	Distortion of business environment

Note: A higher value on the different indices corresponds to a greater degree of flexibility/freedom. Source: [82].

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