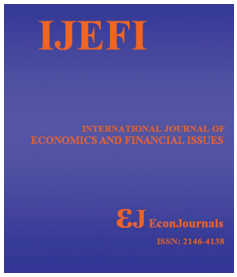

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# Determinants of Sovereign Ratings in Emerging Countries: A Qualitative, Dependent Variable Panel Data Analysis[1]

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**ABSTRACT**

The aim of this paper is to study determinants of sovereign ratings of emerging countries. The effects of macroeconomic and political variables on the ratings are analyzed by probit and logit panel data analysis. This empirical research determines whether the sovereign ratings of emerging countries are independent of macroeconomic indicators of these countries. It might be vital to know the effects of macroeconomic variables on sovereign rating for politicians, foreign investors, monetary authorities and academicians. Thus, we need efficient and strong models explaining sovereign rating. In the empirical model of the study, qualitative and dependent variable models were used to check the effects of current account deficits, external debts, gross domestic product per capita, real exchange rates, inflations, savings rates and political qualities on sovereign ratings that are exported by three large rating agencies' (S & P, Moodys and Fitch). The results show that macroeconomic political variables affect sovereign ratings.

**Keywords:** Sovereign Rating, Emerging Countries, Ordered Probit and Logit Panel Data Analysis
**JEL Classifications:** C33, G24

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## 1. INTRODUCTION

Louis Tappan established the first credit reporting service in 1841 with the goal of investigating merchants' ability to pay their financial obligations. In 1890 John Moody rated the US rail road companies after he started to rate industrials bonds. The first rating was made by Poor's in 1916, Standard Statistic Company and Fitch made their first rating in 1924. In 1941, standard statistics merged with Poor's publishing and formed standard and poor's (S&P) corp. When financial companies opened to international markets, rating companies started to rate internationally (Cantor and Packer, 1994). Accordingly, Moody's gave its first sovereign rating to the USA in 1949 while S&P made its first sovereign rating in 1975; Fitch followed in 1994.

Sovereign ratings judge the ability of a sovereign government to meet their financial obligations. When international investors diversify their portfolio among different investment opportunities in different countries, they may encounter difficult investment decisions. Here, credit rating agencies (CRAs) provide very useful information regarding the financial status of the sovereign government and facilitate investment decisions. International investors have the opportunity to get useful information from the countries that they are planning to invest in by monitoring the sovereign ratings (Cantor and Packer, 1994; Ferri et al., 2001; Mora, 2006).

Note that in addition to the sovereign governments, CRAs also occasionally rate municipals and private entities regarding economic and political changes. A study of cross-country rating data shows that the same government receives different ratings when rated by different rating agencies. For instance, in 2010 S&P, Moody's and Fitch assigned the same rating to nine emerging countries out of a sample of 35[2]. Indeed, CRAs are criticized for being inconsistent, and it is vital to know the effects of macroeconomic variables on sovereign ratings because sovereign ratings affect economic and financial structures of the countries.

2. There are 35 emerging countries in Dow Jones list.

The purpose of this study is to determine the factors that affect sovereign rating. First, we conducted a literature review and identified the explanatory variables. In the empirical section, we ran regressions for the data panel. We conclude with a discussion of the findings.

## 2. THEORETICAL FRAMEWORK

One of the pioneer studies in the literature of this field is Cantor and Packer (1996). In their study, they identified several explanatory variables for sovereign ratings including gross domestic product per capita (GDPPC), GDP growth rate, inflation rate, current account balance to GDP ratio, fiscal balance to GDP, external debt to total exports ratio and debt history. They tried to understand determinants of ratings for 49 countries by linear ordinary least squares methods and could not find statically significant coefficient for fiscal balance and current account deficit to GDP (CATGDP) ratio variables. They also found a positive coefficient for external debt that reversed the rating. Regression coefficients for other independent variables appeared significant and their signs were in line with the theoretical expectations.

Ferri et al. (1999 and 2001) and Mora (2006) extended the basis Cantor and Packer's (1996) explanatory variables. They used linear panel analysis and ordered a probit model in their study that was distinct from Cantor and Packer's study. Both of the articles focused on the sovereign ratings of 17 countries between 1986 and 1998. Consequently, they found statistically insignificant coefficient for growth rate, inflation and fiscal variables. Even fiscal variables are insignificant in a fixed effect panel data analysis; it is significant in random effect panel data analysis. In Mora's ordered probit panel data analysis, she found all variables statistically significant. The theoretically expected sign was noted except for the growth variable.

Ul-Haque et al. (1996) studied 60 developing countries between 1963 and 1980. They tried to explain creditworthiness of the selected countries by three indicators: institutional investors, euromoney and economist intelligence unit. These were used as markers of the ability and willingness of a country to repay its financial obligations. Some of the independent variables they used are total reserves to import (gold excluded), current account balance to GDP ratio, export growth rate, GDP growth rate, term of trade and short-term US interest rate. They found a significant and positive sign for the reserves to import, current account balance to GDP and export growth. They found statistically insignificant and positive signs for the term of trade; they found statistically insignificant positive signs for growth of the economist intelligence unit rating. They detected reverse relationship between US interest rate and creditworthiness of developing countries.

Hu et al. (2002) studied 39 countries between 1981 and 1998 and analyzed the sovereign ratings. They applied a panel probit model in their study. The explanatory variables used were default dummy, debt-to-GDP, reserves to import, as well as inflation and dummy variables for non-industrial countries. All of the regression coefficients agreed with the theoretically predicted signs and were significant.

Gaillard (2006) explained 105 sub-sovereign ratings between 1996 and 2005 with ordered probit analysis. Some of basic variables used in the analysis are debt default history dummy, GDPPC, GDP growth rate and debt-to-GDP ratio. All agreed with the theoretically predicted signs and were significant.

Ratha et al. (2010) estimated sovereign ratings of unrated countries with linear regression model. They used gross national income (GNI) per capita, GDP growth rate, debt-to-export ratio, total reserves-to-imports ratio, inflation, growth volatility and rule of law as explanatory variables. They found the expected and significant sign for growth rate, GNI per capita, debt-to-export and rule of law. They did not find the significant and theoretically expected signs for the reserves-to-import and inflation variables.

Many macroeconomic variables affect sovereign ratings. Some studies checked the impact of sovereign ratings on the selected macroeconomic variables. In these studies, sovereign ratings were taken as explanatory variables and were found to have positive and statistically significant rating effects. Kim and Wu (2008) and Kabadayi et al. (2012) found that ratings positively affect capital inflows to developing and transitions countries. Punkthuanthong-Le et al. (2007), Hooper et al. (2008) and Kabadayi (2013) stated that ratings positively affect financial markets.

## 3. DATA AND EMPIRICAL FRAMEWORK

Here, we explain sovereign ratings given to emerging countries by S&P, Moodys and Fitch between 1993 and 2009.

### 3.1. Data

The list of emerging countries is obtained from S&P. According to S and P's emerging market classification list, there are 19 emerging countries: Brazil, Chile, China, Check Republic, Egypt, Hungary, India, Indonesia, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand and Turkey. We could not find data for Taiwan from the World Bank and other sources so it was excluded. We selected our explanatory variables inspired from Cantor and Packer (1996). The explanatory variables in our study are CATGDP, inflation calculated from deflator, external debt-to-GNI, freedom index obtained from the Heritage Foundation (FI), GDPPC, real exchange rate (REXR) calculated against US dollars (an increase represent an appreciation) and gross domestic savings to GDP (SAVTGDP). Data for variables have been obtained from the World Bank, IMF, Heritage Foundation and CRA websites.

CRAs represent their ratings with special signs. Ratings signs are illustrated in Table 1.

GDPPC and SAVTGDP are expected to have positive effects on sovereign ratings; external debt, inflation, REXR and current account deficit are expected to have negative effects (Cantor and Packer, 1996; Ul-Haque et al., 1996; Ferri et al., 1999; 2001; Hu et al., 2002; Mora, 2006; Gaillard, 2006; Ratha et al., 2010). In Cantor and Packer and other studies, GDP growth rate and GDPPC were used together but only GDPPC was taken in this study because of possible multi co-linearity between variables.

**Table 1: Rating symbols**

| Rating specifications | Rating symbols | | | Ordered probit and logit scale |
|---|---|---|---|---|
| | S&P | Fitch | Moodys | |
| Investment grade rating | | | | |
| Highest quality | AAA | AAA | Aaa | 6 |
| High quality | AA+ | AA+ | Aa1 | 5 |
| | AA | AA | Aa2 | 5 |
| | AA− | AA− | Aa3 | 5 |
| Strong payment capacity | A+ | A+ | A1 | 4 |
| | A | A | A2 | 4 |
| | A− | A− | A3 | 4 |
| Adequate payment capacity | BBB+ | BBB+ | Baa1 | 3 |
| | BBB | BBB | Baa2 | 3 |
| | BBB− | BBB− | Baa3 | 3 |
| Speculative-grade ratings | | | | |
| Likely to fulfill obligation | BB+ | BB+ | Ba1 | 2 |
| | BB | BB | Ba2 | 2 |
| | BB− | BB− | Ba3 | 2 |
| High-risk obligation | B+ | B+ | B1 | 1 |
| | B | B | B2 | 1 |
| | B− | B− | B3 | 1 |
| Obligations cannot meet | CCC+ | CCC+ | Caa1 | 0 |
| | CCC | CCC | Caa2 | 0 |
| | CCC− | CCC− | Caa3 | 0 |
| | CC | CC | Ca | 0 |
| | C | C | C | 0 |
| | SD | SD | D | 0 |

Source: Cantor and Packer (1996)

The FI is a much more inclusive variable that is composed of ten components including business freedom, trade freedom, fiscal freedom, government spending, monetary freedom, investment freedom, financial freedom, property rights, freedom from corruption and labor freedom. All components are graded from 100 to 0, where 100 represents maximum freedom. The FI is the average of the ten components (Heritage Foundation). We expected the index to have a positive effect on sovereign ratings.

The regression between sovereign rating and explanatory variables are stated in Equation 1.

$N = 1,\ldots, 19$: $t = 1993,\ldots, 2009$.

$$SR_{i,t} = \alpha_{i,t} + \beta_{1,t}CATGDP_{i,t} + \beta_{2,t}DEF_{i,t} + \beta_{3,t}EXDTGNI_{i,t} + \beta_{4,t}FH1_{i,t} + \beta_{5,t}GDPPC_{i,t} + \beta_{6,t}REXR_{i,t} + \beta_{7,t}SAVTGDP_{i,t} + \varepsilon_{i,t} \quad (1)$$

SR represents sovereign ratings. Four different models were used including S&P, Moody (MDY), Fitch (FTC) and average ratings of three big rating agencies (ARAT).

### 3.2. Panel Unit Root Test

Our first step was a stationary test on the data. We applied a first generation unit root test that does not consider cross sectional dependency. The tests are Levin, Lin, Chu and Im, Pesaran and Shin (IPS) tests (Levin et al., 2002; Im et al., 2003; Table 2). To lessen possible cross sectional dependency among series, we took averages of the dependent and independent variables at each point in time and reduced the average from observation at point $t$ (Erdem et al., 2010).

**Table 2: First generation panel unit root tests**

| Variable | LLC | | IPS | |
|---|---|---|---|---|
| | Constant | Constant and trend | Constant | Constant and trend |
| CATGDP | −3.017*** | −1.703** | −1.501* | −0.514 |
| DEF | −335.7*** | −351.1*** | −191.4*** | −207.3*** |
| EXDTGDP | −2.68*** | −4.53*** | −0.43 | −0.376 |
| FI | −2.77*** | −1.72** | −1.61* | −0.23 |
| GDPPC | −3.59*** | 1.86 | −0.23 | 1.09 |
| REXR | −6.11*** | −5.03*** | −2.24** | 1.13 |
| SAVTGDP | −1.75** | −2.385*** | −1.671** | −1.1 |
| ΔCATGDP | −7.74*** | −7.495*** | −6.777*** | −4.336*** |
| ΔDEF | −205.3*** | −182.5*** | −112.6*** | −80.48*** |
| ΔEXDTGDP | −8.67*** | −11.54*** | −5.67*** | −5.12*** |
| ΔFI | −8.36*** | −6.63*** | −5.94*** | −3.28*** |
| ΔGDPPC | 1.8 | 1.66 | −1.47* | 1.3 |
| ΔREXR | −10.23*** | −10.32*** | −7.83*** | −5.76*** |
| ΔSAVTGDP | −5.36*** | −3.47*** | −6.28*** | −3.51*** |

Δ is the first difference operator. The *, ** and *** are significance levels at 10%, 5% and 1%. Newey-West bandwidth selection with Bartlett kernel is used in both LLC and IPS. To determine optimal lags, we selected the Schwarz info criteria. LLC: Levin, Lin, Chu, IPS: Im, Pesaran, Shin, CATGDP: Current account deficit to gross domestic product, DEF: Deflator, EXDTGDP: External debt gross domestic product, GDPPC: Gross domestic product per capita, REXR: Real exchange rate, SAVTGDP: Savings to gross domestic product

**Table 3: CADF unit root test**

| Variables | Level | | First difference | |
|---|---|---|---|---|
| | Constant | Constant and trend | Constant | Constant and trend |
| CATGDP | 0.425 | 0.665 | −8.799*** | −6.890*** |
| DEF | −10.855*** | −7.360*** | −10.812*** | −7.123*** |
| EXDTGDP | 1.868 | 2.349 | −4.712*** | −3.503*** |
| GDPPC | −0.328 | 3.986 | −0.328 | 2.349 |
| LGDPPC | 0.333 | 0.781 | −2.371*** | −0.674 |
| REXR | −0.602 | 1.847 | −9.121*** | −7.118*** |
| SAVTGDP | 0.496 | 0.803 | −5.761*** | −3.530*** |

The *, ** and *** rejection of the null hypothesis at 10%, 5% and 1%. P: lags length selected according to SIC. Critical values obtained from Pesaran (2006)'s article. The critical values at 1%, 5% and 10% significance levels are −5.46, −4.17 and −3.63. DEF: Deflator, REXR: Real exchange rate, SIC: Schwarz information criterion, EXDTGDP: External debt gross domestic product, GDPPC: Gross domestic product per capita, SAVTGDP: Savings to gross domestic product, CADF: Cross-sectional augmented Dickey fuller test, CATGDP: Current account deficit to gross domestic product

As a result, all variables are stationary with constants for the LLC test; all variables are stationary with at least 5% significance with constant and trend except from GDPPC. The variables have mixture stationary properties in the IPS test.

We also checked the second-generation unit root test, which considers cross sectional dependency. For these tests we applied Pesaran's cross-sectional augmented Dickey Fuller Test (CADF) test (Perasan, 2006). The test results are illustrated in Table 3. As a consequence of the second-generation unit root test, we found that the first difference is stationary.

In cases of cross sectional dependency between variables, second-generation unit root tests were run. The number of cross sections is 18, and the time series samples' number is 17 for each cross section. In this analysis, $N$ is greater than $T$ ($N > T$). Because $N$ is greater than $T$, the CADF was applied (Perasan, 2006) with results in Table 3.

### 3.3. Multinomial Models

Sovereign ratings are generally classified as investment grade and speculative grade ratings. In a much more detailed classification scheme, ratings are classified as obligation cannot be met (D/CCC+), high-risk obligation (B−/B+), likely to fulfill obligation (BB−/BB+), adequate payment capacity (BBB−/BBB+), strong payment capacity (A−/A+), high payment capacity (AA−/AA+) and highest payment capacity (AAA).

In linear and classic regression models, the dependent variables take quantitative and countable values. However, in some cases, the dependent variables can take qualitative values. These models are estimated by qualitative dependent variable models. If the qualitative dependent variables have two choices like yes/no or successful/unsuccessful, binary choice models are used. The most well known binary choice models are logit and probit models. If the qualitative dependent variables take more than two values, multinomial logit or probit models are used. In addition, because multinomial models have ordered properties, ordered logit or probit models are used for estimations (Çağlayan and Metin, 2005. p. 37). Although, some of the studies on sovereign ratings in the literature determine the sovereign ratings as quantitative dependent variables (Cantor and Packer, 1996; Ferri et al., 1999; 2001; Mora, 2006; Butler and Fauver, 2006; Archer et al., 2007; Ratha et al., 2011), others determine the sovereign rating as a qualitative dependent variables (Ferri et al., 2001; Hu et al., 2001; Mora, 2006; Gaillard, 2006; Hill et al., 2010). In the case of sovereign ratings properties, the ordered probit and logit models were used in this study. A probability distribution function in the panel of multinomial models was given at equation 2 (Cameron and Trivedi, 2005. p. 795).

$$prop\left[Y_{it}=\tau|X_{it},\beta\right]=\begin{cases}F\left(X_{it}^{'}\beta\right)\text{generally}\\ \wedge\left(X_{it}^{'}\beta\right)\text{probit models}\\ \phi\left(X_{it}^{'}\beta\right)\text{logit models}\end{cases} \quad (2)$$

$F(\cdot)$ cumulative distribution function, $\wedge(\cdot)$ standard cumulative distribution function, $\phi(\cdot)$ logistic cumulative distribution function. $\phi(z)=e^{z}/1+e^{z}$ (Cameron and Trivedi, 2005. p. 795).

Sovereign ratings were illustrated as $Y^*$ in this study. $Y^*$ has cut points (thresholds points) that was presented with $\tau$. If $Y^*$ values estimate the ordered probit models, dependent variables show standard distribution between two thresholds points. The distribution of the sovereign rating was given by equation.

The variables of $Y^*$ are stated in the probit model as:

$$Y_{it}^{*}=\begin{cases}\tau_1;\tau_1\le Y_{it}^{*}<\tau_2\\ \tau_2;\tau_2\le Y_{it}^{*}<\tau_3\\ \vdots\\ \tau_k;\tau_k\le Y_{it}^{*}\le\tau_{k+1}\end{cases} \quad (3)$$

$\tau = 0,1,2,3,4.$

The variables of $Y^*$ are stated in probit models like:

$$Y_{it}^{*}=\sum_{i=1}^{i}\beta_i X_{it}+\varepsilon_{it}:\ \text{no constant} \quad (4)$$

$$Y_{it}^{*}=\alpha_i+\sum_{i=1}^{i}\beta_i X_{it}+\varepsilon_{it}:\text{with constant} \quad (5)$$

$t = 1993, 2009$; $n = 1, 19$

In the logit model, $X_{it}$ and $\varepsilon_{it}$ are assumed to be distributed independently and show logistic distribution.

$$F\left(\varepsilon_{it}|X_{it}\right)=f\left(\varepsilon_{it}\right)=\frac{1}{1+\exp(\varepsilon_{it})}\equiv\wedge\left(\varepsilon_{it}\right) \quad (6)$$

Probability distribution function in panel multinomial models was given by equation

$$prop\left[Y_{it}=\tau|X_{it},\beta\right]=\phi\left(\tau_{ik+1}-X_{it}^{'}\beta\right)-\phi(\tau_{ik}-X_{it}^{'}\beta) \quad (7)$$

In qualitative dependent variable models, goodness of fit is calculated by pseudo $R^2$ (Green and Hensher, 2009. p. 127), which is calculated as:

$$Pseduo\ R^2=1-\frac{L_1}{L_0} \quad (8)$$

In the equation, $L_1$ is the log-likelihood function values in which all explanatory variables are included. $L_0$ is the log-likelihood function that considers only the constants.

Ordered probit and logit panel data analysis were run for three big rating agencies; average ratings and the estimation results were given in Tables 4-7 (appendix). Estimation outputs were obtained by the Stata 10 software program.

According to the estimation results for ARAT, CATGDP are statistically significant at the 10% level of significance. Other explanatory variables are statistically significant at 1%. The signs of the independent variables coefficients were theoretically significant. There were similar results for SP, MDY and FTC dependent variables.

In multinomial models, interpretations of the variables are different from quantitative models. The signs of the coefficients show whether the explanatory variables affect the independent variables positively or negatively. To interpret the coefficient obtained from the qualitative models, marginal effects of coefficients must be calculated (Green and Hensher, 2009. p. 520). Marginal effects for probits can be calculated by:

$$\frac{\partial prop\left[Y_{it}=\tau|X_{it},\beta\right]}{\partial X_{it}}=\left[\wedge'\left(\tau_{ik+1}-X_{it}^{'}\beta\right)-\wedge'\left(\tau_{ik}-X_{it}^{'}\beta\right)\right]\beta_i \quad (9)$$

Term $\wedge'$ implies the derivative of $\Lambda$.

**Table 4: Panel ordered probit estimation outputs**

| Dependent variable | ARAT | | Marginal effects (dy/dx) | | | | |
|---|---|---|---|---|---|---|---|
| Variables | Coefficients | *z* statistics | τ=0 | τ=1 | τ=2 | τ=3 | τ=4 |
| CATGDP | −0.036[c] | −1.720 | 0.001 | 0.002 | 0.012 | −0.007 | −0.007 |
| DEF | −0.021[a] | −3.470 | 0.001 | 0.001 | 0.007 | −0.004 | −0.004 |
| EXDTGNI | −0.017[a] | −3.200 | 0.001 | 0.001 | 0.006 | −0.003 | −0.003 |
| GDPPC | 0.001[a] | 3.690 | −4.17e-07 | −0.001 | −0.001 | 0.001 | 0.001 |
| FI | 0.074[a] | 4.760 | −0.001 | −0.004 | −0.025 | 0.015 | 0.014 |
| REXR | −0.001[b] | −2.260 | 7.81e-08 | 1.98e-06 | 0.001 | −7.75e-06 | −7.30e-06 |
| SAVTGDP | 0.071[a] | 0.011 | −0.001 | −0.004 | −0.024 | 0.014 | 0.014 |
| *P* values | | | 0.001 | 0.022 | 0.424 | 0.439 | 0.113 |
| Pseudo $R^2$ | 0.285 | | | | | | |
| **Dependent variable** | **SP** | | **Marginal effects (dy/dx)** | | | | |
| **Variables** | **Coefficients** | ***z* statistics** | **τ=0** | **τ=1** | **τ=2** | **τ=3** | **τ=4** |
| CATGDP | −0.059[a] | −2.710 | 0.001 | 0.002 | 0.021 | −0.015 | −0.008 |
| DEF | −0.034[a] | −4.310 | 0.001 | 0.001 | 0.012 | −0.009 | −0.005 |
| EXDTGNI | −0.007 | −1.290 | 7.70e-06 | 0.001 | 0.002 | −0.002 | −0.001 |
| GDPPC | 0.001[a] | 3.790 | −2.41e-07 | −5.73e-06 | −0.001 | 0.001 | 0.001 |
| FI | 0.089[a] | 5.480 | −0.001 | −0.002 | −0.032 | 0.022 | 0.012 |
| REXR | −0.001[a] | −3.190 | 6.15e-08 | 1.46e-06 | 0.001 | −0.001 | −7.45e-06 |
| SAVTGDP | 0.095[a] | 7.370 | −0.001 | −0.003 | −0.034 | 0.023 | 0.013 |
| *P* values | | | 0.001 | 0.010 | 0.391 | 0.526 | 0.071 |
| Pseudo $R^2$ | 0.350 | | | | | | |

DEF: Deflator, REXR: Real exchange rate, EXDTGDP: External debt gross domestic product, GDPPC: Gross domestic product per capita, SAVTGDP: Savings to gross domestic product, CATGDP: Current account deficit to gross domestic product, ARAT: Average ratings of three big rating agencies, a: 1%, b:5%, c: 10%

**Table 5: Panel ordered probit estimation outputs**

| Dependent variable | FTC | | Marginal effects (dy/dx) | | | | |
|---|---|---|---|---|---|---|---|
| Variables | Coefficients | *z* statistics | τ=0 | τ=1 | τ=2 | τ=3 | τ=4 |
| CATGDP | −0.074[a] | −3.290 | 1.14e-06 | 0.004 | 0.024 | −0.015 | −0.013 |
| DEF | −0.036[a] | −3.830 | 5.57e-07 | 0.002 | 0.011 | −0.007 | −0.007 |
| EXDTGNI | −0.009 | −1.580 | 1.34e-07 | 0.001 | 0.002 | −0.002 | −0.002 |
| GDPPC | 0.001 | 1.470 | −1.27e-09 | −4.57e-06 | −0.001 | 0.001 | 0.001 |
| FI | 0.067[a] | 4.120 | −1.03e-06 | −0.004 | −0.210 | 0.013 | 0.012 |
| REXR | −0.001[a] | −2.710 | 7.44e-10 | 2.67e-06 | 0.001 | −9.58e-06 | −8.82e-06 |
| SAVTGDP | 0.095[a] | 7.040 | −1.48e-06 | −0.005 | −0.031 | 0.019 | 0.018 |
| *P* values | | | 3.268e-06 | 0.023 | 0.357 | 0.513 | 0.105 |
| Pseudo $R^2$ | 0.286 | | | | | | |
| **Dependent variable** | **MDY** | | **Marginal effects (dy/dx)** | | | | |
| **Variables** | **Coefficients** | ***z* statistics** | **τ=0** | **τ=1** | **τ=2** | **τ=3** | **τ=4** |
| CATGDP | −0.067[a] | −3.030 | - | 0.005 | 0.021 | −0.016 | −0.011 |
| DEF | −0.040[a] | −4.010 | - | 0.003 | 0.013 | −0.010 | −0.006 |
| EXDTGNI | −0.014[a] | −2.590 | - | 0.001 | 0.005 | −0.1003 | −0.002 |
| GDPPC | 0.001[a] | 4.000 | - | −01.001 | −0.001 | 0.001 | 0.001 |
| FI | 0.044[a] | 2.730 | - | −0.034 | −0.014 | 0.010 | 0.007 |
| REXR | −0.001[a] | −2.960 | - | 4.60e-06 | 0.001 | −0.001 | −9.29e-06 |
| SAVTGDP | 0.108[a] | 8.020 | - | −0.008 | −0.035 | 0.026 | 0.017 |
| *P* values | | | | 0.035 | 0.416 | 0.460 | 0.086 |
| Pseudo $R^2$ | 0.327 | | | | | | |

c, b and a level of significance at 10%, 5% and 1%, REXR: Real exchange rate, DEF: Deflator, EXDTGDP: External debt gross domestic product, GDPPC: Gross domestic product per capita, SAVTGDP: Savings to gross domestic product, CATGDP: Current account deficit to gross domestic product, a: 1%

For example, the probability of having adequate payment capacity (τ = 3) for emerging countries decreases at the ratio of 0.0148 when CATGDP increases 1%. Similarly, the probability of having strong payment capacity (τ = 4) for emerging countries increases at the ratio of 0.013 when SAVTGDP increases 1%. The marginal effects in the logit models can be calculated by the formula stated in equation 10:

$$\frac{\partial prop\left[Y_{it}=\tau|X_{it},\beta\right]}{\partial X_{it}}=\left[\phi'\left(\tau_{ik+1}-X_{it}^{'}\beta\right)-\phi'\left(\tau_{ik}-X_{it}^{'}\beta\right)\right]\beta_{i} \quad (10)$$

## 4. CONCLUSION

This paper examines the effects of macroeconomic and political variables on sovereign ratings for emerging countries. Ordered panel probit and logit analysis were used to check the effect of GDPPC, saving rates, current account deficits, external debts, REXR, as well as inflation and political quality on the emerging countries' sovereign ratings. We found statistically significant and negative effects of external debt, inflation rates, current account deficit and REXR on sovereign ratings. There were also statistically significant and positive impacts of GDPPC, SAVTGDP

**Table 6: Panel ordered logit estimation outputs 0.00009**

| Dependent variable | ARAT | | Marginal effects (dy/dx) | | | | |
|---|---|---|---|---|---|---|---|
| Variables | Coefficients | *z* statistics | τ=0 | τ=1 | τ=2 | τ=3 | τ=4 |
| CATGDP | −0.058 | −1.550 | 0.001 | 0.002 | 0.013 | −0.009 | −0.005 |
| DEF | −0.039[a] | −3.110 | 0.001 | 0.001 | 0.009 | −0.006 | −0.004 |
| EXDTGNI | −0.031[a] | −3.190 | 0.001 | 0.001 | 0.007 | −0.005 | −0.003 |
| GDPPC | 0.001[a] | 3.580 | −0.000009 | −8.66e-06 | −0.001 | 0.001 | 0.001 |
| FI | 0.130[a] | 4.590 | −0.001 | −0.003 | −0.029 | 0.020 | 0.012 |
| REXR | −0.001[a] | −2.580 | 2.08e-07 | 1.95e-06 | 0.001 | −0.001 | −7.35e-06 |
| SAVTGDP | 0.121[a] | 5.690 | −0.001 | −0.003 | −0.026 | 0.018 | 0.011 |
| *P* values | | | 0.003 | 0.025 | 0.426 | 0.441 | 0.103 |
| Pseudo $R^2$ | 0.285 | | | | | | |
| **Dependent variable** | **SP** | | **Marginal effects (dy/dx)** | | | | |
| **Variables** | **Coefficients** | ***z* statistics** | **τ=0** | **τ=1** | **τ=2** | **τ=3** | **τ=4** |
| CATGDP | −0.094[b] | −2.380 | 0.001 | 0.001 | 0.021 | −0.016 | −0.006 |
| DEF | −0.060[a] | −4.180 | 0.001 | 0.001 | 0.014 | −0.011 | −0.004 |
| EXDTGNI | −0.016[c] | −1.620 | 0.001 | 0.001 | 0.004 | −0.003 | −0.001 |
| GDPPC | 0.001[a] | 3.700 | −7.75e-07 | −5.02e-06 | −0.001 | 0.001 | 0.001 |
| FI | 0.162[a] | 5.420 | −0.001 | −0.002 | −0.037 | 0.029 | 0.011 |
| REXR | −0.001[a] | −3.070 | 2.04e-07 | 1.32e-06 | 0.001 | −0.001 | −6.39e-06 |
| SAVTGDP | 0.165[a] | 6.950 | −0.001 | −0.002 | −0.037 | 0.029 | 0.011 |
| *P* values | | | 0.002 | 0.014 | 0.388 | 0.525 | 0.071 |
| Pseudo $R^2$ | 0.347 | | | | | | |

REXR: Real exchange rate, DEF: Deflator, EXDTGDP: External debt gross domestic product, GDPPC: Gross domestic product per capita, SAVTGDP: Savings to gross domestic product, CATGDP: Current account deficit to gross domestic product, ARAT: Average ratings of three big rating agencies, a: 1%, b: 5%, c: 10%

**Table 7: Panel ordered logit estimation outputs**

| Dependent variable | FTC | | Marginal effects (dy/dx) | | | | |
|---|---|---|---|---|---|---|---|
| Variables | Coefficients | *z* statistics | τ=0 | τ=1 | τ=2 | τ=3 | τ=4 |
| CATGDP | −0.116[a] | −2.860 | 0.001 | 0.003 | 0.024 | −0.016 | −0.011 |
| DEF | −0.064[a] | −3.780 | 0.001 | 0.002 | 0.013 | −0.009 | −0.006 |
| EXDTGNI | −0.017[c] | −1.740 | 4.00e-06 | 0.001 | 0.004 | −0.002 | −0.002 |
| GDPPC | 0.001 | 1.440 | −3.25e-08 | −3.82e-06 | −0.001 | 0.001 | 0.001 |
| FI | 0.118[a] | 4.060 | −0.001 | −0.003 | −0.024 | 0.017 | 0.011 |
| REXR | −0.001[a] | −2.660 | 1.93e-08 | 2.26e-06 | 0.001 | −0.001 | −7.80e-06 |
| SAVTGDP | 0.164[a] | 6.650 | −0.001 | −0.004 | −0.039 | 0.023 | 0.015 |
| *P* values | | | 0.001 | 0.028 | 0.340 | 0.527 | 0.103 |
| Pseudo $R^2$ | 0.284 | | | | | | |
| **Dependent variable** | **MDY** | | **Marginal effects (dy/dx)** | | | | |
| **Variables** | **Coefficients** | ***z* statistics** | **τ=0** | **τ=1** | **τ=2** | **τ=3** | **τ=4** |
| CATGDP | −0.095[b] | −2.490 | - | 0.004 | 0.200 | −0.016 | −0.007 |
| DEF | −0.069[a] | −3.950 | - | 0.003 | 0.146 | −0.012 | −0.005 |
| EXDTGNI | −0.032[a] | −3.120 | - | 0.001 | 0.007 | −0.006 | −0.002 |
| GDPPC | 0.001[a] | 3.730 | - | −0.001 | −0.001 | 0.001 | 0.001 |
| FI | 0.084[a] | 2.820 | - | −0.003 | −0.018 | 0.014 | 0.001 |
| REXR | −0.001[a] | −2.730 | - | 3.51e-06 | 0.001 | −0.001 | −7.08e-06 |
| SAVTGDP | 0.179[a] | 7.630 | - | −0.007 | −0.038 | 0.031 | 0.014 |
| *P* values | | | - | 0.039 | 0.415 | 0.462 | 0.083 |
| Pseudo $R^2$ | 0.327 | | | | | | |

c, b and a level of significance at 10%, 5% and 1%. DEF: Deflator, REXR: Real exchange rate, EXDTGDP: External debt gross domestic product, GDPPC: Gross domestic product per capita, SAVTGDP: Savings to gross domestic product, CATGDP: Current account deficit to gross domestic product

ratio and FI. Terms that highlight the political impact on the sovereign ratings as theoretically expected.

Classic theory implies that all economic units are taking action rationally and without cost. However, considering international investors' decision-making process, they have to have full information about macroeconomic situation of all the candidate countries. For this process, they have to spend much more time and money to have an idea of the economic situation of the countries on their own. Our findings imply that CRAs rate countries by considering political and economic structures of the countries. CRAs are not rating economies without studying the economic and political performance. At this point, CRAs give international investors the chance to evaluate investment choices rationally, quickly and at lower cost.

Countries that need foreign funds to finance their current account deficit and more importantly to finance their development can increase their sovereign ratings by having more capital inflows. As a consequence, these counties will be described as disciplined and rational regarding fiscal and monetary policy, with established democratic institutions and stable economic growth policies.

This will increase their level of welfare as well as their sovereign ratings.

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