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ABSTRACT
The COVID-19 pandemic induced a volatile pattern in household expenditures on a global scale. In this study, we analyse the mitigating effect of vaccination trends on pandemic-related depression in expenditures by exploiting province-level high-frequency credit and debit card data from a large emerging market, Türkiye. The baseline analysis confirms the moderating role of widespread vaccination with respect to consumption tendencies. Our baseline findings are validated by a myriad of robustness checks. Moreover, we show that this effect on pandemic-household expenditures nexus is stronger for provinces with a higher share of services industries in total value-added.

I. Introduction

The COVID-19 outbreak influenced economic activity, global trade volume, supply–chain relationships, labour market conditions and consumption tendencies worldwide (Chronopoulos, Lukas, and Wilson 2020; Bauer and Weber 2021). Among other factors, mobility restrictions and the deterioration in consumer confidence and income emerge as the main determinants of the slowdown in expenditures. Prior works quantify the regional pandemic-related negative effect (via the number of cases) on household spending together with amplified saving behaviour (Baker et al. 2020).

With the vaccination rollout in 2021, the economic activity has begun to pick up gradually at the global scale, mainly on the back of improving consumer confidence and declining uncertainty. However, the empirical attempts for the link between health policies and expenditures during the pandemic remain relatively scarce. Focusing on a cross-country sample, Furceri, Jimenez, and Kothari (2021) document that the rise in vaccination and rebounded economic activity are coincided, without direct conclusions regarding

consumer spending. We aim to investigate how the relationship between outbreak and expenditures is contingent on vaccination rollout.

Ballantine, Zafar, and Parsons (2014), Forbes (2017), and Yuen et al. (2020) show that particular events increasing uncertainty such as natural disasters and healthcare crises change consumer behaviour. In this sense, COVID-19 intensified consumer uncertainty, especially before the availability of vaccines. In addition to psychological factors, consumption patterns deteriorated more during the pandemic period because of self-isolation and social distancing practices. There are some recent studies analysing the negative effect of COVID-19 on private consumption (Baker et al. 2020; Hodbod et al. 2021; Chen, Qian, and Wen 2021) and the relevant channels influencing consumption behaviour (Horvath, Kay, and Wix 2021).

In this article, we analyse whether the regional household spending in Türkiye (as a prominent emerging market economy) elevated following the widespread vaccination containing uncertainties, improving consumer confidence and facilitating mobility of individuals. For this purpose, we use

a confidential dataset monitoring credit/debit card spending of Turkish households at the provincial level by following an empirical design akin to panel fixed effects approach.[1] Our results suggest that advances in the vaccination programme lead to a statistically stronger moderating impact on household expenditures for provinces in which services sector concentration is relatively higher.

We aim to make contributions to the prior literature on two fronts. First, we provide new empirical evidence supporting the negative association between the intensity COVID-19 infection and provincial consumer spending, specifically for the emerging country context. Second, our findings add to the already limited strand of the literature regarding the link between the health policies (through vaccination programmes) and household expenditures, particularly emphasizing the channel of service industry concentration of the regional economic activity.

II. Data

The household spending with credit/debit cards is monitored by the confidential database which is accessed via Interbank Card Center (ICC). It provides provincial information aggregated at the NUTS-3 level corresponding to 81 localities (of Türkiye) at the weekly frequency (see Online Appendix for the geographical distribution). Moreover, we collect additional spatial information from the FinTurk database, maintained by the Banking Regulation and Supervision Agency of Türkiye (BRSA). Discrepancies in the volume of card expenditures across provinces might be misleading to assess consumption tendencies in the case of high level of geographical disparities regarding financial inclusion and development which is widely observed in emerging markets (including Türkiye) (Takmaz, Sarı, and Alataş 2022). Therefore, regional figures at NUTS-3 level for total loans and consumer loans are compiled to transform card spending volume into ratio forms as a percentage of general financial intermediation activities based on total and consumer credits. To compose our empirical design, we further collect provincial statistics for the COVID-19 infections and vaccination rates from the Ministry of Health database including the first

and second doses of jabs administered and COVID-19 cases. As the control variable, we also assemble time-varying provincial indicator regarding macroeconomic and financial conditions. In this context, due to data limitations at weekly frequency, we follow an alternative approach by utilizing the Google Trends web search data.

The post-treatment period is determined based on the launch of a widespread vaccination programme in Türkiye as well as the data availability for provincial vaccination trends. Thus, the post-treatment phase is composed of a 29-week-long interval between February and September 2021. To achieve a clean identification of household expenditure dynamics negating any influence from pandemic and vaccination, for the pre-treatment episode, we take time interval with a similar duration (29 weeks) ending just before the emergence of the first confirmed COVID-19 case in Türkiye. Due to this criterion, our pre-treatment phase covers the interval between August 2019 and March 2020. Overall, our sample includes 81 provinces with 4698 province-week observations.

III. Methodology

The baseline model is defined as follows:

$$Card\ Expenditures_{it} = \beta_1 Covid_{it}$$
$$+ \beta_2(Covid_{it})x(Vaccination_{it})$$
$$+ \gamma\ Sentiment_{it} + \delta_i + \theta_t + \varepsilon_{it}$$
$$(1)$$

where $CardExpenditures$ describes the household spending in province i at time t. Multiple dependent variables are constructed by dividing spending with total loans ($CardExpenditures1$) and consumer loans ($CardExpenditures2$), respectively. $Covid$ displays the weekly number of new infections during the post-treatment period, while it takes the value of zero throughout the pre-treatment period. $Vaccination$ governs the treatment assignment as it follows the cumulative COVID-19 vaccination rate in the form of $FirstDose$ and $SecondDose$, seperately. The main coefficient of interest (β_2) is related to the interaction term, $CovidxVaccination$, quantifying the potential mitigating effect of

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Table 1. Baseline estimations.

	(1) Card Expenditures 1	(2) Card Expenditures 1	(3) Card Expenditures 2	(4) Card Expenditures 2
Covid	−0.3940**	−0.3676***	−1.6155***	−1.2923***
	(0.1805)	(0.1133)	(0.5064)	(0.3272)
Covid × First Dose	0.0766**		0.2639***	
	(0.0296)		(0.0813)	
Covid × Second Dose		0.0813***		0.2344***
		(0.0192)		(0.0545)
Province Sentiment	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes
Observations	4,698	4,698	4,698	4,698
Adjusted R-squared	0.826	0.827	0.853	0.854

***, ** and * represent statistical significance at 1%, 5% and 10% levels, respectively. SEs clustered at province level are reported in parentheses.

vaccination on the outbreak–spending relationship. Province (δ_i) and week (θ_t) fixed effects control for province-level static heterogeneities and time-varying seasonal forces. A province-level index (*Sentiment*) is also added to account for financial/economic outlook at high frequency. SEs are clustered at the province-level. Variable definitions and summary statistics are provided in Online Appendix.

IV. Results

In Table 1, the variable *Covid* is attached with a negative sign indicating that household expenditures decline significantly due to rising infection rates. Interaction terms contain positive coefficients documenting that increasing vaccination rates significantly mitigate the negative influence of pandemic on household spending. This finding is intact for different definitions of dependent variables as well as for both doses of vaccinations. Overall, our findings validate that the infections are negatively related to card expenditures, whereas the advancement of vaccination opportunities alleviates this economic externality of health crisis. Our baseline results are supported by a myriad of robustness checks, sensitivity tests and additional analyses as presented in Online Appendix.

In the following step, we attempt to perform a cross-sectional analysis for the underlying mechanism. We disentangle the provinces with a high and low share of services industries based on province-level value-added measured by GDP by using data describing the orientation of provinces towards services-related sectors (collected from Turkish Statistical Institute). In detail, we aggregate the economic value creation for sectors like wholesale trade, transportation, hotel & accommodation and restaurant business. We normalize and average the sum by total value creation within a particular province. The classification of provinces into 'high' and 'low' service industry-orientation is performed according to the median threshold value. Then, we repeat baseline estimations separately for two province groups. The moderating influence of vaccination program on pandemic-household expenditures nexus is stronger for provinces with a higher share of the services sector in total economic activity (Table 2).

V. Conclusion

This article contributes to the literature by providing evidence on the mitigating effect of vaccination on the negative impact of the COVID-19 pandemic, with a focus on the channel of service sector concentration of the regional economic activity. The COVID-19 pandemic has resulted in a significant decrease in household expenditures. We identify the effect of vaccination on household expenditures using the province-level data from a large emerging economy, Türkiye. Using high-frequency credit and debit card data at the province-level and panel fixed effect method, we show that household spending is more robust in cities with higher vaccination rates. Additionally, given that the pandemic has greater repercussions on the services sector, vaccination has a stronger impact on economic activity for provinces with a higher share of the services sector.

Table 2. Service industry orientation.

	(1) Card Expenditures 1 (High Service Share)	(2) Card Expenditures 1 (Low Service Share)	(3) Card Expenditures 2 (High Service Share)	(4) Card Expenditures 2 (Low Service Share)
Panel A				
Covid	−0.5589**	−0.2801	−2.0796***	−1.2014
	(0.2080)	(0.2645)	(0.4444)	(0.7763)
Covid × First Dose	0.1008***	0.0625	0.3367***	0.2057
	(0.0349)	(0.0423)	(0.0727)	(0.1228)
Province Sentiment	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes
Observations	2,378	2,320	2,378	2,320
Adjusted R-squared	0.798	0.857	0.844	0.836
Panel B				
Covid	−0.4957***	−0.2483	−1.6648***	−0.8841
	(0.1156)	(0.1804)	(0.2880)	(0.5257)
Covid x Second Dose	0.1014***	0.0643**	0.2987***	0.1697*
	(0.0194)	(0.0305)	(0.0463)	(0.0883)
Province Sentiment	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes
Observations	2,378	2,320	2,378	2,320
Adjusted R-squared	0.801	0.858	0.845	0.837

***,** and * represent statistical significance at 1%, 5% and 10% levels, respectively. SEs clustered at province level are reported in parentheses.

Disclosure statement

No potential conflict of interest was reported by the authors.

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References

Baker, S. R., R. A. Farrokhnia, S. Meyer, M. Pagel, and C. Yannelis. 2020. "How Does Household Spending Respond to an Epidemic? Consumption During the 2020 COVID-19 Pandemic." *The Review of Asset Pricing Studies* 10 (4): 834–862. doi:10.1093/rapstu/raaa009.

Ballantine, P. W., S. Zafar, and A. G. Parsons. 2014. "Changes in Retail Shopping Behaviour in the Aftermath of an Earthquake." *The International Review of Retail, Distribution and Consumer Research* 24 (1): 1–13. doi:10.1080/09593969.2013.821419.

Bauer, A., and E. Weber. 2021. "COVID-19: How Much Unemployment Was Caused by the Shutdown in Germany?" *Applied Economics Letters* 28 (12): 1053–1058. doi:10.1080/13504851.2020.1789544.

Chen, H., W. Qian, and Q. Wen. 2021. "The Impact of the COVID-19 Pandemic on Consumption: Learning from High-Frequency Transaction Data." *AEA Papers and Proceedings* 111: 307–311. doi:10.1257/pandp.20211003.

Chronopoulos, D. K., M. Lukas, and J. O. S. Wilson 2020. "Consumer Spending Responses to the COVID-19 Pandemic: An Assessment of Great Britain." Available at SSRN: https://ssrn.com/abstract=3586723

Forbes, S. L. 2017. "Post-Disaster Consumption: Analysis from the 2011 Christchurch Earthquake." *The International Review of Retail, Distribution and Consumer Research* 27 (1): 28–42. doi:10.1080/09593969.2016.1247010.

Furceri, D., D. Jimenez, and S. Kothari (2021). "The Effects of COVID-19 Vaccines on Economic Activity." *IMF Working Papers*, No. 21/248.

Hodbod, A., C. Hommes, S. J. Huber, and I. Salle. 2021. "The COVID-19 Consumption Game-Changer: Evidence from a Large-Scale Multi-Country Survey." *European economic review* 140: 103953. doi:10.1016/j.euroecorev.2021.103953.

Horvath, A., B. S. Kay, and C. Wix. 2021. "The COVID-19 Shock and Consumer Credit: Evidence from Credit Card Data." *Board of Governors of the Federal Reserve System Finance and Economics Discussion Series* 2021: 1–55. No. 2021-008. doi:10.17016/FEDS.2021.008.

Takmaz, S., E. Sarı, and S. Alataş. 2022. "Financial Inclusion in Türkiye: Unpacking the Provincial Inequality and Its Determinants." *Applied Economics Letters* 1–9. doi:10.1080/13504851.2022.2141442.

Yuen, K. F., X. Wang, F. Ma, and K. X. Li. 2020. "The Psychological Causes of Panic Buying Following a Health Crisis." *International Journal of Environmental Research and Public Health* 17 (10): 3513. doi:10.3390/ijerph17103513.