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Far More Than a Shot in the Arm: Vaccines and Consumer Spending

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Far More Than a Shot in the Arm: Vaccines and Consumer Spending

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Abstract

The spread of the COVID-19 pandemic and government interventions have reshaped economic activity with abrupt changes in household consumption behavior across the world. This paper provides an empirical investigation of how the COVID-19 vaccine rollout has affected consumer spending at daily frequency using debit and credit card transactions in three European countries. Empirical results show that COVID-19 vaccinations, along with other policy interventions, have mitigated the severe negative impact of the pandemic and boosted consumer spending. First, the vaccination deployment has a statistically and economically significant positive effect on private consumption. Second, other policy responses to the pandemic—designed to contain the spread of the virus and provide support to businesses and households—have significant effects on the amount and composition of debit and credit card transactions. Third, the impact of COVID-19 vaccinations in terms of stimulating consumer spending appears to be more pronounced on contact-intensive sectors such as services than goods.

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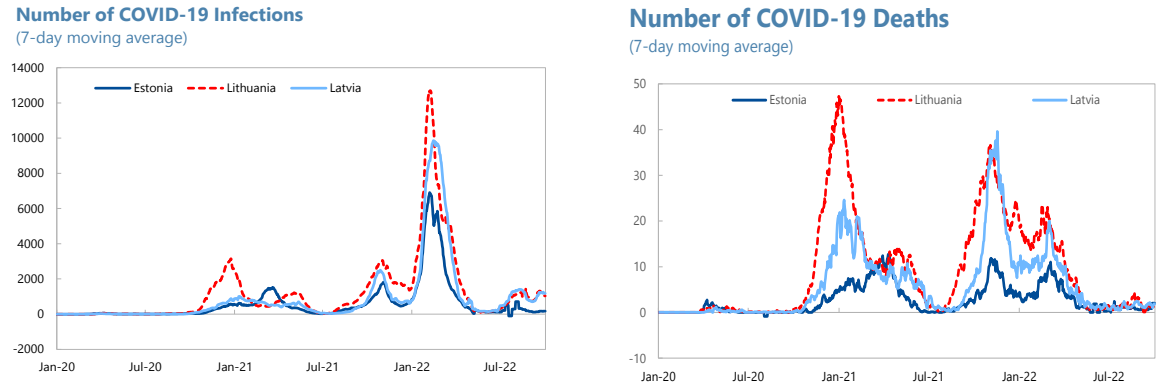
I. Introduction

The COVID-19 pandemic is a massive shock, but vaccination efforts, coupled with other policy interventions, have helped stabilize aggregate economic activity. Over the past three years, the number of COVID-19 cases has reached 763.7 million, resulting more than 6.9 million deaths across the world.[2] The extensive containment and mitigation measures designed to slow the spread of the virus restricted mobility and plunged the world economy into the worst recession since the World War II (Coibon, Gorodnichenko, Weber, 2020; Eichenbaum, Rebelo, and Trabandt, 2020; Fornaro and Wolf, 2020; Hassan and others, 2020; Ludvigson, Ma, and Ng, 2020; Cevik and Miryugin, 2021). While governments implemented a range of policies to cushion the consequences of the pandemic and stimulate economic recovery, the most important turning point in the pandemic is the discovery and rapid deployment of vaccines throughout the world. There is a small but growing strand of the literature on how vaccination affects economic activity (Deb and others, 2022; Gul and others, 2022; Hansen and Mano, 2022; Tevdovski, Jolakoski, and Stojkoski, 2022; Tito and Sexton, 2022). Although the impact of COVID-19 vaccination on economic activity tends to show variation across and within countries, depending on the extent of vaccination and underlying health conditions in population, empirical evidence is unambiguously supportive of the view that the more widespread the vaccination rate, the more confident consumers feel and thereby the faster the post-pandemic economic recovery.

This paper contributes to the literature along several dimensions, including a granular analysis of how COVID-19 vaccination has affected the amount and composition of consumer spending. To shed light on this question, I use daily data on the number of COVID-19 infections (and deaths), the prevalence of COVID-19 vaccination and point-of-sale (POS) debit and credit card transactions as a measure of household consumption in three European countries—Estonia, Latvia, and Lithuania—over the period January 1, 2020 to October 2, 2022. I also control for other policy responses to the pandemic—designed to contain the spread of the virus and provide

Figure 1. COVID-19 Infections and Deaths



Source: OxCGRT; author's calculations.

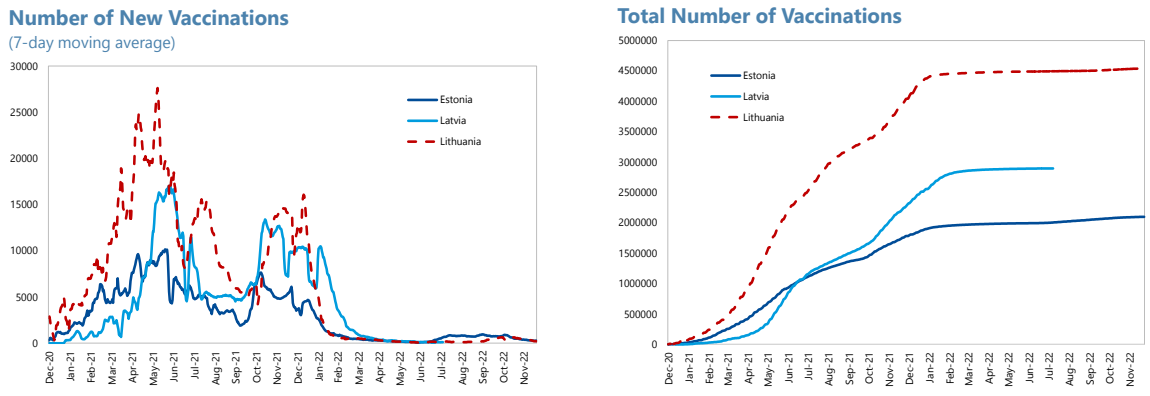
[2] The latest figures can be found at the WHO COVID-19 Dashboard: https://covid19.who.int/.

support to businesses and households. The number of COVID-19 cases (and deaths) has moved in waves across the Baltics (Figure 1). With the high-frequency dataset used in this paper, Cevik (2022) finds that the pandemic shock—as measured by the number of new COVID-19 infections or deaths—had a significant negative effect on consumer spending in the Baltics. Conversely, the COVID-19 vaccination rollout in 2021 and afterwards is expected to have the opposite effect on household expenditures by altering consumer behavior, especially among vaccinated people.

Empirical results show that COVID-19 vaccinations, along with other policy interventions, have mitigated the severe negative impact of the pandemic and boosted consumer spending. First, the vaccination deployment has a significant positive effect on private consumption. A 1 percent increase in the number of COVID-19 vaccinations is associated with an improvement of 0.011 percent in the total amount of debit and credit card transactions. The estimated coefficient may seem trivial, but the cumulative impact grows larger as the intensity of vaccinations increases over time. Second, this effect remains unchanged when I control for other policy responses to the pandemic, which also have statistically significant effects on consumer spending. For example, while a 1 percent increase in the stringency index lowers the amount of card transactions by 0.165 percent, whereas a similar increase in the economic support index brings an increase of 0.004 percent in card transactions. Third, the impact of COVID-19 vaccinations in terms of stimulating consumer spending appears to be more pronounced on contact-intensive sectors such as services than goods. Fourth, I conduct a granular analysis of 33 consumption spending categories and find that there is heterogeneity across spending categories and the impact of vaccination efforts on consumption is particularly greater in magnitude in sectors that are directly restricted by lockdowns and the risk of infection. Finally, I estimate a dynamic version of the model via the Generalized Method of Moments (GMM) method and confirm the persistence in how COVID-19 infections (deaths) and vaccination affect consumer spending.

The remainder of this paper is structured as follows. Section II provides an overview of the data used in the empirical analysis. Section III describes the econometric methodology and presents the findings. Finally, Section IV summarizes and provides concluding remarks.

Figure 2. COVID-19 Vaccination Rates



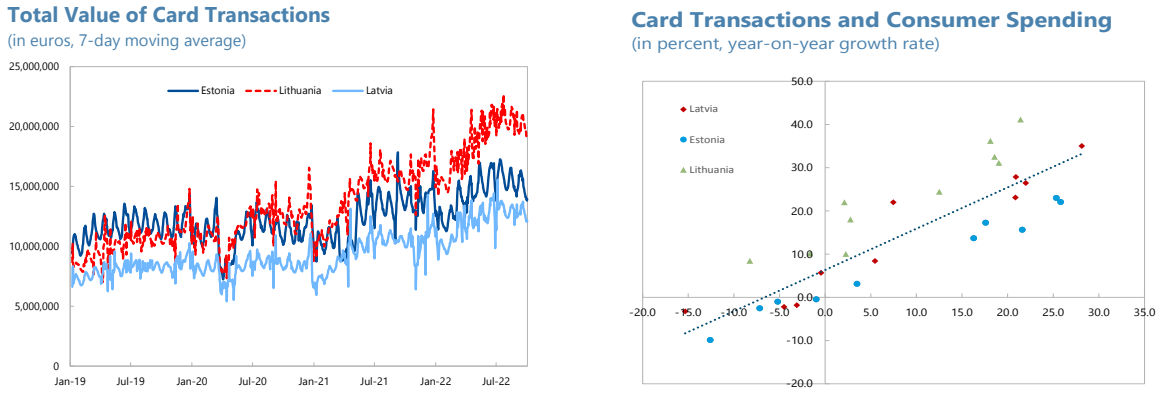
Source: Our World in Data; author's calculations.

II. Data Overview

This section presents the data used in the empirical analysis, which is based on a balanced panel of daily observations of card transactions and various indicators of the COVID-19 pandemic including the prevalence of vaccination. The most comprehensive source of information on private consumption is the national accounts data, but this is not available until two months after the end of each quarter—too late to assess rapidly changing conditions and recalibrate policy responses. To close this information gap and provide a real-time and granular assessment of household expenditures and activity, I use debit and credit card transactions to track consumer spending at daily frequency and estimate the effects of COVID-19 infections and vaccinations, which allows policymakers to properly calibrate policy measures. The underlying data used to construct debit and credit card transactions are acquired from Swedbank—one of the largest retail banks in the Baltics accounting for about half of POS transactions.[3] Disaggregate daily card transaction data cover the period from January 1, 2019 to October 2, 2022 and include 33 spending categories. As illustrated in Figure 3, there is a strong correlation between card transactions and consumer spending in GDP.

Summary statistics, presented in Table 1, show considerable heterogeneity in debit and credit card transactions across the Baltics and over time. The mean value of daily debit and credit card transactions is €13.3 million over the sample period, with a minimum of €602,157 and a maximum of €34.8 million. During the first phase of the pandemic in 2020, the total amount of card transactions in three Baltic countries declined by an average of 2.5 percent year-on-year in the second quarter, after growing at an annual rate of 10 percent in the first quarter. Afterwards, there was an accelerating recovery in consumer spending, albeit with occasional dips and peaks due to the waves of the pandemic and various policy measures introduced by the governments. The total amount of debit and credit card transactions in the Baltics increased by an average of 8.9 percent in the third quarter and 0.9 percent in the fourth quarter of 2020. The recovery

Figure 3. Card Transactions and Consumer Spending



Source: Swedbank; IMF; author's calculations.

[3] POS transactions used in this paper cover both in-store and online purchases.

gained momentum from a growth rate of 0.3 percent in the first quarter of 2021 to an average of 24.6 percent in the remainder of the year and to 27.8 percent in the first three quarters of 2022.

The growth pattern during the COVID-19 pandemic was not homogenous across the Baltics: while Estonia suffered a contraction of 4 percent in debit and credit card transactions in 2020, Latvia and Lithuania experienced an increase of 2 percent and 14.5 percent, respectively. There was also variation in the pace recovery, with Lithuania taking the lead with 26.2 percent in 2021 comparted to 17.9 percent in Latvia and 12.3 percent in Estonia. The breakdown of consumer spending appears to be a contributing factor. Goods purchases account for about 68.5 percent of card transactions on average in the Baltics during the sample period, with purchases of services constituting the rest. The mean values of daily card transactions for goods and services are €9.1 million and €4.1 million, respectively, with goods showing greater cross-country variation than services. Therefore, the empirical model is estimated separately for goods and services, as well as 33 subcategories of consumer spending, to obtain a more granular analysis.

The daily number of COVID-19 infections (and deaths) is drawn from the Oxford Covid-19 Government Response Tracker (OxCGRT) database, while COVID-19 vaccination data is obtained from the Our World in Data repository. The number of new COVID-19 cases varies from a minimum of 0 to a maximum of 15,412, with a mean value of 923 during the sample period. Compared to many other countries, the number of new deaths caused by COVID-19 was limited to 6 in the Baltics, with a minimum of 0 and a maximum of 79. While there is significant variation among three Baltic countries, the rise and fall of COVID-19 infections and deaths have followed a similar pattern. This is also the case with vaccination rates since the rollout in 2021. The number of new vaccinations varies from a minimum of 1 to a maximum of 41,195, with a mean value of 4,873 over the sample period.

The OxCGRT also assembles information on several different common policy responses governments have taken, records these policies on a scale to reflect the extent of government action, and aggregates these scores into a suite of policy indices (Hale and others, 2021). This paper uses the following composite policy indices: (i) stringency index; (ii) containment and

Table 1. Summary Statistics

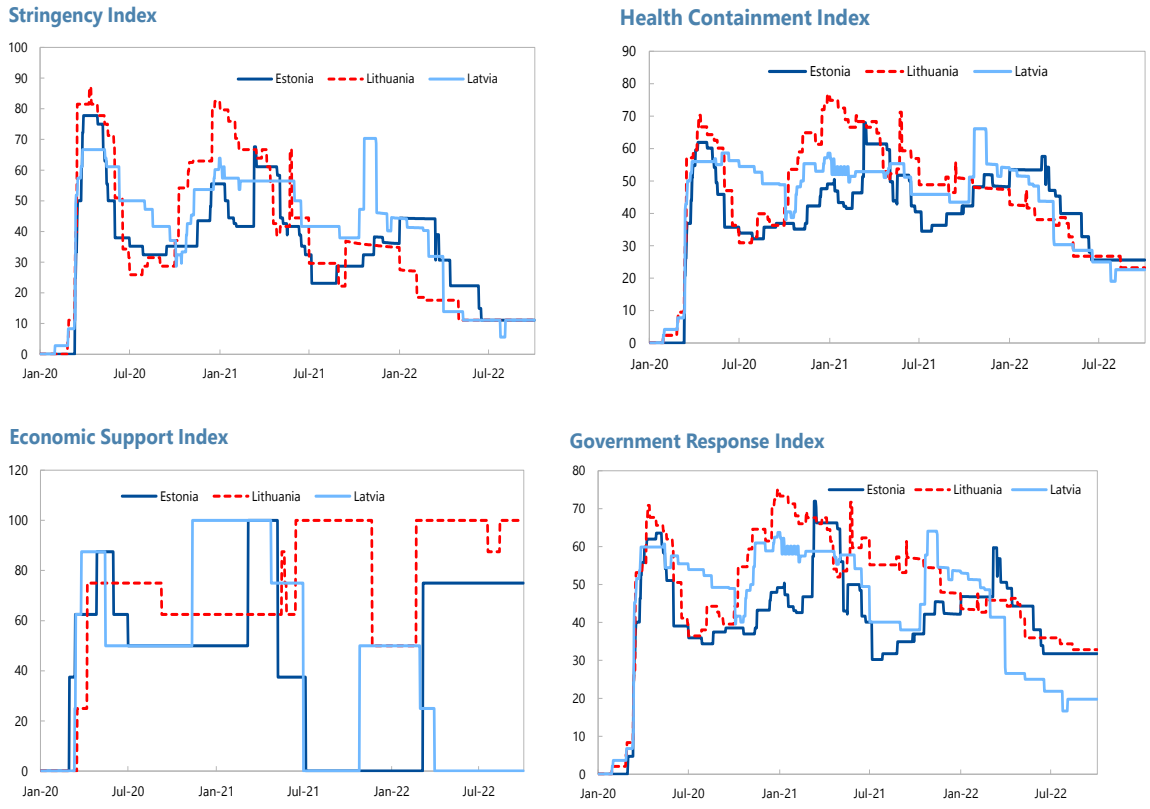
Variable	Observations	Mean	Std. dev.	Minimum	Maximum
Debit and credit card transactions (€)					
Total	3,018	13,300,000	4,836,900	602,157	34,800,000
Goods	3,018	9,121,104	3,202,769	485,225	25,100,000
Services	3,018	4,142,733	1,781,970	102,460	11,600,000
COVID-19					
Infections	3,018	923	1,828	0	15,412
Deaths	3,018	6	9	0	79
Vaccinations	1,955	4,873	6,479	1	41,195
Policy measures					
Stringency index	3,018	36.6	20.7	0.0	87.0
Containment and health index	3,018	42.4	16.4	0.0	76.7
Economic support index	3,018	53.0	35.7	0.0	100.0
Government response index	3,018	43.7	16.5	0.0	74.9

Source: Swedbank; OxCGRT; Our World in Data; author's calculations.

health index; (iii) economic support index; and (iv) overall government response index. Each of these indices report a number between 0 to 100 that reflects the level of the government's response along certain dimensions. While the index is a measure of how many of the relevant indicators a government has acted upon, and to what degree, it cannot say whether a government's policy has been implemented effectively.

These policy measures tend to move in tandem with some variation across three countries and over the sample period: (i) the mean value of the stringency index of NPIs is 36.6, with a minimum of 0 and a maximum of 87; (ii) the mean value of the containment and health index is 42.4, with a minimum of 0 and a maximum of 76.7; (iii) the mean value of the economic support index is 53, with a minimum of 0 and a maximum of 100; and (iv) the mean value of the overall government response index is 43.7, with a minimum of 0 and a maximum of 74.9. As shown in Figure 4, although Baltic governments have responded to the pandemic in similar ways, there are still significant differences in the extent and design of policy measures, especially in providing economic support. Finally, to avoid spurious estimation results, it is necessary to analyze the time-series properties of the data by conducting panel unit root tests. I check the stationarity of all variables by applying the Im-Pesaran-Shin (2003) procedure, which allows for cross-country heterogeneity and is widely used in the empirical literature. The test results, available upon request, indicate that the variables are stationary in levels after logarithmic transformation.

Figure 4. Health and Economic Policy Responses to the COVID-19 Pandemic



Source: OxCGRT; author's calculations.

III. Empirical Strategy and Results

The objective of this paper is to provide a real-time analysis of the impact of COVID-19 vaccinations on consumer spending in a panel of three Baltic countries. Taking advantage of the panel structure in the data, I investigate the effects of the COVID-19 pandemic and policy responses on consumer spending in a panel setting according to the following baseline specification:

$$log(card_{it}) = \beta_1 log(vaccine_{it}) + \beta_2 log(covid_{it}) + \beta_3 X_{it} + \eta_i + \mu_t + \varepsilon_{it}$$

where $card_{it}$ denotes a spending category of debit and credit card transactions in country i and time t; $vaccine_{it}$ is the number of new COVID-19 vaccinations; $covid_{it}$ represents the number of new COVID-19 cases (or deaths); and X_{it} is a vector of health and economic policy measures introduced as a response to the pandemic, including the stringency index, the containment and health index, the economic support index, or the overall government response index. The η_i and μ_t coefficients denote the time-invariant country-specific effects and the time effects controlling for common shocks that may affect consumer spending across all countries in a given period, respectively. ε_{it} is an idiosyncratic error term. To account for possible heteroskedasticity, robust standard errors are clustered at the country level. The model is estimated for aggregate consumption categories (total, goods and services) as well as for the breakdown of 33 spending categories in debit and credit card transactions. This disaggregate approach captures heterogeneity across subsectors and thereby provides a granular analysis of how vaccination affects household consumption patterns.

In addition to the static fixed-effects model, I estimate the dynamic version using the system GMM approach proposed by Arellano and Bover (1995) and Blundell and Bond (1998), which helps correct for estimation biases resulting from the inclusion of the lagged dependent variable, as well as the potential endogeneity of the explanatory variables. The system GMM method involves constructing two sets of equations, one with first differences of the endogenous and pre-determined variables instrumented by suitable lags of their own levels, and one with the levels of the endogenous and pre-determined variables instrumented with suitable lags of their own first differences. I apply the one-step version of the system GMM estimator to ensure the robustness of the results, as the standard errors from the two-step variant of the system GMM method are shown to have a downward bias in small samples.[4]

The use of all available lagged levels of the variables in the system GMM estimation leads to a proliferation in the number of instruments, which reduces the efficiency of the estimator in finite samples, and potentially leads to over-fitting. A further issue is that the use of a large number of instruments significantly weakens the Hansen *J*-test of over-identifying restrictions, and so the detection of over-identification is hardest when it is most needed. Conversely, however, restricting the instrument set too much results in a loss of information that leads to imprecisely estimated coefficients. Estimation of such models therefore involves a delicate balance between

[4] The results remain broadly unchanged when we use the two-step version of the system GMM estimator.

maximizing the information extracted from the data on the one hand and guarding against over-identification on the other. I follow the strategy suggested by Roodman (2009) to deal with the problem of weak and excessively numerous instruments. The system GMM identification assumptions are also validated by applying a second-order serial correlation test for the residuals and the Hansen *J*-test for the overidentifying restrictions. The values reported for AR(1) and AR(2) are the *p*-values for first- and second-order autocorrelated disturbances in the first-differenced equation. As expected, I find that there is high first-order autocorrelation, but no evidence for significant second-order autocorrelation. Similarly, the Hansen *J*-test result indicate the validity of internal instruments used in the dynamic model estimated via the system GMM approach.[5]

Empirical results present a coherent picture of how vaccination efforts, along with other policy measures, have shaped household consumption in the Baltics. The baseline analysis, presented in Tables 2, shows that COVID-19 vaccinations have a significant positive effect on the total amount of debit and credit card transactions across all specifications, thereby mitigating the severe negative impact of the pandemic on consumption. I also find that government interventions—in the form of public health measures to contain the spread of the virus and economic support measures designed to assist businesses and households—have the expected effects on consumer spending. The baseline specification in this analysis displayed in the column [5] of the tables include the number of COVID-19 infections, the prevalence of COVID-19 vaccinations, the stringency index, and the economic support index.

To put these results in perspective, a 1 percent increase in the number of COVID-19 vaccinations is associated with an increase of 0.011 percent in consumer spending as measured by the amount of debit and credit card transactions. The estimated coefficient may seem trivial, but the cumulative impact on consumption grows larger as the number of vaccinations increases over time.[6] Furthermore, although this is not as large as the magnitude of the estimated coefficient on COVID-19 infections (-0.045), it is still considerable enough to partly compensate for the loss in private consumption caused by the pandemic. The effect of vaccination remains unchanged when I control for other government policy responses to the pandemic, which are designed to contain the spread of the virus and provide support to businesses and households. I find that (i) the stringency of NPIs is associated with a significant decline in debit and credit card transactions; and (ii) the economic support index is associated with an increase in debit and credit card transactions. A 1 percent increase in the stringency index lowers the amount of card transactions by 0.165 percent, whereas a similar increase in the economic support index brings an increase of 0.004 percent in card transactions.

These aggregate estimates, however, may mask heterogenous effects of the COVID-19 pandemic and vaccination efforts on consumption subcategories. The decline in consumer spending during

[5] In dynamic specifications estimated via the system GMM approach, all explanatory variables except the lagged dependent variable are taken as "IV-style" instruments or treated as exogenous. The lagged dependent variable is specified as a "GMM-style" instrument due to a potential endogeneity issue and all available lags are used as separate instruments.

[6] For brevity's sake, I do not present the estimation results including the number of COVID-19 deaths (instead of infections), which are broadly similar to the baseline results.

the pandemic, for example, is mostly concentrated in services and goods that are restricted by lockdowns and the risk of infection. Therefore, to obtain a more detailed assessment of the impact of COVID-19 vaccinations on consumer spending as measured by the amount and composition of debit and credit card transactions, I estimate the model separately for goods and services. These results, displayed in Table 3 separately for goods and services, show that the spread of the pandemic has a statistically significant negative effect on both goods and services. It is interesting to observe that the magnitude of the coefficient on COVID-19 vaccinations is slightly larger for goods than services, which may reflect shifts in the composition of services during the pandemic. On the other hand, while the stringency of NPIs dampens the amount of card transactions on both goods and services, the economic support index only matters for goods with no significance for services. In other words, the stimulative impact of economic support measures introduced by governments during the pandemic is statistically significant for card transactions on goods, but not on services, which tend to be more contact-intensive.

The disaggregate analysis of 33 spending categories in card transactions reveals heterogeneity in the pandemic effect across subsectors. I investigate the change in consumption patterns by conducting a granular analysis of 33 spending categories in debit and credit card transactions in the Baltics. These estimations, available upon request, confirm significant heterogeneity across consumption categories. The prevalence of COVID-19 vaccination and other policy measures have significant effects on travel-related expenditures, such as airlines, other types of transportation and hotels, and contact-intensive sectors, such as restaurants and beauty and spa services, as expected.

Table 2. COVID-19 Vaccination and Card Transactions: Baseline

	Total Consumer Spending					
	[1]	[2]	[3]	[4]	[5]	[6]
COVID-19 vaccinations	0.002***	0.009***	0.011***	0.010***	0.006***	0.011***
	[0.082]	[0.094]	[0.095]	[0.095]	[0.088]	[0.095]
COVID-19 infections	-0.025***	-0.032***	-0.032***	-0.035***	-0.028***	-0.045***
	[0.030]	[0.035]	[0.035]	[0.042]	[0.032]	[0.073]
Stringency index		-0.092***				-0.165***
		[0.028]				[0.038]
Containment and health index			-0.218***			
			[0.525]			
Economic support index				0.011**		0.004**
				[0.092]		[0.064]
Government response index					-0.115**	
					[0.245]	
Number of observations	1,657	1,657	1,657	1,657	1,657	1,218
Number of countries	3	3	3	3	3	3
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.89	0.89	0.89	0.90	0.88	0.91

Note: The dependent variable is the logarithm of daily debit and credit transactions. Robust standard errors clustered at the country level are reported in brackets. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Source: Author's estimations.

As a final check of robustness, I estimate the dynamic model with lagged dependent variable to capture persistence over time in consumer spending. These results, presented in Table 4, confirm the negative impact of COVID-19 infections[7] and the positive contribution of vaccination across the Baltics. Furthermore, the magnitude and statistical significance of estimated coefficients are broadly similar to those in the baseline model, especially in the case of our preferred specification including the number of COVID-19 infections, the prevalence of COVID-19 vaccinations, the stringency index, and the economic support index.

Table 3. COVID-19 Vaccination and Card Transactions: Goods and Services

	Goods		Services	
	[1]	[2]	[1]	[2]
COVID-19 vaccinations	0.002***	0.013***	0.005***	0.018***
	[0.047]	[0.225]	[0.198]	[0.334]
COVID-19 infections	-0.028***	-0.057***	-0.036***	-0.056***
	[0.325]	[0.374]	[0.312]	[0.395]
Stringency index		-0.183***		-0.185***
		[0.452]		[0.456]
Economic support index		0.003***		0.028***
		[0.028]		[0.241]
Number of observations	1,657	1,218	1,657	1,218
Number of countries	3	3	3	3
Country FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Adj R^2	0.85	0.88	0.94	0.95

Note: The dependent variable is the logarithm of daily debit and credit transactions. Robust standard errors clustered at the country level are reported in brackets. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Source: Author's estimations.

[7] Including the number of COVID-19 deaths (instead of infections) yields similar results in dynamic estimations.

Table 4. COVID-19 Vaccination and Card Transactions: Dynamic

	Total		Goods		Services	
	[1]	[2]	[1]	[2]	[1]	[2]
Consumer spending $_{t-1}$	0.060***	0.036***	0.044***	0.031***	0.160***	0.194***
	[0.012]	[0.011]	[0.009]	[0.008]	[0.026]	[0.007]
COVID-19 vaccinations	0.017***	0.011***	0.021***	0.022***	0.013***	0.012***
	[0.000]	[0.002]	[0.001]	[0.004]	[0.001]	[0.003]
COVID-19 infections	-0.045**	-0.146***	-0.016***	-0.117***	-0.034***	-0.064***
	[0.019]	[0.037]	[0.007]	[0.024]	[0.007]	[0.020]
Stringency index		-0.009***		-0.261***		-0.125***
		[0.006]		[0.047]		[0.030]
Economic support index		0.112***		0.100***		0.067**
		[0.040]		[0.028]		[0.022]
Number of observations	1,600	1,171	1,600	1,171	1,600	1,171
Number of countries	3	3	3	3	3	3
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
AR (1) p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR (2) p-value	0.152	0.138	0.163	0.152	0.144	0.210
Hansen J-test p-value	0.225	0.210	0.272	0.254	0.236	0.218

Note: The dependent variable is the logarithm of daily debit and credit transactions. Robust standard errors clustered at the country level are reported in brackets. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Source: Author's estimations.

IV. Conclusion

The COVID-19 pandemic is an unprecedented shock, but vaccination efforts, coupled with other policy interventions, have helped stabilize aggregate economic activity. There is a small but growing strand of the literature on how vaccination affects economic activity. The impact of COVID-19 vaccination on economic activity tends to show variation across and within countries, depending on the extent of vaccination and underlying health conditions in population, but empirical evidence so far is unambiguously supportive of the view that the more widespread the vaccination rollout, the more confident consumers feel and thereby the faster the post-pandemic economic recovery.

This paper contributes to the literature along several dimensions, including a granular analysis of how COVID-19 vaccination affects consumer spending at daily frequency as measured by debit and credit card transactions in three European countries (Estonia, Latvia and Lithuania). Empirical results show that COVID-19 vaccinations, along with other policy interventions, have mitigated the severe negative impact of the pandemic and boosted consumer spending. First, the vaccination deployment has a significant positive effect on private consumption. A 1 percent increase in the number of COVID-19 vaccinations is associated with an improvement of 0.011 percent in card transactions. The estimated coefficient may seem trivial, but the cumulative impact grows larger as the prevalence of vaccination increases over time. Second, this effect remains unchanged when I control for other policy responses, which also have statistically

significant effects. For example, while a 1 percent increase in the stringency index lowers the amount of card transactions by 0.165 percent, whereas a similar increase in the economic support index brings an increase of 0.004 percent in card transactions. Third, the impact of COVID-19 vaccinations in terms of stimulating consumer spending appears to be more pronounced on contact-intensive sectors such as services than goods. Fourth, I conduct a granular analysis of 33 consumption spending categories and find that there is heterogeneity across spending categories and the positive impact of vaccination efforts on consumption is particularly greater in magnitude in sectors that are directly restricted by lockdowns and the risk of infection.[8] Finally, I estimate a dynamic version of the model via the system GMM procedure and confirm the persistence in how COVID-19 infections (deaths) and vaccination affect consumer spending

The empirical analysis presented in this paper has important policy implications. First, the speed of vaccination rollout varies from country to country, delaying efforts to reach a critical threshold on coverage across the world. Second, COVID-19 is likely to become an endemic disease (like the common influenza), which could reduce the effectiveness of current vaccines against future variants of the virus. Third, the results emphasize the need for complementary measures that underscore the need for containing the spread of the virus and providing well-targeted economic support.

[8] I obtain unambiguous evidence on the impact of COVID-19 vaccination on consumer behavior, but the risk of infection might have also altered payment habits. In previous pandemics, consumers tend to change payment behavior and reduce the use of cash (Cevik, 2020). Therefore, the extent and intensity of the COVID-19 pandemic may have also resulted in consumers switching from cash transactions to card payments, which might increase the amount of debit and credit card transactions without a corresponding increase in consumer spending.

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