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*Full Length Research Paper*

## Impact of innovation on the entrepreneurial success: Evidence from Nigeria

Olu Dinesh Ojo<sup>1</sup>, Marius Petrescu<sup>2</sup>, Anca Gabriela Petrescu<sup>2\*</sup> and Florentina Raluca Bîlcan<sup>2</sup>

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In the recent years, Nigeria has recorded an economic growth but with a trajectory which offers both positive and negative lessons regarding the innovation of business faced by many countries in Africa and elsewhere in the developing world. This study sought to test the relationship between innovation, the financial performance of company and firm's competitive advantage. This was done through correlation and regression analysis. Data were analyzed using descriptive and inferential statistics. Hypotheses were tested at 0.05 significant levels with the aid of parametric student t-test. The results revealed that there is a positive relationship innovation and the financial performance of company. A clear lesson from this study is that the future must include promoting innovation and entrepreneurship; in other words, business competitiveness depends on the creativity and innovativeness of its entrepreneurship.

**Key words:** Innovation, entrepreneur, enterprises, leadership success, excellence.

### INTRODUCTION

Today's global business environment, innovation and creativity are key ingredients in creating and sustaining strategic advantage. Among the main reasons for this renewal are the new way of thinking managers and economists from countries with a developed market economy and a new perception of economic opportunities. However, innovation cannot be sustainable until and unless it is in aligned with triple bottom line elements that is, economic, social and environmental dimensions. In this context a sustainable environment helps to generate innovations and knowledge, it also changes the knowledge characteristics and ecosystem

(Hemsley and Mason, 2013).

The entrepreneurial successes are the life blood to businesses around the world. Organizations therefore strive to meet these regulations and standards in order to remain compliant, and to increase the efficiency and credibility of the business. This is evident from the fact that every activity carried out by the businesses revolve around learning and fulfilling the needs of the customers (Ayyagari et al., 2003; Chen, 2005; Choi and Hwang, 2015).

One aspect of great importance for the existence and perpetuation of the rise or decline of Small and medium-

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sized enterprises (SMEs) in the economy of any country is to their contribution to creating new value. The rhythms alerts or slower, sooner or later, all countries will realize that initiating, developing, supporting even these organizations are not only unavoidable, but will lead to detect the only alternative economically efficient creation of new jobs, maintaining permanent organizational flexibility, stimulation of innovation and creativity (Oncioiu, 2013).

Another different approach of innovation capability is "the ability to create innovations in responding to contextual changes and opportunities without organizational disruption, excessive time and costs, or loss of performance" (Buganza and Verganti, 2006). The perception of entrepreneurs is that innovation does not only improve the quality of products or process, but also has a positive economic return on the small enterprise (Tan and Nasurdin, 2011). Every firm has certain business objectives which further funnels down to operations and purchasing sub-objectives. Therefore, every firm need to measure performance to evaluate how far it is from the set goals.

Historically, scholars view entrepreneurs in many ways, but mainly as an innovator who is responsible for the creation of new products, new methods of production and new processes, and who is also capable of identifying new markets (Schumpeter, 1949). In fact, the nature of innovative process that affects enterprise survival and economic growth revolves around the active and inactive functions of the entrepreneur (McPherson, 1996).

Literature review indicates that, in Nigeria and in other emerging countries, the subject of innovation reveals that there is a dearth of literature in the developing countries and this creates a major gap in knowledge that has to be filled (Davis et al., 1989; Hage, 1999; Biggs and Shah, 2006; Coad and Rao, 2008; George et al., 2012; Dapice, 2015; Cappa et al., 2016).

The central theme of the article is to present the impact of innovation on the business enterprises' success in Nigeria. The research started from the idea that, at a global level, the action to find a small survival of business enterprises is as important as creating innovation activities. These measures aimed to design a permissive, favorable regulation environment, both legislatively and fiscally, and were meant to provide financial assistance for the enterprises' support and development. They also aimed to improve competitiveness and to stimulate the development of the entrepreneurial culture. These enterprises are nowadays active contributors to the Nigerian economic development as a whole.

The following research questions have been formulated: How can the Nigerian innovative SMEs take part in the economic growth of the country? Could they be analyzed with the aid of quality indicators (economic and financial indicators) in case of time variance? Who should be responsible for implementing the development challenges based on innovative SMEs in Nigeria for a proper

business functioning?

By addressing the aforementioned questions this study seeks to test the relationship between innovation, the financial performance of company and firm's competitive advantage. In spite of the fact that innovation has been viewed as a means of understanding the impact on the financial performance, the existing research literature does not provide any empirical evidence, particularly in Nigerian SMEs, investigating the balance between economic objectives and the entrepreneurial success.

## LITERATURE REVIEW

There are several approaches to 'innovation' in the economic literature from Joseph Schumpeter's definition. Henrik (2007) sees innovation as the successful implementation of a creation and this innovation seems to foster growth, profits and success.

In defining innovation, there is a need to distinguish the subtle difference between an "invention" and "innovation." Traditionally, innovation recognizes development as generalized economic growth. In contrast, inclusive innovation views development as active inclusion of people excluded from the mainstream development. The difference refers to the inclusion involving some aspect of innovation for/by the marginalized groups (Foster and Heeks, 2013).

Paunov (2013) reports heterogeneous terminology used in practice and literature for inclusive innovation. For example, terms like "frugal innovation" "pro-poor innovation" and "innovation for the bottom of the pyramid" have been used to depict inclusive innovation. Such innovations are considered inclusive and can possibly provide solutions for reducing negative lessons regarding the innovation of business faced by many countries in Africa and elsewhere in the developing world.

Combining various views, Zaltman et al. (1973) defined innovation as any idea, practice or material artefact perceived to be new by the relevant unit of adoption. In other words, organizational innovation has been consistently defined as the adoption of an idea or behavior that is new to the organization (Lin, 2007; Wang and Wang, 2012).

On the other hand, prior studies assume that employees' satisfaction has positively impact on innovation behavior and the non-financial performance of service innovation has a positive effect on the financial performance of service innovation (Hsieh, 2016). Other approaches to the measurement of innovation success include the maintenance of an appropriate balance between economic and social objectives which it provides an organization with benefits that have the potential of sustaining its viability in a global economy (Cegarra-Navarro et al., 2016).

The innovation can either be a new product, new technology, new service or new administrative practice

(Hage, 1999). Many companies today are innovative, bringing about new ideas and modifying existing ones into their offerings because of the competitive nature of the market. Innovation is however different from invention. Some researchers suggest that while innovations are concerned with the launch or introduction of new products, services and processes, inventions are not necessarily introduced into the market (Hauschildt, 2004).

On a final note regarding innovation, according to Oman (2008), the newness that innovation portrays in the improvement of products, services or process can be described in two ways, technical innovation and administrative innovation. The technical innovation has to do with technology, products and services. The administrative innovation deals with improved procedures, policies and organizational forms.

But then, Hui and Chuan (2002) point out the possible critical aspects of organizational excellence, as following: establishing a strong vision and mission, forming policies and strategies, commitment to excellence, managing values and ethics, human development, empowerment and innovation, ensuring people's well-being, using new technologies, suppliers and business partnerships, providing customer care, service and satisfaction.

More generally, Brem and Voigt (2007) consider better access to such external resources to be a vital policy instrument to support the innovative capacity of the business sector, especially to achieve entrepreneur knowledge development and an inclination to innovation.

Moreover, innovation management is the beginning, development and, as the case may be, implementation of technical and socio-technical initiatives of management business. In addition, several studies (Hauschildt, 2004; Nybakk and Jenssen, 2012) show that innovation management comprises the decisions about innovation and the innovation processes.

## MATERIALS AND METHODS

Against this background, the research was conducted between July 2016 and October 2016, and its methodology is based on 216 Nigerian SMEs, while the sectors involved in the survey were agriculture, manufacturing and construction.

The instrument used for this study was a combination between an email questionnaire survey and research interviews. We also used the Likert Scale (1 = almost always, 2=to a considerable degree, 3=occasionally, 4=seldom and 5=never). The questionnaire is divided into two parts, and the questions focusing on the following hypothesis:

H1: Innovation can stimulate growth and the financial performance of SMEs.

H2: Innovation positively influences the firm's competitive advantage.

For the final survey, a total of 160 questionnaires were collected, containing information regarding the entrepreneur's attitude towards innovation and the firm-level financial performance using innovation. Evidence on barriers to innovation has revealed an important aspect that should be taken into account when dealing

with data on perceived obstacles to innovation activities.

## RESULTS AND DISCUSSION

In the internal consistency reliability, Cronbach's  $\alpha$  coefficient is used. This study makes the message number as independent variables and innovation as the dependent variable. Data was analysed using one-way analysis of variance (ANOVA).

Table 1 shows the results of ANOVA with participants overall shift to inspect H1. It is shown that there are the significant differences between innovation and stimulate financial performance of SMEs ( $p < 0.001$ ) and further analysis of the mean value of SMEs' financial performance. The results support this study predictions of H1. This data was analysed using one-way ANOVA with participants overall shift to inspect H2. The result shown in Table 2 indicates that innovation can significantly affect a small and medium firm's competitive advantage ( $p < 0.001$ ).

In the first hypothesis tested, the research finding revealed that the existing relationship between innovation and financial performance of SMEs is positive. The MS value of 3.243 shows that the average response of the respondents. Since p-value of .000 is less than 0.05, then the t test value is significant. This means that innovation is positively related to product quality. The reason is that the average customer will appreciate innovative and quality product.

In the second hypothesis, the MS value of 33.207 shows the average response which indicates that the respondents agree that innovation is related to competitive advantage. Similarly, the F-Value value is 62.736 and the degree of freedom is 70. Since p-value of .000 is less than 0.05, then the t test value is significant. Hence there is a significant relationship between innovation and competitive advantage of selected agriculture, manufacturing and construction firms. Thus, the null hypothesis two was rejected.

## Conclusions

This research work examined the impact of innovation on the entrepreneurial success in business enterprises in Nigeria. The study has proven that innovation has a significant and positive relationship with product quality and corporate image.

The different variables under the study have shown a valuable relationship which is the pointer for an enhanced performance in the selected business enterprises. Innovation was found to improve product quality and corporate image and these have subsequently enhanced entrepreneurial success and performance. Therefore, based on the ideas mentioned above, we can conclude that engaging in innovative activities will achieve bumper success in many entrepreneurial ventures.

For all that, very few firms have been able to sustain an



**Table 1.** Innovation can stimulate growth and the financial performance of SMEs.

Variable	SS	DF	MS	F-Value	P-value
Between	3.243	1	3.243	7.41*	0.002
Within	61.054	159	0.447	29.74	-
Sum	64.297	160	-	-	-

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**Table 2.** Innovation positively influences the firm's competitive advantage.

Variable	SS	DF	MS	F-Value	P-value
Between	33.207	1	33.207	62.736**	0.000
Within	48.606	159	0.456	-	-
Sum	81.813	160	-	-	-

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

innovation culture over an extended period of time. During adverse times the tendency has been for companies to deliberately focus on opportunities that promise short-term returns. Hence, the entrepreneurs and decision makers should face a higher hurdle and held responsible for the harms that their organizations predictably create, with or without intentionality or awareness due to unethical decision making approach.

However, the success stories are few and most firms fail because they do not measure the innovative green procurement performance. Firms must focus both on green purchasing effectiveness and green purchasing efficiency which will ultimately lead to the final outcome i.e. enhanced innovative green purchasing performance.

There are a few limitations of this study: firstly, due to the lack of resources and time constraints, the study has collected data from a smaller number of product/service firms, but in the future, a larger sample size can further validate the accuracy of results. Secondly, the indicators refer to a specific type of business, generally local limited liability companies operating in the largest business city. To eliminate these limitations author proposes to use longitudinal data using large sample size and considering different country and sector to validate the results.

This study provides essential insights into excellence operational innovation. The results and conclusions must be put into the context of the potential limitations and directions for future research. In brief, this study was conducted with the small enterprises sector only in one of the emerging markets. Also, the clarification of the connection between innovation to other strategic variables and ultimately growth remains available for further researches.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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*Full Length Research Paper*

## Accountability of local government authorities: A developing economy perspective

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The purpose of this study is to report the contribution of internal controls and managerial competencies on accountability of Local Government Authorities (LGAs). This study is cross sectional and correlational. Data were collected through a questionnaire survey of 73 sub counties from which 64 responded and the questionnaire was designed on a 5 point Likert scale. The study's unit of analysis was a sub county. Senior Assistant Secretaries (SAS) and Sub Accountants (SA) were the study's unit of inquiry. Data were analyzed through correlation coefficients and ordinary least squares regression using Statistical Package for Social Sciences. The results indicate that internal controls and managerial competencies are significant predictors of accountability of LGAs. However, information technology and control environment as components of internal controls individually do not have a significant association with accountability of LGAs. The study findings further indicate that experience as a dimension of managerial competencies has no significant relationship with accountability of LGAs. The study is limited to LGAs of developing countries particularly those of African setting and it is possible that the results are only applicable to Uganda's LGAs. Nevertheless, the findings have implications to Governments who may be wishing to improve accountability of their LGAs. To the researchers' knowledge, this is the first paper to examine the contribution of internal controls and managerial competencies to accountability of LGAs in a single study in a developing country.

**Key words:** Accountability, Uganda, sub county, managerial competencies, internal controls.

### INTRODUCTION

The purpose of this study is to report the contribution of internal controls and managerial competencies to accountability of local Government Authorities in Uganda – a developing economy. This study is motivated by the

likelihood of accountability in ensuring efficient utilization of both financial and non-financial resources for better services delivery (Mzenzi and Gasper, 2015; Lodhia and Burrit, 2010). Stewart (1984) defines accountability as a

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relationship between different parties that is to say, the party that accounts and is held to account and the party that holds the other to account. In this study, we define accountability as the process of reporting on how appropriated funds have been utilized. Accountability of Local Government Authorities (LGAs) is critical since LGAs are accountable to the local community for their decisions, actions and services and thus must demonstrate a strong sense of responsibility in the use of public resources (Elad et al., 2009; Lodhia and Burritt, 2010; Dellaportas et al., 2012; Monfardini, 2010). Elad et al. (2009) points out that shareholders (tax payers) provide resources to state institutions (LGAs), and this calls for the need by managers of these state institutions to demonstrate a sense of responsibility in the use of such resources provided otherwise, these shareholders may decline to provide further resources. Dellaportas et al. (2012) indicate that charities while performing their selfless activities must provide a report to the donors justifying how the previous donated funds were spent before receiving further funds. Equally, politicians worldwide who are agents to voters have been forced to disclose more information to gain public confidence (Monfardini, 2010).

In Uganda, accountability failures in LGAs continue to raise (Auditor General reports, 2013 to 2015) despite the various offices like Office of the Auditor General which is responsible for the audit of government bodies, Inspectorate of Government whose mission is to promote good governance, accountability and the rule of law in public offices, the police among other monitoring mechanisms put in place like boards. This poses a question of what exact mechanism can be employed in LGAs to ensure accountability. Previous studies indicate various explanations of variances in accountability of LGAs for example external auditing (Mzenzi and Gasper, 2015), the audit trinity (Porter, 2009), systems of accounting (Nyamori, 2009), governance (Dunne, 2013; Dellaportas et al., 2012). In this study, we explore managerial competencies and internal controls as possible explanations of accountability of LGAs. As per the researchers' knowledge, no study has employed managerial competencies and internal controls as explanations of accountability of LGAs in a developing economy like Uganda where there is decentralisation in a single study. Previous studies have defined competencies as a panoply of the characteristics (skills, attitudes and abilities), behaviours and traits necessary for job performance (Abraham et al., 2001; Albanese, 1989; Koenigsfeld et al., 2012; Qiao and Wang, 2009; Dessler, 2009).

We thus define managerial competencies in this study as a combination of attitude of a manager, skills possessed by a manager, experience and knowledge of a manager in performing work. In his guest editorial, internal controls are a mechanism used by organisational

leaders to convey the strategy, vision and the desires to the rest of the organisation and internal controls exist in the form of standards, policies, procedures and rules (Pathak, 2005). However, Zakaria et al. (2016) describes internal controls as policies and procedures established to provide reasonable assurance that the specific entity objectives will be achieved. Internal controls include the control activities, control environment, risk assessment, information technology and monitoring activities (Zakaria et al., 2016; Pathak, 2005).

Findings of this study are important for a number of reasons. First, it adds on the existing literature in the area of accountability of LGAs in a developing country. This study provides an initial empirical account of the contribution made by managerial competencies and internal controls on accountability of LGAs. Second, it provides recommendations to improve accountability of LGAs in developing countries especially in Uganda and any other countries who may be experiencing similar situations. Lastly, the community is now made aware of their right to demand for accountability. The community has to demand for accountability for the taxes paid directly to LGAs and those to central government.

## LITERATURE REVIEW

### Theoretical foundation

In this study, the stakeholder theory is used to explain the relationship between internal controls, managerial competencies and accountability of LGAs. The stakeholder theory requires management of various institutions to know the various stakeholders of such institutions. The perceptions surrounding stakeholder theory mean that managers of entities (LGAs) should be aware of the various user needs of the LGAs' financial statements to the extent that shareholders need to make a decision on whether to keep providing finances to government without complaints or cease to support government operations. The stakeholder theory is to the effect that the entity (for this case LGAs) satisfies all the needs of stakeholders and this can be done through provision of quality financial statements and being fiscally compliant (Abor, 2015; Christopher, 2010; Donaldson and Preston, 1995). To achieve quality financial statements, there is need for proper record keeping in terms of complete and accurate payment vouchers, invoices, cash receipts and books of accounts. In some cases, especially in Africa, not all transactions can be supported with source documents (receipts, invoices, payment vouchers) but financial statements will be prepared. However, this theory only requires managers to design appropriate strategies in addressing stakeholders' interests. Abor (2015) further asserts that managers must treat all the stakeholders' interests as important to the

firm in equal terms. Key stakeholders may thus require financial statements and other activities of the organization verified by an auditor (Mzenzi and Gaspar, 2015) so that there are no material misstatements. To achieve this, management must have the necessary competencies like skills, abilities and experience to prepare error free financial statements and internal controls must be in place. In forming an opinion by auditors, it is clear that, it is the role of management to prepare financial statements that are free from material misstatements (ISA 700, 2016) and this can be achieved when management is competent with effective internal controls in place. Therefore, internal controls and managerial competencies are typical determinants of accountability of LGAs.

Having considered stakeholder theory in explaining LGAs' accountability, it is now suitable to gain an understanding of what other researchers have found in the area of accountability of LGAs and how the existing literature has led to the development of hypotheses to guide this current study.

### **Internal controls and accountability**

Abdirisq and Yassin (2014) argue that internal control is at the heart of accountability for a nation's resources and how effectively government uses them. Abdirisq and Yassin (2014) further explain that internal controls serve as the first line of defense in safeguarding assets and preventing and detecting errors and fraud. Ebaid (2011) found out that 94% of internal audit time in Egyptian listed firms is spent on financial audit and internal control activities while the remaining 6 percent of internal audit time is spent on risk management activities, consulting activities, and corporate governance activities.

Sanusi and Mustapha (2015) indicate that in Nigeria, majority of the respondents (60%), strongly agree that adequate verification of vouchers and other financial documents is one of the major control mechanism that could be used to enhance good internal control and financial accountability in the local government council and few respondents (15%) believe that adequate verification of vouchers and other financial documents is a control mechanism used to ensure good internal control and financial accountability. Sanusi and Mustapha (2015) further reveal that majority of the respondents (more than 65%) agree that approval and confirmation of financial transaction, adequate control over cash and bank balances as well as severe punishment for blundering officers are the key control mechanisms that can be used to ensure good internal control and financial accountability in the local government council and less than 30% have weak belief on this as a control tool.

Mzenzi and Gaspar (2015) found out that accountability of LGAs in Tanzania is not proper because of internal

auditors not performing their duties as expected and one such duty is the review and evaluation of internal controls. It has also been argued that some of the recent challenges regarding financial accountability in the developing nations like Uganda can be attributed to weak control systems (El-Nafali, 2008).

From this line of argument, deficiencies in the control systems give room to misuse of public resources, low levels of transparency and provision of doctored financial statements. Thus internal controls act as a framework that facilitates financial accountability. In this study, we try to re affirm that there is a relationship between internal controls and accountability by hypothesizing that:

H1: there is a positive relationship between internal controls and accountability of LGAs

### **Managerial competencies and accountability**

Abaraham et al. (2001) investigated competencies that managers must possess and whether those competencies are considered for appraisal purposes. Abraham et al. (2001) found out 23 competencies and confirmed that they are considered for appraisal purposes. These competencies include the following; communication skills, customer focused, team work, interpersonal skills, trustworthiness, ability in foreign languages, problem solver, purposeful, technical expertise, flexibility, staff developer, experience, results oriented, leadership skills, hard work, quality focus, uncompromising, self-consciousness, time manager, professional dress, imaginative (creativity or inventiveness), safety consciousness and risk taker.

Diane et al. (2012) argues that managerial competencies provide a sound basis for an improved accountability and for the case of LGAs, the sub accountants must have the technical competence for example the sub accountants should have received training in accounting. In addition, Martina et al. (2012) indicates that the dynamic business environment requires managerial competencies to achieve strategic organizational goals since skills are observed as a significant tool for achieving accountability in any business setting. Karmen et al. (2014) found that managerial competencies are associated with the organizational structures and studied these structures in terms of market performance (customer satisfaction, product quality, innovativeness and market share), process oriented and project structures.

In a bid to emphasize on the various roles people in management positions play to ensure accountability, Klein (2009) argued that management competencies are vital. In particular, the scholar argued that managers have to act as role models for others to enhance accountability,

and be able to coach and instruct them on how to go about their work. This therefore would call for competencies such as the technical ability or the leading competencies. In this study, we hypothesize that:

H2: Managerial competences is positively associated with accountability of LGAs

## METHODOLOGY

### Research design, population and sample

This study employs a cross sectional and correlational research design to investigate accountability of LGAs of a developing economy. Cross sectional research design is a type of observational study that analyzes data collected from a population, or a representative subset, at a specific point in time while correlational research design is a quantitative method of research in which there are 2 or more quantitative variables from the same group of subjects from which a relationship can be determined if it exists or not. This study's population was 90 sub counties of Busoga region in Uganda (AG report, 2014) from which a sample of 73 sub counties was determined using Krejcie and Morgan (1973) table of sample selection approach and employed the rotary method of selecting the subjects. Of the 73 sub counties, completed questionnaires were received from 64 sub counties indicating a response rate of 87%. The response rate was high for a survey of this type considering that previous studies involving such surveys are known to generate lesser percentage response rates. The higher percentage response rate was possible because respondents were given 5 months to complete the questionnaire and a number of call backs were made. This study's unit of analysis was a sub county and the unit of inquiry was the Senior Assistant Secretary (SAS) and the Sub Accountant (SA).

### Measures and the questionnaire

A five point Likert scale questionnaire ranging from strongly disagree to strongly agree designed to measure the opinion of a respondent was utilized. This study utilizes a questionnaire with close ended questions since it is aimed at calculating the mean ratings of the extent of agreement with the statements given. The questionnaire is adopted for this study because it is suitable for collecting data from many respondents within a short period of time. The questionnaire design is based on reviewing the existing literature on internal controls, managerial competencies and accountability. We operationalize internal controls by measures as control environment, risk assessment, monitoring activities, information technology and control activities (Mohapatra et al., 2015; Zakaria et al., 2016; Pathak, 2005). Managerial competencies was operationalized in terms of attitudes, skills, abilities, experience and knowledge (Koenigsfeld et al., 2012; Qiao and Wang, 2009; Dessler, 2009; Perdue et al., 2000). The dependent variable for this study is accountability which is operationalized using measures as fiscal compliance and financial reporting (Baron, 2007; Nyamori, 2009; Nurunnabi and Kamrul, 2012).

### Validity and reliability

This study utilizes factor analysis based on principal components, content validity index and Cronbach (1951)  $\alpha$  to examine the validity

and reliability of the scales as measures of the study constructs. To establish convergent validity, the principal components for each variable was extracted by running principal component analysis using varimax rotation method and factor loadings below 0.5 coefficients were suppressed to avoid extracting factors with delicate loadings. Before executing the principal component analysis for our scales, we assessed the suitability of the data for factor analysis based on sample size adequacy, the Keiser-Meyer-Olkin (KMO) and Bartlett tests. The KMO and Bartlett (1954) test of sampling adequacy was computed to ensure that factor analysis yields different and reliable factors (Kaiser, 1974). The KMO values for internal controls, managerial competencies and accountability are 0.712, 0.784 and 0.779 respectively. The KMO values for the predictor and outcomes variables are all above 0.5 which is acceptable. Bartlett's test of sphericity in all scales also reached statistical significance. For reliability, the Cronbach's reliability index was used. Field (2009) explains that a Cronbach's  $\alpha$  values of 0.7 to 0.8 is acceptable and Cronbach's  $\alpha$  values substantially lower than 0.7 indicate an unreliable scale. This study's cronbach  $\alpha$  values for internal controls, managerial competencies and accountability were 0.700, 0.754 and 0.778 respectively. Kline (1999) notes that although the generally accepted value of 0.8 is appropriate for cognitive tests such as intelligence tests, for ability tests a cut-off point of 0.7 is more suitable.

### Model and definition of variables

The study utilizes ordinary least squares (OLS) multiple regression model in investigating the effects of internal controls and managerial competencies on accountability of LGAs. The choice of OLS was dictated by the nature of the dependent variable (it is not a binary variable). Specifically, the model below was tested (Table 1).

$$ACC = \beta_0 + \beta_1 ICS + \beta_2 MC + \epsilon_j$$

## RESULTS

### Demographic characteristics

The male respondents were 65 (or about 55%) and the female respondents were 53 (or about 45%), and this means that in Uganda, the male are more into government employment compared to their counterparts. Majority of the respondents were aged between 38 to 47 years representing 40% of the respondents and 54% had served LGAs for 4 years and above implying that there was maturity in interpreting and answering the questionnaire. About 48% had completed university education (bachelor's degree) and only 11% had post graduate education while 31% had completed ordinary diplomas and 10% had certificates which means that the respondents had the capability of interpreting the questionnaire.

### Descriptive statistics

We generated means and standard deviations to summarize the observed data and this is because means represent a summary of data and standard deviations

**Table 1.** Measurement of the dependent and independent variables.

Variable	Acronym	Variable description
Dependent		
Accountability	ACC	Measured by average score of questions on fiscal compliance and financial reporting
Independent		
Internal controls	ICS	Average score of questions on the control environment, control activities, risk assessment, monitoring activities and information technology
Managerial competencies	MC	Average score of questions on skills, experience, abilities and attitudes
$E_j$		Error term

**Table 2.** Descriptive statistics.

Item	Min	Max	Std. Deviation	Skewness	Kurtosis
Attitudes	1.86	5.00	3.5747	0.65665	-0.324
Abilities	2.40	4.70	3.7785	0.56610	-0.124
Experience	1.80	4.90	3.5615	0.73457	-0.389
Skill	2.30	4.80	3.7092	0.60563	-0.450
Managerial competencies	2.50	4.83	3.6560	0.48344	-0.275
Control activities	2.67	4.83	3.8295	0.53409	-0.766
Monitoring activities	2.67	5.00	3.8410	0.56552	-0.660
Control environment	2.00	5.00	4.0115	0.51241	3.197
Risk assessment	2.50	5.00	3.6154	0.67181	-0.990
Information technology	2.75	5.00	3.9846	0.45259	0.176
Internal controls	3.30	4.62	3.8564	0.30695	-0.352
Fiscal compliance	1.80	4.90	3.7323	0.66359	-0.064
Financial reporting	2.38	5.00	4.0135	0.55469	0.780
Accountability	2.53	4.85	3.8729	0.50724	-0.442

Source: Primary data.

indicate how well the means epitomize the data (Field, 2009). The main objective here is to establish whether the statistical means are a good fit for the observed data (Field, 2009). The mean and standard deviation for internal controls, managerial competencies and accountability is 3.856 and 0.306, 3.656 and 0.483, and 3.872 and 0.507, respectively.

The standard deviations are closer to each other and this implies that there are minimal variations in perceptions of accountability of LGAs. The mean values are higher for all the study variables implying that they are all relevant. However, internal controls has a much higher mean value than managerial competencies implying that it is more relevant for improving accountability of LGAs.

According to Field (2009) and Nkundabanyanga et al. (2015), when deviations are small compared to mean values, it is obvious that the data points are close to the means and hence calculated means highly represent the observed data (Table 2).

We further present skewness and kurtosis values in Table 2 for assessing normality of the data since Pearson correlation coefficient requires data to be normal. Nkundabanyanga et al. (2014) and Tabachnick and Fidell (2007) maintain that normality of variables enhances the solution and such normality tests are done using measures of variation and specifically skewness and kurtosis whose values should be zero.

According to Garson (2012), a skew should be within +2 to -2 range when the data are normally distributed and a skew of +1 to -1 is also acceptable. Garson (2012) further explains that once kurtosis is within the range of +2 to -2, the data set are normally distributed.

Field (2009) explains that, normal data will have values of skewness and kurtosis ranging from 3.29 to -3.29. Field (2009) further demonstrates that, positive values of skewness indicate a pile up of scores on the left of the distribution whereas negative values indicate a pile up on the right. Field (2009) further explains that positive values of kurtosis indicate a pointy and heavily tailed distribution

whereas negative values indicate a flat and light tailed distribution. Table 2 results indicate that our data set is normally distributed with values falling into the range of 3.29 to -3.29.

### Correlation analysis results

We employ Pearson correlation coefficient to investigate the study variables. Pearson correlation coefficient was adopted for this study as it is a parametric statistic and requires interval data for both variables (Field, 2009) and to test its significance, normality is assumed. Parametric statistics assumes that the sample data comes from a population that follows a probability distribution based on a fixed set of parameters.

Correlation results indicate that there is a positive relationship between internal controls and accountability in Local Governments and thus *H1* which states that there is a positive relationship between internal controls and accountability of LGAs is supported. The implication of this finding is that in Local Governments, internal controls which is a summation of control activities, control environment, monitoring activities, risk assessment and information technology should be given attention to achieve accountability.

However, control environment and information technology as individual components of internal controls have no significant association with accountability of LGAs. Results further indicate that there is a positive relationship between managerial competencies and accountability in Local Governments and therefore *H2* which states that Managerial competences is positively associated with accountability of LGAs is substantiated. To improve accountability of LGAs managerial competencies are also critical. There is need to improve the attitudes, skills, experience and abilities of managers to improve accountability of LGAs and this can be done through recruiting experienced accountants and senior assistant secretaries, organise trainings for such staff to equip them with more skills and instil a positive attitude in them towards their jobs. Experience in its own capacity has no significant association with accountability.

### Multiple regression results

We further employ ordinary least squares multiple regression to establish the contribution of each predictor variable on to the outcome variable. Results indicate that internal controls and managerial competencies explain 32.8% of the variance in accountability of LGAs (Adjusted  $R^2 = .328$ ). The adjusted  $R^2$  provides an idea of how well the model generalizes the study variables and every researcher would like the Adjusted  $R^2$  values to be the same as or close to  $R^2$ .

For this study, the difference for the model is  $0.349 - 0.328 = 0.021$ . The shrinkage of 0.021 (2.1%) means that if the model were derived from the population rather than a sample, it would account for approximately 2.1% less variance in the outcome.  $R^2$  is a measure of how much of the variability in the outcome is accounted for by the predictors (Field, 2009).

Multicollinearity which is a situation in which two or more variables are very closely linearly related was tested using tolerance statistics and Variance Inflation Factor (VIF). Tolerance statistics measure multicollinearity and are simply the reciprocal of VIF ( $1/VIF$ ). Field (2009) recommended that tolerance values below 0.1 indicate a serious multicollinearity problem and tolerance values below 0.2 indicate a potential problem. VIF is another measure of multicollinearity and it indicates whether a predictor has a strong linear relationship with other predictor(s). Myers (1990) suggests that a value of 10 is a good value at which to worry. For this study, the VIF values are all below 10 and the tolerance statistics are above 0.2. Therefore, there were no multicollinearity problems in our data (Tables 3 and 4).

### DISCUSSION

Based on the current results, managerial competencies and internal controls are a mechanism for ensuring accountability of LGAs.

The stakeholder theory suggests that all stakeholders should be planned for by the organization especially in terms of consideration for information availability on how the entity is performing. It is important that in Uganda, before a manager or a head of a local government is appointed, past experience, abilities and skills are paramount. The candidate for the position of senior assistant secretary who is the Chief Executive Officer of a sub county must have served at a lower level in the local government especially as a parish chief for some years. The sub accountant (the accountant of a sub county) must as well have served as a cashier or in any other capacity in the office of the accountant or should have been an accountant. Further, the attitude towards job performance of both the sub accountant and the senior assistant secretary (locally known as Gombolola chief) should be positive. To occupy the office of the sub accountant and the senior assistant secretary, one should possess skills and abilities like communication skills which are vital for improving accountability of LGAs.

The components of an internal control system which include the control environment, control activities, information technology, monitoring activities and risk assessment are vital for improving accountability of LGAs. Management is responsible for designing and implementing internal controls in an organization but this



**Table 3.** Zero order.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Attitudes (1)	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Abilities (2)	0.207	1	-	-	-	-	-	-	-	-	-	-	-	-
Experience (3)	0.347**	0.441**	1	-	-	-	-	-	-	-	-	-	-	-
Skill (4)	0.361**	0.579**	0.609**	1	-	-	-	-	-	-	-	-	-	-
Managerial competencies (5)	0.645**	0.712**	0.817**	0.837**	1	-	-	-	-	-	-	-	-	-
Control activities (6)	0.697**	0.060	0.018	0.332**	0.365**	1	-	-	-	-	-	-	-	-
Monitoring activities (7)	0.066	0.589**	0.403**	0.611**	0.540**	0.094	1	-	-	-	-	-	-	-
Control environment (8)	0.360**	0.123	0.185	0.138	0.272*	0.212	0.022	1	-	-	-	-	-	-
Risk assessment (9)	0.272*	0.309*	0.489**	0.445**	0.508**	0.248*	0.354**	-0.112	1	-	-	-	-	-
Information technology (10)	-0.059	0.112	0.152	0.244*	0.147	0.072	0.326**	0.077	0.064	1	-	-	-	-
Internal controls (11)	0.489**	0.447**	0.475**	0.653**	0.682**	0.583**	0.660**	0.389**	0.636**	0.494**	1	-	-	-
Fiscal compliance (12)	0.480**	0.567**	0.395**	0.682**	0.692**	0.469**	0.509**	0.200	0.409**	0.177	0.649**	1	-	-
Financial reporting (13)	0.380**	0.020	-0.048	0.146	0.162	0.481**	-0.083	0.170	0.093	-0.067	0.214	0.382**	1	-
Accountability (14)	0.522**	0.382**	0.232	0.525**	0.542**	0.570**	0.288*	0.223	0.318**	0.079	0.541**	0.863**	0.797**	1

\*\*Correlation is significant at the 0.01 level (2-tailed); \*Correlation is significant at the 0.05 level (2-tailed) (Source: Primary data).

**Table 4.** Multiple regression analysis.

Variable	Unstandardized coefficients		Standardized coefficients	t	Sig.	Collinearity statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	0.587	0.659	0	0.891	0.377		
Managerial competencies	0.338	0.147	0.322	2.298	0.025	0.535	1.870
Internal controls	0.532	0.232	0.322	2.295	0.025	0.535	1.870

R=0.590 R<sup>2</sup>=0.349; Adjusted R<sup>2</sup>=0.328; F change=16.59 df1=2 df2=62; Durbin Watson=1.888 (Source: Primary data).

can be done only when management has the necessary competencies. The control environment includes the governance and management functions and the attitudes, awareness and actions of those charged with governance and management concerning the entity's internal control and its importance in the Local Government Authorities. A strong Internal Control environment provides a good basis for the other components of the internal control. For example, if management has a negative attitude towards control in general, this will undermine the effectiveness of other controls no matter how well they were designed. However, our findings indicate that, the control environment when taken in isolation does not have a significant relationship with accountability.

The findings of this study regarding the positive relationship between internal controls and accountability of LGAs are consistent with those of Abdirisaq and Yassin (2014) who argued that internal control is at the heart of accountability for a nation's resources and how effectively government uses them. However, Mzenzi and Gasper (2015) assert that accountability of LGAs in Tanzania is not proper given that auditors do not perform their duties as expected. So, in any government entity,

once there are any accountability failures, the implication is that management overrides internal controls or the monitoring mechanism for internal controls is weak. For managerial competencies, our results agree with the findings of Diane et al. (2012) who argued that management competencies are vital and as such managers have to act as role models for others to enhance accountability, and be able to coach and instruct them how to go about their work.

## Conclusion

This study aimed to establish the contribution of internal controls and managerial competencies to accountability of LGAs of a developing country like Uganda. To achieve this, we used a questionnaire survey of 64 sub counties of Busoga region in Uganda. We use Pearson correlation coefficient and ordinary least square multiple regression analysis to analyse the data. Results of this analysis indicate that managerial competencies and internal controls contribute significantly to accountability of LGAs.

This study's results are important to both researchers/

academicians and society for example, managerial competencies and internal controls are a mechanism for enhancing accountability of LGAs. Those charged with governance of LGAs should put emphasis on internal controls and managerial competencies through ensuring that, the process of recruitment is transparent to enable those with the necessary skills, abilities and experience to be selected for the job. Internal controls should also be reviewed consistently and a strong monitoring mechanism needs to be put in place. Society too can always demand for accountability of their resources. Whereas there is a notion that tax is a non-*quid pro quo* payment, in the current situation where accountability failures continue to increase at an increasing rate, such a notion may only be applicable where society is satisfied with government spending.

As with any study, this study has a number of limitations for example, the study was cross sectional. This implies that a change in behaviour over time was not monitored. Further, the study did not allow respondents to freely express their feelings on accountability since the study used close ended questionnaires. Regardless of the above limitations, this study can still be useful for managers and those charged with governance of various public sector entities in different national settings to improve accountability. However, further research may investigate the appropriate mechanism for accountability in the private sector or even in the public sector in any other national setting.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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*Full Length Research Paper*

# Investor returns and “re-intermediation”: A case of PPDai.com

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Online peer-to-peer (P2P) lending is a nascent but burgeoning marketplace that is expected to transform the landscape of the finance industry. Although, this topic is crucial, studies on the performance of individual investors in the P2P lending marketplace are few. The majority of P2P lending platforms add more intermediation or platform-based investment to improve product offerings and market efficiency. However, research on the performance of those different types of “re-intermediation” is limited. A unique and complete dataset from PPDai.com indicates that almost 95% of individual investors on the online peer-to-peer lending market generally do not obtain returns commensurate to the amount of systematic risks they assume. The performance of the different types of “re-intermediation”, such as portfolio tools and financial products, is not statistically distinguishable from that of the market. Nevertheless, the returns of these “re-intermediation” are less volatile, which shows most individuals can benefit from these types of “re-intermediation”.

**Key words:** Peer-to-peer lending, performance, individual investor, re-intermediation.

## INTRODUCTION

Online peer-to-peer lending (P2P lending) recently emerged as an appealing new financing channel different from traditional financial intermediaries, which facilitate individuals with limited institutional mediation (Michels, 2012; Duarte et al., 2012; Rigbi, 2013; Lin et al., 2013; Chishti, 2016). P2P lending is generally regarded as the household credit implementation of crowdfunding or simply called debt-based crowdfunding and with close relationship with consumer finance (Feinberg, 2003; Holmes et al., 2007; Dobbie and Skiba, 2013). This emerging online credit marketplace was virtually nonexistent before 2005. However, in 2014, P2P lending in the United States generated over \$8.9 billion in loans with \$1.32 billion in venture capital investments (Wei and Lin, 2016). Meanwhile, the banking regulator-estimated loan balance of online P2P lending platforms in China reached a total of RMB 621.3 billion (Financial Times,

2016<sup>1</sup>) in July 2016.

Despite the global expansion of this industry, little systematic research has been conducted on the fundamental topic of the return performance of individual investors (Morse, 2015). Disintermediation is one of the most significant characteristics of P2P lending. However, disintermediation seems to benefit from more intermediation (Morse, 2015). At the same time, P2P lending platforms all over the world are adding or have added more intermediation to improve product offerings and enhance market efficiency. For instance, PPDai.com<sup>2</sup> offers portfolio tools that can bid on loan listings automatically as well financial products that fund loan

<sup>1</sup> <http://www.ftchinese.com/story/001069068>

<sup>2</sup> <http://www.ppdai.com>

listings independent of the individuals. These platform-based investments are considered as different types of “re-intermediation” in this paper. However, research on the performance of re-intermediation is limited, since if the performance of the different types of “re-intermediation” is inferior to the performance of the most individual investors or the market return, then the platform should not offer those portfolio tools and financial products to individuals. In the current study, an analysis of a dataset is conducted to investigate the performance of individual investors and re-intermediation for the first time.

A unique and complete dataset from PPDai.com is used in the study. The dataset contains more than 1 million loans and the investment track records of more than 0.14 million individual investors over a four-year interval (2011 and 2015). The internal return rate (IRR) of each loan was first calculated based on Freedman and Jin (2014). The dataset allows us to identify the investment choices made by individuals or the re-intermediation. Thus, the rate-of-return series of individuals and the platform-based investment (re-intermediation) was calculated. The individual investors were divided into different groups and then construct a portfolio from the investment track records of each group. The weekly rate-of-return series of the portfolios during the four-year interval was studied and computed: (a) The rate-of-return series of the “market” portfolio; (b) Rate-of-return series of individual portfolios (the investors were classified into 10 subsets according to their total investment size or investing experience, which is measured by the number of weeks an investor bids on loan listings in the platform). Ten portfolios according to the investment size or experience of individual-related investors were obtained; (c) Rate-of-return series of the re-intermediation-related portfolios (these portfolios consist of investment records made by the re-intermediation, portfolio tools or financial products). This paper uses the time-series regression approach of Black et al. (1972) to verify whether a particular portfolio can obtain an “excess return” or outperform the market under different asset pricing models. Hence, the performance returns between the portfolios and the “market” benchmarks are compared.

This empirical analysis clearly demonstrates the performance returns of the individuals and the re-intermediation. The empirical results show that investors with a large investment or long investment experience will likely obtain an “excess return.” Almost 95% of the investors do not obtain returns commensurate to the amount of systematic risk they assume. Moreover, the re-intermediation can only achieve returns that are not statistically distinguishable from market returns but are significantly stable.

This study is one of the first to systematically analyze investor returns in the P2P lending market and the performance of re-intermediation using a comprehensive and large-scale dataset. Thus, the study contributes to

the extensive and growing literature on online P2P lending and crowdfunding. Recent works include those of Hosanagar et al. (2010), Herzenstein et al. (2011), Pope and Sydnor (2011), Michels (2012), Duarte et al. (2012), Zhang and Liu (2012), Burtch et al. (2013), Lin et al. (2013), Rigbi (2013), Tomczak and Brem (2013), Barasinska and Schäfer (2014), Freedman and Jin (2014), Agrawal et al. (2015), Liu et al. (2015), Lin and Viswanathan (2015), Iyer et al. (2015), Zheng et al. (2015a, b), Hildebr et al. (2016), Wei and Lin (2016) and Kang et al. (2016), most part of them have been summarized by Morse (2015). Given the global expansion of this industry, the present study has important and timely implications for investors and P2P platforms, as well as policy makers and regulators, particularly in China, where investors in the market may have limited professional financial skills. This study also contributes to the literature on the performance of individual investors in the financial market (Schlarbaum et al., 1978a, b; Odean, 1999; Barber and Odean, 2001; Grinblatt and Keloharju, 2000; Linnainmaa, 2003). However, the recent literature documented that some individual investors systematically outperform the market (Ivković and Weisbenner, 2004; Coval et al., 2005), which is also consistent with these findings.

### PPDai.com

PPDai.com is one of the largest online P2P lending platforms in China. This platform, which was launched in 2007, facilitates the transactions of numerous individuals to borrow and lend money without financial institutions acting as intermediaries. The website says that PPDai.com has more than 35 million registered members with a total of more than RMB 31.6 billion of transaction volume<sup>3</sup>.

After a potential borrower places a request for a short-term, unsecured, and fixed-rate loan, which also includes the amount he or she wants to borrow and the interest rate to pay, he or she also has to submit personal information, which includes national identification card, cell phone number, and online video, verification of diplomas, age, income, job status, copies of pay checks and bank statements. The platform uses this information to verify the identity of a user and assess his or her creditworthiness. Part of the information is standardized and mandatory, such as national identification card and cell phone number. In the United States, P2P platforms can easily obtain the credit reports of potential borrowers from a major credit-reporting agency, such as Experian. However, well-established credit rating agencies do not exist in China. Hence, PPDai.com assigns each listing, a credit grade that reflects the risk of default to investors or lenders according to their personal information and

<sup>3</sup> <http://map.invest.ppdai.com>

borrowing request. Credit grades in the platform range from AAA, which signifies that the loan listing is extremely low risk, through AA, A, B, C, D, and E to F, which indicates the highest risk by default.

After a loan listing is posted and becomes active, potential investors or lenders can browse through the website to decide whether or not to fund and the amount to contribute, which in most situations will be a minimum of RMB 50. A loan listing is successfully funded if and only if it receives sufficient bids that cover the requested amount. The loan listings in the PPDai.com are auto-funding listings, which means the loan listing is closed as soon as the requested amount is met by investors. This operating model is one of the most commonly used by the majority of P2P lending websites in the United States (Herzenstein et al., 2011; Michels, 2012; Duarte et al., 2012; Zhang and Liu, 2012).

Data-driven models are necessary to assess and price credit risks in microfinance (Einav et al., 2013). These models can also be employed to make investment choices in the P2P lending market because online P2P lending is also a typical representation of microfinance, and the platforms always have advantages in terms of information access and computational ability unlike individual investors. As a result, P2P lending platforms all over the world add more intermediation to improve product offerings.

In 2014, PPDai.com offered new portfolio tools and financial products, collectively called “re-intermediation” in this paper, to individual investors to enhance market efficiency. Portfolio tools, such as “kuaituo” and “auto-bid,” can be used to bid automatically. Investors only need to set the filter criteria, which mainly include the average amount of each bid and the risk preferences. The investment tools will bid automatically on the listings that fit the requirements. The platform also offers financial products to individual investors. Unlike investment tools, individual investors only need to choose the investment size and investment horizon. The platform makes investment decisions independent of investors. However, individuals need to pay a fee to join a financial product, whereas portfolio tools are free.

$$ReturnRate_t = (\sum_1^n IRR_n * BidAmount_n * PayTerm_n) / (\sum_1^n BidAmount_n * PayTerm_n) \quad (3)$$

Five additional rate-of-return series are calculated as representations of the investment performance of the benchmark “market” collections of loans. According to PPDai.com, the loans are aggregated into the following types: loans with low risk by default (loans assigned with credit grade “AAA” or “AA”), loans with middle risk by default (if credit grade of the loan is “A”, “B” or “C”), and loans with high risk by default (which are graded into “E” or “F”).

## METHODOLOGY

### The data

The main data source is a collection of loan-listing web pages from PPDai.com. The data were obtained by downloading all the loan-listing web pages since the platform’s official inception (June 2007 to October, 2015). Next, a pattern-matching algorithm was listings submitted by more 3.9 million potential borrowers, among which 98,1629 loan listings were funded, and investment track records of more than 140,000 individual investors. Items with nonstandard or missing data were disregarded, and earlier and later data were discarded to avoid the initial launch period and truncation on loan repayments. The period studied is from November 2011 to October 2015, which comprise a four-year interval.

The IRR of the defaulted loans was calculated using the approach of Freedman and Jin (2014). If a loan is not defaulted, then the IRR is equal to the interest rate of the loan, because loans with truncation on loan repayments were disregarded in the interval studied. The detailed algorithm is as follows:

- Loan size (*LoanSize*), interest rate of a loan (*InterestRate*), term to amortize (*Term*), and number of months during which the payments have been made (*PayTerm*) were determined.
- The amortized monthly payment (*MonthlyPay*) is calculated as follows:

$$MonthlyPay = \frac{LoanSize * \left(\frac{InterestRate}{12}\right) * \left(1 + \frac{InterestRate}{12}\right)^{Term}}{\left[\left(1 + \frac{InterestRate}{12}\right)^{Term} - 1\right]} \quad (1).$$

- Solve for the IRR that equalizes *LoanSize* to the sum of the present value of *MonthlyPay* from one to *PayTerm* using the IRR as the discount factor. The equation was defined as follows:

$$LoanSize = \sum_1^{Term} \left[ \frac{MonthlyPay}{\left(1 + \frac{IRR}{12}\right)^{Term}} \right] \quad (2)$$

Given a loan without any payment or defaulted at the first month, we set the *IRR* = -12, and *PayTerm* = 1, which means that the monthly discount factor is -1. The dataset allows us identify the investment decisions made by individual investors or the platform. The rates of return of individual investors and platform was calculated independently. We can calculate the rates of returns on a portfolio in week *t* given a portfolio that contains *n* bids in week *t* because the *IRR*, *PayTerm*, and *BidAmount* (amount of bid) for each bid is known. The rates of returns are calculated as follows:

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**Table 1.** Summary statistics.

Quantile (%)	Investment size	Investment experience
50	1400.0	3
60	2000.0	5
70	6285.0	10
80	14249.8	18
90	41764.9	36
95	99153.4	57
99	525597.4	110
99.73	1740830.0	157
99.9*	3858430.0	195

\* It is believed that the empirical results are robust to other breakpoints.

risk portfolio, high-risk portfolio, safe-risk portfolio and market implemented to take the variables of interest from the web page HTML code. The resulting dataset consists of more than 5 million portfolio. Given that one of the objectives of this study is to examine the investment performance of individual investors, we do more than just measure the average return of individual investors. Moreover, the proportions of investors who outperform the market and underperform the market must be determined. This information can be obtained from two aspects, namely, total investment size and investment experience. Investment experience is measured by the number of weeks an investor bids on some loan listings. For example, if an investor funds loan listings in two distinct weeks, the investment experience of the investor is equal to two. These two criteria were chosen mainly because of the following reasons. A less-sophisticated investor tends to obtain a low or negative return and is more likely to withdraw from the market. As a result, less skilled investors are inclined to have a small total investment size and to be less experienced from an ex post perspective. Thus, a feasible method may be employed to distinguish investors with investment skills from those with less skills. This approach involves dividing the investors into different groups according to their total investment size or investment experience. The overall performance of these groups was assessed.

The investors must be divided into different groups to examine their performances. However, the total investment size of individual investors is heavily skewed in the dataset, as shown in Table 1. Investors below the 50th percentile have a total investment size less than RMB 1400, whereas investors in the 99.9th percentile invested more than RMB 3.8 million in the market. To avoid possible biases, we classify the investors into 10 groups and a portfolio is constructed based on each group. According to Expression (3), a rate-of-return series is calculated for each portfolio. 10 groups of investors were obtained according to the following breakpoints: bottom 50, 50-60, 60-70, 70-80, 80-90, 90-95, 95-99, 99.73-99.9 and top 99.9-100%. The same breakpoints were also set when we divided the investors according to the investment experience. The investment experience is also heavily skewed. The summary statistics are shown in Table 1. The table shows that 50% of the investors in the dataset have an investment experience not longer than a month, whereas investors in the 99.9th percentile bid on some loan listings almost throughout the four-year interval.

The attributes of the rate-of-return series of different portfolios are summarized in Table 2. Panel A shows the details of the rate-of-return series of the portfolios, which are constructed from different investment track records of various groups of investors. The arithmetic mean annualized weekly return on the portfolio of the investors below the 50th percentile during the four years is

estimated to be 0.074, whereas the return on the portfolio of individual investors in the 99.9th percentile is estimated to be 0.118. A negative relation exists between the investment size of investors included in the portfolio and the standard deviation of the returns on the portfolio. A stronger positive relation exists between the total investment size of investors and the average return on the portfolio. These findings indicate that investors with a large total investment size will likely obtain high and steady returns. This phenomenon is also discovered when the performance of investors is analyzed according to their investment experience. Investors with a short investment experience will likely have low returns with a high standard deviation. This preliminary examination indicates that some individual investors outperform other investors systematically.

Panel B shows the details of the rate-of-return series of the benchmarks. The average return on the market portfolio is 0.108 with a standard deviation of 0.03. The average return on the safe-risk portfolio is 0.086, whereas the figure of the standard deviation is 0.005, which is significantly smaller than that of the market portfolio at 0.03. The unreported results indicate that when the weekly returns on the safe-risk portfolio are regressed on the returns of the market portfolio by OLS, the  $R^2$  statistic of the linear regression model is close to zero, which indicates that the returns on the market portfolio slightly affect the returns on the safe-risk portfolio. The returns on the safe-risk portfolio are independent from the returns on the market portfolio. Thus, the portfolio is almost a zero-beta portfolio (Blume and Friend, 1973), which will be used in one of the empirical models.

Panel B indicates that significant differences exist in the rate-of-return series on the three portfolios consisting of loans with different risk grades (low risk, middle risk, and high risk). The average returns of the portfolios range from 0.107 for the low-risk portfolio to 0.120 and 0.092 for the high-risk portfolio with a standard deviation of 0.016, 0.067, and 0.040, respectively. The attributes of rate-of-return series of the three portfolios vary significantly. Based on the concept of Fama and French (1993), the high returns on some portfolios may incur high-risk factors. Some individual investors obtain low returns simply because of their risk preferences. For example, when an investor only bids on the loan listings with risk grade "AAA" on the average, he or she can expect a return rate of 0.086. Another investor can expect a return of 0.107 if he or she also bids on loan listings with risk grade "AA" or "A". Thus, we should employ an asset-pricing model to cover the differences of returns resulting from risk preferences. The average return on the high-risk portfolio is less than that on the middle-risk portfolio and even on the low-risk portfolio. This condition can result from the high default rate of high-risk loans. As a result, only few of the high-risk loan listings are successfully funded. The return rate of the low-risk portfolio is almost equal to the return rate of the market (0.108)

**Table 2.** Summary statistics.

Panel A: Weekly return rate series of different portfolios: November 2011 to October 2015												
Quantile		Low	2	3	4	5	6	7	8	9	High	Obs.
Invest amount	$\bar{R}_{jt}$	0.074	0.083	0.088	0.091	0.097	0.102	0.108	0.113	0.117	0.118	211
	$\sigma(R_{jt})$	0.056	0.059	0.042	0.043	0.039	0.037	0.033	0.029	0.033	0.038	211
Invest experience	$\bar{R}_{jt}$	0.076	0.091	0.089	0.095	0.100	0.105	0.112	0.115	0.114	0.116	211
	$\sigma(R_{jt})$	0.087	0.055	0.052	0.042	0.039	0.038	0.031	0.030	0.030	0.028	211
Panel B weekly return rate series of different market portfolios												
Market return	$\bar{R}_{jt}$						0.108					211
	$\sigma(R_{jt})$						0.031					
Safe return	$\bar{R}_{jt}$						0.086					211
	$\sigma(R_{jt})$						0.005					
Low-risk return	$\bar{R}_{jt}$						0.107					211
	$\sigma(R_{jt})$						0.016					
Middle-risk return	$\bar{R}_{jt}$						0.120					211
	$\sigma(R_{jt})$						0.067					
High-risk return	$\bar{R}_{jt}$						0.092					211
	$\sigma(R_{jt})$						0.040					
Tools return	$\bar{R}_{jt}$						0.113					31
	$\sigma(R_{jt})$						0.008					
Product return	$\bar{R}_{jt}$						0.116					54
	$\sigma(R_{jt})$						0.013					

but with a substantially small standard deviation. This descriptive statistical analysis indicates that funding the low-risk loans is a good choice.

The rates of returns on the portfolios of different types of re-intermediation are also presented in Panel B. The average returns on the portfolios of investment tools and financial products are 0.113 and 0.116, respectively, and the standard deviations are 0.008 and 0.013, respectively. Meanwhile, during the same period, the average returns of the market are 0.1156 and 0.1153, and the standard deviations are 0.0074 and 0.0075, respectively. The difference between the rate-of-return series is almost negligible. Hence, the re-intermediation, such as investment tools and financial products, can hardly outperform that of the market. Nevertheless, these types of “re-intermediation” can help individual investors obtain a return rate that is not lower than that of the market.

### Risk-adjust performance criteria

However, a rigorous and complete appraisal of performance results requires that the differences in investment risk preferences be considered as well and additional benchmarks be constructed. The asset pricing models of Sharpe (1964), Black et al. (1972), Merton (1973) and Fama and French (1993) can be used to organize ideas. A new asset pricing model was not proposed but employ asset pricing models to compare the rate-of-return series of different portfolios constructed in the previous section. To ensure the robustness and

comprehensiveness of the empirical results, we run the regressions by choosing different asset-pricing models. The estimating equations have the following forms:

$$R_{jt} - R_{ft} = a_j + b_j(R_{mt} - R_{ft}) + e_{jt} \quad (4)$$

$$R_{jt} - R_{zt} = a_j + b_j(R_{jt} - R_{zt}) + e_{jt} \quad (5)$$

$$R_{jt} - R_{ft} = a_j + b_j(R_{mt} - R_{ft}) + m_j MML_t + h_j HML_t + e_{jt} \quad (6)$$

Where  $R_{jt}$  is the return on an individual-related or re-intermediation-related portfolio in week  $t$ .  $R_{ft}$  is the “risk-free” rate. The one-year deposit rate of China is used as the “risk-free” rate in place of the rate of Treasury bills observed at the beginning of week  $t$ .  $R_{zt}$  is the return on the safe-risk portfolio (consisting of loans with risk grade AAA) in week  $t$ , and  $MML_t$  (middle minus low) is the difference in each week between the return on the middle-risk portfolio (consisting of loans with a middle risk grade) and the return on the low-risk portfolio (consisting of loans with low-risk grade).  $HML_t$  (high minus low) is the difference of each week between the return on the high-risk portfolio (consisting of loans in the high-risk grade) and return on the low-risk portfolio.  $e_{jt}$  is the error term and the regression yield parameter  $a_j, b_j, m_j, h_j$ . The



estimate of intercept  $a_j$  provides a measure of portfolio  $j$ 's risk-adjusted performance over a concerned period and a measure of the volatility on coefficient  $b_j$ . If estimate  $a_j$  is statistically and significantly positive, the portfolio obtains a positive excess return and outperforms the benchmark. If estimate  $b_j$  is statistically significant and larger than 1, the volatility of the portfolio is higher than that of the market or vice versa. The return performance of different portfolios of interest is assessed through the following steps. Equation 1 was examined by using the excess return of market,  $R_{mt} - R_{ft}$  to explain the excess returns of the portfolios of interest. Equation 2 uses  $R_{mt} - R_{zt}$  as an explanatory variable, and we utilize  $R_{zt}$  as the "risk-free" rate. Equation (3) uses  $R_{mt} - R_{ft}$ ,  $MML_t$ ,  $HML_t$  to explain the excess returns on an individual-related or re-intermediation-related portfolio .

The process of computing Equation 1, which is the base model or building block, is similar to the approach of Sharpe (1964) and only obtains the market factor. We construct estimating Equation 2 by re-defining the "risk-free" rate and choosing the rate of return on the safe-risk portfolio as the "risk-free" rate, because the influence of the rate of return on the market portfolio is low or is, in other words, a zero-beta portfolio. The model is a two-factor version of the market model, which is consistent with the work of Blume and Friend (1973) and was also adopted by Schlabraum et al. (1978a). Estimating Equation 3 considers the systematic risk of the market and the risk resulting from loans with different credit grades. The previous analysis shows that the rate-of-return series on portfolios consisting of loans with different risk grades varies significantly. Estimation of Equation 3 was used to handle these differences.

## Performance of individual-related portfolios

### *Can larger investors make an excess return?*

The investigation is conducted by examining the performance of investors according to the total investment size. The parameters of the three equations are estimated from time series regressions utilizing the 211 weekly return observations available from the four-year interval. The results of these regressions are reported in Table 3.

The estimate  $a_j$  changes from negative to positive and is statistically significant (29/30) in most of the regression results, which indicates that investors with a large total investment size will likely obtain an excess return because  $a_j$  is the measure of the portfolio's risk-adjusted performance. However, estimate  $b_j$  decreases gradually, indicating that the returns of investors with a large investment size are less affected by the market when compared with investors with a small total investment size, or, in other words, the volatility of the rate-of-return

series of investors with a large investment size is lower. These results are consistent with the summary statistics of the rate-of-return series in Table 2.  $R^2$  ranges from 0.367 to 0.956. In some cases, our models attribute the relatively large common variations to other possible factors, which cannot be captured in our model. Nevertheless, the average  $R^2$  statistic is equal to 0.7068, which ensures the reliability of our conclusions. The  $R^2$  values in the estimated results of Equation 6 are larger than those of Equations 4 and 5, whereas the differences are almost negligible. The robustness of the empirical results may also be ensured, suggesting that the risk preferences influence investment performance, although the effect is quite limited.

The results show that estimate  $a_j$  is consistently negative and different from zero statistically significant when the rate-of-return series belong to the portfolios of investors below the 90th percentile. The smallest figures in the regression results from the three equations are -0.069, -0.039, and -0.092, respectively. Estimate  $a_j$  of the portfolios of investors in the 99 to 100th percentile is consistently positive and statistically significant. The largest estimate  $a_j$  in the estimation results of the three equations is 0.040, 0.015 and 0.032, respectively. The difference of the "excess return" between the different groups is quite large and far from negligible. The rates of return are annually calculated.

### *Can more experienced investors make an excess return?*

Table 4 reports the estimation results of the rate-of-return series on the portfolios of investors with different investment experiences, which is similar with the previous analysis. Estimate  $a_j$  becomes positive as investment experience increases, and estimate  $b_j$  becomes lower than 1, suggesting that experienced investors will likely obtain an "excess return" and less volatile rates of return.

In most estimation results, the  $R^2$  values in the estimation results of Equation 6 are larger than those in Equations 4 and 5, which are consistent with the results in Table 3. The average  $R^2$  value of all the estimate results is 0.663. The smallest figures of estimate  $a_j$  in the regression results from the three equations are -0.058, -0.039 and -0.102. The largest values of estimate  $a_j$  in the results of the three equations are 0.048, 0.019 and 0.040, respectively, and the differences between these figures and those in Table 3 are almost negligible. However, Table 4 indicates that estimate  $a_j$  is positive and statistically significant in the estimation results of the portfolios of investors over the 95th percentile. The figures in the estimation results of Equations 4 and 5 from the portfolios of the investors in the 90th to 95th percentile are equal to 0.007 and 0.005, respectively, which are not far from 0, whereas it increases to 0.013 in

**Table 3.** Individual investor returns analysis by total investment size.
$$R_{jt} - R_{ft} = a_j + b_j(R_{mt} - R_{ft}) + e_{jt} \quad (4)$$

$$R_{jt} - R_{zt} = a_j + b_j(R_{jt} - R_{zt}) + e_{jt} \quad (5)$$

$$R_{jt} - R_{ft} = a_j + b_j(R_{mt} - R_{ft}) + m_jMML_t + h_jHML_t + e_{jt} \quad (6)$$

Quantile		Low	2	3	4	5	6	7	8	9	High
<i>a</i>	(1)	-0.052	-0.069	-0.014	-0.032	-0.027	-0.019	-0.005	0.019	0.020	0.040
	(2)	-0.039	-0.035	-0.020	-0.021	-0.015	-0.009	-0.001	0.008	0.011	0.015
	(3)	-0.092	-0.072	-0.053	-0.040	-0.031	-0.012	0.010	0.023	0.032	0.020
<i>b</i>	(1)	1.163	1.399	0.942	1.135	1.141	1.121	1.041	0.874	0.895	0.717
	(2)	1.182	1.410	0.972	1.153	1.153	1.126	1.033	0.870	0.886	0.718
	(3)	1.576	1.443	1.366	1.241	1.207	1.056	0.899	0.825	0.765	0.902
<i>t(a)</i>	(1)	-6.803	-8.515	-3.495	-6.974	-9.047	-7.882	-2.524	8.757	5.867	6.084
	(2)	-10.932	-10.775	-7.772	-10.229	-11.954	-9.116	-1.835	9.454	7.806	6.246
	(3)	-7.365	-5.879	-6.380	-5.818	-7.261	-3.856	3.485	6.878	5.786	2.439
<i>t(b)</i>	(1)	13.615	17.318	15.378	22.473	37.317	45.311	60.364	41.659	24.247	11.101
	(2)	12.999	16.827	15.053	21.904	36.560	44.356	59.447	41.413	24.289	11.261
	(3)	11.545	10.795	15.069	15.572	25.528	26.219	34.231	23.371	12.358	7.936
<i>R</i> <sup>2</sup>	(1)	0.466	0.586	0.527	0.705	0.868	0.907	0.945	0.892	0.736	0.367
	(2)	0.443	0.572	0.517	0.694	0.864	0.903	0.944	0.890	0.736	0.374
	(3)	0.511	0.589	0.650	0.737	0.890	0.912	0.956	0.896	0.753	0.374

\* $R_{jt}$  is the return on an individual-related or re-intermediation-related portfolio in week  $t$ .  $R_{ft}$  is "risk-free" rate, one-year deposit rate of China is used as the "risk-free" rate in place of the rate of treasury bills observed at the beginning of the week.  $R_{zt}$  is the return on the safe-risk portfolio (consisting of loans with risk grade AAA) in week  $t$ , and  $MML_t$  (middle minus low) is the difference in each week between the return on the middle-risk portfolio (consisting of loans with a middle-risk grade) and the return on the low-risk portfolio (consisting of loans with low-risk grade).  $HML_t$  (high minus low) is the difference in each week between the return on the high-risk portfolio (consisting of loans in high-risk grade) and the return on the low-risk portfolio.

the regression results of Equation 6. When compared with the corresponding estimated  $a_j$  in Table 3, the differences between estimate  $a_j$  are relatively small. The figures are -0.005, -0.001, and 0.010, respectively, as shown in Table 3. The empirical results in Table 4 are consistent with that in Table 5 in most situations.

### Performance of the re-intermediation-related portfolios

As described above, PPDai.com developed the portfolio tools to help the investors to bid on loan listings automatically. Another type of re-intermediation is the financial products provided by the platform, the financial products are managed by the platform, and the platform make investment choices independently of individual investors. Both approaches, which are employed by the majority of P2P lending platforms all over the world, are

considered as different types of re-intermediation in this paper and the performance of them are analyzed. Firstly, the rate-of-return series was calculated on the two different portfolios of the portfolio tools and the financial products, respectively, and then the same time-series-regressions method is employed to measure the performance of these portfolios. The results of such regressions are presented in Table 5.

The performance return of the portfolio tools was first examined. Table 5 indicates that the values of estimate  $a_j$  in the three models are 0.032, 0.001 and 0.023, respectively. The figures are positive, but estimate  $a$  is only statistically significant in the estimation results of Equation 4. Concluding that portfolio tools help individuals obtain a better return than the market is unreliable. However, estimate  $b_j$  in the three models is smaller than 1, which indicates that the return of portfolio tools may not outperform the market but obtains an average and more stable return than the market.

**Table 4.** Individual investor returns analysis by experience.
$$R_{jt} - R_{ft} = a_j + b_j(R_{mt} - R_{ft}) + e_{jt} \quad (1)$$

$$R_{jt} - R_{zt} = a_j + b_j(R_{jt} - R_{zt}) + e_{jt} \quad (2)$$

$$R_{jt} - R_{ft} = a_j + b_j(R_{mt} - R_{ft}) + m_jMML_t + h_jHML_t + e_{jt} \quad (3)$$

Quantile		Low	2	3	4	5	6	7	8	9	High
a	(4)	-0.058	-0.011	-0.043	-0.026	-0.020	-0.017	0.007	0.014	0.018	0.048
	(5)	-0.039	-0.015	-0.026	-0.016	-0.012	-0.008	0.005	0.008	0.009	0.019
	(6)	-0.102	-0.021	-0.058	-0.043	-0.021	-0.017	0.013	0.012	0.026	0.040
b	(4)	1.313	0.927	1.293	1.162	1.150	1.170	0.958	0.907	0.843	0.493
	(5)	1.276	0.890	1.266	1.145	1.139	1.164	0.965	0.916	0.844	0.497
	(6)	1.977	1.112	1.529	1.402	1.176	1.164	0.874	0.915	0.725	0.610
t(a)	(4)	-4.019	-1.281	-6.858	-6.244	-7.359	-9.784	4.821	7.533	7.612	11.335
	(5)	-5.965	-3.679	-8.936	-8.577	-9.144	-9.225	6.757	9.751	8.120	9.721
	(6)	-4.662	-1.534	-6.061	-6.772	-4.933	-5.984	5.716	4.374	7.280	6.012
t(b)	(4)	7.843	9.031	17.695	23.994	35.450	56.462	55.075	42.828	31.299	10.006
	(5)	7.580	8.660	17.149	23.426	34.734	55.317	55.044	42.729	31.176	9.994
	(6)	7.147	6.558	12.642	17.614	21.841	32.703	30.717	25.573	16.209	7.278
R <sup>2</sup>	(4)	0.223	0.276	0.597	0.731	0.856	0.938	0.935	0.897	0.823	0.320
	(5)	0.211	0.260	0.581	0.722	0.851	0.935	0.935	0.896	0.821	0.319
	(6)	0.274	0.325	0.622	0.752	0.864	0.937	0.940	0.899	0.833	0.327

\* $R_{jt}$  is the return on an individual-related or re-intermediation-related portfolio in week  $t$ .  $R_{ft}$  is the "risk-free" rate, one-year deposit rate of China is used as the "risk-free" rate in place of the rate of Treasury bills observed at the beginning of the week.  $R_{zt}$  is the return on the safe-risk portfolio (consisting of loans with risk grade AAA) in week  $t$ , and  $MML_t$  (middle minus low) is the difference each week between the return on the middle-risk portfolio (consisting of loans with a middle-risk grade) and the return on the low-risk portfolio (consisting of loans with low-risk grade).  $HML_t$  (high minus low) is the difference each week between the return on the high-risk portfolio (consisting of loans in high-risk grade) and the return on the low-risk portfolio.

The performance record of the financial products managed by the platform is statistically indistinguishable from that of the indicated market benchmarks. This result is not surprising because of the close similarities of the various rate-of-return series involved. Table 5 shows that estimate  $a_j$  has not been statistically significant for the period. Neither superior nor inferior over-all performance can be detected in these returns. Nevertheless, estimate  $b_j$  in the three models is not larger than 1, suggesting that the returns on the financial products are less risky.

## DISCUSSION

According to the results displayed in Table 3, the performance of approximately 90% of the investors is inferior to the performance of the market. Table 1 shows that 50% of the investors have a total investment size not more than RMB1400, and that 80% of the investors have not more than 14249.8 even when small investors are

excluded. These relatively large investors with a total investment size around RMB10000 can still hardly earn a positive excess return from the P2P market. Only investors in the 99th percentile consistently gain a positive excess return. Investors with large investment size tend to obtain high returns. Moreover, compared with Tables 5 and 4 shows that the regressions using individual-related portfolio returns yield virtually identical findings regardless of whether the results is examined on the total investment size or the investment experience of the individual investors. Superior overall performances were observed in the returns of the portfolios of experienced investors and investors with a large investment size, implying that a few investors perform better than others during the period systematically.

The performance of different types of re-intermediation, such as portfolio tools or financial products, is displayed in Table 5. The return series of portfolio tools and financial products during the interval of period studied can hardly be distinguished statistically from the

**Table 5.** Investments return analysis of the re-intermediation.
$$R_{jt} - R_{ft} = a_j + b_j(R_{mt} - R_{ft}) + e_{jt} \quad (4)$$

$$R_{jt} - R_{zt} = a_j + b_j(R_{jt} - R_{zt}) + e_{jt} \quad (5)$$

$$R_{jt} - R_{ft} = a_j + b_j(R_{mt} - R_{ft}) + m_jMML_t + h_jHML_t + e_{jt} \quad (6)$$

	Portfolio tools			Financial products		
	(4)	(5)	(6)	(4)	(5)	(6)
<i>a</i>	0.032	0.001	0.023	0.011	0.006	0.028
<i>t(a)</i>	2.281	0.201	1.272	0.569	0.983	0.939
<i>b</i>	0.645	0.927	0.746	0.899	0.861	0.676
<i>t(b)</i>	4.358	7.967	3.643	4.529	5.030	2.043
<i>R</i> <sup>2</sup>	0.367	0.668	0.360	0.265	0.310	0.308

\* $R_{jt}$  is the return on an individual-related or re-intermediation-related portfolio in week  $t$ .  $R_{ft}$  is the “risk-free” rate and, the one-year deposit rate of China is used as the “risk-free” rate in place of the rate of Treasury bills observed at the beginning of the week.  $R_{zt}$  is the return on the safe-risk portfolio (consisting of loans with risk grade AAA) in week  $t$ , and  $MML_t$  (middle minus low) is the difference each week between the return on the middle-risk portfolio (consisting of loans with a middle-risk grade) and the return on the low-risk portfolio (consisting of loans with a low-risk grade).  $HML_t$  (high minus low) is the difference each week between the return on the high-risk portfolio (consisting of loans in high-risk grade) and the return on the low-risk portfolio.

performance of the market. Individuals can benefit from the empirical results. Firstly, given the poor performance of the individual investor which has been verified in Tables 3 and 4, it is wiser to employ the portfolio tools and financial products to obtain a market level return. Then, availing of the financial products offered and managed by the platform entails fees and the portfolio tools can be used without any charge, while their performance varies a little. Thus, employing such portfolio tools is a viable option for individuals.

## Conclusion

In this paper, the performance of individual investors in the online P2P lending market as well as the performance of the re-intermediation was estimated for the first time. These findings indicate that most of the investors do not obtain returns commensurate to the amount of systematic risk they assume and not more than 5% of the investors can outperform the market in the aggregate. The investors with a small investment size or with less experience tend to get a much low return of high volatility. Moreover, the empirical analysis shows that the performance of the re-intermediation, which is neither superior nor inferior overall performance, can be detected in these returns on different types of the re-intermediation. This conclusion holds both for portfolio tools and financial products.

The results have significant implications for practitioners in the P2P lending market, particularly individual investors, since individual investors tend to be less skillful and less informed, especially in China. Not more than 5% of

individual investors can earn an “excess return”; thus, employing the re-intermediation provided by the platform, such as portfolio tools and financial products, is reasonable to obtain an average return. Platforms may be (and are) increasing intermediation to improve product offerings and enhance lending efficiency, because they incorporate content fields into risk scoring and investment decisions to redress possible biases when individual investors assess the creditworthiness of their peers, as verified by Herzenstein et al. (2011), Michels (2012), Duarte et al. (2012) and Hildebrand et al. (2016), as well as this study. The algorithmic extraction of valuable signals of borrowers seems possible, and investment decisions according to these signals should obtain an “excess return.” However, the findings do not support this. This result indicates that other measures must be adopted to improve the performance of the re-intermediation and help less-skilled individual investors to earn high returns.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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