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Covid-19 Risk Analysis of Turkey in the Context of Syrian Influx

Ilhan Can Oze, /Middle East Technical University, Ankara, Turkey

Pinar Derin Gure, Middle East Technical University, Ankara, Turkey

Ecem Yargici, Ludwig-Maximilians-Universitat Munchen, Germany

1. Introduction

The global experience with COVID-19 for the last two years has substantiated a significant difference in the COVID-19 pandemic difference between countries, in the international comparisons of COVID-19 performance of countries, and in the experience with COVID-19 of different subgroups within countries. International scholars are needed to understand the reasons behind the long-term strategy differences between countries and why certain populations have been protected and others left unprotected during this COVID-19 era.

The COVID-19 crisis is finding the unknown vulnerabilities of many countries, as well as allowing some to show and perform a myriad of unknown resiliencies and strengths. In analysing the source of strength, and vulnerability, we have to explore the myriad dimensions of society and the new inequalities and new social issues that have arisen. The analysis of COVID vulnerability must be understood as analysis not only of the health resources and systems but also the aspects of the society that become important for spreading or alleviating contagion or decreasing or increasing the level of disease mortality.

For the Turkish experience, the Syrian integration process is an essential social process that has been analysed by many social scientists in the education, health, economy, and social amity and solidarity dimension. Our paper is the first to look at the Syrian integration in the context of COVID-19 and understand the specific health vulnerabilities for the Syrian refugee population, which are in a unique legal and socioeconomic position in the overall Turkish society.

Syrians have started arriving in Turkish geography in 2012, with an increase in numbers in 2014 and another jump in numbers and integration in 2016. The first observation is that health system integration was reached by the start of the COVID-19 crisis. However, these are not the only vulnerabilities that matter, with the crucial vulnerability in terms of their economic and social situation is much more well established, having to do with their wage level, the degree of the informality of the jobs they are finding, their positions in the cities, and the resources of the neighbourhoods they are living in.

The critical limitation of the data is that we can only analyse at the aggregate level due to the fact that we don't have an individual breakdown for the different ethnic and gender categories. We have data about the provinces and cities with a higher proportion of COVID cases, both in terms of number and its mortality effect.[1] In order to identify the health vulnerability that was dependent on the Syrian integration issue, we have to control for the other effects that are trying to protect the general Turkish population. The most

[1] We measure mortality effect through its impact on excess mortality, observed as the difference in daily mortality trend from the 2015-2019 average.

critical dimensions of macro-protection that were used were implemented through the national restriction laws, which still had significant regional variation (as can be seen by Table 1).

Table 1: *Description of Main Dimensions Included in the Regressions: Data Sources and the Preparation of the Restriction Data at the Province Level*

Dimensions	Epidemic Output	Population Characteristics	Socioeconomic Characteristics	Health System Characteristics	Restrictions
Main Indicators	1-COVID-19 Cases 2-COVID-19 Imputed Cases 3-COVID-19 Associated Excess Death Values	1-Population Size 2-Population Density 3-Old/Young Age Ratio 4- Gender Ratio (M/F) of Population	1-Urbanisation 2-Income level & Income Inequality 3-Household Size 4-Sources of Labour Informality 5-Syrian Prop. in Tot. Population	1-Hospital Provision in 1000 Pop. 2-Bed Provision in 1000 Pop. 3- Physician Provision in 1000 Pop.	1-Schooling Dimension 2-Workplace Dimension 3-Public Events Dimension 4-Public Transport Dimension 5-International Travel Restriction
Periodization of national-provincial data availability	Daily	Monthly	Monthly	Monthly	Daily and Monthly
Data Sources	SB and Municipality Death Records	TUIK	Turkish Stat+TUIK	TUIK+SB Health Stats	Interior Ministry Records

The data that we use for the analysis comes from multiple sources, as shown in Table 1. The sources of the disease parameters have been collected from the Turkish Health Ministry Authorities in terms of the national numbers of cases and the national level of mortality. Regarding the regional distribution, we have used the death numbers from the municipal death records focusing on the top 23 provinces in terms of population.

The restriction data is collected from the Ministry of Internal Affairs and regional governorate records, detailing the restriction decisions that have been implemented in the different regions for the various dimensions of restrictions (we start with the eight main dimensions of the Oxford CRT dimension).

Table 2: *Regional Heterogeneity in the Res. Index Values*

Regions	**Total Average Stringency Index**
Marmara Region	1294,24
Mediterranean Region	1269,88
Aegean Region	1266,91
Black Sea Region	1266,11
Central Anatolia Region	1258,51
Southeastern Anatolia Region	1256,84
Eastern Anatolia Region	1229,77

In our research, all main dimensions from C1 to C8 can get at most value 1, and subsets of the main dimensions get fractions summing up to subsets' fractions resulting in 1. The promise fractions are used as weights.

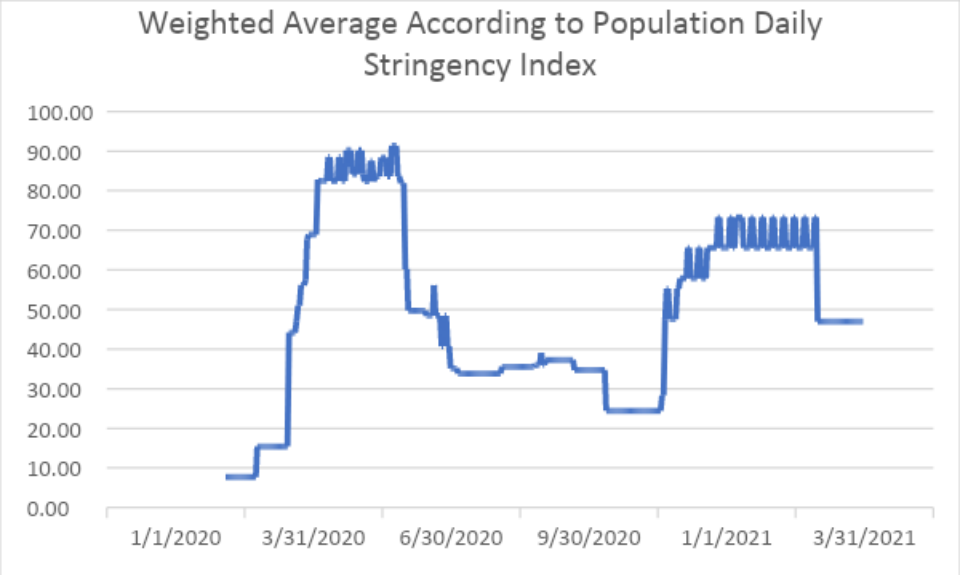
In the OxCGRT index, the leading dimension differs from 2 to 4. Therefore, the total number of the index is different. Also, the tin index can cover over a hundred other than our study. Thus, the direction of movement of the graph lines is used for comparison, not the numerical values.

Although having different shapes until September 2020, both graphs have approximately similar increasing and decreasing trends. After September, according to our study, the government continued to release restrictions until almost the end of October 2020. After that, until the end of December, restrictions have been increased. Until 01.03.2021, restrictions moved within a specific range, then decreased.

On the other hand, according to the OxCGRT graph, the government had increased restrictions after September 2020. However, after the increment at the beginning of September, there was a decreasing trend until December.

Since there is a relationship between a city's population and stringency index, the daily stringency index of Turkey with a weighted average of the city's population is also calculated:

Graph 1: *All Dimensions of Restriction Index- From Administrative Data-Author Calculations*



The situation shows a clear pattern. The initial wave of cases (which was very Istanbul cases) created a national increase in restrictions, which were at the highest level, compared to all other restriction rounds, which was a much more sudden jump. The summer and autumn were a case of significantly decreased restrictions, and the end of autumn 2020 saw a much more step-by-step build-up[2], with the level of national restrictions never reaching the heights it did for the first wave. Table 1 substantiates a similar situation when the Google-Mobility Dataset is analysed for the same provinces, with a similar stringency and smaller elasticity of restrictions in the first round.

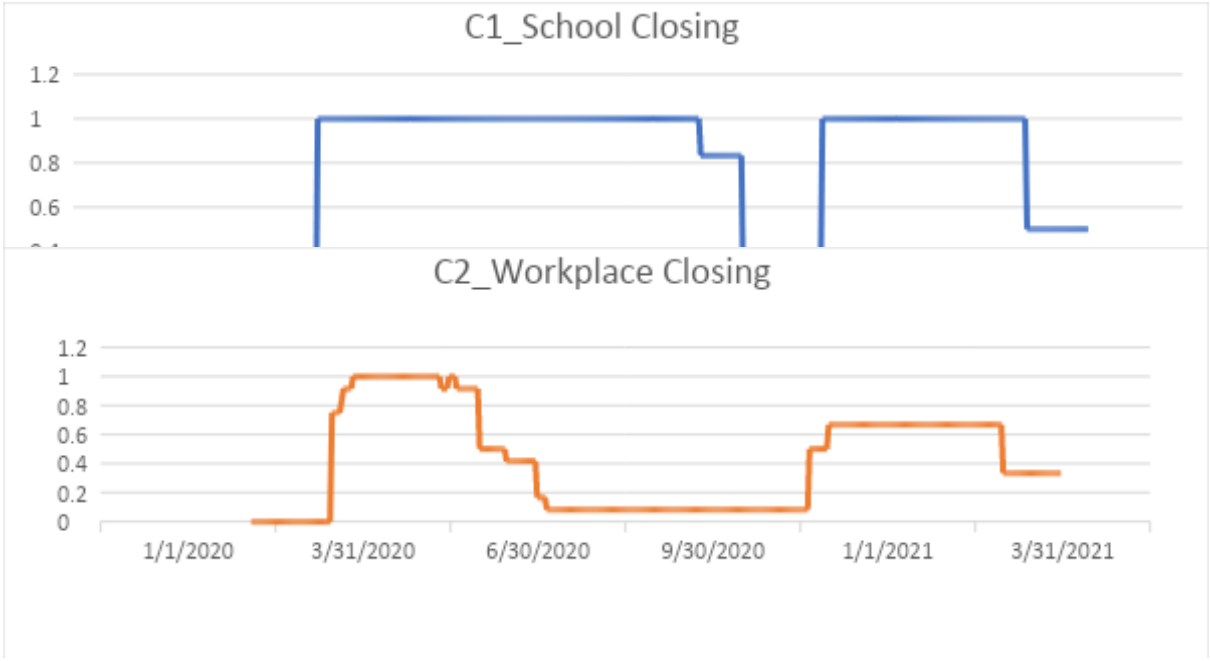
Table 3: *Different Waves and Different Levels of Restriction and Social Mobility*

	Stringency (#|Mean |Var.)	Mobility Rest. (#|Mean |Var.)
1st Wave Equilibrium	6073|| 3.55||1.03	6073||53.42||17.54
2nd Wave Equilibrium	9541|| 3.07 ||1.154	9541 ||4.98 ||21.71
3rd Wave Equilibrium	7444|| 2.88||1.158	7444|| 24.87 ||21.62

The crucial question is, 'How does the Syrian interaction change the timing and severity of restrictions in an area?' We will investigate this question further with an interaction regression, which will be discussed in the next part.

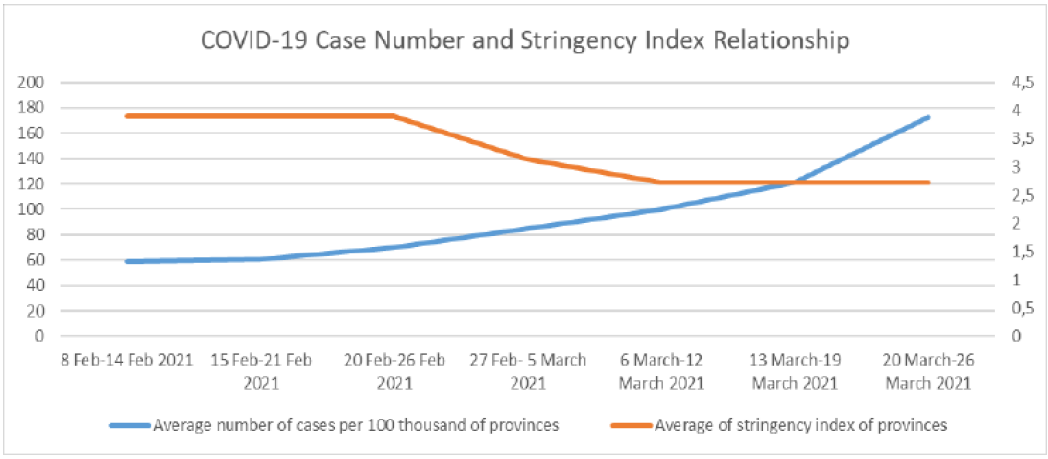
Graph 2: *School Closing Dimensions- From Administrative Data-Author Calculations*

[2] Certain restriction dimensions were returned in late Autumn and early Winter with the same intensity such as schooling dimension-Graph 2, whereas others returned in a significantly watered down format, such as workplace restrictions (see Graph 3).



3. Data Analysis and Regression

Graph 4: *Cases of COVID-19 and Stringency Index of the Study*



As Graph 4 shows, there is a clear case for the restrictions being negatively correlated with the number of cases, with a lag influencing the number of cases through the relaxation of restrictions.

The first OLS regression in this round will be in the simplest form:

$$CV_i = \beta_1 t_i + \beta_2 R_i + \beta_3 D_i + \beta_4 SE_i + \beta_5 O_i + \beta_6 S_i + \beta_7 G_i + \beta_8 HS_i + \gamma_i \quad \text{(Equation 1)}$$

CV is the COVID level (cases) in different provinces per population, with R representing the level of restrictions that we have captured at the provincial level, D is the population density of provinces, SE is the socioeconomic development of provinces, O represents the old/young age distribution, S represents the Syrian proportion of provinces[3], G represents the gender distribution in provinces, and HS represents the health system level development differences between provinces. The significant assumption about the COVID-19 cases is that the underlying deaths from COVID are established from the underlying instances that have been verified three weeks before. We have assumed that restrictions that we are capturing in the nine dimensions are added in an additive, linear fashion. In the robustness part, we will look at how the significance of the restriction will change as the specification of the resilience index changes.

4. Syrian Immigrants and COVID Prevalence-Results:

Using 80 cities (provinces) in Turkey, we look at the impact of the proportion of Syrian Immigrants and restrictions with a set of other explanatory variables. We find that the proportion of Syrian immigrants and restrictions seem to have a significant impact on health burden and excess death. The first set of regressions was undertaken with the data coming exclusively from the 1st wave of the epidemic, where the variance of restrictions was very restricted. As a result, the chance of us entirely identifying the effect of the restrictions will be limited. The restrictions effect is in the direction we expect (decreasing the number and the mortality risk where they are heightened), but we believe the misidentification leads the refugee effect to be wrongly estimated. We would like to point out that the degree of labour market informality in the first round increases the COVID risk, especially at the level of the number of COVID positive cases. We would like to point out that the effect size is more significant for the cases as a dependent variable compared to the death rate with the difference especially observable for the Syrian proportion independent variable, because Syrians are just as susceptible to be infected by the disease, but because of their demographic profile have significantly lower mortality risks (because of having a much smaller proportion of their overall population over the risky age threshold).

In the regression summarised in Table 5, we add data until the first vaccination wave against COVID-19 in March 2021, after which the risk profiles significantly changed. We have also added an interaction variable to capture in the data the relationship between the restrictions and their chance of being higher or lower with the high Syrian provinces. The results suggest that as a result of increasing the breadth of the data, which increases the chance of identifying the restriction effect (which is again negative, even more so), and including the interaction effect, the Syrian rich provinces are not because of the refugee factor actually more vulnerable to the disease, actually quite the opposite. There is a potential data problem that can partially affect our results. There can be more

[3] We have data that is changing in the monthly dimension.

undiagnosed COVID cases among the Syrian refugee population, which needs to be investigated further.

The results are also show through an interaction effect, that all other factors being constant (factors included in Table 1), the provinces with more Syrians are having lower restriction effectiveness compared to other provinces, suggesting the amelioration in disease levels because of restriction index is less observable in these provinces, with a high proportion of Syrian populations under temporary protection. We also investigate further if these provinces have the same level of restrictions in Graph 5.

Table 4: Determinants of Health Burden and Excess Death for COVID-19

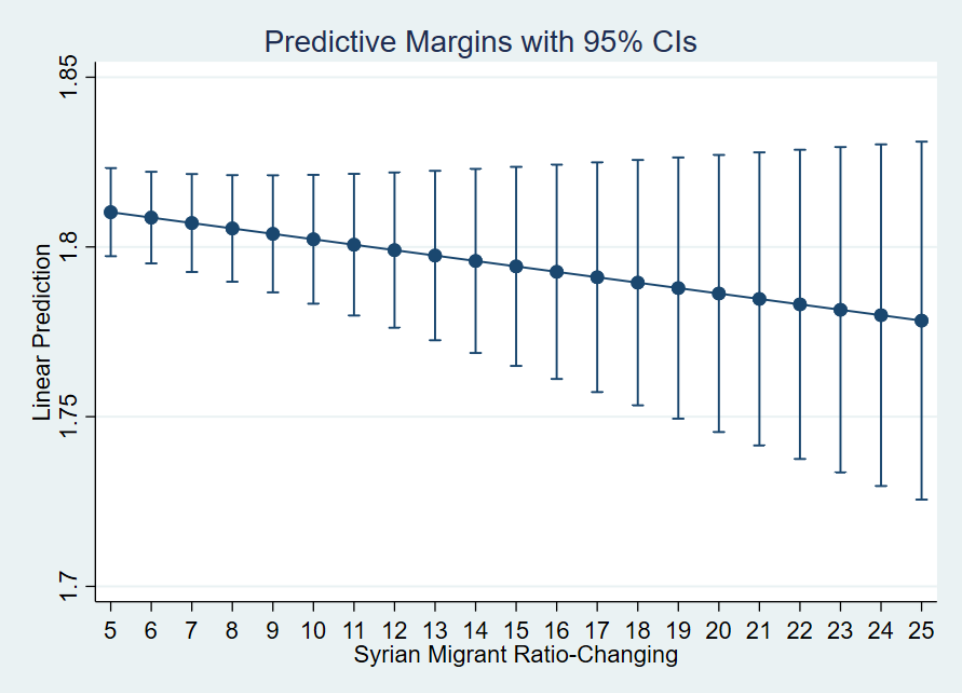
Dependent Variable:	*Health Burden*	*Excess Death*
Distance Comp	122.44	-0.00001**
	(378.85)	(7.85e-06)
Informality	182.54 ***	1.74e-06
	(68.48)	(1.41e-06)
Health Capacity	445.23	-.00005
	(4695.99)	(.00009)
Prop of Immigrants	221.41***	.00001 ***
	(76.78)	(1.59e-06)
Urbanization	200.16	3.37e-06
	(108.28)	(2.22e-06)
Population Density	5.08	1.19e-07
	(1.03)	(7.55e-08)
Average Household Size	-11.46	8.71e-07
	(165.18)	(3.42e-06)
Restriction index	23454.17***	.0002
	(8771.03)	(.0002)
Constant	-84189.17 ***	-.0010*
	(27372.88)	(.0005)
Number of Observations	80	81
R-Squared	0.36	0.49
Note: Standard Errors are in Paranthesis,		
* significant at 10%, **significant at 5%, ***significant at 1%		

Informality: Percentage of Green Card owners

Health Capacity: Hospital bed number and clinic size

Table 5: Panel data, Random Effects Estimations for COVID-19	
Dependent Variable:	*Number of Cases*
Prop of Immigrants	-0.078***
	(0.024)
Restriction index	-0.281**
	(0.123)
Prop of Immigrants X Restriction Index	0.048***
	(0.013)
Constant	0.671***
	(0.225)
Number of Observations	276
R-Squared	0.153
Note: Standard Errors are in Paranthesis	
* significant at 10%, **significant at 5%, ***significant at 1%	

Graph 5: *Restrictions of COVID-19 and The Syrian Proportion in Provinces*



Graph 5 clarifies that the restrictions on provinces are decreasing as the Syrian proportion declines. Together with the effectiveness of the overall restriction index in controlling the explosion of COVID-19 cases, the stated differential in restrictions at the province level is hypothesised to explain the general vulnerability of Syrian rich provinces and potentially the Syrians living in these provinces. In the next step, we want to look at which dimensions these relaxations happen, which create the vulnerability for the provinces and potentially for these populations.

5. Conclusion

COVID-19 has significant impacts on the economy and society, and these impacts might last longer. To plan the future policies and responses, analysing the current policies will be helpful. Therefore, the stringency index can be used for planning policies. Moreover, the index helps create a relationship between cases, economic indicators, etc., and policies.

In this study, the main dimensions of OxCGRT were implemented, and subsets of the main dimensions were created according to the Turkey government responses. It is found that the most crowded regions (as measured by density per km2) and cities of Turkey also have the highest stringency index values. Also, most touristic dimensions and domestic mobility dimensions affect the same stringency index values. It is concluded that population and tourism might affect government policies.

The main difference between provinces' stringency index until the creation of risk groups 01.03.2020 was caused by the prohibition of entry/exit to provinces, daily curfews, ban of circumcision, wedding, henna night, engagement. After that, daily curfews and curfew for citizens under the age of 20 and over the workplace closings created discrepancies between provinces; main dimensions of the index generally move together, and in the summer months the government eased the restrictions. The government started to implement restrictions with restrictions on international movements. The most applied restriction was road transport restrictions, and the least applied restriction was high-end flea market closure. Also, the variation between the total number of restricted days is higher with the workplace closing and restrictions on international travel dimensions. The variation between the total number of restricted days is lower in school closing than the other main dimensions.

We estimate the impact of Syrian immigrants on COVID 19 Prevalence and we find a positive and significant relationship. We also find that restrictions are significantly correlated with both Excess Death and Health Burden.

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