

# Developing a Macro-segmentation Model at Industry Level: Iranian Banking Industry

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## Abstract

*Drastic changes and turbulence in macro-economic factors have the greatest impact on banks target market attractiveness in Iran. It is assumed that conventional segmentation models at the corporate level are not efficient for banking system. This study aims to develop a new segmentation model at the industry level for banks of Iran. For this purpose, structures and variables at the industry level were identified and defined by reviewing the literature and with the help of bank experts in focus group sessions. Then, data of ISIC 3-digit factories with 50 and more employees were extracted from Iran Statistic Center and Tehran Stock Exchange databases during 2005-2013. We used Hierarchical Cluster analysis in each year and identified 4 study groups across 9 years. We found that identified groups are significantly different regarding industry size, deposit and loan market size, industry growth, deposit and loan market growth, profitability, investment risk, and transaction with other industries.*

**Keywords:** Macro-segmentation, Manufacturing Industries, Segmentation based on industries, Hierarchical Clustering, Banking.

**JEL Classification:** E44, G21, L60, M31, C67, C82

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## 1. Introduction

The economy of Iran has experienced severe shocks and turbulences in recent years resulting in a change in macroeconomic factors including oil production, sale and price, exchange rate fluctuations, money supply, inflation rate, economic growth rate, unemployment, etc. Manifold fluctuations and severe turbulence of macroeconomic factors in the bank-oriented economy of Iran have affected the competition pattern and market attractiveness of banks in utilization and allocation of resources in the short run. This has been followed by precipitate, temporal decision-making by managers considering only their own judgment and intuition. Economy of Iran is experiencing a recession which urges the banks, as main players, to pursue an expansionary policy to support stagnant manufacturing industries and invest in job-creating sections in order to fulfill Resistance Economy policies.

Macro-segmentation is one of the strategies by which managers are able to react to changes of circumstances promptly. The intermediary nature of banking industry allows unrelated industries to connect to each other. The volatility of money and high velocity of banking products and services circulation make the segmentation models and variables in banking industry completely different from other businesses. Segmentation based on industries (SBI) helps bank managers to better understand the structure of the economy, identify larger and more stable groups with the same behavioral patterns, thus redefine organizational strategies and respond to environmental uncertainty quickly.

Considering the size and pace of changes in the economy of Iran, industry segmentation is far more necessary than corporate segmentation. In other words, if significant different groups are identified in industries, this study will be able to present a new approach in SBI which is particularly useful in banking. By considering the importance of this study for the economy and conductors of banking and monetary markets, this study aims to answer the following questions:

What is the SBI model for banks? What structures and variables does it include? Based on the identified model, what are the groups and their members? What are the dominant characteristics of these groups? How has the behavior of the groups and their members changed during the time? What are the effective measures and strategies of banks in case of choosing each group as the target market?

## 2. Literature Review and Theoretical Foundations

Segmentation was first indirectly mentioned in a textbook of industrial and business marketing by Fredrick (1934). Studying the details of this concept in papers by researchers did not start until the 1950s and 1960s. Market segmentation and modeling as fundamental concepts in marketing have always been the center of attention. Different approaches have been proposed thus far, each encompassing different assumptions. Table 1 shows the evolution of these approaches and the place of this study in each approach. From 2000 onwards, scholars have developed normative and pragmatic models by criticizing subjective ones. An example of the mentioned criticism can be found in Webster (1978): “Most of the conducted researches in this area of study are limited to descriptive studies including repetitive studies of old subjects. Most of these studies have a small sample and simple assumptions and do not reflect the real complexity of the world of businesses.”

SBI can be related to business segmentation; the latter is more sophisticated than consumer market (Pol, 1994). Many logical and normative models have been developed concerning this matter, as Danneels (1996) put it: “Segmentation models are called normative as they have a prescriptive nature meaning that these models suggest specific policies in the marketplace”. Although several segmentation models have been proposed, they rarely, if ever, have been implemented (Wind, 1978). Normative models of market segmentation consist of a series of logical steps including the Macro-Micro approach of Wind and Cardozo (1974), the Partial approach of Green (1977), and nest hierarchical model of Shapiro and Bonoma (1985). Despite the development in different normative models, Dibb and Simkin (1994) believe that these models mostly deal with conceptual subjects. They believe subjective models to be meaningless unless they are capable of being used in the real world. While we need applicable plans, the destitution of literature in segmentation especially in applying market segmentation plans, is quite disappointing.

A review of the literature shows the gap between theory and practice in market segmentation has been studied in a few studies (Danneels, 1996; Deeb and Simkin, 1994; Jenkins and McDonald, 1994). However, a change of stream toward practical studies is sensed in recent studies. These recent researches are focused on market segmentation in the real world, not

development of normative models. This study aims to design a valid normative model in banking industry. In order to do so, we try to extract the SBI model from the banks' viewpoint, specifying its components, and based on the findings presenting policies and managerial recommendations to the bank managers to choose each of these markets as a target market.

**Table 1. Position of this Study among Different Approaches of Market Segmentation**

Market Segmentation Approaches	Researchers	Market segmentation interpretation in this approach	Place of this study considering this approach
<b>Economic</b>	Robinson(1954), Beik and Buzby(1973), Brandt(1966), Smith(1956)	To do the segmentation, this approach takes resource allocation into account and considers price as the determinant factor of supply and demand and market segmentation.	The main focus of this study is on the efficient allocation of resources (money) to different sectors in the economy in a way that the factories' need to money is answered in time and the profitability of the banks is maximized.
<b>Marketing</b>	Webster(1991), Choffray and Lilien(1980), Flodhammer(1980), Ames(1977), Green and Carmone(2001)	Focus is on demand in market segmentation. In this approach market segmentation is done by measuring the potential to respond to heterogeneous sectors of the market, by designing exactly what the customer needs. This approach is used in markets with competition pressure for a lower price.	The banking system in Iran is in the beginning of marketing approach. The banks are practicing the physical and apparent factors of customer-orientation concepts. Price war (interest rate) is determinant in market share of deposit and loan and other factors have lower priorities. It is crucial that a study with economic approach is done before studying through this approach.
<b>Consumer/business market</b>	Cardozo (1968), Wind (1978), Cheron and Kleinschmidt (1985), Dibb and Simkin (1994), Doyle and Saunders (1985), Pol and Griffith (1994)	Three approaches: 1. If the techniques used in segmentation of consumer market are designed based on the business market, there will be a great opportunity for business market segmentation. 2. There are a few similarities between the consumer and business markets.	Due to the intermediary nature of the banking industry, the line drawn between the consumer and business markets is not as easy as the commodity markets. The deposit market has mostly small customers of B2C kind and the loan market customers of B2B type.

Market Segmentation Approaches	Researchers	Market segmentation interpretation in this approach	Place of this study considering this approach
		3. The third school is placed between the other two admitting to both similarities and differences between the two markets.	
<b>Behaviorism / decisionist</b>	Frank, Massy and Wind (1972), Mahajan and Jain (1978), Danneels (1996), Plank (1985)	Behaviorist approach: It tries to identify and document the generalizable differences of market sectors and considers them to be the foundations for consumers' behavior. Decisionist or normative approach: This approach does not pay specific attention to the differences, instead it tries to reveal the effects of these differences on the improvement of marketing plans of the company.	This study tries to present a proper normative model, thus it is a decisionist approach model.
<b>Macro/Micro</b>	Wind and Cardozo (1974), Shapiro and Bonoma (1984)	Macro approach: Segmentation is done using demographical, environmental (economic, political, social, technological, legal), organizational, and industrial variables. Micro approach: This one focuses on the process of buying by the buyers and buying by decision-makers. The variables are psychological, attitude determining, behavioral.	The firms are dependent on money which is why this study includes all economic sectors of the country in need of long and short run financing. This will cause the study to be of macro nature and the segmentation level is at industrial and economic sectors level.

Market Segmentation Approaches	Researchers	Market segmentation interpretation in this approach	Place of this study considering this approach
<b>Buyer's-Seller's interests</b>	Whitlark (1986), Mayers (1996), Riquier, Luxton and Sharp (1997)	Buyers-oriented approach: Analyzing process starts from the customer and ends with the seller. Seller-oriented approach (based on the availability of the market for the sellers): The process starts with the seller and continues with the availability of the market for the seller and its identifiability of the different sectors.	Due to the following reasons the study is mostly seller-oriented: 1.The dominance of financial and accounting thinking in banking industry; 2.The generality of the need of money; 3.Unavailability of the information at micro level; 4.The dominance of productionism thinking in practice; 5. The youthfulness of the costumer-orientation thinking in Iran banking industry; 6. Unavailability of comprehensive studies in the field of business segmentation based on real data and econometric methodology, in Iran and in the world.

## 2.1. Iranian researches

Few studies have been conducted concerning segmentation in banking industry of Iran. Most of studies are limited to retail banking focusing on current customers which usually use data mining techniques to analyze consumer preferences. Retail customers' market segmentation in the banking industry is focused on depositors and does not cover all potential markets. These studies often classify current customers based on predetermined variables while the main goal of market segmentation is gaining competitive advantage and this goal is not achieved without considering all markets. On the other hand, this method of research is being static so that the results show a picture of customer's preferences in the short run while we need to study the performance in time to assure the stability and reliability of the results of the model.

**Table 2. Summary of the Main Domestic Studies**

Researchers	Title / Scope of the study	Method	Variables
Akhoundzadeh et al.,	Mining customer dynamics in designing customer segmentation	Cluster analysis (K-Means)	Regency, Frequency, Monetary (RFM)
Ghaffari et al.,	Identifying Market Segmentation Variables in Tourism Industry	Conceptual	Demographic, Geographical, Behavioral and Psychological
Kousha and Zahmatkesh	Market Segmentation and Prioritizing Segments	Cluster Analysis (K-Means), Fuzzy Hierarchical Analysis	Regency, Frequency, Monetary, Payment terms (RFMP)
Eghtedarian and Hajipour	Developing Tourism Strategies using Market segmentation For Isfahan Province	Cluster analysis (K-Means)	Pull and Push Motives
Khajevand et al.,	Segmenting Saderat Bank depositors using data mining	Two Step Clustering	Regency, Frequency, Monetary (RFM)
Ahmadi et al.,	Drug market Segmentation	K-Means, Neuron Network	Demographic, , Behavioral and Physiological
Mortazavi et al.,	Segmenting banks customers in Mashhad based on Benefit Expectation Approach	Factor analysis, cluster analysis	Customer Benefit Expectations

## 2.2. Foreign researches

Most of the researches in the business market, especially in the loan market, are devoted to subjective studies and surveys. Few of these have used real data. They have mainly used experts' viewpoints and ANOVA, MANOVA or Conjoint Analysis. These studies are typically classified as consumer behavior survey studies and are able to describe a small part of the market. As the data in this type of study is obtained by means of surveys, the results are highly affected by place and time and are not generalizable.

**Table 3. Summary of the Main Foreign Studies**

Researcher(s)	Market Segmentation Bases	Method	Sample
Meahala (2013)	Identifying market segmentation variables: profitability, return on investment, field of activity, products and services, deposit and loan volume, collaterals, customer behavior in loan repayments, customer reputation	Conceptual	SME's
Silvestrou (2012)	Credit risk	Survey/ descriptive	Romanian SME's
Beck and Kunt (2006)	Accessibility to finance, business competitive conditions for SME's	Conceptual	SME's
Anthapoulos and Labrokous (1999)	Study business customer behavior in: corporate size, required products, profitability, risk profile)	Survey (Manova)	467 corporates in Greece
Zenoldine (1996)	Product Life Cycle, Differentiation Strategies in product and services	Conceptual Model	-
Cheron (1989)	Designing two step market segmentation model for banks	Conceptual model	-
Ma and Chan (1990)	Corporate size, relationship duration, number of banks used by customers, perceived quality, diversity of services, place, CEO's relationship with banks	Survey/ descriptive	96 Corporates in Hong Kong

### 3. Methodology

The aim of this study is to explore a new segmentation model at industry level and then to describe and evaluate segments based on longitudinal real data collection. The data has been obtained from Tehran Stock Exchange and Iran Stats. Center regarding factories with 50 and more employees between 2005 and 2013. The structures and variables of the research have been identified and described using focus group technique and interviews with experts of the industry:

**Focus Group:** In the first step the factors of measuring the attractiveness of the market from the banking system viewpoint were identified using a focus group of 7 experts of banking with different specialties; finance, economics,

accounting, and marketing. In order to identify factors, structures and variables Directed Content Analysis approach was used. In this approach, primitive codes are obtained based on literature review and previous studies and made available to experts as guidance for model development.

**Personal Interviews:** In the next step, interviews were conducted in two levels to confirm the identified components and define operational variables. First the members of the focus group who were completely aware of the model framework were interviewed in a semi-structured framework; then the other experts were interviewed with open questions. With the gradual presentation of the model, the questions were asked to confirm the identified characteristics.

**Table 4. Operational Variables Recommended by Experts in Interview Based on Literature Review**

Market attractiveness factors	References in previous studies	Structures	Recommended variables
Market size	Myers (1996), Wind (1978), Webster (1991), Cheston and Klafitis (1997), Cheron and Kilnshmidt (1985).	Industry size	Number of factories (15), number of employees (15), Sales volume share (15), Value-added share (10), Production share (5) Fixed asset (3)
		Deposit and Loan Market Size	Input- Output volume (15), compensation per capita (12), capital investment share (15)
Market growth	Sharplin (1985), Day (1986), Abell and Hamound (1979), Channon (1979).	Industry growth	Short and long term growth in a number of factories (15), number of employees (15), sales volume share (15), value-added share (14), investment volume (12)
		Deposit and loan market growth	Short and long term growth in input- output volume (15), compensation per capita (12), capital investment share (15)
Profitability	Stahl and Gribby (1992), Abell and	Industry profitability	Profit margin (15), Return on investment (12), interest coverage ratio (11), return on asset (15)

Market attractiveness factors	References in previous studies	Structures	Recommended variables
	Hamound (1979)	Industry productivity	Output to input ratio (12)
Product differentiation	Stahl and Gribby (1992), Abell and Hamound (1979)	Potential to develop new products and services	Commission paid to banks (15), export to sales ratio (11), imported capital to total capital (9), imported raw material to total raw material (10)
Investment risk	Hassy (1978), Cardozo and Wind (1985), Cheron and Klinshmidt (1985)	Financial risk	Debt to equity ratio (15)
		Default risk	Receivable turnover ratio (11)
		Commercial risk	Deviation of real production from trend (15)
		Liquidity risk	Liquidity ratio (11)
Intersectional transactions	Input-output tables	Forward and backward relationships with other industries	Forward linkage (15), backward linkage (15)
Industry value	Abell and Hamound (1979), Chavin and Hirshy (1993)	R&D expenses	R&D expenses to sales (15)
		Advertising expenses	Ad expenses to sales (15)

\* Digits in parentheses represent frequency of recommendation by experts.

In the second step after reaching a consensus on the attractiveness model, the experts were given the information platform and were asked to give their recommended variables to measure each of the following structures: Industry market size, deposit and loan market size, industry growth, deposit and loan market growth, profitability, investment risk, industry value, intersectional transactions. After 15 interviews, no new variable was added to the model and the interviews had reached a theoretical saturation.

Table 4 shows the suggested variables and their frequency in the sample (for more information please refer to appendix 1).

**Statistical Techniques:**

**PCA:** Having the model developed, we used principal component analysis to explore the model based on real data for possible modification. In principal components analysis, the total variance in the data is considered. The diagonal of the correlation matrix consists of unities, and full variance is brought into the factor matrix. Principal components analysis is recommended when the primary concern is to determine the minimum number of factors that will account for maximum variance in the data for use in subsequent multivariate analysis (Malhotra and Bricks, 2007).

**Hierarchical Clustering:** Hierarchical clustering is characterized by developing a hierarchy or treelike structure. Hierarchical methods can be agglomerative or divisive. Agglomerative methods are commonly used in marketing research which start with each objects in a separate cluster. Clusters are formed by grouping objects into bigger and bigger clusters (Malhotra and Bricks, 2007). They consist of linkage methods, error sums of squares or variance methods, and centroid methods. We used centroid methods in this study. In the centroid method, the distance between two clusters is the distance between their centroids (means for all the variables).

**Discriminant Analysis:** We used Discriminant analysis technique to analyze each group features in this study. Discriminant analysis is a technique for analyzing data when the criterion or dependent variable is categorical and the predictor or independent variables are interval in nature. Group membership is dependent variable and market attractiveness factors are independent variables in this study.

**Population and Sample:** The population of this study is the industrial sector of the country and all factories with 50 and more employees are the research sample. The sample has been divided into 55 industries using ISIC classification (list of 55 industries can be found in appendix 2).

#### **4. Data Analysis and Findings of the Research**

**Principal component analysis:** Total 440 observations (55 industries  $\times$  8 years) were evaluated by Exploratory Varimax rotation method. Only factors with Eigen value greater than 1.0 were retained. 13 factors were identified which explains 70 percent of variance of data. Factor 1 represents market size in deposit and loan aspect, factor 2 represents long run growth, factor 3

represents profitability, factor 4 represents market size in industry size aspect, factor 5 represents short run growth, factor 6 represents investment risks, factor 10 represents industry value and factor 11 represents intersectional transactions. Other factors do not show any meaningful concept. According to PCA result product differentiation is omitted and commission paid to banks is defined as a measure for market size.

**Table 5. Principal Component Analysis Results**

Factors	Initial Eigenvalue			Loadings with rotation		
	Total	% of variance	Cumulative	Total	% of variance	% of variance
1	6/026	15/451	15/451	4/130	10/589	10/589
2	3/872	9/929	25/380	2/978	7/636	18/225
3	3/459	8/870	34/251	2/747	7/043	25/268
4	2/481	6/361	40/611	2/739	7/023	32/291
5	2/242	5/749	46/361	2/652	6/799	39/090
6	1/774	4/549	50/909	2/621	6/721	45/811
7	1/535	3/936	54/846	2/353	6/032	51/844
8	1/370	3/513	58/359	1/692	4/339	56/183
9	1/328	3/405	61/764	1/591	4/079	60/261
10	1/190	3/052	64/816	1/394	3/576	63/837
11	1/097	2/812	67/628	1/378	3/533	67/370
12	1/060	2/717	70/345	1/160	2/976	70/345
13	/971	2/489	72/834	-	-	-

Source: Research results.

**Hierarchical Clustering:** The industry grouping was done using the hierarchical clustering method. To do so, the mean of the variables for the 8 years of the study was calculated and the clustering was determined for the mentioned years. The Dendrogram schematic showed the best case is clustering the industries into 4 clusters. The identified clusters were compared

to the other clusters in each year based on the stability and 4 groups of industries were determined based on the stability and persistence of the groups during the 8 years: Green, Yellow, Red, and White. The results of significance test at significance level of 95% of the variable means of these 4 groups can be found in table 6.

**Discriminant Analysis:** As 4 groups were evaluated, a maximum of 3 functions could be derived using discriminant analysis. The Eigenvalue of the first function is 135.2 which shows 95% of the variance of the data. The higher Eigenvalue of the first function indicates its potential to better distinguish the groups. The second function with an eigenvalue of 5.8 can only explain 4% of the variance of the data. The third function only explains 0.5% of the variance of the data with an Eigenvalue equivalent to 0.693.

**Table 6. Discriminant Functions, Eigenvalue and Equality Test of Group's Center**

Discriminant functions	Eigenvalue	% of variance	% of cumulative variance	Wilks Lambda	Chi-square	Sig.
1-3	135.02	95.4	95.4	0.001	301.66	0.000
2-3	5.81	4.1	99.5	0.087	100.24	0.000
3	0.692	0.5	100.0	0.591	21.57	0.364

*Source:* Research results.

For the hypothesis test of all three group centers to be equal, we have considered three cases. First, all three, then the second and the third, and finally, only the third one were evaluated. The results showed that the third one cannot explain the difference between the groups. The first one can effectively explain the differences and the second one can do so in a significant way. Table 5 shows the results of significance test of equal center for all groups, in all three cases with Eigenvalues and Wilks-Lambda statistic.

**Validity of the Identified Groups:** To measure the validity of the identified groups, cross-validation method was used. In this method, the data is randomly divided into two subsamples. The analysis sample, is used for estimating the discriminant function, and the validation sample is used for developing the classification matrix. The discriminant weights, estimated by using the analysis sample, are multiplied by the values of the predictor variables in the hold out sample to generate discriminant scores for the cases in the hold out sample. The cases are then assigned to groups based on their

discriminant scores and an appropriate decision rule. By a rule of thumb, if this ratio is 25% more than the random division of the units between the groups, the results are reliable (Malhotra and Bricks, 2007). As the identified groups in the present study are 4 groups, if the ratio is higher than 50%, the groups are valid. Table 6 shows the validity percentage of the units in desirable groups in each year.

**Table 7. Cross Validation Test of Hierarchical Clustering (2006-2013)**

2006	2007	2008	2009	2010	2011	2012	2013
71%	75%	93%	82%	71%	71%	80%	82%

*Source:* Research results.

Mean Equality Test of Variables across the Groups: Before describing each group's characteristics, we need to know which variables distinguish groups the most. Mean equality test was taken in order to recognize these variables. Table 7 shows the significance of mean differences of variables across four groups. Significant variables were selected as the basis of segmentation and difference description across the groups.

**Table 8. Mean Equality Test across Groups**

Variables	Wilks Lambda	F statistic	Sig.	Variables	Wilks Lambda	F statistic	Sig.
FS	0.924	1.195	0.121	IOG	0.896	2.562	0.065
ES	0.767	5.177	0.003	LIOG	0.766	5.192	0.003
VAS	0.155	92.675	0.000	IG	0.853	2.928	0.042
SS	0.109	138.39	0.000	LIG	0.0721	6.580	0.001
IOS	0.115	131.133	0.000	PM	0.928	1.318	0.279
IS	0.253	50.194	0.000	ROA	0.26	48.2722	0.000
RTR	0.538	14.598	0.000	ROI	0.851	2.987	0.040
DE	0.772	5.030	0.004	IO	0.855	2.887	0.044
WS	0.46	19.996	0.000	CS	0.201	67.493	0.000
FG	0.899	1.908	0.14	RMIT	0.92	1.473	0.233
LFG	0.895	1.999	0.136	CACT	0.861	2.753	0.052
EG	0.809	4.021	0.012	ETS	0.967	0.577	0.633
LEG	0.791	4.484	0.007	STA	0.911	1.659	0.187
VAG	0.857	2.824	0.047	RDS	0.893	2.039	0.120
LVAG	0.882	2.268	0.092	LR	0.822	3.688	0.018
SG	0.877	2.389	0.08	FLL	0.203	66.81	0.000
LSG	0.835	3.357	0.036	BL	0.754	5.549	0.002
WG	0.798	4.316	0.009	FL	0.795	4.371	0.008
LWG	0.798	4.301	0.009	RISK	0.597	11.48	0.000

*Source:* Research results.

Considering table 7, the main characteristics of identified groups are as follows:

### **Group 1. Green Industries:**

*Number of Members: 4 Industries; ISIC: 232, 241, 271, and 341*

This group consists of the industries with the highest number of employees, sales, investment, and wages and salaries although the number of factories in this group is ranked three. The turnover of this group is very high and makes it the biggest market of deposit and loan for the banks. These industries have had higher long and short run growth rate in value added, sales volume, and investment in factors of production. Despite the high turnover and growth, their profit margin, investment return, and productivity are lower than expected. They have had the highest commission paid to the banks. These industries are neither export-oriented nor import-oriented thus are least dependent on foreign markets and could be vital in Resistance Economy Policies. Business risk is high in these industries, meaning that their sales have experienced severe fluctuations; they have a medium-range performance in financial liabilities, and the best liquidity account among all industries; they have a medium condition in collection period which has been prolonged after the sanctions. They have the highest forward linkage and relatively high backward linkage.

### **Group 2. Yellow Industries:**

*Number of Members: 35 Industries; ISIC: 151, 152, 154, 155, 210, 221, 222, 242, 243, 251, 269, 272, 273, 281, 289, 291, 292, 293, 311, 312, 313, 315, 319, 321, 322, 323, 331, 333, 342, 343, 351, 352, 359 and 361*

The number of factories is relatively high but considering the employees and other measures of industry size, they have a medium state. Their market size for attracting deposit and loan is medium and their market growth in the long and short run is the lowest among all industries in all aspects. These conditions have improved to some extent in 2011 and 2012; their profitability is low in general and has improved in recent years; they have the second highest paid commission to the banks; they import capital equipment and as a result are import-dependent; they have the lowest rate of export among all industries; they have a medium state in liquidity, a relatively low collection period, a medium business risk and have average forward and backward linkage.

Table 9. Standard Mean of Variables in Each Group (2006-2013)

Groups	Industry size	Deposit and Loan market size	Industry growth	Deposit and loan market growth	Profitability	Export oriented	Import oriented	Commercial risk	Repayment of financial debt	Receivable turnover ratio	Forward linkage	Backward linkage
Green	0.299	0.472	0.461	0.400	0.170	0.089	0.135	0.286	0.549	0.276	0.513	0.564
Yellow	0.141	0.134	0.328	0.224	0.185	0.237	0.106	0.078	0.510	0.223	0.209	0.667
Red	0.141	0.103	0.359	0.368	0.212	0.252	0.207	0.0034	0.911	0.704	0.104	0.493
White	0.038	0.064	0.384	0.283	0.308	0.211	0.165	0.0001	0.495	0.210	0.109	0.430

Note: Variables are standardized between (0, 1).

Source: Authors' calculations.

**Group 3. Red Industries:**

*Number of Members: 4 Industries; ISIC: 171, 172, 173, and 181*

These industries have the highest number of factories. They have an average state considering the number of employees, investment, and wages and a small size in sales and factors of production; thus their market for deposit and loan is small; their growth is average; they have the lowest growth rate of sales among all industries, and the highest growth rate of deposit and loan market. Their profitability is medium-range and is ranked third in paid commissions to the banks. These industries are import-dependent and were severely affected by the sanctions. They have the highest rate of export, lowest liquidity, and high collection period, as a result the default risk is high in this group; however, they have a low business risk. They have the lowest forward linkage and average backward linkage.

**Group 4. White Industries:**

*Number of Members: 12 Industries; ISIC: 191, 192, 201, 202, 223, 231, 252, 261, 300, 314, 332 and 353*

These industries have the smallest size and deposit and loan market among all groups; value added and investment growth rate are high and they have an average growth rate in other variables; they have the highest profitability state, lowest paid commissions to the banks thus a small market for them. Import and export is of medium-range, so is liquidity; collection period is low and they rank second in this matter; they have the lowest business risk, forward and backward linkage.

Table 10 shows industries membership across 9 years. Accordingly, the majority of industries migrated between the groups. However, final membership is determined by robust members. This table also presents validity and reliability of industries' membership findings.

Table 10. Industries Membership among the Groups across 9 Years

ISIC code	Green	Red	Yellow	White	ISIC code	Green	Red	Yellow	White	ISIC code	Green	Red	Yellow	White
151	1	-	6	2	241	9	-	-	-	314	-	-	4	5
152	-	-	8	1	242	1	-	6	2	315	-	-	8	1
153	1	-	6	2	243	1	-	7	1	319	-	-	8	1
154	1	-	6	2	251	-	1	6	2	321	-	-	4	5
155	1	-	5	3	252	-	-	2	7	322	-	-	4	5
171	-	6	1	2	261	-	-	2	7	323	-	1	5	3
172	-	6	1	2	269	5	-	3	1	331	-	-	7	2
173	-	8	-	1	271	9	-	-	-	332	-	-	3	6
181	-	6	2	1	272	-	1	7	1	333	-	-	6	3
191	-	1	3	5	273	-	1	7	1	341	7	-	-	2
192	-	1	3	5	281	-	-	8	1	342	-	-	7	2
201	-	-	3	6	289	-	-	7	2	343	1	-	5	3
202	-	-	3	5	291	-	1	7	1	351	-	-	4	5
210	-	1	7	1	292	-	1	7	1	352	-	-	4	5
221	-	1	5	3	293	-	1	7	1	353	-	-	4	5
222	-	1	5	3	300	-	1	3	5	359	-	-	7	2
223	-	1	4	4	311	-	-	7	2	361	-	-	6	3
231	-	1	2	6	312	-	-	7	2					
232	8	1	-	-	313	-	-	9	-					

## 5. Conclusion and Suggestions

This study introduced a new approach in segmentation models. SBI can be used in businesses such as banking where its intermediary nature let the businesses to connect with the variety of industries in massive transactional relationships simultaneously. Findings in this study showed that four different and significant groups can be identified at the industry level in Iran banking. Based on the findings, it is suggested that SBI approaches be taken into account before corporate segmentation in businesses such as financial intermediaries, wholesalers and retailers, transportation, public services, legislative and policy institutions since they have multi-sectional relationships.

Findings showed that Iranian industries can be divided into 4 groups from a banking system viewpoint: Green, Yellow, Red, and White. The Green group is the most attractive one for banks. This group has a priority for the banks with high capital which pursue strategies such as gaining high market share, cost leadership in the money market, and utilizing economies of scale. As these industries have an intermediate role among industries, one of the efficient strategies in this market is using the advantages of relationship and network marketing. These industries enjoy a steady and stable growth rate in long run thus are the proper market for long run development investment plans. On the other hand, we can see the importance of these industries in fulfilling the objectives of Resistance Economy as they have a strategic role in our country; this role must be considered far more than the past. Despite all advantages of this group, the banks are prone to suffer in times of recession and shock due to the high business risk of these industries. Also concentration risk should be taken into consideration as the number of the factories is low and their market is quite big in these industries.

The red group is the best choice for the banks which are unable to enjoy the advantages of the first group. Including 35 industries out of 55 in this study, makes the market seriously attractive for the banks. This market is the most attractive one for the banks looking for creating diverse commission revenues with low risk from different sectors, especially in the case of newly established banks which try to pursue diversification strategy and development of monetary and banking services under the concept of universal banking. Most of the industries of this group are import-oriented and are a good market for import bonds. As they are the closest to final consumers, their

collection period and liquidity is in a good condition. This makes the market attractive for the loan to working capital. Low growth rate and profitability are the Achilles Heel for the banks who choose these industries.

The yellow group including textile and clothing industries are import-oriented while they have a high rate of export. This makes them a good market for import and export bonds and to increase commission revenues. The growth of deposit and loan in this sector has shown a great prospect for near future. Since they have a financial leverage and low liquidity, they are highly prone to default risk and thus are a risky market for the banks.

The industries in the white group are a priority for the banks which are willing to choose niche strategy. Banks with low capital can choose these industries in order to increase their market share to the highest level in the market. The high-profit margin of this group members makes these industries attractive for newly established banks which suffer from a high cost of money. It is supposed that interest rate determination mechanism would be more flexible than other groups. Being the most stable and resistant industry against environment shocks in this group makes it a safer market for infants. Also, white group market is recommended for working capital loans.

One of the limitations encountered in this study was the difficulty of identifying the industries' attractiveness dimensions for the experts due to the vast coverage of industries which is why only quantitative data and indices were used to evaluate the groups of the market. In future studies, subgroups of each group could be developed using quantitative and qualitative variables, based on the findings of this study. It is also recommended to try SBI approach to other businesses such as wholesalers, retailers, other financial intermediaries etc.

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Appendix 1: Structures, Variables and Measures of Macro Segmentation Model in Banking Industry

Structure	Variable	Measures	Operational calculation	Structure	Variable	Measures	Operational calculation
Market size	Industry size	Number of factories in industry to total factories	$F_i = \frac{F_i}{\sum_{i=1}^n F_i}$ , i=1384,1385,...,1392	Market growth	Industry growth	Number of factories growth relative to based year	$LFG_i = \left(\frac{F_i - F_{i(t-1)}}{F_{i(t-1)}}\right) \times 100$ , i=1384,1385,...,1392
		Number of employees in industry to total employees	$E_i = \frac{E_i}{\sum_{i=1}^n E_i}$ , i=1384,1385,...,1392			Number of factories growth relative to previous year	$FG_i = \left(\frac{F_i - F_{i(t-1)}}{F_{i(t-1)}}\right) \times 100$ , i=1384,1385,...,1392
		Sales volume in industry to total sales	$S_i = \frac{S_i}{\sum_{i=1}^n S_i}$ , i=1384,1385,...,1392			Number of employees growth relative to based year	$LEG_i = \left(\frac{E_i - E_{i(t-1)}}{E_{i(t-1)}}\right) \times 100$ , i=1384,1385,...,1392
	Deposit and loan market size	Compensation per capita to total average compensation	$W_i = \frac{W_i}{\sum_{i=1}^n W_i}$ , i=1384,1385,...,1392			Number of employees growth relative to previous year	$EG_i = \left(\frac{E_i - E_{i(t-1)}}{E_{i(t-1)}}\right) \times 100$ , i=1384,1385,...,1392
		Summation of Input-Output in Industry to Total Input-Output	$IO_i = \frac{IO_i}{\sum_{i=1}^n IO_i}$ , i=1384,1385,...,139			Sales growth relative to based year	$LSG_i = \left(\frac{S_i - S_{i(t-1)}}{S_{i(t-1)}}\right) \times 100$ , i=1384,1385,...,1392
		Change of Inventories and Investment in Industry to Total change in sector	$I_i = \frac{I_i}{\sum_{i=1}^n I_i}$ , i=1384,1385,...,1392			Sales Growth relative to Previous Year	$SG_i = \left(\frac{S_i - S_{i(t-1)}}{S_{i(t-1)}}\right) \times 100$ , i=1384,1385,...,1392

Structure	Variable	Measures	Operational calculation	Structure	Variable	Measures	Operational calculation
Market Growth	Deposit & Loan Market Growth	Compensation per capita growth relative to based year	$LWG_s = \left( \frac{W_s - W_0}{W_0} \right) \times 100$ , t=1384,1385,.....,1392	Profitability	Profit margin	Earning before interest-tax to sales	$PM_s = \frac{EBIT_s}{Sales_s}$ , t=1384,1385,.....,1392
		Compensation per capita growth relative to previous year	$WG_s = \left( \frac{W_s - W_{s-1}}{W_{s-1}} \right) \times 100$ , t=1384,1385,.....,1392		Return on investment	Earning Before Interest-Tax to Investment	$ROI_s = \frac{EBIT_s}{Investment_s}$ , t=1384,1385,.....,1392
		Summation of real input-output growth relative to based year	$LIOG_s = \left( \frac{IO_s - IO_0}{IO_0} \right) \times 100$ , t=1384,1385,.....,1392		Interest coverage ratio	Summation of operational income, interest and tax to financial cost	$FLI_s = \frac{EBIT_{(interest-tax)_s}}{Interest_{(interest-tax)_s}}$ , t=1384,1385,.....,1392
		Summation of real input-output growth relative to previous year	$IOG_s = \left( \frac{IO_s - IO_{s-1}}{IO_{s-1}} \right) \times 100$ , t=1384,1385,.....,1392		Return on asset	Earning before interest-tax to assets	$ROA_s = \frac{EBIT_s}{Asset_s}$ , t=1384,1385,.....,13
		Investment growth relative to base year	$LIG_s = \left( \frac{IG_s - IG_0}{IG_0} \right) \times 100$ , t=1384,1385,.....,1392		Productivity	Output to input value	$IO_s = \frac{Output_s}{Input_s}$ , t=1384,1385,.....,1392
		Investment growth relative to previous year	$IG_s = \left( \frac{IG_s - IG_{s-1}}{IG_{s-1}} \right) \times 100$ , t=1384,1385,.....,1392		Linkage strength	Forward linkage	$FL = \frac{int\ considered\ asset}{Total\ Asset\ s}$
					Intersection transactions	Backward linkage	$BL = \frac{int\ considered\ equity}{Total\ Equity\ s}$

Structure	Variable	measures	Operational calculation	Structure	variable	measures	Operational calculation
Differentiation	Potential for differentiation of products and services in market	Commission paid to banks in industry to total commission	$C_b = \frac{C_b}{\sum C_b}$ , t=1384,1385,.....,1392	Investment risk	Financial risk	Debt to equity ratio	$D/E = \frac{Debt_i}{Equity_i}$ , t=1384,1385,.....,1392
		Export value in industry to sales	$ETS_i = \frac{Export_i}{Sales_i}$ , t=1384,1385,.....,1392		Liquidity risk	Liquidity ratio	$Liquidity_i = \frac{LiquidAssets_i}{CurrentLiab_i}$ , t=1384,1385,.....,1392
		Imported capital Assets to Total Investment	$CACT_i = \frac{ImportedCapitalAssets_i}{\sum CapitalAssets_i}$ , t=1384,1385,.....,1392		Default risk	Receivables turnover ratio <sup>2</sup>	$\frac{NetCreditSales_i}{AverageAccountsReceivable_i}$ , t=1384,1385,.....,1392
		Imported raw material to total raw material	$RMIT_i = \frac{ImportedRawMaterial_i}{\sum RawMaterial_i}$ , t=1384,1385,.....,1392		Commercial risk	Distance between real production and trend	$PR_i = (P_i - trend_i)^2$ , t=1384,1385,.....,1392
Industry value	Ad. intensity	Ad. expenses to sales	$ATS_i = \frac{AdCost_i}{Sales_i}$ , t=1384,1385,.....,1392	Industry value	R&D intensity	R&D expenses to sales	$RDS_i = \frac{R\&DCost_i}{Sales_i}$ , t=1384,1385,.....,1392

Source: Authors' calculation.

1. Data were extracted from Tehran Stock Exchange databases

2. Data were extracted from Tehran Stock Exchange databases

Appendix 2: List of 3-digit ISIC Classification (research sample)

Row	Code	Field of activity	Row	Code	Field of activity	Row	Code	8
1	151	Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats	20	241	Manufacture of basic chemicals	39	314	Manufacture of accumulators, primary cells and primary batteries
2	152	Manufacture of dairy products	21	242	Manufacture of other chemical products	40	315	Manufacture of electric lamps and lighting equipment
3	153	Manufacture of grain mill products, starches and starch products, and prepared animal feeds	22	243	Manufacture of man-made fibers	41	319	Manufacture of other electrical equipment
4	154	Manufacture of other food products	23	251	Manufacture of rubber products	42	321	Manufacture of electronic valves and tubes and other electronic components
5	155	Manufacture of beverages	24	252	Manufacture of plastics products	43	322	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
6	171	Spinning, weaving and finishing of textiles	25	261	Manufacture of glass and glass products	44	323	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods
7	172	Manufacture of other textiles	26	269	Manufacture of non-metallic mineral products	45	331	Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes, except optical instruments
8	173	Manufacture of knitted and crocheted fabrics and articles	27	271	Manufacture of basic iron and steel	46	332	Manufacture of optical instruments and photographic equipment
9	181	Manufacture of wearing apparel, except fur apparel	28	272	Manufacture of basic precious and non-ferrous metals	47	333	Manufacture of watches and clocks

Row	Code	Field of activity	Row	Code	Field of activity	Row	Code
10	191	Tanning and dressing of leather, manufacture of luggage, handbags, saddlery and harness	29	273	Casting of metals	48	341
11	192	Manufacture of footwear	30	281	Manufacture of structural metal products, tanks, reservoirs and steam generators	49	342
12	201	Sawmilling and planing of wood	31	289	Manufacture of other fabricated metal products; metal working service activities	50	343
13	202	Manufacture of products of wood, cork, straw and plating materials	32	291	Manufacture of general purpose machinery	51	351
14	210	Manufacture of paper and paper products	33	292	Manufacture of special purpose machinery	52	352
15	221	Publishing	34	293	Manufacture of domestic appliances	53	353
16	222	Printing and service activities related to printing	35	300	Manufacture of office, accounting and computing machinery	54	359
17	223	Reproduction of recorded media	36	311	Manufacture of electric motors, generators and transformers	55	361
18	231	Manufacture of coke oven products	37	312	Manufacture of electricity distribution and control apparatus	-	-
19	232	Manufacture of refined petroleum products	38	313	Manufacture of insulated wire and cable	-	-

Source: Authors' calculation.