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Fiscal Marksmanship in Pakistan: With Special Focus on Province Khyber Pakhtunkhwa

Tariq Khan[1], Anwar Hussain[2] and Zalakat Khan Malik[3]

Abstract

The present study aims to analyze the state of fiscal marksmanship in using annual time series secondary data. The findings revealed that the budgetary forecast in Pakistan at the federal level and provincial level in Khyber Pakhtunkhwa was inefficient and also the main component of errors was random. The budgetary forecast was not based on the rational expectation hypothesis and the budgetary efficiency deteriorated overtime at both federal and provincial level i.e. Khyber Pakhtunkhwa. Based on the study, it is recommended that the government should be realistic and must avoid under/over-estimation of budgets to achieve fiscal targets.

Keywords: Marksmanship, Budgetary Errors, Revenues, Expenditures, Rational Expectation Hypothesis, Budgetary Efficiency.
JEL Classification: H72, H71, E62, O23, H27.

1. Introduction

Efficient budget forecasting is an essential component of financial planning and execution for federal as well as for provincial governments as governments have to make their policies based on revenue and expenditure. If the budget estimation is forecasted efficiently, then it ensures to achieve the targets and objectives set by the respective governments and planning bodies. Budgeting mainly projects expenditures and revenues of the country using available information (Phiri 2016; Wikipedia 2012). Rational expectations are generally used for the efficient forecast.

[1] Ph. D. Scholar, Federal Urdu University of Arts, Science and Technology Islamabad, Pakistan. Email: tariqslz41@yahoo.com
[2] Associate Professor, Department of Economics and Development Studies, University of Swat, Pakistan. Email: anwar@uswat.edu.pk
[3] Professor, Department of Economics, University of Peshawar, Peshawar, Pakistan. Email: zilakat@uop.edu.pk (Corresponding Author)

The budgetary process varies across countries. In Pakistan, both federal and provincial governments intimate institutions and departments to prepare their budget, which is compiled after having gone through many layers of the official procedure before final acceptance. In the budgeting process, the governments consult their departments to report their estimates for the next fiscal year. However, there is always possibility of failure of over and underestimating the revenues and expenditures. This failure in planning and implementation in budgeting is termed as a failure in Fiscal Marksmanship. But most of the time, the proposed/estimated budget seem far away from the reality or actual allocations. Sometimes the political race makes these statistics over estimated causing errors in the budgetary forecasts. However, the researchers classified the budgetary errors into two groups namely exogenous and endogenous factors (Allan 1965; Zakaria and Ali 2010). Exogenous factors cover the use of wrong and imprecise parameters, while exogenous factors are beyond the control of the government.

There is also debate on making budget estimates and techniques used for these estimations (Buettner and Kauder 2010; Jena 2006). Some preferred judgments (Grizzle 1986; Klay 1985) in forecasting the budget items, while some others prefer to use econometric models (Botrić and Vizek 2012; Mosley 1985). Cepparulo et al. (2011) proposed to plan and control the public expenditures carefully. For the analysis, mainly the researchers used Theil's inequality coefficients while analyzing the fiscal marksmanship (Auld 1970; Bağdigen 2005; Bhattacharya and Kumari 1988; Chakrabarty and Varghese 1982; Chakraborty and Sinha 2008; Zakaria and Ali 2010). To forecast fiscal variables, Favero and Marcellino (2005) evaluated different econometric techniques such as ARMA, VAR and simultaneous equation models. Marshall (1966) and Voorhees (2000) pointed out that the forecast is affected by political, institutional and economic factors. For the accuracy of the budget, the period also matters. Forecasts revised either on a biannual, annual, or quarterly basis were more accurate than forecasts revised on a monthly or bimonthly basis (Mocan and Azad 1995). There may be chances of biases also in budget forecasting. Danninger (2005) stated that overestimate forecasted revenue is due to the government's attempt to increase unseen revenue collection. Mühleisen et al. (2005) observed that volatile macroeconomic atmosphere, as well as institutional issues, also matter while forecasting the budget. Uncertainty in budgets is another issue highlighted by researchers which can affect the budget forecasts (Crippen 2003; Penner 2001).

Khyber Pakhtunkhwa province in Pakistan is also facing over and underestimation of budgetary forecasts due to various factors including the war on terror, floods, and earthquakes which ultimately affect the resource distribution patterns. However, no study focused on such fiscal marksmanships. This study will bridge this gap. The study is looking to analyze errors in forecasting the budgets, its partition, validity of rational expectation hypothesis and state of forecasting budget efficiency over time for Pakistan as well as the Khyber Pakhtunkhwa province.

2. Theoretical Background

A forecast is defined as a statement regarding the unknown, in particular future, or events. The statement may be made by a person, group of experts or by an organization. The author of the statement is called forecaster. How good or how bad a set of predictions is; this evaluation is essential in many forecasting problems of applied economics. Therefore, in this study, we evaluated the budgetary forecast whether it has been predicted correctly or not. The idea can best be expressed in Figure 1 with the predicted changes measure along one axis and the actual changes along the other axis. In Fig 1, the upward sloping straight line with an angle of 45 degrees through the origin shows the line of perfect forecasts. So, any point on this line means perfect prediction and those points which do not lie on this line represent a non-zero prediction error and points below the perfect forecast means *under-estimation of change* and vice versa. So, this line has a very prominent role in the evaluation of the forecasts.

This study estimates the budgetary forecasting errors of Khyber Pakhtunkhwa. To evaluate these errors, we used different established statistical measures and Theil's Inequality Statistics (Us). to the statistical measures mainly estimate the difference between actual and forecasted values. Similarly, Theil's inequality coefficients (Us) provides a comparison of the estimated and observed values. If the value of Theil's inequality turns out to be 0, then it shows a perfect forecast showing zero difference between actual and forecasted values. The sources of errors can also be decomposed into systematic (endogenous) and random sources (exogenous). The systematic component further forecast error due to *bias* forecast error due to *unequal variation* (Morrisopu 1986). The sum of both *systematic* and *random* sources equals *unity*.

Furthermore, the expectations may be based on the adoptive or rational expectation hypothesis. In rational expectation, the future is predicted considering the available information. The regression analysis can be used to check the unbiasedness. Similarly, to check either the efficiency of the budgetary forecast is improved or deteriorated over time, a linear time trend model has been used.

Table 1
Error in Forecasting Revenue of Federal Budget

Years	Revenue Receipts			Capital Receipts		
	Actual (In Rs. Millions)	% Error (BE)	% Error (RE)	Actual (In Rs. Millions)	% Error (BE)	% Error (RE)
1990-91	170.34	8.79	8.18	914.17	6.18	-6.75
1991-92	216.59	6.45	2.90	864.44	-16.61	-12.29
1992-93	242.62	7.58	2.98	947.00	5.94	0.94
1993-94	273.24	5.65	6.92	1071.51	1.29	2.98
1994-95	321.32	12.71	0.95	1171.12	-3.45	-0.98
1995-96	370.51	3.26	3.08	1371.44	-6.94	-3.26
1996-97	384.26	18.17	1.16	1505.84	-1.18	-1.01
1997-98	433.64	6.08	3.58	1653.07	3.50	2.08
1998-99	464.37	11.65	8.07	1888.77	1.63	2.47
1999-00	531.30	5.58	-2.24	2136.14	-14.57	0.18
2000-01	535.09	11.12	4.27	2572.58	-8.05	-1.97
2001-02	619.07	3.99	2.22	2733.45	4.38	1.16
2002-03	720.70	-6.36	-2.65	2304.84	2.35	-1.40
2003-04	794.13	-8.28	-4.17	2071.16	-5.54	-1.59
2004-05	900.04	-11.52	-2.75	3115.29	-26.33	-1.08
2005-06	1076.63	-13.86	-5.01	3228.64	3.03	-1.06
2006-07	1297.96	-16.58	-6.47	3764.30	-17.62	-0.93
2007-08	1499.38	-8.75	-6.70	3897.15	-4.66	-0.92
2008-09	1679.30	-33.85	-3.31	5603.31	-6.64	-1.23
2009-10	2051.94	-2.18	0.00	6505.99	-0.34	0.23
2010-11	2291.90	5.20	-2.44	8795.33	-19.05	-0.34

Note: BE (RE) Budget Estimates (Revised Estimates)

3. Data and Methodology

3.1 Nature of data and its Sources

This study uses annual secondary data for the period 1990-91 to 2010-11. The variables[4] used were revenue receipts (RR), capital receipts (CR), revenue expenditure (RE) and capital expenditures (CE). The secondary data was obtained from the provincial and Federal Government annual budget Statements.

3.2 Analytical Tools

The analytical tools which have been used in the present study are as under:

3.2.1 Forecast evaluation

For evaluating the forecast errors, Root Mean Square Errors (RMSEs), root mean square percent error and Theil's inequality coefficient have been used, which have been given as under:

$$RMSE = \sqrt{1/n \ \sum(P_t - A_t)^2}$$

$$RMSPE = \sqrt{1/n \sum[(P_t - A_t)/A_t]^2}$$

Where *n* is the total number of observations in the sample, A_t and P_t shows actual and predicted values. The "t" shows the period. This technique is associated with some conditions. If there is no difference between actual and predicted values then the value of RMSE will be zero. To avoid the zero values, the RMSE and absolute errors are used for the analysis.

3.2.2 Theil's (1958) inequality coefficient (U_1)

The "Theil's (1958) inequality coefficient" is also commonly denoted by (U) as:

$$U_1 = \frac{\sqrt{1/n \sum(P_t - A_t)^2}}{\sqrt{1/n \sum P_t^2} + \sqrt{1/n \sum A_t^2}}$$

[4] Revenue receipts include tax and non-tax revenues. Capital receipts include total federal internal gross receipts and loans. Revenue expenditure includes current expenditure and development expenditure on revenue account. Capital expenditure includes current expenditure and development expenditure on capital account (Zakria, 2010).

Where U_1 stands for Theil's inequality coefficient with range 0 and 1.

3.2.3 Theil's revised measure of inequality (U_2)

Alternatively, Theil (1966) revised Measure of Inequality" excluding the Pt in the denominator, expressed mathematically as:

$$U_2 = \frac{\sqrt{1/n \sum (P_t - A_t)^2}}{\sqrt{1/n \sum A_t^2}}$$

To show the magnitude of error of the following "Theil's inequality statistic" is also used in literature.

$$U_3 = \frac{\sqrt{1/n \sum [p(t) - a(t)]^2}}{\sqrt{1/n \sum [p(t)]^2} + \sqrt{1/n \sum [a(t)]^2}}$$

3.2.5 Partitioned forecast error of budgetary estimates

To decompose the total errors into random and systematic, the following equation is used. Further *Systematic sources of error* include the fraction of total forecast error due to "*Bias"* and and "*Unequal Variation"*(Morrisopu 1986).

$$\frac{(\overline{P_t} - \overline{A_t})^2}{1/n \sum (P_t - A_t)^2} + \frac{(S_p - S_a)^2}{1/n \sum (P_t - A_t)^2} + \frac{2(1-r) S_p . S_a}{1/n \sum (P_t - A_t)^2} = 1 \quad (6)$$

3.2.6 Test of rational expectation hypothesis for fiscal variables

When the forecast "P_t" predicted is an unbiased predictor of "A_t" actual, then the budget forecast is considered rational forecast. Therefore, to test unbiasedness, we estimate the regression equation:

$$A_t = \beta_0 + \beta_1 P_t + u_t$$

Where A_t and P_t stand for actual budget forecast and predicted budget forecast respectively, and β_0 is the intercept, β_1 is the coefficient of P (t) and u_t is the stochastic term.

If the intercept is 0 and the slope equals 1, then the forecast is rational. However, to check rational expectations the coefficient of correlation between forecast error and forecasted values should be 0.

The appropriate test to check rational expectations is to estimate the following regression model

$$A_t = \beta_0 + \beta_1 P_t + \beta_2 A_{(t-1)} + u_t$$

if β_0, β_2 equal to zero, β_1 equal to unity and ρ (correlation coefficient among the forecast errors E_t and predicted values P_t) is 0 Then the rational expectation holds.

3.2.7 Efficiency of budget forecasting over time

To check the improvement in the efficiency of budget forecasting over time, the following linear time trend model has been estimated:

$$W_t = \alpha_0 + \alpha_1 T_t + e_t$$

Where W_t is equal to100 (E_t/A_t), E_t is different P_t and A_t, "T_t" is linear time trend in year t, α_0 is the intercept, a_1 is coefficient of "T_t" and e_t is disturbance term. It is also based on some condition that is if $a_1$is less than zero (as $\alpha_1<0$) showing that the efficiency of the Budget forecasting improved overtime. And If a_1 is greater than zero (as $\alpha_1>0$) it means deterioration in budget forecasting efficiency over time.

4. Results and Discussion

4.1 Errors in Forecasting Revenue and Expenditure in Federal Budget

Federal budget estimates of revenue receipts were mostly over predicted during 1990-2001 and under predicted onward from 2002-2009 except 2010-11, (Table 1). Similarly, revised budget estimates of revenue receipts were over predicted during 1990-1998 and 2000-2001, while the rest of the period is under predicted. The federal government had set high targets to collect revenue, which was impossible for the Federal Board of Revenue (FBR) to amass the targeted revenue due to shortfall in income tax (Rs 633,000in

Millions), excise duties (Rs 153,600 in Millions) and import duties (Rs 180,800 in Millions) (Government of Pakistan 2011). This shortfall in revenue was mostly due to the worsening condition of the industrial sector, changing composition of import duty, unavailability of foreign assistance, the world price of imported goods, which affected revenues from custom duties; all these factors were not easy to predict. These underestimations in revenue receipts were due to uncertainty in foreign aid for the fight against terrorism.

Table 2
Errors in Forecasting Expenditure of Federal Budget

Years	Revenue Expenditure			Capital Expenditure		
	Actual (In Rs. Millions)	% Error (BE)	% Error (RE)	Actual (In Rs. Millions)	% Error (BE)	% Error (RE)
1990-91	189.28	-2.01	-2.77	70.86	-22.30	-15.52
1991-92	211.69	-3.87	0.64	114.40	-20.79	-11.19
1992-93	248.54	-5.70	0.31	86.14	9.21	-2.29
1993-94	268.03	1.65	6.72	96.30	-7.66	3.22
1994-95	315.71	0.14	0.48	106.05	2.14	0.74
1995-96	382.67	-4.76	-0.79	124.20	-7.29	-10.89
1996-97	414.45	1.20	0.27	135.38	2.36	-0.58
1997-98	466.50	2.24	0.80	125.90	0.56	3.20
1998-99	529.03	-2.47	-6.58	156.98	2.50	-4.64
1999-00	604.37	-8.35	-3.19	137.07	10.53	10.70
2000-01	612.68	-1.41	-1.79	95.38	-5.31	0.79
2001-02	694.45	-4.58	0.47	254.28	-31.78	1.94
2002-03	705.84	-8.29	0.47	155.41	-21.85	-2.19
2003-04	769.70	-8.47	0.45	122.99	0.21	1.92
2004-05	833.82	-5.71	0.43	150.65	-18.93	-1.08
2005-06	1068.50	-10.05	0.35	123.01	7.76	0.92
2006-07	1230.28	-9.29	0.31	131.11	5.12	-0.59
2007-08	1767.56	-23.42	0.23	148.59	4.56	0.36
2008-09	1887.10	-6.73	8.77	214.25	-3.72	-8.41
2009-10	2333.70	-7.17	0.00	243.34	5.68	-0.01
2010-11	2534.63	-8.87	-1.42	205.21	-8.54	-12.51

Note: BE (RE) Budget Estimates (Revised Estimates)

Similarly, revenues deficit in areas that were affected by the earthquake in the year 2005 and affected by floods in the year 2010 caused revenue underestimation. While on the other side in the years 1992-1993, 1997-1998, 2001-2002 and 2005 of budget estimate and 1992-1993, 1998-1999 and 2009 of revised budget estimate errors in capital receipts were under-predicted during the entire sampled period. These errors in capital receipts were due to the wrong prediction about foreign aid (Rs 103 in Million) and grants (Rs 99,686 in Millions)(Government of Pakistan 2011).

Table 2 shows that budget estimates in 1993-1994, 1996-1997 and revised estimates in 1991-1994, 1996-1997 and 2001-2009 of revenue expenditure were over predicted while the rest of the estimates of the sampled period were under predicted. Budget estimates of revenue expenditure during 2007-08 were grossly underestimated, it is because of less expected expenditure on rehabilitation and reconstruction earthquake (Rs 8394. in Millions) (Government of Pakistan 2011).

Similarly, error in budget estimates and revised budget estimates of capital expenditure also showed a mixed trend during the 1990-91 and 2010-11. So, the errors of capital expenditure were primarily due to errors in estimating loans and advances.

Hence, both table 1 and also table 2 shows that errors in revised budget estimates of capital receipts, revenue receipts, revenue expenditures, and capital expenditures are far smaller than the error in budget estimates. This designates that these errors are due to the formulation of the budget, which has been reduced after having revised the budget.

4.2 Forecast evaluation of federal budgeting of revenue and expenditure

Both RMSEs and RMSPEs of budget estimates of revenue and expenditure are greater as compared to revised budget estimates (Table 3). Also, the revenue expenditure and revenue receipts showed relatively fewer forecasting errors than capital expenditures and capital receipts throughout the sample period. However, RMSE of budget estimate and revised budget estimate of revenue expenditure is greater than the RMSE of budget estimate and the revised budget estimate of capital expenditure. Similarly, root means square percent errors (RMSPEs) for revised budget estimates of revenue receipts, capital

receipts, revenue expenditure, and capital expenditure are smaller than their budget estimates.

This shows that Pakistan's budget forecasts are less efficient. The results are also in line with Zakaria (2010), Even though the size of the forecasted errors is not too big, but even very minute forecasting errors in expenditure and revenue causes big error in estimates of the budget deficit.

Table 3
Root Mean Square Error for and RMSPE in Federal Budget Forecasting

Variables	RMSE (BE, Actual)	RMSPE (BE, Actual)	RMSE (RE, Actual)	RMSPE (RE, Actual)
Revenue Receipts	147.77	0.12	38.81	0.04
Capital Receipts	453.31	0.10	42.69	0.03
Revenue Expenditure	120.54	0.08	38.34	0.03
Capital Expenditure	22.38	0.13	9.25	0.07

Note: RMSE (RMSPE) is Root mean square error (Root mean square Percent error) and BE (RE) is Budget estimates (Revised estimates)

All three Theil's inequality coefficients for revised budget estimates and actual budget are smaller than those for budget estimates and actual budget (Table 4). Even the value of Theil's inequality coefficient (U_3) for budget estimates and actual budget for revenue receipts goes to 0.420, which proved our preceding finding that estimates of the budget forecast are ineffective in Pakistan.

Table 4
Theil's Inequality Statistics (Us), for Federal Budget Forecasting

Variables	Theil's U (BE, Actual)			Theil's U (RE, Actual)		
	U_1	U_2	U_3	U_1	U_2	U_3
Revenue Receipts	0.076	0.147	0.420	0.020	0.039	0.101
Capital Receipts	0.070	0.133	0.388	0.006	0.013	0.033
Revenue Expenditure	0.058	0.110	0.285	0.017	0.035	0.151
Capital Expenditure	0.076	0.149	0.315	0.031	0.061	0.115

4.3 Partitioning the error components of federal budget forecasting

As compared to budgetary forecast errors due to bias and variance, the fraction of error in the budgetary forecast due to random variation except revenue expenditure, has been considerably higher both in budget estimates and revised budget estimates. However, compared to revised estimates the importance of bias and variance proportion of errors cannot be ignored in budgetary estimates. The analysis has shown that mostly in Pakistan the budgetary forecast errors are due to random variations, which is beyond the control of government as well as the forecasting authorities. These figures are not consistent and hence no precise conclusion can be drawn from them.

Table 5
Decomposition of Errors in Federal Budget Forecasting

Variables	Budget Estimates			Revised Estimates		
	Bias	**Variance**	**Random**	**Bias**	**Variance**	**Random**
Revenue Receipts	0.071	0.098	0.878	0.121	0.411	0.511
Capital Receipts	0.193	0.343	0.504	0.220	0.003	0.815
Revenue Expenditure	0.330	0.421	0.282	0.018	0.066	0.966
Capital Expenditure	0.116	0.028	0.900	0.110	0.004	0.930

4.4 Regression Results for testing the rational expectation hypothesis for Pakistan Budget

The results given in Table 6 show that all coefficient of β_0, both budget estimate, and revised estimate are insignificant for all variables that are; revenue receipts, capital receipts, revenue expenditure, and capital expenditure. The β_1 of revenue receipts of the budget estimate is insignificant and that of the revised estimate is significant. While β_1 of all other variables that are; capital receipts, revenue expenditure, and capital expenditure are significant both of budget estimate and revised budget estimate. Capital receipts of the budget estimate are overestimated as $\beta_1<1$ while capital expenditure and revenue expenditure are underestimated as $\beta_1>1$. Similarly, revenue receipts, revenue expenditure and capital expenditure of revised budget estimate and actual are overestimated as $\beta_1<1$ and capital revenue is underestimated as $\beta_1>1$. These results explore that neither budget estimates nor revised budget estimates are the product of rational expectations of actual government expenditures and receipts. Except for the revenue receipts of both budget estimate and revised budget estimate, β_2 of all variables are insignificant. Both Revenue receipts of

budget estimates and revised budget estimates are significant and are underestimated as $\beta_2 > 0$. The high value of ρ (correlation coefficient among the forecast errors *"E_t"* and predicted values *"P_t"*) signify that the forecast error of expenditure and revenue are correlated with the respective budget estimates. Thus, the coefficients in table 6 proposed that for the fiscal variable during the sample period in Pakistan, the rational expectation hypothesis is not validated in Pakistan. It is because it does not satisfy both necessary conditions (i.e., the forecast should be an unbiased predictor of actual) and the sufficient condition (i.e., that the predicted error must be uncorrelated with the historical information).

Table 6
Regression Results for Testing Rational Expectations Hypothesis for Pakistan Budget

Variables	β_0	β_1	β_2	R^2	Adj. R^2	Durbin *h*	ρ
(Budget estimates, Actuals)							
Revenue Receipts	-12.878 (-0.733)	0.072 (0.962)	1.085 (13.523)*	0.995	0.996	-0.463	-0.203
Capital Receipts	-193.93 (-1.208)	0.909 (3.685)*	0.262 (0.917)	0.972	0.968	N.A	-0.566
Revenue Expenditure	-28.888 (-1.047)	1.268 (5.101)*	-0.153 (-0.595)	0.990	0.989	N.A	-0.741
Capital Expenditure	10.990 (0.560)	1.010 (6.954)*	-0.036 (-0.285)	0.787	0.762	1.256	0.055
(Revised estimates, Actuals)							
Revenue Receipts	-17.210 (-1.717)	0.728 (6.137)*	0.349 (2.636)*	0.998	0.998	2.793	0.650
Capital Receipts	12.463 (0.669)	1.003 (49.724)*	-0.001 (-0.043)	0.999	0.999	0.801	-0.052
Revenue Expenditure	7.012 (0.467)	0.950 (11.091)*	0.042 (0.415)	0.997	0.997	-0.710	0.278
Capital Expenditure	-2.424 (-0.307)	0.993 (19.868)*	0.043 (0.907)	0.966	0.962	0.082	0.023

Note: Values in parentheses denote underlying student-t value. The t-statistic significant at 5%, level of significant are indicated by *.

The $\mathbf{R^2}$ shows that the fit of the model is good for both budget estimates and revised budget estimates. Except for the revenue receipts of the revised budget estimate the values of Durbin *h* statistics are less than |1.96|, which shows that least square estimations are serially correlated with errors, exploring the rejection of strong rationality. It is

because when the prediction was made by the predictors, they do not take into account the available information i.e. previous forecast errors. We regard these results that the budget-making authorities implement the econometric forecasting methods very poorly, and/or the results are ignored by political decision-makers. Still, based on these results, one would have to be careful in urging the government to replace old hands with modern computers.

4.5 Regression Results for Efficiency of Federal Budgetary Forecasts

Over time, variables are not all significantly improved (Table 7). But the forecasts for revenue receipts of both budget estimates as well as revised budget estimates and revenue expenditure of budget estimates revealed that over the time these are significantly improved. But, the overall efficiency of the budgetary forecast has not been improved over time.

Table 7
Regression Results for Efficiency of Federal Budgetary Forecasts

Variables	α_0	α_1	R^2	Adj. R^2	DW
(Budget Estimates, Actuals)					
Revenue Receipts	13.305 (3.339)*	-1.307 (-3.836)*	0.436	0.407	1.515
Capital Receipts	0.183 (0.049)	-0.507 (-1.583)	0.116	0.070	2.618
Revenue Expenditure	0.099 (0.052)	-0.562 (-3.472)*	0.388	0.356	1.980
Capital Expenditure	-8.201 (-1.602)	0.356 (0.812)	0.033	-0.017	1.609
(Revised Estimates, Actuals)					
Revenue Receipts	5.845 (4.515)*	-0.544 (-4.910)*	0.559	0.536	1.808
Capital Receipts	-2.808 (-2.080)	0.163 (1.410)	0.095	0.047	1.398
Revenue Expenditure	-0.479 (-0.362)	0.068 (0.598)	0.019	0.033	1.707
Capital Expenditure	-3.534 (-1.314)	0.134 (0.582)	0.017	-0.034	1.471

Note: Values in parentheses represent *t-statistics* and is significant at 5%, the significance is designated by *.

4.6 Errors in Forecasting Revenue and Expenditure in Khyber Pakhtunkhwa Budget

Table 8 shows that the budget estimate of revenue receipts in the years (1997, 2005-2007 and 2009) and their revised budget estimate in the years (1997, 1999, 2005-2006 and 2008-2009) is underestimated, while the rest of the sample period of revenue receipts are mostly overestimated. Similarly, the budget estimates of capital receipts in the years (1991,1996,1998 and 2000-2001) and revised budget estimates in the years (1990-1991, 1994-1995 and 2001) are underestimated while the rest of the sample period of capital receipts are mostly over predicted. This overprediction of the budget points out that the government of Khyber Pakhtunkhwa had set high targets of revenue.

Table 8
Error in Forecasting Revenue and expenditures in Khyber Pakhtunkhwa Budget

Years	Revenue Receipts			Capital Receipts		
	Actual (In Rs. Millions)	% Error (Budget Estimate)	% Error (Revised Budget)	Actual (In Rs. Millions)	% Error (Budget Estimate)	% Error (Revised Budget)
1990-91	8.21	26.13	24.33	0.08	98.93	-19.37
1991-92	13.14	6.65	15.33	3.80	-13.38	-9.52
1992-93	16.02	1.77	5.99	3.00	20.39	7.01
1993-94	16.83	4.91	5.65	2.93	5.57	64.48
1994-95	19.27	7.72	10.33	3.88	3.70	-27.39
1995-96	21.61	10.89	13.93	2.99	2.64	-3.08
1996-97	26.33	3.04	4.06	4.55	-36.90	8.49
1997-98	32.56	-4.58	-0.97	5.77	36.94	13.04
1998-99	30.90	9.23	4.76	8.14	-9.19	7.63
1999-00	36.39	0.62	-0.45	6.99	11.45	3.18
2000-01	41.46	2.97	3.48	3.96	10.12	2.98
2001-02	39.54	5.41	1.99	6.79	-26.30	-1.71
2002-03	35.90	31.42	5.37	9.56	-40.54	6.80
2003-04	37.22	39.29	8.61	8.87	24.09	12.39
2004-05	39.91	17.91	5.25	13.07	11.80	6.12
2005-06	50.44	-7.94	-10.31	22.77	11.25	9.31
2006-07	66.23	-11.99	-1.36	27.51	4.56	1.86
2007-08	80.63	-12.77	0.86	29.89	28.62	25.62
2008-09	96.33	3.90	-0.01	36.89	55.15	13.66
2009-10	133.45	-14.81	-0.02	38.56	106.82	14.43
2010-11	196.23	1.20	0.61	63.78	34.79	4.33

Note: BE (RE) Budget Estimates (Revised Estimates).

However, the provincial government was unable to collect the targeted revenue. This shortfall in revenue was mostly due to unfavorable conditions of the agricultural sector, unavailability of foreign assistance, and global prices of imported goods which affected revenues from custom duties, which was not easy to predict correctly. Budget estimates and revised budget estimates of revenue receipts from 2005 to 2010 are mostly underestimated. This underestimation in revenue receipts was due to uncertainty in taking foreign aid; help to fight against terrorism and shortfall in revenues from earthquake-affected and also from flood-affected areas.

Table 9
Error in Forecasting Expenditure of Khyber Pakhtunkhwa Budget

Years	Revenue Expenditure			Capital Expenditure		
	Actual (In Rs. Millions)	% Error (Budget Estimate)	% Error (Revised Budget)	Actual (In Rs. Millions)	% Error (Budget Estimate)	% Error (Revised Budget)
1990-91	9.50	11.13	8.21	0.37	-0.66	3.82
1991-92	12.10	5.21	5.26	3.24	12.29	6.59
1992-93	15.60	-7.90	-3.14	3.90	-8.03	-8.24
1993-94	18.00	-1.94	2.89	4.96	-2.12	3.18
1994-95	21.30	-0.99	-0.30	4.18	35.94	1.84
1995-96	24.72	-3.08	3.58	4.40	5.36	8.25
1996-97	27.70	7.48	-1.61	2.45	-49.49	29.17
1997-98	28.91	9.89	0.49	5.35	2.80	0.90
1998-99	33.87	3.19	0.81	1.84	63.32	3.13
1999-00	37.42	0.32	-0.62	2.17	121.66	-7.95
2000-01	40.79	5.33	1.31	5.47	2.10	14.62
2001-02	35.99	13.50	2.23	31.82	5.12	1.86
2002-03	28.57	47.07	8.45	23.43	-4.68	4.45
2003-04	31.00	30.47	4.67	22.53	24.33	5.65
2004-05	39.89	-5.74	-10.07	28.35	4.62	-3.53
2005-06	46.87	-6.48	-15.83	30.56	2.15	4.70
2006-07	55.67	-3.95	-2.62	37.35	-5.39	-2.98
2007-08	57.35	2.32	0.96	39.84	-4.05	-6.56
2008-09	79.83	-15.70	-5.30	43.74	-5.03	-10.84
2009-10	11.87	-21.47	7.00	81.45	-2.08	-45.82
2010-11	419.82	-69.52	-66.77	80.23	7.15	2.61

Note: BE (RE) Budget Estimates (Revised Estimates).

Table 9 shows that throughout the sample period, there is a mixed trend in errors of revenue expenditure as well as capital expenditure. Budget estimates of revenue expenditure during the years (1992-1995, 2004-2006 and 2008-2010) are under predicted while the rest of the sample period is over predicted. Similarly, the revised budget estimates of revenue expenditure during the years (1992, 1994, 1996, 2004-2006, 2008 and 2010) are also underestimated and the rest

of the sample period is over predicted. On the other side, budget estimates of capital expenditure during the years (1990,1992-1993,1996,2002 and 2006-2009) and Revised Budget Estimates during the years (1992,1999,2004, and 2006-2009) were underestimated while the rest of the sample period is overestimated. In sum, these underestimation in revenue expenditures and capital expenditures were due to less expected expenditures on rehabilitation and reconstruction of earthquake and floods affected territories and wrong predictions about loans and advances.

So, both table 8 and table 9 shows that the errors in revised budget estimates of capital receipts, revenue receipts, revenue expenditures, and capital expenditures are mostly smaller than the errors in budget estimates. This designates that the Khyber Pakhtunkhwa government makes these errors while formulating budget, but to revise budget estimates, there was ample opportunity to correct these errors. Therefore, errors in revised estimates grew smaller. Thus, it can be safely concluded that errors are not systematic. A similar type of results has also been derived by Zakaria and Ali (2010).

4.7 Forecast evaluation of Khyber Pakhtunkhwa Budgeting of Revenue and expenditure

In Table 10, RMSE and RMSPE of revenues and expenditures have been given. The results show that both RMSEs and RMSPEs of budget estimates are greater as compared to revised budget estimates of both revenues and expenditures. RMSEs show that in a comparative term revenue budget exposes more predicted errors than capital budget. In other words, revenue expenditures and revenue receipts show relatively more forecasting errors than capital expenditures and capital receipts throughout the sample period. However, capital expenditure in the revised budget has shown more error than capital expenditure in the budget estimates in case of the RMSE only. These results indicate that the effectiveness or efficiency of budgetary estimates that is budget estimates and revised budget estimates for revenue expenditure as well as revenue receipts have been enhanced over time. The outcome of this table shows that more stress and emphasis should be given on the budget's capital account prediction.

Root mean square percent errors for revised budget estimates as well as actual budget are lesser than those for budget estimates and actual budget. Even though the size of the forecasted errors is not too large, but even small forecasting errors in expenditure and revenue

causes large error in estimates of the budget deficit, which is the main cause of government's loan and borrowing requirements.

Table 10
Root Mean Square Error and Root Mean Square Percent Error for Khyber Pakhtunkhwa Budget Forecasting

Variables	RMSE (BE, Actual)	RMSPE (BE, Actual)	RMSE (RE, Actual)	RMSPE (RE, Actual)
Revenue Receipts	6.96	0.15	1.92	0.08
Capital Receipts	11.38	0.40	2.54	0.18
Revenue Expenditure	64.05	0.21	61.23	0.15
Capital Expenditure	2.14	0.34	8.27	0.13

Note: RMSE (RMSPE) is Root Mean Square Error (Root Mean Square Percent Error) and BE (RE) is Budget Estimates (Revised Estimates)

Table 11 shows that all three Theil's coefficients for the revised and actual budget of revenue receipts, capital receipts, and revenue expenditure are approximately smaller than those for budget estimates and actual budget. While on the other side, except U_2 all other Theil's coefficients for budget and actual budget of Capital Expenditure are smaller than those for revised budget estimates and actual budget. From the above results, it is clear that still, capital expenditure is inefficient in the revised budget estimate. Therefore, focus should be given on the expenditure side of budget prediction.

Table 11
Theil's Inequality Statistics (Us) for Khyber Pakhtunkhwa Budget Forecasting

Variables	Theil's U (BE, Actual)			Theil's U (RE, Actual)		
	U_1	U_2	U_3	U_1	U_2	U_3
Revenue Receipts	0.053	0.105	0.229	0.014	0.029	0.062
Capital Receipts	0.215	0.529	0.507	0.056	0.118	0.158
Revenue Expenditure	0.428	0.635	0.726	0.726	0.607	0.772
Capital Expenditure	0.033	0.066	0.125	0.125	0.256	0.531

Note: BE (RE) Budget Estimates (Revised Estimates).

4.8 Partitioning the error components of Khyber Pakhtunkhwa budget forecasting

As compared to budgetary forecast errors due to bias and variance, the fraction of random variation has been considerably higher both in budget and revised estimates. However, the importance of the proportion of bias and variance source of errors can't be ignored both in budget and revised budget estimates. It can be empirically concluded that in the Khyber Pakhtunkhwa Province, the budgetary forecast errors are due to random variations, and is afar the control of forecasting authorities.

Table 12
Decomposition of Errors in Khyber Pakhtunkhwa Budget Forecasting

Variables	Budget Estimates			Revised Estimates		
	Bias	**Variance**	**Random**	**Bias**	**Variance**	**Random**
Revenue Receipts	0.006	0.089	0.955	0.204	0.032	0.804
Capital Receipts	0.160	0.657	0.225	0.290	0.385	0.360
Revenue Expenditure	0.049	0.869	0.130	0.048	0.796	0.203
Capital Expenditure	0.059	0.012	0.977	0.049	0.184	0.814

4.9 Regression Results for Testing Rational Expectation Hypothesis for Khyber Pakhtunkhwa Budget

Results of the rational expectation hypothesis for Khyber Pakhtunkhwa are shown in table 4.13. This table shows that except β_0 which is coefficient of revenue receipts and revenue expenditure of budget estimates is significant and underestimated. While β_0, of all other variables both the budget estimate and revised estimate, are insignificant. Similarly, the β_1, which is the coefficient of revenue receipts, capital receipts, revenue expenditure, and capital expenditure are significant both of budget estimates and revised budget estimate. Where revenue and capital receipts of budget estimate and revenue receipts and capital expenditure of revised budget estimates are overestimated as $\beta_1<1$. while revenue expenditure and capital expenditure of budget estimates and capital receipts as well as revenue expenditures of revised budget estimates are underestimated that is as $\beta_1>1$. It indicates that neither budget nor revised estimates are the product of rational expectations of actual expenditures and also of receipts.

Table 13
Regression Results for Testing Rational Expectation Hypothesis for KP Budget

Variables	β_0	β_1	β_2	R^2	Adj. R^2	Durban *h*	ρ
(Budget estimates, Actuals)							
Revenue Receipts	-6.438 (-2.553)*	0.388 (2.920)*	0.751 (3.104)*	0.984	0.982	N.A	-0.217
Capital Receipts	1.510 (0.947)	0.388 (2.426)*	0.495 (1.447)	0.938	0.930	N.A	0.917
Revenue Expenditure	-63.679 (-4.470)*	8.494 (5.234)*	-6.513 (-3.46)*	0.878	0.864	N.A	-0.777
Capital Expenditure	-0.224 (-0.316)	1.003 (19.197)*	-0.021 (-0.335)	0.992	0.991	0.737	0.155
(Revised estimates, Actuals)							
Revenue Receipts	-1.560 (-1.828)	0.960 (16.126)*	-0.067 (0.775)	0.998	0.998	0.654	-0.177
Capital Receipts	0.345 (0.748)	1.049 (13.853)*	-0.216 (-1.915)	0.993	0.992	-1.257	0.748
Revenue Expenditure	-33.151 (-1.386)	3.833 (2.233)*	-2.048 (-0.855)	0.754	0.725	N.A	-0.696
Capital Expenditure	-0.149 (-0.054)	0.964 (3.170)*	0.149 (0.491)	0.891	0.878	N.A	-0.268

Note: Values in parentheses denote underlying student-t value. The t-statistic significance at 5%, the level of the significance is indicated by *.

Similarly, β_2 **(**coefficient) of revenue receipt and revenue expenditure of budget estimate is significant, while all other variables are insignificant of both budget estimates and revised budget estimates. The revenue receipts of the budget estimate are underestimated as $\beta_2 > 0$ and revenue expenditure is overestimated as $\beta_2 < 0$. The values of ρ which is the correlation coefficient among the forecast errors *"E_t"* and predicted values *"P_t"* are not equal to zero which implies that estimate errors of expenditures and revenues are correlated with the particular budget estimates.

Therefore, coefficients in table 13 proposed that for the fiscal variable during the sample period in Khyber Pakhtunkhwa, the rational expectation is not validated. It is because it does not satisfy both stated

necessary conditions and sufficient conditions. $\mathbf{R^2}$ shows that the fit of the model is good for both budget estimates and revised budget estimates. The values of **Durbin *h*** statistics for all variables of budget estimates and revised budget estimates are less than |1.96|, showing serial correlation with errors.

4.10 Regression Results for Efficiency of Khyber Pakhtunkhwa Budgetary Forecasts

The results of the efficiency of budget forecasts are shown in Table 14. The results show that over time, variables are not all significantly improved.

Table 14
Regression Results for Efficiency of KP Budgetary Forecasts

Variables	α_1	α_2	R^2	Adj. R^2	DW
		(Budget Estimates, Actuals)			
Revenue Receipts	12.530 (2.193)*	-0.677 (-1.385)	0.092	0.044	1.021
Capital Receipts	3.436 (0.219)	1.278 (0.952)	0.045	-0.005	1.470
Revenue Expenditure	13.001 (1.497)	-1.304 (-1.756)	0.139	0.094	0.713
Capital Expenditure	13.364 (0.943)	-0.359 (-0.296)	0.005	-0.048	1.470
		(Revised Estimates, Actuals)			
Revenue Receipts	12.578 (5.525)*	-0.794 (-4.077)*	0.467	0.438	1.334
Capital Receipts	0.795 (0.107)	0.588 (0.923)	0.043	-0.007	2.341
Revenue Expenditure	8.541 (1.406)	-1.142 (-2.198)*	0.203	0.161	1.560
Capital Expenditure	9.629 (1.810)	-0.940 (-2.065)*	0.183	0.140	2.070

Note: Values in parentheses denote underlying student-t value. The t-statistic significant at 5%, level of significant are indicated by *.

But only the forecasts of revenue receipts, revenue expenditure and capital expenditure of revised budget estimates revealed that over time, these are significantly improved. As far as the overall results of the table are concerned, the table reveals that the efficiency of the budgetary forecast is not improved over time.

5. Conclusion and Recommendations

Based on the analysis and findings of the study, it is concluded that the results of both Pakistan and the Khyber Pakhtunkhwa province illustrate the magnitude of error in predicting expenditure is less or more identical as predicting revenue. In the same manner, the revenue budget exposes fewer predicting errors than the capital budget. Theil's inequality coefficients values also illustrate that both in Pakistan and in the Khyber Pakhtunkhwa province, there is some miscalculation in budget forecasts. The fraction of random variations is comparatively high than bias and variance. It means that budget forecasting is inefficiently done in the Khyber Pakhtunkhwa province as well as at the federal level in Pakistan. Similarly, a rational hypothesis test is not authenticated both for Pakistan and Khyber Pakhtunkhwa. Over time, the efficiency of the budgetary forecast, both in Pakistan and in the Khyber Pakhtunkhwa, province have also not shown a satisfactory general improvement.

In a nutshell, the budgetary forecast in Pakistan as well as in the Khyber Pakhtunkhwa province is inefficient and the main component of error is a random source of error. Furthermore, it has also been concluded that budgetary forecast is not totally based on rational expectations and also over time, there is no major improvement in forecasting efficiency.

This study shows that there is considerable room for improvement in the fiscal marksmanship of the government of Pakistan as well as of the Khyber Pakhtunkhwa government. For the efficient budget forecast, the governments may increase taxes like excise duty, income tax, and general sales tax and decrease expenditures on defence and civil expenditures. The budget forecasting authorities should properly utilize future information while arranging the budget.

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