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Research Article

On Determinants of Exchange Market Pressure in Turkey: The Role of Model Uncertainty

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ABSTRACT

Macroeconomic and financial indicators have a significant impact on the exchange market pressure (EMP) in Turkey. Despite the huge amount of literature on the subject, there is no study focusing on Turkey that takes into account the role of model uncertainty on exchange market pressure. The role of model uncertainty should be taken into consideration, given the lack of a unique theoretical framework on the exchange markets pressure and a set of numerous explanatory variables. The Bayesian model averaging (BMA) technique is capable of determining as to whether any explanatory variable should be included in the analysis, i.e. the models with high posterior probability. To this end, the determinants of the exchange market pressure index (EMPI) in Turkey for the period of 2010M1-2020M3 are identified using the Bayesian model averaging which takes into account the role of model uncertainty. Model results indicate that the slope of the yield curve, domestic credit growth, the long term yield differentials, and short-term portfolio flows play a significant role as determinants of the exchange rate pressures of Turkey.

Keywords: Financial Crisis, Exchange market pressures, Bayesian model averaging

JEL Codes: C11, F31, F37

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1. Introduction

This study investigates as to whether macroeconomic and financial indicators have a significant impact on the exchange market pressure in Turkey by utilizing a comprehensive dataset. The knowledge on the determinant that causes fluctuation in the exchange market for a given timeframe is resourceful for the design of policy to apply. It is important for the policy maker to describe the internal and external factors affecting EMP, especially when large variations of the exchange rates in developing countries that have a significant effect on the price stability are taken into consideration.

A recent study concludes that transition from the exchange rate to inflation is stronger than the import prices (Öğünç et.al., 2018). This index is also important because it is one of the five components used by the IMF for financial stress tests (Balakrishnan et al., 2009).

The analysis of exchange market pressures was first proposed by Girton and Roper (1977). Van Poeck et. al. (2007) found out that EMP fluctuations are associated with the current account and domestic credit growth while Crespo-Cuaresma and Slacik (2009) concluded that real exchange rate misalignment and financial market indicators are the main determinants on exchange market pressures. Additionally, Feldkircher et. al. (2014) emphasized the importance of price stability as the most important determinant of exchange market pressure. Aizenman and Binici (2015), examining EMP during the recent global financial crisis, concluded that the macroeconomic variables such as GDP per capita and inflation had a significant effect on the EMP in the pre-crisis period, and external factors played a dominant role on the EMP during and after crisis. A recent study by Patnaik and Pundit (2019) analyzed the determinants of exchange market pressure during the taper tantrum. The authors suggested that the macroeconomic fundamentals have no role in determining the level of pressure on the domestic currency, and trade openness and external financing variables have a significant impact on the foreign exchange market.

As noted earlier, it is clear that there is no consensus in the literature on a specific model that captures the relationship between the exchange market and the macroeconomic and financial variables. This may be partially because the effect of model uncertainty is being neglected or, at least, because the true indicators on the exchange market with the macroeconomic and financial fundamentals are not taken into consideration (Claessens and Kose, 2017: 25; Feldkircher et.al. 2014: 22). In this sense, the effect of the model uncertainty should be taken into account, given the lack of a unique theoretical framework on the exchange markets pressure and the set of numerous explanatory variables. Despite the vast amount of publications on EMP, the effect of the model uncertainty is not studied sufficiently. Within this framework, the determinants of the exchange market pressure index of Turkey for the period of 2010-2020 are identified using Bayesian model averaging that takes into account the effect of the model uncertainty. Model results indicate that the parameter uncertainty associated with variables of the yield curve (Tryieldcurve), domestic credit growth (domcredit), the long-term yield differentials (tr10Y_us10Y) and short-term portfolio flows (port_flow (debt)) variable is quite low, and that these variables have a significant impact on the exchange market pressure.

The remaining parts of the paper are organized as follows: Section 2 describes the dataset, and provides the definition of EMP index and the methodology, while the findings and discussions are presented in section 3, and the conclusion is on the final part.

2. Data and Methodology

2.1. Data

The sample covers the period from 2010M1 to 2020M3, and includes the continuous EMP index, and 38 potential explanatory variables. The data is compiled using the data from the Central Bank of the Republic of Turkey (CBRT), St. Louis Fed (FRED), Banking Regulation and Supervision Agency (BRSA) and Bloomberg. The definitions of explanatory variables and data sources are reported in Appendix (Table A1).

Episodes of exchange market pressure are described as periods where the financial system is under stress and its capability to intermediate is impaired (Balakrishnan et al., 2009: 3).

To determine episodes of exchange market pressure, the EMP index suggested by Balakrishnan et al., (2009) is utilized. The EMP index captures exchange rate depreciation and declines in international reserves. Accordingly, the pressure on the domestic currency of country *i* in time *t* is measured as:

$$EMPI_{i,t} = \left(\frac{\Delta e_{i,t} - \mu_{i,\Delta e}}{\sigma_{i,\Delta e}}\right) - \left(\frac{\Delta res_{i,t} - \mu_{i,\Delta res}}{\sigma_{i,\Delta res}}\right) \quad (1)$$

where Δe and Δres stand for the monthly percent changes in the nominal exchange rate and international reserves, and finally, μ and σ indicate the mean and the standard deviation of the relevant series, respectively. The continuous structure of the index goes beyond binary variables (0/1) used extensively in the literature, and enables the investigation of exchange market pressure more systematically (Vlaar, 1999).

2.2. Bayesian Model Averaging (BMA)

Our statistical framework is a linear regression model:

$$y = \alpha_\gamma + X_\gamma \beta_\gamma + \varepsilon, \qquad \varepsilon \sim N(0, \sigma^2 I) \quad (2)$$

where y is the index of exchange market pressures, α_γ is a constant, β_γ is the regression coefficients, and ε is an error term. X_γ refers to a subset of all available relevant explanatory variables *X*.

Here, in the presence of many potential explanatory variables, selection of the variables that should be included in the model appears to be a challenging problem (Zeugner, 2011: 2).

If all potential variables are included in a single regression model, direct approaches have two important disadvantages (Koop, 2003; Babecky et.al., 2012).

First, it is not a satisfactory approach to do inference by using one regression model where all potential variables are included, since the standard errors inflate when unrelated variables are included in the model. Second, if insignificant variables are sequentially tested for the purpose of exclusion, we may face spurious results since there is a possibility of excluding the relevant variable when each time the test is carried out.

These problems are addressed in BMA by considering all models of all possible combinations covering potential variables in a form of weighted average over all of them.

The model weights for this averaging are due to posterior model probabilities that arises from

Bayes' theorem:

$$p(M_\gamma|y,X) \propto p(y|M_\gamma,X)p(M_\gamma) \tag{3}$$

where $p(M_\gamma | y, X)$ is the posterior model probability (PMP), which is proportional to the integrated likelihood of the model $p(y | M_\gamma, X)$ times the prior probability of the model $p(M_\gamma)$. For any statistics θ, the model weighted posterior distribution is obtained as follows:

$$(\theta|y,X) = \sum_{\gamma=1}^{2^K} p(\theta|M_\gamma y,X)\frac{p(M_\gamma|y,X)p(M_\gamma)}{\sum_{i=1}^{2^K} p(y|M_i,X)p(M_i)} \tag{4}$$

Moreover, it is necessary to determine the prior distributions over all parameters in each and every models used in the BMA implementations. In addition, prior probabilities of every single model must be determined. In this framework it is important to figure out how the prior assumptions may affect inference. The integrated likelihood that is an essential component of the weights of the posteriors models may be influenced by the priors on parameters that may affect the results (Eicher et. al., 2011).

Eicher et.al. (2011) highlighted that prior assumptions are extremely important for the results of BMA analysis. In this context, as shown in the study Ley and Steel (2009), an uninformative binomial-beta prior on the model space is chosen; for the regression parameters, the recommendations of Liang et.al. (2008) and Ley and Steel (2012), recommending the use of the hyperprior that perform well in economic applications are considered. [1]

3. Findings and Discussions

In this section, the results of the Bayesian model averaging (BMA) are presented. BMA includes the average of all models considered. The number of the models considered can be very large. In our case, there are 2^{38} potential models for 38 potential explanatory variables (that makes nearly 275 billion models). Since it is not feasible to evaluate all the models in the presence of such a large dataset of variables, we apply the Markov Chain Monte Carlo (MCMC) algorithm. Model results are based on 4 million posterior draws after a burn-in phase of 1 million. All computations are carried out using the R package BMS (Feldkircher and Zeugner, 2009).

Figure 1 reports the best 5000 models out of the BMA application. The red colour corresponds to a negative coefficient, blue to a positive one, and white to a null coefficient i.e. non-inclusion. The horizontal axis shows the 5000 best models, scaled by their cumulated posterior model probabilities (PMP). In addition, the first part of Figure 1 represents a model that has a value of 4% PMP, including the variables TRyieldcurve, domcredit and tr10y_us10y. This section corresponds to "Model 1" in Table 2.

Model 1 represents only 4% of the total probability that exhibits high model uncertainty, while the best 5000 models have a cumulative probability of 31 percent. The second section makes up roughly 2% of model mass (difference between 0.04 and 0.06) on the horizontal axis and indicates a model which also includes a port_flow (debt) variable. This model is called "Model 2".

1 For the regression parameters $\beta\gamma$, we use Zellner's g prior $\beta_\gamma|\sigma^2, M_\gamma, g \sim N(0, \sigma^2 g(X'_\gamma X_\gamma)^{-1})$.

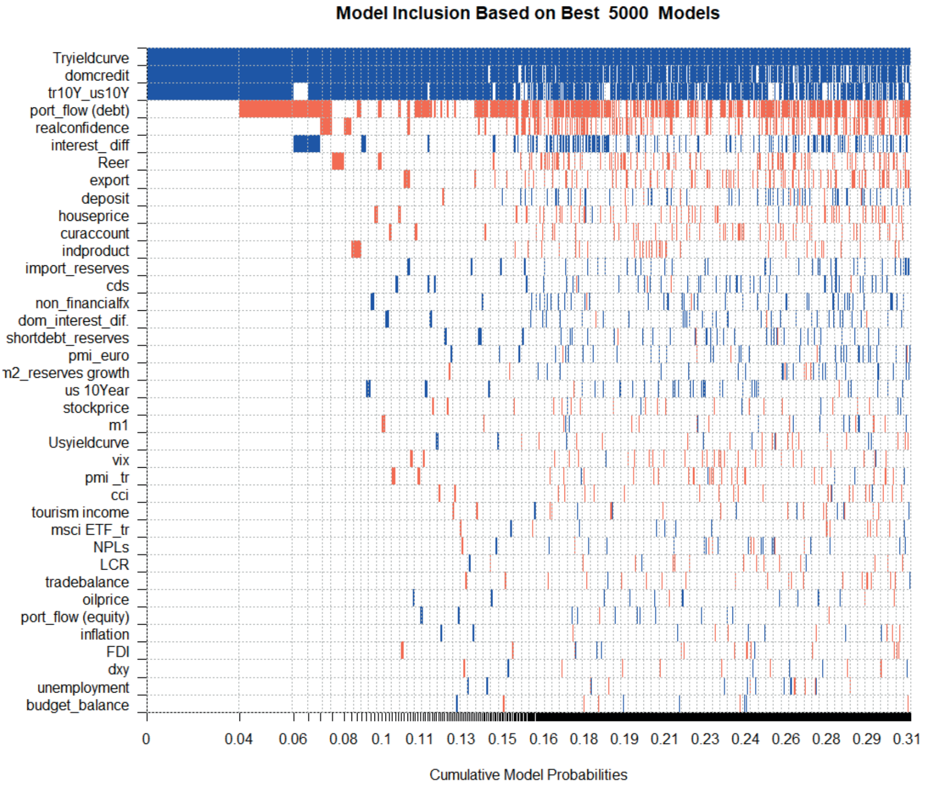

Figure 1: Posterior Inclusion Probabilities.

Note: The vertical axis: potential explanatory variables, the horizontal axis: the 5000 best models, scaled by their cumulated PMP. Blue: positive sign, red: negative sign, white: non-inclusion in model.

Table 1 presents posterior inclusion probability (PIP), posterior mean (Post Mean), posterior standard deviation (Post SD) and conditional posterior sign (Cond. Pos. Sign) for each variable. Regression coefficients are reported as the analytical results.[2] The explanatory variables with a high PIP (0.5 or higher) are considered as strong determinants of the EMP index. Out of 38 potential explanatory variables, 4 have PIPs higher than 0.5. In other words, our results emphasize the important role of the yield curve, domestic credit growth, long-term yield differentials and portfolio flows on the exchange market pressure.

2 The standardized regression coefficients are reported in Appendix (Table A2) to understand the relative importance of statistically significant variables. The standardized regression coefficients are different than those shown in Table 1.

Table 1: Results of Bayesian Model Averaging

	PIP	Post Mean	Post SD	Cond.Pos.Sign
TRyieldcurve	0.99994127	1.308701e+00	2.497428e-01	1.00000000
domcredit	0.91873370	1.571484e-01	6.135831e-02	0.99991873
tr10Y_us10Y	0.84243433	5.545429e-01	2.964738e-01	1.00000000
port_flow (debt)	0.55388154	-2.094217e-04	2.158246e-04	0.00000000
realconfidence	0.20147580	-2.395892e-02	5.685058e-02	0.00000000
interest_ diff	0.17451807	5.482322e-02	1.357593e-01	0.99951356
Reer	0.11609732	-1.089776e-02	3.581476e-02	0.00000000
export	0.09631506	-6.096166e-03	2.262251e-02	0.00311684
deposit	0.06999008	3.803328e-03	1.831715e-02	0.85242095
houseprice	0.06551354	-1.308589e-02	6.379536e-02	0.03485446
curaccount	0.05720735	-1.208873e-03	6.291442e-03	0.00389482
indproduct	0.05588179	-2.824563e-03	1.470489e-02	0.01140795
import_reserves	0.05523958	1.542064e+02	8.383716e+02	0.96263756
cds	0.05286847	2.814198e-01	1.742407e+00	0.92176463
non_financialfx	0.05166679	2.443443e-03	1.505558e-02	0.93419278
dom_interest_dif.	0.04332295	1.122608e-02	7.279993e-02	0.96117670
shortdebt_reserves	0.04315114	1.147943e-01	7.732480e-01	0.96944310
pmi_euro	0.04295185	6.016173e-03	4.352111e-02	0.90173684
m2_reserves growth	0.03648631	1.788057e-03	1.528233e-02	0.76830529
us 10Year	0.03635999	3.571061e-02	2.919679e-01	0.90325283
stockprice	0.03536798	-5.759363e-04	5.482570e-03	0.14123212
m1	0.03479750	5.052800e-05	1.037106e-02	0.35227315
Usyieldcurve	0.03366014	-1.380761e-02	2.486092e-01	0.47080304
vix	0.03343489	-1.648103e-03	1.325921e-02	0.03101270
pmi _tr	0.03245381	-2.476331e-03	2.862457e-02	0.15227895
cci	0.03004105	-1.529027e-03	1.547456e-02	0.05180884
tourism income	0.02974649	2.333834e-05	3.411311e-03	0.37288959
msci ETF_tr	0.02423351	-3.382772e-05	1.335371e-02	0.50027693
NPLs	0.02377351	1.459337e-04	5.761834e-03	0.55938120
LCR	0.02332549	-8.525224e-04	1.420654e-02	0.27562744
tradebalance	0.02323546	-1.895853e-04	3.412104e-03	0.12404769
oilprice	0.02282725	1.264262e-04	2.168270e-03	0.89078614
port_flow (equity)	0.02254247	6.355252e-06	1.040363e-04	0.87939821
inflation	0.02240334	3.398845e-04	2.255496e-02	0.61216363
FDI	0.02223336	-2.628420e-05	5.103965e-04	0.26465327
dxy	0.02024340	-4.757711e-04	1.475060e-02	0.34329231
unemployment	0.01981740	5.786714e-04	3.450068e-02	0.68434609
budget_balance	0.01790451	3.904424e-08	2.166329e-05	0.47035373

In our empirical analysis, we first control the role of the yield curve. The slope of the yield curve captures the market expectations by taking into account the current economic activities and the future monetary policy actions. On the other hand, Estrella and Trubin (2006) conclude that the yield curve outperforms other financial indicators in the long term forecasting horizons, and therefore this financial indicator is more forward looking than the other indicators.

In addition, the signals received from the yield curve can be highly responsive to the variations in the conditions of the financial market. Consideration of the monetary fundamentals and the policy reaction functions together with the yield curve that reflects expectations and risk premia help us better explain the movements in the exchange rates (Chen and Tsang, 2013).

In recent scholarship, the Central Bank of the Republic of Turkey (CBRT) refers to the slope of the yield curve in forming the monetary policy. The number of empirical accounts in the literature on the effect of the yield curve on the foreign exchange market is limited because the Turkish bond market started to grow and become financially deepening, particularly after 2010. For this reason, the yield curve variable is also included in the model. Our model results indicate that the TRyieldcurve variable has a comparatively large coefficient and seems to be the most important. The significance of the variables in the model is provided in the first column PIP which represents posterior inclusion probabilities. It is observed that 99.9 % of posterior model mass is based on the model that includes TRyieldcurve variable. This result that bears relevance to the slope of the yield curve is compatible with the findings of the study by Kara et.al. (2015). A review of the development of economic activity and the slope of the yield curve for Turkey reveals that the reverse (negative) slope yield curve has been mostly observed in times with vivid economic activity (where the volume of economic activity is often larger than the potential).

The literature review indicates that the capital flows play an important role on the foreign exchange market in developing economies. However, the nature of the capital flows is also important in this relationship because, while some of the capital flows, such as foreign direct investment (FDI), alleviate the pressure on the foreign exchange market, some others, such as short-term portfolio flows, exacerbate it. Therefore, the nature of the capital flows is taken into account in this study and, FDI and portfolio flows (debt and equity securities) are evaluated separately. Based on the results of the model, we conclude that while the port_flow (equity) and the FDI variables have no significant impact on the value of the domestic currency, the port_flow (debt) decreases the pressure on the loss of the value of the domestic currency. This finding on the portfolio flows is compatible with the general trends of the market dynamics in Turkey. Despite the portfolio flows amounting to large volumes in the aftermath of the 2008 global financial crisis, the portfolio flows to EMEs and to Turkey became more volatile. In the process that started the taper tantrum in May 2013, the EMEs were subject to capital outflows in large volumes because of US presidential elections, the raised uncertainty on the economic policies and specifically the global trade tensions afterwards. Given the Turkey-specific amplified uncertainty and risks, the volume of capital flows towards Turkey (especially the bond flows) has significantly declined since July 2016 (for further details, see Aktaş and Kaya Ekşi, 2020).

Reduction of the interest rates in a number of developed countries to nearly zero-lower-bound (even to the level of negative interest rates in some cases) in the aftermath of the global financial crisis and sustenance of these rates in the markets for a very long time led to the weakening of the impact of the short-term interest rates, a significant conventional policy tool preferred by central banks (Gourinchas and Rey, 2016; Claessens and Kose, 2017). For this reason, the effect of short-term interest rates is also included in the analysis; and the study concludes that the difference between the domestic and international interest rates does not have a significant impact on the pressure of the foreign exchange market. This finding is compatible with the study by Patnaik and Pundik (2019).

It should be noted, however, that the central banks are able to attain the inflation expectations and long-term returns through purchases of government bonds and assets, and forward guidance (Claessens and Kose, 2017). Concurrent with this observation, where the long-term yield differentials are included in the model, this variable has a high PIP value and is robustly related to EMP. These findings on the difference of the short-term and long-term interest rates support the findings by Takáts and Vela (2014) who argue that the effect of the policy interest rates weakened after the 2008 financial crisis, and that the long-term interest rates were more important.

The study utilized interest rate and domestic credit growth variables to reflect the internal imbalances. Interest rates are taken as the difference between the average lending rate and deposit rate of domestic financial institutions. We observe that the dom_interest_dif variable, which represents domestic interest rate difference, does not have a significant effect on the EMP.

Another variable that has a significant impact on the EMP index is domestic credit growth. The domestic credit growth has expectedly a positive relationship with the exchange market pressure index (EMPI). As shown in the fourth column of Table 1, the coefficient for domestic credit growth is approximate to one, i.e. almost all models that include domcredit, its coefficient sign is positive. Domestic credits increase the money supply in the economy and weakens the value of national currency which in turn shall place upward pressure in the exchange market. Our model results confirm the common view that domestic credit growth plays an important role on the exchange market pressure.

Finally, based on a review of the individual performances of the models, Table 2 presents the PMP values of the five best models out of the 5000 and the variables in these five models. In other words, in addition to the average of the best 5000 models, we report the top-five within this sample.

Table 2: The Best 5 Models

	Model 1	Model 2	Model 3	Model 4	Model 5
port_flow (debt)		√	√	√	√
domcredit	√	√	√	√	√
realconfidence					√
Tryieldcurve	√	√	√	√	√
interest_ diff			√	√	
tr10Y_us10Y	√	√		√	√
PMP (Exact)	0.0381	0.0222	0.0058	0.0050	0.0050
PMP (MCMC)	0.0372	0.0220	0.0057	0.0050	0.0047

Note: The variables that are not included in the table do not take place in the 5 models with highest posterior probability.

The best model, with 4% posterior model probability (PMP), includes the variables TRyieldcurve, domcredit and tr10y_us10y. However, the second best model also includes port_flow (debt). In sum, the high PIP values of Tryieldcurve, domcredit, tr10Y_us10Y and port_flow (debt) variables based on the BMA estimation results mean that the uncertainty associated with these variables is quite low.

4. Conclusion

Economics, similar to other social science disciplines, is quite sensitive to the models employed in the analysis. There are a variety of models that the researchers utilize and that the advantage of one model over the others is not clear-cut. Therefore, the issue of uncertainty on model selection is a growing concern among researchers. To address the problem of the model uncertainty, BMA has become an increasingly popular empirical tool in the field of economy.

Despite an extensive literature search, none of the relevant studies focused on Turkey takes into account the role of model uncertainty on the exchange market pressure. For this reason, the macroeconomic and financial determinants of the exchange market pressure of Turkey are analyzed using the BMA technique.

The BMA technique is capable of determining as to whether any explanatory variable should be included in the analysis, i.e. the models with high posterior probability. BMA findings show that the yield curve with a PIP value of 99.9 % is very important in modeling the EMP index process of Turkey. This finding indicates that for any EMP model selection, the yield curve takes place in almost all models. The domestic credit growth, with a PIP value of 91.8 %, is also an important variable that has a positive coefficient. This finding on the domestic credit growth is consistent with the academic literature and it indicates that excessive credit growth increases the pressure on the foreign exchange market.

It now becomes important to remain observant of the indicators that better measure the impacts of the external circumstances on the domestic developments because of the declining effectiveness of the conventional monetary policy instruments. For this reason, the variable of long-term yield differentials (tr10Y_us10Y) is included in the model. The subsequent analysis confirms that this variable is positively correlated to the EMP index.

This study also considers the structure of capital flow, concluding that no significant correlation between port_flow (equity) and FDI variables and the EMP is found. However, it is concluded that the port_flow (debt) variable decreases the depreciation pressure on the domestic currency.

Based on the overall findings in this study, it is fair to conclude that our empirical findings support the view that exchange rate fluctuations are related to expected (future) macroeconomic fundamentals even though the academic literature generally suggests that vulnerability of an economy depends on its macroeconomic fundamentals.

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Appendix

Table A1: Explanatory variables and data sources

Variable	Description	Source
LCR	Liquidity coverage ratio (banking sector) (%yoy)	BRSA
NPLs	Non-performing loans (banking sector) (%yoy)	BRSA
dom_interest_dif.	Commercial loan interest rate – up to 3 months time deposits (local currency)	CBRT
port_flow (debt)	Portfolio Investment, Net incurrence of liability: Debt securities (%yoy)	CBRT
port_flow (equity)	Portfolio Investment, Net incurrence of liability: Equity securities (%yoy)	CBRT
FDI	Foreign direct investment (%yoy)	CBRT
deposit	Foreign exchange deposit account (%yoy)	CBRT
stockprice	Stock price index (%yoy)	CBRT
budget_balance	General budget balance %yoy	Treasury
Reer	Real effective exchange rate(deviation from the trend)	CBRT
shortdebt_reserves	Short-term debt / reserves	CBRT
curaccount	Current account / GDP	CBRT
inflation	Consumer prices index (%yoy)	CBRT
indproduct	Industrial production index (%yoy)	CBRT
m2_reserves growth	M2 / reserves growth rate (%yoy)	CBRT
domcredit	domestic credit growth (banking system) (%yoy)	CBRT
m1	M1growth rate (%yoy)	CBRT
export	Export growth rate (%yoy)	CBRT
Tradebalance	Trade balance (% GDP)	CBRT
import_reserves	Import / reserves	CBRT
houseprice	Residential property price index (%yoy)	CBRT
unemployment	Unemployment (%yoy)	CBRT
realconfidence	Real sector confidence index (%yoy)	CBRT
non_financialfx	Net foreign exchange position of non-financial companies (%yoy)	CBRT
pmi _tr	Purchasing manager index (Turkey)	ICI
Tryieldcurve	10 year government bond – 2 year government bond	Bloomberg
msci ETF_tr	iShares MSCI Turkey ETF	Bloomberg
oilprice	Global price of brent crude (%yoy)	FRED
interest_ diff	The differential between domestic (Tr) and foreign (Us) policy interest rate	CBRT, FRED
pmi_euro	Purchasing manager index (Euro zone)	Bloomberg
vix	CBOE Volatility index	Bloomberg
dxy	U.S.Dollar index	Bloomberg
cci	Consumer confidence index (%yoy)	TURKSTAT
tourism income	Total travel incomes (%yoy)	CBRT
cds	Credit default swap (CDS)	Bloomberg
tr10Y_us10Y	The differential between domestic and foreign 10 year treasury rate	Bloomberg
us 10Year	10 year treasury constant maturity rate	Bloomberg
Usyieldcurve	10 year treasury constant maturity – 3 month treasury constant maturity	FRED

Note: Banking Regulation and Supervision Agency (BRSA); Ministry of Treasury and Finance (Treasury); The Istanbul Chamber of Industry (ICI); Turkish Statistical Institute (TURKSTAT); Central Bank of the Republic of Turkey (CBRT).

Table A2: Results of Bayesian Model Averaging (standardized coefficients)

	PIP	Post Mean	Post SD	Cond.Pos.Sign
TRyieldcurve	0.99966800	0.9304313437	0.19259927	1.00000000
domcredit	0.70267350	0.3408082081	0.28964174	0.99492154
tr10Y_us10Y	0.69592650	0.4370787893	0.36066961	0.99936056
port_flow (debt)	0.69312550	-0.1946367755	0.15795321	0.00005302
realconfidence	0.44957575	-0.2198905229	0.29803596	0.00079909
export	0.32625700	-0.0668360954	0.11949813	0.00447117
Reer	0.28922075	-0.1055866246	0.21131686	0.00434616
m2_reserves growth	0.27636350	0.0697488243	0.14318051	0.97855180
interest_ diff	0.25997850	0.1373357113	0.30819147	0.97760488
curaccount	0.25284800	-0.0657911657	0.14903869	0.00829550
vix	0.22472950	-0.0422891896	0.10403210	0.01332380
deposit	0.21893250	0.0440326003	0.17047046	0.79744784
houseprice	0.19951800	-0.0610437265	0.18968799	0.08626540
m1	0.19090500	0.0294966571	0.12011714	0.77895812
import_reserves	0.18471050	0.0286824438	0.09613811	0.89038793
pmi_euro	0.18090475	0.0414446697	0.17180130	0.84032343
non_financialfx	0.17445900	0.0405637027	0.17853614	0.80537834
cds	0.17320625	0.0370339790	0.20815989	0.74419370
shortdebt_reserves	0.17134075	0.0328350189	0.17690230	0.80259220
cci	0.16570550	-0.0328026462	0.11875382	0.09451708
stockprice	0.16073700	-0.0310853628	0.13465724	0.18954410
indproduct	0.15739250	-0.0143297053	0.07437410	0.21786140
LCR	0.15713500	-0.0216157640	0.08182975	0.09115569
dom_interest_dif.	0.15151125	0.0150953583	0.09991416	0.75330215
us 10Year	0.14495200	-0.0102480906	0.13365614	0.42201384
Usyieldcurve	0.14285825	-0.0157077082	0.15820519	0.35813297
tradebalance	0.13968475	-0.0078966603	0.09631213	0.26967511
oilprice	0.13592950	0.0154206095	0.09117638	0.78400752
tourism income	0.13572300	0.0094856289	0.10355832	0.62913250
msci ETF_tr	0.13335575	0.0121314337	0.17032175	0.60400283
pmi _tr	0.13313450	-0.0008926356	0.09891532	0.47577074
NPLs	0.13030675	0.0063499266	0.07119872	0.63512443
inflation	0.12456225	-0.0124621481	0.13478413	0.34705940
dxy	0.11949350	0.0009384044	0.06624973	0.50427848
unemployment	0.11790625	0.0063827892	0.07854420	0.63925576
FDI	0.11632350	0.0026098959	0.03656932	0.66205238
port_flow (equity)	0.11619600	-0.0028106725	0.04294729	0.40957305
budget_balance	0.09922525	-0.0005648526	0.02829499	0.41868375

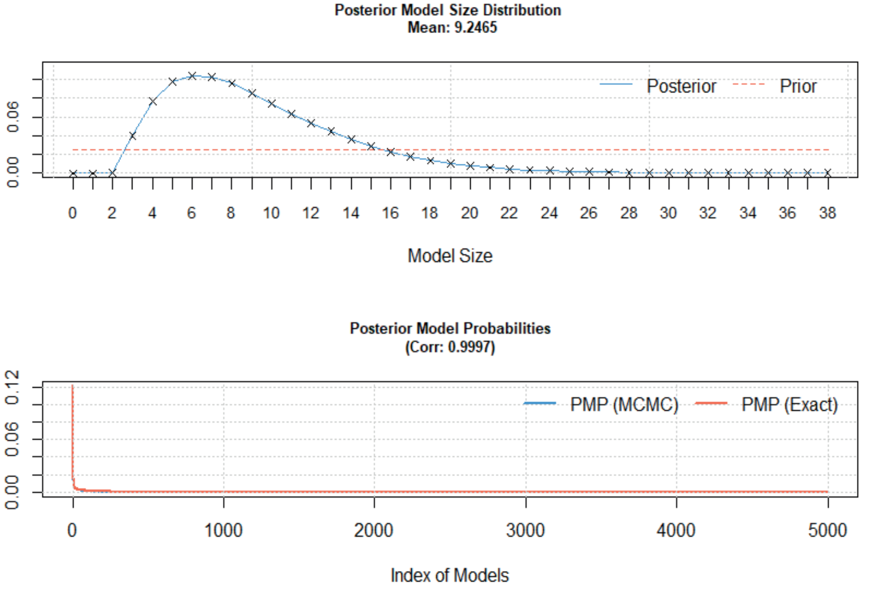

Figure A1: The correlation between analytical and MCMC PMPs for the 5000 best models is 0.99, thus indicating a perfect convergence.