Forecasting Fiscal Revenues in a Transition Country: The Case of Croatia

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Abstract: In this paper we asses the ability of alternative time series models to produce accurate fiscal revenue forecasts in a transition country and compare them to official forecast. We take on a disaggregated approach and estimate separate models for seven revenue sources. Alternative time series models – trend model, random walk, ARIMA, regression and error correction models – are specified using quarterly data. One - and two - year ahead forecasts are calculated and compared against actual values and official forecasts. Results suggest that despite impediments, econometric methods produce forecasts that are in general more accurate than official forecasts prepared using expert judgment.

Keywords: forecasting, fiscal revenues, time series, transition

JEL Classification: C22, E62, H2, P35

Introduction

In order to manage the public sector revenues, the policy makers need to develop and execute budgetary plans. The requirements regarding sound budgetary procedures as well as responsible fiscal governance pose severe challenges in transition economies. Retaining fiscal discipline requires cautiousness both in the planning and execution phase of the budgetary process. Developing budgetary plans in turn requires having the insight into the interplay between macroeconomic variables' dynamics and fiscal policy measures on the one side, and the interdependency of public sector revenues and expenditures on the other. Therefore, policy makers can benefit from unbiased and as accurate as possible forecasts of macroeconomic aggregates, budgetary revenues and expenditures in order not just to develop the budgetary plans, but also to

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successfully implement the desired fiscal policy measures in timely and effective manner.

In EU member states, the interest for the public sector revenues' and expenditures' forecasting increased with the emergence of the fiscal policy rules embedded in the Treaty on European Union (European Commission, 1992), and clarified in the Stability and Growth Pact. This framework allows EU countries to use fiscal policy for stabilization purposes, but only up to a point, since the upper limit for budgetary deficits is set to 3 percent of GDP. Restraining from extensive budget deficits has become even more significant during the recent crisis experience. In order to ensure the fiscal stance monitoring within the guidelines, all EU member states have to submit on a regular basis their programs to Economic and Financial Affairs Council which entail forecasts of main macroeconomic variables, as well as forecasts of main budgetary items for next three years. Despite the increasing interest in forecasting practices, there is no agreement on the most appropriate method, even though authors like Jonung and Larch (2006) suggested the existence of a forecast bias associated with the budgetary process of several large euro area countries could have contributed to their increased fiscal deficits.

Fiscal forecasting is equally important in European transition countries, in part due to the fact that most of them have experienced episodes of increased fiscal instabilities. All transition countries are faced with the same set of impediments to fiscal forecasting: rapidly changing structure of the economy and relatively underdeveloped data sources leading to the shortness of available time series. In addition, the overall requirements for documented public officials' accountability regarding fiscal revenues management are insufficient to create the demand for assessing the long-term impacts of policy measures. Given these impediments, one can not overstate the importance of questioning the current fiscal forecasting practices and exploring the alternative solutions for these countries. However, the literature on fiscal forecasting practices for transition economies is relatively scarce. Therefore the aim of this paper is to take a closer look at possibilities for applying different methods of the fiscal forecasting in Croatia. We fill the gap in the existing literature by providing detailed evidence on possibilities for applying econometric methods in contrast to the judgment forecasting approach dominating the transition countries' practice.

We compare time series forecasts of fiscal revenues to official forecasts which are obtained mostly by using expert judgment, in order to determine whether the policy makers would profit from adopting a formal forecasting approach. Another contribution to the literature is entailed in our estimation strategy. It somewhat differs from the approaches frequently found in the literature, i.e. studies either forecast revenues from just one revenue source (Nazmi and Leuthold, 1988; Fullerton, 1989; Grizzle and Klay, 1994; Kong, 2007), or they concentrate on highly aggregated fiscal variables like the deficit, total revenues or expenditures (Baguestani and McNown, 1992; Pike and Savage, 1998, Marcellino and Favero, 2005). Due to the fact that in a

transition economy, there are significant changes in the tax system even during relative short time spans, we take on a dissagregated approach and look at various types of fiscal revenues separately. Namely, we test how well linear trend model, random walk model, ARIMA model, regression and error correction model forecast each of the following fiscal revenues: revenue from income tax, corporation tax, value added tax, property tax, import duties, excises, their seven components, and social contributions and their three components.

Our results suggest that the limitations related to data quality and availability should not discourage the policy makers in transition countries from adopting more formal forecasting practices. Moreover, our forecasting exercise suggests that the policy makers would even profit from adopting simple time series methods since even linear trend model or random walk on average outperform official fiscal revenues forecast. We also show that in Croatian case, the benefits of aggregating the forecasts of component revenues are very limited.

The rest of the paper is divided in four sections. In the next section we review the literature on fiscal forecasting in developed countries. Then we describe the current fiscal forecasting practice in Croatia. The following section encompasses brief explanation of the data and methods used in the analysis and it presents the results of the empirical exercise. The remaining section summarizes main findings and discusses policy implications.

Searching for the Most Adequate Fiscal Forecasting Method

Cost-benefit analysis of applying advanced versus simple econometric methods for fiscal variables short-run forecasting does not always rule in favor of advanced models. For example, Beckett-Camarata (2006), Bretschneider et al (1989) and Grizzle and Klay (1994) suggest that the combination of expert judgment and simple time series models yields better results in terms of forecasting accuracy when compared to more complex time series models. When considered that complex models are relatively costly not only in terms of data requirements, but also regarding time required for obtaining plausible forecasts and the need for frequent forecast updating, the relative reluctance for their implementation is understandable.

For example, Bretschneider et al (1989) question institutional, political and methodological factors that affect the accuracy of fiscal forecasts. Comparing the judgmental approach with simple and more complex time series methods, the authors conclude that expert judgment and simple regression models result in more accurate fiscal forecasts. Similar reasoning can be found in Grizzle and Klay (1994), who compare official forecasts of sales taxes in 28 states of USA, with forecasts calculated using seven simpler time series methods. They conclude that official forecasters provide more accurate sales tax forecasts than time series models, implying thereby

that the cost of econometric methods outweigh the benefits. However, the authors also show that if one combines official with time series forecasts, the forecasting accuracy increases.

Beckett-Camarata (2006) analyses the accuracy of forecasts of a county and a city in Ohio, USA, where the former uses judgmental approach, while the latter relies on variety of methods including econometric forecasting procedures. The author concludes that in general the accuracy of forecasting procedures varies by the level of revenue aggregation and the source of the revenue, suggesting that in some cases it makes sense to use expert judgment. However, the author finds that on average formal forecasting procedures are more accurate when compared to judgment approach.

Another strand of the empirical literature investigates the usefulness of adopting more complex models for forecasting fiscal variables. It rests on the underlying assumption that formal approaches to fiscal forecasting clearly outperform informal, judgmental approaches, with more complex formal approaches being in most cases more suitable for forecasting than simple approaches (Baguestani and Mc-Nown (1992), Marcellino and Favero (2005), Nazmi and Leuthold (1988), Fullerton (1989), Kong (2007), Pike and Savage (1998), Sentence et al (1998), Giles and Hall (1998)). Although different authors advocate different estimation methods, they all agree that the application of econometric techniques results in more accurate and less biased fiscal revenues forecasts.

These authors test the usefulness of the following time series methods for fiscal forecasting:

- ARIMA models (Baguestani and McNown (1992), Marcellino and Favero (2005), Nazmi and Leuthold (1988), Fullerton (1989)),
- VAR (Baguestani and McNown (1992), Marcellino and Favero (2005)),
- trend models (Kong (2007)),
- random walk model (Marcellino and Favero (2005)),
- regression models (Nazmi and Leuthold (1988), Fullerton (1989), Kong (2007)),
- error correction models (Baguestani and McNown (1992)),
- (semi-)structural macroeconomic models (Marcellino and Favero (2005), Pike and Savage (1998), Sentence et al (1998), Giles and Hall (1998)).

The comparisons of the forecasting performance of different methods frequently find that ARIMA outperforms other models (Marcellino and Favero (2005), Nazmi and Leuthold (1988)), at least in the short run. Although, Fullerton (1989) compares ARIMA and regression models and rules out in favor of the latter. Therefore, there seem to be no clear guidelines from the literature as to which econometric method provides the most accurate fiscal variables forecasts, but rather each forecasting case should be considered separately.

The advantage of the structural modeling should also be considered, as it can track down the effects of fiscal policy changes on the economic activity. Moreover,

these models ensure the consistency between basic macroeconomic and fiscal variables. They are, however, rarely considered as optimal from the standpoint of the budget planner, as the potential increase in the forecast accuracy (or insight into the variables' dependency within the economic system) does not justify the increased costs. Moreover, structural modeling is considered less useful if policymakers need detailed fiscal revenue forecasts.

All the above mentioned papers refer to the fiscal forecasting practice in developed economies, while the information on fiscal forecasting experiences in transition economies is generally not available. The insight into the current practice in Croatia, briefly presented in the next section, provides part of the explanation for this literature gap.

Fiscal Forecasting in Croatia

In Croatia, the responsibility for planning and executing the budget, as well as implementing the fiscal policy, lies within the Ministry of Finance. In that regard, Croatia is not different from EU member states in which the Ministry of Finance or the Treasury is responsible for the budget. The Croatian Ministry of Finance prepares its own forecasts for the main macroeconomic and fiscal variables. OECD (2008) shows that this is also the case in sixteen EU member states. The forecasts prepared by the Ministry are not subject to any kind of external independent review, which is not that surprising given the fact that an independent review is not present in half of the EU member states. However, unlike 18 EU member states which have long-run forecasts of fiscal revenues and expenditures, Croatian Ministry of Finance does not engage in long-run fiscal forecasting at the moment.

The current practice of the Ministry is to prepare medium-run forecast of fiscal revenues and expenditures, i.e. forecasts are provided for the upcoming three years. Along with fiscal forecasts, the Ministry also publishes forecasts for key macroeconomic variables for the three years forecasting horizon. So far, the Ministry has not relied on econometric methods in order to forecast neither main macroeconomic variables, nor fiscal variables. In most of the cases, the forecasts of fiscal variables are based on the combination of expert judgment, simple extrapolation methods and forecasts of macroeconomic variables. The revision of forecast is not systematic, bur rather related either to the next budget planning cycle or the requirements of the EU accession process.

Having in mind the current forecasting practice we have investigated, rather extensively, the possibilities of supplementing the expert judgment method with more formal forecasting techniques. Existing research on forecasting practice in Croatia implies that the Ministry could thereby improve the accuracy of its forecasts. Namely, Švaljek (2009) concluded that in Croatia the revenues in the original budget passed

for the fiscal year are on average underestimated, while they are overestimated in the budget revision process. Moreover, the comparison of fiscal forecasts made during an election year with forecasts prepared in years with no elections shows that in face of upcoming election the Ministry is less prone to underestimate fiscal revenues and is also more inclined to underestimate fiscal expenditures. This finding implies that official fiscal forecasts contain a political cycle bias, which could be removed if official forecasters were to use formal, instead of informal, forecasting approach.

In addition to analyzing different estimation methods for forecasting fiscal variables in Croatia, we have also adopted a disaggregated approach. Namely, we opted to model each fiscal variable separately. The main reason behind this approach is that, similar to the situation in many other transition economies, changes in fiscal system are constantly being introduced.[1] Therefore, in order to be able to better incorporate these changes in our estimation models, we have disaggregated the overall fiscal revenues. The methodology, as well as final results, is concisely presented in the next section.

Data, Methodology and Results

We focus our empirical analysis on the following fiscal revenues: value added tax, income tax, corporation tax, property tax, excises, social contributions and import duties. It is worth noting that in Croatia the two most important sources of revenues are the value added tax and social contributions each accounting for approximately 35 percent of total budget revenues. The shares of excises and corporation tax in total budget revenues are 11 and 7.7 percent respectively. These four revenue sources account for almost 90 percent of total budget revenues. The share of import duties is constantly decreasing as the result of trade liberalization due to Stability and Growth Pact.[2] It also has to be noted that for income tax, corporation tax and property tax we have used the data on consolidated general government. The reason is that these revenues were significantly affected by the fiscal decentralization process that formally started to be implemented in Croatia during the year 2001. Therefore, neither central government budget data, nor local government data could provide adequate time series for the whole analyzed period.

All revenue sources are displayed on Figure 1. As one can note, there is a clear positive trend in all revenue sources except import duties. VAT and corporation tax

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[1] For example, in the third quarter of 2009 the Government introduced two new revenue sources in order to bridge the increasing gap between revenues and expenditures: an excise on mobile phone services and a so called „crisis tax", which is in effect an income tax levied on a net wage.

[2] Fiscal revenues data can be downloaded from the Croatian Ministry of Finance web site http://www.mfin.hr/en/time-series-data.

exhibited a decline in 1999, associated with a short recession Croatia recorded during the year.

In addition to series presented in Figure 1, we were also able to obtain disaggregated data for excises and social contributions. Specifically, the overall excises consist of excised levied on cars and other types of vehicles, oil and oil derivatives, alcohol, beer, non-alcoholic beverages, tobacco, coffee and luxurious items. The social contributions data comprise of contributions for the compulsory health insurance, contributions for compulsory pension funds and contributions for unemployment insurance.

Figure 1. Fiscal revenues developments
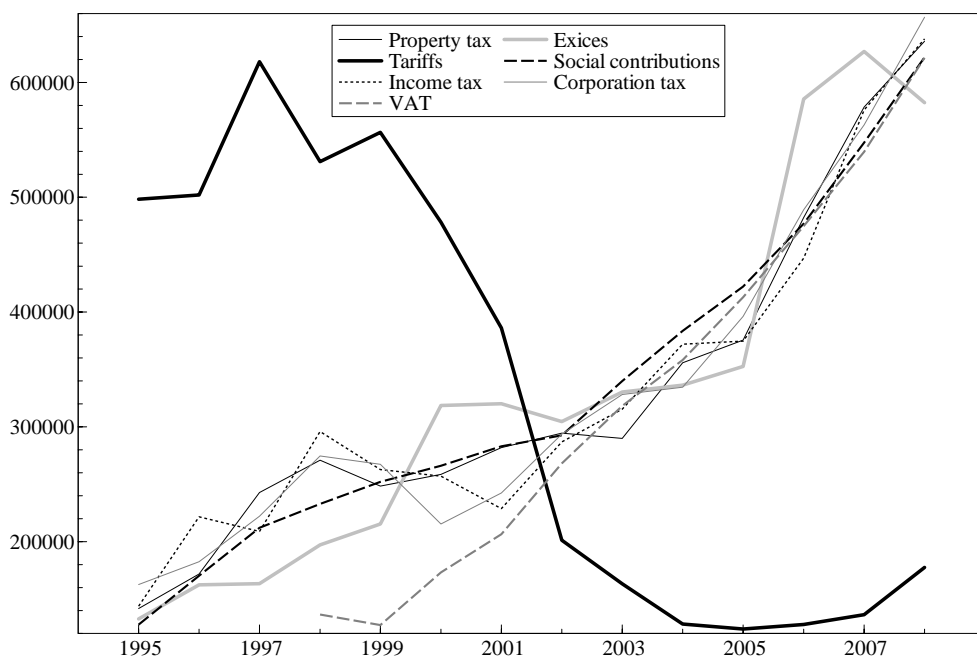
Note: Series are mean adjusted in order to be displayed on the same figure.

Source: Ministry of Finance of the Republic of Croatia.

Apart from VAT which was introduced in the beginning of 1998, the data for all other series range from the first quarter of 1995 to the fourth quarter of 2008. Our dataset includes several macroeconomic series that are used in regression and error correction models. More specifically, GDP series is used for modelling VAT, income tax and corporation tax; personal consumption is used for modelling VAT and excises; total import of goods is used for import duties; average gross wage and total

wage bill are used for the income tax and social contributions, while housing loans series is used for the property tax. All series were available with quarterly frequency or monthly, which was transformed into quarterly by the authors. The data source for the fiscal series is the Ministry of Finance of the Republic of Croatia. Data source for housing loans is Croatian National Bank, while the source for all other non-fiscal series is Central Bureau of Statistics. Series are not seasonally adjusted, but instead seasonal dummies are used in all models in order to control for seasonal oscillations.

Models Used for Forecasting

Following the methods most frequently applied in the literature, we consider in our empirical exercise linear trend model, random walk model, ARIMA, regression or error correction model. It is worth noting that besides seasonal dummies, in most of the cases dummies for various types of structural breaks were also included in most models. The breaks are mostly controlling for the changes introduced into Croatian tax system over the years.[3]

Linear trend model and random walk model are estimated for seven aggregated revenues series and also for components of excises and social contribution. ARIMA model, regression and error correction model were not estimated for components of excises and social contribution either due to the lack of reliable proxies for tax bases of the components or due to unsatisfactory diagnostic tests. The forecasts of excises and social contribution components obtained from trend model and random walk model are aggregated in order to verify whether aggregating the forecasts increases their accuracy. The data transformation was used in order to obtain the best possible fit and diagnostic tests of the different methods applied. The linear trend model was estimated using original quarterly series in levels, while the random walk model was applied to the annualized data in first differences.

ARIMA model (i.e. Box-Jenkins procedure) was applied on fiscal series in annual growth rates, due to the fact that previously performed ADF unit root test indicated annual growth rates series are stationary. All revenue sources, except property tax, contain only AR component. VAT, income tax and excises are AR(2), while corporation tax, social contributions and import duties are AR(1). Property tax is MA(1). All models satisfy diagnostic tests, i.e. their residuals are white noise.

Regression is applied on log-differenced quarterly series in case when a fiscal revenue variable and its macroeconomic base are not cointegrated. Due to the fact that there is no prior experience in forecasting fiscal variables in Croatia, whenever

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[3] Detailed description of the structural break dummies, as well as unit root tests, cointegration tests and estimation results for all models used for forecasting can be obtained upon the request from the authors.

the data sources permitted, several macroeconomic variables were used as possible tax bases. However, the data limitations restricted the choice of macroeconomic variables to GDP, personal consumption, total imports of goods (corrected for the EU share in order to capture the effect of trade liberalization), average gross wage, total wage bill and housing loans.

Since in two models for VAT (one that uses GDP as a tax base and another that employs personal consumption for the same purpose), property tax model and in a model for import duties which uses total imports of goods as a base performed tests did not provide evidence of cointegration, these four models are estimated as a bivariate regression model. In all other cases a cointegrating vector is found, which in turn enabled specification and estimation of an error correction model.

Whenever the data availability permitted, models were estimated using full dataset ranging from 1q1995 to 4q2006. In cases when the fiscal variable was not available at the beginning of period (for instance VAT, which was introduced in 1998) or when the data for macroeconomic base was not available, the estimation period was shortened, but all the estimates were estimated for a period up to 2006. The estimates are then used in order to calculate one- and two-year ahead forecast of fiscal revenues. The results are presented in the next section.

Forecasting results

In order to obtain one and two years ahead forecasts of fiscal revenues (years 2007 and 2008), we use the forecasts of macroeconomic variables prepared by the Ministry of Finance that were available at the end of 2006. Since our regression and error correction models are estimated using quarterly data and the Ministry of Finance forecasts only annual data, we have assumed that even though the Ministry does not have perfect foresight regarding the annual data, they are able to perfectly predict the quarterly dynamics. In other words, our assumption of the quarterly dynamics is based on the official data published in the meantime. For the variables the Ministry of Finance does not publish forecasts (housing loans, average gross wage, total wage bill), we have used the official statistics data.

Prior to forecasting, all models were pre-tested for the usual sets of misspecification errors (normality, heteroscedasticity, serial correlation, stability, etc.). During the testing, some models were discarded. Only those models that gave satisfactory results in the testing procedures are included in the forecasting exercise. In order to compare the forecasting accuracy of models, we calculate two relative measures of forecasting accuracy: Thiels U and mean absolute percent error (MAPE), which compare the forecasts to the actual values of fiscal revenues. For social contributions and excises, the components forecasts are aggregated in order to verify whether aggregating the forecasts increases their accuracy. The measures are displayed in Table 1.

Table 1. Relative measures of forecasting accuracy of the models

Fiscal revenue	Econometric method	One year ahead (2007)		Two years ahead (2008)	
		MAPE	THIEL U	MAPE	THIEL U
VAT	Trend model	4.333	0.023	8.950	0.049
	RW model	1.111	0.006	0.097	0.000
	ARIMA	58.285	0.259	34.999	0.170
	Regression (personal consumption)	15.749	0.085	17.744	0.097
	Regression (GDP)	14.006	0.001	15.359	0.083
Income tax	Trend model	19.296	0.075	22.700	0.135
	RW model	12.438	0.066	15.741	0.085
	ARIMA	9.020	0.050	239.111	0.394
	EC model (total wage bill)	15.843	0.086	37.985	0.234
	EC model (GDP)	32.691	0.195	49.501	0.329
Corporation tax	Trend model	18.341	0.174	27.933	0.198
	RW model	5.812	0.030	15.307	0.083
	ARIMA	25.715	0.112	16.882	0.102
	EC model (GDP)	57.907	0.407	98.915	0.978
Property tax	Trend model	24.132	0.147	27.055	0.169
	RW model	12.126	0.065	15.196	0.082
	ARIMA	6.371	0.035	87.275	0.258
	Regression (housing loans)	4.431	0.022	13.084	0.061
Social contributions	Trend model	9.804	0.053	14.353	0.078
	RW model	4.952	0.025	9.597	0.050
	ARIMA	23.099	0.133	26.787	0.155
	EC model (average gross wage)	4.369	0.022	9.544	0.050
	EC model (total wage bill)	2.689	0.014	6.613	0.034
Social contributions - aggregation	Trend model	9.169	0.049	13.445	0.072
	RW model	4.954	0.025	9.488	0.050
Import duties	Trend model	21.403	0.125	38.843	0.250
	RW model	14.590	0.079	37.477	0.231
	ARIMA	229.599	0.934	132.217	1.000
	Regression (total import of goods)	13.643	0.073	35.059	0.213
Excises	Trend model	3.327	0.022	3.850	0.025
	RW model	1.436	0.007	9.500	0.045
	ARIMA	101.276	0.315	374.770	0.956
	EC model (personal consumption)	2.491	0.013	9.491	0.045
Excises - aggregation	Trend model	3.742	0.026	4.332	0.026
	RW model	1.264	0.006	12.730	0.060

Source: calculation of the authors.

When analyzing the measures, one can notice that in general each revenue has its own preferable forecasting method. The data in the table show that random walk model on average performs much better than linear trend model and ARIMA. In case of income tax and property tax, the forecasting performance of the random walk model improves as the forecasting horizon changes from one to two years ahead.

The successfulness of random walk model can in part be explained if one takes a closer look at Figure 1. Namely, almost all revenues except excises exhibit rather steady growth rates in last couple of years including two years for which the forecasts are generated (2007 and 2008) and the last year taken into the estimation sample (2006). Thus it makes perfect sense that random walk forecasts are performing well. However one must note that if forecasting period contains a turning point in economic activity (i.e. effects of global economic crises) the results might be very different. Therefore, a battery of different methods is more useful in any forecasting exercise than relying on previous period dynamics or just one method.

Aggregating the forecasts on average does not increase forecasting accuracy. In case of aggregated social contribution forecasts, forecasting accuracy actually decreases slightly when compared to non-aggregated forecasts. Forecasting accuracy of one year ahead aggregated excises forecast is somewhat improved when compared to non-aggregated forecast of excises. However, since the improvement is almost negligible, one could conclude that the costs of producing an aggregated forecast are higher than the benefits. The fact that two years ahead non-aggregated forecast of excises is more accurate that its aggregated counterpart corroborates this conclusion.

We also compare model based forecasts to official forecasts of seven types of fiscal revenues prepared by the Ministry of Finance (2006) in year 2006 for the 2007-2009 period in order to establish whether formal forecasting methods can outperform judgmental methods used by the Ministry. It has to be noted that relative poor performance of error correction and regression models when compared to Ministry's judgment forecast is mostly related to the fact that Ministry's macroeconomic variables forecasts (which were used in order to obtain forecasted values of fiscal revenues) were significantly misaligned. For example, the Ministry projected for the year 2007 nominal GDP growth of 7.9 percent, when it actually was 9.7 percent. The Ministry forecasted the same growth in 2008, while it actually was 8.9 percent.

Table 2. Comparison of model based forecasts to official forecasts of fiscal revenues

Fiscal revenue	Econometric method	Relative to budget outturn data			
		Econometric methods		Ministry of Finance	
		2007	2008	2007	2008
VAT	Trend model	97.0	93.8	98.9	96.5
	RW model	101.1	99.9		
	ARIMA	99.9	99.3		
	Regression (personal consumption)	84.3	84.6		
	Regression (GDP)	86.0	97.3		
Income tax	Trend model	80.3	76.9	72.8	72.7
	RW model	87.6	84.3		
	ARIMA	99.2	107.7		
	EC model (total wage bill)	84.2	62.0		
	EC model (GDP)	67.3	50.5		
Corporation tax	Trend model	77.4	70.1	78.7	70.9
	RW model	94.2	84.7		
	ARIMA	70.1	69.6		
	EC model (GDP)	42.1	1.1		
Property tax	Trend model	75.3	72.2	80.5	79.1
	RW model	87.9	84.8		
	ARIMA	99.0	104.0		
	Regression (housing loans)	104.4	113.1		
Social contributions	Trend model	90.2	85.6	96.6	94.9
	RW model	95.0	90.4		
	ARIMA	97.9	95.7		
	EC model (average gross wage)	95.6	90.5		
	EC model (total wage bill)	97.3	93.4		
Social contributions - aggregation	Trend model	90.8	86.5		
	RW model	95.0	90.5		
Import duties	Trend model	79.5	61.3	93.3	78.9
	RW model	85.4	62.5		
	ARIMA	93.8	76.9		
	Regression (total import of goods)	86.4	64.9		
Excises	Trend model	97.8	99.9	99.3	109.7
	RW model	98.6	109.5		
	ARIMA	102.9	118.2		
	EC model (personal consumption)	97.7	109.8		
Excises - aggregation	Trend model	96.5	98.5		
	RW model	101.3	112.7		

Source: calculation of the authors.

What one can conclude after analyzing Table 2 is that the Ministry of Finance would benefit from adopting a more formal approach to fiscal forecasting. For some fiscal revenues, like income tax, almost all model based forecasts perform better than the official forecasts. Random walk forecasts outperform official forecasts of VAT, income tax, corporation tax and property tax. Linear trend model is more accurate when compared to official forecast in case of income tax and excises. We can therefore conclude that if the Ministry were to adopt just relatively simple econometric methods for forecasting, the accuracy of their forecast would have increased. However, as indicated by the results displayed in Table 2, incorporating ARIMA model into the forecasting practice of the Ministry, in cases of income tax, property tax and social contributions and regression (error correction) model in case of property tax would further increase the accuracy of official forecast.

When it comes to regression and error correction model, although the estimated models fitted the data rather well, the success of their application in forecasting depends also on the success in forecasting macroeconomic variables that are used as tax base variables. Since the Ministry of Finance does not use an overall macroeconomic model, the link between the macroeconomic variables and fiscal revenues variables in current forecasting practice is missing. The judgment methods used for macroeconomic forecasting on the one side and the judgment methods used for fiscal revenues forecasting on the other do not seem to be consistent in current forecasting practice in Croatia.

Concluding remarks

Forecasting fiscal variables is as much a political as it is an economic issue. This observation seems particularly relevant for transition economy, where the democratic process behind budget preparation is still elusive. It is also highly relevant for EU accession country, as the demands for transparency increases in most government actions and the requirements for coordination in specific government activities grow with the level of integration.

The aim of this paper was to show that transition countries can benefit from adopting a more formal practice of fiscal forecasting. In case of Croatia, there is a clear indication that problems encountered with the quality of available data and the presence of structural breaks should not prevent official forecasters from engaging in some kind of econometric modeling with the aim of preparing fiscal revenues forecasts. In other words, time series methods demonstrate the ability to produce relatively accurate forecasts in a challenging environment.

Although the choice of the time series method is subjected to academic debate and it also depends in many cases on ratio of costs and benefits of the overall forecasting process (for the Government officials the cost benefit ratio might seem prohibitively high), we show that even rather simple econometric methods such as random walk model or

linear trend model in some cases outperform official forecasts. This suggests that official forecasters would benefit from implementing even a relatively simple forecasting framework. However, since the results of our exercise suggest that forecasting accuracy increases with the complexity of the method, adopting ARIMA model, error correction or regression model would probably be worth the effort. In that context, it could be argued that even developing a full-fledged macroeconomic model might give Government officials more information on the most likely future direction of the economy.

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