

# A Simple Method for Calculating Monthly Revenue Targets

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The Budget includes a forecast of annual revenue collections (both tax and non-tax) for purposes of guiding budget expenditure decisions and for monitoring the level of the budget deficit. Once the overall budget has been established, successful implementation requires periodic evaluation and monitoring. In order to evaluate the performance of the budgeted agencies throughout the course of the year, periodic financial benchmarks are required. Traditionally, the state of the budget is evaluated on a monthly basis, as this is the highest frequency for which reliable data are available. To establish a process designed to successfully monitor revenues flowing into the budget, it is necessary to develop revenue benchmarks for each month in the fiscal year.

Monthly collections, as categorized into the various tax and non-tax revenue sources, are subject to several primary influences. These include:

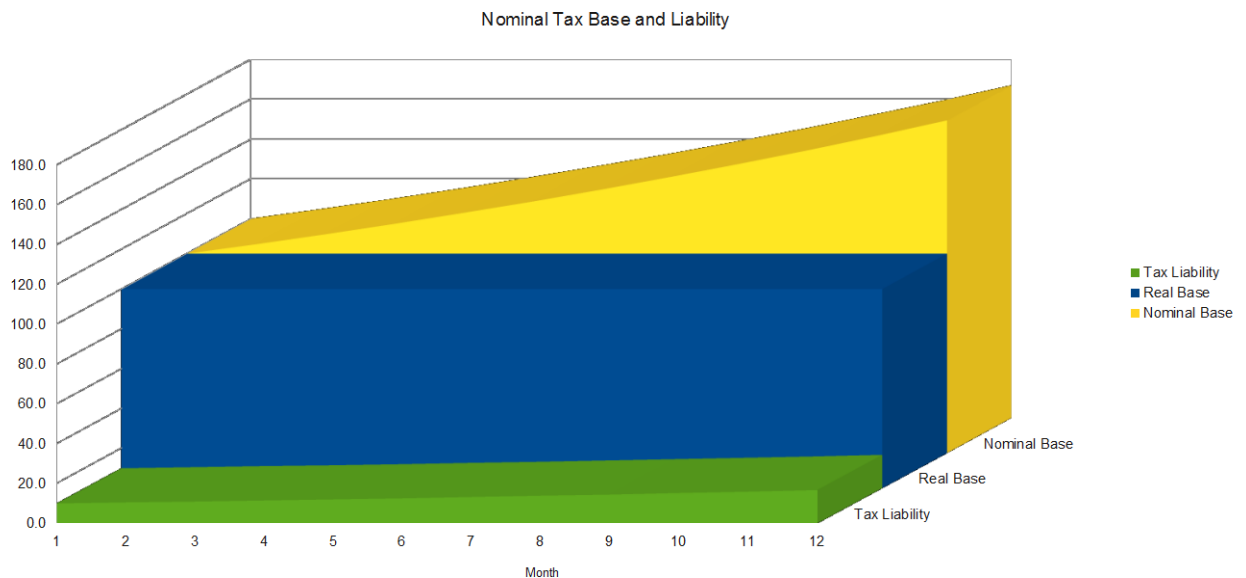
- The level of overall real economic activity undertaken during the month, as well as how that activity influences the tax bases.
- The overall inflation rate, and its influence on relative prices throughout the economy.
- The official tax calendar, which defines the legal timetable governing the payment responsibilities of taxpayers.
- The enforcement practices of the tax administration authorities.

These influences are subject to seasonal patterns. Real economic activity can be quite seasonal, especially in certain economic sectors (e.g., retail trade or agriculture) where output is generally realized according to the seasons of demand (e.g., holiday purchases) or supply (e.g., harvest). Likewise, inflation is subject to seasonal variations. While no generalizations should be made, prices are often lower during summer months, when locally produced food products are most plentiful, and fuel demand is minimal. The tax calendar and the tax administration authorities combine to form seasonal patterns, advanced payments derived from past performance are collected in lieu of future liability, and end-of-year reconciliation captures liability not previously identified.

Monthly collections are also governed by non-seasonal changes that affect collections. Mid-year adoption of new tax legislation, changes in tax administration policies, and domestic or international macroeconomic shocks can combine to influence monthly collections.

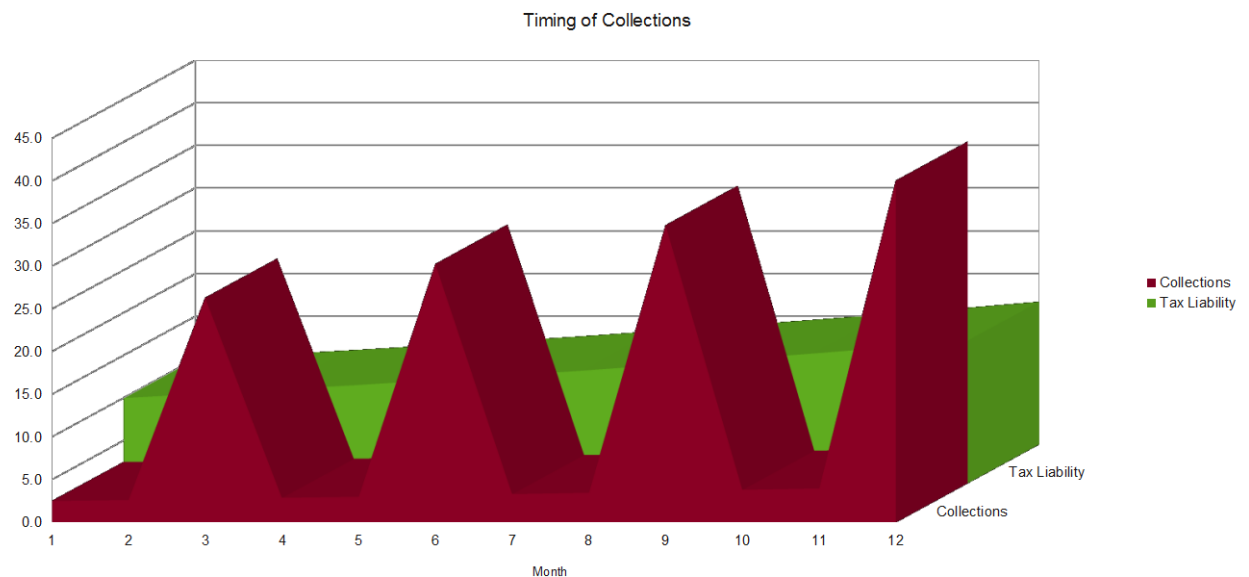
## The Composition of Observed Collections: an illustration

To illustrate the relationship between real economic activity, price changes, the tax calendar, and observed nominal collections, consider a simple example. Suppose we observe constant real collections of 10 UAH each month. Further, suppose that the effective rate of taxation is 10 percent, implying that the real tax base is 100 UAH per month. Finally, suppose that the economy is facing an annualized inflation rate of 75 percent, spread constantly across the months of the year, implying a monthly inflation rate of around 4.8 percent. The relationship between the nominal base and real collections would look something like this:



Of course, the notion of *real* tax collections is somewhat theoretical, as tax collections are nominal by nature. In reality it is the nominal tax base that drives collections, and by applying our 10 percent tax rate to the nominal base of our example, we would calculate our true tax liability.

But tax liability is not generally collected as it is accrued, but according to some schedule set forth in the tax legislation. It is not uncommon for taxes to be collected quarterly. Taking into consideration that some payments might be made early, or late, one might well see a relationship between liability and collections that looks something like this:



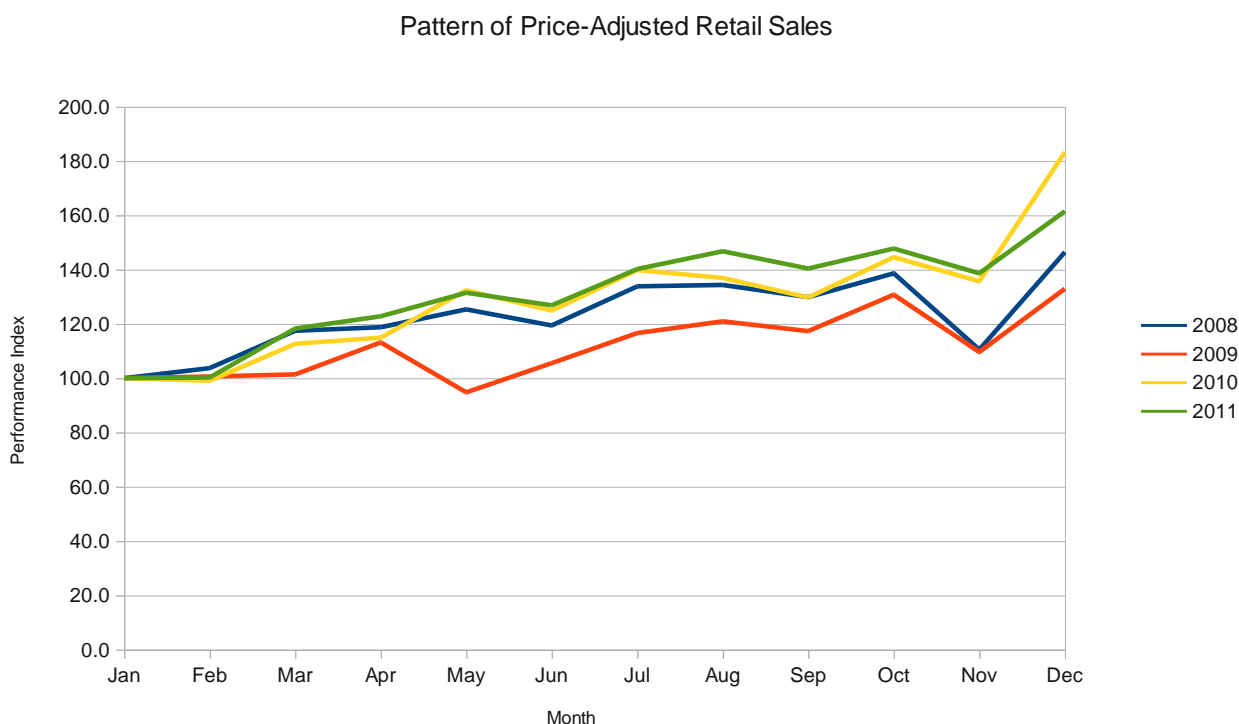
## Decomposing nominal collections into three primary influences

The procedure described below attempts to decompose a time series of nominal collections into its three principle drivers: (a) real economic activity, (b) changes in the price level, and (c) the tax calendar. Having done so, we can then combine what is known about these influences with established fiscal and macroeconomic forecasts to calculate monthly predictors of revenue collections. For purposed of illustration, we will use the Value Added Tax of Ukraine as an example. The process can be readily applied to any major revenue source in any country or tax district.

## The Pattern Real Economic Activity

Typically, the preferred measure of broad economic activity is gross domestic production (GDP). However, Ukraine lacks official statistics for monthly GDP, and as a result, we have chosen to use retail sales as a measure of the VAT base. There are pluses and minuses to this choice – VAT is fundamentally a tax on final consumption, so using retail sales makes a certain amount of sense. But VAT is also collected at all stages of production as well as the point of importation, and so collections are only loosely associated with final purchases. Still, lacking a broader measure of economic activity, the official data series describing retail sales represents the best available option.

The pattern of real economic activity is generally expected to be consistent from year to year. As can be seen in the following chart, retail sales have been consistently growing over the past four years.



The year 2009 is a bit of an outlier, but across all years a general upward trend in real sales can be observed, along with some predictable fluctuations in June, September, November, and December. The stable pattern of real activity provides a solid foundation upon which to build a set of financial benchmarks for evaluating budget performance. In general, we would expect real tax liability to be strongly correlated with real activity. To construct intermediate financial benchmarks, we need only proceed to identifying seasonal deviations in tax collections resulting from the tax calendar, and then apply the effects of price changes to anticipated real collections so as to create nominal benchmarks.

## The Pattern of Tax Administration

As the arm of the government responsible for providing the funding for government activities, as well as enforcing the Country's tax laws, the tax administration authorities face three central objectives:

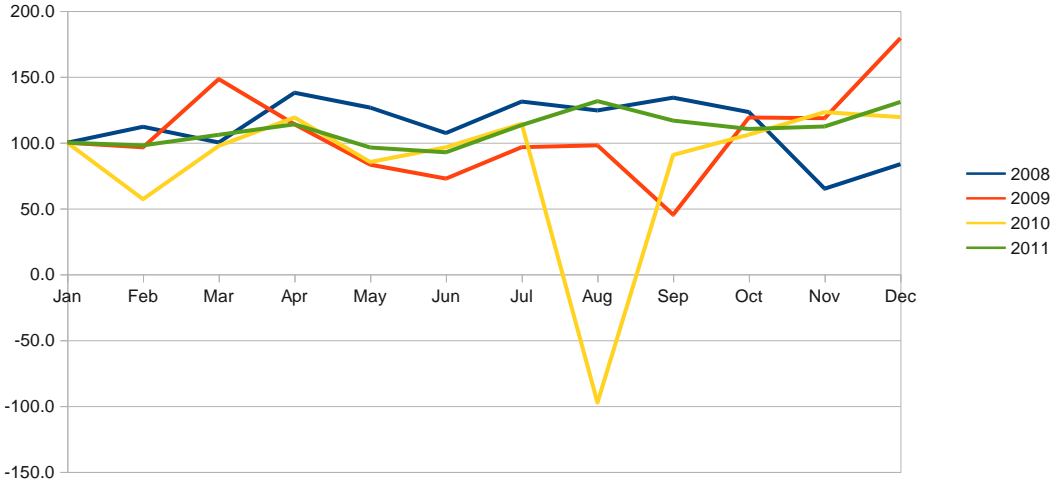
- Enforce the tax laws, ensuring that liability is realized in the forms of payments into the Budget.
- Collect taxes as liability is accrued.
- Provide a smooth stream of revenue to allow for seamless budget execution.

In some countries these objectives are relatively consistent with one another. However, in countries such as Ukraine, they distinctly compete with one another. The loading of real economic activity into the second half

of the year suggests that liability is not going to be accrued evenly over the course of the year, thereby providing a budgetary squeeze earlier in the year.

As can be seen below, the pattern of payments into the budget differs significantly in real terms from the pattern of retail sales. In particular, real VAT collections do not readily grow over the course of the year, but rather experience relatively flat performance with the occasional month falling below January levels. The differences between these two series are the effects of the tax calendar and the efforts of the tax administration authorities. In essence, taxes are being collected at a relatively constant rate, in spite of the fact that real economic activity is growing from month to month.

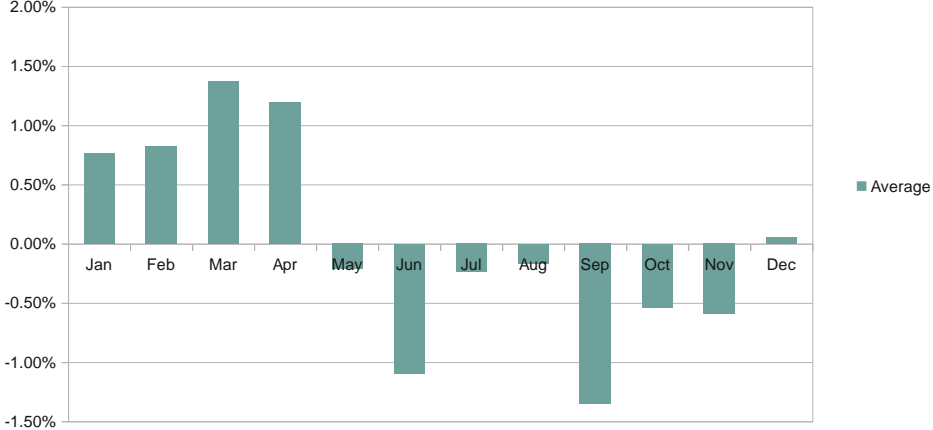
Pattern of Price-Adjusted VAT Collections



It is difficult to discern a clear pattern of real collections. Clearly there are some strange observations in the data. August 2010 observed negative VAT collection (in both real and nominal terms). This is the result of a one-time repayment of VAT refunds, and should not be included in any attempt to extract a pattern for tax collections. Apart from that, one might observe a decline in real collections over the second quarter of the year, and a decided up-tick in collections in December.

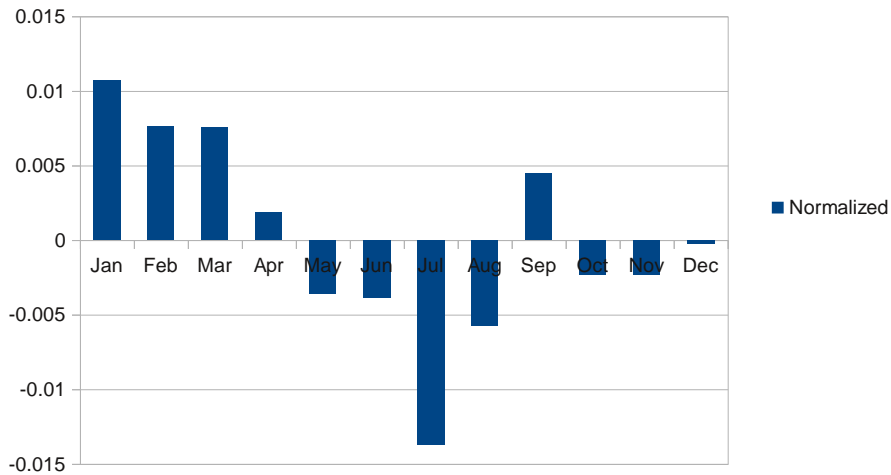
But more importantly, if we compare the share of real annual VAT collections each month to the monthly share of annual retail sales (calculated as an average of 2008, 2009, and 2011 – 2010 excluded to eliminate the effect of the August data outlier), we can see that the tax administration is purposely over-collecting early in the year and under-collecting later in the year (see chart below).

Difference Between Collections and Retail Sales



In effect, the system of VAT payments in Ukraine seems to have been designed to smooth revenue payments in the face of constant growth of the base.

Average Monthly Price Changes, Normalized



## The Pattern of Price Changes

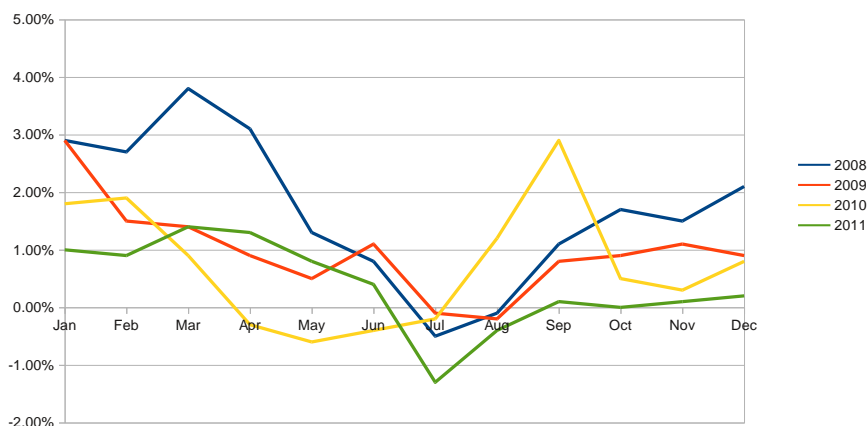
In a country with stable prices, the effects of monthly inflation can be of minimal importance in determining monthly collections. However, in countries experiencing high or radically volatile inflation rates, inflation can seriously affect collections. Revenues are paid into the budget in nominal terms. Increases in prices have a direct and positive effect on collections.

In Ukraine, inflation must be considered, both because it follows an observable pattern, and also because its forecasted level of 9.7 percent for 2012 is easily significant enough to affect Budget performance. The front loading of inflation into the earliest months of the year suggests a positive overall revenue effect. However, the summer-time dip in overall price levels should also be considered when projecting monthly collections.

As can be seen above, inflation rates late in the year tend to be significantly lower than at the beginning of the year. While the pattern for the first and fourth quarters clearly suggest that inflation rates will be significant and positive, the monthly inflation rate tends into the negative range during the summer months, indicating a reduction in the overall level of prices. When annual inflation rates are normalized to zero and averaged, the pattern is even more apparent.

By accelerating the rate of increase in prices early in the year, Ukraine experiences a positive overall effect on budget revenues. This revenue effect is the result of the impact on the monthly nominal tax base of the higher accumulated price levels. For equivalent annual inflation rates, a front-loaded pattern will yield more revenue.

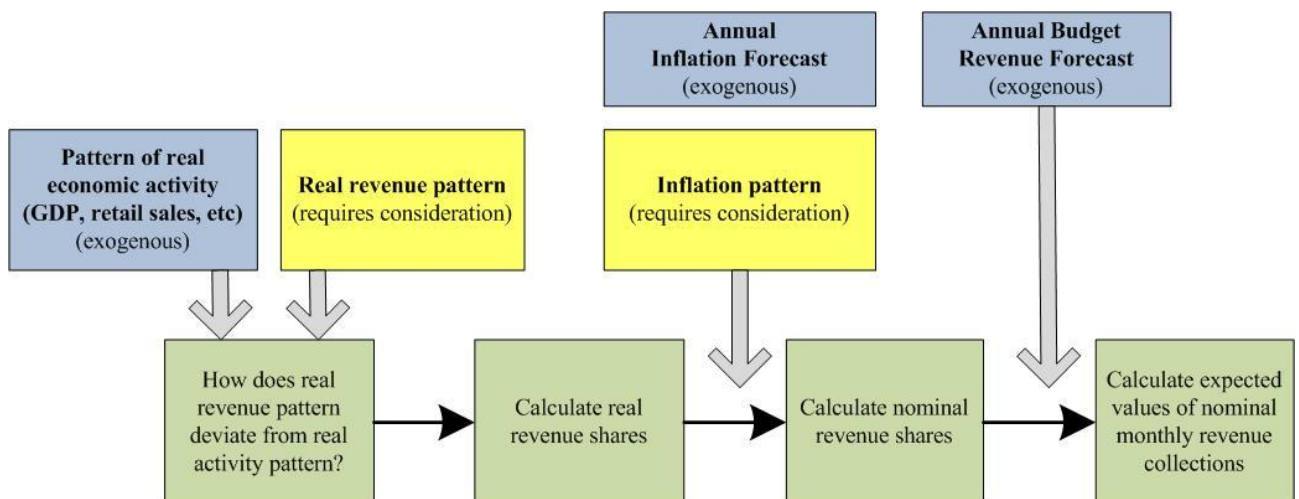
Monthly Inflation Rates



## The process of developing monthly projections

Having discussed the inputs into the calculation of monthly revenue benchmarks, we are now able to speak concretely about the steps required to perform the necessary calculations. In particular, the methodology used to develop monthly revenue benchmarks is illustrated in the chart below and is based on the following process:

- The first step is to identify the **patterns of real activity** in the economy. When detailed information is lacking, a broad indicator, such as GDP (or, in our case, retail sales) can be used.
- The process then proceeds to the identification of how the pattern of real collections deviates from that pattern. This pattern represents the pattern defined by the **tax calendar** and the **tax administration effort**.
- Combining this information will yield **real revenue shares** for each revenue source on a monthly basis, which describes how liability accrued against real economic activity will be collected.
- **Nominal revenue shares** are calculated by combining the anticipated real revenue shares with the projected level of prices defined by the **pattern of inflation**.
- The nominal shares are then applied to the **Budget revenue projections** for Ukraine to provide the **expected values for collections in each month**.



As discussed earlier, for purposes of revenue monitoring, it is necessary to have a series of nominal revenue targets, defining periodic performance benchmarks. Projecting nominal revenue patterns requires the combination of:

- a real revenue pattern,
- an annual forecast of inflation,
- a projected periodic pattern of inflation, and
- an annual revenue forecast.

Of these four inputs, two are exogenously given (revenue and inflation forecasts). The identification of the appropriate real revenue pattern and the projected pattern of inflation require some consideration.

- **Pattern of inflation.** In principle, selecting a pattern of inflation is never an easy exercise, as inflation is generally thought to be under the control of the Central Bank. In order to forecast inflation, it would be necessary to forecast the exogenous actions of the Central Bank, which is subject to frequent policy changes. In many situations, the best choice is to assume that inflation is

equally distributed across months. However, as we have seen in Ukraine, the inflation pattern has historically differed greatly from a smooth rate of price increase, and is influenced by predictable seasonable market pressures. Lacking a better procedure, to establish a forecasted pattern for inflation in 2012, we assumed that the periodic pattern of inflation is consistent with a weighted average pattern over the previous four years, with inflation in each year normalized to the annual year 2012 forecast, which is 7.6 percent.

- **Real revenue pattern.** Selecting a real pattern to represent the tax calendar is also a difficult process. In a country with a stable pattern of collections, the normal procedure would be to employ the pattern of collections in the previous year. If collections are unstable, an average or weighted average pattern is often used. However, sometimes available data will suggest the way in which the pattern of the collection effort is evolving. In the case of Ukraine, it is difficult to identify a clear trend in the pattern of tax administrative practices. For this reason, we have used a weighted average of 2008, 2009, and 2011, with 2011 weighted most heavily, and have omitted 2010 to avoid the one-time disturbance in collections in August of that year.

As is hopefully clear, there is some judgement required throughout the calculation process. While evaluating the historical pattern of prices and real collections, it is up to the analyst to identify those patterns that are most applicable to the coming year. Emphasizing one year over another during the calculation process will result in (modest) variances in monthly benchmarks. While these variations will result in changes in the perception of how revenues are performing from month to month, over the course of the year the variations will net to zero, meaning that there will be very small variations noticeable when the time comes to do a mid-year evaluation of revenue performance.

## Sample calculation results for 2012 (VAT)

Nominal monthly revenue targets, along with cumulative projections, are calculated to be (in millions of UAH):

Projected VAT Revenues		<i>(Final monthly revenue benchmarks.)</i>											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
<b>Monthly</b>	10.4	10.5	12.9	12.7	11.1	9.9	12.4	13.1	10.5	13.0	12.4	16.8	
<b>Cumulative</b>	10.4	20.8	33.7	46.4	57.5	67.4	79.8	92.9	103.4	116.3	128.7	145.5	

## Incorporation of non-seasonal factors

As was discussed in the introduction to this note, apart from seasonal changes, revenue patterns are also driven by exogenous policy variables such as tax policy changes and macroeconomic shocks. These changes may impact both, historical revenue patterns (distorting the trends and making it difficult to project them into future periods) and current collections, if the changes happen mid-year. Estimating the impact of such policy changes is a separate task which may require a various specific methodologies.

While it is possible to integrate revenue estimation with revenue projection for the purposes of monthly revenue benchmarking, the methodology described in this note does not attempt to do so. All major changes in tax policy environment, as well as other autonomous economic influences, which need to be considered in projecting future revenue trends remain, therefore, outside this model.

For Ukraine, this means that revenue baseline projections calculated based on this methodology do not include influences from several recent policy developments and should be used with caution. In particular, the following limitations should be kept in mind:

- The influence from introduction of Ukraine's Tax Code in 2011, which modified tax bases of several taxes including Land Tax, as well as rates of other taxes (such as EPT and VAT);

- The influence from policy changes surrounding VAT refund arrears, especially in the context of ongoing negotiations of the IMF Stand-by Agreement;
- Administrative reforms and other policy changes with relevance to tax administration during 2011-2012, especially in the context of revenue policy negotiations with the IMF.

A simple change in the VAT rate is unlikely to affect the pattern of collections, unless it comes into effect mid-year. A change in policies governing VAT refunds is mostly likely to present a disturbance to the pattern of collections if arrears are dispersed in large on-time corrections. Such on-time events are easily documented and can be incorporated into a monthly revenue monitoring process. Changes in administrative policies will affect the timing of collections relative to the accrual of liability, and pose the greatest challenge to establishing viable revenue benchmarks.

## **Conclusion**

Creating monthly revenue benchmarks is not overly difficult. One needs only examine historical patterns and combine them with the relevant forecasts. The case of developing benchmarks for the 2012 budget year in Ukraine presents many of the typical modelling decisions that must be made throughout the process. By examining recent historical data for economic activity and prices, we are able to decompose VAT collections into the principle influences driving monthly receipts. Combining this information with official budget forecast information for prices and anticipated annual revenue collections, we can demonstrate the expected pattern of tax collections, and from this create monthly nominal revenue targets.