



Journal of Economic Cooperation & Development

Ahmet Ugur and Esma Gultekin

Approaching the Environmental Kuznets Curve: Empirical Evidence from Turkey

Ali Ashraf, Walter Lane and
M. Kabir Hassan

Monetary Policy Responses to the 2008 Financial Crisis: Quantitative Easing Evidence in the United Kingdom

Jennifer Brodmann, Blake Rayfield, M.
Kabir Hassan and Anh Thu Mai

Banking Characteristics of Millennials

Moundir Lassassi and Ibrahim Alhawarin

The Role of Social Networks and Ties in Finding a Job in Economies Characterized with High Youth Unemployment: A Case study of Algeria and Jordan

Vahid Pourshahabi, Masoud Pourkiani,
Mohsen Zayandeh Roodi and
Ayoub Sheikhi

Prioritizing the Sustainable Development Components to improve the level of Development with Analytical Hierarchy Process

ISSN 1308 – 7800

Volume 39, No.4, December 2018

**J o u r n a l o f
E c o n o m i c C o o p e r a t i o n
& D e v e l o p m e n t**



**Statistical Economic and Social Research
and Training Centre for Islamic Countries
(SESRIC)**

Contents

Ahmet Ugur and Esma Gultekin

Approaching the Environmental Kuznets Curve: Empirical Evidence from Turkey	1
---	---

Ali Ashraf, Walter Lane and M. Kabir Hassan

Monetary Policy Responses to the 2008 Financial Crisis: Quantitative Easing Evidence in the United Kingdom	19
--	----

Jennifer Brodmann, Blake Rayfield, M. Kabir Hassan and Anh Thu Mai

Banking Characteristics of Millennials	43
--	----

Moundir Lassassi and Ibrahim Alhawarin

The Role of Social Networks and Ties in Finding a Job in Economies Characterized with High Youth Unemployment: A Case study of Algeria and Jordan	75
---	----

Vahid Pourshahabi, Masoud Pourkiani, Mohsen Zayandeh Roodi and Ayoub Sheikhi

Prioritizing the Sustainable Development Components to improve the level of Development with Analytical Hierarchy Process	103
---	-----

EDITORIAL NOTE

The selection of these articles in this issue of the Journal of Economic Cooperation and Development – December 2018 – based on the theme on ‘Finance and People’ - gives a prospect for the new trend of the exchanges of knowledge and information among and outside the OIC countries. While environmental factors and economic growth within the context of adaptation to the environment provides a new look of how an economy can be curved, the characteristics of the Millennial generation along with their mastery of social media networks influence the banking sector by matter of interest in and utilization of financial products and services typically offered by banks and help these people find employment as well. By opening a window to various scholars, researchers and academics within and outside the OIC region to continue demonstrating an increased interest in sharing their valuable works and studies with the readers of our Journal of Economic Cooperation and Development, SESRIC is proud to share the valuable information in these articles with the OIC Member countries to provide them with a chance to keep up with the pace of the changes occurring in the world economy. This December issue contains five noteworthy articles which accentuate a detailed analysis of environment vs. economic growth, monetary policy, banking, social media and employment as well as sustainable development.

The first article investigates the important relationship between environmental factors and economic growth within the context of adaptation to the environment. The generation of Kuznets curve based on the original Kuznets (1995) curve for Turkey’s economy for the period 1960–2011, using the carbon dioxide emissions, energy consumption and per capita GDP variables helped obtain results parallel to the Kuznets curve for Turkey’s economy and the reverse approach was accepted and the structural break analyzes applied in the study are important in terms of Turkey's economy.

The second article analyzes responses to monetary policy tools during the United Kingdom’s Quantitative Easing regime from March 06, 2009 to June 02, 2010 on a set of target variables: market index, foreign exchange index, investment grade and non-investment grade bond yield, and spots and forwards of different maturities for OIS, LIBOR and Nominal Government Yield. Results suggest that conventional monetary policy tools other than a zero-bound official bank rate may still be effective. Inclusion of one unconventional tool, the increase in government gilt holdings, has significant impact on most of the target variables.

The third article looks at the characteristics of the Millennial generation, compares them to other generations, and explores how the characteristics of Millennials influence their banking behavior, specifically their choice to utilize financial products and services commonly associated with financial institutions. The results indicate that Millennials differ from Generation X and Baby Boomers in several aspects, including utilization of mobile banking, accumulation of student loan debt, and perception of financial knowledge. Through differences in means tests and probit regression, this study reflects how these factors influence Millennials' interest in and utilization of financial products and services typically offered by banks.

The fourth article shows that social networks and ties play an important role in labor market intermediation in Arab countries. In addition to descriptive analysis, we utilize binary probit regressions to investigate determinants of the probability of finding a job through social contacts. The study finds that social networks are a popular method to find a job in Algeria and Jordan but not for skilled jobs. Such methods increase the probability of obtaining less secured informal jobs. Also, the study shows that despite the importance of public sector agencies in the job search process, less than 5% in Algeria and 9% in Jordan of employed youth state that such agencies have helped them transit into employment.

The fifth and last article underlines that Sustainable development consists of a long-term, integrated approach to develop and achieve a healthy community by jointly addressing economic, environmental, and social issues, whilst avoiding the over consumption of key natural resources for managers and government planners in public management. Therefore, this study aims to identify and rank the sustainable development components influencing and improving the development level of Sistan and Baluchestan province of Iran through using hierarchical analysis method (AHP) and Expert Choice software. The obtained results analyzed and ranked the factors using collected comments. Expert Choice software also indicated that the economic had the highest effect on improving the development level and the social and the environmental factors were the next priorities, respectively.

The SESRIC with its JECD team shall continue to serve its readers by always selecting the best articles whose long-term profitable and constructive information shall be of use as well as serve the OIC countries' best interests, upholding their willingness to contribute to the expansion of economic and technical cooperation among themselves and beyond.

Amb. Musa KULAKLIKAYA
Editor-in-chief

Approaching the Environmental Kuznets Curve: Empirical Evidence from Turkey

Ahmet Ugur¹ and Esma Gultekin²

This study investigated the important relationship between environmental factors and economic growth within the context of adaptation to the environment. We generated a Kuznets curve based on the original Kuznets (1995) curve for Turkey's economy for the period 1960–2011, using the carbon dioxide emissions, energy consumption and per capita GDP variables. A time series analysis was applied to test the existence of a long-run relationship between the series and the coefficient definitions of the variables were made. The results obtained were parallel to the Kuznets curve for Turkey's economy and the reverse approach was accepted and the structural break analyzes applied in the study are important in terms of Turkey's economy.

Keywords: environmental Kuznets curve, CO₂ emissions, pollution, energy consumption, cointegration

JEL Classifications: Q43, Q50

1. Introduction

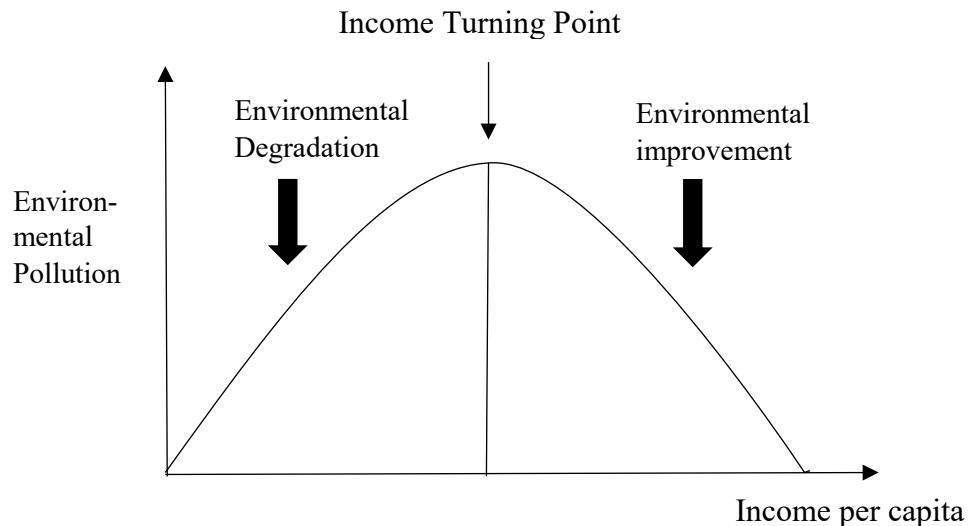
The world has used systems based on fossil fuel since the Industrial Revolution. Carbon fuels such as petroleum, natural gas, and coal still occupy an important place alongside nuclear power. Under these circumstances, the global economy creates substantial greenhouse gas and carbon dioxide emissions (Tutulmaz, 2015: 73). Greenhouse gases gradually affect the global climate, ecosystems, and socioeconomic

¹ Department of Economics, Inonu University, Malatya, Turkey,
E-mail: ahmet.ugur@inonu.edu.tr

² Department of Economics, Firat University, Elazig, Turkey,
E-mail: egultekin@firat.edu.tr

systems. Unless environmental degradation stops, it is estimated that global warming will increase and the rise in sea level will be dramatic (Yin, Zheng, & Chen, 2015: 97). Environmental degradation is currently such a factor that the relationship between economic growth and environmental degradation is significantly associated with increased environmental awareness (Özcan, 2013: 1139). The Environmental Kuznets Curve (EKC) examines the relationship between economic growth and environmental degradation based on the Kuznets curve, which is inverted-U shaped for the relationship between environmental pollution and economic growth.

Figure 1: Environmental Kuznets Curve.



Source: Yandle, Vijayaraghavan, & Bhattarai (2002: 3).

As shown in Figure 1, the EKC hypothesis shows an increase in the first stage of economic growth with income per capita and a decrease of environmental degradation in an inverted-U-shaped relationship with a threshold of income per capita (Apergis & Öztürk, 2015: 16). Typically, the logarithm of the figure is modeled as a quadratic function of the income logarithm (Stern, 2004: 1419). For the inverted-U approximation, reaching the threshold of income per capita is important. After reaching this point, the economy transitions from the beginning regime to a different regime. At the beginning, environmental degradation depends

on the economy's growth in developing countries because industrialization is not rudimentary, and it induces poverty and pollution. This corresponds to the first area of increased environmental degradation. At the second stage, industrialization undergoes structural changes, and the effect of economy degradation decreases. The economy shifts from an agricultural structure to a manufacturing one. The final stage is when the chaotic and unproductive industrialization of countries occurs with development and technology. In this stage, the downward tendency appears after environmental degradation reaches a threshold (Robalino-Lopez, 2014: 923). It has been stated that the EKC hypothesis considers environmental pollution; therefore, under it, carbon dioxide (CO_2) is significant, along with sulfur dioxide (SO_2), suspended particulate matter (SPM), and nitrogen dioxide (NO_2) (Onafowora & Owoye, 2014: 47). Therefore, basically the CO_2 emissions of environmental degradation will be used in this study. So it is important in terms of examining the relationship between the economic actors and the environmental factors in peculiar today. The empirical research to be carried out in the study will enable the testing of the EKC hypothesis in terms of the Turkish economy in the resulting breaking structures. A new approach is being followed.

2. Literature Review

Studies related to the EKC have commonly excited academic attention. The EKC appeared in the 1990s with a significant increase in the number of studies related to environmental pollution. First, the entire original curve was reformed by Grossman and Krueger (1991), and Kuznets (1955) changed it to examine the relationship between environmental pollution and economic growth. In these studies, the relationship between the two variables was stated to be inverted-U-shaped.

As a result of the time series being applied to Turkey, Altınay and Karagöl (2004), who examined the relationship between energy consumption and GDP variables, although they did not approach it in the context of the EKC, determined that there is no relationship between energy consumption and GDP variables by applying Granger causality analysis. Kaplan, Öztürk, and Kalyoncu (2011) specified that the two variables are cointegrated, and there is dual causality between them. Soytaş and Sarı (2007) added the manufacturing industry and electrical consumption to the relationship between energy and growth in their study. According to

the applied Johansen cointegration test, the authors specified a long-term relationship between variables. Halıcıoğlu (2009) found that a long-term relationship existed between variables by testing the relationship among energy consumption, economic growth, carbon dioxide emission, and foreign trade with ARDL bound testing. According to causality, test income is the most important variable in examining emissions.

Time series tests of the EKC hypothesis have caused division. Başar and Temurlenk (2007); Öztürk and Acaravcı (2010); Dam, Karakaya, and Bulut (2013); and Koçak (2014) specified that the inverted-U-shaped EKC hypothesis did not apply for Turkey's economy. In addition, Başar and Temurlenk (2007) and Dam et al. (2013) specified that the relationship between income per capita and emission was reverse-N-shaped. Saatçi and Dumrul (2011), Shahbaz et al., Ali (2013), Öztürk and Acaravcı (2013), and Çil Yavuz (2014) examined the inverted-U-shaped EKC hypothesis and found long-term relationships between variables in their studies. Bölük and Mert (2015), who added renewable energy usage to the variables, found a U-shaped EKC in their study.

As we examine time series tests applied to different national economies, it can be seen that the ARDL bound test and Granger causality have mainly been applied. As a result, Saboori and Sulaiman (2013) analyzed the relationships among carbon dioxide emission, economic growth, and energy consumption within the context of an EKC for Malaysia between the years of 1980 and 2009 in their study. Considering the total energy consumption, the inverted-U approach was not supported, and a dual relationship between economic growth and energy consumption was determined. Onafowora and Owoye (2014) researched the effects of economic growth, energy consumption, population distribution, and trade gap variables on carbon dioxide emission for Brazil, China, Egypt, Japan, Mexico, Nigeria, South Korea, and South Africa for the period 1970–2010. While the inverted-U approach was confirmed for Japan and South Korea, according to long-term relationships, an N-shaped curve approach was found for the other six countries. In another study, Jebli and Youssef (2015) examined carbon dioxide emission, renewable energy consumption, and international business for Tunisia between the years of 1980 and 2009. According to the results of the long-term estimation, although non-renewable energy sources have a positive effect on carbon dioxide consumption, renewable energy sources had a strong negative effect and, in the long term, the inverted-U approach was not supported.

Al-Mulali, Saboori, and Öztürk (2015) examined the EKC hypothesis for Vietnam for the period 1981–2011 in their studies. Because of short- and long-term relationships between the gross domestic product (GDP) and the pollution rate, they found that the EKC was not effective. Balaguer and Cantavella (2016) tested the EKC hypothesis for Spain for the period 1874–2011 in their study. According to the evidence, the EKC was not supported in this case. Lastly, Javid and Sharif (2016) compared financial development, openness, energy consumption per capita, and income per capita to carbon dioxide emissions for Pakistan for the period 1972–2013 in their study. They found that the EKC approach was valid for Pakistan.

3. Data Set and Model Description

In this study, metric tons per capita, carbon dioxide emission, equivalent kiloton petroleum energy consumption per capita, and per capita GDP variables from the dollar-denominated 2005 base year were used, including the years 1960–2011, for Turkey's economy. The data were obtained from the World Bank database. The models stated in the study were identified as the result of the scanning carried on the academic field. In considering the relationship between variables, we followed the models obtained by Ang (2008), Apergis and Payne (2009, 2010), Lean and Smyth (2010), and Acaravci and Öztürk (2010). The reason for selecting these models is that the variables followed in the studies that are performed are compatible with our hypothesis.

$$C_t = \alpha_0 + \alpha_1 Y_t + \alpha_2 Y_t^2 + \alpha_3 E_t + \varepsilon_t$$

The $t = 1960, \dots, 2011$ time period is shown here. C_t is represent Carbon dioxide emission and it is a constant parameter, Y_t is represent GDP per capita, Y_t^2 is represent squared GDP per capita, E_t is represent energy consumption and error term. These are added to the model by taking the variables' logarithms. The EKC hypothesis suggests that $\alpha_1 > 0$ as an increase in emissions coupled with an increase in income level so it states that $\alpha_2 < 0$ as hypothesis requirement and $\alpha_3 > 0$ as an energy consumption results in increase in carbon dioxide emissions The model has an inverted-U shape and increases to a certain threshold level based on income growth. After reaching this threshold, it is expected that the parameter sign will be negative or positive to support the EKC hypothesis, which is

assumed to be decreasing. As it is thought that energy consumption increases emissions, the parameter's coefficient is expected to be positive.

4. Methodology and Empirical Results

In this study, a time series analysis is performed. First, we determined the intercept level by doing a unit root test with the variable. In the case of $[I(1)]$, we looked at the relationship between variables by applying the Gregory-Hansen cointegration test. When there was cointegration, we created the EKC figure by estimating the FMOLS, DOLS, and CCR parameters.

4.1. Traditional Unit Root Test

Because of the importance of series stability, the unit root test is needed. The variables are analyzed by the extended non-structural break unit root test, which was developed by Dickey-Fuller (ADF; 1981) and Phillip-Perron (PP; 1988). Results are shown in Table 1.

Table 1: ADF and PP Test Results

	Variables	ADF	PP
Level			
Intercept	CO ₂	−2.6813(0)	−3.3763(7)
	ENC	−1.0006(0)	−1.0223(3)
	GDP	−0.3333(0)	−0.3007(3)
	GDP ²	−0.1192(0)	−0.0041(4)
Intercept + Trend	CO ₂	−2.6190(0)	−2.6677(6)
	ENC	−2.3922(0)	−2.3922(0)
	GDP	−2.9317(0)	−2.9317(0)
	GDP ²	−2.8804(0)	−2.8804(0)
First Differences			
Intercept	CO ₂	−7.0409(0)*	−7.0422(1)*
	ENC	−6.8915(0)*	−6.8900(2)*
	GDP	−7.1164(0)*	−7.1214(3)*
	GDP ²	−7.0981(0)*	−7.1037(3)*
Intercept + Trend	CO ₂	−7.7662(0)*	−7.7339(2)*
	ENC	−6.9225(0)*	−6.9276(3)*
	GDP	−7.0466(0)*	−7.0494(3)*
	GDP ²	−7.0234(0)*	−7.0256(3)*

Notes: * values show the intercept level of the variables. For the ADF test, parenthetical values show delay lengths selected by SIC criteria and DF tests when delay lengths are 0. MacKinnon (1996) critical values are −2.855 at 5% confidence interval for the intercept model and −3.447 for the intercept and trend model. Parenthetical values for the PP test show bandwidths selected by Newey-West using Bartlett kernel criteria. The critical values are equal to the ADF test.

In this study, the unit root test used augmented ADF and PP tests non-structural breaks. The predicted statistical value's absolute value must be greater than the MacKinnon (1996) critical value. According to the unit root test applied to variables when the levels include the unit root, they are intercept on first differences [I (1)].

4.2. Unit Root Test with Structural Break

Unlike non-structural break unit root tests, the unit root test with a structural break has become a subject of central importance because of

structural changes and major interventions in economic systems (Lanne, Lütkepohl, & Saikkonen, 2002: 668). In this study, a unit root test that considers one endogenously structural fracture, which was developed by Zivot and Andrews (1992), is applied.

4.2.1. Zivot–Andrews Unit Root Test Considering One Endogenously Structural Break

Research has found that the break date actualizes on the determined date by using Perron's (1989) ADF test strategy, developing the presence of the external break, and differentiating to the test (Zivot & Andrews, 1992: 251). According to the developed model, Model A, which allows for one-time change in the level of the series, Model B, which permits a one-time changes in the slope and trend, Model C, which combines one-time changes in the intercept and trend.

Model A;

$$x_t = \alpha_0 + \alpha_1 DU_t + \beta_t + \rho x_{t-1} + \sum_{i=1}^p \varphi_i \Delta x_{t-i} + e_t$$

Model B;

$$x_t = \alpha_0 + \gamma DT_t + \beta_t + \rho x_{t-1} + \sum_{i=1}^p \varphi_i \Delta x_{t-i} + e_t$$

Model C;

$$x_t = \alpha_0 + \alpha_1 DU_t + \gamma DT_t + \beta_t + \rho x_{t-1} + \sum_{i=1}^p \varphi_i \Delta x_{t-i} + e_t$$

In this model, where the intercept dummy DU_t represents a change in the level; $DU_t = 1$ if $t > TB$ and “0” otherwise the slope dummy DT_t represents a change in slope of the trend function; $DT = t - T_B$ if $t > TB$ and “0” otherwise. TB shows the break date.

Table 2: The Results of the Unit Root Test with One Endogenously Structural Break

	Variables	t Statistic	Break Date
Level			
Intercept (Model A)	CO ₂	-4.037	1968
	ENC	-3.846	1970
	GDP	-4.095	1977
	GDP ²	-4.365	1980
Intercept + Trend (Model C)	CO ₂	-4.081	1976
	ENC	-4.094	1977
	GDP	-5.353**	1977
	GDP ²	-5.292**	1976
First Differences			
Intercept (Model A)	CO ₂	-8.488*	1975
	ENC	-7.317*	1975
	GDP	-7.236*	1974
	GDP ²	-7.218*	2000
Intercept + Trend (Model C)	CO ₂	-8.337*	1975
	ENC	-7.286*	1975
	GDP	-7.190*	1979
	GDP ²	-7.204*	2005

Notes: * values show the intercept level of variables. *, **, *** values indicate significance levels of 1%, 5%, and 10%, respectively.

According to Zivot-Andrews, the results of the unit root test considering structural break show that variables are parallel with the results of the traditional unit root tests. When the level values contain the unit root, it can be seen that they are constant on first differences [I(1)]. The constant value at the level value in Model C is ignored due to the long memory of GDP and other variables. It can be seen that the break dates generally happened between 1974 and 1979. It can also be seen that the oil shock that occurred in these years triggered the break dates. The break dates that occurred at emission, energy consumption, and real GDP reflect the crisis period in the Turkish economy. According to the result of the unit root test considering structural breaking, cointegration tests considering structural breaks will be applied to the [I(I)] series in further study.

4.3. Gregory-Hansen Cointegration Test with Structural Breaks

A test with the structural break allows changing the Gregory-Hansen (1996) cointegration vector during a representative period at an unknown time and is related to the more general possibility of cointegration (Gregory & Hansen, 1996: 100). The regression model is the only equation developed to allow structural changes at cointegration. Gregory and Hansen (1996) stated that structural changes can be differently developed and proposed three types of tests.

Model C shows a break when it is intercept, Model C/T is a model with the trend and breaking intercept, and Model C/S shows breaking at the regime.

Using dummy variables for modeling structural changes,

$$\varphi_{t\tau} = \begin{cases} 0 & t \leq [n\tau], \\ 1 & t > [n\tau], \end{cases}$$

where n is the observation number, $\tau \in (0,1)$ is the breaking point, and the statement in $[\]$ is an integer.

Model C:

$$y_{1t} = \mu_1 + \mu_2 \varphi_{t\tau} + \alpha^T y_{2t} + e_t \quad t = 1, \dots, n$$

Model C/T:

$$y_{1t} = \mu_1 + \mu_2 \varphi_{t\tau} + \beta t + \alpha^T y_{2t} + e_t \quad t = 1, \dots, n$$

Model C/S:

$$y_{1t} = \mu_1 + \mu_2 \varphi_{t\tau} + \alpha_1^T y_{2t} + \alpha_2^T y_{2t} \varphi_{t\tau} + e_t \quad t = 1, \dots, n$$

μ_1 indicates a intercept parameter before breaking, and μ_2 means changing at intercept during break time. α_1 is the slope coefficient before changing the regime, and α_2 is the change of the slope coefficient. Gregory and Hansen (1996) used ADF^* , Z_t^* , Z_a^* statics to test Model C, Model C/T, and Model C/S.

Table 3: Gregory-Hansen Cointegration Test Considering Structural Break Results

Breaking at Intercept						
	Test	Statistic	Break Date	1%	5%	10%
GH-1996	ADF	-6.052*	1992	-5.77	-5.28	-5.02
	Zt	-6.109*	1992	-5.77	-5.28	-5.02
	Za	-38.09	1973	-63.64	-53.58	-48.65
Model with Trend, Breaking at Intercept						
	Test	Statistic	Break Date	1%	5%	10%
GH-1996	ADF	-6.048*	1992	-6.05	-5.57	-5.33
	Zt	-6.104*	1992	-6.05	-5.57	-5.33
	Za	-38.34	1973	-70.27	-59.76	-54.94
Breaking at Regime						
	Test	Statistic	Break Date	1%	5%	10%
GH-1996	ADF	-7.572*	1983	-6.51	-6.00	-5.75
	Zt	-7.656*	1983	-6.51	-6.00	-5.75
	Za	-52.60	1982	-80.15	-68.94	-63.42

Note: * values show the value of variables' cointegration. The 1%, 5%, and 10% critical values are obtained from Gregory and Hansen (1996).

When the obtained statistical value exceeds the stated value by the Gregory-Hansen absolute value, the empty hypothesis, which tests cointegration relationships, is ignored. In this study, according to data obtained from the ADF and Zt tests, it is determined that the variables have a cointegration relationship through the cointegration test. The study by Gregory and Hansen (1996) stated that the Zt test statistic has the highest power value. According to the results, the Zt test statistic is significant in breaking at intercept, the model with trend that is broken at intercept, and breaking at regime. Cointegration parameters will be used in further studies to test stated values according to model specifications between long-term relationship variables by predicting coefficient values.

4.4. Prediction of Cointegration Parameters with FMOLS, DOLS, CCR

The methods of fully modified ordinary least squares (FMOLS) by Philips and Hansen (1990), dynamic ordinary least squares (DOLS) by Stock and

Watson (1993), and canonical cointegrating regression (CCR) by Park (1992) are used to predict the long-term cointegration coefficient.

Table 4: Predicted Results of Coefficients with FMOLS, DOLS, and CCR

	Breaking at Intercept		
	FMOLS	DOLS	CCR
ENC	0.7524* (0.000)	0.8389* (0.000)	0.7533* (0.000)
GDP	9.3875* (0.000)	8.7700* (0.000)	9.2170* (0.000)
GDP ²	-0.5181* (0.000)	-0.4870* (0.000)	-0.5077* (0.000)
DUM	-0.0375** (0.014)	-0.0368* (0.001)	-0.0405** (0.013)

Notes: Parenthetical values are prop values. *, **, ***, indicate 1%, 5%, 10% significance level, respectively.

According to the results, the coefficient of the energy consumption variable is positive for each of the three tests, and the energy consumption increases as expected. Although the real GSYH's sign is positive, the square of the GSYH's real sign in the EKC hypothesis is negative. All variables' signs are actualized in the hypothesis, as we supposed. This is the indicator that the inverted-U approach is valid for Turkey's economy.

5. Conclusion

The existence of the relationship between environmental problems and economic growth has begun to be investigated in particular in the last few years. In this study we used the EKC hypothesis to test this problem in practice. The EKC hypothesis, which examines the relationship between environmental degradation and economic growth, was tested with time series analysis for Turkey's economy for the period 1960–2011. Traditional unit root test was applied to evaluate the stability level of variables. Although the level values of series have a unit root, it was determined that they are constant at first differences [I(1)]. In the next phase, the Zivot-Andrews (1992) unit root test, which includes one endogenously structural break, was applied. It was similarly seen that the variables are constant. The long-term cointegration relationship between variables, thanks to the applied Gregory-Hansen (1996) cointegration test, considering a structural break. The coefficient prediction of variables was

performed with the FMOLS, DOLS, and CCR predictors. The first structural break year, 1992, was found, added as a dummy variable, and used for coefficient prediction. Each variable obtained significant results. According to the results, the coefficients supported the EKC hypothesis. Results showed that the inverted-U hypothesis of the EKC was valid for Turkey's economy. According to these results per capita income increases in parallel with environmental degradation to some extent, after that point which the per capita income decrease environmental degradation. An active energy policy to be applied in such a case, it can be seen that the environmental degradation from the threshold value for the Turkish Economy can be decrease and that this is a positive situation. Hence, an effective environmental policy should be set for this. For instance, in developing countries such as Turkey, we should reduce dependence on fossil fuels such as oil by using renewable energy sources to reduce high emission rates. In particular, given the strong negative effect between renewable energy consumption and carbon dioxide emission, dismissal of the inverted-U approach used by Jebli and Youssef (2015) and Bölük and Mert (2015) in their studies is significant to give direction to further studies. In addition, after an active energy policy that enables efficient production and use of energy, the situation of the Turkish economy needs to be evaluated.

References

Acaravcı, A., İ. Öztürk (2010), “On the Relationship Between Energy Consumption, CO₂ Emissions and Economic Growth in Europe”, *Energy*, 35, 5412-5420.

Al-Mulali, U., B. Saboori, I. Ozturk (2015), “Investigating the environmental Kuznets curve hypothesis in Vietnam”, *Energy Policy*, 76, 123-131.

Altınay, G., E. Karagöl (2004), “Structural Break, Unit Root, and the Causality between Energy Consumption and GDP in Turkey”, *Energy Economics*, Vol.26, 985-994.

Ang, J.B. (2008), “Economic development, pollutant emissions and energy consumption in Malaysia”, *Journal of Policy Modeling*, 30, 271–278.

Apergis, N., İ. Öztürk (2015), “Testing Environmental Kuznets Curve Hypothesis in Asian Countries”, *Ecological Indicators*, Vol.52, 16-22.

Apergis, N., J. E. Payne (2009), “CO₂ emissions, energy usage, and output in Central America”, *Energy Policy*, 37, 3282-3286.

Apergis, N., J. E. Payne (2010), “The emissions, energy consumption, and growth nexus: Evidence from the common wealth of independent states”, *Energy Policy*, 38, 650-655.

Balaguer, J., M. Cantavella (2016), “Estimating the environmental Kuznets curve for Spain by considering fuel oil prices (1874–2011)”, *Ecological Indicators*, 60, 853-859.

Başar, S., M. S. Temurlenk (2007), “Çevreye Uyarlanmış Kuznets Eğrisi: Türkiye Üzerine Bir Uygulama”, *Atatürk Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, Cilt 21, Sayı 1.

Bölük, G., M. Mert (2015), “The Renewable Energy, Growth and Environmental Kuznets Curve in Turkey: An ARDL Approach”, *Renewable and Sustainable Energy Reviews*, Vol.52, 587-595.

Çil Yavuz, N. (2014), “CO₂ Emission, Energy Consumption, and Economic Growth for Turkey: Evidence from a Cointegration Test With a Structural Break”, *Energy Sources, Part B: Economics, Planning, and Policy*, 9:3, 229-235, DOI: 10.1080/15567249.2011.567222.

Dam, M.M., E. Karakaya, Ş. Bulut (2013), “Çevresel Kuznets Eğrisi Ve Türkiye: Ampirik Bir Analiz”, *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi EYİ 2013 Özel Sayısı*.

Dickey, D., A., W. Fuller (1981), “Likelihood Ratio Statistics for Autoregressive Time Series With a Unit Root”, *Econometrica*, Vol.49, No.4, 1057-1072. *Energy Policy*, 60, 892-905.

Gregory, A. W., B. E. Hansen (1996), “Residual-Based Test for Cointegrationin Model with Regime Shift”, *Journal Of Econometrics*, Vol.70, 99-126.

Grossman, G. M., A. B. Krueger (1991), Environmental Impacts of a North America Free Trade Agreement, NBER Working Paper No.3914.

Halıcıoğlu, F. (2009), “An Econometric Study of CO₂ Emissions, Energy Consumption, Income and Foreign Trade in Turkey”, *Energy Policy*, Vol.37, 1156-1164.

Javid, M., F. Sharif (2016), “Environmental Kuznets curve and financial development in Pakistan”, *Renewable and Sustainable Energy Reviews*, 54, 406-414.

Jebli, M.B., S.B, Youssef (2015), “The environmental Kuznets curve, economic growth, renewable and non-renewable energy, and trade in Tunisia”, *Renewable and Sustainable Energy Reviews*, 47, 173-185.

Kaplan, M., I. Oztürk, H. Kalyoncu (2011), “Energy Consumption And Economic Growth In Turkey: Cointegration And Causality Analysis”, *Romanian Journal of Economic Forecasting*, 2.

Koçak, E. (2014), “Türkiye’de Çevresel Kuznets Eğrisi Hipotezinin Geçerliliği: ARDL Sınır Testi Yaklaşımı”, *İşletme ve İktisat Çalışmaları Dergisi*, Cilt.2, Sayı.3, 62-73.

Kuznets, K. (1955), "Economic Growth and Income Inequality", *American Economic Review*, 45(1), 1-28.

Lanne, M., H. Lütkepohl, P. Saikkonen (2002), "Comparison Of Unit Root Tests for Time Series With Level Shifts", *Journal Of Time Series Analysis*, Vol.23:6, 667-685.

Lean, H.H., R. Smyth (2010), "CO₂ emissions, electricity consumption and output in ASEAN", *Applied Energy*, 87, 1858-1864.

Onafowora, O. A., O. Owoye (2014) "Bounds Testing Approach to Analysis of the Environmental Kuznets Curve Hypothesis", *Energy Economics*, Vol.44, 47-62.

Özcan, B. (2013), "The Nexus Between Carbon Emissions, Energy Consumption and Economic Growth in Middle East Countries: A Panel data Alalysis", *Energy Policy*, Vol.62, 1138-1147.

Öztürk, İ. A. Acaravcı (2010), "CO₂ Emissions, Energy Consumption and Economic Growth in Turkey", *Renewable and Sustainable Energy Reviews*, Vol.14, 3220-3225.

Öztürk, İ. A. Acaravcı (2013), "The long-run and causal analysis of energy, growth, openness and financial development on carbon emissions in Turkey", *Energy Economics*, 36, 262-267.

Park, J. Y. (1992), "Canonical Cointegrating Regressions", *Econometrica*, Vol.60, No.1, 119-143.

Perron, Pierre (1989), "Test Consistency with Varying Sampling Frequency," Papers 345, Princeton, Department of Economics - Econometric Research Program.

Phillips, P. C. B., B. E. Hansen (1990), "Statistical Inference in Instrumental Variables Regressions with I(1) Processes", *The Review of Economic Studies*, Vol.57, No. 99-125.

Phillips, Peter. C., P. Perron (1988), “Testing for A Unit Root in Time Series Regression”, *Biomètrika*, 75(2), 335-346.

Robalino-Lopez, A., J. Garcia-Ramos, A. A. Golpe, A. Mena-Nieto (2014), “System Dynamics Modelling and the Environmental Kuznets Curve in Ecuador (1980-2025)”, *Energy Policy*, Vol.67, 923-931.

Saatçi, D., Y. Dumrul (2011), “Çevre Kirliliği ve Ekonomik Büyüme İlişkisi: Çevresel Kuznets Eğrisinin Türk Ekonomisi İçin Yapısal Kırılmalı Eş-Bütünleşme Yöntemi ile Tahmini”, *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, sayı 37, 65-86.

Saboori, B., J. Sulaiman (2013), “Environmental degradation, economic growth and energy consumption: Evidence of the environmental Kuznets curve in Malaysia”, *Energy Policy*, 60, 892-905.

Shahbaz, M., İ. Öztürk, T. Afza, A. Ali (2013), “Revisiting the Environmental Kuznets Curve in a Global Economy”, *Renewable and Sustainable Energy Reviews*, Vol.25, 494-502.

Soytaş, U., R. Sarı (2007), “The Relationship Between Energy and Production: Evidence from Turkish Manufacturing Industry”, *Energy Economics*, Vol.29, 1151-1165.

Stern, D.I. (2004), “The Rise and Fall of the Environmental Kuznets Curve”, *World Development*, Vol. 32, No. 8, 1419–1439.

Stock, J. H., M. W. Watson (1993), “A Simple Estimator of Cointegration Vectors in Higher Order Integrated System”, *Econometrica*, Vol.61, No.4, 783-820.

Tutulmaz, O. (2015), “Environmental Kuznets Curve Time Series Application for Turkey: Why Controversial Results Exist for Similar Models?”, *Renewable and Sustainable Energy Reviews*, Vol.50, 73-81.

Yandle, B., M. Vijayaraghavan, M. Bhattarai (2002), The Environmental Kuznets Curve, PERC Research Study, 02-1.

Yin, J., M. Zheng, J. Chen (2015), “The Effects of Environmental Regulation and Technical Progress on CO₂ Kuznets Curve: An Evidence from China”, *Energy Policy*, vol.77, 97-108.

Zivot Eric, D.W.K. Andrews (1992), “Further Evidence on the Great Crash, the Oil-Price Shock, and the Unit-Root Hypothesis”, *Journal of Business&Economic Statistics*, Vol.10, No.3, 251-270.

Monetary Policy Responses to the 2008 Financial Crisis: Quantitative Easing Evidence in the United Kingdom

Ali Ashraf ¹, Walter Lane ², and M. Kabir Hassan ³

This paper analyzes responses to monetary policy tools during the United Kingdom's Quantitative Easing regime from March 06, 2009 to June 02, 2010 on a set of target variables: market index, foreign exchange index, investment grade and non-investment grade bond yield, and spots and forwards of different maturities for OIS, LIBOR and Nominal Government Yield. Results suggest that conventional monetary policy tools other than a zero-bound official bank rate may still be effective. Inclusion of one unconventional tool, the increase in government gilt holdings, has significant impact on most of the target variables.

JEL Key words: General Financial Markets, Financial Institutions and Services, Bond Interest Rates

JEL codes: G100, G280, G120

1. Introduction

Quantitative Easing refers to an expansionary monetary policy regime where a monetary authority is actively involved in large-scale asset purchase programs in order to inject additional liquidity into the economy as the official bank rate becomes an insignificant monetary tool because it has been reduced to a threshold level at or close to zero. During such policy regimes, asset purchase programs may engage a wide variety of financial assets from government short term treasuries and short term commercial paper and CDs to long term corporate bonds and government treasury notes and bonds.

¹ Department of Marketing & Finance, Frostburg State University,
Email: aashraf@frostburg.edu

² Department of Economics and Finance, University of New Orleans, New Orleans, USA, , Email: wlane@uno.edu

³ Department of Economics and Finance, University of New Orleans, New Orleans, USA, Email: mhassan@uno.edu

Recently, Japan was one of the developed economies that pursued a similar policy as the overnight lending rate reached the effective lowest bound of zero rates in February 1999. In March 2001, the Bank of Japan decided to supplement the zero-rate policy with a Quantitative Easing policy to provide further stimulus to the economy as price levels kept falling. The recent global financial crisis following the Lehman Brothers collapse in September 2008 forced monetary authorities in most countries around the world to initiate active monetary responses to stabilize the financial markets and support aggregate demand (Klyuev et al, 2009).

In this paper, we discuss Quantitative Easing (QE) monetary policy responses in the United Kingdom during the period of August 01, 2008 to June 02, 2010. We analyze how the conventional monetary policy tools—narrow money, broad money, and official bank rates—may impact financial markets and term structure during three sample periods; a) Overall Sample Period from 08/01/2008 to 06/02/2010, b) Pre-Quantitative Easing Period from 08/01/2008 to 03/05/2009, and c) Quantitative Easing Period from 03/06/2009 to 06/02/2010. Later we focus on analyzing the impact of non-conventional monetary policy tools—increasing the Central Bank asset-base through Gilt purchase and corporate bond sales and purchases—on increasing inflation expectations during the QE period.

We contribute to existing literature on monetary policy transmission in three different ways. First, we provide empirical evidence on monetary policy by using the United Kingdom dataset compared to the Japanese zero-bound interest rate literature. Second, we differentiate between monetary policy regimes for the pre-quantitative easing period and the quantitative easing period by dividing the sample period. Third, we include a large cross-section of different maturities of interest rates to analyze whether a long-run equilibrium or steady state exists between monetary policy tools and target variables. We follow the approach of Pedroni (2004) who presents a thorough discussion of issues in dealing with short time series variables and illustrates that, in the absence of any alternative to extend the time series, allowing more cross-sectional data may solve the short time span problem of structural co-integration tests.

1.1 Literature Review

Although the Japanese experience of Quantitative Easing is most frequently cited in the literature, evidence of Quantitative Easing can be traced back as early as 1932 in the U.S. when the U.S. Federal Reserve initiated a \$1 billion purchase of government treasuries and maintained it until 1936 to mitigate deflationary trends during the Great Depression. However, the monetary impact of Quantitative Easing regimes is still a debated issue.

Recent studies in the Quantitative Easing literature focus on the Japanese experience beginning in February 1999 as the official bank rate effectively reached the zero-bound threshold. To provide further stimulus to the economy and avoid a deflationary trend, the Bank of Japan undertook Quantitative Easing as a supplement to its zero-rate policy in March 2001. Shirakawa (2002) discusses the Japanese experience of Quantitative Easing and delineates possible transmission channels of monetary policy during a zero-bound interest regime. He notes the similarity of the Japanese experience to the experiences of Sweden and the U.S. in the early 1930s. More recently, Shiratsuka (2010) compares the Quantitative Easing policy of the Bank of Japan during 2001 to 2006 to the U.S. Federal Reserve's policy. The U.S. Federal Reserve policy reactions aim at the asset side of its balance sheet whereas the Bank of Japan focuses on a target for the current account balances on the liability side.

Gauti and Woodford (2004) analyze the possible impact of Quantitative Easing as a supplement to a zero interest rate regime in a Neo- Keynesian framework. They argue that QE may fail to inject the desired level of stimulus to an economy if central bank policy cannot change expectations about future policy. That is, to ensure the desired effect, the central bank needs to make an explicit commitment about the future policy and such commitment needs to be credible. However, their interpretation is different from Auerbach and Obstfeld (2003) although both models are based on a similar framework. Unlike Gauti and Woodford (2004), Auerbach and Obstfeld (2003) assume that open-market operations may permanently increase the monetary base.

Later, Bernanke (2004) draws from the Japanese experience and discusses three monetary policy alternatives during a zero-interest regime that can provide additional stimulus to an economy. First, the central bank can

provide assurances that short-term rates will be kept lower in the future, to influence investor expectations. Second, a monetary authority may change relative supply through open market operations. Third, by increasing its balance sheet (QE), the central bank may keep the short-term rates at the zero-bound. Bernanke (2004) concludes that credibility of monetary policy will be pivotal in such policy regimes.

More recently, Klyuev et al (2009) elaborate on four possible alternative monetary actions central banks may take during a zero rate period, namely a) making an explicit commitment to maintain low policy rates, b) providing additional liquidity to financial institutions, c) affecting the long-term interest rates by purchasing government securities (QE), and d) actively intervening in specific credit markets. However, the impact of central bank actions may not be obvious because monetary transmission to the economy is complex. Later, Joyce et al. (2010) perform one of the few studies to analyze a Quantitative Easing experience other than Japan's. They analyze the impact of gilt purchases by the Bank of England on long-term interest rates by using multivariate GARCH model.

More recently, Ashraf et al. (2015) analyzes the QE experience in the United States and investigates the impact of unconventional monetary tools on the stock market reaction, with specific reference to the financial institutions.

This paper aims at providing empirical evidence to the much debated issue of the efficiency of conventional monetary policy tools during zero-bound official fund rate regimes. It also addresses another important research issue relevant to the existing literature, namely how unconventional policy tools such as asset purchase programs may impact the target interest rates vis-à-vis term structures.

2. Data & Methodology

2.1 Data

The Bank of England dataset provides daily information on spot and forward rates of Overnight Index Swap (OIS), LIBOR rates, and inflation curves for fifty different maturities ranging from 6 months to 25 years at six-month intervals. QE regime asset purchase data are available following the formation of the Asset Purchase Facility Fund on January 30, 2009. Gilt purchase data are available on a ticker by ticker basis with

offer prices and yield information from the first gilt purchase date on January 26, 2010 to March 11, 2011. Corporate bond purchase and sales data begin on March 25, 2009 and January 08, 2010 respectively on a ticker by ticker basis with allocation volume and effective yield information.

2.2 Methodology

We analyze time series properties and the data generating process of the target variables. Then, we conduct pair-wise Granger causality tests for every possible combination of the target variables and conventional and non-conventional monetary policy tools. Later, we use Engle and Granger (1987) co-integration technique. We consider the following as the long-run equilibrium model:

$$y_{it} = \alpha_i + \beta_i X_{it} + e_{it} \quad (1)$$

where we assume a linear relationship exists among the UK stock market index, exchange rate index, and other target variables, (y_i), and conventional and non-conventional monetary policy tools (vectors of X_i). Although co-integration tests are commonly used by financial economists in analyzing the long-run equilibrium relationship of non-stationary variables, there are concerns about the low power of co-integration tests when applied to shorter span data.

3. Empirical Analysis

3.1 Descriptive Statistics

Following the global market collapse in September 2008, the Bank of England started reducing official bank rates on December 6, 2008 to increase liquidity and avoid a possible credit crunch. The bank further reduced the official bank rates five times between January 08, 2009 and February 07, 2009 by a total of 4 percent, from 5.50 percent to 1.50 percent. On March 05, 2009, the official bank rate was lowered to its threshold lowest level at 0.50. Subsequently, to increase liquidity and avoid deflation, the Bank of England undertook a Quantitative Easing policy regime that entailed active asset purchase participation of the bank during the near-zero bank rate era. On January 19, 2009 the Chancellor of Exchequer announced the decision to set up the asset purchase program.

Following the announcement, the Bank of England established an asset purchase facility on January 30, 2009 and started the first purchases of commercial papers and gilts on February 13 and March 09, 2009 respectively. By February 2010 the Monetary Policy Committee of the Bank of England had approved the purchase of £200 billion worth of securities, an amount equivalent to 14% of nominal GDP, mostly in UK government securities commonly known as gilts.

Panel 02 and Panel 03 of Table 01 suggests that, firstly, OIS (Overnight Interest Swaps) spots and forwards of lower maturities (one year and two year) show their rapid fall at the beginning of the financial turmoil that is consistent with the prevalent credit crunch. Other spot and forward rates however show the tendency to herd closely. Panel 02 and Panel 03 also depict a similar declining trend for other interest rates even after the official bank rate is lowered to the threshold limit. Second, OIS spots and forwards become more aligned with the other spots and forward rates with higher maturities as evident in Panel 04. Table 02 summarizes the descriptive statistics of the target variables and monetary policy tools. Panel 03 shows the most critical information that during the QE period the official bank rate is constant at 0.50% with a standard deviation of zero.

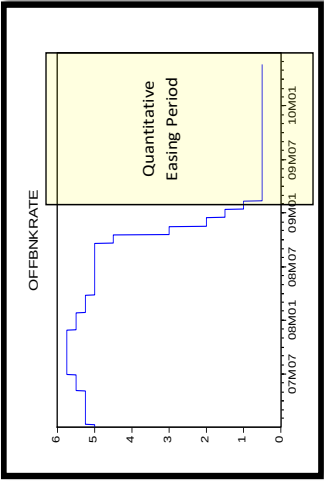
In Table 01, we present the time series plots of official bank rates in Panel 01. Panel 02 shows the time series plots of LIBOR spot and forward, OIS spot and forward, Nominal Govt. Spot and Forward for one year maturity. Other Panels such as Panel 03 through Panel 06 exhibit similar time series plots for 2 year, 5 year, 15 year and 20 year maturities.

In Table 01, we present the time series plots of official bank rates in Panel 01. Panel 02 shows the time series plots of LIBOR spot and forward, OIS spot and forward, Nominal Govt. Spot and Forward for one year maturity. Other Panels such as Panel 03 through Panel 06 exhibit similar time series plots for 2 year, 5 year, 15 year and 20 year maturities.

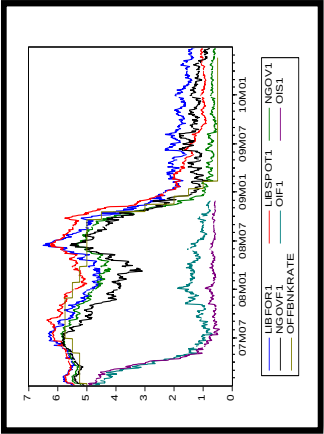
In Table 01, we present the time series plots of official bank rates in Panel 01. Panel 02 shows the time series plots of LIBOR spot and forward, OIS spot and forward, Nominal Govt. Spot and Forward for one year maturity. Other Panels such as Panel 03 through Panel 06 exhibit similar time series plots for 2 year, 5 year, 15 year and 20 year maturities.

Table 1: Plots of Term Structure

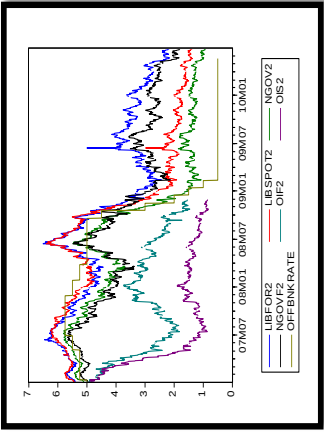
Panel 01: Official Bank Rates



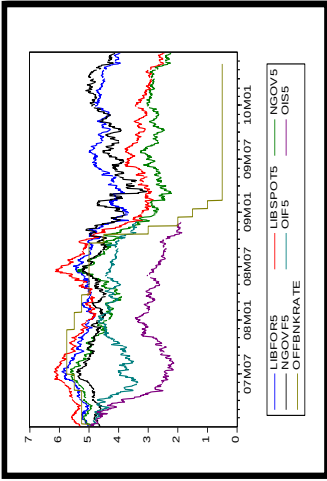
Panel 02: 1 yr Maturity spots and forwards



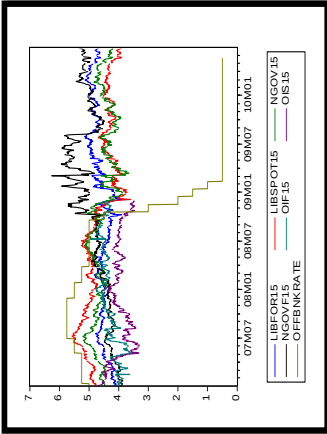
Panel 03: 2 yr Maturity spots and forwards



Panel 04: 5 yr Maturity spots and forwards



Panel 05: 15 yr Maturity spots and forwards



Panel 06: 20 yr Maturity spots and forwards

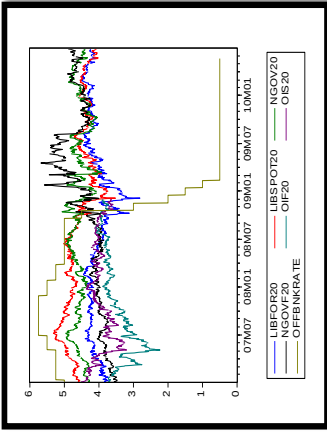


Table 2: Descriptive Statistics of Monetary Policy tools, Stock Market Index, Exchange Rate Index and Bond Yields

	Panel 01: Overall Sample Period					Panel 02: Pre-QE Period					Panel 03: QE Period				
	Mean	Max	Min	Std. Dev.		Mean	Max	Min	Std. Dev.		Mean	Max	Min	Std. Dev.	
M1	53914.86	57121.00	50157.00	2056.76		51388.28	53201.00	50157.00	997.54		55135.12	57121.00	53201.00	1101.97	
M2	98907.32	156405.00	27942.00	51903.97		38585.90	48367.00	27942.00	7180.54		128040.90	156405.00	39467.00	36880.14	
M4	2007350.00	2208798.00	1776607.00	126820.50		1874059.00	1989966.00	1776607.00	67495.04		2071725.00	2208798.00	1977499.00	94435.88	
Bank Rate	1.35	5.00	0.50	1.54		3.12	5.00	0.50	1.64		0.50	0.50	0.50	0.00	
Govt. Gilt Holding	105156.20	125374.60	32677.68	32031.08		68939.70	125374.60	32677.68	34644.84		122647.80	125374.60	120130.50	1711.95	
FTSE100	4806.63	5825.01	3512.09	591.25		4493.42	5636.61	3512.09	578.99		4957.90	5825.01	3753.68	535.80	
EXGIND	81.68	93.28	73.75	4.14		83.89	93.28	73.75	6.02		80.61	85.26	75.69	2.11	
Investment Grade Bond Yield	7.32	10.27	5.44	1.50		8.59	9.70	7.23	0.70		6.70	10.27	5.44	1.38	
Non-Invest Grade Bond Yield	18.96	34.61	10.11	7.29		22.79	32.67	13.46	6.28		17.11	34.61	10.11	7.03	
Sample Period	08/01/2008 to 06/02/2010					08/01/2008 to 03/05/2009					03/06/2009 to 06/02/2010				
No. of Observation	479					156					323				

We report the basic descriptive statistics (mean, maximum, minimum, and standard deviation) for Monetary Policy tools, Stock Market Index, Exchange Rate Index and Bond Yields for three sample periods; a) Overall Sample Period from 08/01/2008 to 06/02/2010 , b) Pre-Quantitative Easing Period from 08/01/2008 to 03/05/2009, and c) Quantitative Easing Period from 03/06/2009 to 06/02/2010 in Panel A, B and C respectively. M1, M2, M4 and Government Gilt Holding are in £ millions. Stock Market Index (FTSE100) and Exchange Rate Index (EXGIND) are in index and Official Bank Rate, Investment Grade Bond Yield and Non-investment Grade Bond Yields are in percentage.

3.2 Time Series Properties of Target Variables

We also analyze the ACF (Auto Correlation Function) and PACF (Partial Auto Correlation Function) for the target variables followed by the appropriate AR process based on the AIC (Akaike Information Criterion) and SBC (Schwarz Criterion) criteria, and conduct ADF unit root tests although that we do not report the results in the paper. Results show that for the majority of the spot and forward rates, the variables are I(1) processes; that is, the variables are non-stationary at their level but stationary at their first differences

Table 3: Unit Root Test for Market Index, Exchange Index, Monetary policy tools and Interest Rates at their Level and First Differences

Series		Panel 1: Market Index, Exchange Rate Index, Bond Yields								Panel 2: Conventional Monetary Policy Tools																	
		Levels		First Diff.																							
		Prob.	Lag	Prob.	Lag																						
LN_FTSE100		0.508	5	0.000	3	Official Bank Rate																					
EXGIND		0.062	0	0.000	0	Ln_M1				0.711	0	0.000	1														
INV_GRD		0.948	0	0.000	0	Ln_M2				0.590	0	0.000	0														
NON_INV_GRD		0.905	0	0.000	0	Ln_M4				0.687	0	0.000	0														
						Ln_Gilt_Hldg				0.154	0	0.000															
Panel 3: LIBOR swap curve, spot		Panel 4: LIBOR swap curve, forward				Panel 5: OIS curve, spot				Panel 6: OIS curve, forward				Panel 7: Inflation curve, Spot				Panel 8: Inflation curve, forward									
		First Diff.		Levels		First Diff.		Levels		First Diff.		Levels		First Diff.		Levels		First Diff.									
		Prob.	Lag	Prob.	Lag	Prob.	Lag	Prob.	Lag	Prob.	Lag	Prob.	Lag	Prob.	Lag	Prob.	Lag	Prob.	Lag								
Series	0_5_yr	0.959	4	0	3	0.971	0	0	0	0.000	0	0	3	0.000	0	0	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	1_0_yr	0.982	0	0	0	0.936	2	0	1	0.000	0	0	0	0.007	0	0	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	2_0_yr	0.959	0	0	0	0.871	0	0	0	0.003	0	0	0	0.300	0	0	0	0.000	0	0	0	0.199	1	0	0	0	
	5_0_yr	0.961	0	0	0	0.716	0	0	0	0.098	0	0	0	0.253	0	0	0	0.560	2	0	1	0.073	1	0	0	0	
	10_0_yr	0.876	0	0	0	0.003	0	0	0	0.151	0	0	0	0.023	0	0	0	0.516	1	0	0	0.207	1	0	0	0	
	15_0_yr	0.700	0	0	0	0.023	0	0	0	0.154	0	0	0	0.192	1	0	0	0.278	1	0	0	0.264	1	0	0	0	
	20_0_yr	0.494	0	0	0	0.045	0	0	0	0.132	0	0	0	0.614	0	0	0	0.075	1	0	0	0.18	1	0	0	0	

Table 3 reports Augmented Dickey Fuller test of Unit Roots for Market Index, Exchange Index, Monetary policy tools and various Interest Rates at their Level and First Differences for the overall sample period February 07, 2001 to April 15, 2011 with 2500 daily observations for each of the time series variables. Panel 1 shows the ADF statistics for the LSE Stock market index, Exchange Rate Index, Investment Grade Bond Yields and Non-Investment Grade Bond Yields and Panel 2 presents the test statistics for conventional monetary policy tools: official bank rates, M1, M2, M4, and gilt holding. Panel 3 to Panel 8 provide the ADF results for yields for different maturities for LIBOR swap spots and forwards, OIS overnight swap spots and forwards, and Inflation spots and forwards, respectively. For Augmented Dickey Fuller test, the null Hypothesis in each case is that the variable has unit root. A rejection of the null hypothesis means that the variable is otherwise stationary. Presented p-values are computed according to MacKinnon (1996) one-sided p-values.

Table 4: Granger Causality Tests

Panel A: Causality among Monetary Policy Tools				
	Obs.	F-Stat.	Prob.	
LN_M2 does not Granger Cause LN_M1	323	0.031	0.969	
LN_M1 does not Granger Cause LN_M2		0.054	0.948	
LN_M4 does not Granger Cause LN_M1	323	0.008	0.992	
LN_M1 does not Granger Cause LN_M4		1.874	0.155	
LN_GILTHLD does not Granger Cause LN_M1	323	0.413	0.662	
LN_M1 does not Granger Cause LN_GILTHLD		0.339	0.712	
LN_M4 does not Granger Cause LN_M2	323	0.059	0.943	
LN_M2 does not Granger Cause LN_M4		0.660	0.518	
LN_GILTHLD does not Granger Cause LN_M2	323	0.010	0.990	
LN_M2 does not Granger Cause LN_GILTHLD		0.465	0.629	
LN_GILTHLD does not Granger Cause LN_M4	323	4.393	0.013	
LN_M4 does not Granger Cause LN_GILTHLD		0.208	0.812	

In Table 04 we report pair-wise Granger Causality analysis for the set of all possible combinations of explanatory variables and different maturities of different types of target interest rates and inflation rates in Panel A through Panel C. In Panel A, we present a pair-wise Granger Causality test among the Monetary Policy tools. In Panel B, we report the same for Monetary Policy Tools and different maturity spot and forward yields. Panel C shows the causal relations across the different maturities of spots and forwards that are the target of the monetary policy tools.

Table 4: Granger Causality Tests (continued)

Panel B: Granger Causality between Monetary Policy Tools and different maturity spot and forward yields													
		OIS		OIF		LIBORSPOT		LIBORFOR		IS		IF	
Null Hypothesis:	Obs	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.
LN_M1 does not Granger Cause 0_5yr	323	2.407	0.092	1.811	0.165	3.204	0.042	0.450	0.638	--	--	--	--
0_5yr does not Granger Cause LN_M1		0.223	0.800	0.294	0.745	0.036	0.965	0.049	0.952	--	--	--	--
LN_M2 does not Granger Cause 0_5yr	323	0.111	0.895	0.675	0.510	1.856	0.158	3.090	0.047	--	--	--	--
0_5yr does not Granger Cause LN_M2		1.428	0.241	0.996	0.371	0.431	0.650	0.139	0.870	--	--	--	--
LN_M4 does not Granger Cause 0_5yr	323	2.598	0.076	0.605	0.547	2.959	0.053	0.328	0.721	--	--	--	--
0_5yr does not Granger Cause LN_M4		0.011	0.989	0.068	0.934	0.940	0.392	1.236	0.292	--	--	--	--
LN_GILTHLD does not Granger Cause 0_5yr	323	1.112	0.330	0.610	0.544	1.165	0.313	0.330	0.719	--	--	--	--
0_5yr does not Granger Cause LN_GILTHLD		0.892	0.411	1.259	0.285	0.513	0.599	0.468	0.627	--	--	--	--
LN_M1 does not Granger Cause 1yr	323	1.093	0.337	2.661	0.071	0.342	0.711	8.153	0.000	--	--	--	--

1yr does not Granger Cause LN_M1		0.463	0.630	1.096	0.336	0.070	0.933	0.166	0.847	--	--	--	--
LN_M2 does not Granger Cause 1yr	323	0.530	0.589	0.469	0.626	4.782	0.009	3.288	0.039	--	--	--	--
1yr does not Granger Cause LN_M2		1.123	0.327	0.832	0.436	0.344	0.709	0.057	0.944	--	--	--	--
LN_M4 does not Granger Cause 1yr	323	1.604	0.203	4.299	0.014	0.079	0.924	6.640	0.002	--	--	--	--
1yr does not Granger Cause LN_M4		0.106	0.899	0.293	0.746	1.329	0.266	1.730	0.179	--	--	--	--
LN_GILTHLD does not Granger Cause 1yr	323	0.280	0.756	1.859	0.158	0.932	0.395	4.147	0.017	--	--	--	--
1yr does not Granger Cause LN_GILTHLD		1.521	0.220	0.776	0.461	0.442	0.643	0.322	0.725	--	--	--	--

Table 4: Granger Causality Tests (continued)

Panel B: Granger Causality between Monetary Policy Tools and different maturity spot and forward yields													
		OIS		OIF		LIBORSPOT		LIBORFOR		IS		IF	
	Obs	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.
Null Hypothesis:													
LN_M1 does not Granger Cause 10yr	323	4.552	0.011	0.686	0.505	3.434	0.034	0.248	0.781	0.068	0.935	1.281	0.279
10yr does not Granger Cause LN_M1		2.420	0.091	2.606	0.075	0.141	0.868	1.247	0.289	0.035	0.966	0.126	0.881
LN_M2 does not Granger Cause 10yr	323	1.478	0.230	0.483	0.617	5.554	0.004	4.681	0.010	0.398	0.672	1.997	0.138
10yr does not Granger Cause LN_M2		0.801	0.450	0.716	0.489	0.541	0.583	0.506	0.604	1.403	0.248	2.976	0.052
LN_M4 does not Granger Cause 10yr	323	4.339	0.014	0.101	0.904	2.825	0.061	0.381	0.684	0.342	0.711	0.042	0.959
10yr does not Granger Cause LN_M4		0.397	0.673	0.521	0.594	0.054	0.947	0.424	0.655	0.865	0.422	0.486	0.616
LN_GILTHLD does not Granger Cause 10yr	323	3.448	0.033	0.711	0.492	2.343	0.098	0.625	0.536	1.009	0.366	2.354	0.097
10yr does not Granger Cause LN_GILTHLD		1.664	0.191	4.368	0.013	3.278	0.039	7.864	0.001	4.625	0.011	3.700	0.026
LN_M1 does not Granger Cause 15yr	323	3.617	0.028	0.089	0.915	1.843	0.160	0.256	0.775	0.150	0.861	4.912	0.008
15yr does not Granger Cause LN_M1		3.053	0.049	1.289	0.277	1.522	0.220	0.655	0.520	0.227	0.797	1.708	0.183
LN_M2 does not Granger Cause 15yr	323	0.844	0.431	0.721	0.487	2.280	0.104	3.277	0.039	0.713	0.491	6.543	0.002
15yr does not Granger Cause LN_M2		1.094	0.336	1.123	0.327	0.401	0.670	0.357	0.700	2.295	0.102	1.562	0.211

[illegible]

Table 4: Granger Causality Tests (continued)

Panel C: Granger Causality among different maturity spot and forward yields														
		OIS		OIF		LIBORSPOT		LIBORFOR		IS		IF		
Null Hypothesis:	Obs	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.	F-Stat.	Prob.	
1yr does not Granger Cause 0_5yr	323	6.177	0.002	0.690	0.502	5.790	0.003	6.041	0.003	--	--	--	--	
0_5yr does not Granger Cause 1yr		0.998	0.370	3.971	0.020	8.726	0.000	3.670	0.027	--	--	--	--	
5yr does not Granger Cause 0_5yr	323	3.247	0.040	0.138	0.871	4.644	0.010	2.492	0.084	--	--	--	--	
0_5yr does not Granger Cause 5yr		1.560	0.212	0.004	0.996	2.006	0.136	1.414	0.245	--	--	--	--	
10yr does not Granger Cause 0_5yr	323	1.749	0.176	2.710	0.068	3.419	0.034	0.877	0.417	--	--	--	--	
0_5yr does not Granger Cause 10yr		0.976	0.378	0.305	0.737	1.137	0.322	1.473	0.231	--	--	--	--	
15yr does not Granger Cause 0_5yr	323	1.352	0.260	2.021	0.134	2.302	0.102	0.229	0.796	--	--	--	--	
0_5yr does not Granger Cause 15yr		0.979	0.377	0.020	0.980	0.690	0.503	0.398	0.672	--	--	--	--	
2yr does not Granger Cause 0_5yr	323	4.736	0.009	0.158	0.854	5.085	0.007	2.420	0.091	--	--	--	--	
0_5yr does not Granger Cause 2yr		3.137	0.045	1.658	0.192	3.252	0.040	5.137	0.006	--	--	--	--	
20yr does not Granger Cause 0_5yr	323	0.995	0.371	1.687	0.187	1.755	0.175	0.210	0.811	--	--	--	--	

yr0_5 does not Granger Cause 20yr		0.636	0.530	0.463	0.630	0.628	0.534	0.241	0.786	--	--	--	--
5yr does not Granger Cause 1yr	323	3.688	0.026	2.045	0.131	2.925	0.055	0.039	0.962	--	--	--	--
1yr does not Granger Cause 5yr		3.740	0.025	1.060	0.348	1.883	0.154	0.540	0.583	--	--	--	--
10yr does not Granger Cause 1yr	323	4.607	0.011	1.707	0.183	2.381	0.094	0.695	0.500	--	--	--	--
1yr does not Granger Cause 10yr		0.352	0.704	0.455	0.635	1.517	0.221	0.793	0.453	--	--	--	--
15yr does not Granger Cause 1yr	323	4.888	0.008	0.119	0.888	1.925	0.148	0.150	0.861	--	--	--	--
1yr does not Granger Cause 15yr		0.219	0.803	0.141	0.868	1.053	0.350	0.098	0.906	--	--	--	--
2yr does not Granger Cause 1yr	323	3.192	0.042	10.177	0.000	2.689	0.070	0.626	0.535	--	--	--	--
1yr does not Granger Cause 2yr		5.766	0.004	5.897	0.003	14.193	0.000	9.976	0.000	--	--	--	--
20yr does not Granger Cause 1yr	323	4.270	0.015	1.480	0.229	1.784	0.170	1.594	0.205	--	--	--	--
1yr does not Granger Cause 20yr		0.139	0.871	0.931	0.395	0.884	0.414	0.575	0.563	--	--	--	--

Table 4: Granger Causality Tests (continued)

[illegible]

2yr does not Granger Cause 10yr	323	1.799	0.167	0.342	0.710	0.962	0.383	0.368	0.692	1.066	0.346	0.300	0.741
10yr does not Granger Cause 2yr		0.976	0.378	0.387	0.679	3.083	0.047	1.418	0.244	0.599	0.550	1.849	0.160
20yr does not Granger Cause 10yr	323	2.466	0.087	0.064	0.938	1.000	0.369	0.232	0.793	3.726	0.025	0.409	0.665
10yr does not Granger Cause 20yr		3.174	0.043	0.150	0.861	1.715	0.182	5.158	0.006	0.040	0.961	0.959	0.385
2yr does not Granger Cause 15yr	323	0.721	0.487	0.111	0.895	0.631	0.533	0.611	0.544	1.261	0.285	2.020	0.135
15yr does not Granger Cause 2yr		0.459	0.632	2.049	0.131	2.033	0.133	1.450	0.236	0.185	0.831	3.334	0.037
20yr does not Granger Cause 15yr	323	3.564	0.030	7.602	0.001	0.811	0.445	1.115	0.329	2.854	0.059	0.330	0.719
15yr does not Granger Cause 20yr		3.881	0.022	0.552	0.576	1.608	0.202	1.406	0.247	0.113	0.894	0.657	0.519
20yr does not Granger Cause 2yr	323	0.229	0.796	3.462	0.033	1.396	0.249	1.063	0.347	0.344	0.709	4.854	0.009
2yr does not Granger Cause 20yr		0.734	0.481	1.150	0.318	0.690	0.503	1.252	0.287	0.825	0.439	5.084	0.007

For 6 month OIS and LIBOR spots and forwards, there is also not enough evidence of Granger causality with the monetary policy tools. However, for 1 year rates of OIS and LIBOR spot and forwards, there exists a unidirectional causality relationship between monetary policy tools and target variables. Within the different maturities of the spots and forwards, Granger causality results are significant in both the shorter maturity yields and longer maturity yields subgroups. To conclude, it is notable that the summary results of the Granger causality tests do not provide sufficient evidence in favor of the Expectation Hypothesis.

5. Conclusion

This paper analyzes the impact of conventional and unconventional monetary policy tools on a set of interest rates with different maturities. Although we do not present OLS regression results in this version of draft, we find the response to conventional monetary tools is significant in a) the overall period, b) the pre-QE period, and c) the QE period. The official bank rate becomes ineffective as a monetary policy tool as it reaches the threshold lower bound and becomes fixed. During the QE period, government balance of gilt purchases is an effective non-conventional policy tool. OLS regression also results show that the explanatory power of monetary policy tools decreases monotonically with an increase in maturity. We consider two possible explanations: a) spots and forward rates are interrelated consistent with the pure Expectation Hypothesis or b) spots and forward rates have autocorrelation.

The Autocorrelation Function and Partial Autocorrelation Functions of the target variables conform to the second explanation that the variables have significant autocorrelation. In general, most of the spots and forward rates are AR (1) processes. The ADF test of unit root shows that variables are mostly I(1) process with a few exceptions. Pair-wise Granger causality tests reveal no evidence of a strong presence of Granger causality between different spots and forwards rates. However, monetary policy tools Granger cause target variables but are not caused otherwise. Results from pair-wise Granger causality do not provide enough evidence to confirm the Expectation Hypothesis.

References

-----, Economic SYNOPSES.2010/ Number 17, Federal Reserve Bank of St. Louis

Ashraf, A., Hassan, M. K., & Hippler III, W. J. (2016). "Monetary shocks, policy tools and financial firm stock returns: evidence from the 2008 us quantitative easing". *The Singapore Economic Review*, 1740002. Publication date: 2016/4/13, <http://www.worldscientific.com/doi/pdf/10.1142/S0217590817400021>

Auerbach, A. J., & Obstfeld, M. (2003). "The case for open-market purchases in a liquidity trap". *National Bureau of Economic Research*. (No. w9814)

Bernanke, B. and Reinhart, R. (2004). "Conducting Monetary Policy at Very Low Short-Term Interest Rates". *The American Economic Review*, Vol. 94, No. 2, Papers and Proceedings of the One Hundred Sixteenth Annual Meeting of the American Economic Association San Diego, CA, January 3-5, 2004 (May, 2004), pp. 85-90.

Cúrdia, V. and Woodford, M. (2010). "Conventional and Unconventional Monetary Policy". *Federal Reserve Bank of St. Louis Review*, July/August 2010, 92(4), pp. 229-64.

Eggertsson, G. B. and Woodford, M. (2004). "Policy Options in a Liquidity Trap". *The American Economic Review*, Vol. 94, No. 2, Papers and Proceedings of the One Hundred Sixteenth Annual Meeting of the American Economic Association San Diego, CA, January 3-5, 2004 (May, 2004), pp. 76-79.

Johansen, S., & Juselius, K. (1994). "Identification of the long-run and the short-run structure an application to the ISLM model". *Journal of Econometrics*, 63(1), 7-36.

Joyce, M., Lasaosa, A., Stevens, I. and Tong, M. (2010). "The financial market impact of quantitative easing". *Bank of England, Working Paper No. 393, July 2010, revised August 2010*.

Klyuev, V, de Imus, P and Srinivasan, K. (2009). “Unconventional choices for unconventional times: credit and quantitative easing in advanced economies”. *IMF Staff Position Note, SPN/09/27, November 2009*.

Pedroni, P. (2004). “Panel Co-integration: Asymptotic and Finite Sample Properties of Pooled Time Series with and Application to the PPP Hypothesis”. *Econometric Theory*, 597-625.

Shiller, R. J., & Perron, P. (1985). “Testing the random walk hypothesis: Power versus frequency of observation”. *Economics Letters*, 18(4), 381-386.

Shiratsuka, S. (2010). “Size and Composition of the Central Bank Balance Sheet: Revisiting Japan’s Experience of the Quantitative Easing Policy”. *Monetary and Economic Studies/November 2010*

Shirakawa, M. (2002). “One Year Under Quantitative Easing”. *Bank of Japan. IMES Discussion Paper Series 2002-E-3 April 2002*.

Banking Characteristics of Millennials

Jennifer Brodman¹, Blake Rayfield², M. Kabir Hassan³ and Anh Thu Mai⁴

This paper looks at the characteristics of the Millennial generation, compares them to other generations, and explores how the characteristics of Millennials influence their banking behavior, specifically their choice to utilize financial products and services commonly associated with financial institutions. The results indicate that Millennials differ from Generation X and Baby Boomers in several aspects, including utilization of mobile banking, accumulation of student loan debt, and perception of financial knowledge. Through differences in means tests and probit regression, the results from this study reflect how these factors influence Millennials' interest in and utilization of financial products and services typically offered by banks.

Keywords: Millennials, Financial Institutions, Financial Services

JEL Classification: G21, G23, G30

1 Introduction

The Millennial population is ascendant on both a domestic and international scale, with half of the global population being younger than 30 as of 2012 (Boumphrey, 2012). Fry (2015) states that "More than one-in-three American workers today are Millennials (adults ages 18 to 34 in 2015), and this year they surpassed Generation X to become the largest share of the American workforce." Figure 1 shows the upward trend of

¹ University of New Orleans Kirschman Hall, Department of Economics and Finance
Email: jbrodman@uno.edu

² University of New Orleans Kirschman Hall, Department of Economics and Finance
Email: bkrayfie@uno.edu

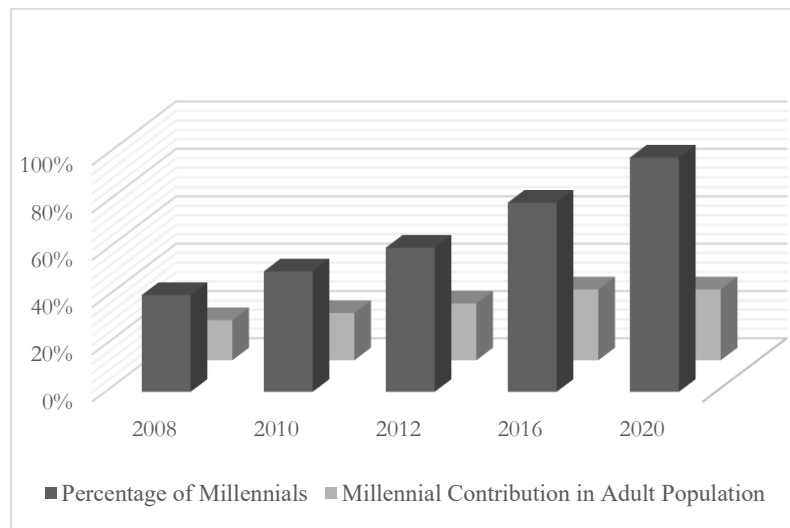
³ *University of New Orleans* Kirschman Hall, Department of Economics and Finance
Email: mhassan@uno.edu

⁴ University of New Orleans Kirschman Hall, Department of Economics and Finance
Email: atmai@uno.edu

Millennial dominance in the U.S. adult population from the U.S. Census Bureau. Cudmore, Patton, Ng, and McClure (2010) state that “Millennial spending power is a market force of significance that captures the interest of many players in the economy, to include the financial services firms, trying to capture some of this wealth.” This study categorizes the Millennial generation as individuals who are 13 to 34 years of age. We examine the differences in characteristics of the Millennial generation in comparison to the two preceding generations, Generation X (Gen X), and Baby Boomers.

The Millennial generation is going through major milestones that include pursuing general education, college education, and employment. There are several ways that Millennials differ from past generations. In contrast to the Gen X and Baby Boomer generations, Millennials are the most diverse generation in American history (Wey Smola and Sutton, 2002). Moreover, a vast majority of Millennials have attended college and have college degrees, even more so than other generations (Levenson, 2010).

Figure 1: The Increase of Millennial Dominance in the U.S. Adult Population



Source: US Census Bureau

In addition, the Baby Boomer generation is entering retirement age while the Millennials are entering the workforce (Dohm, 2000; Perry, 2015). The Council of Economic Advisers (2014) found that over 60 percent of adult Millennials have attended college, exceeding the Baby Boomers, 46

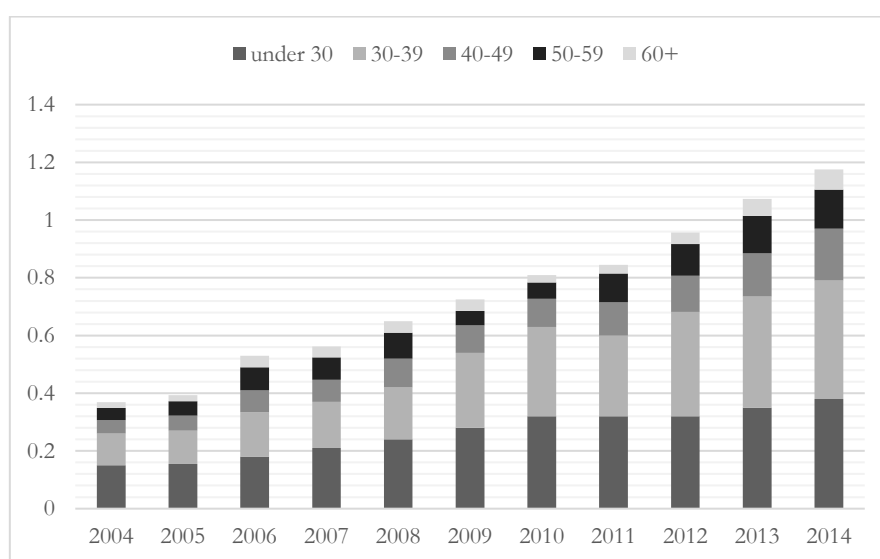
percent of whom attended college. Furthermore, Millennials are the first generation to grow up enjoying both the access to and the benefits of the internet, which has shaped their views on technology, communication, and commerce. Their early adoption of technology and internet utilization has provided opportunities for alternative financial services that target this generation of consumers. Payment transfers can now be done through internet-based service providers such as Paypal, Venmo, Square, Stripe, and Braintree. Financing can be accessed through peer-to-peer lending platforms such as Zopa, Prosper, and Lending Club, which are marketplaces where lenders can issue loans to individuals and small businesses (Mateescu, 2015).

Survey studies have been conducted by financial institutions and firms that specialize in financial services, such as Wells Fargo, Standard & Poor's, KPMG Capital, and Oracle. Pew Research Center (2014) shows that previous generations think Millennials face a tougher economy than they faced when starting out, which reflects the current public sentiment on the U.S. economy and employment opportunities for previous generations.

Previous literature finds that student loan debt is a major factor affecting the personal finance decisions of Millennials. Levenson (2010) states, "Millennials have about twice the college credentials than their predecessors in the tail end of the Baby Boom and leading edge of Generation X, and they reached that point by doubling both college attendance (without graduation) and 4-year college graduation." Millennials have higher levels of debt in comparison to previous generations due to the necessity of obtaining student loans to cover rising education costs while earning college degrees (Nava, Karp, and Nash-Stacey, 2014; Kern, 2016). The student loan debt burden is also more pronounced, exceeding the national average, for young adult students from lower socioeconomic status (Houle, 2013). Efforts for addressing this student loan issue have led to alternative financing methods such as Income Sharing Agreements (ISA) where universities advance the student money to cover education expenses, and in turn, the student agrees to pay a fixed percentage of their income for a set amount of years (Friedman, 2015). Student loan refinancing demand is also rising, with financial institutions providing refinancing options for students to obtain more affordable interest rates, which has been considered more advantageous for college graduates with higher incomes (Paquette, 2014). The rise in

student loan balances is seen in Figure 2 which shows student loan balance growth by age group in 2015.

Figure 2: Total Student Loan Balance Growth by Age Group 2015



Source: FRBNY Consumer Credit Panel/Equifax, Standard & Poor's 2015

Since the Millennial generation is comprised mainly of college educated and college graduates, two primary outcomes arise. Student loan debt is high amongst Millennials, and there is greater competition in obtaining work with more of the workforce having college degrees. Total student loan growth, seen in Figure 2, consists primarily of people who are 39 years or younger in age, which consists mostly of Millennials. Because of this, there is growing pressure for Millennials to obtain a job after graduation and pay off student loan debt.

There are several factors that may influence a Millennial's financial decisions, such as student loan debt, relocation, and level of education. Demographic characteristics and characteristics of financial institutions come into play in a Millennial's decision to invest in financial services and products and to use a given financial institution. This paper examines the characteristics of the Millennial, what influences Millennials' financial decisions, and what types of financial products and services are of interest to and utilized by Millennials.

2 Literature Review

Millennials have entered and dominated the workforce (DelCampo, Haggerty, Haney, and Knippel, 2011), which makes them the largest consumption targets for traditional financial institutions. Cudmore, Patton, Ng, & McClure (2010) emphasize that each generation cohort embraces distinctive characteristics and that financial institutions must customize their offerings to accommodate the demand of that targeted generation – the Millennial. Research reveals that Millennials are delaying marriage and household formation; this factor contributes to the slow recovery of the housing market, the decline in rates of homeownership, and the increase in demand for housing rentals (Nava, Karp, Nash-Stacey, 2014). In agreement with this, another research paper furthered the discussion on Millennials having higher levels of debt in comparison to previous generations due to Millennials obtaining student loans to cover rising education costs (Kern 2016). Another study sampled a large proportion of Millennials, especially ones with lower-income, having sufficient savings to cover unexpected expenses. That study emphasized the need for a combination of initiatives that promotes financial capability and financial inclusion for effective determinants of “financial outcomes.” (Friedline and West, 2015). Millennials, when compared to previous generations, have incurred different demands and preferences for financial services.

The retirement preparedness of different generations is explored in several research studies. Lee, Hassan, & Lawrence (2016a) examines the differences in retirement preparedness of the Generation X, Y, and “hippie” generations and finds that the “hippie” generation is more prepared for retirement compared to Generation X and Y. Hassan & Lawrence (2001) studies gender differences in retirement preparedness and states that women have higher chances of facing events that can reduce their economic well-being and can be subject to pay inequality, which can impact their level of retirement savings. Hassan & Lawrence (2011) analyze how individuals in their fifties from the 1995 Survey of Consumer Finances have prepared for retirement and find that good health, work history, and income have a positive effect on retirement eligibility and that age and education levels have a negative effect on pension plan eligibility. Lee, Hassan, & Lawrence (2016b) study the 2016 Survey of Consumer Finances and find that health, age, and gender effect retirement planning.

The loyalty of Millennials towards any specific financial institution depends on their satisfaction, lower fees, relevant product options, and helpful customer service (Perry, 2015). Millennials have been exposed to technology at early ages, and many use both personal and internet banking; yet factors such as marriage status, education level, and utilization of ATMs, direct deposit, direct bill payment, and computer software tremendously affect the inclination of Millennials to become tech-savvy and to adopt internet banking (Kim and DeVaney, 2016). Interestingly, a study on the use of internet banking among Millennials in Trinidad and Tobago questions the validity of technological inclination being the reason Millennials continue to use internet banking despite the limited access to these services at those physical locations. Indeed, its findings support the initial proposition that loyalty towards internet banking depends both on customers' rational consideration, rather than innovative inclinations, and on governmental support (Rambocas and Arjoon, 2012). That research, however, was only limited to students as its main subjects, which is a relatively homogeneous group and therefore cannot be generalized to portray a more diverse population.

This paper looks to fill this gap in the academic literature by constructing a national scale survey administered to respondents throughout the United States. This study aims to provide additional insight into the characteristics of potential Millennial bank clients, including what financial institution characteristics they perceive to be important in their choice of utilizing financial products and services. The final sample consists of university students, professors, young professionals, and Amazon Mechanical Turk (AMT) panelists in the United States. Several studies utilize AMTs for survey respondents. Mason and Suri (2012) conclude that utilizing AMTs as respondents can be used as a "useful tool" to conduct research studies. Shapiro, Chandler, and Mueller (2013) find that AMTs provide "several advantages for clinical research while providing insight into potential problems, such as misrepresentation, that researchers should address when collecting data online." We have screened our AMT respondents by adding in screening questions to make sure that the respondents were seriously answering the questions.

Among current research literature, Hussain and Wong (2015) embrace similar perspectives and methods, constructing the quantitative description of Millennials as consumers for banks for marketing purposes targeting product demands. Specifically, the Millennial generation

(sometimes referred to as Generation Y) was segmented based on different demographic factors. However, the Hussain and Wong (2015) survey was limited to a sample of 110 Millennial students from a university in Northern California; most of the respondents were between the ages of 21 and 23. Remedying that limitation, this paper contributes to the existing literature by examining a larger dataset consisting of 400 respondents spanning from Baby Boomers to Millennials. A comparison study is conducted to examine the differences in characteristics between generations as well as to gauge the interest and probability of generations to utilize financial institutions.

Alternative financial services should be further examined for financial institutions to effectively compete in a changing industry. Traditional financial institutions need to not only adjust for the shift of customer generation mentioned above but also prepare for threats coming from alternative financial services competing for current market shares. Peer-to-peer lending operations – “which provide efficient alternative markets for lending and saving” – and Neobanks – “which offer highly accessible yet purely online services that compete directly with retail banks” are new forms of financial services available to Millennials that provide valuable services without requiring consumers to have access to a physical banking branch. Despite this rigorous competition, traditional banking remains stable. “Even among Millennials, branches are still key, as 53 percent say they visit a branch because they feel it is more secure and they seek more personalized service, especially for their own personal finances” (Chang, 2014). However, the reality that Millennials are more inclined to use new and alternative financial services and providers in comparison to previous generations (Herbst-Murphy and Weed, 2015) deserves attention from traditional banks in consideration of modifying their products to maintain their competitive advantages in the current and future marketplace. The objective of this study is not just collecting and compiling data, but also developing empirical models that can be used to estimate the propensity to utilize financial products and services that are associated with financial institutions.

3 Hypotheses

Findings from previous survey reports have outlined the bank characteristics that Millennials value, namely mobile banking, ethical business practices, low fees, and low transactions costs. KPMG Capital

(2014) found four clear bank characteristics that Millennials in their sample wanted: personalized service, a focus on convenience, being progressive with social and technological advancement, and taking a results-oriented approach to helping the Millennial bank client.

Pew Research Center (2015) stated that 84 percent of American adults utilize the internet and that young adults are more inclined to use the internet in comparison to previous generations. This has been a growing trend, which the report has tracked from 2000 to 2015 and can be seen in Figures 3 and 4. Gattiker and Stollemeir (1992) proposed that there is a strong relationship between a person's age and the level of acceptance of new technology. Millennials have grown up with wider access to the internet, personal computers, and smartphones in comparison to previous generations. The Board of Governors of the Federal Reserve System (2014) suggested that an increase in smartphone use leads to an increase in the usage of mobile banking services. Thus, a bank offering mobile and online banking could have the potential to influence a Millennial's choice in using a given financial institution. We hypothesize that access to mobile and online banking will have a significant impact on a Millennial's propensity to bank with a given banking entity.

Hypothesis 1 (H1): Millennials value mobile banking and online banking more than previous generations do.

Hypothesis 1 relates Millennials' banking habits to available technology. To investigate this hypothesis, we employ several methods. Panel A of Table 4 shows the mean of the variables of interest. In Panel A, we conduct a difference in means tests for each of the generations measuring *Smartphone Use*, *Laptop Use*, *Use Mobile Banking*, and *Use Online Banking*. In addition, we conduct one-tailed tests to determine whether the Millennial generation differs in *Smartphone Use*, *Laptop Use*, *Use Mobile Banking*, and *Use Online Banking*. We employ one-sided tests to determine if mobile banking is greater in the Millennial generation compared to others. If the value is positive and significant, it indicates that the Millennial response for any given variable is larger. The results of Millennials and Generation X, Generation Z and X, Millennial and Generation Z, and *Smartphone Use*, *Laptop Use*, and *Use Mobile Banking* are positive and significant. Millennial and Generation Z and *Use Online Banking* is positive and significant. Overall, the data shows significant heterogeneity between generations at almost all levels.

In Panel B, we employ a probit regression with the dependent variable being *Mobile Banking Value* and the independent variables being *Millennial*, *Generation X*, and *Baby Boomer*. We specify two interaction terms. The first independent variable is *Use Laptop*Millennial*. The second independent variable is *Use Smartphone* Millennial*. We also include controls for each generation. The final specification for Table IV Panel B is reflected in Equation (1).

$$\begin{aligned}
 (1) \quad & \text{Mobile Banking Value} \\
 &= \beta_{\text{controls for generation}} + \beta_{\text{Laptop*Millennial}} \\
 &+ \beta_{\text{Smartphone* Millennial}} + \epsilon
 \end{aligned}$$

Survey respondents were asked if they value mobile banking. From this question, we create the variable *Mobile Banking Value*. Using this response, we employ a second probit regression with additional controls for both bank and individual characteristics. Those controls include *Low transaction costs and fees*, *ATM vicinity*, *Customer Service*, *Financial Advising*, *Financial Coaching*, *Online Banking*, *Ethical Business Practices*, *Community Involvement*, and *Networking Events*. Our main variable of interest is a Millennial indicator variable which equals 1 if the respondent is a Millennial and zero otherwise. The final specification for this model is shown in Equation (2).

$$\begin{aligned}
 (2) \quad & \text{Mobile Banking Value} = \\
 & \propto + \beta_{\text{millennial}} + \beta_{\text{Low costs and fees}} + \beta_{\text{ATM vicinity}} \\
 & + \beta_{\text{Customer Service}} + \beta_{\text{Financial Advising}} \\
 & + \beta_{\text{Financial Coaching}} + \beta_{\text{Online Banking}} \\
 & + \beta_{\text{Ethical Business Practices}} \\
 & + \beta_{\text{Community Involvement}} + \beta_{\text{Networking}} + \epsilon
 \end{aligned}$$

Hypothesis 2 (H2): Student loan debt hinders financial product utilization.

For Hypothesis 2, we investigate the relationship between Millennials' economic circumstances and financial product use. We categorize these variables as "wealth formation" variables because they are products generally associated with wealth formation. The literature shows Millennials are affected by student loans in several ways. Millennials may delay household formation, a major vessel of wealth, for a variety of

reasons. A major factor can be rising student loan debt. Rising college costs are also keeping Millennials in co-residence with their parents (Bleemer, Brown, Lee, and Van der Klaauw, 2014). In addition, Millennials are choosing to have fewer children in comparison to previous generations, due to increases in costs of living and day care (Astone, Martin, and Peters, 2015).

We investigate Millennials' relationship with banking using two methods. To provide initial evidence we employ analysis of a difference in means testing. Table III reports difference in mean testing for several survey questions administered. The second method employs a probit regression to investigate products associated with wealth formation, *Mutual Funds*, *Stocks*, and *Savings*. We categorize the savings variable by the subject's propensity to save—Disagree, Somewhat Disagree, Neutral, Somewhat Agree, Agree, and Strongly Agree. After adding controls for age, the final specification is reflected in Equation (3).

$$(3) \quad \text{Student Loans} = \alpha + \beta_{\text{Mutual Fund}} + \beta_{\text{Stocks}} + \beta_{\text{Savings},i} + \beta_{\text{Generation Controls},i} + \epsilon$$

Hypothesis 3 (H3): Millennials' perceived financial knowledge affects utilization of financial products and services.

For Hypothesis 3, we investigate the impact of perceived financial knowledge on the interest in and utilization of financial products and services by Millennials, Generation X, and Baby Boomers. Several terms have been used interchangeably to refer to the concept of financial knowledge throughout the extant literature. Huston (2010) found that financial literacy and financial knowledge have been used synonymously in previous academic literature, specifically 76 percent of the research studies included in his paper's sample. In contrast, Remund (2010) stated that the academic literature concurrent with his paper considered financial literacy to be a combination of financial knowledge, financial ability, and skills. For the sake of clarity, we will solely use the term "financial knowledge." The survey question assessing this factor states "What would you consider to be your level of financial knowledge, overall?"

Increased access to the internet and technology has given Millennials the opportunity to utilize social networks and research services and products from financial institutions in a faster, possibly more efficient, manner, which can impact their level of financial knowledge. Even though this access to new technology may impact Millennials' financial knowledge level, Friedline and West (2015) have found that the financial capability of Millennials is quite low, especially for low-income Millennials. Yet, Millennials who have even taken personal finance classes at the university level may not have higher levels of financial literacy due to lack of motivation (Mandell and Klein, 2007). Gender differences have been found to impact enthusiasm for learning personal finance topics (Chen and Volpe, 2002). We examine the difference between the level of perceived financial knowledge the Millennial asserts and the interest in and utilization of financial products and services in this paper's administered survey. To test Hypothesis 3, we employ the following probit regression seen in Equation (4):

$$(4) \quad \text{Perceived Fin Knowledge} = \alpha + \beta_{\text{financial products},i} + \epsilon$$

4 Data and Results

National data regarding the ways in which financial institutions should approach serving this new generation is collected using a survey administered to potential Millennial banking clients through the survey software Qualtrics. The survey was developed by referencing two Generation Y surveys conducted by Azmi and Madden (2015a, 2015b). Questions were added and updated to suit testing this study's three hypotheses, which assess bank characteristics, utilization of and interest in financial products and services, and perceived financial knowledge. The survey used in this study was administered to 468 total respondents. The respondents consisted of university students, professors, young professionals, and Amazon Mechanical Turks (AMT). Amazon Mechanical Turks are Human Intelligence Task Workers who can be contracted out to take surveys. AMTs have been included as respondents for academic behavioral research studies (see Buhrmester, Kwang, & Gosling, 2011). Paolacci and Chandler, J. (2014) states that "MTurk data facilitates the collection of well-powered samples that, ceteris paribus, better reflect the available workforce."

The total sample consists of 468 responses. Table I shows the characteristics of the full survey sample, first with all generations and then segmented by Millennials, Generation X, and Baby Boomers. The majority of Millennials, Generation X, and Baby Boomers work in the for-profit sector (49% of all generations and 53%, 54%, 51% for each generation respectively). The majority of Millennials have annual income below \$50,000 (33% from \$50,000 to \$25,001 and 35% below \$25,000). This reflects the segmentation of labor in the workforce by generation.

For job-level, Millennials primarily are at entry-level (58%) and mid-level (33%). Generation X and Baby Boomers are predominantly at mid-level (51% and 48% respectively). For education level, 51 percent of Millennials have an associate's degree, 58.06 percent have a Bachelor's degree, 16 percent have a Master's degree, and 12 percent had some college but did not graduate. 43 percent of Generation X have an associate's degree, and 24 percent have a Master's degree, which is a greater percentage than both Millennials (16%) and Baby Boomers (21%). For marital status, 60 percent of Millennials are single, and 28 percent are married. The plurality of Generation X is married at 47 percent, with 31 percent being single and 12 percent being divorced/widowed. The plurality of Baby Boomers is married at 49 percent, with 31 percent being divorced/widowed. In addition, domestic partnerships have almost doubled from the Baby Boomers to Generation X from 6 to 11 percent and remained steady with Millennials at 11 percent.

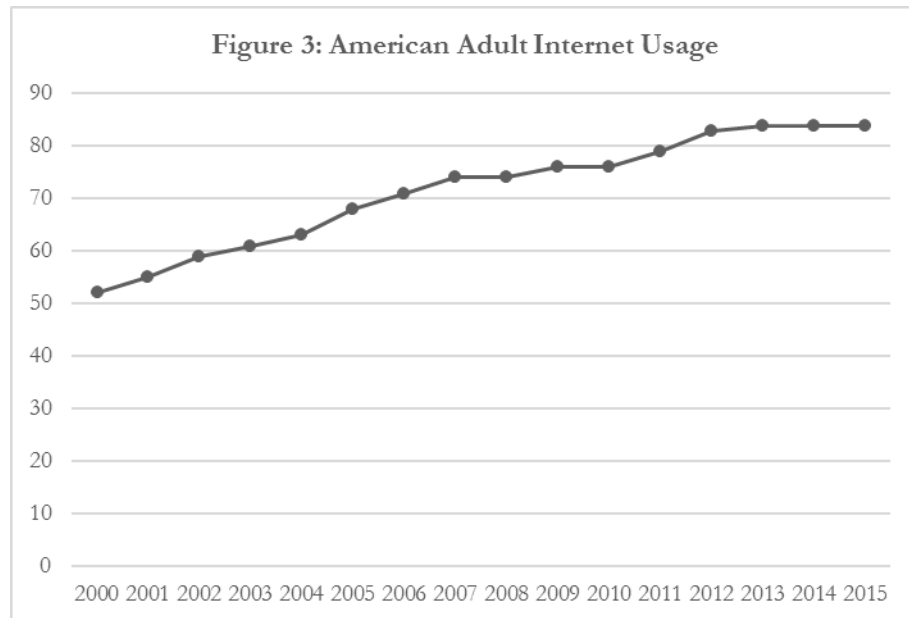
Table II shows the descriptive statistics. The mean age of the full sample is 37 years. More than half (56 percent) of the respondents are Millennials. Generation X comprises 26 percent and Baby Boomers comprise 18 percent of the sample. The sample consists of 262 Millennial respondents, with a mean age of 27 years. The mean number of dependents for Millennials is 1.51, 2.09 for Generation X, and 1.87 for Baby Boomers. The mean level of financial knowledge is 47.45 for Millennials, 49.74 for Generation X, and 61.25 for Baby Boomers. The difference in financial knowledge between Millennials and Generation X is relatively small, yet there is a much larger difference in financial knowledge between Generation X and Baby Boomers (difference of 11.51). This jump in perceived financial knowledge from Generation X to Baby Boomers may stem from Baby Boomers being more acclimated to personal finance and financial planning for a longer period of time. Baek and DeVaney (2004)

have found that the majority of Baby Boomers are comfortable with investing and have adequate investment and debt-to-asset ratios, which may explain their heightened level of perceived financial knowledge.

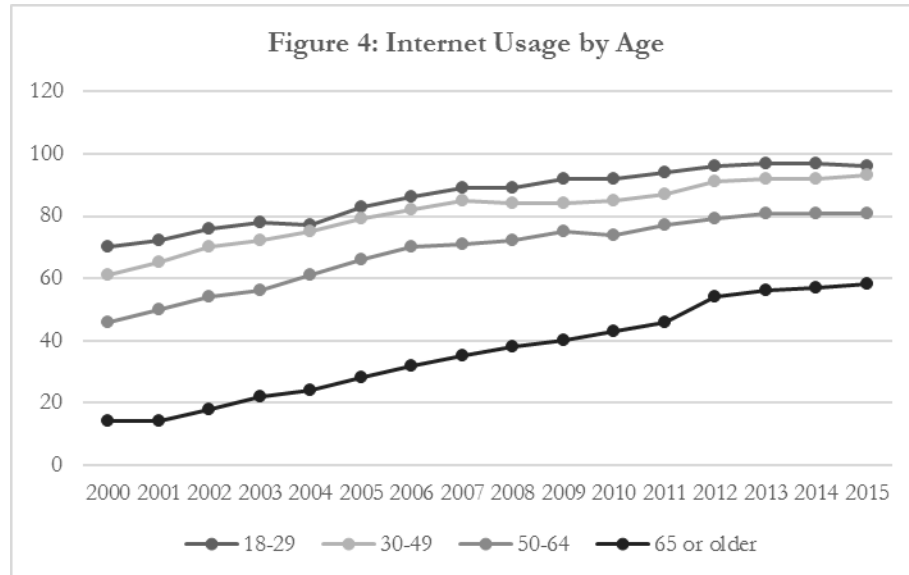
Table III shows difference in means testing for some variables of interest. We employ two-tailed testing to not to imply any specific direction for the difference. Many of the differences across generations are significant. We see the number of dependents is significant across generations, reaching a peak for Generation X. We do not see a significant difference between Millennials and Baby Boomers. Annual income seems to increase with age from \$46,320 for Millennials to \$55,600 for Generation X to \$79,950 for Baby Boomers.

The number of relocations increases with each generation. However, if we consider the number of relocations controlled for generation or age, we can conclude that Millennials on average relocate more. Further studies should include more analysis on this result. Lastly, perceived financial knowledge provides interesting results; while it would seem that perceived financial knowledge should increase with generation, we do not see a significant difference between Millennials and Generation X. This invites more analysis which we interpret in Hypothesis 3.

Hypothesis 1 is *Millennials value mobile banking and online banking more than previous generations*. The results of the analysis are shown in Table IV. This relationship between customers and technology is important because of the increased frequency of mobile use. Table IV, Panel A shows that there is greater use of smartphones by the Millennial generation. Figure 3 and 4 illustrates how mobile banking is becoming increasingly important. Figure 4 shows that while internet usage has increased overtime, Millennials tend to use the internet in greater proportions. Because of their familiarity with internet technology, Millennials may value mobile and online technology more than other generations.



Source: Pew Research Center Surveys 2000-2015



Source: Pew Research Center Surveys 2000-2015

To further investigate this relationship, we employ a probit model in Panel B. The dependent variable is *Mobile Banking Value* and the independent variables are control variables for *Millennial*, *Generation X*, and the *Baby*

Boomer generation. To investigate the interest of Millennials in online and mobile banking, we employ two interaction terms *Use Laptop * Millennial* and *Use Smartphone * Millennial*. The results show little evidence that Millennials value online banking. However, the results show that millennials have a strong preference for mobile banking.

To further test this relationship, we employ a second probit model. This model regresses *Mobile Banking Value* on several control variables and a Millennial indicator variable. The model results reveal that, after controlling for several other bank preferences, if Millennials prefer mobile banking services. We expect a positive and significant coefficient for the Millennial indicator variable. Table IV, Panel C displays the results of this model. The results suggest that millennials prefer mobile banking.

Hypothesis 2 is *Student loan debt hinders financial product utilization*. Student loans have been shown to impact financial decisions such as homeownership (Cooper and Wang, 2014; Houle and Berger, 2014). If student loans are affecting the wealth formation of Millennials, then demand for these financial products may also be affected.

To test this hypothesis, we employ a probit regression. The results can be found in Table V. For the dependent variable, we use student loans. We use the independent variables *Use of Mutual Funds*, *Stock Investments*, and *Savings*. For savings, we use propensity to save and we control for generation. We find that people who use mutual funds are less likely to have student loans and those who do not use savings are more likely to have student loans.

We use all response options for savings. The results indicate that when a someone saves less, they are more likely to have student loans. These results indicate that student loan debt may drive down use of traditional financial products. If these financial products offer a greater rate of return for financial institutions, this may become a problem in the future.

Hypothesis 3 is *Millennials' perceived financial knowledge affects utilization of financial products and services*. To test this hypothesis, we employ a linear regression. For the dependent variable, we use perceived financial knowledge. This number is calculated by asking respondents their financial knowledge on a scale of 0 to 100. Subsequently, we use

this number as the dependent variable in a regression and include the use of several financial products. Controlling for several financial products allows us to determine if there is strong correlation between any financial product and perceived financial knowledge. The results of the regression are in Table VI.

Table VI shows that perceived financial knowledge is increasing between generations except for Millennials and Generation X. Panel 1 reports the results for only the Millennials subgroup. The relation between perceived financial knowledge and financial products is relatively weak, apart from stocks. The level of stock investment is positively related to perceived financial knowledge. This would seem to indicate that financial knowledge translates to more investments in the stock market.

We also investigate the relationship between perceived financial knowledge and financial products for all generations. This regression tells a similar story. Financial knowledge is not only remaining positively related to stock investments, but also to mutual funds. The coefficient on mutual funds is larger in magnitude to stock investment. We hypothesize that greater financial knowledge is correlated with complex financial products, such as stocks and mutual funds.

5 Conclusion

The findings of this study suggest that there are several ways that Millennials differ from older and younger generations. This can be seen from their marital status, education level, income, and adoption of new technology. Results from the survey reflect that the majority of Millennials are using laptops and online banking as well as smartphones and mobile banking, yet prefer mobile banking over online banking due to high smartphone usage. We determine that Millennials prefer mobile to online banking. This relationship is unique to the Millennial generation. Millennials' economic circumstances, such as student loans, may prevent them from consuming financial products generally associated with wealth formation.

Millennials have lower levels of perceived financial knowledge in comparison to Generation X and Baby Boomers. As perceived financial knowledge grows, Millennials and other generations tend to invest in complex financial products such as stocks and bonds. Previous studies

have found a relationship between financial education, financial literacy, and beneficial financial outcomes (Fox, Bartholomae, and Lee, 2005; Lusardi, 2003). Simplified training to improve knowledge of finance can be effective at increasing financial literacy (Drexler, Fischer, and Schoar, 2014). Financial coaching may also be an effective way to increase financial knowledge and literacy by providing individual support through setting and monitoring goals (Collins and O'Rourke, 2010). Young Americans may have limited financial literacy and rely heavily on debt (Brown, Grigsby, van der Klaauw, Wen, and Zafar, 2016). Our study reveals that over half of Millennials respondents are burdened with student loan debt. Incorporating means of training Millennial consumers may potentially increase financial literacy, thereby increasing perceived financial knowledge, and ultimately improving debt repayment behavior.

The findings also reveal how much Millennials value mobile banking, as they consider it to be the most important bank characteristic. Financial institutions should adopt mobile and online banking services to garner client interest from Millennials and members of Generation X. The collected data and empirical results suggest ways in which financial institutions can best approach serving the Millennial generation.

This study has limitations as well as potential extensions. A factor that can affect Millennial utilization of financial products and services is risk tolerance, which was not included in this study. Hallahan, Faff, and McKenzie (2004) have found that there is a negative and significant relationship between age and risk tolerance. The level of risk tolerance associated with age may influence Millennials' interest in and utilization of financial products and services. This can be further explored in future research. Perceived control over outcomes can affect an individual's propensity to save, maintain a budget, and control spending (Perry and Morris, 2005). Measures to control for this should be added in future studies. Also, perceived financial knowledge, not actual financial knowledge, was addressed. Huston (2010) examined the various types of measures used in academic literature to assess financial literacy. These measures, administered through interviews and surveys, incorporated four distinct content areas, namely the basics of money, borrowing, investing, and resource protection. Pursuing a study that compares perceived financial knowledge to actual knowledge would further extend the current research literature.

References

Azmi, W. N. W. & Madden, R. (2015a), "Financial knowledge and behaviour of Gen Y," Asian Institute of Finance.

Azmi, W. N. W. & Madden, R. (2015b), "State of ethics in the financial services industry," Asian Institute of Finance.

Astone, N. M., Martin, S., & Peters, H. (2015, April), "Millennial childbearing and the Recession," Retrieved April 23, 2016, from <http://www.urban.org/sites/default/files/alfresco/publication-pdfs/2000203-Millennial-Childbearing-and-the-Recession.pdf> Urban Institute.

Baek, E., & DeVaney, S. A. (2004), "Assessing the Baby Boomers' financial wellness using financial ratios and a subjective measure," *Family and Consumer Sciences Research Journal*, 32, 321-348.

Bleemer, Z., Brown, M., Lee, D., & Van der Klaauw, W. (2014), "Debt, jobs, or housing: What's keeping millennials at home?," *FRB of New York Staff Report*, 700.

Board of Governors Of The Federal Reserve System. (2014), "Consumers and mobile financial services 2014," Retrieved October 2016. <http://www.federalreserve.gov/econresdata/consumers-and-mobile-financial-services-report-201403.pdf>

Boumphrey, S. (2012), "Special Report: The World's youngest populations," Retrieved October 28, 2016, from <http://blog.euro-monitor.com/2012/02/special-report-the-worlds-youngest-populations.html>

Brown, M., Grigsby, J., Van der Klaauw, W., Wen, J., & Zafar, B. (2016), "Financial education and the debt behavior of the young," *Review of Financial Studies*, hhw006.

Buhrmester, M. D., Kwang, T., & Gosling, S. D. (2011), "Amazon's Mechanical Turk: A new source of inexpensive, yet high quality data," *Perspectives on Psychological Science*, 6, 3–5.

Chang, E. (2014), "Do Millennials really want to eliminate banks?". MainStreet.

Chen, H., & Volpe, R. P. (1998), "An analysis of personal financial literacy among college students," *Financial Services Review*, 7, 107-128.

Chen, H., & Volpe, R. P. (2002), "Gender differences in personal financial literacy among college students," *Financial Services Review*, 11, 289-307.

Collins, J. M. & O'Rourke, C. M. (2010), "Financial education and counseling – still holding promise," *Journal of Consumer Affairs*, 44, 483-489.

Cooper, D., & Wang, J. C. (2014), "Student loan debt and economic outcomes. Current policy perspective No. 14-7," Federal Reserve Bank of Boston.

Council of Economic Advisers (2014), "15 Economic facts about Millennials," whitehouse.gov. Retrieved October 28, 2016, from https://www.whitehouse.gov/sites/default/files/docs/millennials_report.pdf

Cudmore, B. A., Patton, J., Ng, K., & McClure, C. (2010), "The millennials and money management," *Journal of Management and Marketing Research*, 4, 1-28.

Delcampo, R. G., Haggerty, L. A., Haney, M. J., & Knippel, L. A. (2011), "Managing the multi-generational workforce," Surrey, UK & Burlington, VT: Gower.

Dohm, A. (2000), "Gauging the labor force effects of retiring baby-boomers," *Monthly Lab. Rev.*, 123, 17.

Drexler, A., Fischer, G., & Schoar, A. (2014), "Keeping it simple: Financial literacy and rules of thumb," *American Economic Journal: Applied Economics*, 6, 1-31.

Fox, J. J., Bartholomae S., and Lee, J. (2005), "Building the case for financial education," *Journal of Consumer Affairs*, 39, 195-214.

Friedline, T., & West, S. (2015), "Financial education is not enough: Millennials may need financial capability," *Kansas State University School of Social Welfare Research Brief*.

Fry, R. (2015), "Millennials surpass Gen Xers as the largest generation in U.S. labor force," Retrieved October 28, 2016, from <http://www.pewresearch.org/fact-tank/2015/05/11/millennials-surpass-gen-xers-as-the-largest-generation-in-u-s-labor-force/>

Gattiker, U. E., & Stollenmaier, R. S. (Eds.). (1992), Technology-mediated communication: *Technological innovation and human resources* (Vol. 3), Oxford: Walter De Gruyter.

Hallahan, T. A., Faff, R. W., & McKenzie, M. D. (2004), "An empirical investigation of personal financial risk tolerance," *Financial Services Review*, 13, 57.

Hassan, M. K., & Lawrence, S. (2001). Retirement Savings: Similarities and Differences between Men & (and) Women in Their Forties. *J. Retirement Plan.*, 4, 27.

Hassan, M.K., & Lawrence, S. B. (2011). Retirement savings of the hip generation: A study of retirement preparation among individuals in their fifties. *Southwestern Economic Review*, 34, 115-130.

Herbst-Murphy, S., & Weed, G. (2014), "Millennials with money: A new look at who uses GPR prepaid cards," *FRB of Philadelphia-Payment Cards Center Discussion Paper*, (14-3).

Herbst-Murphy, S., & Weed, G. (2015), "Millennials with money revisited: Updates from the 2014 Consumer Payments Monitor," *FRB of Philadelphia Payment Cards Center Discussion Paper*, (15-6).

Houle, J., & Berger, L. (2014), "Is student loan debt discouraging home buying among young adults," *Association for Public Policy and Management*.

Houle, J. N. (2013), "Disparities in debt parents' socioeconomic resources and young adult student loan debt," *Sociology of Education*, 0038040713512213.

Hussain, Mahmood, and Wong. The online banking behavior of Generation Y (January 14, 2015). XIV International Business and Economy Conference Bangkok, Thailand, January 5-8, 2015. Available at SSRN: [G1] [G2] <http://ssrn.com/abstract=2549898> or <http://dx.doi.org/10.2139/ssrn.2549898>[G3]

Huston, S. J. (2010), "Measuring financial literacy," *Journal of Consumer Affairs*, 44, 296-316.

Johnson, S.D., & Larson, S.J. (2009), "Millennials: Strategies for financial planning with a new generation," *Journal of Financial Planning*, 22, 65-71

Kim, H., & DeVaney, S. (2016), "Banking Behavior Among the Millennials," *Consumer Interests Annual*, 62.

Kern, S. (2016), "Falling behind to get ahead: The Millennial student debt trap?," *ABA Banking Journal*, 108, 30.

KPMG Capital (2014), "Banking on the future: The expectations of the Gen Y professional," Retrieved from <https://www.kpmg.com/AU/en/IssuesAndInsights/ArticlesPublications/banking-on-the-future/Documents/banking-on-the-future-2015-report.pdf>

Lee, Yun Doo, Hassan, M.K., and Lawrence S. (2016b), "Are There any Differences between the Hippies Cohort and X&Y Cohort Regarding Adequate Preparation for Retirement," Paper Presented at the 2016 Academy of Financial Services Annual Meetings, Las Vegas, Nevada, October 20-21, 2016.

Lee, Yun Doo, Hassan, M.K., and Lawrence S. (2016b). "An Analysis of Financial Preparation for Retirement: A Study of Retirement Preparation of Men and Women in Their Positive Savings Periods," Paper Presented at the 2016 Academy of Financial Services Annual Meetings, Las Vegas, Nevada, October 20-21, 2016.

Levenson, A. R. (2010), "Millennials and the world of work: An economist's perspective," *Journal of Business and Psychology*, 25, 257-264.

Lusardi, A. (2003), "Saving and the Effectiveness of Financial Education," PRC Working Paper 2003-14. Retrieved from <http://rider.wharton.upenn.edu/~prc/PRC/WP/WP2003-14.pdf>

Mandell, L., & Klein, L. S. (2007), "Motivation and financial literacy," *Financial Services Review*, 16, 105

Mason, W., & Suri, S. (2012), "Conducting behavioral research on Amazon's Mechanical Turk," *Behavior research methods*, 44(1), 1-23.

Mateescu, A. (2015, June 1), "Peer-to-Peer Lending," Retrieved October 8, 2016, from <http://datasociety.net/pubs/dcr/PeertoPeerLending.pdf>

Nava, M., Karp, N., and Nash-Stacey, B. (2014), "The Millennials paradox," *US Banking Watch*, BBVA Research.

Paquette, D. (2014), "Student loan refinancing will save you money — if you don't actually need it," Retrieved October 08, 2016, from <https://www.washingtonpost.com/news/storyline/wp/2014/10/15/student-loan-refinancing-will-save-you-money-if-you-dont-actually-need-it/>

Paolacci, G., & Chandler, J. (2014), "Inside the Turk: Understanding Mechanical Turk as a participant pool," *Current Directions in Psychological Science*, 23(3), 184-188.

Perry, M. (2015), "Finding Middle Ground: Expectations of and Enrollment Strategies for Millennial Students," *College and University*, 90(3), 39.

Perry, V. G., & Morris, M. D. (2005), "Who is in control? The role of self-perception, knowledge, and income in explaining consumer financial behavior," *Journal of Consumer Affairs*, 39, 299-313.

Pew Research Center (2014), "Millennials in adulthood," Retrieved October 28, 2016, from <http://www.pewsocialtrends.org/2014/03/07/millennials-in-adulthood/>

Rambocas, M., & Arjoon, S. (2012), "Using diffusion of innovation theory to model customer loyalty for internet banking: A millennial perspective," *International Journal of Business and Commerce*, 1, 1-14.

Remund, D. L. (2010), "Financial literacy explicated: The case for a clearer definition in an increasingly complex economy," *Journal of Consumer Affairs*, 44, 276-295.

Shapiro, D. N., Chandler, J., & Mueller, P. A. (2013), "Using Mechanical Turk to study clinical populations," *Clinical Psychological Science*, 1(2), 213-220.

Sprouse, J. (2011), "A validation of Amazon Mechanical Turk for the collection of acceptability judgments in linguistic theory," *Behavior research methods*, 43(1), 155-167.

Wey Smola, K., & Sutton, C. D. (2002), "Generational differences: Revisiting generational work values for the new millennium," *Journal of Organizational Behavior*, 23, 363-382

Appendix A: Profile of Survey sample, Descriptive Statistics and Regression Tables

Table I: Characteristics of All Generations of the Survey Sample
Panel A:

	Respondents Characteristics	Number of Respondents	% of Sample
All Generations			
Industry			
	Non-profit Sector	58	12%
	For-profit Sector	230	49%
	Government/Public Sector	65	14%
	Other	80	17%
Job Level			
	Entry-level	202	43%
	Mid-level	186	40%
	Divisional Management	43	9%
	Upper-level Management	18	4%
	C-suite Executive	12	3%
Level of Education			
	High School	47	10.11%
	Some College	43	9.25%
	Associate's Degree	168	36.13%
	Bachelor's Degree	104	22.37%
	Masters' Degree	70	15.05%
	PhD	33	7.10%
Marital Status			
	Single	206	44%
	Domestic Partnership	46	10%
	Married	171	37%
	Divorced Widowed	42	9%
Annual Income (thousands)			
	Below 25,000	137	29%
	25,001 - 50,000	131	28%
	50,001 - 75,000	99	21%
	75,001 - 100,000	41	9%
	Above 100,001	47	10%
Student Loan		250	53%

Data was taken from the 2015-2016 Qualtrics survey administered in this study. The results include the characteristics of all generations and segmented by Millennials, Generation X, and Baby Boomers for the respondents in the survey. Table I represents summary statistics for the survey. Panel A represents survey responses in aggregate, and Panel B represents responses in proportion to each generation.

Table I: continued:
Panel B: Responses by generation

	Millennial Generation	Generation X	Baby Boomer
Respondents Characteristics			
<i>Industry</i>			
Non-profit Sector	14.04%	14.91%	9.52%
For-profit Sector	53.19%	54.39%	51.19%
Government/Public Sector	14.47%	14.04%	17.86%
Other	18.30%	16.67%	21.43%
<i>Job Level</i>			
Entry-level	58.08%	25.00%	25.93%
Mid-level	33.08%	50.83%	48.15%
Divisional Management	5.38%	14.17%	14.81%
Upper-level Management	1.92%	5.00%	8.64%
C-suite Executive	1.54%	5.00%	2.47%
<i>Level of Education</i>			
High School	6.45%	1.72%	1.94%
Some College	4.95%	3.01%	1.29%
Associate's Degree	21.51%	8.82%	5.81%
Bachelor's Degree	58.06%	79.35%	84.95%
Master's Degree	6.88%	4.95%	3.23%
PhD	2.15%	2.15%	2.80%
<i>Marital Status</i>			
Single	60.38%	30.58%	14.29%
Domestic Partnership	10.77%	10.74%	5.95%
Married	28.08%	47.11%	48.81%
Divorced Widowed	0.77%	11.57%	30.95%
<i>Annual Income (thousands)</i>			
Below 25,000	34.78%	22.69%	26.51%
25,001 - 50,000	32.81%	27.73%	18.07%
50,001 - 75,000	19.76%	25.21%	22.89%
75,001 - 100,000	5.93%	14.29%	10.84%
Above 100,001	6.72%	10.08%	21.69%
<i>Student Loan (Across Sample)</i>	55.20%	28.40%	16.40%

Table II: Summary Statistics

		Mean	Median	Standard Deviation
Variable				
All Generations	n = 468			
Age		36.74	33	13.34
Number of Dependents		1.73	1	1.11
Annual Income (thousands)		54.89	40	63.42
Number of Relocation		7.11	5	6.06
Financial Knowledge		50.56	55	26.03
Millennial Generation	n = 262			
Age		27.36	28	4.06
Number of Dependents		1.51	1	0.93
Annual Income (thousands)		46.32	31	55.97
Number of Relocation		3.62	4	4.20
Financial Knowledge		47.45	51	27.31
Generation X	n = 122			
Age		40.93	40	4.78
Number of Dependents		2.09	2	1.29
Annual Income (thousands)		55.61	46.5	47.10
Number of Relocation		3.54	6	6.07
Financial Knowledge		49.74	53.5	23.69
Baby Boomer	n = 84			
Age		59.93	59.5	8.24
Number of Dependents		1.87	1	1.24
Annual Income (thousands)		79.95	55.5	92.14
Number of Relocation		4.00	10	8.20
Financial Knowledge		61.25	63.5	25.13

Data was taken from the 2015-2016 Qualtrics survey administered in this study. The results include the characteristics of all generations and segmented by Millennials, Generation X, and Baby Boomers for the respondents in the survey.

Table III: Two-tailed t-tests of means

Variable	Mean				Absolute Difference		
	$\frac{Millennial}{\bar{X}}$	$\frac{Gen}{\bar{X}}$	$\frac{Baby}{Boomers}$	$ \frac{Millennial}{\bar{X}} - \frac{Gen}{\bar{X}} $	$ \frac{Millennial}{\bar{X}} - \frac{Baby}{Boomers} $	$ \frac{Baby}{Boomers} - \frac{Gen}{\bar{X}} $	
Age	27.35	40.92	59.92	13.57 ***	32.57 ***	19.00 ***	
Number of Dependents	1.50	2.09	1.86	0.58 ***	0.36 **	0.22	
Annual Income (thousands)	46.32	55.61	79.95	9.28 ***	33.63 ***	24.34 **	
Number of Relocation	3.61	3.54	4.00	0.08 ***	0.38 ***	0.46 ***	
Financial Knowledge	47.44	49.74	61.25	2.30	13.80 ***	11.51 ***	

Data was taken from the 2015-2016 Qualtrics survey administered in this study. We test the mean to determine differences between generations. The leftmost columns represent the conditional means from respondent answers. The rightmost columns represent the absolute difference of the conditional means. Significance was calculated using two-tailed P-values. The results show responses vary by generation in the sample.

* 10% significance, ** 5% significance, *** 1% significance

Table IV: Hypothesis 1 Test Results from Differences in Means and Probit Regression

Panel A: Means		Mean		Difference in Means Testing			
	<u>Millennial</u>	<u>Gen X</u>	<u>Baby Boomers</u>	<u>Millennial > Gen Z</u>	<u>Millennial > Gen X</u>	<u>Gen Z > Gen X</u>	<u>Millennial > Gen Z</u>
Smartphone use	0.96	0.92	0.79	0.06***	0.11***	0.11***	0.06***
Laptop use	6.14	6.08	5.92	-0.03*	0.05***	0.05***	-0.03
Use Mobile Banking	0.75	0.55	0.34	0.2***	0.21***	0.21***	0.2***
Use Online banking	0.74	0.66	0.61	0.08**	0.03	0.03	0.08**
Panel B: Probit Regression							
<i>Dependent: Mobile Banking Value</i>	Coefficient	SE	t-stat	p-value			
Millennial	-0.8787	0.5757	-1.5151	0.1313			
Gen X	0.12	0.11	1.13	0.26			
Baby Boomer	-0.44	0.14	-3.24	0.00	***		
Use Laptop * Millennial	-0.1111	0.4646	-0.2525	0.8080			
Use Smartphone * Millennial	1.7272	0.5252	3.3232	0.00	***		
Panel C: Probit Regression							
<i>Dependent: Mobile Banking Value</i>	Coefficient	SE	t-stat	p-value			
Intercept	-1.1313	0.0303	-37.3535	0.0000	***		
Millennial	0.1212	0.0101	12.23	0.0000	***		
Low transaction costs and fees	0.00	0.00	-5.5454	0.000000	***		

ATM vicinity	0.00	0.00	3.57	0.0000	***		
Customer Service	0.00	0.00	-2.3737	0.0202	**		
Financial Advising	0.0000000	0.0000000	-2.5151	0.0101	**		
Financial Coaching	0.0000	0.00	5.34	0.0000	*****		
Online Banking	0.01	0.00	35.5454	0.00	***		
Ethical Business Practices	0.00	0.00	-0.2121	0.8383			
Involved in the Community	0.0000	0.00	-1.1111	0.2727			
Networking Events	0.00	0.00	7.44	0.0000	***		

Panel A represents the conditional means for respondent's conditional on generation. We conduct a one tail hypothesis test between each generation and variable. Panel B is a probit regression Mobil Banking Value = $\alpha + \beta$ (Laptop * Millennial) + β (Smartphone * Millennial) where Millennial is a dummy variable for a Millennial respondent. This model shows that Millennials prefer mobile banking. For robustness, we control for additional bank characteristics in Panel C. Panel C is the probit regression, which is a similar model with additional controls for banking characteristics. After including additional controls for banking characteristics, mobile banking is still preferred by the Millennial bank customers. * 10% significance, ** 5% significance, *** 1% significance

Table V: Hypothesis 2 Results from Probit Regression

Dependent: Student Loans	Coefficient	Standard Error	t-Stat	p-value
(Intercept)	-0.81	0.44	-1.83	0.07 *
Use Mutual Fund	-0.41	0.26	-1.54	0.10 *
Invest in Stocks	0.36	0.25	1.44	0.15
Savings Disagree	1.36	0.47	2.89	0.00 ***
Savings Somewhat Disagree	1.77	0.39	4.53	0.00 ***
Savings Neutral	1.79	0.44	4.07	0.00 ***
Savings Somewhat Agree	-0.001	0.516	2.396	0.02 **
Savings Agree	-0.003	0.4035	2.997	0.00 **
Savings Strongly Agree	-0.81	0.44	-1.83	0.07 *

Table V represents a probit model with student loans as the dependent variable and wealth formation products as independent variables. Generation controls are also included. The results show that a respondent who invests in mutual funds and has savings is less likely to have student loans. * 10% significance, ** 5% significance, *** 1% significance

Table VI: Hypothesis 3**Panel 1: Millennial Generation Only**

<i>Dependent: Perceived Financial Knowledge</i>	Coefficient	Standard Error	T-Stat	P-value	
(Intercept)	44.85	6.80	6.60	0.00	***
Savings Accounts	-1.97	4.31	-0.46	0.65	
Fixed Deposit Accounts	5.44	5.09	1.07	0.29	
Credit Cards	1.74	4.14	0.42	0.67	
Debit Cards	-6.14	7.72	-0.80	0.43	
Mutual Funds	5.70	5.43	1.05	0.29	
Mortgage (Property, Land)	4.94	4.69	1.05	0.29	
Construction Loan	8.62	13.86	0.62	0.53	
Auto Loan	-0.12	4.18	-0.03	0.98	
Student Loan	1.07	3.52	0.31	0.76	
Insurance	2.83	4.16	0.68	0.50	
Pension Funds	-0.99	5.87	-0.17	0.87	
Mortgage Refinance	1.76	8.86	0.20	0.84	
Stocks	9.92	5.16	1.92	0.06	**
Bonds	-5.84	6.44	-0.91	0.37	
IRA	5.02	5.05	0.99	0.32	
Credit Lines	-1.27	4.59	-0.28	0.78	
Certificate of Deposit	4.54	5.75	0.79	0.43	

Panel 2: Full Sample

<i>Dependent: Perceived Financial Knowledge</i>	Coefficient	Standard Error	T-Stat	P-value	
(Intercept)	46.25	4.39	10.53	0.00	***
Savings Accounts	0.34	3.13	0.11	0.91	
Fixed Deposit Accounts	1.66	3.04	0.55	0.59	
Credit Cards	3.26	3.19	1.02	0.31	
Debit Cards	-9.13	4.55	-2.01	0.05	*
Mutual Funds	10.61	3.36	3.16	0.00	**
Mortgage (Property, Land)	4.33	3.00	1.44	0.15	
Construction Loan	3.36	5.03	0.67	0.50	
Auto Loan	-0.68	2.90	-0.24	0.81	
Student Loan	2.05	2.41	0.85	0.40	
Insurance	-0.08	3.29	-0.02	0.98	
Pension Funds	-1.80	3.22	-0.56	0.58	
Mortgage Refinance	-2.05	3.72	-0.55	0.58	
Stocks	8.29	3.42	2.42	0.02	*
Bonds	0.66	3.66	0.18	0.86	
IRA	1.76	3.14	0.56	0.58	
Credit Lines	-1.32	2.88	-0.46	0.65	
Certificate of Deposit	3.36	3.27	1.03	0.30	

Table VI is an investigation into how the use of financial products is affected by perceived financial knowledge. Panel A is a subset of only Millennials, and Panel B represents the full sample. Results show that as perceived financial knowledge increases so does use of complex financial products (Stocks and Mutual Funds).

* 10% significance, ** 5% significance, *** 1% significance

The Role of Social Networks and Ties in Finding a Job in Economies Characterized with High Youth Unemployment: A Case study of Algeria and Jordan

Moundir Lassassi¹ and Ibrahim Alhawarin²

Using nationally representative data from Algeria and Jordan, this paper shows that social networks and ties play an important role in labor market intermediation in Arab countries. In addition to descriptive analysis, we utilize binary probit regressions to investigate determinants of the probability of finding a job through social contacts. The study finds that social networks are a popular method to find a job in Algeria and Jordan but not for skilled jobs. Such methods increase the probability of obtaining less secured informal jobs. Also, the study shows that despite the importance of public sector agencies in the job search process, less than 5% in Algeria and 9% in Jordan of employed youth state that such agencies have helped them transit into employment.

Classification JEL:C25, J23, J64, O12.

Keywords: Job search methods, social networks, labor market, Algeria, Jordan.

1. Introduction

Utilizing communal ties in searching for and finding jobs is a widespread phenomenon in Arab countries (Lassassi and Muller, 2013). This phenomenon extends to advanced economies as well. In USA, for example, social contacts are the main channel of finding jobs of 30% to 60% of employed (Ioannides and Loury, 2004). Social networking, as a less costly method, can enhance information transmission in labor market and in effect improves the match between workers and firms (Munshi, 2003). However, such methods may result in adverse effects on both

¹ Researcher and Division Manager “Social Economics & Human Development”, Center for Research in Applied Economics for Development (CREAD) - Algiers - Algeria. E-mail: lassassim@gmail.com.

² Al Hussein Bin Talal University, Department of Economics, Jordan. E-mail: ibrahimhawarin@ahu.edu.jo.

equity and economic efficiency in labor markets, particularly those characterized with high unemployment rates and underdeveloped job intermediation. In this vein, Assaad (2014) argues that employment, particularly in public sector, in much of the region privileges certain social groups for political motives. Jordan and Algeria, like many Arab countries, have been confronted with growing rates of high youth unemployment and limited capacity of the economy to create enough and decent jobs. The existence of such labor market problems fuels a heightened sense of social injustice and may lead to socio-political instability as happened during “Arab Spring”. The current study aims at providing a first step in understanding the role of social contacts and ties in finding employment in two Arab economies characterized with high youth unemployment, namely Jordan and Algeria. Better understanding of job matching and labor market intermediation can enhance labor market policy making in the two countries, particularly in terms of selecting effective instruments that promote youth employment. The study also enriches the limited literature on the role of social contacts in Arab labor markets.

After the introduction, the study is outlined as follows: Labor markets indicators of both countries will be handled in Section 2. Section 3 reviews the existing literature on job search and social networks, focusing attention on the studies conducted in Arab countries. Section 4 discusses the methodology followed and the data used in the paper. Section 5 discusses descriptive results. In Section 6, we present the empirical results, and section 7 concludes the work.

2. Labor markets in Algeria and Jordan

The economies of both countries differ in terms of their natural resources and structure. While Algeria is classified as an energy-producing and exporting economy, Jordan, as a services economy, depends heavily on imported energy sources and in part on regional and foreign aid. However, both countries are vulnerable to external factors, basically volatile aid and energy prices. They also tend to share the fact that the recent economic growth is not sufficient to sustainably generate enough jobs (Furceri, 2012; Taghdisi-Rad, 2012). Although they have weathered the storm of ‘Arab Spring’, Algeria and Jordan remain to suffer persistently from several problems encountering their labor markets.

In addition to cultural and social similarities, to some extent, Algerian and Jordanian labor markets share common stylized characteristics (see Table 1). The public sector in both countries is oversized, employing a large fraction of the workforce, around 31% in Algeria and 40% in Jordan (World Bank, 2013). The size of the informal sector is also large and ranges around 46% in Algeria and 44% in Jordan (IMF, 2013; UNDP, 2013). Unemployment, which is more severe among females and youth, is a daunting challenge facing both economies. This is coupled with low participation rates especially for females. Despite these efforts, youth and female unemployment rates have remained in the double digits over the last decade. Youth unemployment has proven hard to resolve in both countries (Kreishan and Alhawarin, 2014; Furceri, 2012). The current population shares of 15 to 24 years-old account for about 17% and 20% of the total population in Algeria and Jordan, respectively, as shown in Table (1). The share of those younger than 15 is also substantial particularly for Jordan (around 29% for Algeria versus 35% for Jordan). The latter two indicators suggest that youth unemployment, particularly in Jordan, may remain high in the medium terms, and the two countries will need to create enough jobs for a large youth bulge.

Long-term unemployment (i.e. unemployment spells for more than 12 months) in Algeria concerned 72.2% of the unemployed in 2015 (74% and 67.6% for males and females, respectively). On the other hand, in Jordan in 2014, it amounts to almost 38%; 34.4% and 46.3%, for females and males respectively.

Table 1: Labor market indicators in Algeria and Jordan

	Algeria (2015)			Jordan (2014)		
	Male	Female	Total	Male	Female	Total
Population (10³)	20235	19728	39963	3441	3234.3	6675.3*
0 - 14 years (%)	29.2	28.4	28.8	35.1	33.2	34.6
15 – 24 years (%)	16.8	16.6	16.7	20.6	18.9	19.8
25 - 64 years (%)	48.3	49	48.7	39.3	43	40.6
65 and over (%)	5.7	6	5.9	5	4.9	5
Labor force participation rate (%)	66.8	16.4	41.8	60	12.6	36.4
Labor force participation rate (%) - Youth 15-24 years	41	8.8	25.2	38.1	7.6	23.2
Employment-population ratio (%)	60.2	13.6	37.1	53.7	9.8	32
Employment-population ratio (%) - Youth 15- 24 years	30.1	4.8	17.7	28.1	3.5	16.1
Unemployment rate (%)	9.9	16.6	11.2	10.1	20.7	11.9
Unemployment rate (%) - Youth 15 - 24 years	26.7	45.3	29.9	26.4	53.3	30.6
Unemployment rate (%) - 25 years and over	7	12.3	8	6.1	15	7.5
Long-term unemployment (%) (>=12 months)	74	67.6	72.2	34.4	46.3	37.9

Source: Official labor force survey - Algeria 2015 (ONS) – Jordan 2014 (DoS) Employment and unemployment survey. *Excluding the Syrian refugees and foreign workers.

2.1. Formal labor market intermediation

Algeria and Jordan have implemented several active policies to influence the performance of their labor markets. A variety of initiatives to strengthen job information networks were carried out, with the aim to improve labor mobility, enhance job matching and shorten the process of job search and filling vacancies.

In Algeria, (see Musette et al, 2014), the National Employment Agency (ANEM) is the key governmental player regarding employment intermediation and labor market information. ANEM has different functions and schemes towards different target groups, primarily

unemployed youth. By law, private companies and municipalities must inform ANEM about job vacancies they have, besides the number of jobs they have recently created. Non-compliance results in employers to be fined and penalized. Currently, this agency attempts to vocationally integrate unemployed youth into the labor market through promising schemes in co-operation with private firms. Among others, for instance, it tries to match unemployed youth with available jobs through subsidized work contracts, irrespective of youth's education levels. On the other hand, the Public Service Directorate is the main governmental branch in charge of announcing and managing public sector vacancies. The Algerian ministry of labor licensed private employment agencies to get involved in improving the employability of Algerians.

Department of Employment and Training (DET), an autonomous agency supervised by the Ministry of Labor (MOL), performs an important labor market intermediation function in Jordan (Angel-Urdinola et al., 2012). It also holds the responsibility of authorizing and supervising private employment agencies, which amounted to 73 companies in 2016. Practically, DET and its branches in various governorates require private employers to report their employment needs, and simultaneously keep records of local job seekers. MOL also organizes every year National Employment Campaigns (NEES) and gather employers and job seekers to interact face-to-face. In addition, there exist several public and private internet-based job search services, which provide various services for job seekers in Jordan. On the other hand, employment and job matching in the public sector employment are governed by the Civil Service Bureau (CSB).

It appears that Jordan has implemented better and more efforts in this respect compared with Algeria. However, the performance of public agencies in charge of employment services in the MENA region and Arab countries is not satisfactory and largely underdeveloped. The role of the government in labor market intermediation is constrained by a number of obstacles, including a lack of proper funding, training, and staff. Moreover, public agencies function in a very complicated socio-economic environment, including high rates of unemployment and informality (Angel-Urdinola et al., 2012).

3. Previous studies in the Arab countries

The available literature pertaining to the role of networks of personal contacts in mediating employment opportunities has been largely conducted on advanced labor markets, using economic, sociological, and psychological models³. In addition to highlighting the importance of them in job-search, labor economists have studied potential influences of social networks, as an informal information mechanism, on the probability to find a job, to have more offers, and to earn higher wages. Overall, the studies of job search reveal that around 50% of individuals obtain jobs or information on job opportunities through friends and relatives (Zenou and Wahba, 2005; Patacchini and Zenou, 2012). Most of empirical evidence approximates unobserved social networks and communal ties by using population density and information on ethnic minorities or migrants. Few studies (see, for example Dang, 2015) apply direct measures to observe social networks (e.g., number of employed friends, number of schoolmates, and number of greetings in special occasions).

In the Arab countries, similar to other developing countries, this area has attracted few studies. In his attempt to compare between the effects of informal and formal institutions on labor market dynamics in Egypt, using in-depth interviews, Assaad (1993) shows that hiring workers in the construction activities, particularly craft workers, depends partly on personal ties and social networks. The study also indicates that family long-lasting ties with employers, in the informal sector, can also enhance the opportunity of a jobseeker to gain access to an apprenticeship. Using the same data in the latter study, Assaad (1997) provides evidence on the role of kinship ties and social networks in segmented labor markets. Among others, his findings show that there exists a rationing of entry into the construction sector determined significantly by a worker's age and region of birth. The study, however, provides inconclusive statistical evidence on the contribution of kinship ties and social networks to determining the rationing process.

Zenou and Wahba (2005) offer evidence on the effect of social contacts in the process of job search in the context of Egypt. Specifically, the latter study handles the relationship between the size and quality of social

³ For an extensive survey of economic studies see Jackson (2011).

networks and job-finding, and the processes of information acquisition and transmission from friends and relatives to job seekers. The study uses population density as a proxy for the size of social networks and classifies workers according to their education into two groups (low educated and high educated), with the assumption that the former group uses only social contacts and ties while the latter type uses both formal and informal channels. The empirical results they show match very well the theoretical expectations of their model. In general, the study first indicates that the probability to find a job through social networks rises and is concave with population density. Second, this relationship decreases with education and local unemployment rates and surprisingly becomes negative when population exceeds a certain size.

Lassassi and Muller (2013) analyze Algerian data obtained from the Employment Survey carried out by the National Office of Statistics (1997, 2003 and 2007) and employment matching data gathered in 2005 using a regional survey that aimed to explore labor dynamics in Algeria, Morocco and Tunisia. Primarily, the paper is concerned with showing how social networks influence the probability to find a job and identifying the characteristics of employers that are most likely to utilize such networks in hiring decisions. Their empirical logit models follow Zenou and Wahba (2005) in using population density to represent the size of social networks. Most importantly, among others, Lassassi and Muller (2013) show that a high proportion of job seekers, regardless of gender and age, utilizes friends and relatives in their search for a job and this proportion has increased markedly from about 57% in 1997 to 86% in 2007. They report that around 40%, in 2003 and 2007, of all Algerian workers identify that they obtained their jobs through personal or family relationships. This pattern tends to increase slightly for men during the period 2003 to 2007, while social networks are found to contribute less and less in helping women transit into employment.

The current study utilizes more recent and detailed data to enrich the literature in Algeria and provides evidence on the role of social ties in Jordan's labor market for the first time.

4. Methodology and Data considerations

The study utilizes micro data obtained from nationally representative labor market surveys. The first wave of Jordan Labor Market Panel Survey (JLMPS) is the source of our Jordanian data. It is a large scale survey offering very detailed data on a wide range of labor market aspects and covering (5102) households. It was conducted in 2010 by the Department of Statistics with the cooperation of the Economic Research Forum (ERF). In the context of Algerian data, we use the Labor Force Survey carried out in 2010, which encompassed (14592) households and was administered by the National Statistical Office.

Both surveys have useful, and to some degree comparable, job searching and finding questions. Workers are asked to report the main method of job search used to find their current jobs. To the question *How did you find this job?* Algerian workers can choose one answer from a list of seven alternatives: Answering a newspaper ad, personal or family relationship, contest or exam, approaching the business, assigned by the school after training, through public agencies, or other methods. On the other hand, the Jordan Labor Market Panel Survey asks an employed to choose the first and second most important search methods out of twelve options: TV/newspaper ads, visiting institutions and workplaces, relatives, friends and current and previous officials, applying in Ministry of Labor offices, applying in Civil Service Bureau, internet sites, using land lines and cell phones, waiting at a place for workers gathering, seeking a private project, seeking a private project finance, through family, and others. In this paper we take into account only the first choice. To harmonize Algerian and Jordanian data, in terms of the employed, we have grouped the answers into five categories: 1) Newspaper ads, 2) Friends and relatives, 3) Asking at work place, 4) Government employment office, 5) Other methods.

Similar alternatives were possible for questions asking for methods through which currently unemployed job seekers are looking for jobs. However, unlike the employed, unemployed individuals could choose more than one answer. For Algeria they could choose from four options: registration with a labor office, asking at the workplace, personal relationships, and other methods. The Jordan Labor Market Panel Survey uses the same above choices provided to Jordanian employed, excluding the last two options (others and through family). Similarly, we harmonize

data by grouping jobseekers' answers into four categories: 1) Government employment offices, 2) Asking at the work place, 3) Friends and relatives, 4) Other methods.

We estimate a number of probit models, focusing attention on youth. Our models aim at analyzing the determinants of the probability of an individual to find a job through personal or family relationships. To correct for potential sample selection bias, we draw on Heckman test, which will verify and quantify the selection bias in the estimated dependent variable.

5. Descriptive analysis

5.1. Job search methods used by unemployed and the role of social networks

Table (2) summarizes responses of currently unemployed people on whether they have utilized one or more job-search methods. Several important patterns can be drawn from the table. *Firstly*, job seekers considerably rely on friends and relatives as a key job search method, both in Algeria and Jordan (Nearly 83% and 64% in Algeria and Jordan, respectively). However, while this method turns out to be the most frequently used method in Algeria, it ranks second in Jordan, with "*Asking at the work place*» being the first method. This pattern occurs regardless of age groups (i.e. youth and adults) and gender. Whereas the "*Government employment offices*" method is common among female job seekers, it tends to be extremely less popular than using friends and relatives among unemployed youth and adult males in both countries. For Algeria, similar overall results were observed in earlier data (Lassassi and Muller, 2013).

Secondly, unemployed females in Jordan are markedly less likely to employ friends and relatives in their search for work, while they depend more heavily on the other methods. For example, around 50% of young female job-seekers in Jordan use this informal method in comparison to nearly 72% for their male counterparts. In the case of Algeria, such indicators are also in favor of males, but with much slighter differences

Table 2: Search methods used by job seekers

	Algeria (2010)			Jordan (2010)		
Youth (15-24)	Total	Male	Female	Total	Male	Female
Government employment offices	59.9	53	78.7	44	33.9	60.5
Asking at the work place	52.5	46.1	69.8	69.6	75.3	60.5
Friends and relatives	83.4	85.9	76.7	63.7	71.9	50.3
Others	25.1	25.3	24.6	63.7	65.7	60.5
Adults (25-59)	Total	Male	Female	Total	Male	Female
Government employment offices	71.6	65.8	81.6	35.7	23.8	54.7
Asking at the work place	67.3	61.1	77.8	65.5	71.3	56.3
Friends and relatives	84	86.8	79.3	61.9	67.1	53.6
Others	27.7	26.2	30.2	62.1	65.7	56.3

NB: Unemployed could choose more than one answer. Source: Computed by the authors from the official labor force survey in Algeria 2010 and the Jordan Labor Market Panel Survey 2010.

5.2. The role of social networks and ties in employment

Informative job-search methods should principally enhance the efficiency of labor markets by attaining a better allocation of resources (i.e. labor). Given the distressing indicators characterizing labor markets in Algeria and Jordan (e.g. youth unemployment and low participation rates, particularly for women), the data provided in Table (3) can suggest only how effective each job search route is compared with the other methods. Also, one must bear in mind that the responses analyzed in Table 3 are taken from currently employed workers about how they found their way into labor market, while Table 2 depends on responses reported by current unemployed. Accordingly, the comparison between the two tables in order to reflect on the benefits of each job-search method will be only suggestive. A perfect evaluation of the overall effectiveness of the job search process necessitates more intensive, and may be panel, individual level data.

Table 3: Percentage of jobs found by employed workers using each method

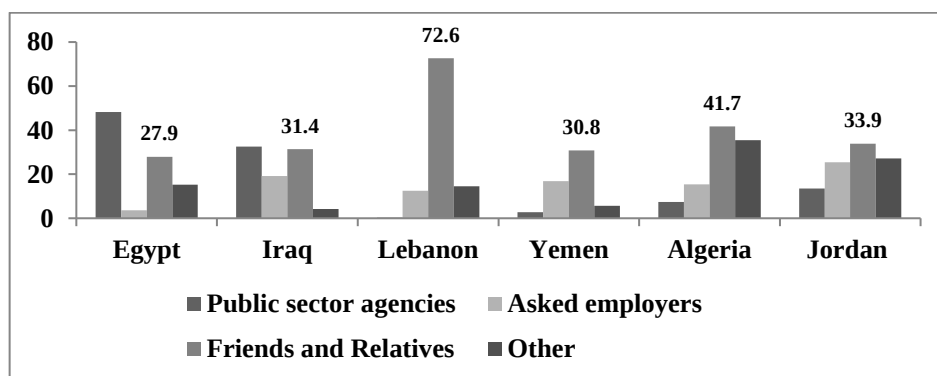
	Algeria (2010)			Jordan (2010)		
Youth (15-24)	Total	Male	Female	Total	Male	Female
Newspaper ads	4.5	4.1	7.4	14.7	15.4	10.3
Friends and relatives	51.5	53.4	35.5	39.4	40.6	31.7
Asking at the work place	20	20.6	15	30.3	29.2	37.2
Government employment office	4.5	2.9	17.5	9	7.8	16.5
Others	19.5	19	24.6	6.6	7	4.3
Adults (25-59)	Total	Male	Female	Total	Male	Female
Newspaper ads	9.2	9	10.2	11.3	12.5	6.5
Friends and relatives	39.5	42.2	24.7	33	35.2	26.3
Asking at the work place	14.5	16	6.1	31.1	32.3	24.4
Government employment office	8	6.6	15.9	20.6	15.6	40.7
Others	28.8	26.2	43.1	4	4.4	2.1

Source: Computed by the authors from the official labor force survey in Algeria 2010 and the Jordan Labor Market Panel Survey 2010.

As a whole, social networks by means of obtaining information or referrals from friends and relatives *comparatively* prove to be the most, or among the most, effective job-search channels as reported by employed themselves. One average, between a quarter and a half of all adult and youth respondents state that they became employed relying largely on friends and relatives. Although the significance of social networks in job-finding for Jordanian women is substantial and has risen, comparing between youth and adult females, such channels play less important roles than directly contacting employers and applying through public sector agencies. This result holds true also in case of Algerian adult females, who identify that government offices are more vital in this process (see Lassassi and Muller, 2013 for earlier comparable findings for Algeria). Overall, interacting directly with employers plays a smaller role in Algeria, ranking second and third to using friends and relatives, for youth and adults correspondingly. However, the effectiveness of this method tends to have clearly improved as its percentage contribution increased over-generationally (almost 20% for youth versus 14.5% for adults).

One interesting aspect of Table (3) is that the importance of social networks in finding jobs is greater for youth, irrespective of gender. Relying on friends and relatives is on average responsible for about 52% and 39% of all hires in terms of the young employed in Algeria and Jordan, respectively, compared to apparently lower percentages in the case of adults. Except for Algerian women, the opposite conclusion holds for the role of government employment search methods, as its contribution to finding jobs has decreased dramatically (by around 50%) in the two countries. Such gender and age differences will be statistically tested in our empirical analysis using probit models (see below).

Figure 1: Role of social contacts and other methods in finding a job in a group of Arab countries



Sources: Several statistics reports- Dos (Jordan), ONS(Algeria), CAPMAS (Egypt), COSIT (Iraq), CAS (Libya), CSO (Yemen). Lebanon (CAS).

As depicted in Figure 1, which is concerned with workers aged between 15 and 65, the phenomenon of depending on social networks in employment extends to other Arab countries. Except Egypt and to some extent Iraq, it is evident that social networks are the main method in such a process, with its contribution varying between almost 73% in Lebanon and 28% in Egypt.

6. Estimation results

6.1. Determinants of employment using social networks

To delve more deeply in the role of social networks in finding jobs, probit models with selection are run on the employed samples⁴. In both models reported in Table 4 below, we corrected selectivity by estimating the probability of an individual to be employed⁵. The dependent variable is binary taking a value of one if social networks are the main method of obtaining a job and zero otherwise. In Table 4 (Model 1) the estimation incorporates the same explanatory variables for the two countries for the whole sample and for youth, Table 4 (Model 2) repeats the same estimation using additional variables available only for one of the two countries. The data we use allow us to control for different variables at the individual, household and region levels. Similar to previous studies in this field, we use population density as a proxy for the size of social networks. Density, gender, year of entry to the labor force, job characteristics, household characteristics and characteristics of the area are used as explanatory variables. We also integrate age and level of education into our models and into the estimation of selection equations. Additional covariates for selection are: vocational training, marital status, number of children aged between 5 and 14 years in a household and interaction between gender and number of children under 5 years. The probit model with sample selection assumes that there exists an underlying relationship

$$y_j^* = x_j \beta + u_{1j} \quad [3] \quad \textit{Latent equation}$$

Such that we observe only the binary outcome:

$$y_j^{probit} = (y_j^* > 0) \quad [4] \quad \textit{Probit equation}$$

⁴The Wald test is highly significant, indicating a good model fit. The likelihood-ratio test indicates that we can reject the null hypothesis that the errors for outcome and selection are uncorrelated. This means that we should use the probit with sample-selection model instead of the simple probit model. See Annex 3. Annex 1 defines the variables applied in the probit models.

⁵We further also corrected selectivity by probability of being economically active. The results are reported in Annex 2. In general, the results of the estimated models with different dependent variables of selections are comparable.

The dependent variable for observation j is observed if:

$$y_j^{select} = (z_j \gamma + u_{2j} > 0) \quad [5] \text{Selection equation}$$

Where : $u_1 \sim N(0,1)$ $u_2 \sim N(0,1)$ $\text{corr}(u_1, u_2) = \rho$

Looking at the results, *population density* as a measure of the size and strength of social contacts shows a small positive effect on the probability of finding a job, and only for the Algerian sample as a whole. In the case of Algeria, the probability of finding a job through social networks decreases with network size (in the denser areas). In areas where the population density is higher, relational networks become ineffective for people seeking for a job because the sharing of information about job vacancies is more extensive than in less dense areas. In Jordan this effect is insignificant. In the context of the youth in both countries, a greater size of social networks does not improve the probability of employment through friends and families. This means that networks approximated by local population density do not work for the population as a whole and may mainly work for minorities and immigrants. This finding also means that strong ties (closer family members, relatives and friends) are possibly more important than weak ties (population in adjacent areas) in information diffusion and spillovers.

To some degree, other reported results confirm the later conclusion. The *region* variable reveals similar interesting results in Table 4 (Models 1 and 2). Living in the most heavily populated areas, the capitals and their urban suburbs, decreases the probability of obtaining employment through social networks compared with the other methods. Typically, population in rural areas and small cities in most of the Arab world consists of big families and tribes and therefore have arguably better social contacts. Currently employed coming from the middle and southern areas of Algeria are significantly more likely to find a job using social contacts, regardless of age group. Likewise, compared to northern areas in Jordan, those living in middle areas; including Amman, have a lower probability of getting jobs using social networks. The same trend is observed for the southern part of the country, which is less populous than the north, however, with smaller magnitude than middle areas. Also *household wealth* emerges to intervene positively in the probability of

finding a job through social networks. This variable is overall significant in both countries except for the youth in Jordan. This probably suggests that the effectiveness of the network is also related to social background as represented by assets possessed by an individual's family. Further, when we include nationality of a worker into the estimation, which is available only for Jordan, it appears that Jordanian workers are less likely to find a job counting on social ties compared to non-Jordanian workers. This might capture the same effects found in the literature pertaining to the importance of kinship ties among foreign workers and immigrants in labor markets.

6.2. Additional results

A number of interesting aspects emerge from Table 4. In both countries, using social contacts do not appear to enable individuals to improve their chances of getting decent and formal jobs. This can be generally drawn from estimated coefficients related to the variables: affiliation to social security, legal sector, economic activity, firm size (for Algeria only), hourly wage (for Jordan only), and primary job requires any skill (for Jordan only). The analysis confirms that those utilizing social ties and contacts are more likely to obtain less secured private jobs in smaller in size firms. Such search methods also tend to match unemployed with jobs in some economic activities that traditionally characterized with higher risk of informality. This effect is maximum in construction activities in Jordan and trade activities in Algeria. Using the Jordanian data, our results are not supportive to the hypothesis that jobs found through friends and relatives require skills and augment wages. Relatively, particularly for Jordanian workers, the estimation suggests that the role of social networks as a key channel of finding a job improves with *age*. This may imply that as workers age they might accumulate more contacts or become more efficient in utilizing information coming from friends and relatives. Concerning the levels of education, the estimates indicate that those holding secondary education and less are more likely to find a job through social ties and contacts. This pattern tends to be more acute among youth in both countries. The inverse effect of education has been emphasized by the literature (for Arab countries, see Zenou and Wahba, 2005).

90 The Role of Social Networks and Ties in Finding a Job in Economies
Characterized with High Youth Unemployment:
A Case study of Algeria and Jordan

Table 4: Determinants of obtaining a job through social networks and ties

	Model 1				Model 2			
	Algeria		Jordan		Algeria		Jordan	
	Total	Youth	Total	Youth	Total	Youth	Total	Youth
Density	0.0448*** (0.00938)	0.0277 (0.0222)	0.0104 (0.0537)	0.00747 (0.0921)	0.0437*** (0.00946)	0.0227 (0.0226)	0.0158 (0.0538)	0.0226 (0.0929)
Density Squared	-0.000991*** (0.000242)	-0.000699 (0.000576)	-4.39e-05 (0.000117)	7.78e-05 (0.000198)	-0.000943*** (0.000243)	-0.000554 (0.000586)	-5.44e-05 (0.000117)	6.10e-05 (0.000199)
Demographic characteristics								
Gender (Ref: Female)	0.151** (0.0679)	-0.0876 (0.170)	0.105 (0.156)	0.0125 (0.395)	0.173** (0.0683)	0.00916 (0.174)	0.102 (0.159)	0.00941 (0.402)
Age								
25-34 years	0.0716 (0.0437)	-	0.172** (0.0765)	-	0.0699 (0.0439)	-	0.166** (0.0768)	-
35 and more years	0.179*** (0.0557)	-	0.314** (0.147)	-	0.165*** (0.0562)	-	0.311** (0.147)	-
Human Capital (Ref: University)								
Without instruction	0.805*** (0.0615)	0.458* (0.255)	0.636*** (0.212)	0.354 (0.471)	0.801*** (0.0615)	0.518** (0.257)	0.596*** (0.214)	0.401 (0.478)
Primary	0.652*** (0.0494)	0.133 (0.177)	0.733*** (0.0993)	0.674*** (0.237)	0.645*** (0.0495)	0.167 (0.179)	0.729*** (0.101)	0.689*** (0.243)
Intermediate	0.680*** (0.0429)	0.212 (0.150)	0.703*** (0.106)	0.536** (0.244)	0.675*** (0.0429)	0.245 (0.151)	0.670*** (0.107)	0.460* (0.249)
Secondary	0.439*** (0.0425)	0.245* (0.137)	0.269** (0.107)	0.250 (0.223)	0.440*** (0.0426)	0.283** (0.139)	0.271** (0.108)	0.276 (0.225)
Year of entry to LF								
[2006 -2010]	0.153*** (0.0444)	0.701* (0.376)	0.196* (0.110)	5.509 (283.9)	0.157*** (0.0445)	0.708* (0.377)	0.181 (0.110)	5.456 (283.2)
[2001 -2005]	0.106** (0.0427)	0.710* (0.377)	0.0670 (0.0950)	5.545 (283.9)	0.111*** (0.0428)	0.721* (0.379)	0.0630 (0.0951)	5.499 (283.2)
[1996 -2000]	0.136*** (0.0383)	0.897** (0.392)	-0.00794 (0.0912)	5.092 (283.9)	0.137*** (0.0384)	0.881** (0.393)	-0.0143 (0.0913)	5.001 (283.2)
Job characteristics								
Economic activity (ref:services)								
Agriculture	0.175*** (0.0515)	0.156 (0.110)	0.350 (0.226)	0.243 (0.336)	0.170*** (0.0520)	0.156 (0.112)	0.316 (0.230)	0.270 (0.356)
Industry	0.215*** (0.0366)	0.00998 (0.103)	0.129 (0.0869)	0.126 (0.154)	0.259*** (0.0374)	0.0486 (0.105)	0.149* (0.0883)	0.115 (0.157)
Construction	0.0828** (0.0374)	-0.0533 (0.0873)	0.211 (0.190)	0.764*** (0.295)	0.108*** (0.0380)	-0.0173 (0.0892)	0.209 (0.191)	0.721** (0.299)
Trade	0.335*** (0.0484)	0.0739 (0.101)	0.228** (0.101)	0.291* (0.166)	0.323*** (0.0490)	0.0306 (0.104)	0.229** (0.101)	0.292* (0.168)
Affiliation to Social security (Ref:No)Yes	-0.183*** (0.0378)	-0.187* (0.0973)	-0.401*** (0.0795)	-0.443*** (0.131)	-0.0948** (0.0417)	-0.0221 (0.105)	-0.372*** (0.0808)	-0.398*** (0.134)
Legal sector (Ref:Private)Public	-0.797*** (0.0394)	-1.455*** (0.125)	-0.256*** (0.0795)	-0.156 (0.155)	-0.714*** (0.0416)	-1.237*** (0.132)	-0.250*** (0.0807)	-0.128 (0.159)
Size of enterprise (ref 250 or more)								
0 to 4 workers	-	-	-	-	0.343*** (0.0498)	0.674*** (0.135)	-	-
5 to 9 workers	-	-	-	-	0.429*** (0.0522)	0.736*** (0.140)	-	-
10 to 49 workers	-	-	-	-	0.182*** (0.0410)	0.415*** (0.131)	-	-
50 to 249 workers	-	-	-	-	0.206*** (0.0383)	0.302** (0.126)	-	-
Looking for another job (Ref:No)Yes	-	-	-	-	-0.0316 (0.0286)	-0.0819 (0.0622)	-	-
Hourly Wage	-	-	-	-	-	-	-0.00522 (0.00429)	-0.00531 (0.00650)
Primary job require any skill (Ref: No)Yes	-	-	-	-	-	-	-0.0982* (0.0585)	-0.0495 (0.107)
Nationality (Ref: others)Jordanian	-	-	-	-	-	-	-0.266** (0.121)	-0.488*** (0.187)

Table 4 (continued)

	Model 1				Model 2			
	Algeria		Jordan		Algeria		Jordan	
	Total	Youth	Total	Youth	Total	Youth	Total	Youth
Household Characteristics								
Household wealth	0.0637*** (0.0114)	0.165*** (0.0275)	0.0259** (0.0112)	-7.66e-05 (0.0188)	0.0644*** (0.0114)	0.170*** (0.0279)	0.0332*** (0.0115)	0.00819 (0.0192)
Number of unemployed in the household	-0.0177 (0.0238)	-0.0519 (0.0587)	-0.00181 (0.0514)	-0.0620 (0.0871)	-0.0190 (0.0238)	-0.0550 (0.0594)	0.000211 (0.0515)	-0.0652 (0.0878)
Characteristics of area								
Region (Ref: North)								
Middle (HautsPlateaux)	0.142*** (0.0326)	0.167** (0.0737)	-0.298*** (0.0770)	-0.486*** (0.137)	0.140*** (0.0328)	0.175** (0.0748)	-0.299*** (0.0773)	-0.481*** (0.138)
South	0.510*** (0.0461)	0.814*** (0.112)	-0.230* (0.118)	-0.484*** (0.213)	0.497*** (0.0462)	0.786*** (0.113)	-0.213* (0.119)	-0.471** (0.215)
Unemployment rate at district level	-0.970*** (0.154)	-1.284*** (0.348)	0.0824 (0.758)	0.648 (1.501)	-0.895*** (0.156)	-1.106*** (0.355)	0.0296 (0.762)	0.552 (1.517)
Constant	-0.985*** (0.126)	-0.542 (0.543)	-0.904*** (0.239)	-6.072 (283.9)	-1.328*** (0.136)	-1.315** (0.576)	-0.645** (0.255)	-5.604 (283.2)
Selection equation								
Age	0.349*** (0.00464)	-	0.366*** (0.0556)	-	0.349*** (0.00464)	-	0.366*** (0.0556)	-
Age square	-0.00434*** (5.97e-05)	-	-0.00565*** (0.00105)	-	-0.00434*** (5.97e-05)	-	-0.00566*** (0.00105)	-
Marital status (Ref: Others)	0.114*** (0.0275)	0.0857 (0.0915)	-0.559*** (0.0715)	-0.508*** (0.125)	0.115*** (0.0275)	0.0962 (0.0922)	-0.559*** (0.0715)	-0.506*** (0.125)
Married								
Without instruction	-0.820*** (0.0325)	0.200* (0.104)	-1.866*** (0.157)	-1.680*** (0.276)	-0.820*** (0.0325)	0.201* (0.104)	-1.865*** (0.157)	-1.678*** (0.276)
Primary	-0.490*** (0.0294)	0.847*** (0.0557)	-1.402*** (0.0747)	-1.191*** (0.127)	-0.490*** (0.0294)	0.848*** (0.0557)	-1.403*** (0.0747)	-1.192*** (0.127)
Intermediate	-0.318*** (0.0259)	0.455*** (0.0434)	-1.332*** (0.0882)	-1.072*** (0.151)	-0.318*** (0.0259)	0.455*** (0.0434)	-1.331*** (0.0882)	-1.070*** (0.151)
Secondary	-0.374*** (0.0277)	0.0234 (0.0471)	-0.410*** (0.0961)	0.0905 (0.187)	-0.374*** (0.0277)	0.0234 (0.0471)	-0.410*** (0.0961)	0.0909 (0.187)
Vocational training (Ref:No)	0.513*** (0.0230)	0.613*** (0.0362)	0.125* (0.0739)	0.142 (0.117)	0.513*** (0.0230)	0.613*** (0.0362)	0.122* (0.0740)	0.138 (0.118)
Number of people 5 – 14 years in the household	-0.0358*** (0.00792)	-0.0923*** (0.0133)	-0.0599*** (0.0216)	-0.0483 (0.0330)	-0.0357*** (0.00792)	-0.0919*** (0.0133)	-0.0599*** (0.0216)	-0.0479 (0.0330)
l.sexe	-2.002*** (0.0209)	-1.324*** (0.0352)	2.239*** (0.0710)	2.211*** (0.101)	-2.002*** (0.0209)	-1.324*** (0.0352)	2.238*** (0.0710)	2.208*** (0.101)
Children under 5 years in the household	0.152*** (0.0164)	-0.0443 (0.0271)	-0.183*** (0.0387)	-0.0786 (0.0750)	0.152*** (0.0164)	-0.0448* (0.0271)	-0.184*** (0.0387)	-0.0780 (0.0749)
Gnder#c.Number of children under 5 years in the household	-0.453*** (0.0254)	-0.222*** (0.0633)	0.499*** (0.0595)	0.187* (0.0997)	-0.453*** (0.0254)	-0.219*** (0.0633)	0.499*** (0.0595)	0.186* (0.0998)
Constant	-5.360*** (0.0920)	-0.833*** (0.101)	-5.024*** (0.734)	-0.0625 (0.113)	-5.361*** (0.0920)	-0.844*** (0.101)	-5.027*** (0.734)	-0.0630 (0.113)
Sample size	46358	15740	5160	1852	46355	15739	5154	1847

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Finally, the probability of obtaining employment through social contacts emerges to be significantly influenced by short term conditions prevailing in labor markets. To investigate this possibility, our models divide

employed respondents according to the year of their entry to the labor market. Specifically, for Algeria, the likelihood of getting employed through social networks varies significantly from one period to another. This result may be largely driven by fluctuations in business cycles in the short run. In Jordan, the positive effects of this variable turn out significant only at the level of 10% for the whole sample in one of our models, and only for those who have entered the labor market during the period (2006-2010). The latter finding, which is also evident for Algeria, may partly reflect the effects of the global financial crisis that had hit the world economy during that period. In such an environment, job seekers may find it more difficult to find a job through formal channels and therefore increase their reliance on social ties.

7. Conclusions and policy implications

This study is one of few attempts that handle the role of social ties in the Arab labor markets, particularly in Jordan and Algeria. It shows that labor market information and referrals obtained through friends and relatives emerge crucial in searching for and finding jobs in both countries. Our results indicate that nearly 83% and 64% of Algerian and Jordanian job seekers, respectively, rely on friends and relatives. Female jobseekers in both countries, particularly in Jordan, are less likely to use these informal channels compared to males irrespective of age. While using *Government employment offices* method in looking for a job is common among female job seekers, it tends to be much less popular than using friends and relatives among unemployed youth and adult males in both countries. Concerning the effectiveness of social networks in helping unemployed find a job, they *comparatively* prove to be the most, or among the most, effective job-search channels as reported by employed themselves.

We further use binary probit models to investigate determinants of the probability of finding a job through social networks. The models show interesting results. First, population density as a measure of the size and strength of social contacts has only a small positive effect on the probability of finding a job, and only for the Algerian sample as a whole. For all Jordanian workers, including youth, and youth in Algeria this effect is insignificant, as a greater size of social networks does not improve the probability of employment through friends and families. Also, the study shows positive effects of household wealth. In Jordan,

foreign workers are more likely to benefit from social networks in gaining employment. These findings suggest that networks approximated by regional population density may mainly work for minorities and immigrants not for the population as a whole, particularly youth. They may also imply that strong ties (e.g. closer relatives and friends, and friendship relationships on social media) are more important than weak ties (population in adjacent areas) in information diffusion and spillovers. The empirical findings indicate that higher levels of education, particularly among youth in both countries, lead to less reliance on social contacts in attaining jobs. On the other, gender is found to be significant only for Algerian data, as males appear to be more likely to gain from social networks in finding a job compared with their female counterparts. However, relative to other methods, the use of social networks appears evidently to increase the probability of obtaining jobs characterized with poorer quality.

Policy makers must seek effective policy formulation processes that facilitate non-discriminatory employment. In general, national employment policies and strategies should take into account the impact of social networks on employment and labor market participation. More investment in education and training, particularly in remote areas may enhance the efficiency of job search and equity of opportunities offered by labor markets. The findings of the study show also that despite the importance of public sector agencies in job search process, less than 5% of employed youth in Algeria and 9% in Jordan state that such agencies have helped them transit into employment. This confirms the idea that the performance of public agencies in charge of employment services in the Arab region is not adequate and largely underdeveloped. In effect, policy makers are advised to pay more attention to boosting the effectiveness of public agencies. The data shown in the current study provides suggestive evidence that the society, and possibly private sector employers, favor males over female jobseekers in employing referrals from friends and relatives. Arab women have very low labor market participation and unemployment among youth females amounts to high levels. This is coupled with the fact that women are more educated and that they prefer public sector jobs. Job search difficulties may have contributed to limiting labor market opportunities available to females in both countries and may partly explain why they have lower participation rates.

References

Angel-Urdinola, D., A. Kuddo, A., and A. Semlali. (2012), *Public Employment Services in the Middle East and North Africa*. World Bank, Washington: DC.

Assaad, R. (1993), Formal and informal institutions in the labor market, with applications to the construction sector in Egypt. *World Development*, 21, 925– 939.

Assaad, R. (1997), Kinship ties, social networks and segmented labor markets: evidence from the construction sector in Egypt. *Journal of Development Economics*, 52, 1 –30.

Assaad, R. (2014), Making Sense of Arab Labor Markets: The Enduring Legacy of Dualism, *IZA Journal of Labor and Development*, 3(6), 1-25.
Dang, D.A. (2015), Social Networks and Employment Performances: Evidence from Rural – Urban Migration in Vietnam, *MPRA Paper* No. 69653.

DoS - Annual reports - Several years.

Furceri, D. (2012), Unemployment and Labor Market Issues in Algeria, *IMF Working Paper*, WP/12/99.

IMF (2013), Algeria: 2012 Article IV Consultation, IMF Country Report No. 13/47, February 2013.

Ioannides, Y.M., Loury, L.D. (2004), Job Information Networks, Neighborhood Effects, and Inequality. *Journal of Economic Literature*, 42 (4), 1056-1093.

Jackson, M.O. (2011), An overview of social networks and economic applications,” In: J. Benhabib, A. Bisin and M.O. Jackson (Eds.), *Handbook of Social Economics* Volume 1A, Amsterdam: Elsevier Science, 511–585.

Kreishan, F., Alhawarin, I. (2014), Youth Unemployment in Jordan: What Can be Learned for the Future? *Zarqa Journal for Research and Studies in Humanities* 14 (1). (In Arabic).

Lassassi, M., Muller, C. (2013), Réseaux sociaux et insertion sur le marché du travail en Algérie, *ERF WorkingPaper* N°.756.

Ministry of Labor (MOL) - Annual reports - Several years, Amman, Jordan.

Munshi, K. (2003), Networks in the modern economy: Mexican migrants in the US labor market. *Quarterly Journal of Economics* 118, 549–599.

Musette, S.M., Lassassi, M and Meziani, M.M. (2014), Employment Policies and Active Labour Market Programmes in Algeria, European Training Foundation (ETF).

ONS - Annual reports - Several years.

Patacchini, E., Zenou, Y. (2012), Ethnic networks and employment outcomes, *Regional Science and Urban Economics*, 42, 938–949.

Taghdisi, S.R. (2012), Macroeconomic policies and employment in Jordan: Tackling the paradox of job-poor growth. *Employment Sector Employment ILO Working Paper* No. 118.

UNDP (2013) The Informal Sector in the Jordanian Economy. New York. Available online: <http://www.undp.org/content/dam/jordan/docs/Publications>.

Wahba, J., Zenou, Y. (2005), Density, social networks and job search methods: Theory and application to Egypt, *Journal of Development Economics* 78, 443–473.

World Bank. (2013), *Jobs for Shared Prosperity: Time for Action in the Middle East and North Africa*. Washington D.C.: World Bank.

ANNEX 1: Definition of variables

Variables	Definition
Social network	
Density	Number of people per square kilometer by governorate
Density Squared	Density square
Demographic Characteristics	
Gender	dummy = 1 if female
Marital status	dummy = 1 if married
Age	Age of the individual
Age squared	Age of the individual squared
Human capital (ref university)	
Without education	dummy = 1 if without education
Primary	dummy = 1 if education level primary
Intermediate	dummy = 1 if education level Intermediate
Secondary	dummy = 1 if education level Secondary
Vocational training	dummy = 1 if the person has followed vocational training
Year of entry to labor force(ref :before 1996)	
[2006 -2010]	dummy = 1 if the employee was recruited between 2006 and 2010
[2001 -2005]	dummy = 1 if the employee was recruited between 2001 and 2005
[1996 -2000]	dummy = 1 if the employee was recruited between 1996 and 2000
Work experience	Dummy = 1 if the person has worked in the past
Job characteristics	
Legal sector (ref : public)	dummy = 1 if private sector
Affiliation to the social security(ref : affiliated)	dummy = 1 if the employee is not affiliated at the social security fund
Looking for another job(ref : non)	dummy = 1 if the employee is not seeking for another job
Hourly Wage	Hourly wage
Primary job require any skill	Dummy = 1 if job require skill
Economic activity (ref :services sector)	
Industry	dummy = 1 if industry sector
Construction	dummy = 1 if construction sector
Trade	dummy = 1 if trade sector
Agriculture	dummy = 1 if services sector
Firm size (ref 250 or more)	
0 to 4 workers	dummy = 1 if establishment size is between 0 and 4 employees
5 to 9 workers	dummy = 1 if establishment size is between 5 and 9 employees
10 to 49 workers	dummy = 1 if establishment size is between 10 and 49 employees
50 to 249 workers	dummy = 1 if establishment size is between 50 and 249 employees

Nationality (ref: others)	Dummy = 1 if Jordanian
Household Characteristics	
Household wealth	Composite index of household assets
Children under 5 years	Number of children under 5 years in the household
Number of people 5 – 14 years	Number of children aged between 5 and 14 years in the household
Number of employed in the household	the respondent is not recognized if it is in this status
Number of unemployed in the household	the respondent is not recognized if it is in this status
Characteristic of the area	
Geographic areas (ref: North)	
Middle	dummy = 1 if Middle governorate
South	dummy = 1 if South governorate
Local unemployment rate	percentage of unemployed in the workforce at the district of residence
Urbanization rate by governorate	percentage of population living in urban areas by governorate

98 The Role of Social Networks and Ties in Finding a Job in Economies
Characterized with High Youth Unemployment:
A Case study of Algeria and Jordan

Annex 2: Determinants of getting a job through relatives and Friends-Selection
[Employment vs Unemployment]

	Algeria		Jordan	
	Total	Youth	Total	Youth
Density	0.0467*** (0.00950)	0.0215 (0.0224)	0.00988 (0.0533)	0.00926 (0.0876)
Density square	-0.00103*** (0.000245)	-0.000505 (0.000580)	-4.18e-05 (0.000116)	6.84e-05 (0.000189)
Demographic characteristics				
Gender (Ref: Female)	0.0898** (0.0457)	-0.00987 (0.115)	0.173* (0.0979)	-0.320 (0.216)
Age				
25-34 years	0.0500 (0.0443)	-	0.210** (0.0849)	-
35 and more years	0.138** (0.0670)	-	0.361** (0.154)	-
Human Capital (Ref: University)				
Without instruction	0.839*** (0.0561)	0.423* (0.256)	0.588*** (0.202)	0.432 (0.393)
Primary	0.656*** (0.0481)	0.191 (0.149)	0.718*** (0.0875)	0.616*** (0.233)
Intermediate	0.688*** (0.0429)	0.258* (0.136)	0.694*** (0.0961)	0.448* (0.260)
Secondary	0.439*** (0.0435)	0.201 (0.144)	0.268** (0.106)	0.124 (0.256)
Year of entry to labor force (ref :before 1996)				
[2006 -2010]	0.156*** (0.0468)	0.677* (0.365)	0.157 (0.116)	5.632 (703.2)
[2001 -2005]	0.0952** (0.0438)	0.669* (0.367)	0.0445 (0.0967)	5.658 (703.2)
[1996 -2000]	0.137*** (0.0387)	0.865** (0.382)	-0.0174 (0.0908)	5.215 (703.2)
Job characteristics				
Economic activity (ref:services)				
Agriculture	0.214*** (0.0527)	0.163 (0.111)	0.331 (0.223)	0.244 (0.316)
Industry	0.215*** (0.0367)	0.0219 (0.101)	0.127 (0.0863)	0.122 (0.146)
Construction	0.0894** (0.0378)	-0.0683 (0.0859)	0.209 (0.189)	0.723** (0.290)
Trade	0.337*** (0.0488)	0.0621 (0.100)	0.227** (0.0999)	0.266* (0.160)

Affiliation to Social security (Ref: Yes) No	-0.193*** (0.0382)	-0.188* (0.0959)	-0.392*** (0.0799)	-0.426*** (0.131)
Legal sector (Ref: Public) Private	-0.791*** (0.0396)	-1.407*** (0.137)	-0.252*** (0.0791)	-0.150 (0.148)
Household Characteristics				
Household wealth	0.0601*** (0.0115)	0.162*** (0.0277)	0.0262** (0.0111)	0.000121 (0.0179)
Characteristics of area				
Region (Ref: North)				
Middle (HautsPlateaux)	0.133*** (0.0327)	0.144** (0.0724)	-0.295*** (0.0766)	-0.458*** (0.137)
South	0.500*** (0.0463)	0.769*** (0.114)	-0.226* (0.117)	-0.455** (0.207)
Unemployment rate at district level	-0.918*** (0.157)	-1.196*** (0.366)	0.0254 (0.745)	0.643 (1.393)
Constant	-0.875*** (0.126)	-0.620 (0.458)	-1.020*** (0.237)	-5.591 (703.2)
Selection equation				
Age	0.100*** (0.00799)	-	0.180*** (0.0602)	-
Age square	-0.000965*** (0.000111)	-	-0.00194* (0.00116)	-
Marital status (Ref: Others) Married	-0.570*** (0.0417)	-0.823*** (0.209)	0.169* (0.0906)	0.222 (0.157)

Annex 2 (continues): Determinants of getting a job through relatives and
friends-Selection [Employment vs Unemployment]

	Algeria		Jordan	
	Total	Youth	Total	Youth
Human Capital (Ref: without instruction)				
Intermediate	0.166*** (0.0578)	0.139 (0.172)	0.485*** (0.180)	0.512* (0.290)
Secondary	0.308*** (0.0603)	0.315* (0.177)	0.426** (0.186)	0.463 (0.305)
University	0.137** (0.0614)	-0.0397 (0.183)	0.359** (0.175)	0.0190 (0.289)
Vocational training (Ref:No)	0.0197 (0.0300)	0.00730 (0.0492)	-0.105 (0.0733)	-0.186* (0.102)
Number of unemployed in the household	-0.259*** (0.0198)	-0.317*** (0.0359)	-0.220*** (0.0414)	-0.258*** (0.0581)
Number of employed in the household	0.0727*** (0.0106)	0.109*** (0.0186)	0.0692*** (0.0244)	0.0494 (0.0360)
Number of people 5 – 14 years in the household	0.00973 (0.0123)	0.00258 (0.0201)	-0.0151 (0.0247)	-0.0478 (0.0315)
1.sexe	-0.464*** (0.0354)	-0.497*** (0.0681)	0.770*** (0.0748)	0.683*** (0.114)
Children under 5 years in the household	-0.0474** (0.0199)	-0.0805** (0.0382)	0.00656 (0.0595)	0.0304 (0.109)
Gnder#c.Number of children under 5 years in the household	-0.150*** (0.0425)	-0.252** (0.108)	0.0505 (0.0644)	0.00614 (0.122)
Constant	-0.920*** (0.153)	1.042*** (0.262)	-3.477*** (0.785)	-0.284 (0.305)
Sample size	17764	4067	3440	1307

ANNEX 3: Quality of models

		Social networks	Social Networks (extended model)	
	Test Wald	LR test of indep. Eqns. (rho = 0)	Test Wald	LR test of indep. Eqns. (rho = 0)
Jordan				
Total	Chi2 (24) = 358.76 Prob> Chi2 = 0	Chi2(1)=9.33 Prob>chi2 = 0.0021	Chi2 (27) = 366.57 Prob> Chi2 = 0	Chi2(1)=7.22 Prob>chi2 = 0.0044
Youth	Chi2 (22) = 139.45 Prob> Chi2 = 0	Chi2(1)=13,31 Prob>chi2 = 0	Chi2(25)=145.58 Prob>chi2 = 0	Chi2(1)=6.24 Prob>chi2 = 0.0067
Algeria				
Total	Chi2 (24) = 2939.45 Prob> Chi2 = 0	Chi2(1)=11,62 Prob>chi2 = 0	Chi2(29)=2990.06 Prob>chi2 = 0	Chi2(1)=14,71 Prob>chi2 = 0
Youth	Chi2 (22) = 542.62 Prob> Chi2 = 0	Chi2(1)=10,53 Prob>chi2 = 0	Chi2(26)=557.71 Prob>chi2 = 0	Chi2(1)=9.87 Prob>chi2 = 0

**Prioritizing the Sustainable Development Components to improve
the level of Development with Analytical Hierarchy Process
(Case Study: Sistan and Baluchestan province of Iran)
Expand this title to reflect content and context**

Vahid Pourshahabi¹, Masoud Pourkiani², Mohsen Zayandeh Roodi³,
Ayoub Sheikhi⁴

Sustainable development consists of a long-term, integrated approach to develop and achieve a healthy community by jointly addressing economic, environmental, and social issues, whilst avoiding the over consumption of key natural resources for managers and government planners in public management. Therefore, since the sustainable development refers to three major dimensions, this study aims to identify and rank the sustainable development components influencing and improving the development level of Sistan and Baluchestan province of Iran through using hierarchical analysis method (AHP) and Expert Choice software. The obtained results analyzed and ranked the factors using collected comments. Expert Choice software also indicated that the economic had the highest effect on improving the development level and the social and the environmental factors were the next priorities, respectively. Therefore, according to the results of this research, decision makers can plan to increase the development level of the study area.

Keywords: Sustainable Development; Sistan and Balushestan; Iran, Group Analytical Hierarchy Process; AHP; Expert Choice.

1. Introduction

The rapid industrial development taken place within the last century has led to many environmental and social implications around the world. The scale of these implications has gradually increased over the last couple of

¹ Student, Department of Management, Kerman Branch, Islamic Azad University, Kerman, Iran.

² Corresponding Author, Department of Management, Kerman Branch, Islamic Azad University, Kerman, Iran. Email: pourkiani.masoud@gmail.com,

³ Department of Economics, Kerman Branch, Islamic Azad University, Kerman, Iran.

⁴ Department of Statistics, Faculty of Mathematics and Computer, Shahid Bahonar University of Kerman, Kerman, Iran.

decades and currently, many developing and developed nations are more or less in vulnerable states (Jayawickrama, Kulatunga, and Mathavan, 2017, 571). Our built environment is responsible for some of the most serious global and local environmental changes (Alyami and Rezgui and Kwan, 2014, 167) and the future of our planet is a matter of great concern. Environmental issues and the way human communities affect ecosystem concerns have been a key part of human society from the early beginning. Since the deterioration of environmental conditions in many parts of the world, sustainable development has become a recognized goal for most human societies (Bossel, 1999). Therefore, everyman is forced to pay more attention to his environment. This is becoming more and more important since modern industrial societies are leaving even more burden on nature (Wall & Gong, 2001). It is also found that the concept of sustainable development has an important role in business and resource conservation in the 21st century (Duran et al., 2015, 807).

2. Sustainable Development

Historically, the concept of sustainable development (SD) emerged in the context of environmental concerns as witnessed by its first appearance in the World Charter for Nature. These concerns were addressed in the World Commission on Environment and Development: "Our Common Future" and were further elaborated in 40 Chapters of Agenda 21 of the Earth Summit in 1992 (Hak, Janouskova, and Moldan, 2016, 565).

The concept of sustainable development (Brundtland, 1987) came into being because of the enormous environmental, social, and economic challenges manifested in the contemporary life (Stacy and Stacy, 2012, 54). Due to the increase in environmental complexities, it is unwise to ignore the concept of sustainable development (Corina, 2013, 441). In other words, acceleration of technological development and sustainable development have become more significant in today's developed and developing countries, leading to more efficient use of natural sources so as to enable them for further use by next generations (Bircan and Gençler, 2015, 1350).

Over the years, the concept of sustainable development (SD) has led to various definitions, interpretations, and instrumentations. Basic definition of SD implies interrelation of three dimensions – Environment, Economy and Social factors- as showed in Figure 1. It means that each of these

dimensions is as important as the next one (Visvaldis, Ainhua, and Ralfs, 2013, 23).

Figure 1: Dimensions of Sustainable Development (Keiner, 2005, 4)



Sustainable Development has definitions, principles, and dimensions which focus upon the ways the economic, social and environmental factors integrate. However, experiences of many countries showed that there are practical difficulties in integrating these dimensions and in putting the concept into operation (Darian, Salleh, and Shafiai, 2016, 160).

Thus, the purpose of a sustainable development assessment is to provide decision-makers with an evaluation of ‘from global to local’ integrated society–economy–environment systems in short-term and long-term perspectives to assist them determine whether actions should be taken in the process of sustainable development or not (Tan and Lu, 2016, 71). Accordingly, the formulation of policy and strategy to develop the country, it must concern real benefits and environmental costs in the three above mentioned areas (Sutthichaimethee et al., 2015, 325). However, the difficulty of taking a three-dimensional (environmental, economic, and social) sustainability approach is being experienced in many places, so local communities are adapting sustainable development to their individual contexts (Kusakabe, 2013, 1).

2.1. Indicators of Sustainable Development

Indicators play a key role in making sustainable development implementable by defining it in directly or indirectly measurable terms. They can also reflect and guide human values. They can reflect existing human values since “we measure what we care about”, but they also amplify the importance of what ends up being measured, since “we care about what we measure” (Meadows, 1998, 8). For years, indicators have been used as a tool used to obtain more information about issues such as health, weather, and economic welfare. Compared to the indicators of economic and social aspects, environmental and sustainable development indicators are just relatively new phenomena to concern (Segnestam, 2002, 1).

The United Nations Conference on Environment and Development in 1992 recognized the important role of indicators in aiding countries make informed decisions about sustainable development. At the international level, the Commission on Sustainable Development (CSD) approved its Work Program on Indicators of Sustainable Development in 1995. The first two sets of Sustainable Development Indicators (henceforth CSD indicators) were developed between 1994 and 2001. They have been extensively tested, applied and used in many countries as the basis for the development of national indicators of sustainable development (United Nations, 2007, 3).

Rio+20 Summit was named after June 2012, for it took place 20 years after the 1992 Rio de Janeiro Earth Summit that allowed, as already mentioned, the adoption of the first international documents, mandatory or voluntarily, on sustainable development: two international Conventions (one regarding the fight against climate change and the other concerning the safeguarding of biodiversity) and also an Action Program that brought together many of the Recommendations for the states in economic, social, and environmental areas (Dogaru, 2013, 1346).

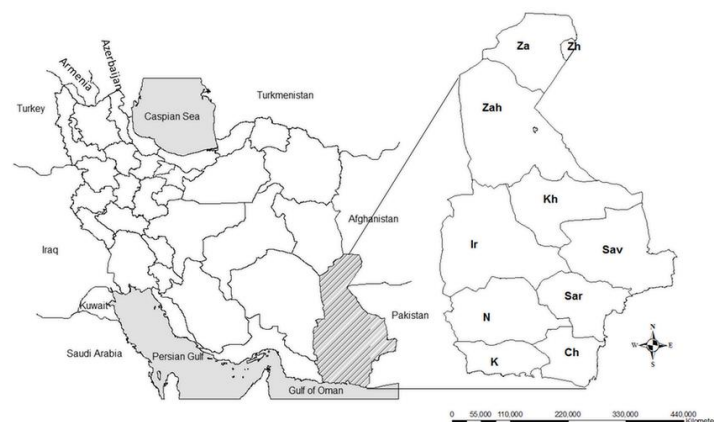
Sustainable development indicators (SDIs), which reflect key trends in the environment, social systems, economy, human well-being, and quality of life, have been seen as major and effective tools in measuring progress toward SD goals (Tran, 2016, 418). So, a better equilibrium between social, economic, and environmental goals is strongly needed to build a true index of sustainable development (Bravo, 2014, 148). Interest and

various activities related to sustainable development indicators among many international organizations have increased in the past years. The Organization for Economic Cooperation and Development has developed and published indicators for both particular areas (resource use and environmental outlook), sectors (households or transport) and developed a standardized indicator-based framework for countries' environmental performance review (OECD, 2005). The United Nations Environment Program has regularly published the Global Environmental Outlook, which has used a set of indicators to underline the choices available to policymakers across a range of environmental, social, and economic challenges (UNEP, 2007). At the regional level, the European Environmental Agency (EEA) has intensively developed and used indicators for assessment of the European environment (Hak, Kovanda, and Weinzettel, 2012, 46).

3. Study area

The target area (the Sistan and Baluchestan region, $25^{\circ}3' - 31^{\circ}28'N$, $58^{\circ}47' - 63^{\circ}19'E$) in this study (Figure 2) comprises two sections: Sistan in the north and Baluchestan in the south. Among 31 provinces of Iran, Sistan and Baluchestan, as the second largest province (after Kerman province), is located in the southeast of the country, bordering Pakistan and Afghanistan and its capital is Zahedan. Its area is 181,785 km² with a population of 2.5 million people. The province consists of 36 cities, which are almost identical in terms of climatic and cultural conditions.

Figure 2: Location of the Sistan and Baluchestan province, Iran



4. Method of Study

The method of this research is developmental and descriptive. The statistical population of this study consists of two groups. The first group is made up of knowledgeable experts. The number of people in this statistical society is not clear and the sample size is 70 people. The second group includes all high education graduates in Sistan and Baluchestan province with 65012 people, and according to the Cochran formula, the sample size is 382. The data used in this study was collected through 10 questionnaires whose validity and reliability were confirmed. The data has been analyzed using Excel, SPSS, AMOS, and EXPERT CHOICE Software, and has resulted in a model that has three social, economic, and environmental dimensions with 23 indicators. Finally, the indicators presented in the model are prioritized and the policy makers can plan on the basis of these priorities in order to promote the development level of the province with a sustainable development approach.

4.1. Identification of indicators

In the first stage, given that many researchers have introduced various indicators in their studies, the basic indexes in each dimension of the model have been identified by analyzing the articles and the existing books using content analysis method. Content analysis is indigenous to communication research and is potentially one of the most important research techniques in social sciences (Krippendorff, 1989, 403). The content analysis method is based on the hypothesis that by analyzing linguistic messages, one can discover the meanings, priorities, attitudes, perceptions as well as the organization of the world. At the end of this phase, 93 indexes of books and articles which were related to the research topic were extracted.

4.2. Delphi Process

The Delphi technique is well suited as a means and a method for consensus-building by using a series of questionnaires to collect data from a panel of selected subjects (Hsu & Sandford, 2007, 1). Delphi usually undergoes four distinct phases. The first phase is characterized by exploration of the subject under discussion, wherein each individual contributes additional information apparently pertinent to the issue. The second phase involves the process of inferring how the group views the

issue. If there is significant disagreement, that disagreement is explored in the third phase to bring out the underlying reasons for the differences and possibilities to evaluate them. The last phase, a final evaluation, occurs when all previously gathered information has been initially analyzed and the evaluations have been fed back for consideration (Linstone & Turoff, 2002, 6).

4.2.1. Selecting experts

In the second stage, the indices obtained in the previous step became the Delphi's five-point Likert questionnaire. Then the Delphi questionnaire was sent to the experts. The questionnaire involved both closed and open questions. Selection of individuals for the Delphi process depended on the experience and expertise required in the subject under study. Doblecq et al. (1975) considered three groups of people eligible to Delphi study:

- 1) The top management decision makers who will utilize the outcomes of the Delphi study;
- 2) The professional staff members along with their support team; and
- 3) The respondents to the Delphi questionnaire whose judgments are being sought" (Delbecq, 1975, 85).

Generally, panel members are selected through targeted (judgmental) inaccuracies. The judgment method is based on the assumption that the researcher's knowledge of the community can be used to make panel members (Keeney et al., 2005, 208). One of the methods of judging sampling is the snowball method. The Snowball or Referral sampling yields a study sample through referrals made among people who share or know of others and those who possess some interesting characteristics for the researchers (Biernacki, 1981, 141). So, using snowball sampling method, four panels of experts were selected regarding the following topics:

- Panel 1- Experts on educational, cultural and social issues;
- Panel 2 - Experts on therapeutic issues;

- Panel 3 - Experts on economic, agricultural and livestock, and infrastructure issues;
- Panel 4 - Experts on environmental issues.

4.2.2. Number of Participating experts in the Delphi process

Different researchers have never reached consensus on the optimal number of collaborators in the Delphi process. But it is noted that 10 to 15 people can be enough. Witkin and Altshuld (1995) argued that the approximate size of a Delphi panel is generally less than 50 people (Witkin and Altshuld, 1995). According to Ludwig (1997), in most Delphi studies, between 15 and 20 respondents are used (Ludwig, 1997: 2). So, in this research, 20 experts have been used for each panel (In some panels, the same people have been involved).

4.2.3. Agreement in the Delphi process

The major statistics in Delphi studies are measures of central tendency (means, median, and mode) and level of dispersion (standard deviation and inter-quartile range) used to present information concerning the collective judgments of the respondents (Hasson, Keeney, & McKenna, 2000).

According to Chia-chien (2007), the Delphi process can be repeated continuously until a consensus is reached (Chia-Chien, 2007, 2). However, Cyphert and Gant (1971), Brooks (1979), Ludwig (1994, 1997), and Custer, Scarcella, and Stewart (1999) point out that in most cases, three iterations are often sufficient to collect the needed information and to reach a consensus.

To reach consensus among experts, some criteria recommend that a consensus of 80% is acceptable (Chia-Chien, 2007, 4). Green (1982) argues that at least 70% of the collaborators involved in the Delphi process need to be unanimous, but Scheibe et al., (1975) showed that using percentages is inadequate, and a more reliable and measurable alternative to the stability of respondents has to be repeated in iteration.

In this study, Kendall's Coefficient of Concordance was used to determine the degree of experts' perceptions using the Delphi method. The Kendall's Coefficient of Concordance is a measure to determine the

degree of coordination and agreement among several rank categories per N person. Such a scale is particularly useful in studies assessing "the existing validity among judges" (Legendre, 2010, 164). To decide whether to stop or to continue the Delphi round, a strong consensus among members of the panel is required which is based on the amount of Kendall's Coefficient of Concordance. Table 1 shows how to interpret the various values of this coefficient.

Table 1: Correlation coefficient interpretation (Agunbiade & Ogunyinka, 2013, 314)

Kendall's Coefficient of Concordance	Interpretation
0.90 to 1.0	Very high positive correlation
0.70 to 0.90	High positive correlation
0.50 to 0.70	Moderate positive correlation
0.30 to 0.50	Low positive correlation
0.00 to 0.30	Negligible correlation

The quantities of Kendall's Coefficient of Concordance for various stages of the Delphi process are shown in Table 2. It should be noted that the Kendall's Coefficient of Concordance Test was performed in SPSS 19 software.

Table 2: Test Results for Kendall's Coefficient of Concordance

Panel number	First round		second round		Third round		Fourth round	
	Kendall's Coefficient	Consensus	Kendall's Coefficient	Consensus	Kendall's Coefficient	Consensus	Kendall's Coefficient	Consensus
1	0.055	Negligible	0.213	Negligible	0.492	Low	0.704	High
2	0.143	Negligible	0.180	Negligible	0.786	High	Consensus in third round	
3	0.217	Negligible	0.573	Moderate	0.774	High	Consensus in third round	
4	0.247	Negligible	0.368	Low	0.738	High	Consensus in third round	

Considering that in the questionnaires sent to experts, they were asked to remove unnecessary indicators and suggest useful indicators for adding

to future periodic questionnaires, the number of the final indicators proposed by the experts decreased to 81 indicators.

4.3. Determining the present situation of the indicators

After identifying the research indicators in the previous stages, the status quo of the indicators has been extracted from the latest statistical journal of Sistan and Baluchestan province.

4.4. Determining the desirable situation for indicators

At this stage, Delphi method was re-used to get the desired status of the indexes. At the end of this stage, the present situation and the most desirable status of sustainable development indicators for the cities of the province have been identified. In the next step, the present and the most desired situations of the indicators will be compared to identify the chronic gaps for development.

4.5. Comparing the existing status and desired status of indicators

The gap analysis was used to compare the existing situation and the desired situation of the indices. Because the indicators are in different scales and there is no possibility of performing arithmetic operations on them, eliminating the effect of different scales and converting all of them into a standard scale require a scaling-based method. In this method, equations (1) and (2) were used according to the purpose (Boulanger, 2008, 49).

$$\text{Equation 1: } x'_{ij} = \frac{x_{ij} - x_j^{\min}}{x_j^{\max} - x_j^{\min}}$$

$$\text{Equation 2: } x'_{ij} = \frac{x_j^{\max} - x_{ij}}{x_j^{\max} - x_j^{\min}}$$

Equation (1) is used when the maximization of criterion or index is considered, and equation (2) is used to minimize the desired criterion. At this stage of the research, all present and desirable values of the indicators are standardized using these two equations.

After standardizing the values of the indices, to obtain the gap between the existing status and the desired condition, the differences between the

desired and the existing values were calculated. According to Chui et al (2016) and Abdelhamid et al. (2015), the quartiles were used to identify the chronic gaps in the province's development path. Accordingly, 24 out of the 81 indicators studied in this study had more gaps than the third quartile of the data and were identified as indices with chronic gaps. Therefore, according to the findings of this study, in order to promote the level of development of Sistan and Baluchestan province, it is necessary to plan to improve the level of indicators specified in Table 3.

Table 3: Indicators that have chronic gaps in the development path of Sistan and Baluchestan province

Dimensions	Components	Indicators
Social	Educational	Population literacy
		Number of Volume 2 Secondary Schools
		Number of Teachers for Volume 1 Secondary Schools
		Number of vocational training centers
		The ratio of the number of professors to the students
	Cultural and Social	The number of cinema halls
	Therapeutic	Number of beds in the hospital
		Number of health centers
		Number of Sub-specialist doctors
		Number of pre-hospital emergency rooms
Economic	Economy	Percentage of service sector employees
		Number of active cooperative companies
	Infrastructure	The length of the railways
		Length of highways
		Mobile penetration rate
		Percentage of Internet Access
Environmental	Environmental Protection	Number of fire stations
		Capacity of wind power projects
		Capacity of solar power projects
	Environmental Pollution	Gas-to-household split ratio
		Per capita gasoline
		Per capita consumption of kerosene
		Per capita gas oil consumption
		Per capita consumption of mazut (Fuel Oil)

4.6. Method of Prioritizing Sustainable Development Indexes

4.6.1. Analytical Hierarchical Processes (AHP)

The Analytic Hierarchy Process (AHP) is a logical Multi-Criteria Decision-Making technique that allows decision makers to model complex problem-based on mathematics and human psychology (Gupta et al., 2015, 212). The multiple criteria decision making (MCDM) methods are frequently used to solve real world problems with multiple, conflicting, and incommensurate criteria. MCDM problems are generally categorized as continuous or discrete, depending on the domain of alternatives (Pirdashti et al., 2011, 8). In this study, multiple criteria decision modeling (MCDM) was used, which considers more than one criterion in decision-making environments.

The theory and practice of the evolution of Analytical Hierarchical Processes (AHP) have created an excitement of many researchers in various fields including oil and gas, arts, humanities, health, education, business, military, politics, and construction industry. AHP helps people with the intuitive, the rational and irrational, and with risk and uncertainty towards complex situation. The idea of AHP was designed by Dr Thomas Saaty in the 1970s while he was a professor at the Wharton School of Business. In 1983, he joined Dr. Earnest Forman (a professor of management science at George Washington University) to co-found the Expert Choice (Yunus et al., 2013, 467).

4.6.2. Expert Choice (EC) Software

Expert Choice software is a quick-to-learn and easy-to-use product for Collaborative Decision Making to help research intuition. It is a graphical based structure which is able to apply judgment to objectives and finally achieve the ultimate goal. The advantage of using this software is that it helps decision makers arrive at the best decision, but it also gives a crystal clear picture for that decision. This is true since the given results provide extra internal validity through visual integration in testing sensitivity analysis (Yunus et al., 2013, 467). The AHP and Expert Choice software engage the decision makers in structuring a decision-making process into smaller parts. Beginning from setting a goal to achieve it, objectives and sub-objectives and alternatives are determined. Decision-makers then make a simple pair-wise comparison judgment throughout the hierarchy

priority to arrive at the overall priorities for the alternatives (Yunus et al., 2013, 467). This paper presents the application of Analytical Hierarchical Process (AHP) using Expert Choice.

4.6.3. Designing Questionnaires for Expert Choice

Designing the questionnaires for the experts requires designers to spend enough time and attention for the answers of the questionnaires prepared by the expert. The original design includes all pair-wise to all criteria, objectives, and alternatives (Yunus et al., 2013, 468). Table 4 shows the Preference Level and the Numeric Values ranging from 1 to 9 and used in selecting the significance of the criteria.

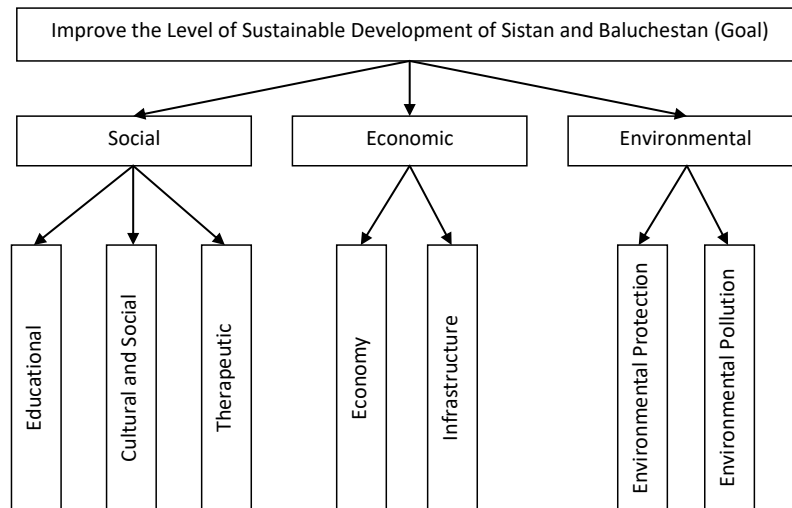
Table 4: AHP Preference scale (Yunus et al., 2013, 468)

Preference level.	Numeric Value.
Equally preferred.	1
Moderately preferred.	3
Strongly preferred.	5
Very strongly preferred.	7
Extremely preferred	9
Intermediate values between the two adjacent judgments.	2, 4, 6, 8

5. Results

Dimensions and components of sustainable development used to improve the development level of Sistan and Baluchestan Province are presented in the hierarchical tree of Figure 3. The first level is dedicated to research objective (Improve the level of Sustainable Development of Sistan and Baluchestan province). In the second level, Dimensions of sustainable development and in the third level, the components of sustainable development are shown, respectively.

Figure 3: Hierarchical tree of AHP



The weights achieved for each main dimension are shown in Figure 4. According to the information obtained, economic factors with the weight of 0.520, social factors with the weight of 0.340, environmental factors with the weight of 0.140 were determined by the experts. Also, the inconsistency rate of data, 0.04, is less than 0.10 and indicates the consistency between the paired comparisons.

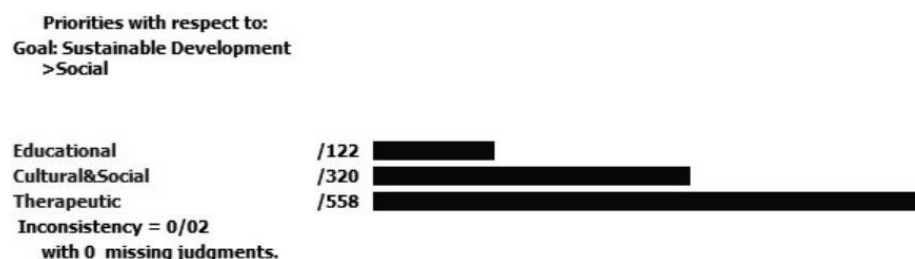
Figure 4: Weights of Main Criteria



The weights achieved for each component related to the social dimension of sustainable development are shown in Figure 5. According to the obtained information, the hierarchal array of the components includes:

Therapeutic with the weight of 0.558, Cultural and Social with the weight of 0.320, and Educational with the weight of 0.122, respectively. In addition, the inconsistency rate is 0.02, which is less than 0.10 and indicates the consistency between the paired comparisons.

Figure 5: Weights of Components related to the social dimension



The weights achieved for each component related to the social dimension of sustainable development are shown in Figure 6. According to the obtained information, the hierarchal array of the components includes: Infrastructure with the weight of 0.800, and Economy with the weight of 0.200, respectively. In addition, inconsistency rate is 0.00, which is less than 0.10 and indicates the consistency between the paired comparisons.

Figure 6: Weights of Components related to the Economic dimension



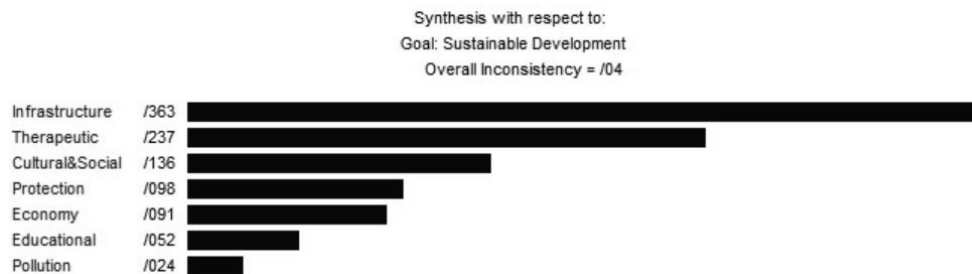
The weights achieved for each component related to the environmental dimension of sustainable development are shown in Figure 7. According to the obtained information, the hierarchal array of the components includes: Environmental Protection with 0.800 weights, and Environment Pollution with 0.200 weights, respectively. In addition, inconsistency rate is 0.00, which is less than 0.10 and indicates the consistency between the paired comparisons.

Figure 7: Weights of Components related to the Environmental dimension



The weights of components related to the main criteria (social, economic, and environmental dimensions) are presented according to improvements in the development level of Sistan and Baluchestan Province which is based on the obtained results, infrastructures, and the therapeutic factors have the highest weights among other components. Also, the rate of overall inconsistency is 0.04 which indicates the consistency between paired comparisons (Figure 8).

Figure 8: Weights of Components related to the main criteria



6. Conclusion

Sustainable development encourages researchers to conserve and enhance the resource base, by gradually changing the ways in which technologies are developed and used. Countries are supposed to meet their basic needs of employment, food, energy, water and sanitation. Most official plans encourage the countries to commit certain things and work towards given goals, which is the only way all of these things will work. It is a never-ending, continuous process that cannot be finished overnight, but organizations like the UN believe that if all work together to move towards their goals, their efforts can eventually be accomplished at sustainable development. The authors of this article believe that in order

to achieve sustainable development, each region of the country must have its own program. To this end, sustainable development components have been ranked to promote the development level of Sistan and Baluchestan province in Iran, in order to provide the possibility of planning for its future sustainable development.

The data of this research was obtained using experts' opinions and was analyzed in Expert Choice software. The results of this analysis indicate that the economic dimension with a weight of 0.520 is the most important factor for promoting the development level of Sistan and Baluchestan province. Among the components considered to enhance the development level of the province, the "Infrastructure" component with a weight of 0.363 and "therapeutic" component with a weight of 0.237 were known as the most important items. The results of the sensitivity analysis for this study show that if the weight of the "environmental" dimension increases, the "environmental protection" component will be the most important factor used for promoting the provincial development. Similarly, if the weight of the "social" dimension increases, the "Therapeutic" component will be the most important factor in promoting the development of the province. Therefore, in order to promote the development of Sistan and Baluchestan province, the local decision makers must consider the dimensions and components of sustainable development that are mostly prioritized to base their future planning and policy-making on these priorities.

Regarding the results of prioritizing the indices of the native model derived from this study, it is suggested to increase the length of the railway lines to improve the infrastructure situation in the study area. To this end, it is suggested that the government provide the conditions for private sector investment. As there is a common land border between Sistan and Baluchestan Province and Pakistan and Afghanistan, investment can also be made by these countries. The length of highways will also increase through state-sponsored highway construction projects, and will lead to infrastructure development for sustainable development in the region under study. To finance these projects, the government can proceed by selling tickets and taking tolls. The third most important indicator in the infrastructure component is the number of fire stations. In order to upgrade this index, existing vehicles and equipment should be restored, private facilities used and new machines purchased. Increasing the percentage of Internet access can also help to improve the level of

development of the area under study. To this end, it is suggested that the use of satellite internet for villagers be provided. It is also necessary to reduce the cost of using the Internet and provide the necessary training to users.

To improve the therapeutic component, it is suggested that the number of emergency bases in the examined area be increased. For this purpose, it is suggested that continuing training courses are provided for staff of emergency departments. Also, the use of air and motorized emergency stations is recommended. Increasing the number of health care centers is possible through funding from international organizations. Also, the government can take advantage of private sector capabilities by providing incentives (such as tax breaks). Another important indicator is the number of hospital beds. In this regard, it is suggested that the government take action to attract foreign investors, especially from neighboring countries. Paying low interest loans and lowering tax rates can also pave the way for private sector entry into the issue. The number of sub-specialist doctors can also be increased by attracting students from various medical courses among native people. Meanwhile, the government should provide facilities and incentives for physicians to stay in the area.

Conflict of Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

References

Abdelhamid, M.S. & Beshara, I. & Ghoneim, M. (2015), Strategic asset management: Assessment tool for educational building in Egypt, *HBRC Journal*, 11, 98–106.

Agunbiade, D. A. & Ogunyinka, P. I. (2013), Effect of Correlation Level on the Use of Auxiliary Variable in Double Sampling for Regression Estimation. *Open Journal of Statistics*, 3, 312-318.

Alyami, S. H. & Rezgui, Y. & Kwan, A. (2015), The development of sustainable assessment method for Saudi Arabia built environment: weighting system. *Sustain Sci*, 10. 167–178.

Biernacki, P. (1981), Snowball Sampling: Problems and Techniques of Chain Referral Sampling. *SOCIOLOGICAL METHODS & RESEARCH*, Vol. 10 No. 2. 141-163.

Bircan, I. & Gençler, F. (2015), Analysis of Innovation-Based Human Resources for Sustainable Development. *Social and Behavioral Sciences*, 195, 1348 – 1354.

Bossel, H. (1999), Indicators for sustainable development: theory, method, applications. Winnipeg: *International Institute for Sustainable Development*.

Boulanger, P. M. (2008), Sustainable development indicators: a scientific challenge, a democratic issue. *Institute Veolia Environment*. S.A.P.I.EN.S [Online], 1.1 | 2008, Online since 23 December 2008, connection on 30 September 2016. URL : <http://sapiens.revues.org/166>

Bravo, G. (2014), The Human Sustainable Development Index: New calculations and a first critical analysis. *Ecological Indicators*, 37, 145–150.

Brooks, K. W. (1979), Delphi technique: Expanding applications. *North Central Association Quarterly*, 54 (3), 377-385.

Brundtland, G. H. (1987), Our Common Future. Geneva: *United Nations World Commission on Environment and Development*.

Chia-Chien, H. (2007), The Delphi Technique: Making Sense of Consensus. Practical Assessment. *Research & Evaluation*, Vol 12, No 10

Chui, T. B. & Ahmad, M. Sh. & Ahmad. & Ahmad Zaimi, N. (2016), Evaluation of Service Quality of Private Higher Education using Service Improvement Matrix. *Social and Behavioral Sciences*, 224, 132 – 140.

Corina, J. (2013), Understanding sustainable development concept in Malaysia, *Social Responsibility Journal*, VOL. 9 NO. 3, 441-453.

Custer, R. L. & Scarcella, J. A., & Stewart, B. R. (1999), The modified Delphi technique: A rotational modification. *Journal of Vocational and Technical Education*, 15 (2), 1-10.

Cyphert, F. R., & Gant, W. L. (1971), The Delphi technique: A case study. *Phi Delta Kappan*, 52, 272-273.

Dariah, A. R. & Salleh, M. S. & Shafiai, H. M. (2016), A New Approach for Sustainable Development Goals in Islamic Perspective, *Procedia - Social and Behavioral Sciences*, 219, 159 – 166.

Delbecq, A. L. & Van de Ven, A. H., & Gustafson, D. H. (1975), Group techniques for program planning. *Glenview, IL: Scott, Foresman, and Co.*

Dogaru, L. (2013), The importance of environmental protection and sustainable development. *Social and Behavioral Sciences*, 93, 1344 – 1348.

Duran, D. C. & Gogan, L. M. & Artene, A. & Duran, V. (2015), The components of sustainable development – a possible approach. *Procedia Economics and Finance*, 26, 806-811.

Green, P. J. (1982), The content of a college-level outdoor leadership course. Paper presented at the Conference of the Northwest District Association for the American Alliance for Health. *Physical Education, Recreation, and Dance*, Spokane, WA.

Gupta, S. & Dangayach, G. S. & Singh, A. K. and Rao, P. N. (2015), Analytic Hierarchy Process (AHP) Model for Evaluating Sustainable

Manufacturing Practices in Indian Electrical Panel Industries. *Procedia - Social and Behavioral Sciences*, 189. 208 – 216.

Hak, T. & Kovanda, J. and Weinzettel, J. (2012), A method to assess the relevance of sustainability indicators: Application to the indicator set of the Czech Republic's Sustainable Development Strategy. *Ecological Indicators*, 17, 46–57.

Hak, T. & Janouskova, S. & Moldan, B. (2016), Sustainable Development Goals: A need for relevant indicators. *Ecological Indicators*, 60, 565–573.

Hasson, F. & Keeney, S., & McKenna, H. (2000), Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing*, 32 (4), 1008-1015.

Hsu, Ch. & Sandford, B. A. (2007), The Delphi Technique: Making Sense of Consensus. Practical Assessment, *Research & Evaluation*, Vol 12, No 10. 1-8.

26. Jayawickrama, H.M.M.M & Kulatunga, A.K. & Mathavan, S. (2017), Fuzzy AHP based Plant Sustainability Evaluation Method. *Procedia Manufacturing*, 8, 571 – 578.

Keeney, S. & Hasson, F. & McKenna, H. (2005), Consulting the oracle: ten lessons from using the Delphi technique in nursing research. *Journal of Advanced Nursing*, 53(2), 205–212.

Keiner, M. (2005), History, definition(s) and models of sustainable development, ETH, *Eidgenössische Technische Hochschule Zürich*.

Krippendorff, K. (1989), Content analysis. In E. Barnouw, G. Gerbner, W. Schramm, T. L. Worth, & L. Gross (Eds.), *International encyclopedia of communication*. Vol. 1, 403-407. New York, NY: Oxford University Press. Retrieved from http://repository.upenn.edu/asc_papers/226

Kusakabe, E. (2013), Advancing sustainable development at the local level: The case of machizukuri in Japanese cities, *Progress in Planning*, 80, 1–65.

Legendre, P. (2010), Coefficient of concordance. *Encyclopedia of Research Design*, Vol. 1. N. J. Salkind, ed. SAGE Publications, Inc., Los Angeles. 164-169.

Linstone, H. A. & Turoff, M. (2002), The Delphi Method Techniques and Applications, *Addison-Wesley Publishing, United States of America*.

Ludwig, B. (1997), Predicting the future: Have you considered using the Delphi methodology?. *Journal of Extension*, 35 (5), 1-4.

Ludwig, B. G. (1994), Internationalizing Extension: An exploration of the characteristics evident in a state university Extension system that achieves internationalization. doctoral dissertation, *The Ohio State University*, Columbus.

Scheibe, M. & Skutsch, M., & Schofer, J. (1975), Experiments in Delphi methodology. Reading, MA: *Addison-Wesley Publishing Company*, In H. A. Linstone, & M. Turoff (Eds.), 262-287 .

Meadows, D. (1998), Indicators and Information Systems for Sustainable Development. 1st ed. Hartland, Canada: *The Sustainability Institute*.

OECD, (2005), Environmental Performance Reviews—Czech Republic. OECD, Paris. Office of the Government of the Czech Republic. The Czech Republic Strategy for Sustainable Development. *Office of the Government of the Czech Republic*, Prague.

Pirdashti, M. & Omid, M. & Pirdashti, H. & Hassim, M. H. (2011), An AHP-Delphi Multi-Criteria Decision Making Model with Application to Environmental Decision-Making, *Iranian Journal of Chemical Engineering*, Vol. 8, No. 2 (Spring), IChE, 3-17.

Segnestam, Lisa. (2002), Indicators of Environment and Sustainable Development. *The World Bank Environment Department*, Environmental Economics Series, Paper No. 89, Washington, D.C.

Stacey, A & Stacey, J. (2012), Integrating Sustainable Development into Research Ethics Protocols. *The Electronic Journal of Business Research Methods*, 10, 2, 54-63.

Sutthichaimethee, P. & Tanoamchard, W. & Sawangwong, P. & Pachana, P. & Witit-Anun, N. (2015), Environmental problems indicator under environmental modeling toward sustainable development. *Global J. Environ. Sci. Manage*, 1(4), 325-332.

Tan, F. & Lu, Z. (2016). Assessing regional sustainable development through an integration of nonlinear principal component analysis and Gram Schmidt orthogonalization. *Ecological Indicators*, 63, 71–81.

Tran, L. (2016), An interactive method to select a set of sustainable urban development indicators. *Ecological Indicators*, 61, 418–427.

UNEP. (2007), Global Environmental Outlook. *UNEP*, Geneva.

United Nations. (2007), Indicators of Sustainable Development: Guidelines and Methodologies, *United Nations*, New York.

Visvaldis, V. & Ainhua, G. & Ralfs, P. (2013), Selecting indicators for sustainable development of small towns: The case of Valmiera municipality, *Procedia Computer Science*, 26, 21 – 32.

Wall, G., & Gong, M., (2001), On exergy and sustainable development—Part 1: Conditions and concepts. *An International Journal*, 3, 128-145.

Witkin, B. R., & Altschuld, J. W. (1995), Planning and conducting needs assessment: A practical guide. *Thousand Oaks, CA: Sage Publications*, Inc.

Yunus, R. M. & Samadia, Z. & Yusop, N. Mohd. & Omara, D. (2013), Expert Choice for Ranking Heritage Streets, *Procedia - Social and Behavioral Sciences*, 101, 465 – 475.