Expert Journal of Finance

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Editor's Introduction to Volume 3 of Expert Journal of Finance

Simona VINEREAN [*]

Sprint Investify

In this third volume of *Expert Journal of Finance,* we have published various interesting articles exploring the indicators that can be used to anticipate banking crises in Asian emerging countries, the issues and opportunities of tax policies, the McKinnon's complementarity hypothesis of m*oney and physical capital relationship, the* analyses of the accounting standard for business enterprises based on a simulation study, a case study of Spain's housing crisis, and the insights that the banking sector can draw from the pharmaceutical industry in terms of innovation transfer. We are appreciative of the opportunity to publish such meaningful contributions to finance knowledge. Further, I present a short description of each article that is published in *Expert Journal of Finance*, volume 3.

Hmili and Bouraoui's article entitled *'Early Warning Indicators of Banking Crisis in Asian Countries'* examines 6 Asian emerging countries over the period 1973-2012 in order to develop a model that enables the anticipation of future banking crises in emerging markets. The authors address global financial imbalances that are more impactful in emerging countries from Asia. Their research uses the Early Warning System (EWS), to determine the variables that may have a role in predicting banking crisis in 6 Asian emerging countries over the period 1973-2012. Hmili and Bouraoui's results show that inflation has the strongest impact in predicting systemic banking crisis.

In *Problems and Recommendations over Tax Policies*, Engin Öner presents a deep understanding in the various applications and issues with tax policies by regarding this concept from financial, economic, and social standpoints. From a financial perspective, tax policy helps with the funding of public expenditure; from an economic point of view, it provids economic stability and development; and from a social standpoint, tax policy is regarded as a tool that provides fair distribution of income and wealth.

Azeem and Mohammad's article *Money and Physical Capital Relationship: McKinnon's Complementarity Hypothesis on Turkey's Economy* offer a thorough theoretical background of McKinnon's complementarity hypothesis and an empirical analysis that tests the limits and ARDL method or Turkey's economy. Empirical analysis of the findings suggests that Turkey's economy is based on a limited complementary relationship between money and physical capital.

In *The Simulation Study of the Change of Accounting Standards for Business Enterprises Based on Evolutionary Game,* Qin and Jian use NetLogo software to simulate and build a game model between stakeholders, based on the idea of an evolutionary game by analyzing the accounting standard for business enterprises. Qin and Jian's analysis establishes the evolution system based on multi-agent strategy choice

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and their system is comprehensively is divided into three parts of input, control, and output. Their results show that the structure of benefits often leads to the change of the accounting standard for business enterprises.

Daly and Zarco approach the issue of housing bubbles in a case study entitled *The Global Economic Crisis: Spain's Housing Bubble*. The case study approach to the situation in Spain is presented in terms of its economy, the housing market and the ongoing economic crisis. Their paper notes that the population most affected by the crisis consists of young adults who find it difficult to find employment. In their case study, the authors propose more austerity and steady growth would be the key to not inflating the bubble again.

Francesco Corea, in this paper *What Finance Can Learn from Biopharma Industry: A Transfer of Innovation Models,* focuses on an interdisciplinary approach to innovation, and on insights that the banking sector can draw from the pharmaceutical industry. His original study uses different newly created indicators to empirically examine the level of innovation of the financial industry compared to the biopharma one, and to properly understand and determine the best growing strategy for the fintech sector. Corea's paper fills numerous literature gaps in relation to innovation as a source of growth by offering valuable insights regarding the similarities between biopharma and fintech.

A Final Thought

On behalf of the *Expert Journal of Finance* Editorial Board, I would like to thank our Authors for publishing their valuable research with us, our Reviewers for their incredible work ethic and commitment, and our Readers for advancing and disseminating the work we publish in their future articles!

Early Warning Indicators of Banking Crisis in Asian Countries

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This paper aims to test the relevance of the advanced warning indicators in the prediction of systemic banking crises in 6 Asian emerging countries over the period 1973-2012. Based on multivariate panel logit model, our empirical results suggest that among 6 determinants of banking crises ranged into macroeconomic, financial and external variables, inflation demonstrates the most significant predictive power on systemic banking crises.

Keywords: *banking crises, early warning system, panel logit regression*

JEL classification: *C23, C52, G21*

1. Introduction

Banking crises strike relentlessly for three decades almost all countries, especially emerging Asian countries that have experienced serious problems and banking panics. The Asian crisis of 1997 can be interpreted as a currency and financial crisis that has spread in the Asian countries, after a decade of strong growth. One of the root causes of this crisis lies in an appreciation of Asian currencies (against US dollar) which caused a loss of competitiveness and a worsening trade balances in some countries such as Thailand and Malaysia. Other major causes are internal and external debts; but also a heavy reliance on foreign portfolio investment.

The Asian crisis is an overinvestment crisis in which the private sector has played a major role (overborrowing syndrom). The outbreak of the crisis in the devaluation of the Thai baht in July 1997 reveals the extent of internal financial and banking problems in Asian economies. These countries are considered as victims of private capital inflows which helped the bank credit and reduced the efficiency of the allocation of investments. Devaluation of Asian currencies begins a phase of major bankruptcies. The 1997 crisis was spread to the entire region of South East Asia, through the exchange markets and stock markets. As such, it constitutes the most marked illustration of what is known in the economic literature financial contagion.

In the current context of globalization, it is interesting to determine the basic indicators that can detect crisis signals at the earliest and to understand their dynamics. Suetorsak (2006) mentions the root causes of the Asian crisis. First, substantial amounts of foreign funds were found available at relatively low interest rates, when investors looking for new opportunities have massively shifted their capital to Asia. As with any boom phase, stock prices and real estate in Asia soared, attracting, thus, more funds. But domestic allocation of these

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borrowed foreign funds was inefficient, due to the fragility of banking systems, poor corporate governance and lack of transparency in the financial sector. The limited absorption capacity of these countries has also contributed to the inefficient allocation of foreign capital. Second, countries maintained fixed exchange rates that gave a false sense of security to borrowers, encouraging them to incur debts in US dollars. Finally, in countries affected by the crisis, exports were low in the mid of 90s for a number of reasons, including the appreciation of the US dollar against the Japanese yen, the devaluation of the yuan by China in 1994 and the loss of some markets with the entry into force of the North American Free trade.

In the literature related to Early Warning System (EWS), a lot of variables were used to explain and to predict major systemic banking crises, such as GDP growth rate, inflation and interest rates, current account balance, etc. Our contribution in this paper is to include short-term debt to external debt variable. This variable reflects the specificities of our country sample. Indeed, global financial imbalances are generally larger and more frequent in Asian emerging countries and also tend to affect the economic environment, in which these countries operate. The rest of the paper is structured as follows. Section 2 focuses on the literature review related to EAS. Section 3 presents the data and methodology. Estimation results are presented and discussed in section 4. Section 5 concludes.

2. Literature Review

Sufian (2009) reports that the Asian crisis of 1997 paved the way for a new century of crises for their spread and rash on emerging economies. Indeed, the Asian crisis that began in Thailand has been spread rapidly throughout the region. Haile and Poso (2008) also found that the financial panic has been spread in the region of East Asia after the collapse of the Thai Baht in 1997. This crisis was characterized by an increase in interest rates (34% in Korea, 13% in Indonesia), a dramatic fall in stock prices (-55% in Thailand, 52% in Malaysia), a depreciation in exchange rates (- 97% in Korea, Thailand -87%) and a decline in GDP across the region by 481 billion dollars. Agusman *et al.* (2008) noted that the Asian crisis tells us about a crucial element of a financial crisis that is the internal bank credit boom. The evolution of bank credit has increased massively to finance private investment. In the same context, Gugliette and Sgard (1998) found that the majority of these investments is characterized by speculative and unprofitable movements, and have destabilized Asian banks. Indeed, due the abundance of liquidity, Asian banks have massively funded the real estate sector. This outburst allocated evil of bank loans is much stronger than GDP growth. Consequently, Asian banks are confronted with a major problem that results in the inability to monitor their clients because of information asymmetry between lenders and borrowers.

Allen and Gale (2003) explain that several factors in a banking crisis are combined together to be born a true crisis. Volatility in interest and exchange rates is considered by Goldstein and Turner (1996) as the main reason for banking fragility.

Based on a panel of 26 countries, Lambretz and Ottens (2006) ranged the indicators of the recent banking crises into four categories, namely external, macroeconomic, financial and institutional indicators. The authors show that the stability of the banking sector in emerging economies is threatened by rising interest rates. Bordo (2008) also noted that the increase in interest rates for two consecutive years is a sign of a banking crisis. In the same context, Pasquariello (2008) shows that crises are based on the weakness of macroeconomic and microeconomic indicators. However, Hagen and Ho (2007), Edwards (2009) and Klomp (2010) concluded that internal, external and financial indicators are precursor determinants of recent banking crises.

The volatility of exchange rates is also among the determinants of banking crises. Indeed, Demirguc-Kunt *et al.* (2006) note that banking crises are accompanied by a depreciation of exchange rates. Moreover, they show that the exchange rate is a policy instrument and that any devaluation of the exchange rate causes difficulties borrowers' repayment. Hardy and Pazarbasioglu (1998) argue that overvalued currencies make the economy vulnerable to a currency crisis. In the same line of ideas, Gonzales *et al.* (1997) state that overvalued exchange rates stimulate imports and deteriorate the trade balance.

Detragiache (2002) highlights that in a country where the export is based on a single sector, the decline in export prices widens the deficit in the trade balance and generates a currency surplus. This risk is spread to banks by the deterioration of liabilities and, therefore, makes them unable to pay back their debts. Berg *et al.* (2008) examined the money supply indicator and state that the period in which the economy has a high growth rate of the money supply M2 is usually a crisis period. According to Lestano *et al.* (2004), M2 to foreign exchange reserves ratio is widely used in the explanation of systemic banking crises. It measures the ability of the economy to withstand speculative pressures.

Some other authors focused on the financial indicators of banking crises. Borio and Lowe (2002) indicate that banking crises result from a crucial financial indicator which is the rapid growth of bank loans.

Frankel and Rose (1996) report that expansion of bank credit leads to an increase in money supply which is an indicator of recent banking crises. Gorton (1988) adds that the rapid expansion of bank credit deteriorates the quality of banks' portfolios. Through a study of 69 countries, Beck *et al.* (2006) found that crises are less likely to emerge in economies with more concentrated banking systems. Similarly, Boyd and De Nicolo (2005), in their study based on a sample of 45 countries, notice that the bank competitiveness measured by the concentration makes banks immunized against banking crises. These results are in opposite with those of Caminal and Matutes (2002) who show that bank concentration is positively correlated with the likelihood of banking crises.

3. Data and Methodology

Our dataset includes 6 Asian emerging countries: South Korea, Malaysia, Indonesia, Thailand, Sri Lanka and Philippines. The aim of selecting this country sample is to construct a model that allows us to anticipate future banking crises in emerging markets. For each emerging countries, annual data over the period 1973-2012 are collected from Datastream and World Bank database. Table 1 summarizes the dates of major systemic banking crises in Asian emerging countries of our sample.

Table 1. Review of systemic banking crises in Asian emerging countries

Country	Dates of systemic banking crises
South Korea	[1997-2003+]
Malaysia	[1985-1988]- [1997-2003+]
Indonesia	[1994-2003+]
Thailand	[1983-1987], [1997-2003+]
Sri Lanka	[1989-1993]
Philippines	1983

Source: Reinhart and Rogoff (2008)

To analyze the relevance of EWS's indicators in predicting systemic banking crises, we employ the panel logit regression, which is widely applied and considered to model dichotomous outcome variables. Davis and Karim (2008) highlight that logit model is the most used approach in predicting crises. The logit model estimates the probability of occurrence of banking crisis in a given country according to the following function:

$$\Pr ob(crisis_{it} = 1) = F(\beta X_{it}) = \frac{e^{\beta' X_{it}}}{1 + e^{\beta' X_{it}}} \tag{1}$$

where, *Crisis$_{it}$* is the banking crisis dummy variable for country i at time t, taking the value of 1 if there is a crisis and 0 otherwise, β is the vector of coefficients, X_{it} is the vector of explanatory variables and *F(βX_{it})* is the cumulative standard logistic distribution.

The log likelihood function is written as:

$$Log(L) = \sum_{i=1}^{n} \sum_{t=1}^{T} \left[crisis_{it} \log(F(\beta' X_{it})) + (1 - crisis_{it}) \log(1 - F(\beta' X_{it})) \right] \tag{2}$$

In selecting explanatory variables, we adopt the approach of Lambregts and Ottens (2006). Therefore, we range our variables into three categories, *i.e* macroeconomic, financial and external variables. This choice is in accordance with both the theoretical and empirical literature. Table 2 presents the list of all variables.

Table 2. List of variables

Category	Explanatory variables	Definition
Macroeconomic Variables	RIR	Real interest rate (%)
	EGRO	GDP growth rate
	INF	Inflation (%)
	BUDG	Budget balance to GDP

	HPEXCH	Real exchange rate overvaluation *
External Variables	CACC	Current account balance to GDP
	OPEN	Trade openness**
	USST	Short term US interest rate
	USLT	Long term US interest rate
	M2RES	M2/ Foreign exchange reserves (%)
Financial Variables	MGRO	Monetary growth (%)
	CGAP	Credit to private sector/GDP (%)
	DEBT	Short-term debt to external debt (%)

* Difference between real effective exchange rate and HP detrended real effective exchange rate (Hodrick and Prescott filtering parameter: lambda=104)

**The trade-to-GDP ratio is a basic indicator of openness to trade.

The choice of the macroeconomic variables- real interest rate, GDP growth rate, inflation, current account balance and the ratio of M2 to foreign exchange reserves- is consistent with both the theoretical and empirical literature on EWS models. This is because most of banking crises resulted from fragile macroeconomic fundamentals, such as high inflation, low economic growth and high real interest rates (Blalock *et al.*(2008)). External and financial variables are selected because they reflect the specificities of our country sample. Indeed, global financial imbalances are generally larger and more frequent in emerging countries and also tend to affect the economic environment, in which these countries operate. However, a key difference of our EWS model to previous works on the subject is the inclusion of the variable short-term debt to external debt. Kalotyhou and Staikouras (2006) and Gai *et al.* (2008) noted that portfolios of emerging banks have excessive public funds intended to finance external debts of the government. As emerging economies have large external debts, the variable short-term debt to external debt may have a significant power to explain banking crisis.

The EWS model to be estimated is the following:

$$Crisis_{it} = \beta_1 RIR_{it} + \beta_2 EGRO_{it} + \beta_3 INF_{it} + \beta_4 BUDG_{it} + \beta_5 HPEXCH_{it} + \beta_6 CACC_{it}$$
$$+ \beta_7 OPEN_{it} + \beta_8 USST_{it} + \beta_9 USLT_{it} + \beta_{10} M2RES_{it} + \beta_{11} MGRO_{it} + \beta_{12} CGAP_{it} + \beta_{13} DEBT_{it}$$

(3)

To get the final model specification, we use a general to specific approach. With this method, we start by estimating the general model given by equation (3). Then, we eliminate the statistically non-significant variables at each subsequent round of regressions to obtain, in the final stage, only the significant variables.

4. Empirical Results

4.1. Descriptive Analysis

Table 3 and Table 4 show the descriptive statistics and the correlation matrix, respectively for all variables used in model (3).

Table 3. *Descriptive statistics*

Variables	Observations	Mean	Std. Dev.	Min	Max	Jarque-Bera statistic
Crisis	234	0.197	---	0.000	1.000	92.803
RIR	181	5.245	4.961	-24.600	21.609	595.576
EGRO	231	4.030	3.828	-14.296	14.872	273.271
INF	231	2.032	0.296	1.991	2.199	634.165
BUDG	228	-0.446	1.888	-9.341	4.560	1066.778
HPEXCH	231	3.732	2.849	-0.328	11.780	73.054
CACC	211	-0.550	7.480	-19.738	28.443	67.818
OPEN	231	118.836	102.898	38.631	456.087	134.705
M2RES	231	4.235	2.677	0.900	20.397	10.397
USST	231	6.745	3.052	1.241	14.804	19.277

USLT	235	7.760	2.507	4.010	13.920	43.847
CGAP	224	64.050	43.631	8.821	210.417	311.253
MGRO	224	18.161	11.667	-43.738	71.912	42.717
DEBT	196	18.068	9.319	3.858	46.389	54.321

Table 4. Correlation Matrix

	Crisis	RIR	EGRO	INF	BUDG	HPEXCH	CACC	OPEN	M2RES	USST	USLT	CGAP	MGRO	DEBT
Crisis	1.000													
RIR	0.061	1.000												
EGRO	-0.228	0.196	1.000											
INF	-0.027	-0.526	-0.487	1.000										
BUDG	-0.019	-0.017	0.017	-0.069	1.000									
HPEXCH	0.098	-0.146	0.105	-0.013	-0.444	1.000								
CACC	0.178	-0.034	-0.099	-0.375	0.069	-0.046	1.000							
OPEN	-0.050	0.075	-0.006	-0.394	0.058	-0.282	0.776	1.000						
M2RES	0.146	0.022	0.058	0.089	0.148	0.264	-0.350	-0.512	1.000					
USST	-0.150	-0.117	0.007	0.338	0.269	-0.360	-0.434	-0.332	0.304	1.000				
USLT	-0.157	0.065	0.034	0.313	-0.284	-0.363	-0.469	-0.371	0.430	0.940	1.000			
CGAP	0.244	0.033	0.026	-0.457	0.154	-0.193	0.464	0.592	-0.142	-0.268	-0.315	1.000		
MGRO	-0.081	-0.103	0.002	0.375	0.022	-0.090	-0.348	-0.297	0.183	0.248	0.250	-0.191	1.000	
DEBT	-0.067	0.012	0.010	0.020	0.387	-0.324	-0.109	-0.053	0.134	0.252	0.257	0.323	0.068	1.000

As seen in Table 3, on average, 19.7% of Asian emerging countries included in our sample have experienced systemic banking crises. The analysis of correlation between variables reveals a strong dependence between the variables USST and USLT (0.940) on the one hand, and between OPEN and CACC (0.776) on the other hand. Asian countries are, usually, characterized by large proportion of exports and high degree of openness to international trade. Since current account balance include, among others, balance of trade and net income from abroad, an increase (decrease) in trade openness leads to an increase (decrease) in current account balance. This finding is in accordance with those of Romelli *et al.* (2014) who mention that more open economies experience a rise in current account.

4.2. Logit Estimates
The results of logit estimates are reported in Table 5.

Table 5. Estimation Results

Explanatory Variables	Model 1 Coef. Std. Dev.		Model 2 Coef. Std. Dev.		Model 3 Coef. Std. Dev.		Model 4 Coef. Std. Dev.	
RIR	0.035	0.068	0.057	0.067				
EGRO	***-0.328	0.125	***-0.301	0.112	**-0.319	0.108	***-0.347	0.110
INF	-0.387	1.541	***-2.605	1.107	*-2.387	0.915	***-2.315	0.885
BUDG	0.224	0.187	0.226	0.183				
HPEXCH	0.235	0.211	***0.374	0.179	***0.302	0.126	***0.355	0.122
CACC	**0.205	0.100	**0.159	0.083	0.950	0.060		
OPEN	-0.028	0.018						
M2RES	***0.556	0.226	***0.670	0.194	***0.613	0.161	***0.587	0.163
USST	-0.172	0.181						
CGAP	*0.039	0.022	0.021	0.014	***0.035	0.013	***0.043	0.012
MGRO	0.007	0.030						
DEBT	**-0.154	0.069	**-0.142	0.071	-0.178	0.062	***-0.215	0.063
Number of crises	45		45		45		45	
Observations	154		179		179		189	
Log likelihood	-46.880		-47.014		-55.001		-56.538	
Sigma-u	2.211		2.953		2.657		2.574	
Rho	0.597		0.726		0.682		0.668	
Wald chi2	23.480		23.860		26.058		25.630	
Prob>=chibar2	0.000		0.000		0.000		0.000	

*Significant at the 10% level   ** Significant at the 5% level   *** Significant at the 1% level

The most relevant macroeconomic variables in predicting systemic banking crisis are EGRO, CGAP, M2RES, INF, DEBT AND HPEXCH.

The estimated coefficient of EGRO (-0.347) is statistically significant at 1% level, indicating that slow economic growth is typically a signal for the emergence of banking crises. This is consistent with most studies such as Ostu (2008), *Gai et al.* (2008) and Gersbech and Wenzelburger (2008).

The coefficient of CGAP is positive (0.043) and statistically significant at 1% level. Indeed, the Asian crisis of 1997, as Agusman *et al.* (2008) mentioned, is a typical example of financial crisis. This is due to the emergence of a domestic boom in bank credit to finance private investment with uncertain profitability. Moreover, Asian banks are fragile as they are characterized by a poorly allocated bank loans and are unable to monitor their clients because of the asymmetry of information. This shortcoming has weakened the situation of Asian banks.

M2RES is positively correlated with the emergence of banking crises. The higher this ratio, the more vulnerable the economy. For the countries of our sample, the period during which the economy records a high growth rate of the money supply in the sense of M2 is usually a time of crisis. These results are in line with those of Moshirian and Wu (2009) who consider the ratio M2RES as an indicator of the banking system's power.

With regard to variables INF and DEBT, unlike our expectations, we find that both are negatively related to crisis. The variable INF is inversely related to the emergence of a crisis phenomenon In a rapidly growing economy, such as the Asian countries, aggregate demand including raw materials, labor, fuel, energy and capital increases quickly, which leads to higher prices and therefore to inflation. Although the rapid economic growth is often attached to monetary and credit expansion which is the direct origin of inflation, it plays a significant role in reducing the emergence of crisis. On the other hand, periods of crises corroborate, usually, with large volume of debts. Countries that have experienced crises were generally highly indebted economies. For the countries of our sample, the negative coefficient shows that the variable DEBT is not a reliable indicator of banking crises. In other words, the debt is not a triggering cause of crisis in Asian countries. These results are opposed to those of Suetorsak(2006), Gai et al (2008) and Deesmosak et al (2009).

Finally, the estimates of the variable HPEXCH show a positive relationship with banking crisis indicating that the occurrence of systemic banking crisis is driven by an appreciation of the exchange rate. Indeed, Thailand, one of the emerging countries of our sample, has triggered in mid-1997 the Asian financial crisis when it became unable to defend its overvalued currency, and has interrupted anchoring it to the US dollar, making, thus the Thai Baht floating. As the crisis has been spread gradually, the political leaders of Asian countries were forced to use their foreign exchange reserves to defend their currencies.

4.3. Robustness Checks: Hausman Test

After the estimates of the logit model, it would be interesting to test the specification of the individual effects of Lambregts and Ottens (2006) model through the Hausman test.

Hausman test is used to differentiate between fixed effects model and random effects model. Under the null hypothesis, random effects are preferred as estimated coefficients are efficient, whereas under the alternative hypothesis, fixed effects estimators are consistent, and then, preferred.

The statistic of the test is given by:

$$H = (\hat{b}_{MCG} - \hat{\beta}_{Within})'\left[Var(b_{MCG}) - Var(\beta_{Within})\right]^{-1}(\hat{b}_{MCG} - \hat{\beta}_{Within}) \qquad (4)$$

Where: $\hat{b}_{MCG}$ - MCG estimator, $\hat{\beta}_{Within}$ - Within estimator,

The results of Hausman test are reported in Table 6.

Table 6. *Hausman test results*

Variables	Coefficients			
	(b)	(B)	(b-B)	sqrt (diag(V_b –V_B))
	fixed	fixed	Difference	
EGRO	-0.3046090	-3.4776420	0.0431552	0.0562092
INF	12.3054200	-2.3159660	14.6213800	16.8627300
HPEXCH	0.2737286	0.3554971	-0.8176850	0.0459522
M2RES	0.6220054	0.5875762	-0.0344291	0.0478750
CGAP	0.0427216	0.0431070	-0.0003854	0.0098457

DEBT	-0.2071239	-2.1507960	0.0079557	0.0364873

b = consistent under Ho and Ha; obtained from xtlogit
B = inconsistent under Ha, efficient under Ho; obtained from xtlogit
Test: Ho: difference in coefficients not systematic
$chi2(6) = (b-B)'[(V\_b - V\_B)^{\wedge}(-1)](b-B) = 8.57$
Prob>chi2 =0.1993

Table 6 shows that prob = 0.1993>0.05. Therefore, the null hypothesis is approved, indicating that random effects model is preferred than fixed effects model.

5. Conclusion

The Asian crisis of 1997 was seen as one of the most terrific dangers to Asian emerging countries. This crisis was driven, among others, by the massive indebtedness of some countries that have over-invested in the 90s in unprofitable or very risky projects, particularly in the real estate sector. An important part of the private sector debt was contracted in foreign currencies (mainly in US dollars) without hedging. As currency risk was significant, a depreciation of the domestic currency against the US dollar increases mechanically the amount of debts. Therefore, these market imperfections weakened Asian banks which suffered deterioration in their balance sheets due to losses and the increase in impaired loans. This situation ended up with devaluation of local currencies which lead to the emergence of the crisis.

Faced with the recurrence of banking crises in recent decades, several regulatory authorities have developed some models in the line of early warning systems (EWS) in order to predict crises. These models of crises prediction enable decision-makers to identify economic weaknesses and vulnerabilities in order to take preventive measures to reduce the risk of appearance of a crisis. The aim of our paper was to determine the variables that may have a role in predicting banking crisis in 6 Asian emerging countries over the period 1973-2012. Macroeconomic, external and financial indicators of banking crisis were selected. Based on panel logit model, our results reveal that inflation has the strongest impact in predicting systemic banking crisis, while economic growth, real exchange rate, the ratios M2 by foreign exchange reserves, credit to private sector by GDP and short-term debt to external debt have a small effect. In order to enlarge the explanatory variables that may be associated with systemic banking sector problems, it would be interesting in further research to include other variables, such as financial liberalization, in explaining systemic banking crisis.

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Problems and Recommendations over Tax Policies

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Tax policy is a tool that state uses on economic, social and financial fields. Funding public expenditure is its financial goal, providing economic stability and development is its economic goal and contributing to fair distribution of income and wealth is its social goal. In result of high debt load, rupture between taxes and economic goals, being not established a document and registration order and lacking in management of administration and control functions, significantly increasing tax loss and evasion and factors such as unfair competition that it leads to show that our tax system is ineffective and have a negative influence in economic life. In order to succeed in tax policies, "taxes should be minimalistic, should consider the ability to pay with respect to income level, should prevent the luxurious consumption and waste, should decrease tax evasion and loss, should tax informal economy, should encourage export, employment and development, should be reformed in a permanent way and implementing tax consciousness into whole society" is inevitable.

Keywords: *tax policy, tax reform, tax evasion*

JEL Classification: *E62, H30, H26*

1. Introduction

Tax policy is a tool utilized by states in order to regulate economic, financial and social activities. As a financial tool, funding public expenses; as an economical tool, providing stability and development; as a social tool, fair distribution of wealth and income are the main objectives of tax policing.

A tax policy without compatible economic policy, besides its own failure, would have a negative effect in general policing thus compelling a tax policy which is in harmony with other policies (Doğan, 1984, p. 94).

The objectives of tax policing in developing countries include "cutting down the consumption or preventing it to increase in order to redirect economic resources to investments, encouraging to save or invest, to turn public investments which is necessary for development to increasing public savings' advantage, diminishing the economic gap between regions, industries and individuals, raising national income and providing a fair distribution" (Türk, 1988, p. 273); briefly, policies which reduce consumption, encourage savings and promote investments is beneficial in terms of development and stability.

2. Problems with the Tax Policies in Practice

For a long time, in governing policies of our country, the efforts made by other tools resulted in failure due to the omission of modern economic and social functions of taxing (Usta, 1994, p.72). The tax income fall short of expectations, mainly because of the belief that taxing system is unfair combined with the lack of effective measures in fight with the wasted public expenses.

While part of the public expenses is tried to be covered by the most reliable financial tool, tax income, the other part is tried to be funded by issues or indebtment (deficit financing). Excessive amount of debt and inflation, hiatus of relationship between tax and economic goals and unfair competition caused by tax incentives and exiles show that our tax policy is not efficient and affects the economic life negatively.

The causes of insufficient progress in tax collecting are: diminishing taxable income due to high utilization of tax incentives, being not able to set a document and registration order, high values of tax exile due to malfunction of management and monitoring devices.

Activities in informal economy are mainly caused by illegal activities (drug traffic, bribery i.e.) in developed countries but poor documentation of the process of a product from producer to the consumer plays a role in developing countries as well (Şimşek, 1994, p. 32). Besides its main function as a reliable financing tool, taxing is also used to manage economic and social policies and it is a very effective tool in achieving targeted goals.

Taxing is the state's most effective measure to intervene economic and social life (Nadaroğlu, 1985, p. 253). It is not only collected to finance public expenditures but also for achieving social and financial goals (Nadaroğlu, 1985, p.259).

Economic crisis is a serious threat on public finance. First, budgets suffer and burden of debt increases and finally sustainability of public finance gets much more difficult (Şahin and Akdemir, 2014, p.66). Therefore, in the times of economic crisis, expanding public finance policies which will not trigger inflation might be adopted. An increase in tax income could be targeted only after resulting employment and production increase with the help of these policies. Moreover, applying tax incentives to all industries and stimulation of investments and private expenditure might increase the efficiency of it (Bayrak and Kanca, 2014, p.290).

Tax policy was a key concept in overcoming economic crisis, accelerating coordination among member countries, economic development and reducing economic inequality and it is still a major concept. By tax policies, EU members try to restore the fragility that economic crisis creates and encourage employment and development.

Let's go through the policy applications at Ministry of Treasury, Revenue Administration Department (RAD) and tax offices:

Tax Audit and Inspection Coordination Commission is established with the executive order number 6009, section 33/B of Mission and Organization of Ministry of Finance (Yılı Bütçe Gerekçesi, 2011, p. 119).

The website of RAD is renewed and by 22 December 2008 it started to serve as New Internet Tax Office. Moreover, the scope of services is increased. One of the most important innovation is corporate entities and individuals could make transactions behalf of their grantors under the scope of their grant in Internet Tax Offices (Yılı Bütçe Gerekçesi, 2011, p. 124).

Under the scope of Electronic Bank Transaction Project (EBTIS), tax payments made to banks and PTT are sent to Information Technologies Department of RAD electronically and processed to tax payer's accounts electronically as well (Yılı Bütçe Gerekçesi, 2008, p.138).

In order to save from energy consumption, tools that save energy and expenditures to save energy in households and work places will be encouraged tax-wise. Incentives to increase production and investment on the variation of energy resources and renewable energy resources will continue to be developed (Yılı Bütçe Gerekçesi, 2014, p. 106).

The tax policy will be efficiently utilized if necessary to fight with elements, which are primarily national lack of savings and account deficit that threaten economic growth (Yılı Bütçe Gerekçesi, 2013, p.101).

Informality seriously affects the competitiveness of economy and prevents the structure of public finance work healthily. Therefore, the fight with informality carries an important role to eliminate the inequality in competitiveness of economy, to provide a safe route for economic development and to maintain a solid social security system (Yılı Bütçe Gerekçesi, 2014, p.123).

In this context, over the action 31 of program 2011, "The Action Plan of Strategy to Fight with Informal Economy (2011-2013)" is prepared and came into effect on 21/12/2011 in the official register No. 28149 with the mandate 2011/21 of prime minister.

With aforementioned mandate, the process of Action Plan application will be monitored by RAD, coordinators that are assigned to specific action will be reported to RAD every three months and these reports

will be inspected by monitoring and evaluation commissions of Action Plan developments (Yılı Bütçe Gerekçesi, 2014, p.123).

"The High Commission of the Fight with Informal Economy" is established with the relevant ministers who are assigned in the Action Plan. They gather at least once in a year in order to review, revise and decide over the developments in the Action Plan (Yılı Bütçe Gerekçesi, 2014, p.124).

Taxing informal economy, fair distribution of taxing with respect to ability to pay, simplification of tax legislation, effective inspection i.e. is still an active agenda in Turkey.

Encouraging direct foreign investment, supporting employment and export, obtaining a high competitiveness in international markets by developing the capacity to produce high value products will be in the primary objectives of tax policy (Yılı Bütçe Gerekçesi, 2009, p.108).

The main goal of taxation is funding public services. In addition to that, taxation has a role in economic and social activities. These functions of taxation enforce a constant up-to-date taxing system and structure (Yılı Bütçe Gerekçesi, gelir politikası ve uygulamaları, 2012, p. 117).

Tax Office Application Software are designed to reduce work load in tax offices by processing tax office transactions via computers, to increase efficiency and effectiveness in tax office works and to maintain a healthy decision-making, support and management information systems by collection information through computers (Yılı Bütçe Gerekçesi, gelir politikası ve uygulamaları, 2012, p. 122).

The problems with fine system and forgiving some of the fines still continue. In a broad sense, tax forgiveness could be defined as the removal of fines which are be applied to tax payers who do not follow tax laws. In other words, using tax forgiveness in the highest organization of a society, state, could mean waiving the right to punish as a sanction on the ones who are not following the laws which state put itself (Yalçın and Başer, 1996, pp. 104-106).

3. Recommendations on Tax Policies to be Applied

a. Effective precautions should be taken to maintain documentation system;

Information Technologies should be used for disseminating taxes which are prevailing financial resource for achieving economic and stability – development goals and for maintaing a document order. Using tax numbers or Turkish Identity numbers in every transaction, using bank cards, tracking tax payers in their taxable activities would have a positive effect on detecting tax losses and evasion.

Tax collection via internet banking through banks is finished. 24 banks are using this system now. Changes in the program over collecting taxes after maturity by banks are going to finish (Yılı Bütçe Gerekçesi, gelir politikası ve uygulamaları, 2012, p. 124).

In the period of 2012-2014 due to the legal obligations, documents needed to be prepared at least 2 copies. In order to prepare, store and present these documents whenever they are needed electronically, e-Arşiv General Declaration will be published and the scope and the application field of it will be expanded (Yılı Bütçe Gerekçesi, gelir politikası ve uygulamaları, 2012, p. 131).

With the project of e-beyanname which is an application of e-devlet, return forms and their attachments were collected via internet after 1/4/2004. It is started with 8 return forms and by January 2011, 35 different return forms can be collected via internet. Changes and innovations in the tax legislation or revisions made in return forms because of the needs of RAD become compatible with e–beyanname (Yılı Bütçe Gerekçesi, gelir politikası ve uygulamaları, 2012, p. 126).

With the project of e-beyanname which is an application of e-devlet, attachments such as declarations and balance sheets are collected via internet thus work load in tax offices is reduced and level of service to tax payers is increased. Accruements which are related to return forms are automatically processed to accounts of tax payers. Thus, the need of tax payers to come to tax offices is removed (Yılı Bütçe Gerekçesi, 2011, p.125).

The practice of one "tax number" for every tax payer which started in 1995 is changed with Turkish Identity numbers for real individuals after 1/1/2007. Therefore, using the MERNIS system tax numbers and Turkish identity numbers are matched (Yılı Bütçe Gerekçesi, gelir politikası ve uygulamaları, 2012, p. 121).

Using Turkish Identity numbers for real individuals and using tax number as a "Management Number" for tax payers who give service or good obligatorily and voluntary for other tax payers, allow an auto-control system over tax breaks which are applicable to expenditures made with credit cards and tax fines for the ones without any number (Can, 2003, p.98).

Law number 4358, section 4 over spreading Tax Number and Tax Rule Law number 8, last section gives Ministry of Treasure to use 11 digit Turkish Identity number for real individuals as Tax Numbers. The bill number 3 has published in the official journal in 1/1/2007. After this bill Turkish Identity number is started to use instead of Tax number (Yılı Bütçe Gerekçesi, 2008, p.141).

The practice of one "tax number" for every tax payer which started in 1995 is changed with Turkish Identity numbers for real individuals after 1/1/2007. Therefore, using the MERNIS system tax numbers and Turkish identity numbers are matched (Yılı Bütçe Gerekçesi, gelir politikası ve uygulamaları, 2012, p. 121).

b. Precautions needed to tax Informal Economy;

Registering informal economy is an important resource in increasing tax income and setting a fair tax system. Legal and administrative regulation should be made to contain informal economy within the formal system; moreover, applications and regulations which will cause tax payers to leave the formal system should be avoided.

In order to prevent unfair competition, increase competitiveness of economy and public revenue, there will be an effective fight with the informal economy. In this context, controls, capacity of application of administration and information infrastructure will be developed, fight with smuggling, cooperation between institutions and data sharing will be increased and public awareness will be raised. The works will continue for participation of all parts of the community within the frame of "Strategic Action Plan for the Fight with Informal Economy" (Yılı Bütçe Gerekçesi, 2014, p.105).

In the current tax laws, taxing tax payers more than it should be is the main policy in order to fund extra need of resource. Registering low-taxed or none-taxed parts of society with information Technologies will be beneficial to tax revenues.

All VAT tax payers are analyzed and graded for their risk of arranging fake invoices and compatibility to taxing with a software in the context of VAT Refund Risk Analysis Project (Yılı Bütçe Gerekçesi, 2011, p.118).

The legal and administrative regulations will be made to prevent tax evasion in the e-commerce. Works will continue for voluntary compliance to taxing and for expanding tax base (Yılı Bütçe Gerekçesi, 2014, p. 105).

Taxes are inarguably the most important factor in diminishing budget deficits. As a natural result, it is inevitable to increase the tax revenue. The real tax load is not due to items which are known as tax but due to public expenditures. The main issue here is to draw these loads into the legal tax system (Önder, 1993, p.21).

c. Agricultural section should be effectively taxed;

In Turkey, agricultural section is not taxed adequately (Avşar, 1989, p.42), thus tax evasion is high in this section. Therefore, revenues made in agriculture should be inspected and incentives, exceptions, exempts should be considered. Also, with an effective return system, evasion and losses should be registered.

In agriculture, products with high value and products as an industrial input should be increased, agricultural fields should be merged. Moreover, tax policies should be developed for scale economy in agriculture and support agricultural production (Yılı Bütçe Gerekçesi, 2014, p.105).

d. Precautions should be taken over the controls of tax evasion and loss, tax fine system should be more effective;

It is possible to take some measures in fight with tax evasion and loss. These could be categorized in three groups: legal, administrative, socio-psychological (Öner, 1991, pp. 78 - 95).
- Legal measures include "Providing a stability in tax laws, establishing public companies, developing tax security measures, more effective financial consulting as an institution, setting a document order and more effective fine system",
- Administrative measures include " Re-organization of tax offices, having a solid tax controlling structure, spreading information systems, solving the problems of staff in inspection and control",
- Socio-psychological measures include "presenting educational, enlightening, pragmatic information to tax payers to implement tax paying consciousness, developing control systems over tax evasion and loss, setting a document order and using tax number to register every transaction".

Informal economy, ineffective tax administration and control and structure of tax system are still major problems preventing an increase in tax revenue. Politicians have strong role to resolve these problems and expanding financial field. Tax evasion and loss have a negative effect on the size of financial field in many countries but especially in developing countries. An increase tax income is getting constrained when activities in formal economy move towards informal economy. Having not established a healthy tax policy after 1980 in the main problem of issuing and borrowing money and being financially dependent on foreign countries (Ulusoy, Akdemir and Karakurt, 2014, p.228; Ünsal and Durucan, 2014, p.43).

RAD continues to work in order to implement paying taxes is a civic duty, giving information on tax liabilities and rights, simplifying the tax paying process, conveying the correct information about tax laws and

applications to tax payers and providing a basis for voluntary compatibility by increasing level of service (Yılı Bütçe Gerekçesi, 2014, p.124).

It will be more effective to apply prison term instead of fines and to expand the context of administrative and legal crimes.

e. Reconsidering tax incentives which are important for export, development and production; exceptions, reductions and exempts;

Measures on tax incentives are not affective in development. After an evaluation of incentives in Turkish tax system, these measures (investment incentives, under-taxing rental incomes, export incentives, and measures to develop capital market) are found to be ineffective (Turhan, 1994, p.53).

While tax incentives and exempts create problems in tax operations, tax unfairness and inequality in income distribution increases and put pressure on low-income tax payers who are not benefiting from these incentives. The inability of monitoring the benefits of incentives and inability to compare these with the losses that incentives reduce the effectiveness of tax policies which are used to influence social and economic life (Öner, 2002, pp.188-189).

Paying tax expenditures which include incentives, reductions, exempts and offsets, in dividends to tax payers at the end of every year will give the opportunity to auto-control and to evaluate these loads to state. To apply this, it is needed to have tax return from every tax-payer (Can, 2003, p.98).

Incentive tax policies are used to format tax system in order to increase the profitability of investments. These redirections decrease the tax load on investment products and the tax incomes that will be gathered in future. Therefore tax policy is an important factor in determining the level of investment – employment (Uluatam, 1988, p.30).

The works will continue to evaluate exceptions, exempts and reduction financially, to removing or revise ineffective regulations, defining criteria for the upcoming exceptions, exempts and reductions, to evaluate application results and to give detailed information to public regularly on tax expenditures (Uluatam, 1988, p.30).

It is believed that incentives do not contribute to economy significantly in developed countries therefore restricted. However, it cannot be accepted as a fact in developing countries such as ours. Because we believe that tax incentives will have a positive effect on selected critical industries and activities. The applications to remove tax incentives in developed countries are done simultaneously with the regulations which aim to spread tax base and to decrease taxes significantly (Özen, 1993, p.20).

It will be beneficial to diminish bureaucracy and simplify incentive law and to evaluate it in terms of efficiency, productivity, investment and increase in export (Öner, 2002, p.188).

f. Minimum wage and other necessary minimum living discounts should not be taxed;

Since 1980, tax load on wage earners are increasing and this has a negative effect on work peace, economy and political life. Therefore tax load on wage earners should definitely be decreased. Some possible measures about it are (Akalın, 1990, p.8);

- Efforts should be put into development through private savings and private sector and part of the state should be decreased. Briefly, tax load should not be increased,
- A significant minimum living discount should put into service and it should be supported by a special discount,
- Some public services should be financed with user fees instead of taxes if applicable, financial discipline and effectiveness should be provided in resources, a financial model like in private sector should be achieved in public sector and income tax should not be a wage earner tax,
- There should be legal modifications to exclude minimum wage from taxes by conjoining minimum wage and minimum living discount,
- There should be a decrease in tax rates for both employees and employers. In the developed countries which decreased the tax rates experience an increase in tax income, competitiveness in the international market, the level of well-being of employees, investments of private sector and the economic activities (Yüksel, 1990, p.11).

A stable and extensive living discount should be considered in Turkey. Because applying a minimum living discount to all tax payers would encourage them to pay their taxes voluntarily by decreasing their resistance to pay taxes.

g. Modifications should made in tax rates by reconsidering them in today's circumstances and a soft increasing proportional structure should be regarded;

Decrease in tax rates are common practice in developed countries and an application in the opposite direction in Turkey would result with a decrease in tax income and shift towards informal economy because of the high and not efficient taxes (Akalın, 1995, p.101).

Proportionality is gradually lost in income tax rates after 80's. Low-income tax payers compose a broad section in the tax rates and their tax rate is not adjusted accordingly with inflation. Therefore an early increase occurs in tax rates of low income section because of the increase in nominal wages although there is no change in real wages (Bektaş and Gündoğdu, 2014).

The up end limit of tax rate should be decreased by 5% to 25%, sections of income taxes and their discounts should be proportional with an index which constitutes inflation rate and the capacity to develop per capita (Akalın, 1990, p.8).

Tax regulation should be reconsidered and the first section of it should start from a very low point. The number of tax levels should increase, the rates of increment should be readjusted and the tax over tax payers with low and stable income should be decreased in the times of high inflation (Coşkun, 1990, p.19).

h. Reforms are in need for reorganization and effectiveness of tax offices;

Even the tax laws are regulated in order to achieve financial, economic and social goals, if the tax offices are not capable of applying these laws, tax system would fail to reach the expected results (Turhan, 1994, p.54).

In this regard measures need to be taken to apply tax laws effectively and to monitor taxes in the tax offices.

In order to minimize the relationship between tax payers and tax offices, "regulations to reduce the number of visits to tax offices by tax payers; and as part of it, combining some refund files, increasing the tax fines by limiting the scope of the concept of economic penalty for economic crime, encouraging early tax payments, limiting cash payments starting from taxable transactions, resolving the issues with incidents that creates tax, applications of suspicious account receivable, rediscount of postdated checks and donations and contributions, identifying the status of new financial instruments such as leasing, forfeiting, factoring, bartering, forward, swap etc., a tax low for transactions that occur in electronic media and e-commerce" (Can, 2003, p.100) are important.

Overcoming economic crisis compels the need to establish an order in public finance which is already not in a good situation. Reform in tax law is brought to the agenda because of the need of effective taxing. Despite that, instead of establishing a new rational system according to our taxing practices and our economy, the goals such as grasping informal economy, spreading taxes over base and increasing tax revenue (Cesur, 1994, p.64), are tried to achieved by adding new rulings to the existing tax law and cancelling some of the rulings

The regulations are being made continuously in the tax policy of our country for an improvement both structurally and as a system-wise and tax policy is being oriented in the direction of the needs of the country. The main purpose of our tax policy is supporting development and employment policies, diminishing informal economy and establishing a tax system which is effective, simple and consistent with macroeconomic policies at the same time. In order to achieve these goals, RAD is founded under Treasury Ministry with the law 5345 in 16/5/2005. The most important aim of the RAD is to ensure a full and in time payment of taxes by providing a basis for voluntary compliance with taxes (Yılı Bütçe Gerekçesi, gelir politikası ve uygulamaları, 2012, p.118).

The RAD should be an independent institution and authorizations which belong to central bureaucracy should be transferred to regional tax offices that should be established. The Works planned in this direction are as follow:
- "Feedback Service" is started by Tax Communication Centre (VİMER-444 0 189), which serves in issues with consultation, denunciation management and Motorized Vehicle Tax,
- "SMS Information System (1189)" which is developed to increase the variety of data distribution methods and the speed of the information that will be declared to public, is a service to give notification to users automatically and allow users to inquire information. The service will continue to work and will be spread among public.

The works will continue to extend the services available and to increase accessibility in the RAD webpage (Yılı Bütçe Gerekçesi, gelir politikası ve uygulamaları, 2012, p. 119).

Recommendation, Denunciation and Management System Based on Process will be established to increase the effectiveness and efficiency of RAD and the level of satisfaction of the tax payers. The last week

of February is celebrated as Tax Week for a better adoption of taxes in whole community and the habit of tax paying. The events held throughout the week will be increased to alter the attitudes of tax payers, public and students and their perceptions of taxes in a positive way (Yılı Bütçe Gerekçesi, gelir politikası ve uygulamaları, 2012, p. 121).

In developing countries, the attempts of reform of tax system only considered in the times of economic crisis. In theory, extensive reforms would allow tax system to achieve its goals of simplicity, effectiveness, justice and development. In real life, since the results of an extensive reform would only benefit in the long term, it is difficult to persuade politics in such reforms. Therefore, in many studies only marginal reforms are exercised (Shirazi and Shah, 1991, p.462).

An institution compatible with the technical properties of tax reforms and tax services should be established, authorizations should be spread from bottom to top, bureaucracy should be diminished and an administrative structure which has a good relation with the tax payers should be provided (Öner, 1991, p.88).

i. The distribution of tax load which is opposed to wage earners should be improved with effective measures;

Terminating the tax accumulation on the wage earners and decreasing tax burden on employment would be a good decision because Turkey would not progress, increase its employment or industrialized with the tax load up to 40% on minimum wage (Akalın, 1995, p.103).

Wage earners should be able to file refund theoretically and they should able to benefit from discounts that commercial profiteers are, such as education, health and interest on debts. The number of tax payers who make money besides their wages should be increased (Akalın, 1990, p.8);

Public finances should be disciplined before increasing taxes. If user fees and making each electorate a tax payer are not involved in our system, every increase in revenue would be insufficient (Akalın, G. 1993: 28).

Decrease in taxes on registered tax payers who are industrialists, merchants or wage earners is necessary. It is a known fact that if untaxed parts of community are not contained in the system, increasing taxes on registered tax payers would not increase tax revenue but decrease it.

Therefore, resolving the issues on the unfair distribution of taxes instead of increasing them is a primary topic. In Turkey, a tax reform that aims to have a system which depends on social justice and economy is much needed. The regulations so called tax reforms should not be formed to increase tax types and rates but to expand the taxable base and fair distribution of tax loads (Aktürk and Gökbunar, 1996, p.145). Moreover, the main reason that we have low tax revenue in Turkey is not the inadequate tax types or rates but it is being not able to register and tax the informal economy.

j. Tax laws should be simple and understandable; they should be stable with the fundamentals of legislations;

Frequent changes in the tax laws and being not able to tax informal economy shows that our taxing system is not effective enough (Cesur, 1994, p.69); therefore, building a balance in public finance constantly, overcoming the economic crisis, rebuilding the tax laws and judiciary rationally in accordance with Turkish taxing techniques and our economy such that it will not need any frequent changes and effective and fair taxing in this context are needed to be provided.

Fix taxes and fees are going to be updated considering economic situation (Yılı Bütçe Gerekçesi, gelir politikası ve uygulamaları, 2012, p. 99).

Using VAT is a common practice in tax reforms in developing countries (Shirazi and Shah, 1991, p.465). However in order to succeed with VAT; all sectors besides health, education, social development, banking and insurance sectors should be included in the tax system; to protect low income people, food, requisite consumer products, medicine, electricity, fuel, newspapers, books and public transportation services should have a discount, taxing luxurious products should proceed with a Special Consumption Tax.

The works that aim stabilization and simplification in the applications of tax laws will continue with considering fundamental tax laws (Yılı Bütçe Gerekçesi, 2014, p. 105).

Definitely, the goal of the tax system is distributing the financial burden of public expenditure fairly on individuals and diminishing the negative effects of tax on community. To reach this goal, every tax system should possess fundamental principles of reasonability, equality, fair distribution of tax load, encouraging savings, promoting work, comprehensibility and simplicity (Hacıosmanoğlu, 1995, p.4);

While regulating the tax laws, taxes should be taken according to power of tax payers and depending on a fair and balanced distribution; regulations should be understood easily by tax payers and they should have

the sufficient conditions for carrying out the formal properties of taxes (definition, notification, accrual and collection).

In addition to this, having tax laws which are not confusing or puzzling, rearranging tax incentives, exceptions and discounts, stabilizing it with no further frequent adjustments would be a significant simplification in terms of tax regulation and application.

k. Politicians must believe in the importance and effectiveness of the taxing;

How technically perfect works have been done in taxing, these regulations and changes should be demanded by "political will" (Yeni Düzenlemeler, 1992, p.17). Because the political will should clearly decide and put this decision into real life strictly to reduce tax evasion and loss, to face with all taxable capacity and to register the economically active but not taxed sections which counted as hundred thousands.

Being successful in these regulations and changes depend on the steady coordination of the units which apply these regulations. Lack of necessary coordination between units would result with misinterpreting the regulations and would create problems in achieving expected goals (Bal–Ak, 1994, p.77).

Therefore, the success of changes in the regulation strictly depends on the ability the collect revenue (and political will of course) by correct and effective application (Shirazi and Shah, 1991, p.469). This situation must be reflected to all efforts in choosing between alternative techniques as fundamental criteria which emphasize on simplicity in design and application. For example, additional theoretical and applied studies would have potentially significant benefits in terms of tax reform.

l. There should be effective measures in implementing tax consciousness into whole society;

In order to develop and implement tax consciousness in children, "verGİBilir: Education of Developing Tax Consciousness in Children" handbook for teachers and students in 3rd, 4th and 5th grade is published with the agreement between Ministry of Education and Treasury.

With the protocol, guidance counselor chosen by Ministry of Education will give education to primary school students (Yılı Bütçe Gerekçesi, 2010, p. 130).

In the context of studies in providing voluntary compliance to taxes:
- The education towards students will continue to develop tax consciousness.
- "www.vergibilir.gov.tr" will be revised and entertaining games for children will be implemented to the website.
- Supplementary materials will be provided for the education of tax consciousness.
- A character and cartoon for tax will be built and this will be carried out with TRT (Yılı Bütçe Gerekçesi, 2014, p.125).

m. Tax Policy should have a supportive role in employment;

Tax system should not possess the properties that encourage illegal working and that constrict employment. Decaying structure of economic and social life, negativities in domestic and international competitiveness, thoughts in avoiding investments by local and foreign investors, high level of unearned income are the major factors in expanding unemployment problem in Turkey (Eratlı, 1995, pp.8-9). The fundamental way of increasing employment is finding resources for investment and transmitting this resource to economy as soon as possible. It is inevitable to invest in human resources to be competitive. Instead of increasing job opportunities artificially, permanent jobs should be provided. Increasing the ability to compete of companies, providing flexibility in labor laws, subsidies for investment and measures for increasing export are the important factors of encouraging employment.

Labor is one most important factor in economic development. The growth rate of the production capacity depends on the efficiency of labor and volume of employment with the volume of investment and its effective capacity. The first thing that comes to mind, when the relation of tax and labor supply is mentioned, is the relation between wage, equivalent of labor, and tax. Especially when tax is applied onto wage, labor supply and ambition to work might decrease. However, an income tax which is increasing with high rates would lead to income effect to make a living or finding new ways of income (Coşkun, 1990, p.13).

In order to increase the competitiveness of manufacturing industry and to have a bigger slice in world trade, tax policies that decrease the costs of energy and raw materials, provide security, increase the quality of employment are going to be developed. The tax policy works will continue to provide activities in research and development, to increase investment, employment and export, to develop value added products that would compete in the international arena (Yılı Bütçe Gerekçesi, 2014, p.105).

The public revenue policy in 2014-2016 will be carried out to encourage employment and investment, to increase domestic savings, to decrease regional differences in development and to increase the

competitiveness of the economy. Having a solid and constant resource for public financial system is the main goal (Yılı Bütçe Gerekçesi, 2014, p.105).

At this point, it is important to increase employment, to decrease unemployment, to invest more in order to provide job opportunities of the unemployed and to back these investments with selective tax policy.

The detection and passing the necessary regulations will continue in order to employ more woman, young and disadvantaged groups in the labor market, to provide extra employment by companies and to prevent informal economy (Yılı Bütçe Gerekçesi, 2014, p.106).

n. A Simple, Comprehensible and Permanent Tax Reform is needed to provide a solution for general problems;

The goals of the tax reform are diminishing the inequality in distribution of tax load and rationalizing the functions of tax system. In general there are three criteria in the evaluation of tax systems. These are effectiveness, simplicity and justice (Aktürk and Gökbunar, 1996, p.141). The tax systems that increase the level of development of a tax payer by increasing the tax revenues without decreasing the tax level of another tax payer are effective. Simplicity is the ability of tax system to introduce itself. Although justice criterion is not fully defined, it is one of main reasons of tax reforms.

Besides the domestic and international changes and developments factors that a tax system belong to, the increased expectancy from a tax system in order to provide an over-all development, the debates over tax reform is in the agenda in Turkey which is changing swiftly and expanding its horizons (Usta, 1994, p.72).

One of the specific areas of the tax reform is environment. It is aimed to provide an environmental quality and effective tax system through ecological tax reforms by increasing taxes on dirty products and decreasing taxes on clean products. "Fuel with lead tax", "Energy carbon tax" Carbon dioxide tax", "Package tax", "Emission tax and other similar taxes are brought to public agenda and discounts over tax assessments for investments which prevent contamination, are provided (Aktürk and Gökbunar, 1996, p.142).

At this point, "in the context of fight with increasing air contamination and climate change, there will new regulations on special consumption tax and motorized vehicle tax concerning emissions of motorized vehicles" puts the importance of the subject (Yılı Bütçe Gerekçesi, 2014, p.106).

Recently, in developed countries, since taxing interest is seen as ineffective, discouraging and as restricting development in tax systems in practice, reform proposals encourage capital and income (Aktürk and Gökbunar, 1996, p.144). These countries are moving to a tax system which is broad based but not increasing proportioned consumption tax" especially.

Tax reforms consist of the important part of financial reforms and they are the main goal of the stability programs. A tax reform based on the real income and the principle of horizontal tax justice is recommended to developing countries such as Turkey (Akalın, 1994, p.8).

It is inevitable to reform taxes as economy, society and politics change because of the historical changes in the economic and social developments of countries. As a result of social transformations, tax systems which are a resource sharing tool, might change in time and have different form. Reforming taxes in order to follow changes in social and economic structures are always in agenda although its importance and dimensions might differ (Aktürk and Gökbunar, 1996, p.139).

The reliability of tax regimen is the key of success in tax reform (Shirazi and Shah, 1991, p.462). A determined tax policy encourages companies to have long-term point of views in their investments and finance. Changes in the regulations should be critically considered then the changes should be applied and these changes should be presented as a long term strategy. Job safety issue, introduction part, analysis of reforms, advanced consultation and having a reasonable time before application should be considered very carefully.

It is already present that instability is not prevented by recent revenue policies because malfunctions in the application are far from solving the problems (Yereli and Egeli, 1993, p.58). Thus it is compulsory to dramatically change the regulation and innovating new alternatives in taxes especially.

While defining the regulations which will be carried out to achieve expected goals in tax reform, taking account of the whole tax system; it is necessary in this point to have legal and administrative regulations in order to reach an effective, fast and fair interoperability. In contrast, because changing some sections in the law or considering only some issues could not be regarded as reform, in tax laws and other legislations, in RAD, in tax judiciary and in tax control, strong regulation are in need.

It is compulsory to make regulations to increase tax revenue undoubtedly in economic crisis periods. However, this increase should be realized by not increasing rates but by fighting with tax loss and evasion effectively and by providing a basis of consciousness and trust such that constitution foresees "tax by economic power" (Can, 2003, p.102).

State is taxing fixed wage earners and minimum wage earners heavily. Minimum wage earners are not taxed or lightly taxed in developed countries. The biggest portion of the tax revenue comes from direct consumption products. Companies could not be taxed. Tax revenues are mainly collected from middle class, lower class and fixed wage earners (Dayıoğlu, 2012).

The economic and financial programs followed after 80's foresees an export oriented transformation by funding private sector and cutting domestic demand down. The tax load continuously shifted onto lower income tax payers relying heavily on indirect taxes in order to compensate for resource loss due to support the program of cutting domestic demand down (Bektaş and Gündoğdu, 2014).

The shift from direct taxes which enables to tax high income sections more to indirect taxes caused a more imbalanced tax revenue (Kazgan, 1990, p.12)

In order to achieve success in policies, the important issues are "preventing informal economy, heavily penalizing tax evasion, having no more tax peace, monitoring taxes effectively and independently, implementing the consciousness that paying taxes is the most important duty of citizenship" (Dayıoğlu, 2012).

A good tax system should support the economy for development, not affect the income distribution in the opposite way, follow and grasp the transformations in income, expenditure and wealth, be fair and efficient enough to finance public services. It will be definitely effective to reinforce tax administration, to speed the tax judiciary up and to fill the gaps in the system to reach tax capacity (Çakmak, 2003).

Tax policies that would prevent the negative effects of taxes on income distribution are shifting from direct taxes to indirect taxes, applying indirect taxes by tax schedules, leaving out the unnecessary and excessive exempts and exceptions from indirect tax regulations, not taxing minimum and low income wage earners and taking measures to remove the negative effects of inflation on low income sections (Bektaş and Gündoğdu, 2014).

In the context of providing a financial discipline and sustaining it, in the field ox tax management, "tax practice laws should be regulated with one law, income and corporal taxes should be merged, restricting exempts and exceptions, decreasing special consumption tax to a reasonable level, removing highly bureaucratic and ineffective heritance and transfer tax, stamp tax, bank insurance process tax and some other fees (passport and diploma fees i.e.) and a financial process tax shoul put in to service instead of them (Akyel and Söyler, 2014, p.107).

4. Evaluation and Conclusion

Tax policies which are used to finance public expenditure, to provide an economic stability and development, to utilize resources, to render fairly distributed national income among all income levels and more, have an important role in economic and social order of countries

Tax policies to reduce the demand in short term in fight with inflation and tax policies to increase the supply in long term, consist the applications of encouraging efficient investments for development, penalizing consumption and reviving the economy in deflationist environment with exceptions and exempts.

In order to fill the gap between low income and high income groups, taxing the high income more and taxing the low income less and transferring this revenue to disadvantage sections of the society presents the social role of tax policies.

With tax policies, for budget deficits, low level of investment, unemployment, unequal income distribution and inflation:
- Decreasing inflation
- Measures to promote export
- Encouraging investments and savings by using resources effectively and efficiently,
- Penalizing extravagance, waste and luxurious consumption and supporting productivity,
- Removing unfairness of income distribution,
- Preventing unfair taxing against wage earners,
- Decreasing tax evasion
- Financing public services and expenditure reliably are possible.

In order to be successful in tax policy which is an important tool of financial policy, it is important that "taxes should be less in numbers and simple, should consider the ability to pay with respect to income level, should prevent the luxurious consumption and waste, should decrease tax evasion and loss, should tax informal economy, should encourage export, employment and development and reforming the tax law in a simple, comprehensible and permanent way and implementing tax consciousness into whole society."

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Money and Physical Capital Relationship: McKinnon's Complementarity Hypothesis on Turkey's Economy

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A complementary relationship between money and physical capital, emphasis on liberalization, financial liberalization theory and increased real interest rates will lead to a surge in money demand and investment. In this research paper, the validity of this hypothesis, which is also known as McKinnon's complementarity hypothesis, in terms of financial liberalization policy has been tested empirically to examine the performance, money demand, interest rate and investment size in order to attempt to designate the respective relationship in Turkey. In this study, over the period of 1999Q1-2014Q4 in Turkey, the relationship between money and physical capital for available data is investigated through the BOUND and ARDL test methods. Empirical analysis of the findings suggests that Turkey's economy is based on a limited complementary relationship between money and physical capital.

Keywords: *financial liberalization, McKinnon's complementarity hypothesis, money and physical capital, Bound test and ARDL method*

JEF Classification: *G32, F38, F40*

1. Introduction

1970's financial repression policies presented appropriate policy recommendations for developing countries to achieve high growth rates, simplifying the interest rate by keeping at low levels that increase an investment. This policy was based on Keynesian economic policy, the decline in return on money against demand for real money leads to a change in favor of the demand for real assets and, thereby, the substitution relationship between money and physical capital.

Eric J. Pentecost and Tomoe Moore, (2004) tested the McKinnon's complementarity hypothesis on India over the second half of the 20th century, by using multivariate econometric techniques and found strong support for the hypothesis and it resulted that financial liberalization policies are effective as a mechanism to increase the rate of capital formation in India.

Developing countries would not have the anticipated results in these types of low interest rate policies due to slow rating of financial markets. McKinnon (1973) and Shaw (1973), in their independent works argued that abandoning the interest rate that have taken up measures to restrict the practice, should be determined under free market conditions and out of the financial liberalization hypothesis. According to this hypothesis, it would encourage financial savings as a result of implementation of the liberalization of the market and would increase real interest rates, along with increasing the amount of resources used for the financing of investment. Thereby, it would be expected to achieve economic growth.

Hafeez et al. (2005) tested the McKinnon and failed to find the evidence of complimentarity between money and capital. Moore (2009) extensively tested the McKinnon's complementarity hypothesis in more than 100 developing countries by using panel cointegration and IV econometric techniques through empirical results and found that a real rate of interest has a positive effect on money and investment; hence McKinnon's investigated hypothesis on the significant financial conditions in the development process is conciliated. Amaira Bouzid (2012) examines empirical analysis concerning McKinnon-Shaw complementarity's hypothesis for Arab countries and found that an increase in the real interest rate would lead to accumulative of the money balances.

In this context, the increase in a real rate of return of money in other words, interest rates, the relationship between money and capital as well as a demand for money will increase demand for real assets and investments, both of which demonstrate a complementary relationship. In the literature, the validity of this hypothesis also named as McKinnon's complementarity hypothesis, the financial pressures and many applications after financial liberalization took place in a sample which has been tested in many countries in line with the experience of working with different analysis methods.

This is the small number of empirical studies that deals with the validity for Turkey's economy hypothesis and limits the validity of a quarter-term data over the period of 1999Q1 - 2014Q4. Demand for money using the ARDL methods seeks to determine the relationship between the volume of investment and interest rates, which will be tested in the context of the article. From this point, our work consists of the following sections: Firstly, in the Introduction, the McKinnon theory and financial liberalization hypothesis gives the main recommendations in accordance with the opinion of Shaw. The 2nd section describes the theoretical background of McKinnon's complementarity hypothesis. Following, the 3rd part of the analysis of the data set used in the empirical analysis is discussed in the methodology section that tests the limits and ARDL method. The results given in section 4, are thereafter evaluated in the 5th section.

2. Hypothesis of Financial Liberalization

The prevailing opinions in the economic literature until the early 1970s, a clear inference could not be made about the relationship between the economy and interest rates, but there is a negative relationship between investment and interest rate.

Keynesian theory and its development with the support of low interest rates in emerging countries, investment spending and increase of economic growth yields sophisticated results. Although the empirical results point to different findings on the interest rate, sensitivity of the investment, increase of investment at low interest rates in developing countries have accepted the suggestion that a suitable policy should be executed. At this point, in financial repression policy use, this is the best policy recommendations that can be implemented in order to maintain the low level of real interest rates (Fry, 1989, p.13; Molho, 1986, p. 90).

Tobin (1965) mentioned the portfolios of individuals in an environment remained high as the interest rate will greatly reduce the economy in the capital-labor ratio due to the allocation of money, and the economy reduces the income of the person, even though if there is a full employment level. Financial inducible applications with low interest rates keep the currency unfavorable and produce a result in favor of physical capital that leads to a rise in the capital-labor ratio in one's economy and thus it supports economic growth (Fry, 1989, p.13).

The approach of neoclassical economists on money considers that the decrease in return on money and the financial pressure in developing countries lead to lower economic growth rate. The validity of the assumptions of McKinnon (1973) and Shaw (1973) for developing countries are still under consideration excluding high yielding investments because such applications will create a priority for capital-intensive projects, future savings will be negatively affected and thus savings will be reduced quantitatively and qualitatively.

These movement explanations of 'neoclassical finance theory' and 'financial liberalization theory', a version that has been adapted to the developing countries is in line with the theoretical background of the

constituent descriptions of McKinnon and Shaw and the work they have done in 1973 (Williamson and Mahar, 2002, p.8).

This practice of low interest rates applies to certain sectors of bank credit, inefficient forms of dissemination of credit by providing the scarce credit resources of commercial banks that further create public deficits, while the economies of other financing need moneylender, that is a policy type that is obtained from weak sources such as cooperativeness, known as financial repression (McKinnon, 1973, pp.68-69). Applications that prevent the determination by the market of policy rates "interest checks and capital flows restrictions" as it is implemented in two different areas, including domestic and international (Williamson and Mahar, 2002, p.7).

Accordingly, making arrangements for transactions to be made by some of the state's financial institutions under a certain economy, to have ownership of some banks and applications, such as imposing restrictions on international capital flows is the implementation of repressive policies in that country (Williamson and Mahar, 2002, p.15). McKinnon's (1973) deposit and loan interest rates affect growth through the ceil of savings and can implement the financial repression policy via placing investments, in line with the relationship between money and physical capital, in other words, investments have adequate support to many empirical studies.

We can give examples of these studies by following Fry (1978, 1979), Harris (1979), Khan and Hassan (1998), Laumas (1990), Moore (2009), Pentecost and Moore (2006), Natka (1999), Thornton and Poudyal (1990), Odhiambo (2004), Watson (1992), for the the demand for money in their work across different countries and time zones, however they do not point to a common conclusion about the relationship between investment and profit. From the perspective of the studies investigating the relationship of complementarity for Turkey's economy, Pentecost (2000), indicated the complementary relationship between money and physical capital. Hepsağ (2009) reached a result and provided evidence against this result.

This interaction between different signs of the movement of investment and money demand should be noted that only support the empirical findings contrast with each other because of differing aspects. However, the country is successful in all the ways associated to the liberalization of financial markets as the congregational findings of these studies generally rejected this hypothesis, although the analysis methods used in the study of the period for Turkey's economy and countries experiencing problems in the financial liberalization often it is being said that the applications are accepted.

3. Theoretical Framework of McKinnon's Complementarity Hypothesis

According to McKinnon's extra investigational study, deep financial markets in developing countries and the lack of financial intermediation system balance should be deposited before investing their money because of the physical capital amount. In order to finance the investment projects of a company, they are determined by the savings they hold in the form of monetary assets and is considered as a highly decentralized structure because independent savers (McKinnon, 1973, pp.57-58).

According to McKinnon, in developing countries due to those reasons, investors can benefit from the more internal financing facilities (McKinnon, 1973, pp.59-60). In this context, McKinnon accepts the money as a tool for accumulation of capital, and therefore assumes a relationship of complementarity between money and physical capital (McKinnon, 1973, pp.57-61).

Neo-classical money demand function, although not claimed to be complete in substitutability between money and physical capital as McKinnon speaks of the existence of a complementarity relationship between money and capital (McKinnon, 1973, p.59). This complementary relationship, in other words, the increase in the return on investments, the physical capital stems from increasing the required amount of money that will be reflected in the real money stock (McKinnon, 1973, p.60; Shaw, 1973, p.71 cited in Ozsahin, 2011). If a rate of return rises or possession of money declines in the opportunity cost, and if the money would be a more effective means of accumulating value of securities, then the investments will emerge with positive interaction between the consumption of domestic financing and the remainder will be financed by the investors themselves, who can achieve savings by taking the cash and investments.

The relationship of complementarity between money and physical capital can be more easily explained through equations 1 and 2 (McKinnon, 1973, p.59):

$$\frac{M}{P} = (Y, r, d - P^*) \qquad (1)$$
$$\frac{I}{Y} = (r, d - P^*) \qquad (2)$$

According to the complementarity hypothesis real money demand (*M/*P), real income level (*Y*), real deposit interest rate (*d-P**), and average real return of capital (*r*) are positively correlated. The average real rate of return of capital (*r*) and real money demand the (*M/*P) means that there is positive relationship between the complementary relationship between money and physical capital. But this relationship refers to only one aspect of the complementarity hypothesis. Also, the ratio of investment's income to the complementary relationships of McKinnon (*I/Y*) and the real rate of return of money's balance should be positively correlated. Thus, bank deposits increase in their rate of real return (*d-P**) along with real money demand (M/P) that increase the complementarity relations in accordance with the investment ratio which will also increase between the growing demand for real money in investments (*I/Y*) (Pentecost and Moore, 2006).

One of the main problems in testing the complementary relationship is the difficulty in calculating the average yield of the capital in real terms. According to McKinnon (1973), the average real return of capital may be used in the ratio of income instead of investment in order to overcome additional difficulties.

McKinnon's entry-level model cannot borrow to finance the investments of individuals and therefore acts from the point where there is a need to increase their savings before investing. The expansion of credit facilities as a result of financial liberalization eliminates the need for making savings before investments. McKinnon's entry-level model in the context of financial liberalization policies can be rewritten as follows (Pentecost and Moore, 2006):

$$\frac{M}{P} = (Y, \frac{I}{Y}, d - P^*) \tag{3}$$
$$\frac{I}{Y} = (\frac{DC}{Y}, d - P^*) \tag{4}$$

Equations 3 and 4, located in one of the parameters real money demand (*M/P*), real income level (*Y*), ratio of the income of investments (*I/Y*), real interest rates on deposits (*d-P**), and (*DC/Y*) of the private sector credit to GDP represents the ratio. '*L*' is correlated with the demand for money in the process of capital accumulation in the direct model.

According to the partial derivatives of each of the variables in *L*'s equation is a positive value. Especially $\frac{\partial L}{\partial(\frac{I}{Y})}$ is greater than 0 is an indication of a simple complementary relationship between money and physical capital (McKinnon, 1973, p.59).

The neo-classical money demand function does recognize the relationship between money and physical capital substitution. This substitution relationship indicates and carries the meaning that hinders the accumulation of physical capital, the size of the real cash balance and a negative impact on the capital's demand for money as well as increasing the real rate of return. Individuals' increase in capital return rate will move to physical capital that are more profitable than their money and assets and an increase in the real return on possessing money, each Y will run level reducing effect on the demand for physical capital. This situation arises as a result of the substitution relationship between envisioned by the neo-classical monetary approach and capital (McKinnon, 1973, pp.44-45).

4. Data Set

Data set is taken as a series on a quarterly analysis that is selected based on econometric models that we developed between a periods of 1999Q1-2014Q4. Analysis of the variables series are collected through Electronic Data Distribution System of Turkey's Central Bank. Eviews 6.1 packages are based on econometric models that we developed using logarithmic transformation analysis and their application are made through the series.

Models in order to investigate the complementary relationship between money and physical capital McKinnon (1973), it can be summarized as following.

$$\frac{M}{P} = (Y, \frac{I}{Y}, d - P^*) \tag{5}$$
$$\frac{I}{Y} = (\frac{DC}{Y}, P^*) \tag{6}$$

Equations 5 and 6 represent (*M/P*) real money demand, (*Y*) real income level, $(\frac{I}{Y})$ the ratio of the income of investments, (*d-P**) real interest rates on deposits and (*DC/Y*) the GDP ratio of private sector credit.

Demand and real money are used to calculate the consumer price index, the real income. Money supply for the variables of the money demand M2, real GDP values for 1999 with a base price of real income are used.

The expected inflation rate has been increased interest rate for the calculation of real interest rates on deposits. Achieving the expected inflation rate while benefiting from base year 1999 GDP deflator $\frac{X_t - X_{t-1}}{X_{t-1}} \times 100$ and inflation rates are calculated with this formula.

5. Methodology

Granger and Newbold (1974) estimated regression models using non-stationary time series and the coefficients obtained from these models and found in conclusion that they reflect the actual signs of the relationships. Thus, it is of great importance that the research data be subjected to a series of stability tests performed using serial analysis. The ADF and PP tests are most frequently used in the literature for testing the presence of unit root in the series and have been used in this paper, for this purpose.

5.1. Unit Root Tests

By applying the Dickey and Fuller (1981) procedure, ADF test models are to be estimated in the practice of Equation 7, 8 and 9 as they have been expressed as follows:

$$\Delta Y_t = \delta Y_{t-1} + a_i \sum_{i=1}^{m} Y_{t-1} + u_t \tag{7}$$
$$\Delta Y_t = \beta 1 + \delta Y_{t-1} + a_i \sum_{i=1}^{m} Y_{t-1} u_t \tag{8}$$
$$\Delta Y_t = \beta 1 + \beta 2t + \delta Y_t - 1 + a_i \sum_{i=1}^{m} Y_{t-1} + u_t \tag{9}$$

Located in the error term u_t and Y_{t-1} represent the dependent variables' values in the delay period. The presence of a unit root in the ADF test implies that δ's testing with the calculated values are not equal to zero and reaching this decision implies comparing them with the critical values of McKinnon (Gujarati, 2004, p. 817).

The decision we have reached is to reject the null hypothesis of the calculated values, in other words for the acceptance of the stationary series of the alternative hypotheses must be smaller than the critical statements.

Phillips and Perron unit root test values are to be associated with each of the regression error terms from the equations (autocorrelation). Phillips and Perron's test is a method to correct the heteroscedasticity (1988) that is to be developed in the data. This method can be explained by Equation 10 (Zivot and Wang, 2006):

$$\Delta Y_t = \beta' D_t + \pi y_{t-1} + u_t \tag{10}$$

5.2. Limit Test Method and ARDL

Long-term variables are tested for the existence of relationships using Engle and Granger (1987) and Johansen cointegration tests. In the study of long-term relationships, the series have a different level of stability and the ARDL limit test is the most appropriate method.

P delay values in the first stage of the limit test Akaike (AIC) vs. Schwarz (SBC) are estimated from the length of the delay suggested by the information criteria. In determining the length of the delay models estimated with the lack of autocorrelation lag issue is of great importance (Pesaran and Shin, 1999, p.373, 386).

The existence of a long term relationship between the variables, the estimated value of statistical regressions, Pesaran. et al (2001) had decided that the results can be compared with the given critical value. It considers two lower and upper critical values including statistical F value calculated etc. The F value is to be greater than the critical upper limit for an inference so that there is a long-term relationship (Pesaran et al., 2001, p. 290).

The limit test findings point to where a long term presence on long- and short-term regression equations is to be obtained with the help of the ARDL method. Long-term conditions created by the appropriate lag length obtained in the test phase boundary of the ARDL model of equality is expressed in

$$Y_t = c_0 + \sum \alpha_i Y_{t-1} + \sum \theta_{2i} \pi_{t-i} + \sum \theta_{3i} \partial_{t-1} + u_t \tag{11}$$

The equation of error correction model to obtain the short-term coefficients of the variables is included in equation 12.

$$\Delta Y_t = \mu + \sum \lambda_i \Delta Y_{t-i} + \sum \omega_i \Delta X_{t-i} + \sum \varphi_i \Delta \pi_{t-i} + \sum \gamma_i \Delta \partial_{t-i} + \vartheta ECM_{t-1} + u_t \qquad (12)$$

Equation 12 is located in front of each variable coefficient, while short-term coefficients of the variables represent the θ term error correction model coefficients.

In addition to the short-term Breusch-Godfrey autocorrelation test for the reliability of the regression estimates, there should also be applied two tests, namely Jarque-Bera normality test and the White heteroscedasticity test.

6. Empirical Results

McKinnon suggested to test the complementary relationship between money and physical capital (1973) using Equations 5 and 6 for the stability tests related to the clearly expressed sequence described by Dickey and Fuller's (1981) ADF unit root test and Phillip and Perron's (1988) PP unit root test which were developed and the results are presented in Tables 1 and 2.

Table 1. ADF and PP Unit Root Test Series

	Results Original Series		The first difference is received Series	
	ADF	PP	ADF	PP
$\dfrac{M}{P}$	-1.329 (0.93)	-1.647 (0.75)	-7.108 (0.00)	-7.007 (0.00)
Y	-3.139 (0.10)	-6.367 (0.00)	-3.517 (0.00)	-12.7 (0.00)
$\dfrac{I}{Y}$	-3.476 (0.04)	-3.247 (0.08)	-3.761 (0.00)	-11.24 (0.00)
$(d-P*)$	-3.597 (0.03)	-3.527 (0.04)	-22.97 (0.27)	-12.00 (0.00)
$\dfrac{DC}{Y}$	-2.403 (0.32)	-2.364 (0.38)	-2.002 (0.39)	-71.40 (0.00)
Critical Values				
1%	-4.310	-4.120	-3.530	-3.560
5%	-3.542	-3.462	-2.919	-2.829
10%	-3.279	-3.179	-2.697	-2.672

According to the findings of Table 1, unit root test results were compiled in order to test the stability of the variables in real income, the ratio of income of investments, real deposit interest rate variables ADF and PP tests according to other works, it seems to be stable in the original level (0). It is understood that real money demand and other variables outside of that private sector credit to GDP ratio are stable in the first difference (I (1)). The results of the unit root tests for the next stage of data at different levels are determined as they have been passed the limit stability test. In addition, after applying the ADF test for unit root test, variables (d-P*) and DC / Y are not integrated at order 1, thus the conditions for the validation of the co-integration are not met. Instead, according to the Phillips-Perron Tests all variables are integrated at order 1. These results signal possible difficulties in the co-integration process.

Table 2. Recommended appropriate lag lengths by Akaike and Schwarz criteria

	Persistence Model				Persistence and Trendline model			
	p	AIC_p	$\chi^2(1)$	$\chi^2(4)$	p	AIC_p	$\chi^2(1)$	$\chi^2(4)$
Money Demand Model	1	-2.351	0.440 (0.50)	4.865 (0.30)	1	-2.344	0.759 (0.38)	4.966 (0.28)
Investment Model	3	-2.178	0.898 (0.34)	11.91 ((0.06)	3	-2.239	0.772 (0.37)	17.01 (0.05)
	Persistence Model				Persistence and Trendline model			
	p	SBC_p	$\chi^2(1)$	$\chi^2(4)$	p	SBC_p	$\chi^2(1)$	$\chi^2(4)$

Money Demand Model	1	-2.089	0.450 (0.50)	4.855 (0.30)	1	-2.028	0.769 (0.38)	4.976 (0.28)
Investment Model	1	-1.85	0.103 (0.74)	18.95 (0.05)	1	-1.926	0.307 (0.57)	19.85 (0.05)

Note: According to the Akaike and Schwarz criteria selected for the length of the delay. $\chi^2(1)$ and $\chi^2(4)$ give the first and fourth delays of autocorrelation LM test statistics. χ^2 the probability, p values of statistics are shown in parentheses under the LM statistics

Appropriate length of delay that is determined by both the persistence of the money demand equation, and by the persistence-trend model shows the appropriate length of the delay in accordance with the Akaike and Schwarz criteria presented in the findings of Table 2. The length of this delay in model '1' and '4' according to test results, delays in LM is moving autocorrelation problem. Investment equation for the appropriate length of delay according to the Akaike criterion both persistence and constant-trend model suggests Schwarz's delay for the criteria set by a delay of '3'. Simplification of the table for both delay of the numerical size of the model is estimated based on the lags in the investment equation model which has shown that there are very significant differences necessary to take into consideration in order to determine the delay length of the Schwarz's criterion in the next stage, which is essentially taken and passed the limit test at the next lag.

***Table 3.** Limits on the Demand for Money and Investment Equations Test Results*

		Trend Model				Without Trend Model	
	p	F-iv	F-v	t-v	*p*	F-iii	t-iii
Money Demand Model	1	827[c]	498[c]	-2.025[c]	1	607[c]	-3.085[c]
Investment Model	1	0.251[c]	0.427[c]	-4.627[c]	1	0.225[c]	-4.060[c]

Note: Pesaran et al (2001) calculated [c] values indicate that the value is above the upper limit of 5%.

According to the test results in Table 3 where the limit and money demand models of the F-iii to both types of investment models, for the F-iv, F-v, t-iii and t-v, namely the values of the statistics, Pesaran et al. (2001) stated that for the null hypothesis there is no level relationship model above the 5% of the value given by the upper critical are rejected and the alternative hypothesis is accepted. In this context, both models of the demand for money can be made available to review of the level of investment relations model equation.

Table 4 is located in the appropriate length of the delay proposed for long-term results of parameter estimates obtained by the value of '1' for both models, namely demand of money and the investment model.

***Table 4.** Long-Term Coefficient Estimation Results*

	Money Demand Model (Dependent variable: *M/P*)			Investment Model (Dependent variable: *I/Y*)	
	Y	*I/Y*	*d − P**	*DC/Y*	*d − P**
Persistence Model	3.358*** (4.009)	1.770* (1.785)	0.850 (0.934)	0.125 (1.087)	-0.542** (-1.946)
Trendline Model	1.701* (1.768)	1.285** (2.179)	.888 (1.537)	0.197 (1.434)	-0.708*** (-2.652)

Note: *t*-statistics are calculated in parentheses. Level of significance are ***, **, *, namely 1, 5 and 10 %, respectively.

The parameters obtained in the framework of long-term money demand models according to the forecast results from the long-term demand for money show an important positive and statistically significant relationship with income level.

At the same time, positive and significant correlation between the ratios of investment income and the demand for money, shows that increases in the demand for money leads to increase in demand for physical capital. If we look at the results in the framework of an increase of investment in domestic investment model it creates a positive impact on the volume of credit investments. Analysis results are evaluated in terms of the relationship between long-term investments with private investment model, and real deposit rates are negative and statistically significant. It is also be noted that between Money Demand (*M/P*) and variables *Y* and *I/Y* there are positive direct relationships established at a significance level of 10%. Also, research results show an inverse relationship within the investment model between (*I/Y*) and (*d-P**) at a significance level of 5%. Regarding the relations between Money Demand (*M/P*) and (*d-P**), and between *I/Y* and *DC/Y*, the validation tests show that there are no relationships between these variables. Results of the validity tests reinforce the stationary tests, presented in Table 1.

Consequently, the investment function is not verified by these findings, according to McKinnon's complementarity hypothesis. Despite the increase in interest rates, the increase in the rate of investment increases the demand for money in investments, contrary to what McKinnon anticipated as an increase. Isik et al. (2005) and Hepsağ (2009) stress that their applications for financial liberalization in market characterized by rising interest rates on private sector investments in Turkey's economy show the exclusionary effect upon these findings. Their results (Isik et al., 2005; Hepsağ, 2009) therefore, present a partial complementarity relationship between money and physical capital in Turkey's economy.

The error correction model results estimated for the acquisition of short-term help the ARDL equation coefficients that are exhibited in Table 5. Table 5's error correction obtained with the help of models of short-term factors are examined when the long-term findings support the short-term model for the demand for money. A positive relationship between the investment rate and real interest rates is determined.

However, unlike the persistence and long-term relationship with money demand models there is a significant trend of real interest rates at a level of significance of 10%. Thereby, it is an important variable in determining the demand for real money that can be made in the short term review contrary to long-term real interest rates on the basis of these findings.

When evaluating short-term factors related to the investment equation in the framework of the model, vector error correction was significant at the 1% level for domestic credit volume and, therefore, it is seen that the function of the amount of credit is an important variable determining investments on the short term. The results obtained in Table 5 are limited in terms of interpretation because of the previous limitations, discovered in earlier stages.

Table 5. Error Correction Model Results Obtained Coefficients of Short-Term Forecasts

		Money Demand Model		Investment Model	
Persistence Model	DY	0.167 (1.566)	D (I/Y)(−1)	0.139 (1.600)	
	D(I/Y)	0.160 (1.569)	D (I/Y)(−2)	-0.219 (-2.153)**	
	D (d-P*)	0.132 (1.76)*	D (d-P*)	-0.048 (-0.570)	
	ECM (−1)	-0.093 (-3.70)***	D (DC/Y)	0.526 (5.287)***	
			ECM (−1)	-0.278 (-4.921)***	
Trend Model	DY	0.116 (1.212)	D (I/Y)(−1)	0.167 (2.018)**	
	D(I/Y)	0.149 (1.563)	D (d-P*)	-0.114 (-1.57676)	
	D (d-P*)	0.161 (2.163)**	D (DC/Y)	0.628 (7.315)***	
	ECM (−1)	-0.125 (-3.784)***	ECM (−1)	-0.385 (-5.940)***	

Note: *t*-statistics are calculated in parentheses. Level of significance are ***, **, *, namely 1, 5 and 10 %, respectively.

7. Conclusion

7.1. Theoretical Contributions

In the financial liberalization theory, an application of this theory for having different rates of growth performance for a country caused a question on neoclassical and endogenous growth theories. Different financial development levels for different countries seems to be the answer cited as a justification neo-classical economic thought for financial markets in relation to the technological changes and financial services innovations brought about by the demands advocated by the driving forces for financial development. The number of financial instruments as a result of rapid growth momentum seen in the financial markets and with the rise in the 1990s of the instrument function is an extension of these developments.

Liberalization of applications follows as a result of increasing interest rates on investments in physical capital, in other words, demand for money will encourage these predictions which are tested by investigating the relationship between interest rates and investment volume. As McKinnon also established the complementarity hypothesis in this study for the relationship between money and physical capital, and to this end we have tried to investigate the test limit and ARDL method for Turkey's economy. Negative and significant relationship between the structures of money demand, according to the analysis result of the estimated money demand equation and the investment rate in a statistically significant and positive interaction of presence are detected. The investment variable in the equation of investment rate and interest rate refers to a substituent relationship rather than complementarity. Based on the results obtained in this direction from the period 1999Q1-2014Q4, there is a limited complementary relationship between money and physical capital in Turkey's economy for the reviewed period.

7.2. Suggestions and Limitations

According to the above research findings, one must look further down the development area, by following from the middle-level to the least developed countries for understanding and implementing the complementary theory.

In most developing countries under the disequilibrium interest rate system, a reduction in real deposit rate of interest also declines the money demand which further has an impact on real credit supply and new fixed investment. The central banks of developing countries should concentrate on changing the negative interest rate levels to positive interest rate levels or on developing the positive insurance policy in order to secure the level of investments. The policy makers should boost commodities export and encourage financial institutions to broaden their credit zone for creating export processing and enable the environment to increase export volume. The government should implement policies that are aimed at increasing domestic revenues and eventually reducing reliance on external bailout to support the budget, because this is an important issue for under develop countries to tackle. For a successful policy of financial liberalization, the authorities should ensure that appropriate fiscal and monetary policies are created and implemented to reduce the rate of inflation.

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The Simulation Study of the Change of Accounting Standards for Business Enterprises Based on Evolutionary Game

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This article tries to analyze the characteristics of the accounting standard for business enterprises, which is based on the idea of evolutionary game, in order to build a game model between stakeholders, and to conduct the simulation of the game model with NetLogo software. It shows the performance of all participants in the course of the game in a dynamic process, and the simulation results are analyzed, accordingly.

Keywords: *Accounting Standards for Business Enterprises, Evolutionary Game, Change, NetLogo*

JEL Classification: *G32, F38, F40*

1. Introduction

Since the 21st century, the game theory is widely used in various fields of social science research. Some researchers have started using it to explain the change of accounting standards for business enterprises (ASBE), and achieved research results. However, most of those are confined to the traditional game theory, which is only one side of the coin. Because we have to take the interaction among bounded rational people in different interest groups into consideration. Evolutionary game analysis solves the bottle-neck issue. It combines game analysis with dynamic evolution process analysis, of which all game players are viewed as bounded rational competitors, finishing their evolution in the competition with each other.

In addition, most scholars make use of evolutionary game theory to analyze problems mainly through analytic methods. This method is applicable to simple models in the game, but if the model is much more complex in the game, the analytical method is no longer applicable. With the help of computers, the simulation based on the multi-agent modeling method can deal with the complicated problem, but also can reflect participants' performance in the course of the game by dynamic process (Juanjuan, 2007; Ruan et al., 2011; Liu, 2012).

2. The Applicability of Evolutionary Game Analysis in the Change of ASBE

2.1. Evolutionary Game Analysis

Evolutionary game analysis (Bai, 2004; Li, 2014) initially originated from the conflict between animals and plants and the game analysis of cooperative behavior, so it is based on biological evolution, the human economic activities competitive compared with biological evolution, and the study of human economic behavior to equilibrium convergence process of a kind of methodology. Different from traditional, the completely rational assumption of game theory, evolutionary game theory thought is limited to rational behavior's main body of economic activity, it cannot be implemented currently because of its environment and its change, and in turn, it provides the best response, but only if it is thought the most advantageous strategy available by imitating, trial-and-error learning, and eventually reaching a steady state (Wang et al., 2011).

Qingmu Changyan and Aoye Zhengkuan use evolutionary game theory to study the change of the economic system, and put forward the bounded rationality of game party which depends on the following three elements: the inertia - game strategy change cost increase causes part of the game party give up change strategy; Nearsightedness - forward strategic change is often based on the specific strategies; Trial and error - part of the game party attempt to adopt new strategies. Especially, emphasizing the third of three elements, therefore, in simple terms, evolutionary game theory is the game achieved through trial and error to reach game equilibrium, to complete the evolution of the group.

This group, the evolution process of both the process of choosing, also have a mutation process. Selection refers to the strategy can get higher pay will more be adopted in the participants in after the game, the mutation is refers to the part of the individual in the form of random selection is different from groups that exist in the strategy, these strategies may be able to get high pay, can also be get lower pay.

2.2. The Applicability of Evolutionary Game Analysis in the Change of ASBE

Evolutionary game theory can apply to study the change of the accounting standard for business enterprises, mainly because of the characteristics of accounting standard for business enterprises the following aspects:

a. Stakeholders' rationality is limited in accounting standards for business enterprises setting. In practice, the actors at the unknown environment and their own cognitive limitations, can only appear as bounded rationality. Game theory and the assumption of rational man broke the traditional economics, better fitting of the motivation and process in the accounting standards change.

b. The change of the accounting standard for business enterprises is always based on the original accounting standards subtle or a small amount of correction or improvement, little or no disruptive change. The lock-in effect rule of the change and the path dependence coincided with evolutionary game of 'inertia' and 'short-sighted'.

c. The accounting standards for business enterprises is a process of change. Bounded rational because of the behavior of the individual, the enterprise accounting standards setters cannot be optimal in the initial set of accounting standards, but in a review of the facts, the understanding of the reality and the future information prediction, on the basis of making an adjustment to adapt to the environment and improve, form better accounting standards, and constantly reach an optimal equilibrium. Evolutionary game can help us to analyze the dynamic evolutionary process, and explain under the participation of stakeholders, how to achieve this equilibrium - the old to the new accounting standards convergence of accounting standards.

d. Evolutionary game theory to analyze accounting standards modifications changed our point of view. Previous research showed that the main body of institutional change is to organize game theory and thought, whereas the organization behind the economic subject of income inequality is the source of institutional change. Using evolutionary game analysis on the change of the accounting standard for business enterprises, the main aspect will shift the analysis from the point of view of the game, and further explore the lifeblood of the accounting standards changes.

3. The Establishment of the Evolutionary Game Model

3.1. The Analysis on Game-Agent

Many scholars (Qi and Yang, 2003, 2004) on China's accounting standards formulated the classification of the stakeholders involved in the process. Its classification index content is basically the

same, only is in the mode of expression and divided differences. Through the analysis of the existing literature summary, the authors think that the interests of the involved aspects in the process of establishing accounting standards related group are divided into: makers, demanders and other stakeholders. Table 1 shows various stakeholders, the representation of the subject, motivation, impact on accounting standards setting process and its influence are analyzed and summarized.

Table 1. *Each stakeholder's impact on the formulation of accounting standards*

Stakeholder	Representative agent	Motivation	Way of influence	Degree of influence
Policymaker	The government (such as the ministry of finance)	The government interests is the most important	"Active rent creating" and "passive rent creating"	Very strong
Demander	User: shareholders	Acquire the information of other companies operating conditions, the pursuit of profit maximization	Priority to protect the interests of the shareholders in accounting standards setting	Relatively strong
	User: investors, creditors, employees, etc.	To understand the management information of the target enterprise	Focus on corporate governance and supervision and the opportunity to participate is few	Common
	Provider: all enterprises within the territory of China	Get better operating performance, earnings management	Convince other stakeholders agree on their side of the accounting standards, but does not participate in the development of accounting standards	Common
	Professional accounting organizations	Provide accounting information; analysis of enterprise production and operation conditions	Do not participate in setting accounting standards	Common
Other stakeholders	Such as Chinese Institute of Certified Public Accountants	Focus on auditing standards and professional standards	Do not participate in setting accounting standards	Weak

Source: Lu, 2008; Wu and Li, 2010

Based on the above analysis (Table 1), the interests related to the main body of the diversity and heterogeneity make accounting principles for the establishment of a multi-agent process of game. Accounting standards is always given priority to with a strong group, balancing the interests of other groups, and according to various stakeholders to the influence degree of the accounting standards setting process, we mainly consider the two main body government and shareholders (Zhang, 2009).

In addition, in the process of establishing accounting standards, the role of political interest groups should not be ignored. In general, in the process of accounting standard setting, political interests for their own interests, tend to formulate the intervention process, formulation process cannot effectively, institutional change path dependence, even in inefficient situations. So here, the Zhang (2009) is the political game between interest groups and the government that are analyzed.

3.2. Construction of Evolutionary Game Model
3.2.1. More Evolutionary Game Model between the Accounting Entity

The change of the system is often driven by the interests of stakeholders' conflict. Considering the change of accounting standards, intuition is an accounting entity is not follow after the ratio increased to a certain number of accounting standards as a result of direct need and inevitable demands. (Liu et al., 2015) Follow the accounting standard for business enterprises and an accounting entity or not, depends on the following and do not follow the rules of the size of the profits. Which can be set up game model between the accounting entity, explain the process of enterprise's accounting entity strategy choice of earnings (Table 2).

Table 2. Game Payoff Matrix between an Accounting Entity

		Player2	
		Noncompliance (p)	Compliance (1-p)
Player1	Noncompliance	$(\dfrac{v-f}{2}, \dfrac{v-f}{2})(p=1)$	$(\dfrac{v}{2}-f*(1-p), \dfrac{v}{2}-e*p)$
	Compliance	$(\dfrac{v}{2}-e*p, \dfrac{v}{2}-f*(1-p))$	$(\dfrac{v}{2}, \dfrac{v}{2})(p=0)$

Assumptions:

A. game party 1 and party 2 on behalf of the enterprise accounting entity;

B. are respectively the bilateral unilateral do not follow the current accounting standards and gains;

C. is game both sides do not follow the current accounting standards of the punishment cost;

D. is the loss of the game both sides follow the accounting standards for unilateral interests.

Choosing not to follow the accounting standards of accounting entity, influenced by various factors. In other words, evolution game strategy selection mechanism is varied. Nowak (2006) summarizes the evolution of cooperation mechanism in the evolution game, the mechanism of accounting subject behavior choice has the same significance:

- Kin selection: genetic similarity, the enterprise strategy choice is often a reference in the actual operation and its industry, scale and other similar enterprises business strategy;
- Direct reciprocity: the introduction of the discount factor and degree of punishment, when you do not follow the accounting standard for business enterprises of punishment cost will tend to follow the accounting standards for business enterprises, to seek cooperation;
- Indirect reciprocity: introducing reputation signal, do not follow the accounting standard for business enterprises will lead to the external image and reputation of the wreck;
- Network reciprocity: group of interconnected network structure;
- Group selection: introducing group, there are competition relations between groups and groups.

Considering the enterprise subject in choosing not to follow the accounting standards, will consider their own experience and expectations of compliance in other industries, therefore in the process of its strategy adjustment corresponding EWA learning algorithm (experience - weighted attraction) (Camerer and Ho, 1999; Arifovic and Ledyard, 2004; Hopkins, 2002) EWA learning algorithm is combined with reinforcement learning and beliefs of a way of learning, reinforcement learning refers to the decision-making according to the recent experience of success or failure of the adjust the probability of its choice, faith learning refers to the decision-making believe other participants will be based on its historical behavior to make current decisions, thus according to this belief, find its optimal decision.

EWA learning algorithm has two need periodic updates core variables: strategy charisma of A(t) and weight of the past experience of N(t):

$$A_i^k(t) = \frac{\emptyset \cdot N(t-1) \cdot A_I^k(t-1) + (\delta + (1-\delta) \cdot I(s_i^k(t), s_i(t))) \cdot \pi_i(s_i^k(t), s_{-i}(t))}{N(t)} \tag{1}$$

$$N(t) = N(t-1) \cdot \emptyset \cdot (1-\rho) + 1 \tag{2}$$

$$P_i^j(t+1) = \frac{(A_i^j(t))^\lambda}{\sum_{k=1}^{m_i}(A_i^k(t))^\lambda} \tag{3}$$

Note:

$A_i^k(t)$ means I choose k at the t period strategy charm value. Strategy of k to follow or not to follow the accounting standard for business enterprises;

$s_i^k(t)$ = the strategy k is chosen at the period of "t".

$s_i(t)$ = The strategy that i has chosen.

$s_{-i}(t)$ = Strategy combination that other subjects except i have chosen at the period of "t".

$\emptyset$ = Charisma score's attenuation coefficient.

Δ = the weights of income of unselected strategy.

ρ = Charisma growth factor.

$I(\dots)$ = indicator function. The weight coefficient indicates whether the strategy was adopted, evaluation: 0,1.

$\pi_i(s_i^k(t), s_{-i}(t))$ = the profits at the period of "t".

λ = Charisma score's sensitivity.

When N(0)=1, ρ=1，δ=0, the model is simplified to reinforcement-based learning model.

When δ=1, ρ=0, the model is simplified to beliefs-based learning model.

In view of the enterprise accounting entity, strategy choice is to follow or not to follow the accounting standard for business enterprises. Enterprise accounting entity through the reference of its past historical experience and other accounting subject strategies, the strategy choice of the next round of adjustment, in order to achieve a stable state, is under the condition of the current enterprise standards and a market status, enterprise accounting subject to follow the trend towards accounting standards or not.

Based on the above analysis, we can propose, according to the following four parts to EWA based multiple simulation (Jing and Yang, 2010) between enterprise accounting entity, the following steps:

Step 1: according to the payoff matrix, initialize each strategy of the initial charm value;

Step 2: according to the strategy of charisma, the formula (3) is used to calculate each policy choice probability;

Step 3: according to the strategy of choice of probability, each stochastic accounting entity is given in the next round of strategy choice;

Step 4: calculate the next round of the charm of each policy value, and repeat steps 3, 4.

4. The Simulation of Evolutionary Game Stability and Result Analysis

By using evolutionary game simulation system, the authors, have carried on the simulation to be in the economic model of evolutionary game analysis. (Zhu, 2010)

4.1. The Simulation of Evolution Game Between Accounting Subjects

4.1.1. Experiments Settings

To realize the above model in Net Logo platform, namely, to establish the evolution system based on multi-agent strategy choice, as shown in figure 1, the system is divided into three parts of input, control, and output. Among them, in the Input is used to add or adjust the value of benefits and costs of the enterprise accounting entity, and all kinds of related coefficients; the Control part is used for initialization of the control system as well as the evolution process; the Output part is used for the visualization of the system model, real-time output of the main body of strategy choice evolution process.
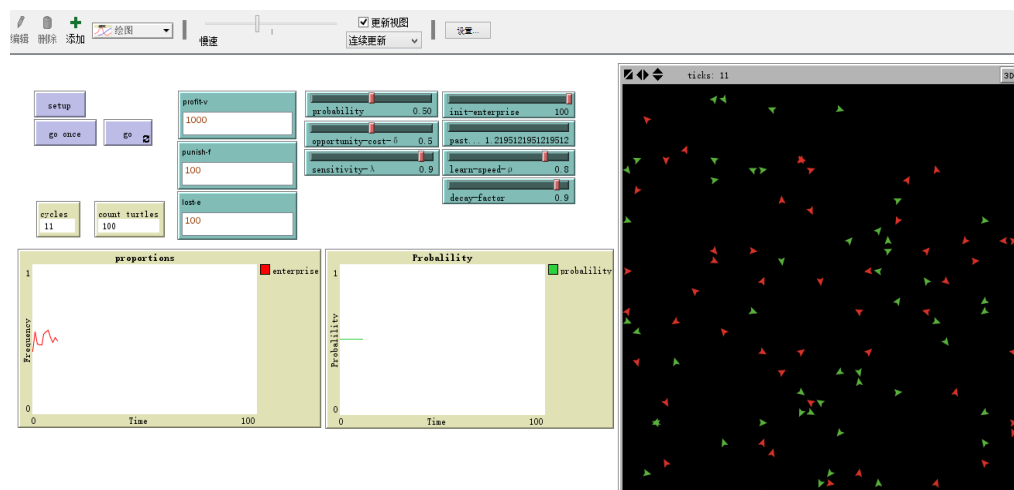

Figure 1. *Based on the multi-agent simulation model of rendering*

Before the simulation operation, as shown in table 2 game model is given to the parameter selection, and type of the corresponding input box. The EWA involved in the model parameters of the experimental data is used with reference to existing literature (Camerer et al., 2002), by using maximum likelihood estimation, it is concluded that these parameters are fitting values, as shown in table 3. For each experiment the maximum number of rounds is 1000, that is to say, if running after 1000 applications of the simulation program, the simulation results still do not show convergence, then this this experiment does not present convergence. In addition, because enterprise accounting entity is in the process of strategy selection, based on the attraction strategy, which is based on the probability of random selection, so in the process of simulation, the enterprise accounting entity strategy choice is of frequency fluctuations.

***Table 3.** EWA model parameters*

N(0)	1	$A_i^k(0)$	1
δ	0.5	ρ	0.8
$\emptyset$	0.9	λ	0.9

4.1.2. The Simulation Results and Corresponding Analysis

Simulation scenario 1: when v for 1000 units, f and e are 100 units, and the original do not follow accounting standards was 30%, the proportion of businesses can get the following results as shown in figure 2. It does not follow the accounting standards formed stable at 49.99% (Figure 2).
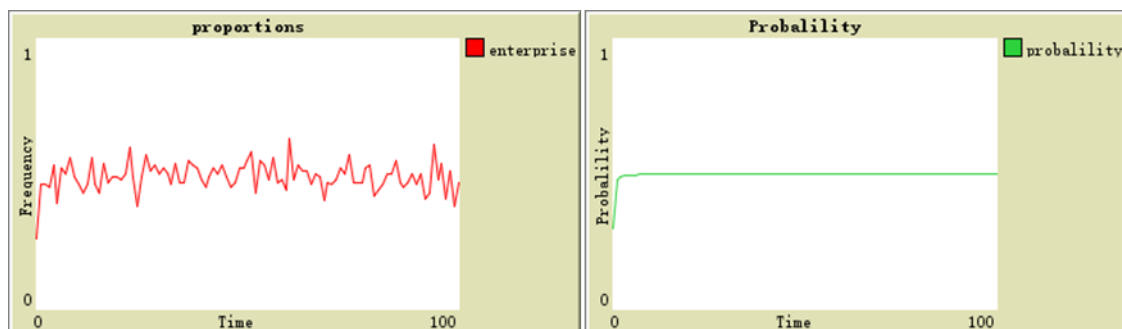

Figure 2.Simulation scenario 1*

Simulation scenario 2: when v for 1000 units, f to 500 units, e for 100 units, and the first to 30% do not follow the accounting standards for business enterprises, can get the following result is shown in figure 3. It does not follow the accounting standards formed stable at 18.3% (Figure 3).
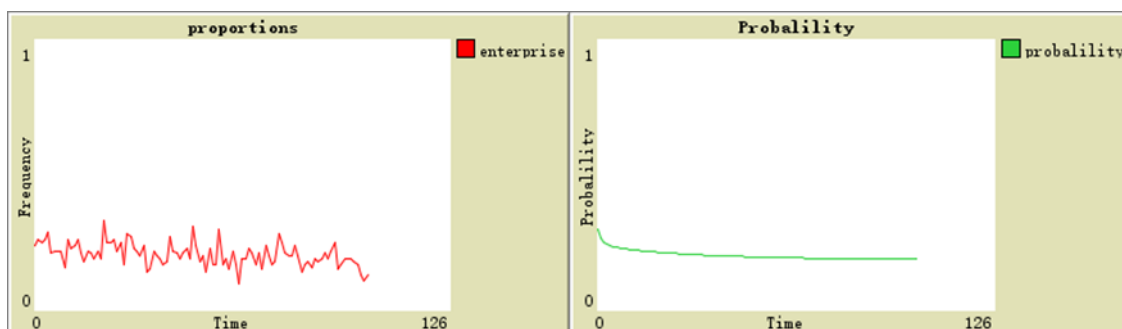
***Figure 3.** Simulation scenario 2*

Simulation scenario 3: when v for 1000 units, f to 100 units, e for 300 units, and initially do not follow the accounting standards was 30%, the proportion of business can be shown in figure 4, the following results are obtained. It does not follow the accounting standards formed stable at 57.5% (Figure 4).
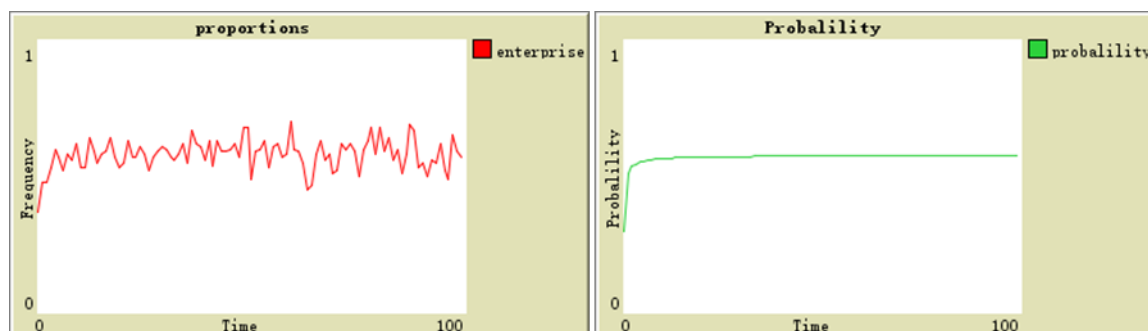

***Figure 4.** Simulation scenario 3*

By comparing the above three simulation scenarios, we can find that when we do not follow the accounting standard for business enterprises of penalties, namely the f value increases, the market does not follow the accounting standard for business enterprises the proportion of reduced, and stable. When following the accounting standard for business enterprises, the enterprise is affected by other companies that

do not follow the accounting standard for business enterprises, due to the inaccurate information leading to the pay increases, the corresponding e value increases, and the enterprise is more inclined to follow the accounting standard for business enterprises. These results might be more clear and intuitive in figure 5. Among them, we propose a variation of the data by controlling the input values of the complex simulation system, and re-run the system. In figure 5, on the left side of this chart, v value and e value is set to 1000 units and 200 units for the change of value of f. On the right side of figure 5, the value of v and f value is set to 1000 units and 200 units respectively, change the value of e.
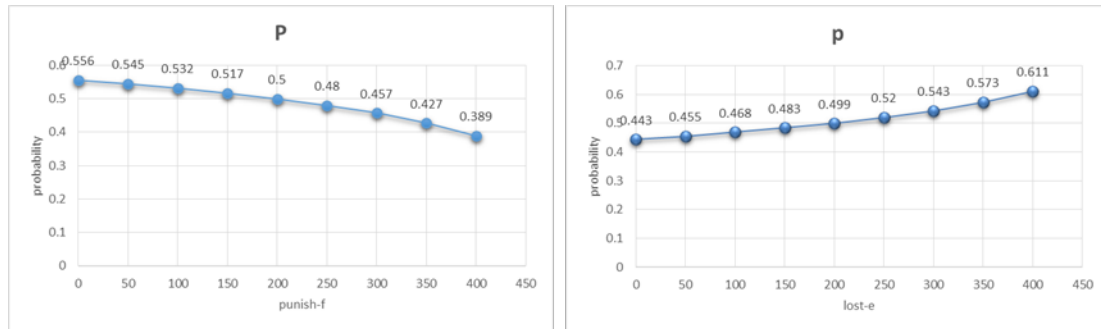
Figure 5. Do not follow the accounting entity proportion of accounting standards change table

When the market does not follow the accounting standard for business enterprises of enterprise main body reaches a certain value, the accounting standard for business enterprises is not good corporate code of conduct, resulting in a decline in corporate reputation and market order confusion. Therefore, considering the strict market supervision cost is huge, standard setters and revision should pay attention to control the market proportion of businesses do not follow the accounting standard for business enterprises, under the condition of lower costs, make the enterprise accounting standards specification function to the optimal.

4.2. Evolutionary Game Between the Two Groups, Multi-Agent Simulation

In Net Logo platform is used to realize the above model, namely, to establish, based on two groups, between multiple subjects the evolution of the system, as shown in figure 6, the system into three parts of input, control, and output. Among them, in the Input is used to add or adjust the payment value between different groups, and all kinds of related coefficients; the Control part is used for initialization of the control system as well as the evolution process; the Output part is used for the visualization of the system model, real-time output of two groups the of the strategy choices of their evolution process.
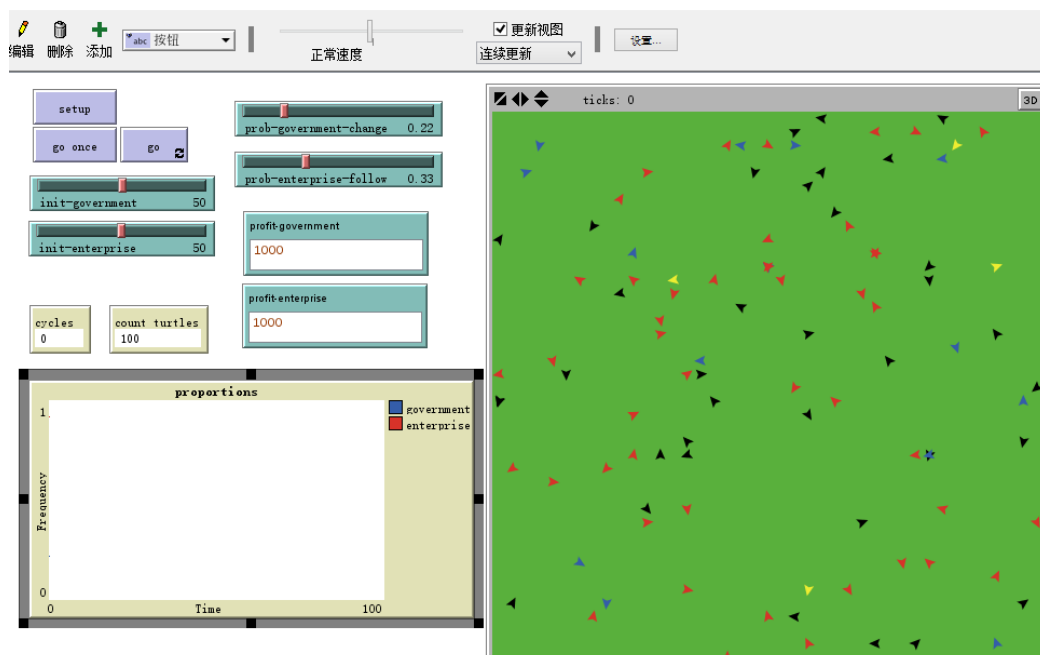

Figure 6. Based on the multi-agent simulation model of rendering

This model has two groups, four different main bodies (Figure 6): (a) units of government support the accounting standards change (the black marks), (b) units of government do not support the accounting standards (the blue marks), (c) following the body of the accounting standard for business enterprises (the red marks), (d) not following the body of the accounting standard for business enterprises (the green marks). To simplify the model, we assume that the enterprise accounting entity and the government pay the value of the subject and are not accounted for by their decision. Each subject within the space of the canvas moving step per unit time, considering two different groups of subjects, when they met separately in the game, comparing the decision-making behavior of the other side and their own different decisions, they make final decisions.

5. Conclusion

This article shows that the structure of benefits often leads to the change of the accounting standard for business enterprises. The fundamental power of change of accounting standards for business enterprises comes from the comparisons, the stakeholders in the current accounting standards of earnings or cost and the ones that do not follow the current accounting standards, and paid the corresponding benefits or costs. Strategy choice (following or not following the accounting standard for business enterprises) results in specific levels of the costs and benefits, which is the basis of the change of the accounting standards and the direction of the change of these accounting standards.

Because of bounded rationality, as well as the limitations of difficulty experienced in getting all the information, it is difficult to make the optimal decision. However, people in the decision-making process tend to absorb their past experience, and refer to other people's experiences. Therefore, learning and imitation is one of the interactions between stakeholders, which play an important role in the change of the accounting standard for business enterprises. Learning and imitating maintains consistency of the decision-making behavior between enterprise accounting subjects, possibly leading to 'lock' effect and 'path dependence' of the change of the accounting standards (Gai, 2012). Thereupon, the strengthening of accounting regulation and strengthening the punishment dynamics can break the 'lock' state. Finally, we can keep the effectiveness and sustainability of accounting standards for business enterprises.

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The Global Economic Crisis:
Spain's Housing Bubble

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Housing bubbles have been discussed and closely linked to current world economics since 2008. This paper takes a case study approach to the situation in Spain in terms of its economy, the housing market and the ongoing economic crisis. Unique aspects of the Spanish culture and historical idiosyncrasies are included for the reader to compare and contrast various international settings and economic machinations. Micro and macro factors are incorporated in order to allow the reader to evaluate the complexity of the ongoing crisis, options and potential alternatives. The unique burden the Spanish housing bubble places on young adults, those most dramatically affected by Spanish unemployment levels, is also broached.

Keywords: *International Economics; Case Study; International Business; EU*

JEL Classification*: F6*

1. Introduction

A housing bubble can be defined as a run-up in housing prices fueled by demand, speculation and the belief that recent history is an infallible forecast of the future (Investopedia, 2013). It usually starts with an increase in demand, opening the door for speculators that believe they can make a profit, followed by a drop in prices caused by the decrease in the aforementioned demand. Historically housing bubbles are repeated every 13 years and last about 2.5 years and cause about 4 per cent loss in GDP (Investopedia, 2013).

The real estate bubble in Spain has had a huge impact on the country's economy and the way people there live and invest. Some well positioned individuals in Spain were able to take advantage of the bubble and improve their financial investments in the process. One such case was the family of Enrico. Enrico's family changed homes three times specifically due to the speculative bubble, taking advantage of the rising prices of properties by willingly selling their home at a peak in price. But in 2008, the bubble burst in Spain, not long after the USA had triggered world attention with its own housing crisis.

2. Premise

The situation in Spain right now does not look promising. Few families can afford to buy houses and yet the building of new houses continues due to work in process and planned building prior to 2008 that has not stalled. Most of the ongoing projects are very high cost projects and planners hope by simply slowing the building process, conditions will improve once the project is complete. Builders do not want to abandon work in progress due to the investment already incurred, despite projections that these projects will not get the expected and needed financial return (Foxman, 2012). This process will cause a domino effect, eventually taking away jobs and leaving empty houses and high debt. Banks are left with real estate properties that have no market value. Many families have tied up all their liquidity and leverage in real estate and have found themselves financially overextended. The whole country of Spain is suffering due to the housing bubble created and its resultant economic crisis.
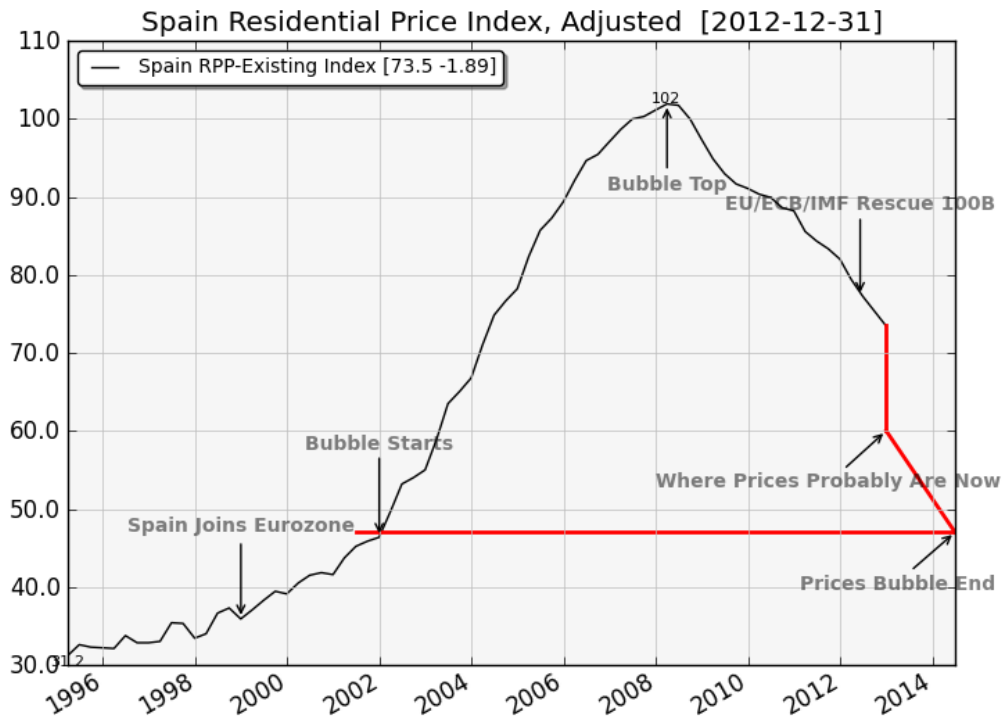

Figure 1. *"Market oracle"*

Figure 1, offers a timeline of different stages of the Spanish housing bubble. Starting in 2002, primarily as a result of joining the Eurozone, residential prices started to rise dramatically and this continued until 2008. Correlated to the global economic crisis of 2008, demand for Spanish real estate started dropping. In 2012, the ECB (European Central Bank) and the IMF (International Monetary Fund) offered 125 Billion bailouts to banks. Spain accepted these bailouts due to increasingly urgent calls from across Europe and the United States (Minder). The prediction at the time were that prices would continue to decrease lower than they were before the bubble started.

3. Analysis

There were both international factors as well as internal factors in Spain that led to this situation. First of all, Spain belongs to the Eurozone, so its economy has to compete with other European countries under a fixed exchange rate regime (Gentier). In order to compete with other European countries Spain had to develop industries such as real estate, tourism and construction. Because inflation was high in Spain, the production of tradable goods was not enough to compete against other top European economies such as Germany; this caused Spain to link its GDP exclusively to the housing market, creating an illusion of wealth.

Second, Spain's Central Bank used a currency devaluation policy and has enjoyed a long period of very low interest rates (Gentier). In Spain, the population has always been encouraged to buy houses. Renting is an expensive option due to high renting rates. It was actually cheaper to pay for a mortgage than to rent. The government encouraged people to buy and the banks made it even easier with affordable mortgages with low interest rates. This caused the private Spanish debt to rise dramatically: it represented

64.6% of the GDP in 2009, compared to 31.6% in 2001 (Gentier 345).

Migration from other European countries also rose. The migratory balance increased by 800% between 1998 and 2002 (Dorgan). Additionally, foreign investments increased considerably in Spain's coastal areas, boosting the housing effect. People saw the opportunity to speculate with real estate, buying and selling in short-time operations just like Enrico's family. Other factors that led to the housing bubble were the desire for people to move out of their parent's house, encouraged by government campaigns and low mortgage rates, and the increase in urban population.

4. Discussion

Just when everyone in Spain was enjoying the financial benefits of the housing bubble, the 2008 global economic crisis hit. Unemployment began rising and of course, these people had mortgages and loans to pay, but no income available to them. For example, Fernando and Sara friends of Enrico, bought a home in 2007. After both of them lost their jobs, they were forced to move out since they could not afford the mortgage. Now, the young couple lives with their parents, yet still owe 90,000 euros to the bank because in Spain, one is not free of mortgage repayments once the bank has repossessed the property (Hadzelek and Rodriguez).

The aftermath of Spain's housing crisis is not promising. Right now, banks hold more troubled real estate assets than non-troubled ones and bad loans account for 8.95 percent of total loans, the highest in 18 years (Foxman). The total amount of housing increased between 2001 and 2008 by 20%, while population only increased by 13% (Gentier). There are between 6 and 8 million properties that are either vacant, being constructed or available on the rental market ("The dire state"). Furthermore, 800,000 used homes are in the market, banks have foreclosed on 300,000 homes and 150,000 are in the process of foreclosing. Figure 2, shows how demand was surpassing construction between 1994 and 2007, and then in 2008 dropped significantly leaving thousands of houses empty, construction companies broke and an unprofitable housing market.
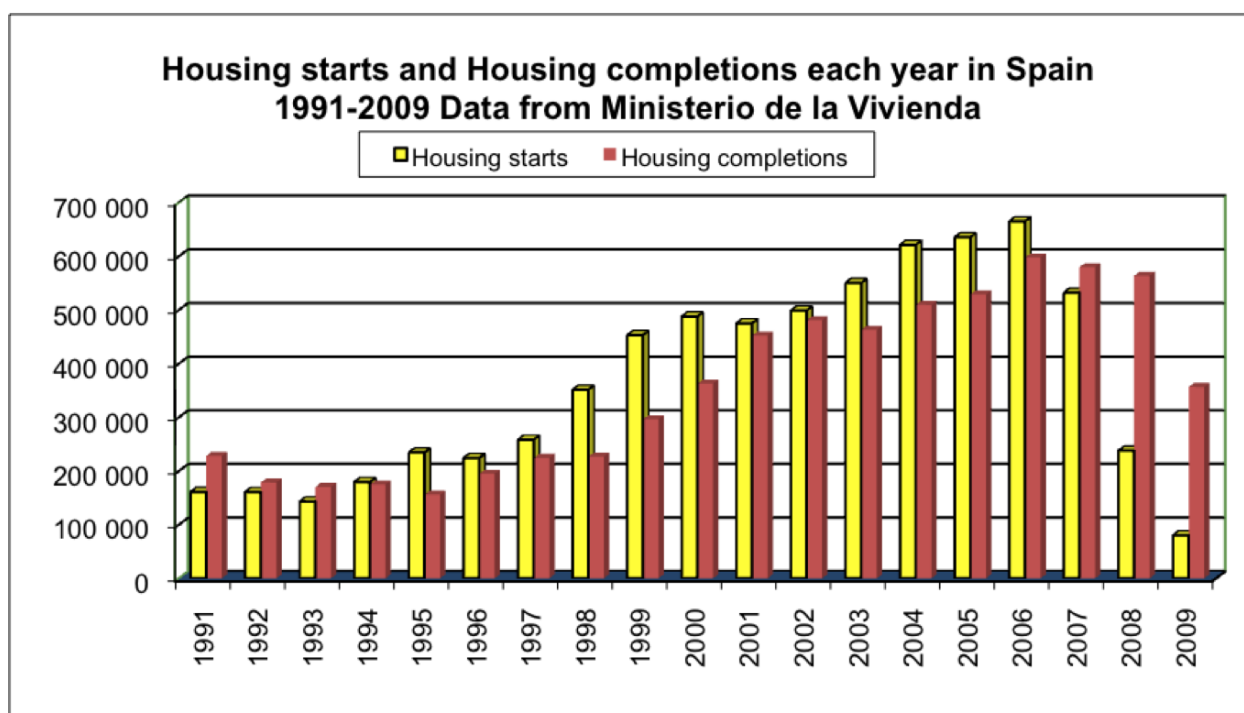

Figure 2. *Housing starts and housing completions in Spain, 1991-2009*
Source: Gentier

What alternatives does Spain have to diminish the cost of the housing crisis and start an economic upswing? First, consider the bailout option. As stated, the ECB gave 100 billion to the banks in 2012. At the end of 2012, Spain was requesting another 39.5 billion for their banks. Even though the banks have not been good at managing the situation, in Spain's case bailing the banks out means trying to help the creditors (people that deposited money) and trying to keep the cash flowing in order to give Spain a chance to turn the crisis around. If the banks do not get bailed out, Spain could be forced out of the European Union for not

keeping up with the economic standing of other countries. That would be disastrous for Spain due to the economic opportunities and growth that membership in the European Union produces. Enrico, and other citizens like him, feel that the banks being helped are not in turn helping them, because they have to help the government (public debt) first. It seems that a country like Spain, which heavily relies on tourism and services must be bailed out in order for the government to keep offering those services.

On the other hand, countries like Iceland have refused a bailout successfully. They imposed austerity measures and let their three main banks fail. They focused on improving the economy of the public by imposing temporary controls to the spending of the population. Could this be an option for Spain? Letting the banks fail usually makes the investors lose money but guarantees the safety of the people's money. The main problem in Spain is that the banks are linked closely to European banks (due to the euro) and letting them fail could seriously damage existing financial markets. Also, the situation in Spain is a lot more complicated than Iceland.

Another measure that could work in order to reduce the number of vacant houses would be to promote renting. As of now, income tax is very high for renting, which heavily forces home ownership. In 2002, 79.7% of the gross wealth of households was related to real estate, compared to 38.4% in the U.S. (Harrison). If the tax was reduced, many empty houses would be rented, given the owners cash flow to keep up with overdue mortgages.

Recently, some private-equity foreign firms are buying Spanish real estate. This is very positive for the economy. Miami based H.I.G Capital is buying a majority stake in a package of 939 homes known as Project Bull (Bjork). Since February of this year, foreign investors are starting to come back to the Spanish market. Also, Spain is planning to offer residency permits to foreigners who buy houses priced at more than 160,000 euros ("Spain seeks"). This measure is a very interesting one, and could help the banks sell the thousands of houses that are empty. Also, foreigners would revitalize the economy with their everyday spending.

It is obvious that the current situation does not allow for young people to buy houses. A housing bubble of this magnitude cannot be fixed in a short period of time. People want to buy houses, so demand is there; if the economy can turn around, these empty houses will eventually be filled. The government should try to balance between the population needs and banks' needs. It is not an easy task and they will be required to analyze every possibility before making decisions.

5. Conclusion

Spain seems to be following the right steps towards economic improvement. Enrico and many young Spaniards like him support the bailout of the banks mainly because they believe Spain needs this money in order to improve. Tourism and services are extremely important to the Spanish economy and Enrico believes it is critical to save the banks to continue a successful presence in these industries. As a short-time decision, Enrico and many like him believe the government should do what it can to encourage renting. This is a generation raised on home ownership, independence from parents and independent living.

Moving forward, it seems important for banks and investors to keep in mind previous mistakes and not let the huge demand and financial growth blur the fact that risky low interest rate loans are not the way to go. Instead, more austerity and steady growth would be the key to not inflating the bubble again. Central Banks historically have a lagging action plan on recessions and bubbles which means the process of growth comes at a slow pace.

6. Questions for Discussion

1. Were there prevention measures Spain failed to take to avoid the bubble?
2. Do you think joining the Eurozone was a good idea for Spain?
3. Is Spain's banking system in good shape now?
4. How do you feel about IMF and ECB bailouts.
5. What could the government do to prevent a housing bubble again?
6. The case states 'the situation in Spain is a lot more complicated than Iceland'. Compare and contrast the current situations of the two economies.

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What Finance Can Learn from Biopharma Industry: A Transfer of Innovation Models

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The financial sector is living a profound crisis in order to keep pace with the continuous technological breakthroughs that come out daily, while other sectors seem to be historically more growth-by-innovation-based (e.g., the pharma/biotech sector). This work focuses on an interdisciplinary approach to innovation, and on insights that the banking sector can draw from the pharmaceutical one. Hence, a unique dataset has been built, and it collects information on the most relevant players for both the fields. Different indicators have been created as well in order to empirically test whether the financial industry is actually less innovative with respect to the pharmaceutical one, and to understand the best growing strategy for the banking industry. The results confirm that there is an innovation gap between the two industries, as well as identify the corporate venture capital as the best mean to drive business growth through innovation.

Keywords: *Fintech, Biotech, R&D, venture capital, innovation, licensing, M&A*

JEL Classification: *G32, G24, O31, O32, O33*

1. Introduction

The financial services sector is without doubt one of the biggest businesses in terms of size and turnover nowadays. With the last years' boom of financial technology (fintech) companies, the field is also becoming extremely trendy, and looking at some numbers, only financial technology (fintech) companies accounted for more than $23 billion dollar of venture capital investments in the last two years (Santander and Oliver Wyman, 2015). The fintech space is taking over every gap left by big institutions, banks, and regulators, and often is even trying to replace some of the existing players with faster, improved, and customized services.

These two realities, big banks, funds and institutions from one hand, and the plethora of fintech startups from the other, are indeed stretching out the sector, and they are creating a huge rift in the financial industry because of their intrinsic different natures. If it is true that big banks manage incredibly large pools of money, exploit economies of scale to cut down diverse kinds of costs, and that are "*too solid to fail*" institutions, it is also true that startups are extremely more agile, are not bound by strict hierarchical structures or excessive bureaucracy, and can disrupt the system from the ground. In other words, banks are presently stuck within their old-rigid cultural mentality, they have to take care of their daily revenue-generator activities, and are therefore having hard times in keeping the pace with the technological breakthrough (Perez, 2002; 2010).

Truth be told, historically speaking the banks did not need to drastically evolve, or to innovate continuously to earn market share. Both commercial and investment banks have about the same types of products and services of twenty years ago – surely more complicated, covering more nuances or clients' needs, but basically the same loans, stocks, bonds, derivatives, and so on so forth. Another example of how innovation is barely, deeply-rooted within financial services, comes directly from academic researches: Scott and White (2002) demonstrated, until the mid-nineties, there were no relevant contributions to financial innovation in academia, especially from an empirical perspective: in fact, in few survey articles (Cohen and Levin, 1989; Cohen, 1995) with more than 600 different articles and books quoted, none of them concerned financial innovation subjects. Although this is an exaggeration and even if different authors gave some theoretical insights over the past three decades (among many, Faulhaber and Baumol, 1988; Mayer, 1986; Merton, 1992; 1995; Miller, 1986; 1992), it is also a signal of how innovation seems to be marginally related to the financial world with respect to other fields of study.

Unfortunately for the banking industry though, this is a particular historic transition in which technology is taking over and playing a crucial role in every single sector, and therefore the necessity for revolutionary discovery is quickly becoming a key point in any banking board's agenda (Zepeda, 2015). So far, the type of innovation presented has been only on the product side – new products or services offered – but it is much more important to deal with the production process and with the innovation flow. It is relevant for the financial sector to start to wonder not about *what* type of innovation may be introduced, but rather *how*. Understanding the how would also allow the big institutions to manage and overcome the uncertainty of the returns associated to innovation investments (Hall, 2002; Hall and Lerner, 2009).

Banks, funds, regulatory bodies, institutional investors, all these players were used to boost their profitability or their efficiency by either enlarging the clients' base, or by lowering their costs, but they need right now to radically transform themselves for the sake of growing. The new technological paradigm is tightening the inner strong causal relation between innovation and growth, and is leading any business as the new golden rule to follow. The growth is then no more measured only in terms of profits achieved, but also with the degree of disruption, impact, and evolution it brings and generates.

Hence, claiming that innovation is the quintessential factor for growing – if it is well implemented (Teece, 1986) -, and with the prior that rigid tiered financial organizations may not excel in innovating from the ground, it comes spontaneously out to wonder whether a successful innovation model can be imported from a different player, sector, or market where the equation that links innovation and growth is at the base of any wealthy business.

In fact, there exists in particular a sector that had to innovate to prosper by definition, i.e., the pharmaceutical and biotech sector. Research and Development (R&D) are key drivers for any big pharmaceutical firm, and each novelty is welcomed with huge investments.

In the biopharma industry, there are some important features that have to be highlighted in order to understand the business model the firms generally adopt: first of all, it is an extremely high-risky sector. The probability of failure is very high for each molecule in analysis, and the timeline for the development is quite long. On average, it oscillates between ten and fifteen years, with then a patent life of around twenty years, and the length of this cycle has turned then the business from a human-intensive sector into a capital-intensive industry. Most importantly, in spite of the already low success rate of the drugs produced, only three of them out of ten are indeed able to repay the development costs and provide a positive return on investment (Meyer, 2002). In fact, it seems that several companies operate at loss, and that the top 3% of the companies generates almost 80% of the total industry profit (Li and Halal, 2002). As a consequence, the field players have to prove to be risk-takers, able to assess efficiently where to allocate their funds, and they have to continuously innovate to survive, due to both the time constraint of the products they create (i.e., patent lives) and to the rolling-disruption that new technologies and drugs bring to the sector. It has been therefore essential to compensate the systematic risk with a more risk-averse approach and to develop new diversification techniques to spread the failure risks as much as possible. In contrast with the Venture Capitals' (VCs) model, in which the risk is shifted more to the market phase, i.e., whether you are able to match the clients' need with the product's characteristics, in the biopharma industry the development process is where the risk lies.

In other words, from one hand VCs invest a consistent amount of money in a selected spectrum of companies, hoping that at least a (low) number of them will pay back the total investments made, and from the other they increment the probability of success helping and leading the new company (usually obtaining some seats in the board of the firm), and focusing their attentions on the final stage of the supply chain. Biotech firms concentrate instead the risk-management in the first part of the supply chain, i.e., the ideation and development of the molecules.

Hence, given all the industry-specific issues, the big pharma companies have identified a range of different methods to foster their growth by innovation: first, the companies spent a large portion of their budget in pure research and development. Second, the firms have adopted a "*competitively-collaboration*" scheme, i.e., they have found a good balance between market competition and research collaboration. Alliances (Baum et al., 2000), joint ventures, and wider networks in general (Gulati and Singh, 1996; Powell et al., 2005), allow to pool resources enhancing the probability of developing the right molecule with a lower cost, and they usually run through licensing agreements in partnership with universities, with another company (e.g., *built-to-buy deals*, *venture co-creation*, *limited partners agreements*), or with a foundation. Alternatively, they started investing in businesses (typically biotech companies) that were already working for a certain drug instead of developing it from scratch, and they did it through a Corporate Venture Capital (CVC) mean. Of course, each strategy – either R&D, M&A or any kind of collaboration/joint ventures – has its own pros and cons: capital intensive use vs. low flexibility, possible synergies vs. long negotiation times, strategic expansion vs. loss of control in the company.

On the other side, big banks and financial institutions are mainly chasing innovation through direct acquisition of fully-operational companies, or cultivating their ecosystem setting up accelerators and business incubators. The first model is the most common one, since it is safer and more convenient to integrate a service instead of developing it from scratch – and it would culturally and historically be out of banks' scope -, while the second is a more recent one, and it borrows some features from the VCs model.

To sum up then, it seems that different businesses lead innovation in different ways. The biopharma model has been created to face industry-specific issues, such as expensive labs, difficult distribution, and high-risk of failure, but it evolved during time to become quite solid and profitable, although highly volatile. The banking sector has instead different traits and challenges to deal with (e.g., service integration issues more than high research expenses), but it needs to start innovating now more than ever, and it could probably borrow some ideas from the biopharma field.

Then, the aim of the paper will be to i) empirically verify that the assumptions so far explained hold, i.e., the pharma industry has an intrinsic higher innovation impulse with respect to the banking sector, which thus needs a new growth model, and ii) to identify how the banking sector innovates, what the financial services industry is or should borrow from the pharma sector, and where they are converging to. It is going to be eventually possible to provide an insight on a new growth innovation-based business model.

The structure of the work is then as follows: the next section shows some prior literature and studies related to biotech and pharmaceuticals industry and their ability to manage innovation. Section 3 deals with the data collection and construction, which is then used for discussion in Section 4. Section 5 concludes and draws some final thoughts on the relation between biopharma and financial services sectors.

2. Literature Review

The literature about both the biopharma sector and innovation is quite huge, as well as the intersection between the two has been previously explored in some works. The biotech sector in particular disrupted the old pharmaceutical world (Gassmann et al., 2004) with its growing compulsion. This necessity of growing, as well as the hidden innovation potential of the biotech industry, have been widely explained by Baker (2003); conversely, in another study it has been claimed that the innovation curve is indeed concave and crystallizes at some plateau level (Linder et al., 2003). However, although some contrarian opinions may exist concerning the ability of biotech to innovate, the general consensus supports the idea that innovation in biotech is much more radical than in other sectors (Gans and Stern, 2004; Fuchs and Krauss, 2003), and it pushes biotech companies to explore new niche markets (Chin, 2004). Several attempts have been done to try to explain this innovation flow, as for instance through sequential stages of products development over a long period (Delois and Beamish, 2004). Moreover, Khilji et al. (2006) provided an integrated innovation framework for biotech firms starting from similar models (Rothwell, 1994) already implemented in different industries (manufacturing, technological – Lichtenthaler, 2008 -, etc.), in order to fill the gaps left by either the technology push, market pull, or organizational approaches. Respectively, as explained in the same work, the first one did not take into account any market forces (Lippitt et al., 1958), the second one looked at the market as the main source of innovation (Clark, 1979), while the last one basically found a compromise between the two assessing the relevance of some internal features to lead a change within the company (Meyer and Mugge, 2001).

This work will then augment from one hand the existing research, filling some gaps found in literature concerning the innovation as a source of growth, and from the other it will be able to compare different business model, creating a bridge between the far sector such as the pharmaceutical and the financial ones.

3. Data Collection and Research Design

In order to address the research question on the innovation models for both the banking and biopharma industries, an inductive study has been performed using a unique and longitudinal dataset built ad-hoc, with data extracted from 2003 to 2014. Several different datasets have been used to accomplish a higher level of accuracy, but the main ones were Medtrack, Osiris, and Zephyr. The main data concerning the pharmaceutical industry came indeed from Medtrack, while the financial sector ones from Osiris and Bankscope. Zephyr provided cross-industry information, and allowed for a crosschecking of some of data obtained from other sources.

Further in detail, relevant information has been collected for 50 major companies, i.e. 25 major investment and commercial banks, and 25 pharmaceutical firms. They have been selected based on the ranking report issued by Global Corporate Venturing (GCV, June 2010), and through a combination of The Wall Street Journal ranking and the EU scorecard, augmented for some Asian based bank to adopt a worldwide perspective and eliminate any geographic bias. The list of the companies is showed in the table.

Table 1. List of companies considered.

Financial Services	Biopharma
JP Morgan	Siemens
Wells Fargo	J & J
Bank of America Corporation	Clarian Health
Citigroup	Novartis
HSBC	DOW Chemical
Santander	Bayer
BNP	Roche
Barclays	Pfizer
Deustche Bank	Sanofi
Mitsubishi UFJ	GSK
Goldman Sachs	Astrazeneca
Morgan Stanley	Medtronic
Societe Generale	Abbott
UBS	Amgen
Unicredit	Eli Lilly
RBC	BMS
Lloyds	Takeda
BBVA	Novo
Credit Suisse	Merck
RBS	Astellas
Intesa	Biogen
Credit Agricole	Daiichi Sankyo
Mizuho	Mitsubishi Tanabe Pharma
ING	Boehringer Ingelheim
Nordea	Wellcome Trust

From Zephyr it was possible to obtain precise estimates on the number of merger and acquisition deals implemented by each company, while Medtrack provided a full list of the corporate venture capital (CVC) deals for the biotech and pharmaceutical industries. The number of the CVC deals for the banking sector has been instead manually extracted through companies' website and financial prospects, and for two banks (HSBC and Barclays), it has been proxied with their competitors' behavior and weighted for the period of activity. Furthermore, data on licensing agreements have been gathered from Medtrack, the Biotech Gate, and the EU scorecard, and records of registered patents has been acquired from professional patents platforms (Freshpatents, Justia Patents, and Google Patents).

Osiris (and Bankscope as well) provided instead a series of important balance sheet and firm-related data, such as net income, number of recorded shareholders, and number of companies in the corporate group.

It has also been confirmed whether every company had backed or initiated an incubator or accelerator through companies' website, and finally the research and development data have been mined from the EU Scorecard, approximating the R&D amounts for American and Asian banks with some of their closer European competitors.

4. Discussion

For the sake of this work, innovation has been defined as pure technological development (i.e., product innovation), and two hypothesis have been formulated and tested:

➢ Proposition 1: *The banking/fintech sector is intrinsically less innovative than the biopharma one;*
➢ Proposition 2: *The growth by innovation is converging to venture funding as privileged mean of financing;*

The first hypothesis has been validated through an empirical study: a new indicator has been developed, in order to map each player with respect to both his imperative to innovate and his commitment to do so. The innovation impulse indeed has been assembled as the log amount of the number of patents times the number of recorded shareholders, and eventually standardized to zero. The number of patents tends to capture the external pressure to innovate, because of then growing competition within the industry, while the amount of recorded shareholders characterizes the internal innovation pressure, because to a high number of shareholders corresponds a higher profit target as well as a well-established institution, which has reached the mature phase and as to innovate to overcome the revenues' plateau. Furthermore, it is worthy to be noticed that the internal pressure is more closely related to the banking sector, while the external pressure is more common in the biotech world, and therefore the indicator so created is consistent with a cross-sectional analysis. Figure 1 plots indeed the innovation impulse with respect to the innovation commitment (indicated by the R&D intensity), and weighted for their net income for both the sectors (pharma in red, banks in blue).
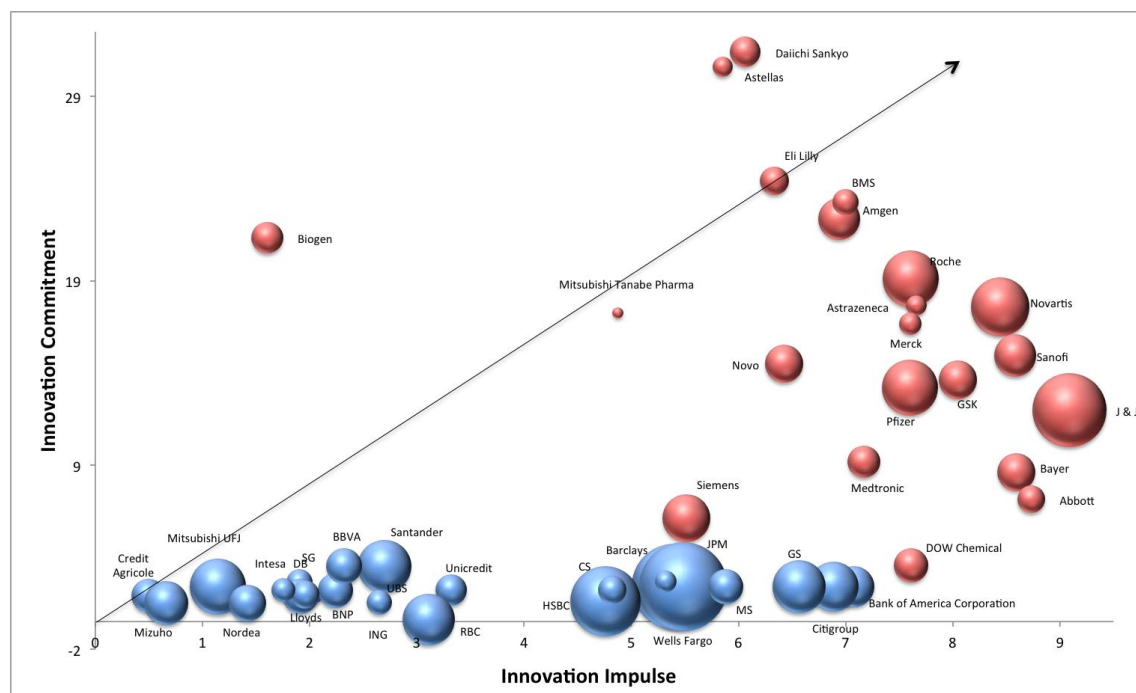

Figure 1. *Innovation drivers map.*

The banking sector fills mainly the down side of the picture, meaning that the banks' commitment to innovate is fairly low, although the impulse to innovate is growing. This is particularly verified for high-income companies, and thus in the old-minded banking industry growing by innovation seems to be a prerogative of biggest and most profitable companies. Oh the other hand, in the biopharma world, both the

commitment and the inner impulse to innovate are quite high, and completely unrelated with respect to the income size.

In order to test the second hypothesis instead, two different indicators have been constructed: the first one with the aim of capturing the degree of innovation for each company, while the second with the goal to understand the innovation intensity across single firms. In particular, the *degree of innovation* has been assembled equally weighting five different kinds of growth initiatives, i.e. research and development expenditure, licensing and knowledge partnerships, corporate venture capital, incubators and accelerators, and finally merger and acquisitions. The ordered disposition is not accidental though, but swings from the most internal growth strategy (R&D investments) to the most external one (M&A). Hence, the innovation meter has been created in order to keep reflecting this 5-incremental-innovation-stages distinction, and more in particular with the following structure:

$$DoI_i = 0.2 * IA + 0.2 * Licensing + 0.2 * M\&A + 0.2 * CVC_j + 0.2 * R\&D$$

where the subscript *i* represents all the single companies, *j= Banking, Pharmaceutical*, and with the variables defined as follows: IA is a dummy variable that indicates whether the firm has (1) or not (0) an incubator or accelerator. The licensing variable is obtained scaling the number of technical agreements and licensing partnerships for each company to the maximum amount of licensing deals made by a single firm. The CVC variable is again taking into account the number of CVC deals completed over the period, scaled for the maximum amount of deals closed by a single entity within the same industry. The R&D indicator measures more in details the research intensity, since it weights the research and development expenditures on the net sales, and then it is compared to the total cross-industry average. Finally, the M&A variable has been constructed as percentage distance of the company number of M&A deals from the maximum amount of deals completed by a single entity.

The second indicator is instead about the innovation intensity of each firm. It has been created as the number of patents scaled for the highest amount of patents registered by a single company.

The Figure 2 therefore aggregates all the information, and plots each company with respect to their degree of innovation and their innovation intensity, weighting each corporation for the number of companies in the corporate group (the bubble area).
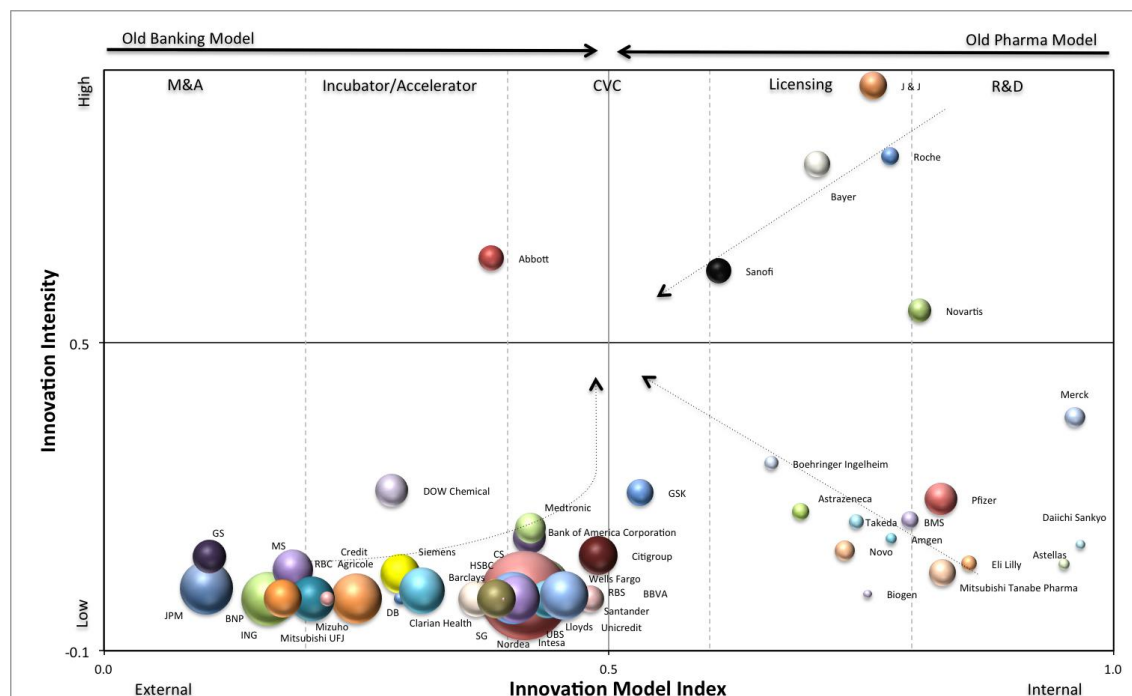

Figure 2. Business model innovation matrix.

Hence, the degree of innovation has been set to the x-axis, and it goes from 0 (external growth) to 1 (internal growth) by construction. The y-axis is instead given by the innovation intensity – still from 0 to 1, where 0 means a low-level of innovation and 1 a high level. Appears as if the data confirms some of the initial assumptions above explicated: the banking sector mainly lies in the first quadrant, meaning that the innovation

instinct is quite low in the financial services industry, and it is driven mainly by mergers, accelerators, and some venture financing deal. The pharmaceutical sector has instead an inner innovative intensity, which occurs through internal R&D, licensing, and corporate venture capitals. Furthermore, the corporate complexity matters when it comes to innovation and growth. Intuitively, more complex hierarchical institutions have to do a greater effort with respect to more flexible company with a lean structure. It seems that less-high value patents are a better options than a larger portfolio of smaller deals, and the corporate venture capital may represent the best way to fund these alternatives.

Unfortunately the chart is a static representation of the sectorial innovation, and this is why a further adjustment is needed. In order to verify whether a shift within the business model for both the sectors can be observed, the innovation model has been modified no longer taking into account the R&D intensity, but rather the R&D 1-year growth. This would allow to capture some time dynamics, and the results are shown in Figure 3. It should be pointed out that the vertical axis has been changed, in order to spot at the same time the relation between the innovation impulse and the overall index.
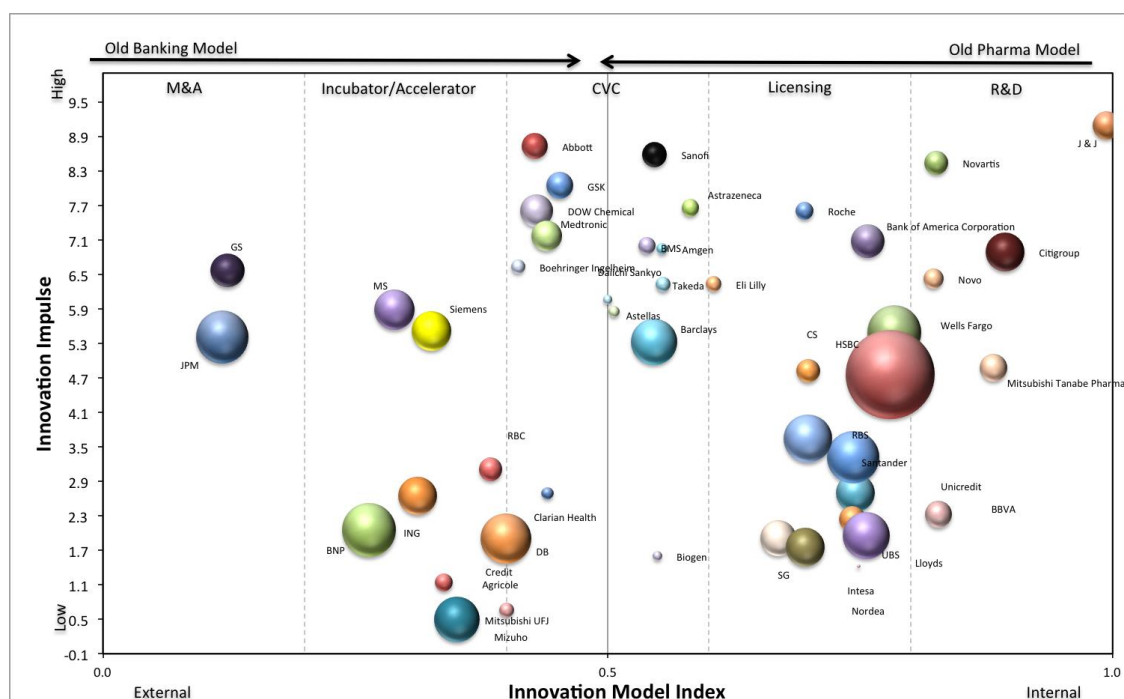

Figure 3. Business model dynamic transition matrix.

The outcome confirms the initial expectations: regardless of the sector considered, internal and external innovation pressures push the growth models to migrate toward the central section of the matrix, i.e., toward more innovative approaches, and in particular they tend to CVC as preferred instrument. Old-banking models were indeed mainly based on merger and acquisition deals, while pharmaceutical sector on internal research and development, but they are commonly converging toward a mid-point. The chart shows the change of the distribution based only on the R&D 1-year change, but it looks completely different from the static case, and suggests that the financial sector is quickly trying to evolve to become more competitive.

5. Concluding Thoughts

In this study, a unique dataset has been created ad hoc to test the similarities between the biotech/pharma industry and the fintech/banking one. It has been empirically verified that the financial sector is less innovative with respect to the pharmaceutical one, and that, at present, corporate venture capital represents an important innovation driver. This is extremely relevant for managers to understand the future directions and identify successful strategies to innovate minimizing the costs and maximizing the investments impact.

Indeed, it has previously been exposed how cross-sectors innovation is converging to CVC as preferred mean of innovation, and different matrices for innovation have been explained. The first indicator of the above-claimed can be observed in recent market news, e.g., the launch of Santander's VC fund. In addition to that, it

seems that one of the greatest lessons the finance industry can learn from the biopharma one is the value of networking and strategic partnerships. The network effect amplifies each process and enhances the resonance of any single innovation, no matter how small or disruptive it may be. A new integrated ecosystem structure represents indeed the future of the innovation model for financial services.

The study is limited to the comparison between fintech and biotech spaces, but further sectors can be taken into account, such as energy or exponential technology. Moreover, future research may involve a higher spectrum of companies within fintech/biotech sectors. In spite of any conclusion or future research direction, the main limitation of this work lies in the definition of innovation, which still is subjective. In the study, it has been considered the product (technology-intensive) innovation, but the outcomes may vary depending on different definitions.

There are two additional interesting aspects that would be considered in the future, and that may affect the results. First of all, the regulatory environment plays an important role in this scenario: fintech companies are usually less regulated than banks, while biotech and pharmaceuticals are equally controlled. Furthermore, the law changed over time adapting to research developments in the biotech industry, and it poses a stronger set of constraints with respect to many other sectors. On the other hand, the banking space has tight boundaries to respect, although less strict than the biopharma one. This may result into a longer wave of innovation once the best path is identified.

The second relevant feature is the governmental subsidies, much more common in the biopharma industry than in the banking one. It is intuitive that subsidies and innovation are correlated to some extents, but the causation is not clear and needs further investigation: do subsidies incentive innovation, or is successful innovation that demands for more incentives and investments? If the first case applies, the results have to be modified accordingly, and the innovation push of the biotech industry has to be scale down. If the second case turns to be verified, the study will require taking into account a multi-stage innovation model, where a higher importance has to be assigned to breakthrough discovery that triggers the innovation cycle. Finally, incentives and subsidies implicate a moral hazard problem, inasmuch companies invest money that are not their own ones. This may push them to look for highly risky investments with a really high payoff in case of success, and thus might misrepresent the innovation appetite and research impulse.

In conclusion, technological breakthroughs are demanding a faster-pace innovation, and in financial sectors this innovation is neither horizontal nor vertical, rather it is completely disruptive. The banking industry needs therefore to learn from anything and anyone how to manage this innovation efficiently, and the pharmaceutical sector could be only one of the possible instructors.

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