

Determinants of Consumer Confidence in Emerging Economies: A Panel Cointegration Analysis

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**30th Annual Meeting of The Middle East Economic Association,
Allied Social Science Associations,
Atlanta, GA, January 3-6, 2010**

Abstract

This study aims to analyze the relationship between consumer confidence and economic growth in six emerging economies, namely Brazil, China, Mexico, Poland, South Africa and Turkey. The relationship between consumer confidence and economic activity in developed markets has been well documented (Carroll *et al.*, 1994, Howrey, 2001 and Ludvigson, 2004). However, to our knowledge, there are hardly any studies which assess the validity of this theoretical framework for households in emerging economies. We propose that there are two different variables that could play a significant role on consumer confidence in emerging economies as economic variables that measure production and financial variables that reflect the relationship between consumer confidence and financial markets. This study uses panel data analysis via conducting panel unit root and cointegration tests. Our empirical findings show that consumer confidence, industrial production and stock exchange have a long-run relationship in emerging economies. Moreover, households in emerging and developed markets exhibit similar behavior.

Keywords: Consumer Confidence, Emerging Markets, Financial Market Variables, Panel Cointegration.

JEL Codes: C22, C32, E27, E37.

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1. Introduction

“What determines consumer confidence?” has been the main question in the research field of consumer surveys around the world. It would not be wrong to assume that what happens in the real world should have repercussions on the behaviors of consumers. Real world can simply be defined as the activities in goods and financial markets. Those activities are observed every day and at any moment by the economic agents. These observations should simultaneously affect the behaviors of those agents. It is almost impossible to document the every movement of this interaction. However, some monthly aggregate figures allow us to detect the relation between consumer sentiment and activities in goods and financial markets.

Recent economic crisis has substantially damaged the domestic demand in developed countries. Private consumption expenditures of emerging countries are expected to be the engine of effective demand for the recovery in the world economy (Blanchard, 2009). The state of consumer sentiment in the emerging countries seems to be vital for the recovery and stability of the world economy. This is one of the main reasons why this study aims to analyze the determinants of consumer confidence for the major emerging countries.

We will try to examine the interaction between one real variable (industrial production index), one financial variable (stock exchange index) and consumer confidence for six emerging countries namely; Brazil, China, Mexico, Poland, South Africa and Turkey. We use panel data analysis for the period January 2002 - August 2009 through panel unit root tests and panel cointegration tests. This study is expected to be an original contribution using panel cointegration analysis for a new set of variables and a new period for the emerging countries.

Within this framework, there will be a brief literature survey in the second section of the study. This will be followed with a section on the methodologies of consumer confidence indices in the six emerging markets. In section four, the methodology of our study will be introduced and the results of our analysis will be presented. In conclusion, there will be a short assessment on the results of the study and consumer confidence indices in emerging countries.

2. Literature Survey

There have been many studies analyzing the relationship between stock market and industrial production as well as between stock market and consumer confidence. One of the earlier

studies for the stock market-industrial production relationship is by Fama (1981) which finds a positive and significant linkage between stock returns and the level of economic activity (proxied by industrial output). While Fama illustrates the strong correlation between current stock market returns and future growth rates of real GDP and industrial production, Geske and Roll (1983) focus on the effect of unanticipated changes in economic conditions on stock returns and hence, on inflationary expectations. Furthermore, emphasizing on the sensitivity of asset prices to unanticipated events, Chen *et al.* (1986) advocate that the future growth in industrial production well explains the variation in stock prices. Some of the other studies that focus on the possible causality among the stock market and measures of real economic activity include Mallaris and Urrutia (1991), Kwon and Shin (1999), Darrat and Dickens (1999), Ibrahim (1999), Muradoglu *et al.* (2000) and Mahmood and Diniah (2009).

Mallaris and Urrutia (1991) and Darrat and Dickens (1999) examining U.S. argue that Standard and Poor's (S&P) index leads industrial production. According to Kwon and Shin (1999), the fluctuations in Korean stock market are very sensitive to the changes in industrial production. Moreover, Ibrahim (1999) investigates the dynamic relationship between Malaysian stock market and industrial production index and many other macroeconomic variables conclude that the Malaysian market is information inefficient as it is led by the macroeconomic variables. The study by Muradoglu *et al.* (2000) documents the linkage between stock market returns and some macroeconomic variables one of which is industrial production. Their study covering a time period between 1976 and 1997 for 19 emerging countries finds that the relative size of the stock market determines the relationship between stock returns and macroeconomic variables. Finally, Mahmood and Diniah (2009) test whether stock prices and economic variables in six Asian-Pacific countries (Malaysia, Korea, Thailand, Hong Kong, Japan and Australia) move together both in the long run and in the short run employing cointegration tests vector error correction models. The monthly data set spanning from 1993 to 2003 indicates that there exists a long run link between all variables (stock price indices, foreign exchange rates, consumer price index and industrial production index) in Japan, Korea, Hong Kong and Australia and there exists a short run interaction between all these variables in Malaysia, Korea, Japan and Australia.

The casual link between stock markets and the consumer confidence is also well-documented in the literature. For instance, Ng (1992) underlines two possible reasons for a depression caused by a share market crash, one is the reduction in aggregate demand and the other is the

collapse in business/consumer confidence. Besides, Gulley and Sultan (1998) establishes a link between the Consumer Board Consumer Confidence on various stock prices, bond yields and some currency rates using a GARCH model. Likewise, Otoo (1999) finds that causality between stock price index and consumer sentiment runs from the former to the latter and notes that declining stock prices reduce consumer confidence because people experience a loss of wealth and also expect that their income would decline since they see the negative movements in stock prices as a leading indicator for the future declines in income. Another study for US by Fisher and Statman (2003) examines the relationship between S&P 500 Index returns and the components of Michigan Consumer Sentiment Index. They obtain a negative relationship between the current level of confidence and the future stock returns.

Jansen and Nahuis (2003) study the relationship between stock market developments and consumer confidence in 11 European countries over the years 1986-2001. They argue that the relationship between stock market and consumer sentiment depends on the expectations about economy-wide conditions rather than the conventional wealth effect. Likewise, studying the Euro zone in a VAR model for share prices and consumer confidence between 1985 and 2004, Kremer and Westermann (2004) examine the linkage between stock market developments (via broad share price index and price-earnings ratio) and consumer confidence. They find a unidirectional causality running from stock prices to consumer confidence.

Best (2008), using a different confidence data (Chief Executive Officer's confidence) from Conference Board and three stock market indices for the period January 2000 - April 2008 finds that average increases in the S&P 500, Dow Jones Industrial Average, and Nasdaq indexes are well explained by the increases in CEO confidence. Recently, Bremmer (2008) tests the relationship between consumer confidence and nine different stock indices and concludes that while expected changes in consumer confidence do not affect stock price changes, unexpected changes in consumer confidence directly affect changes in stock prices.

Therefore, previous studies somehow show the relation between consumer confidence and stock exchange for developed countries. However, there is hardly any study that models consumer confidence as a function of stock exchange index and industrial production index for a small group of emerging economies. Moreover, the link between consumer confidence and industrial production has not been well established although unemployment is assumed to be one of the primary determinants of consumer sentiment.

2. Consumer Confidence Indices in Brazil, China, Mexico, Poland, South Africa and Turkey

We now explain the methodology of the consumer confidence indices in the emerging economies we employ.

2.1 Brazilian Consumer Confidence Index

In Brazil, the consumer confidence index is known as the INEC Index (INEX). It is calculated by the National Confederation of Industries (CNI) using data from opinion pools carried out by CNI and the Brazilian Institute of Opinion and Research (IBOPE). The nationwide survey is based on a sample of 2,000 individuals, age over 16. Each question included in the INEC corresponds to a series of alternative responses. The first step in the calculation of the index is to assign for each alternative, numbers which vary directly with economic optimism. The average weighted by the relative frequency of each response is thus translated into an index number for that question. Index base 100 was fixed for October 1997, month of the editing of the survey, in which new questions were introduced. The Index of Consumer Sentiment is calculated by summing the relative scores for all the following five questions and dividing by the relative score in the base year (A constant value is added to the result to adjust for changes):

Question 1: “We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?”

Question 2: “Now looking ahead, do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now?”

Question 3: “Now turning to business conditions in the country as a whole--do you think that during the next twelve months we'll have good times financially, or bad times, or what?”

Question 4: “Looking ahead, which would you say is more likely--that in the country as a whole we'll have continuous good times during the next five years or so, or that we will have periods of widespread unemployment or depression, or what?”

Question 5: “About the big things people buy for their homes--such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or bad time for people to buy major household items?”

2.2 Chinese Consumer Confidence Index

The increasing importance of China for the world economy implies a growing demand for

information on its macroeconomic developments. Besides basic economic statistics, policymakers and enterprises use various business climate and confidence indicators to assess the current situation and the future outlook. Unfortunately, China's rapidly evolving economic environment and its underdeveloped statistical system with often-short time series limit the availability of relevant indicators. The National Bureau of Statistics (NBS) and the People's Bank of China (PBoC) currently publish a number of survey indicators for the consumer and business actors. For the consumer side, the NBS publishes its monthly consumer confidence index (CCI). The CCI has been available since the beginning of 1997; its purpose is to identify changes in consumer attitudes to consumption, income and general economic conditions. The CCI is based on a monthly survey of 4200 Chinese consumers in six major cities around the country. 700 consumers are selected for each of these cities and each month the results are announced earlier than many other economic indicators. The index is a gauge to tell Chinese consumers' evaluation of the current state of the economy and their longing of future incomes and economic health.

2.3 Consumer Confidence Index in Mexico

Consumer Confidence in Mexico is released on a monthly basis by National Institute of Statistics, Geography and Informatics (INEGI). 2336 urban households are interviewed every month during the 3 first weeks of the month. The data that cover people 18 years old and over are compiled according to national definitions. The indicator measures households' opinions regarding their financial position, the actual and expected economic situation of the country and major purchases of consumer durables.

2.4 Consumer Confidence Index in Poland

There is a variety of consumer surveys in Poland and currently five institutions are conducting consumer tendency surveys. These are Research Institute for Economic Development (RIED)² that has been conducting monthly since 1990, IPSOS which has been conducting monthly survey since December 1991, CSU that has been conducting monthly survey since 2004 (quarterly survey since the second quarter of 1997), PENTOR which has been conducting monthly survey since January 2000 and GfK Polonia that has been conducting monthly survey since May 2001. We use GfK Polonia as it is the official result that OECD announces.

² Dudek (2008) examines the RIED data in order to test whether this data forecast the real private consumption expenditures in Poland in the short term.

The sample frame for GfK Polonia is the PESEL database which is a register of all residents of Poland. The database contains personal information, e.g. name, date/place of births, gender, address. Multistage sampling is used to select the sample as

1. Stratas are formed by crossing 9 regions and 7 town size categories. Each of 3073 Primary Sampling Units (PSU) is assigned to one of the stratas.
2. Random selection of PSU within each strata is carried. The PSU are drawn with the probability proportional to the density of population.
3. Random selection of Households (only private) is done.
4. Random selection of the Individual to be interviewed within the selected Household completes the survey.

Sample size is around 1020 persons net per wave. The response rate is approximately 75%.

The average of the following questions with respect to the base period forms the CCI:

- (1) Expected change in financial situation of household over the next 12 months;
- (2) Expected change in general economic situation over next 12 months;
- (3) Expected change in unemployment over the next 12 months;
- (4) Expected change in savings of household over next 12 months.

The confidence indicator is expressed as the balance of positive over negative results. There are 5 response categories. Responses “a lot better” and “a lot worse” get the weight 1 and “a little better” and “a little worse” get the weight 1/2, and “the same” has zero weight.

2.5 Consumer Confidence Index in South Africa

The consumer survey is part of South Africa Bureau for Economic Research's Quarterly Retail Survey and collected through computer-aided personal interviews. The sampling frame is updated every quarter and consists of race, household income, age, home language, gender, province, TV viewing, community size, living standards measure and life stages. The survey covers all races living in urban areas with urban being defined as community size 500+. The period over which the survey data is collected is 4 weeks.

All provinces are included, however, survey results for only the 4 largest provinces are published, namely the Western Cape, Gauteng, KwaZulu-Natal and the Eastern Cape. This coverage is representative of 91% of the total urban adult population and 55% of the total adult population. Non-urban blacks are therefore not represented. Although they form a large number of people, their relative purchasing power is marginal given their extreme poverty. On average, there are 2500 adults (1,250 male and 1,250 females of 16 years and older,

furthermore it is ensured that 1000 whites, 1000 blacks, 250 colored citizens and 250 Indians are included).

Consumer confidence is equal to the average of the net balance to the following three questions:

1. Expected economic performance during next 12 months,
2. Expected household finances during the next 12 months and,
3. Appropriateness of the present time to buy durable goods. There are five reply options as in Poland which makes use of the net balance statistic, i.e. percentage “up” less percentage “down”.

2.6 Turkish Consumer Confidence Index

In Turkey, there are two consumer confidence indices that are announced on a monthly basis. One is the CNBC-e CCI and the other one is the TCMB – TÜİK (CBRT - TURKSTAT) CCI. The correlation coefficient between these indexes has been significant and reaching to about 0.9. This study employs the CNBC-e Consumer Confidence Index as it has a larger data span.

The methodology of CNBC-e CCI is similar to the Michigan University index of consumer sentiment.³ The base period of the index is set as January 2002 and the value of the index at this period is 100. The database contains records of approximately 15,000,000 Turkish individuals. The index is compiled of 720 completed surveys. The survey data is obtained from the respondents between the 27th day of the past month and the 25th day of the current month. The distribution of the completed surveys meets seven criteria:

- 1) 70 percent is selected from Istanbul, Ankara and Izmir, 30 percent selected from other cities and big districts in Turkey.
- 2) 60 percent is selected from 36-55 age group, 40 percent is selected from 18-35 age group.
- 3) 50 percent is male and the other half is female.
- 4) 50 percent of the total surveys are composed of new records.
- 5) A minimum of 30 percent of new records belongs to individuals who had been successfully surveyed in the previous month.

³ Both the Michigan index of consumer sentiment and the Conference Board’s consumer confidence index are based on five questions that have remained unchanged since their inception. Both surveys ask respondents two questions designed to measure attitudes about current conditions, and three questions that ask respondents about their future expectations. See Bram and Ludvigson (1998) and Garner (2002) for further details.

- 6) A maximum 20 percent of 720 completed surveys may be composed of additional respondents and these respondents are not called again in the next month.
- 7) Respondents are not surveyed more than two times. This helps to minimize the biases in the answers of respondents.

The index is composed of the following questions:

- 1) We would like to learn your current economic situation. Can you compare your (and your family's) current financial situation with last year?
- 2) What do you think your (and your family's) future financial situation will be in a year?
- 3) Can you compare your current expectations about Turkish economy with the previous month?
- 4) What do you think Turkish economy's situation will be in a year?
- 5) Do you think that the current period is a good time to buy durable consumer goods such as a TV set, refrigerator and furniture or vehicles or residence?

Answer Choices are, Better, Worse, Same and No Idea for the first 4 questions and Good Time, Bad Time and No Idea for question 5.

3. Methodology and Empirical Results

As we use a group of countries, we need to employ panel data analysis including unit root and cointegration tests and panel coefficient estimation methodology. We first briefly discuss the empirical methodology and then present our results.

3.1. Empirical Methodology

Panel Unit Root Tests

We check for non-stationarity by employing the three well-known panel unit root tests of Levin *et al.* (hereafter LLC, 2002), Im *et al.* (hereafter IPS, 2003) and Pesaran (2007) CIPS test. The existence of different time trends and intercepts for individuals in panels is the source of heterogeneity and also autocorrelation between individual time series. Hence, termed as first generation unit root tests, the LLC and IPS tests disregard the cross sectional dependency whereas termed as second generation unit root test, the CIPS test takes into account the possibility of cross sectional.⁴

⁴ There are several first generation and second generation panel unit root tests. However, we prefer to use the ones that have been very common in recent literature. Breitung and Pesaran (2008) is an excellent survey of non-stationary panel data analysis.

1. LLC (2002) test

LLC panel unit root test is feasible for the panel data which is moderate in size. In addition, the test is performed under the null hypothesis that the time series are non-stationary against the alternative hypothesis that all series in the panel are stationary. LLC restricts correlation across individuals and correlation cannot be removed by ejecting the cross sectional averages.

The model takes the following form:

$$\Delta Y_{i,t} = \alpha_i + pY_{i,t-1} + \sum \varphi_k \Delta Y_{i,t-k} + \lambda_{i,t} + \delta_t + \varepsilon_{it} \quad i=1,\dots,N \quad t=1,\dots,T \quad (1)$$

The null hypothesis against the alternative is formulated as $H_0: p = 0$ against $H_1: p < 0$.

Hence, this test assumes that there is a common unit root process so that " ρ " is identical across cross-sectional units. LLC has a three-step approach. First, Augmented Dickey-Fuller test is performed to each time series in panel and two orthogonalized residuals are generated (Dickey and Fuller, 1979, 1981). Second, for each individual the ratio of long run to short run is estimated. As a final stage, t-statistic is derived to evaluate the null hypothesis that series have unit root.

2. IPS (2003) test

IPS *et al.* (2003) criticize LLC and extend the LLC test by allowing heterogeneity on the coefficient of the $Y_{i,t-1}$ variable and propose standardized t-bar test statistic based on the average of the individual unit root test statistics, that is averaging (augmented) Dickey-Fuller statistics across the groups. IPS test is performed under the null hypothesis that all series are non-stationary.⁵ The model takes the following form:

$$\Delta Y_{i,t} = \alpha_i + p_i Y_{i,t-1} + \sum \varphi_k \Delta Y_{i,t-k} + \lambda_{i,t} + \delta_t + \varepsilon_{it} \quad i=1,\dots,N \quad t=1,\dots,T \quad (2)$$

The test is:

$H_0: p_i = 0$ for all i vs. $H_1: p < 0$ for at least one i .

The main advantages of IPS test are i) for every horizontal section, individual "p" coefficients are calculated, ii) this test can be used for unbalanced panels and iii) it permits different lag values in ADF tests that are calculated for every horizontal sections.

3. Pesaran (2007) CIPS test

CIPS test is different from LLC and IPS tests as it allows for cross sectional dependency and has unit root in the null hypothesis. Pesaran includes cross sectional averages of the lagged

⁵ The formulation of the alternative hypothesis of the IPS test allows for p_i to differ across groups and it is more general than the homogeneous alternative hypothesis of the LLC test.

levels as the common factor. The average of the cross sectionally ADF t-statistics bring out the CIPS t-statistic.

Panel Cointegration Tests

Once panel unit root tests show that the series are non-stationary and have the same integration order, it is possible to proceed further for panel cointegration analysis. We apply two panel cointegration techniques as Pedroni (1999) tests and Westerlund (2007) tests.

1. Pedroni (1999, 2004) Panel Cointegration tests

Pedroni (1999) proposes seven tests with the null hypothesis of no cointegration. The test allows for heterogeneity among cross sectional units. He introduces seven statistics, three of which are between dimension and the four are within dimension. The between dimension statistics are group mean panel cointegration statistics since they are based on estimators that average the individually estimated coefficients for each cross sectional unit. The within dimension statistics are panel cointegration statistics and are based on estimators that pool the autoregressive coefficients across different cross sectional units for the unit root tests on the estimated residuals. Namely, these seven tests are panel v , ρ and non-parametric and parametric t statistics, group ρ and non-parametric and parametric t statistics.⁶ Pedroni (2004) enhances 4 within dimension tests of Pedroni (1999).

2. Westerlund (2007) ECM Panel Cointegration Tests

Westerlund proposes 4 new panel cointegration tests as G_α , G_τ , P_α and P_τ that are based on ECM. If the null of no error correction is rejected, this means that the null hypothesis of no cointegration is also rejected. Since the tests are based on structural rather than residual dynamics, there is no common factor restriction. P_α and P_τ are panel statistics which are based on pooling the information regarding the error correction along the cross sectional units. The null and alternative hypothesis for the panel tests are $H_0: \alpha_i = 0$, $H_1: \alpha_i = \alpha < 0$ for all i .

G_α and G_τ are group statistics which do not exploit the information regarding the error correction. The null and alternative hypothesis for the group tests are

$H_0: \alpha_i = 0$, $H_1: \alpha_i < 0$ for at least some i .⁷

⁶ These usually are termed as first generation panel cointegration methods.

⁷ Westerlund also points out that G_α and P_α have higher power than G_τ and P_τ in samples where T is substantially larger than N .

3. Westerlund and Edgerton (2007) Panel Cointegration Tests

The third panel cointegration test we use is by Westerlund and Edgerton (2007) (WE). WE test is a panel bootstrap cointegration test with the null hypothesis of cointegration. The test is based on McCoskey and Kao (1998) Lagrange Multiplier test.⁸ Westerlund and Edgerton (2007) use bootstrap property to handle the dependency between and within cross sectional units. Moreover, the test is shown to have local power in small samples.

Panel Coefficient Estimation Test (Panel Fully Modified OLS)

Pedroni (2000) proposes fully modified ordinary least squares (FM-OLS) to estimate the coefficients of cointegrating vectors, detected by panel cointegration tests. This method permits the existence of heterogeneity between cross section members. According to Pedroni (2000) there are two sources which cause cross member heterogeneity. First, heterogeneity exists because of the different mean levels between the variables of each group member in the panel. This source of heterogeneity is modeled by adding individual specific intercepts. Second, individual members of panel respond differently to short-run deviations from equilibrium cointegrating vectors that develop in response to stochastic disturbance. The source of heterogeneity is modeled by permitting the associated serial correlation properties of the error processes to vary across individual members of the panel. The group mean panel FM-OLS provides t-statistic to test a common value for cointegrating vector under the null hypothesis that values of the cointegrating vector are common versus the alternative that those values need not to be common. The FM-OLS group mean estimator is derived by averaging the value of individual FM-OLS estimates.

3.2 Empirical Findings

This study uses panel data analysis for six emerging economies, Brazil, China, Mexico, Poland, South Africa and Turkey. We model consumer confidence index (CCI) as a function of industrial production index (INDPRO) and the stock exchange index (SE). The data span is January 2002 – August 2009. All variables are in their natural logarithms.

$$CCI_t = \alpha + \beta INDPRO_t + \gamma SE_t + \varepsilon_t \quad (3)$$

⁸ McCoskey and Kao (1998) test is shown to work poorly in small sample cases and does not allow to for cross sectional dependency.

The CCI for all countries except South Africa and Turkey are obtained from the OECD database (<http://stats.oecd.org/mei>). The CCI for South Africa is obtained from Burea for Economic Research website (<http://www.ber.ac.za>) and the CCI for Turkey from CNBC-e website (<http://www.ntvmsnbc.com>).

The INDPRO data for all countries are obtained from OECD web site, except for Brazil and South Africa for which it is obtained from Reuters (<http://www.reuters.com>). All the industrial production indices are seasonally adjusted.

The SE data are the daily closing values of the stock exchange indices and for Brazil, China and Mexico are obtained from the Yahoo Finance website (<http://finance.yahoo.com>), for Poland from Warsaw Stock Exchange website (<http://www.wse.com.pl>), for South Africa from Johannesburg Stock Exchange website (<http://www.jse.co.za>) and for Turkey from Istanbul Stock Exchange website (<http://www.imkb.gov.tr>). The monthly figures are calculated averaging the daily closing values.

Table 1: Panel Unit Root Tests in Levels

VARIABLE	CASE	First Generation		Second Generation
		Common Unit Root	Individual Unit Root	
		LLC	IPS	Pesaran CIPS
CCI	Constant	-0.760 (0.224)	-1.043 (0.149)	-1.399
	Constant and Trend	0.742 (0.771)	-0.277 (0.391)	-1.666
INDPRO	Constant	-0.725 (0.234)	-0.589 (0.278)	-2.032
	Constant and Trend	1.595 (0.947)	2.533 (0.994)	-2.256
SE	Constant	-0.450 (0.326)	0.179 (0.881)	-2.127
	Constant and Trend	1.543 (0.939)	2.751 (0.997)	-2.570

Notes: All tests use Schwarz Information Criteria (SIC) for lag selection. In the first generation tests, the values in brackets are the p-values. For the case with constant, critical values for Pesaran CIPS test are -2.53, -2.32 and -2.21 for 1 %, 5 % and 10 % significance levels, respectively. For the case with drift and trend, critical values are -3.03, -2.83 and -2.72 for 1 %, 5 % and 10 % significance levels, respectively.

Both first and second generation panel unit root test results reveal non-stationarity as we fail to reject the null of unit root at any significance level. Our results are not sensitive to the cases of constant and a constant and a trend. As all three panel unit root tests provide similar outcomes, we feel confident to move on to panel cointegration analysis.

Table 2: Pedroni Panel Cointegration Tests

Pedroni (1999, 2004)	Constant	Constant and Trend
Homogenous Alternative		
Panel v-statistic	0.289	0.170
Panel rho-statistic	-0.905	-1.056
Panel PP-statistic	-0.983	-1.366*
Panel ADF-statistic	-1.188	-1.602**
Panel v-statistic – Weighted	0.548	0.148
Panel rho-statistic – Weighted	0.153	-0.264
Panel PP-statistic – Weighted	0.263	-0.605
Panel ADF-statistic – Weighted	0.056	-2.013**
Heterogeneous Alternative		
Group rho-statistic	0.679	0.323
Group PP-statistic	0.642	-0.293
Group ADF-statistic	-0.137	-2.410**

Notes: (*) and (**) denote significance at 10 % and 5 % levels, respectively. The level of integration order is tested under the null hypothesis of no cointegration.

The results of Pedroni panel cointegration tests are demonstrated in Table 2. For both cases of unweighted and weighted panel cointegration tests, we observe cointegrating relationship for 2 cases, leading to a total of 4 cases out of 22 possibilities. Breitung and Pesaran (2008) argue that residual based panel cointegration tests result in low power for small samples. Therefore, the existence of panel cointegration should be checked by rather new tests of so-called second generation panel cointegration tests. Among others, we choose to use Westerlund (2007) and Westerlund and Edgerton (2007) which seem to be more powerful than residual-based panel cointegration tests.

Table 3: Second Generation Panel Cointegration Tests

Westerlund (2007)		
Test	Constant	Constant and Trend
G_{τ}	-9.565*	-8.426*
G_{α}	-11.283*	-7.539*
P_{τ}	-10.783*	-10.138*
P_{α}	-11.511*	-7.182*

Westerlund and Edgerton (2007)		
Constant	lm statistic	0.989
	bootstrap p-value	0.846
	asymptotic p-value	0.161
Constant and Trend	lm statistic	2.621
	bootstrap p-value	0.190
	asymptotic p-value	0.004*

Notes: For Westerlund (2007), the critical value for all test statistics is -1.645 at 5 % significance level under the null of no cointegration. (*) denotes significance at 5 % level. For Westerlund and Edgerton (2007), the test is conducted under the null hypothesis of cointegration. (*) denotes significance at 5 % level.

Table 3 includes the results of the second generation panel cointegration tests considering. Westerlund (2007) indicates significance for all 8 cases in both constant and constant and trend cases, establishing the long run link between CCI, INDPRO and SE. For Westerlund and Edgerton (2007) test, the constant case has an insignificant lm statistic with high bootstrapping and asymptotic p-values leading us to fail to reject the null of cointegration. In the case for constant and trend, only the asymptotic p-value below 5 % signals the non-existence of cointegration. Hence, we have strong evidence of a long-run relationship between our variables of interest.

Table 4: FM-OLS Test Results for Coefficient Estimation

COUNTRY	INDPRO	SE
China	1.62 (0.67)	-0.01* (-50.52)
Brazil	0.11* (-9.81)	0.02* (-74.99)
Turkey	-0.74 (-1.46)	0.05* (-3.47)
South Africa	0.22* (-3.32)	0.02* (-28.18)
Poland	0.03* (-40.50)	0.06* (-89.51)
Mexico	-0.34* (-3.20)	0.07* (-14.38)
Panel Group	0.15* (-23.52)	0.03* (-106.58)

The values in brackets are t-statistics. 12 is selected as the maximum number of lags based on SIC. (*) denotes significance at 5 % level.

Last step in our empirical analysis is to conduct FM-OLS test in order to obtain the coefficient estimates for cointegrated panel. We have significant FM-OLS coefficients for all variables except INDPRO for the case of Turkey and China. The sign of the coefficients are not

consistent with the fundamentals of economic theory for Turkey and Mexico in case of INDPRO and for China in case of SE. However, both of the coefficients for the panel group have statistically significant coefficients as well as positive signs for INDPRO and SE. Hence, in this small group of emerging markets, any increase in industrial production and stock exchange index lead to a similar response from consumer confidence. Households in these economies show identical behavior to the developed ones whereas the level of saving and wealth are considerably lower. Moreover, industrial production seems to present us a unique opportunity for affecting consumer confidence. In almost all of these markets, stock exchange is dominated by large foreign investors. Therefore, any increase in the stock exchange affects consumer confidence relatively less than an increase in industrial production. This is not surprising as households will feel optimistic when they hear the news that the economy is starting to gain momentum. Nevertheless, the downside will be the quick rise in pessimism as any signs of recession are observed.

4. Conclusion

This study aims to test whether there is a long-run structural relationship between consumer confidence and two major economic variables which are supposed to reflect the trends in economic growth. We use industrial production index and stock exchange market index as they are readily observable by households. The empirical results for the six emerging countries show the existence of a dynamic and structural relationship between consumer confidence, industrial production and stock exchange market index. It can be argued that what happens in the real world have repercussions on the behaviors of consumers. Moreover, we think that the validity of our results will strengthen the importance of consumer confidence measures. One of our shortcoming is we focus on only six emerging countries and two variables. Hence, it is important to note that further studies are required with higher number country data and with some other factors that are likely to affect the consumer behavior to better grasp the consumer sentiment in emerging countries.

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