

## Box 4.3

### Heat Map for Economic Activity in Turkey

Derivation of timely indicators that exhibit the current course of economic activity is important to effective implementation of economic policies. To this end, a heat map representation for Turkey is introduced in this box.

#### What is a Heat Map?

A heat map is a two-dimensional representation, in which variables are placed in rows and columns in a table format and the values in each cell are colored according to a scale. Heat maps are preferred because several variables can be displayed at the same time, ensuring an easier understanding of relationships between the variables and visual summary of the information content of comprehensive data sets.

#### Heat Map for Economic Activity in Turkey

One of the most important benefits of constructing a heat map for economic activity is to see the trends in different areas of the economy in a single graph. While providing information about the direction of the variables and economic activity, heat maps provide more limited information about the extent of the change in the economic activity.

In heat maps for economic activity, while columns indicate the time period, different approaches are adopted for the selection of row variables. Alternatives are using the level, the percentage deviation from trend, the percentage change, and standardized score of percentage change (z-score approach) of the variables.

In preparing the heat map for economic activity in Turkey, a z-score approach is preferred. Each colored cell in the heat map shows the interval into which the standardized value (z-score) of the seasonally and calendar-adjusted quarterly percentage change of the variable falls. The calculated z-score indicates the number of standard deviations the realized quarterly percentage change is above or below its historical mean.

The heat map is constructed using 85 indicators in 20 main headings (Table 1). The indicators were chosen to represent the main expenditure items (private consumption, public consumption, investments, export and import) that constitute the economic activity. All of the indicators are in real terms. Therefore, indicators originally available in nominal terms are deflated by the related price indices, which are Consumer Price Index (CPI), Domestic Producer Price Index and Non-Domestic Producer Price Index. In addition, instead of aggregate indicators, breakdowns that add up to the aggregates are preferred. For instance, instead of the Industrial Production Index (IPI), the five sectors that make up the IPI according to the MIGs classification are included in the heat map. The aim here is to reflect the differentiation in the components of an aggregate indicator, as they can move in different directions due to the conjuncture, and thus to display a more accurate economic outlook.

The heat map constructed by the indicators in Table 1 is presented in Figure 1. The z-scores in each cell of the map are colored by the tones of red and green, which indicate negative and positive z-scores, respectively. Each tone of the colors corresponds to 0.5-point interval of z-scores. As the colors get darker, the z-score increases in absolute terms. In other words, a darker red shows that the deceleration in the indicator grows stronger, whereas a darker green shows that the acceleration in the indicator grows stronger.

**Table 1: Indicators in Heat Map**

Main Headings	Series	# of series	Source
Shopping Mall Turnover Index (SMTI)*	Technology, Clothing, Shoes-Bags, Hypermarket, Food, Other	6	CSC
White Goods	Domestic Sales, Production, Exports, Imports	4	TURKBESD
Industry Domestic Turnover (DTI)**	Intermediate, Durable, Nondurable, Capital Goods and Energy	5	TURKSTAT
Industry Non-Domestic Turnover (NDTI) ***	Intermediate, Durable, Nondurable, Capital Goods and Energy	5	TURKSTAT
Export Volume Index (EVI)	Intermediate, Consumption and Capital Goods	3	TURKSTAT
Import Volume Index (IVI)	Intermediate, Consumption and Capital Goods	3	TURKSTAT
Ercan Türkan Consumption Index	Food, Non-food, Total, Total (including vehicles)	4	ETTE
Budgetary Expenditures *	Compensation of Employees, Social Security Contribution, Goods and Services Purchases, Capital Expenditures	4	MTF
Home Sales	First and Second Hand Sale (Mortgaged and Other)	4	TURKSTAT
Credit Stock*	Commercial (TRY), Commercial (FX, adjusted), Personal, Housing, Vehicle, Credit Card	6	BRSA
Company Establishment	Industry, Construction, Services	3	TOBB
Company Liquidation	Industry, Construction, Services	3	TOBB
Retail Sales Volume Index (RSVI)	Food, Non-food (exc. fuel), Automotive Fuel	3	TURKSTAT
Retail Payment System*	Total	1	CBRT
Industrial Production Index (IPI)	Intermediate, Durable, Nondurable, Capital Goods and Energy	5	TURKSTAT
Airline Statistics	Commercial Aircraft and Load (Domestic & International)	4	MTI
Maritime Load Statistics	Total Exports-Imports, Total Cabotage, Total Transit	3	MTI
Vehicles	Domestic Sales, Production, Exports (Auto, light-heavy comm. vehicles)	9	ADA, AMA
Foreign Visitors	Europe, CIS, America, Africa, Asia	5	CBRT
Tax Revenue*	Domestic VAT, VAT on Imports, SCT, Stamp Duties and Income Tax	5	MTF

\* deflated by CPI or related CPI items.

\*\* deflated by Domestic PPI.

\*\*\* deflated by Non-domestic PPI.

The intensification of red or green colors in the heat map provides information on whether the economic activity is in a contraction or expansion phase, and on the spread of the contraction/expansion across sectors. For example, in the third quarter of 2016, when seasonally and calendar-adjusted GDP contracted by 2.8 percent on a quarterly basis, the red colors intensified. However, in the rapid recovery recorded in the following quarter, the intensity of green colors increased significantly.

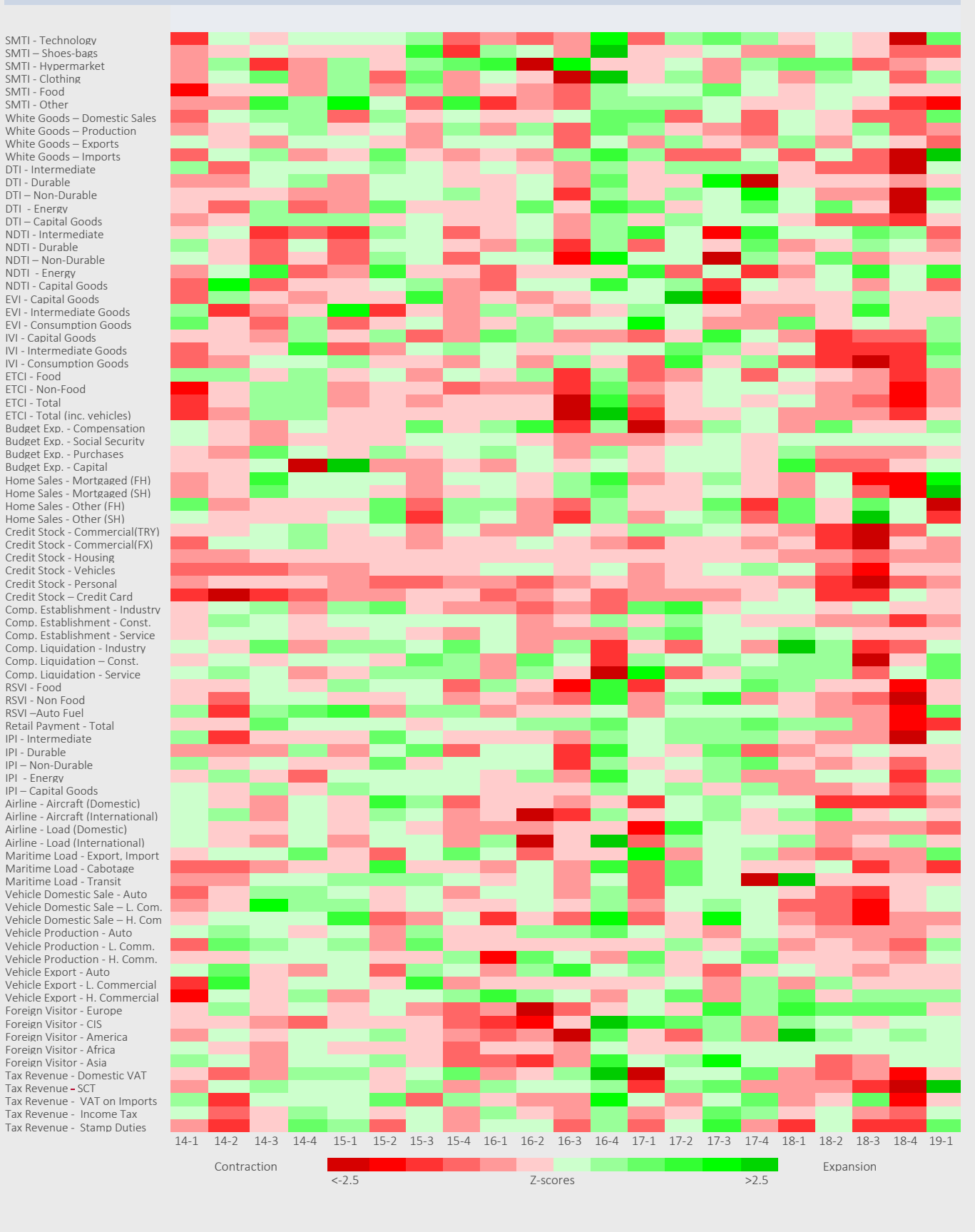
### What Does the Heat Map Imply for 2019Q1 Growth?

As stated earlier, the explanatory power of heat maps for the direction of economic activity is more than their explanatory power for the extent of the change in economic activity.

Nevertheless, presentation of the z-scores as a percentage distribution may provide a better indication of the extent of the change in economic activity.

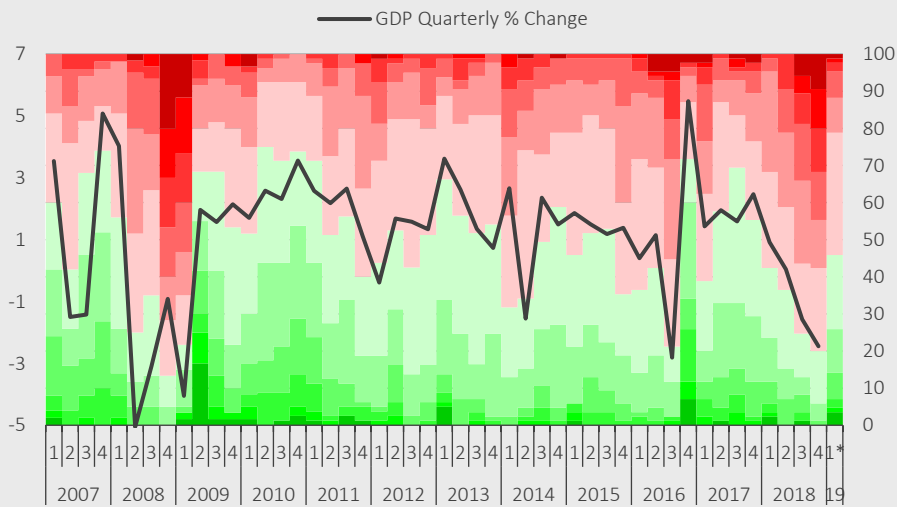
To illustrate the relationship between the heat map and percentage change of seasonally and calendar-adjusted GDP on a quarterly basis, the percentage distribution of the colors of z-score intervals and quarterly percentage change of GDP are graphed together (Figure 2). As depicted, in the quarters where economic activity contracted, negative z-scores in the heat map increased significantly. Similarly, when there is an increase in negative z-scores, the quarterly growth rate decelerates, and when there is an increase in positive z-scores, quarterly growth rate accelerates.

Figure 1. Heat Map for Economic Activity in Turkey



In this context, the relationship between the distribution of z-scores and the quarterly GDP growth is clearer compared to the heat map. Historically, in all contraction periods, the red colors are more common. Similarly, green-colored cells were denser in the strong growth period throughout 2017, while the number of red colors increased with the rebalancing process and the slowdown that started in the second quarter of 2018. However, it is noteworthy that this trend is interrupted in the first quarter of 2019 and there is a significant decrease in the number of indicators indicating a decline compared to past periods. Therefore, the heat map signals a mild recovery in the first quarter of 2019.

**Graph 2: Percentage Distribution of Heat Map for Economic Activity in Turkey and GDP Quarterly Growth Rate**



\* The heat map is calculated with the available data as of April 25. Accordingly, the first quarter data of 50 of 85 series were completed, while for other variables the average of January-February was used.