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Determinants of Informal Competition faced by Formal Firms in Pakistan: An Empirical Evaluation from 2013 World Bank Enterprise Survey

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There is no denying in the fact that informal sector of any economy offers employment flexibility by absorbing a pool of labor force. However, the rapid progression of the informal sector in Pakistan and the consequent increase in competition faced by the formal firms urge a need to understand the dynamics of informal competition. The current study is an attempt to identify the core factors responsible for the incidence of informal competition faced by formal firms in Pakistan, along with an investigation of the determinants of the severity of this competition. The study investigates the variables of firm's characteristics and regulatory measures in order to examine the incidence and severity of informal competition faced by formal firms employing World Bank Enterprise Survey 2013 (WBES). The study not only conducts frequency analysis of the variables but based on the nature of data; it uses the logit and ordered logit techniques to determine the significant variables. The results of the study show that out of total of 1125 formal firms used in the analysis, 583 firms (46.75%) reported facing informal competition. Among these firms facing informal competition, only 16.98% reported informal competition as no obstacle in terms of its severity, however, rests of the firms (almost 83 %) consider the severity of informal competition as an obstacle in one or the other form and consider informal competition as a threat to their businesses. The result of logit model shows that characteristics of formal firms resembling more to the informal firms in terms of size and locality have more likelihood of facing the informal competition. However, in determining the severity of informal competition through the ordered logit model, the regulatory variables such as taxation, licensing & permits and corruption are found to be more significant and relevant. These results call on to introduce regulatory reforms making the regulatory system less burdensome and better enforcement mechanism of those reforms. There's a need to create ease for the existing formal firms to fulfill the regulatory requirements as well as encourage the informal firms to join the mainstream formal setup of economy. Furthermore, the current research can be extended by availing the latest dataset to explore the dynamics of informal sector and the resultant competition for the formal firms in an ever-changing business environment.

Keywords*:* informal competition, formal firms, firm characteristics, regulatory environment.

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Job creation is a challenge for any government, nevertheless, the two goals of job creation and an efficient regulatory environment seem to move in opposite direction. Micro and small enterprises are generally an appropriate source of job creation, nonetheless, owing to their enlisting in the informal economy, many such organizations remain outside the regulatory framework (Leyva & Urrutia, 2020). Although there are multiple definitions of the informal economy, nevertheless, there are certain dominant characteristics of the entities clubbed in it, such as they involve small scale production, more labour-intensive nature, and an absence of formal labour contracts or guarantees. In the Fifteenth International Conference of Labour Statisticians, the ILO defined the informal sector as comprising unregistered enterprises that are unincorporated entities owned by individuals that are not formal legal entities (ILO,2000). OECD (1997), categorized the informal sector as enterprises either founded mostly in residencies rather than formal legal unit, having little capital input and partially or fully managed by family workers.

During the 1980s, the informal economy grew specifically in periods of economic adjustments, hence regarded as a feature of transition economy (Johnson, Kaufmann, & Schleifer 1997). According to Carr and Chen (2002), the era of the 1990s experienced the changing trend in world economics due to globalization and economic integration; changing the dynamics and underpinnings of the informal economy. Businesses started to shift towards informal arrangements to gain a competitive edge to minimize costs; trends of outsourcing the labour-intensive units and offshoring, popularized. Despite the documented evidence about the merits of the informal economy (Rossis, 2011; Thai & Turkina, 2013; Davis & Garb, 2015; Mukherjee, 2016; Etambakonga & Roloff, 2020), it is criticized mainly due to the issues of tax-evasion, and an ability to stay out of the regulatory framework (Ali & Najman, 2015). The informal sector grew, despite the prediction and suspicion of being absorbed by the formal sector. In the contemporary world, the informal sector has become a large source of employment generation and output production. There is a noteworthy convergence of interest in the informal economy as more and more development scholars and practitioners recognize that it is here to stay, in both new and old guises. The increasing size and worldwide practice of informal activities have its ramifications on the formal setup of the economy. Many researchers have argued that the informal sector is less productive, an unskilled labour-intensive sector with deficient financial base, improper infrastructure, regulation, and social benefits (De Soto, 1989, 2001; Djankov et al., 2005; Galal, 2005; Gardes & Starzec, 2009; El-Hamidi, 2011). There are certain factors considered to influence the severity of informal competition, such as financial constraints, corruption, labour regulations, and firm size (Friesen & Wacker, 2013; González & Lammana, 2007). Although many dimensions of the informal economy have

been studied by the researchers; nevertheless, research on the aspect of informal competition faced by formal firms, remains qualified (Ali & Najman, 2017).

Why the topic of informal competition is worth researching upon? Globally, a significant proportion of the workforce is engaged in the informal sector. According to International Labour Organization, the informal economy comprises half to three-quarters of all non-agricultural employment in developing countries, whereas it ranges from 6-20% in developed Eastern Europe and Commonwealth countries (ILO, 2002). Albeit it acts as a last resort for the unemployed stratum of the labour force, however, it generates an economic activity in the country which is beyond government control. According to the Labour Force Survey 2017-18, the share of employment in the informal sector is 72% of the total employments outside the agriculture sector; the proportion is even higher in the rural settings — 76% share of informal economy in the rural areas (PBS, 2018). With such a large share of the informal sector, it is judicious to analyse the intensity of competition exerted from it towards the formal sector. It is pertinent to explore the power of the informal sector because it may exploit labour, indulge in tax evasion, and minimize government's revenue due to no legal compulsion on it to comply with the regulatory requirements. Despite the criticism on the informal economy an alternative discourse is also taken by researchers; Mccan and Bahl (2017), empirically proved that competition from the informal firms can force the formal ones to develop new and better products. The informal economy has enabled countries like Russia and other states of the former Communist Bloc, to generate bearing-capacity against the shocks of economic and political transition of the 1990s; the informal firms satisfied the consumer demand and generated jobs to the population during the frugal times — typical of transition recession (Zabyelina, 2012).

Whether the informal economy is in interests of a country or against it, shall be a digression from the focal point of the current study; nevertheless, it can be inferred from the literature that it is important to analyse the strength of the informal sector so that when either government or the stakeholders in the formal sector, devise a strategy to deal with these firms then they have an idea of the potential of this sector. By analysing the extent of pressure from the informal sector, this study offers a starting point for the policymakers. To the best of our knowledge, all the previous studies in the domain relevant to the under study, have been conducted, predominantly in Latin America (González & Lamanna, 2007), Southeast Europe (Hudson et al., 2012), and Sub-Saharan African countries (Ali & Najman, 2017). The literature on the informal economy in the case of Pakistan is limited either to the calculation of the size of the informal sector, or to the reasons for the existence and

progression of the informal economy (Arby, Malik & Hanif, 2010; Kemal & Mahmood, 1998; Williams, Shahid & Martinez, 2016; Tahir & Tahir, 2012). Analysis of determinants of informal competition faced by formal firms in Pakistan is an untapped area; it becomes pertinent in the current scenario of the proliferating informal firms in Pakistan that an insightful study should be attempted to identify the core variables either relating to the firm's characteristics or regulatory measures to determine the extent and intensity of informal competition faced by formal firms. This study attempts to bridge that gap in the existing literature by investigating the role of a firm's characteristics and regulatory environment in determining the severity of informal competition faced by formal firms.

Literature Review

The informal economy and its linkages with the rest of the economy have remained a topic of debate in economics from several decades. Less productivity and inefficiency are often regarded as the main characteristics of firms operating informally; lack of access to financial resources and major reliance on labor as a factor of production, has been discussed as the basic reasons for the low productivity of informal firms (Friesen & Wacker, 2013). According to La Porta and Shleifer (2008), informal firms are extremely inefficient, small and unproductive compared to their formal counterparts; it is worth investigating that how this inefficiency and low productivity poses a threat for relatively efficient, resourceful and productive firms operating in a formal environment

Researchers have argued that there are different reasons for the firms to operate informally, such as the tax system, labor regulations, and social security systems (Blackburn, Bose, & Capasso, 2012; Khuong et al., 2020). Jha and Bag (2019), concluded that the topmost factors for the existence of the informal sector in India, are the lack of awareness and competition. Williams and Kedir (2017), analysed the World Bank Enterprise Survey data for Turkey; they concluded that formal firms that started from informal sector, have significantly higher productivity, growth rates, and annual sales. Damayanti, Scott, and Ruhanen (2018), used qualitative methods to conclude that in Indonesia, the informal workers serve as the backbone of the tourism sector. There are some promising features of the informal sector, such as their role in forcing the formal firms to offer innovative products and services under a market-competitive pricing structure (Mendi & Costamagna, 2017; Belete, 2018; Sheikh, 2019; Sharma & Kumar, 2019). Leyva and Urrutia (2020) developed a model for frictional labor markets, typical of a small open-economy model with informal sector; model was applied on the Mexican economy, by making use of the Encuesta Nacional de Ocupación y Empleo survey. Leyva and Urrutia (2020), discussed that the informal sector

helps to offset the impact of a tight regulatory framework for monitoring the fluctuations in employment.

Many researchers have discussed the factors that invoke the exertion of competition from the informal firms against their formal counterparts. The informal firms are characterized by the small size and single owners which enable them to have greater flexibility in terms of decisions related to internal matters, production processes, and labor management, informal firms are particularly responsive in times of market shocks, consequently are able to enter or exit markets, in accordance with the market forces (Saviotti & Pyka, 2008; Duchêne & Rusin, 2002; Gülbiten & Taymaz, 2000). By evading taxes and regulatory costs, not only a cost advantage is created for informal firms, rather it also leads to an informal competition faced by formal firms. The aforementioned cost advantage enables the informal firms to take market share from formal firms —by offering cheaper alternate products; higher the cost differential between formal and informal firms, greater will be the extent of informal competition towards formal firms. (La Porta & Shleifer, 2008; Schneider, Buehn & Montenegro, 2010; Mrkajić et al., 2018). Financial constraints that restrict the ability of the firms to innovate and invest as well as ill-designed labor market regulations, corruption, and firm size are significant contributors that determine the intensity of competition to be faced by formal firms from informal firms (Friesen & Wacker, 2013). Moreover, formal firms with low cost to entry and higher government regulatory frameworks face more informal competition (González & Lamanna (2007)).

A sufficient amount of work is present in an international context that investigates the informal sector and competition arising from it that affects the formal sector; nonetheless, the literature on the informal economy in the case of Pakistan is limited only to a few domains. Some studies have tried to estimate the size of the informal economy of Pakistan, while others have investigated the reasons for firms' enlisting and continuance in the informal economy (Kemal & Mahmood, 1998; Williams, Shahid & Martinez, 2016; Tahir & Tahir, 2012; Lent et al., 2019; Hayat & Rashid, 2020). Apart from these domains, there exist evidence of causation inquiries pertinent to the informal sector of Pakistan, for instance, Wu et al., (2019) analyzed the nexus between trade openness and an expansionary informal sector; a flexible informal sector is expected to yield the benefits from liberalization. Goel and Rehman (2020), analyzed the garment industry of Pakistan; garment exporters in the country that are formal firms registered under sole proprietorship, are more likely to collaborate with the informal sector to meet the demand pressure.

This study adds in the existing literature by investigating an important dimension in the informal sector of Pakistan. On account of a rapidly growing informal economy and the resultant competition arising from that sector, give rise to serious repercussions for the formal sector. This study thus intends to investigate the role of a firm's characteristics and regulatory environment in determining the severity of informal competition faced by formal firms. This study is a unique attempt to fill a crucial gap in the literature; by using empirical evidence from Pakistan, it shall offer a plan of action for the formal firms, and the relevant stakeholders to envisage an idea about the likelihood of pressure from the informal firms. This study is important because if it concludes a noticeable existence of the competition from informal firms, then it can offer newer avenues of research, for instance, the likelihood of increased attempt for innovation by the formal firms, consequent upon the aforementioned competition.

Method

In order to examine the factors that determine the presence and severity of informal competition faced by formal firms, this study employs following two models.

IC = f (Firm characteristics, Regulatory environment, Sectors/Industrie Model 1

SIC = f (Firm characteristics, Regulatory environment, Sectors/ Industries) Model 2

The dependent variable in model 1 is IC, it shows the incidence of informal competition faced by formal firms, while SIC is the dependent variable in model 2 which captures the severity of informal competition faced by formal firms. The explanatory variables are the firm's characteristics, regulatory environment, and sector(industries). The current study utilizes these explanatory variables as determinant of IC and SIC, following the studies of (Gonzalez & Lamanna, 2007; Friesen & Wacker, 2013; Hibbs & Piculescu, 2010; Hudson et al., 2012). These studies further subdivide the variables of firm's characteristics, regulatory environment and sector (industries) into sub-variables to identify the core individual component of these broad categories that can determine the presence and severity of informal competition faced by formal firms. Utilizing the sub-components as identified by the above-mentioned studies, the current study presents the following elaborated form of model 1 and model 2

$$IC_i = \alpha_0 + \alpha_1 A_i + \alpha_2 S_i + \alpha_3 SP + \alpha T_{4i} + \alpha_5 C_i + \alpha_6 Tax_i + \alpha_7 Ins_i + \alpha_8 PI_i + \alpha_9 Per_i + \alpha_{10} Corr_i + \alpha_{11} F_i + \alpha_{12} Chi + \alpha_{13} G_i + \alpha_{14} MV_i + \alpha_{15} OM_i + \alpha_{16} NMMP_i + \alpha_{17} RW_i + \alpha_{18} Text_i + \varepsilon i \quad \textbf{(Eq 1)}$$

$SIC_i = \beta_0 + \beta_1 A_i + \beta_2 S_i + \beta_3 SP + \beta_4 T_i + \beta_5 C_i + \beta_6 Tax_i + \beta_7 Ins_i + \beta_8 PI_i + \beta_9 Per_i + \beta 10 Corr_i + \beta_{11} F_i + \beta_{12} Ch_i + \beta_{13} G_i + \beta_{14} MV_i + \beta_{15} OM_i + \beta_{16} NMMP_i + \beta_{17} RW_i + \beta_{18} Text_i + \varepsilon i$ **(Eq 2)**

In Equation 1 and 2, explanatory variable of Firm's characteristics is captured by following sub-variables: A=age, S= small size, SP= sole-proprietor, T= town, C= credit. The regulatory environment is captured by following sub variables: Tax= taxation, Ins= inspections, PI= political instability, Per= Permits, Corr= corruption. The last independent variable of sectors (industries), is covered by: F= food, Ch=chemicals, G= garments, MV= motor vehicles, OM= other manufacturing, NMMP= non-metallic mineral products, RW= retail and wholesale, Text=Textile, and finally the εi represent the error term in the empirical equations.

Variables Description

In model 1, the dependent variable i.e., informal competition is a response of formal firms indicating whether it is facing competition from informal firms. This variable is binary in nature; 1 denotes a firm facing competition, while 0 is the contrary. This information is captured from the survey's question for formal firms —whether they face informal competition or not.

The dependent variable in model 2, is the severity of the informal competition faced by formal firms. It is a categorical variable having four categories from 0-3; 0 indicates no obstacle, while 3 denotes informal competition faced by the formal firm as a major obstacle. This variable is captured through formal firms' response to a question regarding their perception about considering informal competition as an obstacle to their operations.

The independent variable named firm characteristics includes small size, age, sole proprietorship, town, and credit as sub-variables. Small size is a dichotomous variable; 1 referring to the small size, while 0 represents otherwise. The age variable is continuous, determined from the year of establishment of the respective firm. Sole proprietor variable takes the value 1, if a firm is owned by a sole proprietor, while 0 represents otherwise.

A location is declared as a town if the population in the area of the firm's location is between 50,000 to 100,000, and it is not a capital city. The Credit variable records the overdraft facility or line of credit from a bank; it is coded as 1 if the respective firm availed it, and 0 otherwise. The regulatory environment is the second independent variable which includes taxation, inspection, licensing and permits, political instability, and corruption as sub-variables. These variables, except inspection, are constructed from the

responses of formal firms where they are directly asked, 'to what degree they regard these variables as an obstacle' each variable is asked separately on a 7 points scale. Taxation is a categorical variable ranging from 1-7, where 1 represents tax as no obstacle, while 5 indicates tax as a severe obstacle for a firm, 6 and 7 corresponding to don't know, and doesn't apply. The variable inspection, depicts whether inspection(s) were held over the last year of the survey 2013 i.e., year of the survey used for the study. The extent to which firms faced licensing and permit as an obstacle is measured on a scale of 1-7, where 1 represents no obstacle and 5 as a severe obstacle, 6 and 7 represents "don't know" and "doesn't apply", respectively. The same scale is used for political instability and corruption variables. Variable of inspection is captured through the response of a firm to a question asking if the firm was inspected during the last year, the firm responded by choosing among the given options of "no", "yes" or "don't know", coded as 1, 2, and 3, respectively. The third independent variable, or the factor affecting the informal competition and its severity is the sector; it includes textiles, garments, motor vehicles, chemicals, other manufacturing industries, non-metallic mineral products, retail & wholesale, and food. This variable is used as a dummy variable; the reference category is other services.

Data

Data for 1247 firms were obtained from World Bank Enterprise Survey (WBES)—2013 for Pakistan; WBES represents formal firms in non-agricultural private economy, including small, medium, and large businesses in manufacturing, service, transportation, and construction sectors, it excludes the agricultural sector (The World Bank Group, 2015). This extracted data uses stratified random sampling. Three levels of stratification are used by WBES for Pakistan: industry, establishment size, and region—details of data stratification included in the appendix A1. WBES survey focuses on infrastructure, trade, access to finance, regulation & taxes, corruption, crime & informality, labor & firm's performance, and perception about barriers to doing business. The information or the statistics collected by WBES is of significant importance to researchers and policymakers for linking the state's business climates with the performance of the firm, moreover, for the comparison of their outcomes within and across the states. This survey is unique in a sense that it provides information regarding the intensity of competition arising from the informal sector; therefore, it is widely used for analyses of the intensity of competition (Friesen & Wacker, 2013; Gonzalez & Lamanna, 2007; Ali & Najman, 2017; Hudson et al., 2012; La Porta & Shleifer, 2008). Since WBES provides information regarding small enterprises along with medium and large enterprises, it is much helpful for the investigation of competition generated by informal firms over formal firms, making WBES the most suitable survey to carry out such kind of research.

Estimation Methodology

This study analyses the presence and severity of informal competition, faced by formal firms. It uses logit and ordered logit techniques, respectively according to the nature of dependent variables; STATA 14 has been used for data analysis. The dependent variable in model 1 is binary, therefore, traditional OLS regression doesn't provide appropriate results[1]; consequently, the logit model has been used for estimation. The model 2 contains more than two responses for the dependent variable, in this scenario ordered logit has been used for analysis; in such a scenario, there is a choice to use either logit or probit model, while the choice depends on the preference of the user. This is due to the fact that irrespective of whether logit or probit is used, the coefficients and standard errors of one model may be easily converted into the other. Independent variables in this study are individual responses of firms, hence there is no suspected issue of endogeneity; also, there is no issue of collinearity among all the included independent variables. Correlation among independent variables is given in Appendix (A2).

The test proposed by Hosmer and Lemeshow (2000), is commonly used to check the goodness of fit of the logit model; by accepting the null hypothesis "model fits well", the goodness of fit is established through this test. For the ordered logit model, the Wald test is used to determine the significance of the explanatory power of the variables that are added to the model. The Wald tests the hypothesis, of zero value, simultaneously, of all the parameters of interest; if they are, this strongly suggests that removing them from the model will not substantially reduce the fit of that model. In other words, a predictor whose coefficient is minuscule relative to its standard error, is not improving the prediction of the dependent variable.

Results and Discussion

Total number of formal firms (N) sampled for the study were 1125, out of which, 583 (almost 52%) confirmed that they are facing competition from the informal firms, while the remaining 48% didn't face informal competition. The summary of the frequency analysis of these 583 firms' key traits regarding their characteristics, regulatory environment and sector (industries) is presented in Table 1, 2, and 3. The important stylized facts from descriptive summary of variables for firm's characteristics presented in

[1]In such cases where the dependent variable is discrete, has more than two possible outcomes and the outcomes have a natural ordering but distances between them are unknown and not necessarily meaningful (Long and Freese, 2006, p. 137), the linear regression framework is inappropriate because a discrete dependent variable violates the Gauss-Markov assumptions and can lead to incorrect conclusions (McKelvey and Zavoina, 1975). Instead, a (non-linear) ordered response model has to be used.

Table 1, show that formal firms resembling more to the informal firms, in terms of their characteristics are more likely to face informal competition[2]. Almost 49% of the firms that reported that they face informal competition are small-sized, as compared to medium and large sized firms; moreover, 40% of firms facing informal competition, are located in town as compared to any other location. The variable of sole proprietorship, is the most significant one; almost 77% of the firms claiming to face informal competition belong to this category. It implies that a great majority of formal firms facing informal competition are sole properties, they are not big enterprises(entities). The sole proprietorship allows the firms to have greater flexibility in terms of decisions related to internal matters, production processes, and labor management; such flexibility is an important characteristic of an informal firm. For remaining variables, 32% of the formal firms facing informal competition use the credit facility, while 54.80% of the formal firms facing informal competition, had inspections from a regulatory body.

Table 1

Percentage of formal firms facing Informal Competition based on their characteristics

Variables	**Formal Firms facing Informal Competition (Percentage)**
Small size	48.90
Town	40.30
Sole Proprietor	76.67
Credit	32.70
Inspections	54.80

[2] The sum of the categories is greater than 100, because the categories are non-mutually exclusive.

Table 2 represents the cross-tabulation for the firms facing informal competition, with respect to the variables that represent the regulatory environment. These variables have been scaled on the basis of severity of obstacle faced by the firms and ranges from the category of no obstacle to severe obstacle. As Table 2 shows, majority of the responses for all the variables except for the Licensing and Permits, fall under the scale of moderate, major and severe obstacles. Almost 65% responses for all these regulatory variables (except for, Licensing and Permits) with slight variations, are covered under moderate to severe obstacles. This implies that taxation, political instability and corruption are perceived to be significant obstacles by those formal firms who face informal competition.

Table 2

Formal firms facing Informal Competition w.r.t Regulatory Variables[1].

Variables	No Obstacle	Minor Obstacle	Moderate Obstacle	Major Obstacle	Severe Obstacle
Taxation	13.03	18.35	20.75	29.33	16.80
Political Instability	16.63	18.19	16.29	20.24	26.90
Licensing & Permits	34.63	23.67	19.21	13.20	6.68
Corruption	16.63	18.18	16.29	20.24	26.92

1. *Figures in the table are percentages*

Table 3, exhibits the occurrence of informal competition across the firms working in various sectors. Except the “other manufacturers” category, the informal competition faced by formal firms in all other sectors is low. The informal competition faced by formal firms is highest in the “other manufacturers” category (33.10 %), while for all other sectors, it lies in the range of almost 3 % (for motor vehicles) to 13.7 % (for food). These percentages for various sectors show that the firms belonging to major manufacturing sectors, such as textile, garments, food, face less informal competition and may be considered large enterprises, in contrast to the firms belonging to the category of other manufactures.

Table 3
Occurrence of informal competition across different sectors

Variables	Percentage
Textiles	9.70
Food	13.7
Garments	5.80
Motor vehicles	2.90
Chemicals	6.10
Other manufacturers	33.1
Non-metallic mineral products	9.40
Retail and Wholesale	8.20

Table 4 exhibits the severity of informal competition which is the dependent variable in the second model. Out of 583 formal firms facing informal competition, only 16.98% reported informal competition as no obstacle in terms of its severity. However, rest of the firms (almost 83%) consider the severity of informal competition as an obstacle, in one or the other form. The important implication of this cross-tab is that a significant percentage of the firms (almost 40%) consider its severity level as moderate and major obstacle, they perceive informal competition as a threat to their businesses.

Table 4
Perception about the severity of informal competition

Variables	Percentage
No obstacle	16.98
Minor obstacle	34.82
Moderate obstacle	28.99
Major obstacle	19.21

Next, we applied a binary logistic regression model treating informal competition as a dependent variable; results are reported in Table 5. Results show that the small size of a firm is a significant predictor of informal competition; if the size of the firm is "k" then the odds of facing informal competition for size=(k+1), are 1.258 times higher than the odds of facing informal competition for size=k. This can be explicated as follows: an increase in size makes the firm a potential threat for other firms, hence the likelihood of competition increases. Age of the firm is another significant variable increasing the likelihood of firms facing informal competition; if the age of the firm is "a" then the odds of facing informal competition for age= (a+1), are 1.031 times higher than the odds of facing informal competition for age=a. The odds of facing informal competition are 1.259 times higher for

firms operating in a town, compared to those working in other types of areas. The odds of facing informal competition are 1.116 times higher for sole proprietor firms, compared to firms with different types of ownership structure. Reliance on credit facility decreases the likelihood of informal competition; the odds-ratio is less than 1 for credit variable. Out of the regulatory variables, taxation is significant, while licensing and permits and political instability are found to be statistically highly significant. The more a firm perceives taxation as an obstacle —implying burdensome taxation system, higher the likelihood of facing informal competition; the odds of facing informal competition are 1.121 times higher for firms reporting taxation as an obstacle, compared to those firms that do not find taxation as an obstacle. The firm's perception of licensing & permit requirement as a burden decreases the likelihood of facing informal competition; the odds-ratio is less than 1. Political instability increases the likelihood of firms facing informal competition; the odds of facing informal competition are 1.133 times higher for firms finding political instability as an obstacle, as compared to those firms that do not find political instability as an obstacle. The variable representing visits of regulatory bodies for inspection purposes, has a negative sign which is in accordance with the theory, while the coefficient for corruption variable, is in contradiction to theory; nevertheless, both the variables in this study are statistically insignificant. The firm belonging to textiles, food, garments, motor vehicles, chemicals, non-metallic mineral products, and retail & wholesale, has less likelihood of facing informal competition as compared to other services' sector. Firm operating in other manufacturing sector has more likelihood of facing informal competition as compared to other services' sector. Hosmer and Lemeshow test of goodness of fit, has a significant value of 0.786 showing that the model is a good fit — as the threshold for the test is greater than 0.5.

Table 5

Results of Binary Logistic Regression.

Informal competition					
	Coefficients	**Std. errors**	**Z**	**P>|Z|**	**Odds-Ratio**
Small	.2295	.1350	1.70	0.089	1.258
Age	.0310	.0161	1.92	0.054	1.031
Town	.2309	.1414	1.63	0.085	1.259
Sole proprietor	.1102	.1483	0.74	0.457	1.116
Credit	-.011	.1406	-0.08	0.937	0.988
Taxation	.1150	.0522	2.20	0.028	1.121
Inspections	-.108	.1120	-0.96	0.337	0.898
Licensing and Permits	-.213	.0537	-3.97	0.000	0.808
Political Instability	.1253	.0436	2.88	0.004	1.133
Corruption	-.055	.0498	-1.12	0.263	0.945
Textiles	-.632	.2902	-2.18	0.029	0.531
Food	-.717	.2661	-2.69	0.007	0.488
Garments	-.377	.3246	-1.16	0.245	0.685

Motor vehicles	-.041	.4184	-0.10	0.920	0.959
Chemicals	-.108	.3377	-0.32	0.748	0.897
Other manufacturing	.1427	.2415	0.59	0.555	1.153
Non-metallic mineral products	-.321	.2941	-1.09	0.274	0.724
Retail and Wholesale	-.346	.2923	-1.19	0.236	0.707
Constant	-.386	.4325311	-0.89	0.371	0.679
Number of Observations = 1125			LR Chi-Square (19) =78.40		
Prob>Chi-Square=0.000			Pseudo R^2=0.0503		
Hosmer-Lemeshow Chi-Square (19) =13.95			Prob > Chi-Square =0.7864		

Next, we applied ordered logistic regression model, treating severity of informal competition as dependent variable; results are reported in Table 6.

Table 6

Results of Ordered Logit Regression.

Severity of Informal Competition	**Coefficients**	**Std. errors**	**Z**	**P>|Z|**	**Odds-Ratio**
Small	-.056	.1757	-0.32	0.749	.9453
Age	-.004	.0062	-0.69	0.492	.9956
Town	-.145	.1812	-0.80	0.422	.8644
Sole proprietor	-.070	.2020	-0.35	0.729	.9322
Credit	-.101	.1799	-0.56	0.573	.9034
Taxation	.1895	.0711	2.66	0.008	1.208
Inspections	.0396	.1627	0.24	0.807	1.040
Licensing and Permits	.3944	.0776	5.08	0.000	1.483
Political Instability	.3451	.0636	5.43	0.000	1.412
Corruption	.1105	.0669	1.65	0.099	1.116
Textiles	.4964	.4038	1.23	0.219	1.642
Food	.6916	.3684	1.88	0.060	1.997
Garments	.8017	.4330	1.85	0.064	2.229
Motor vehicles	.2927	.5837	0.50	0.616	1.340
Chemicals	1.101	.4446	2.48	0.013	3.008
Other manufacturing	.4792	.3221	1.49	0.137	1.614
Non-metallic mineral products	.7212	.3987	1.81	0.071	2.056

Retail and Wholesale	.6738	.4102	1.64	0.101	1.961

Number of Observations = 543	LR Chi-Square (18) = 145.30
Prob>Chi-Square = 0.000	Pseudo R^2 = 0.0993
Wald Test (small size, age, town, sole proprietor, credit):	
Chi-Square (5) = 1.51	Prob>Chi-Square= 0.9115
Wald Test (taxation, licensing and permits, political instability, corruption, inspections):	
Chi-Square (5) = 113.23	Prob>Chi^2 = 0.00

The model 2 is used for estimating the severity of informal competition faced by the formal firms; this model estimates the severity of informal competition only for those formal firms who responded "yes" to the question of facing informal competition. Determining the severity, the firm characteristics are not much influential in this context; the variables of small size, age, town, sole proprietor, and credit, are statistically insignificant. The regulatory variables have more capacity to influence the severity of the informal competition in this model. This interesting result is in conformity with the finding of Hudson et al., (2012); they concluded that taxation, licensing & permits, political instability, corruption, and inspections as variables have a much strong influence on the severity of informal competition as compared to firm characteristics. Out of five regulatory variables, taxation, licensing & permits, political instability, and corruption, are highly significant in determining the severity of informal competition. Aforementioned variables increase the likelihood of increase in the severity of informal competition to be faced by the formal firms by 1.208, 1.483, 1.412, and 1.116 times, respectively. These variables are already presented in the literature as highly influential in increasing the informal competition severity; therefore, the results are congruent with theory. The firms operating in all the under-study sectors i.e., textiles, food, garments, motor vehicles, chemicals, non-metallic mineral products, retail & wholesale, and other manufacturing sector are more likely to face severe competition as compared to the other services' sector. Results of the Wald test show that the firm's characteristic variables of small size, age, town, sole proprietor, and credit don't add statistically significant improvement in the explanatory ability of the model, based on the obtained P-value of 0.91. On the other hand, for the regulatory variables of taxation, licensing & permits, political instability, corruption, are inspections, the null hypotheses were rejected — based on their P-value of 0.00; indicating they are not simultaneously equal to zero, or in other words, create statistically significant improvement in the explanatory ability of the model. The results of the study are in accordance with theory; Kemal & Mahmood (1998), described credit and firm size as characteristics of informal firms, keeping this in mind, the study's assumption that the formal firms resembling more to informal firms face more of informal competition holds

true. Tedds (2010), identified the same for the small firm size; the results of this study confirm the same.

In terms of regulatory variables, Williams, Shahid and Martinez (2016), concluded that burdensome regulations reduce the likelihood of formality, hence increasing the firm's resemblance with informal firms; this ultimately increases the informal competition faced by the formal firms. In this study, regulatory variables are in conformity with this finding; results are also congruent with Hibbs and Piculescue (2010) who mentioned poor governance, high corruption, and high taxes as main factors pushing firms towards facing informality.

Conclusion

The rapid progression of the informal sector and its linkages with the other sectors of the economy had been an extensively studied area of research both in developed and developing countries. While the existence of the informal sector matters for a relevant policymaking; the competition faced by the formal firms, on account of the frequent rise of informal firms, is equally important albeit less explored domain, particularly for developing countries. In any economy, the informal sector firms are a major source of competition for the formal firms; particularly, in the developing and underdeveloped countries — Pakistan is no exception to this proposition.

The results of this study are an important contribution to the already existing literature in the case of Pakistan, as no study has been attempted so far to determine the extent and intensity of informal competition faced by formal firms using the WBES data. The available literature is limited either to the calculation of the size of the informal sector or to the reasons for the existence and progression of the informal economy (Arby, Malik & Hanif, 2010; Kemal & Mahmood, 1998; Williams, Shahid & Martinez, 2016; Tahir & Tahir, 2012). The novelty of the current research is that it not only comes up with the significant variables determining the informal competition faced by formal firms but also determines the major(significant) variables that affect the severity of informal competition faced by formal firms. As far as the result regarding the competition faced by the formal firms through informal competition is concerned, in the logit model, the variables of characteristics come out to be significant determinants; out of the regulatory variables, taxation is significant, while licensing & permits and political instability are found to be statistically highly significant. The results of the current study conclude that firms in Pakistan, resembling more with informal firms in terms of characteristics, are more prone to facing competition from informal firms. In the ordered logit model, taxation, licensing & permits, political instability,

and corruption, are highly significant in determining the severity of informal competition.

The regulatory environment in Pakistan is perceived to be burdensome by formal firms, making them vulnerable to the informal competition. This is evident in the case of those formal firms that possess or are similar to the characteristics of informal firms; this burden of regulations is a decisive factor for the severity of informal competition. The more the burden of regulations, the more formal firms are likely to face severe informal competition. Due to the burden of regulations coupled with a weak enforcement system in Pakistan, more firms opt to operate informally, hence increasing the size of the informal sector and informal competition resultantly.

On the basis of the above conclusions, it is recommended that regulatory reforms shall be introduced, making the regulatory system less burdensome; moreover, there is a need for an efficient mechanism that ensures the enforcement of such reforms. This would help in creating ease for the existing formal firms to fulfill the regulatory requirements as well as encouraging the informal firms to join the mainstream formal setup of the economy. Furthermore, the current research can be extended by availing the latest dataset (whenever available) to explore the dynamics of the informal sector in an ever-changing business environment.

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APPENDIX

A1. Levels of Stratification

Industry, establishment size, and region are used as three levels of stratification in WBES for Pakistan:

1. Industry stratification was formulated into two service sectors (Retail and Other services') and seven manufacturing industries (Food, Textiles, Garments, Chemicals, Non-metallic Minerals, Motor Vehicles, Other Manufacturing).
2. Standardized definition used for the size stratification follows: small (5 to 19 employees), medium (20 to 99 employees), and large (more than 99 employees).
3. For the Pakistan Enterprise Survey, Regional stratification was specified in five regions: Punjab, Sindh, KPK, Baluchistan, and Islamabad.

A.2 Correlation of Independent Variables

smallsize	1.0000									
age	-0.1578	1.0000								
TOWN	0.0368	-0.0711	1.0000							
SOLEPROPRI~R	0.1302	-0.1537	-0.0181	1.0000						
CREDIT	-0.2438	0.0721	-0.0038	-0.1834	1.0000					
taxation	-0.0336	-0.0332	-0.0480	0.0500	0.1136	1.0000				
politicali~y	-0.0232	-0.0612	-0.0390	0.1411	-0.0386	0.2906	1.0000			
liicsensin~s	0.0017	-0.0694	-0.2240	0.0220	0.0125	0.4831	0.2556	1.0000		
corruption	-0.0342	-0.0351	-0.2678	-0.0002	0.1062	0.3361	0.1770	0.4968	1.0000	
inspections	-0.0030	-0.0291	0.0050	-0.1010	0.0425	-0.0132	-0.1540	0.0625	0.1696	1.0000

No correlation among any of independent variables found.