

**Review Article***Copyright © All rights are reserved by Farshid Moghtader*

# Comparison of the Local Financial Impacts of the Kahramanmaraş and Hatay Earthquakes (Mw 7.7 - Mw 7.6) Estimated Values

**Farshid Moghtader<sup>1\*</sup>, Zeynep Lacin<sup>2</sup>**<sup>1</sup>Department of Business Administration, Institute of Social Sciences, Yildiz Technical University, Istanbul, Turkey<sup>2</sup>SEV American College, Istanbul, Turkey

**Corresponding author:** Farshid Moghtader, Department of Business Administration, Institute of Social Sciences, Yildiz Technical University, Istanbul, Turkey.  
Email: [farshid.moghtader@std.yildiz.edu.tr](mailto:farshid.moghtader@std.yildiz.edu.tr)

**Received Date:** March 22, 2024**Published Date:** May 03, 2024**Abstract**

On February 6, 2023, at 04:17 and 13:24 Turkey time, two earthquakes with magnitudes of Mw7.7 (focal depth=8.6km) and Mw7.6 (focal depth=7km) occurred in Kahramanmaraş. On February 20, 2023, at 20:04 Turkey time, another earthquake with a magnitude of Mw6.4 struck Hatay. These earthquakes caused more than 48,000 deaths in 11 provinces on the Eastern Anatolian Fault Line, destroyed or severely damaged over half a million buildings and resulted in significant material losses.

This study examines the financial impact of these earthquakes by evaluating the structural damage and loss of life. We estimate the financial impact on the economies of Hatay and Kahramanmaraş. As there is no clear data for 2023, we consider the population over the age of 18 as the number of people in the workforce. Based on the ratios of the current population of Hatay and Kahramanmaraş and the registered working population of 2022, we estimate that the number of insured employees in Hatay in 2023 would be approximately 123,060, and the number of insured employees in Kahramanmaraş would be 112,273. We also estimate the GDP contribution of Kahramanmaraş to be approximately 38.47 billion TL, and the GDP contribution of Hatay to be approximately 59.64 billion TL in 2023.

**Keywords:** Earthquake; Financial impact; Estimated GDP; Employee

**Introduction**

Turkey is situated on a highly seismically active plate, which has experienced major earthquakes throughout history. Since 1900, Turkey has had 20 earthquakes with a magnitude over 7, making it the country that has been damaged the most by earthquakes. 269 incidents were reported between 1900 and 2023 that caused loss of life or damage in Turkey. The biggest earthquake in terms of loss of life and severe damage is the 2023 Kahramanmaraş earthquake [1].

In recent years, there has been an interest in analysing the economic impacts of earthquakes. The loss of capital assets in the economic production mechanism reduces the economic output, while the loss of other elements at risk requires resources for recovery, slowing down the development process. The ratio of losses to GNP is widely used when comparing losses in terms of magnitude [2].

Official sources reported that the overall impact of the major disaster that occurred in Turkey on February 6, 2023, was the

deterioration of 11 cities due to the earthquake. However, there is no study examining the provinces one by one. We tried to estimate the economic impact of the earthquake on Hatay and Kahramanmaraş, two cities with important sectors such as tourism and textiles, respectively, for the year 2023. The estimated financial impact on the economy of these cities is evaluated. Given the lack of clear data for 2023 after the earthquake, we considered that the population over the age of 18 represents the number of people in the workforce. In this case, we examined the impact of the earthquake on the economy of these cities through the estimated working population for 2023, based on the ratios of the current population of Hatay and Kahramanmaraş and the registered working population of 2022.

## Financial Impacts Related to Earthquake

### The Number of Heavily, Moderate and Minor Damaged Buildings

According to a post-earthquake damage assessment study, a total of 99,326 buildings in Kahramanmaraş and 215,255 buildings in Hatay were categorized as urgently in need of demolition, demolished, or heavily damaged. The study also estimated that 17,887 houses in Kahramanmaraş and 25,957 houses in Hatay had moderate damage, while 161,137 houses in Kahramanmaraş and 189,317 houses in Hatay had minor damage. These figures indicate that the total number of damaged buildings in Kahramanmaraş was 278,350 and in Hatay was 430,529.

These data were obtained from the Kahramanmaraş and Hatay earthquake report prepared by the Presidency of the Republic of Turkey, Strategy and Budget Directorate in 2023. While the earthquake affected 11 provinces, our focus in this study is on the direct and indirect losses resulting from the earthquake in the provinces of Kahramanmaraş and Hatay [3].

## Long-Term Impacts on Employment

### The population of Kahramanmaraş and Hatay in 2022

The Address-Based Population Registration System (ADNKS) data shows that Kahramanmaraş and Hatay have a population of 1,177,436 and 1,686,043, respectively. However, the unemployment rate in Hatay, Kahramanmaraş, and Osmaniye regions is higher than the average rate in Turkey, standing at 17.1 percent compared to the national average of 12 percent. According to the Turkish Statistical

Institution's Population Statistics Portal, the average household size in Kahramanmaraş in 2022 is 3.6, whereas in Hatay, it is 3.5 people.

### Calculation and comparison of the total population over the age of 18 and the number of insured employees in 2022 and 2023

The population of Kahramanmaraş and Hatay was 1.177.436 and 1.686.043 in 2022 according to the Address-Based Population Registration System (ADNKS) data, respectively. According to data received from the Turkish Statistical Institute and the Ministry of Internal Affairs, the official number of deaths recorded as a result of the February 6 earthquakes is 53 thousand 537. In addition to the people who lost their lives, many people migrated from earthquake zones to different provinces. The population of Kahramanmaraş, the epicenter of the February earthquakes, decreased to 1 million 116 thousand 618 in 2023, a decrease of 60 thousand 818 people compared to the previous year.

The population of Hatay, one of the provinces where the earthquake caused the most destruction, decreased by 141 thousand 403 compared to the previous year, decreasing to 1 million 544 thousand 640 in 2023. Among the provinces hit by the earthquake, the largest population decrease was in Hatay.

### Labor demand and Labor supply in Kahramanmaraş and Hatay in 2022

The years 2020 and 2021 were marked by the coronavirus pandemic that affected the entire world. In order to get an estimate of the impact of the earthquake that occurred in February 2023, we need to examine the labour demand and labour supply data for 2022. This year is also expected to see the global markets recover after the pandemic.

The most basic data on the labour market demand is compiled by İŞKUR through its administrative records and labour market research conducted annually. This report presents an analysis of both the supply and demand aspects of the labour market. It is based on the results of the Kahramanmaraş Province Labor Market Research. The data collected from the Kahramanmaraş Labor and Employment Agency Provincial Directorate reveals that in 2022, 17 sectors with cooperations employing 20 or more individuals were researched [4].

**Table 1:** The sectoral distribution of the enterprises in Kahramanmaraş [4].

Sectors	Amount of Organization
Production	318
Wholesale and retail trade	150
Construction	136
Transportation and storage	42
Accommodation and food service activities	41
Education	33
Health and social service activities	27
Administrative and support service activities	26

Professional, scientific and technical activities	21
Production and distribution of electricity, gas, steam and air conditioning	10
Other service activities	8
Mining and quarrying	6
Information and communication	5
Water supply; sewage, waste management	4
Real estate activities	2
Finance and insurance activities	1
Culture, art, entertainment	1
Total	833

The following information pertains to the data collected on 833 businesses in the Kahramanmaraş province.

**Table 2:** Number of employees by sector and gender in Kahramanmaraş [4].

Sectors	Male Employee	Female Employee	Total Employee
Production	47.311	8.122	55.433
Wholesale and retail trade	5.147	2	7.147
Construction	4.592	269	4.861
Production and distribution of electricity, gas, steam and air conditioning	3.47	256	3.725
Administrative and support service activities	3.282	228	3.51
Transportation and storage	2.264	287	2551
Health and social service activities	1.002	1.423	2.425
Accommodation and food service activities	1.577	684	2.261
Education	744	871	1.615
Water supply; sewage, waste management	1.186	110	1.296
Other service activities	1.122	116	1.238
Professional, scientific and technical activities	456	155	610
Information and communication	262	56	317
Mining and quarrying	271	29	300
Real estate activities	56	1	57
Culture, art, entertainment	39	3	42
Finance and insurance activities	23	16	39
Total	72.803	14.625	87.429

The total number of employees for businesses with 20 or more employees in the Kahramanmaraş province is 87,429. Out of these, 72,803 are men and 14,625 are women. As per SSI data from July 2022, 18,817 businesses in the Kahramanmaraş province have employed compulsory 4a insured individuals, with a total of 171,541 employees being insured. Additionally, as of July 2022, the number of insured women was 36,130.

As of September 2022, the number of registered unemployed individuals in the Kahramanmaraş province is 57,390, with 49.1% of them being women. Among the registered unemployed individuals, 32.3% are young adults aged 18-24. Moreover, there are 8,305 unemployed individuals who have not registered with the Institution.

Labor market research was conducted in Hatay in 2022 for

1,038 cooperations. The enterprises in Hatay are distributed across 17 sectors and the data is presented in Table 3.

The cooperations included in this research have 20 or more employees. The employee distribution by sector and gender in Hatay is presented in Table 4.

According to İŞKUR's administrative records and labor market research conducted in 2022, the total number of employees for cooperations with 20+ employees in Hatay province was determined as 195,051. Out of these, 143,655 are men and 51,396 are women.

The Social Security Institution regularly publishes insured statistics every month. For Hatay province, these statistics provide detailed information about the number of insured people and the number of workplaces with 4a insured employees [5].

**Table 3:** The sectoral distribution of the enterprises in Hatay [5].

Sectors	Amount of Organization
Wholesale and retail trade	232
Transportation and storage	216
Production	206
Construction	114
Education	56
Health and social service activities	47
Accommodation and food service activities	42
Administrative and support service activities	39
Professional, scientific and technical activities	24
Other service activities	20
Mining and quarrying	15
Water supply; sewage, waste management Production and distribution of electricity, gas, steam and air conditioning	8
Transportation and storage of electric, gas, steam and air conditioning	6
Real estate activities	6
Culture, art, entertainment	4
Finance and insurance activities	1
Total	1.038

**Table 4:** Number of employees by sector and gender in Hatay [5].

Sectors	Male Employee	Female Employee	Total Employee
Production	22.717	2.826	25.544
Wholesale and retail trade	8.851	3.799	12.65
Transportation and Storage	11.115	850	11.964
Administrative and support service activities	8.978	2.016	10.994
Construction	4.712	504	5.216
Health and social service activities	1.795	2.485	4.28
Education	1.335	1.886	3.221
Accommodation and food service activities	1.405	481	1.886
Transportation and storage of electric, gas, steam and air conditioning	1.401	127	1.528
Water supply; sewage, waste management	983	61	1.043
Professional, scientific, and technical activities	819	188	1.007
Other service activities	519	230	750
Mining and quarrying	623	27	651
Culture, art, entertainment	189	71	260
Real estate	104	53	157
Finance and insurance activities	13	25	38
Total	65.56	15.629	81.189

According to the SSI data for July 2022 in Hatay province, 27,558 workplaces employ compulsory 4a insured workers. These workplaces have a total of 195,051 employees who are 4a insured. In Hatay province, the total number of 4a compulsory insured individuals as of July 2022 is 195,051, out of which 51,396 are

females. In Hatay province, the registered number of unemployed people as of the end of September 2022 is 71,603, out of which 51.8 percent are women. The age group of 18-24 years constitutes 28.4 percent of the unemployed population.

## The Labor Force Statistics in Turkey in 2023

During the first quarter of 2023, Turkey's workforce increased by 132,000 from the previous quarter, reaching 35,040,000. The labour force participation rate remained unchanged at 53.7%, with men having a participation rate of 71.8% and women 36.0%. According to the Household Labor Force Survey, the number of unemployed people aged 15 and above decreased by 62,000 in the first quarter of 2023, reaching 3,483,000 people. The unemployment rate decreased by 0.3 points to 9.9%, with men having an estimated unemployment rate of 8.2% and women 13.4% [4,5].

However, the Household Labor Force Survey 1st quarter survey application could not be carried out in Adiyaman, Gaziantep, Hatay,

Kahramanmaraş, Kilis, Malatya, and Osmaniye provinces due to the country's earthquake disaster. The survey will be conducted in the future.

In 2023, the population of Hatay over 18 years old was 1,064,200, including 528,699 women and 535,501 men. In Kahramanmaraş, the population over the age of 18 was 769,732, with 374,004 females and 379,728 males. The population over 18 years old represents the number of people in the workforce. Comparing the current population of Hatay and Kahramanmaraş with the number of registered employees in 2022 and estimating new ratios for 2023, Table 5 shows the ratio of insured employees to the total population ratio for Hatay and Kahramanmaraş in 2022.

**Table 5:** The ratio of insured employees to the total population in 2022 for Hatay and Kahramanmaraş.

Province	Total population	Total insured employees	Insured employees to total population ratio
Hatay	1,686,043	195,051	195,051 / 1,686,043 $\approx$ 0.1156
Kahramanmaraş	1,177,436	171,541	171,541 / 1,177,436 $\approx$ 0.1458

To estimate the number of insured employees in the new populations of Hatay and Kahramanmaraş in 2023, we can use the ratios we have calculated. We will multiply the population of each province by the respective ratio of insured employees to the total population. The calculation is as follows:

For Hatay:

Estimated insured employees in Hatay = Population of Hatay \* Ratio for Hatay  
 Estimated insured employees in Hatay = 1,064,200 \* 0.1156  $\approx$  123,060 (rounded to 123,060)

For Kahramanmaraş:

Estimated insured employees in Kahramanmaraş = Population of Kahramanmaraş \* Ratio for Kahramanmaraş

Estimated insured employees in Kahramanmaraş = 769,732 \* 0.1458  $\approx$  112,273 (rounded to 112,273)

Based on these estimations, the number of insured employees in Hatay is estimated to be around 123,060 and the number of insured employees in Kahramanmaraş is estimated to be around 112,273 in 2023.

## The share of Kahramanmaraş and Hatay, affected by the earthquake, in the Gross National Income

The following text presents information about the foreign trade shares and the gross domestic product (GDP) of Kahramanmaraş and Hatay provinces in Turkey. According to the data, Kahramanmaraş and Hatay's shares in foreign trade were evaluated in terms of exports and imports, which were 1,412 and 4,067 million dollars and 1,731 and 7,611 million dollars, respectively. However, their shares in the gross domestic product were 0.9% and 1.4%, respectively, in 2021.

Furthermore, the gross domestic product estimate by production method increased by 79.8% in the third quarter of

2023, reaching 7 trillion 681 billion 432 million TL at current prices. This amount equates to 295 billion 815 million US dollars at current prices.

To estimate the GDP contribution of Kahramanmaraş and Hatay provinces in 2023 based on their shares in 2021, we can follow these steps:

1. The GDP of Turkey for 2023 can be calculated by using the growth rate provided:  $GDP_{2023} = GDP_{2023\_Q3} / \text{Growth Rate} = 7,681,432,000,000 / (1 + 79.8\%) \approx 4,274,075,556,013$  TL

2. The GDP values for Kahramanmaraş and Hatay provinces in 2023 can be calculated based on their shares in 2021:  $GDP_{Kahramanmaraş\_2023} = GDP_{2023} * \text{Share}_{Kahramanmaraş\_2021} \approx 4,274,075,556,013 * 0.009 \approx 38,466,679,004$  TL

$GDP_{Hatay\_2023} = GDP_{2023} * \text{Share}_{Hatay\_2021} \approx 4,274,075,556,013 * 0.014 \approx 59,636,857,784$  TL

Based on these calculations, the estimated GDP contribution of Kahramanmaraş in 2023 would be approximately 38.47 billion TL, and the estimated GDP contribution of Hatay in 2023 would be approximately 59.64 billion TL.

It is important to note that the impact of disasters cannot be measured in terms of a single financial figure. Nevertheless, World Bank officers consider that the summed losses that are over 2% of a country's GDP can be catastrophic [2].

## Conclusion

On February 6, 2023, at 04:17 and 13:24 Turkey time, two earthquakes occurred in the epicenters of Kahramanmaraş with magnitudes of Mw7.7 (focal depth=8.6km) and Mw7.6 (focal

depth=7km). On February 20, 2023, at 20:04 Turkey time, another earthquake with a magnitude of Mw 6.4 occurred in Hatay. As a result of these earthquakes, more than half a million buildings were either destroyed or severely damaged, resulting in significant material losses.

In our study, we examined the financial impacts of the earthquakes by evaluating the structural damage and loss of life. We estimated the financial impact on the economy of Hatay and Kahramanmaraş, respectively. To do this, we considered that the population over the age of 18 represents the number of people in the workforce. Since clear data for 2023 was not available, we based our estimates on the ratios of the current population of Hatay and Kahramanmaraş and the registered working population of 2022.

Our analysis showed that the estimated number of insured employees in Hatay in 2023 would be approximately 123,060, and the estimated number of insured employees in Kahramanmaraş would be 112,273. Additionally, we estimated that the GDP contribution of Kahramanmaraş in 2023 would be approximately 38.47 billion TL, and the estimated GDP contribution of Hatay in 2023 would be approximately 59.64 billion TL.

## Acknowledgement

None.

## Conflicts of Interest

There is no conflict of interest.

## References

1. Ömer Faruk Nemutlu, Ali Sari, Bilal Balun (2023) Comparison of Actual Loss of Life and Structural Damage on 06 February 2023 Kahramanmaraş Earthquakes (Mw 7.7-Mw 7.6) with Estimated Values. *AKU J Sci Eng* 23: 1222-1234.
2. Georgescu, Emil-Sever, Antonios Pomonis (2011) A review of socio-economic consequences, losses and human casualties of the 1977 Vrancea, Romania earthquake. *Constructii* 12(2): 21.
3. (2023) Presidency of the Republic of Turkey, Strategy and Budget Presidency, 2023 Kahramanmaraş and Hatay Earthquakes Report, Post-Earthquake Assessment.
4. (2023) Turkish Employment Agency, Labor Market Research Kahramanmaraş Province 2022 Final Report.
5. (2023) Turkish Employment Agency, Labor Market Research Hatay Province 2022 Final Report.