

# Analysis of the COVID-19 Shock, Technology and Trade

## Adopters Types Analysis

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E-payment/E-commerce adopter firms can be categorized into distinct categories based on the specific date in which the firm adopted the technology. Specifically, an adopter firm can be categorized into one of two primary, each of which is further divided into several subcategories that are also determined by the data in which the firm adopted the technology:

1. **COVID Adopters:** This category includes firms that adopted the e-payment/e-commerce technology from 2020 onwards. The subcategories within this group are as follows:
  - COVID Early Adopters: This subcategory includes firms that adopted the technology during the year 2020.
  - COVID Late Adopters: This subcategory includes firms that adopted the technology after the year 2020
2. **Old Adopters:** This category comprises firms that adopted e-payment/e-commerce technology prior to 2020. Within this category, the firms can also be subcategorized into the following groups:
  - 2019 Adopters: This subcategory is for firms that adopted the technology during the year 2019.
  - 2018 Adopters: This subcategory is for firms that adopted the technology during the year 2018.
  - 2017 Adopters: This subcategory is for firms that adopted the technology during the year 2017.
  - Pre 2017 Adopters: Since the BuiltWith dataset is only available from 2016 onwards, this subcategory includes both the adopters during 2016 and those that adopted the technology before 2016.

To better understand the differences between the two major types of adopters – ‘old adopters’ and ‘Covid adopters’ – we compare the average trade characteristics of these groups for two distinct time periods: before 2020 (pre-Covid period) and from 2020 onwards (Covid period). The trade variables compared include the average export/import value, average number of destinations/sources, average number of distinct HS6 exported/imported products, and the total import/export volume for each firm during these periods.

We start by calculating the average of each characteristic for each firm within the two periods. This results in two averages per firm for each characteristic - one average for the pre-covid period and one average for the period from 2020 onwards (covid period).

Next, we conduct a t-test to compare the pre-Covid period and Covid period averages of these characteristics between the two types of adopters. Specifically, we compare the average characteristics of old adopters against those of covid adopters for both time periods. In essence, we’re comparing the average characteristics of the two types of adopters before 2020 and repeating the same comparison for the period from 2020 onwards.

We apply the same t-test methodology to compare adopters within specific categories. Specifically, within the ‘Covid adopters’ group, we compare the average characteristics of ‘Early Covid adopters’ against those of ‘Late Covid adopters’.

In the same vein, within the ‘old adopters’ category, we draw a comparison between two distinct groups of adopters. The first group includes firms that adopted the technology before 2017, and the second group consists of firms that adopted the technology during the 2017-2019 period. This method allows us to discern the contrasts within the adopter categories themselves.

**Note:** The sample employed for these t-tests is identical to the one used to run the regressions for the model assessing whether technology adoption mitigates the impacts of Covid.

## India

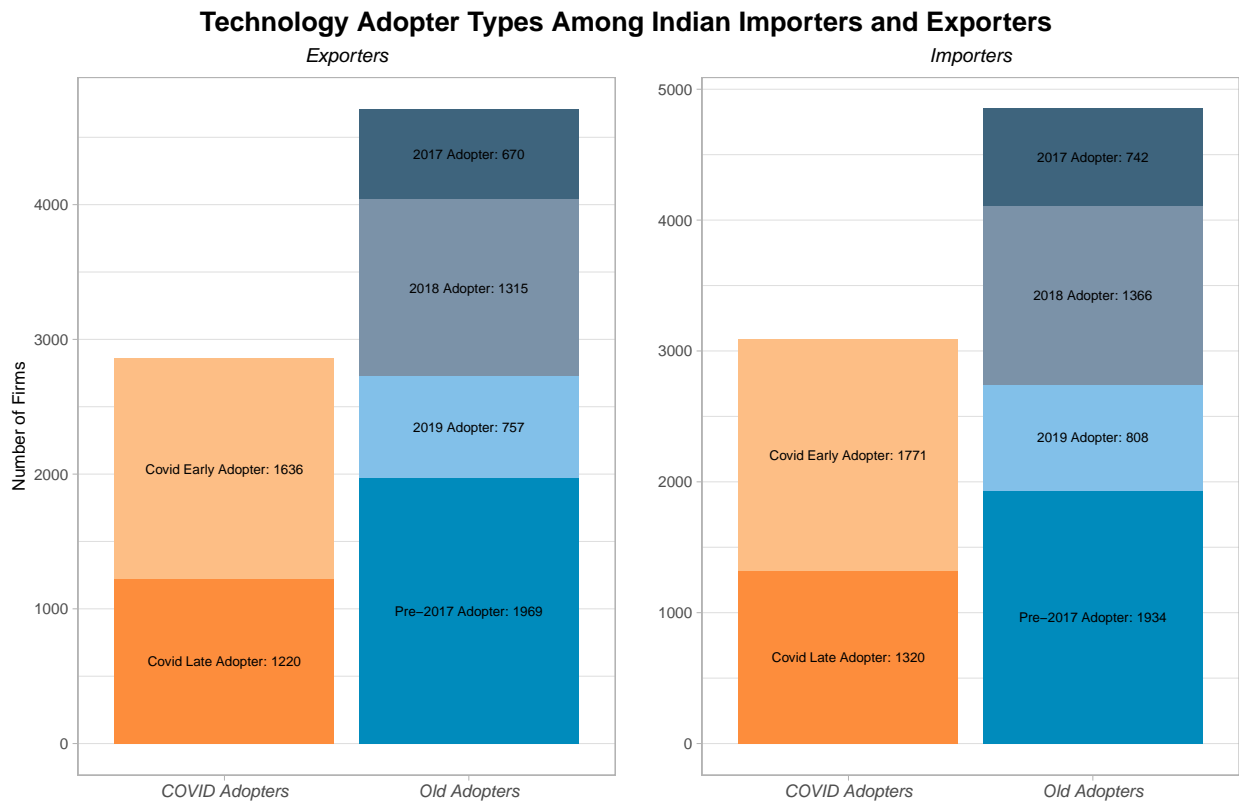


Table 1: India - T-Tests Comparing Average Characteristics of Covid Adopter and Old Adopter During Pre-Covid and Covid Periods

	Mean Covid Adopter	Mean Old Adopter	Difference
<b>Panel A: Pre-Covid Period (Jul 2018 - Dec 2019)</b>			
Mean Export Value (USD)	582,362.4	236,234.8	346,127.7**
Mean No. Destinations	2.7	2.4	0.3**
Mean No. Distinct HS6 Exported Products	3.6	3.5	0.1
Total Export Volume (USD)	9,979,975	3,659,231	6,320,745**
Mean Import Value (USD)	426,576.1	273,212.3	153,363.7*
Mean No. Sources	1.8	1.7	0.1*
Mean No. Distinct HS6 Imported Products	5.1	4.8	0.3
Total Import Volume (USD)	7,104,314	4,432,523	2,671,791*
<b>Panel B: Covid Period (Jan 2020 - Dec 2021)</b>			
Mean Export Value (USD)	606,667.2	232,580.9	374,086.3***
Mean No. Destinations	2.6	2.3	0.3***
Mean No. Distinct HS6 Exported Products	3.5	3.4	0.1
Total Export Volume (USD)	13,725,710	4,771,864	8,953,846***
Mean Import Value (USD)	414,028.9	254,033.7	159,995.2**
Mean No. Sources	1.8	1.7	0.1**
Mean No. Distinct HS6 Imported Products	4.6	4.4	0.2
Total Import Volume (USD)	9,107,832	5,304,020	3,803,812**

Note: Mean variables in the first column denote the average value for the respective variables for each firm within the specific panel period. 'Total Import Volume' and 'Total Export Volume' variables indicate the cumulative trade volume for each firm during the specific panel period. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 2: India - T-Tests Comparing Average Characteristics of Covid Early Adopter and Covid Late Adopter During Pre-Covid and Covid Periods

	Mean Covid Early Adopter	Mean Covid Late Adopter	Difference
<b>Panel A: Pre-Covid Period (Jul 2018 - Dec 2019)</b>			
Mean Export Value (USD)	374,699.6	866,250.7	-491,551.1
Mean No. Destinations	2.7	2.8	-0.1
Mean No. Distinct HS6 Exported Products	3.7	3.4	0.2
Total Export Volume (USD)	6,171,114	15,186,931	-9,015,817
Mean Import Value (USD)	441,443.8	406,843.5	34,600.3
Mean No. Sources	1.8	1.9	-0.1
Mean No. Distinct HS6 Imported Products	5.3	4.8	0.5
Total Import Volume (USD)	7,310,684	6,830,418	480,265.9
<b>Panel B: Covid Period (Jan 2020 - Dec 2021)</b>			
Mean Export Value (USD)	390,215.2	895,467	-505,251.9
Mean No. Destinations	2.6	2.7	-0.1
Mean No. Distinct HS6 Exported Products	3.5	3.5	0
Total Export Volume (USD)	8,513,388	20,680,221	-12,166,833*
Mean Import Value (USD)	417,039.7	409,996.6	7,043.2
Mean No. Sources	1.7	1.8	-0.1
Mean No. Distinct HS6 Imported Products	4.8	4.5	0.2
Total Import Volume (USD)	9,063,005	9,167,865	-104,860.1

Note: Mean variables in the first column denote the average value for the respective variables for each firm within the specific panel period. 'Total Import Volume' and 'Total Export Volume' variables indicate the cumulative trade volume for each firm during the specific panel period. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 3: India - T-Tests Comparing Average Characteristics of Pre 2017 Adopter and 2017 To 2019 Adopter During Pre-Covid and Covid Periods

	Mean Pre 2017 Adopter	Mean 2017 to 2019 Adopter	Difference
<b>Panel A: Pre-Covid Period (Jul 2018 - Dec 2019)</b>			
Mean Export Value (USD)	267,090.5	213,010	54,080.4
Mean No. Destinations	2.6	2.4	0.2
Mean No. Distinct HS6 Exported Products	3.8	3.2	0.5**
Total Export Volume (USD)	4,421,151	3,085,742	1,335,409
Mean Import Value (USD)	392,762.9	193,364	199,398.8**
Mean No. Sources	1.8	1.7	0.1**
Mean No. Distinct HS6 Imported Products	5.4	4.4	1.1***
Total Import Volume (USD)	6,478,010	3,066,333	3,411,677**
<b>Panel B: Covid Period (Jan 2020 - Dec 2021)</b>			
Mean Export Value (USD)	299,609.9	185,365.8	114,244.1*
Mean No. Destinations	2.5	2.2	0.3**
Mean No. Distinct HS6 Exported Products	3.9	3.1	0.8***
Total Export Volume (USD)	6,229,812	3,744,890	2,484,922*
Mean Import Value (USD)	360,062.4	184,854.9	175,207.5**
Mean No. Sources	1.8	1.6	0.2***
Mean No. Distinct HS6 Imported Products	5.1	3.9	1.2***
Total Import Volume (USD)	7,758,246	3,702,751	4,055,495**

Note: Mean variables in the first column denote the average value for the respective variables for each firm within the specific panel period. 'Total Import Volume' and 'Total Export Volume' variables indicate the cumulative trade volume for each firm during the specific panel period. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

# Mexico

Technology Adopter Types Among Mexican Importers and Exporters

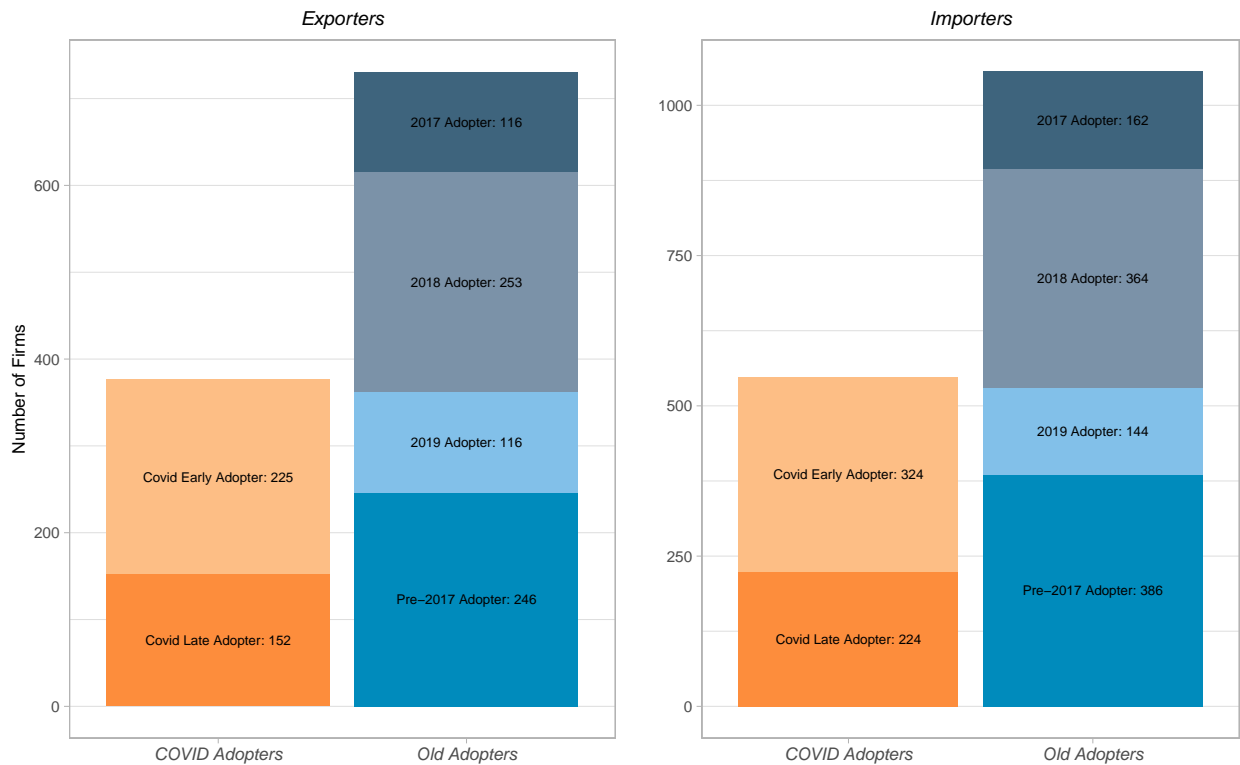


Table 4: Mexico - T-Tests Comparing Average Characteristics of Covid Adopter and Old Adopter During Pre-Covid and Covid Periods

	Mean Covid Adopter	Mean Old Adopter	Difference
<b>Panel A: Pre-Covid Period (Jul 2018 - Dec 2019)</b>			
Mean Export Value (USD)	2,320,075	6,089,288	-3,769,214
Mean No. Destinations	2.6	2.7	-0.1
Mean No. Distinct HS6 Exported Products	6.6	8	-1.5
Total Export Volume (USD)	40,496,690	109,187,667	-68,690,978
Mean Import Value (USD)	1,192,710	2,638,164	-1,445,454
Mean No. Sources	2.9	3	0
Mean No. Distinct HS6 Imported Products	18.4	20.5	-2
Total Import Volume (USD)	21,132,873	47,193,888	-26,061,015
<b>Panel B: Covid Period (Jan 2020 - Dec 2021)</b>			
Mean Export Value (USD)	2,394,647	5,213,786	-2,819,138
Mean No. Destinations	2.5	2.5	0
Mean No. Distinct HS6 Exported Products	6.1	7.7	-1.6
Total Export Volume (USD)	55,771,684	124,106,815	-68,335,131
Mean Import Value (USD)	1,148,670	2,806,535	-1,657,865*
Mean No. Sources	3	3.1	-0.1
Mean No. Distinct HS6 Imported Products	16.7	19.2	-2.5
Total Import Volume (USD)	27,112,222	66,426,348	-39,314,127*

Note: Mean variables in the first column denote the average value for the respective variables for each firm within the specific panel period. 'Total Import Volume' and 'Total Export Volume' variables indicate the cumulative trade volume for each firm during the specific panel period. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 5: Mexico - T-Tests Comparing Average Characteristics of Covid Early Adopter and Covid Late Adopter During Pre-Covid and Covid Periods

	Mean Covid Early Adopter	Mean Covid Late Adopter	Difference
<b>Panel A: Pre-Covid Period (Jul 2018 - Dec 2019)</b>			
Mean Export Value (USD)	2,469,258	2,096,301	372,956.9
Mean No. Destinations	2.6	2.5	0.1
Mean No. Distinct HS6 Exported Products	6.5	6.6	0
Total Export Volume (USD)	42,934,999	36,839,225	6,095,774
Mean Import Value (USD)	1,295,135	1,038,822	256,313.5
Mean No. Sources	2.9	3	-0.1
Mean No. Distinct HS6 Imported Products	19.2	17.3	1.9
Total Import Volume (USD)	23,021,222	18,295,744	4,725,477
<b>Panel B: Covid Period (Jan 2020 - Dec 2021)</b>			
Mean Export Value (USD)	2,572,712	2,127,551	445,160.8
Mean No. Destinations	2.6	2.4	0.2
Mean No. Distinct HS6 Exported Products	6	6.2	-0.2
Total Export Volume (USD)	59,830,116	49,684,036	10,146,080
Mean Import Value (USD)	1,305,703	919,980.5	385,722.2
Mean No. Sources	3	3	0
Mean No. Distinct HS6 Imported Products	18.1	14.8	3.3
Total Import Volume (USD)	31,022,052	21,418,293	9,603,759

Note: Mean variables in the first column denote the average value for the respective variables for each firm within the specific panel period. 'Total Import Volume' and 'Total Export Volume' variables indicate the cumulative trade volume for each firm during the specific panel period. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 6: Mexico - T-Tests Comparing Average Characteristics of Pre 2017 Adopter and 2017 To 2019 Adopter During Pre-Covid and Covid Periods

	Mean Pre 2017 Adopter	Mean 2017 to 2019 Adopter	Difference
<b>Panel A: Pre-Covid Period (Jul 2018 - Dec 2019)</b>			
Mean Export Value (USD)	5,879,707	6,192,560	-312,852.8
Mean No. Destinations	2.4	2.8	-0.4
Mean No. Distinct HS6 Exported Products	7.4	8.4	-1
Total Export Volume (USD)	105,328,230	111,089,419	-5,761,189
Mean Import Value (USD)	2,854,377	2,509,723	344,653.9
Mean No. Sources	2.7	3.1	-0.5*
Mean No. Distinct HS6 Imported Products	20.7	20.3	0.4
Total Import Volume (USD)	51,126,446	44,857,777	6,268,669
<b>Panel B: Covid Period (Jan 2020 - Dec 2021)</b>			
Mean Export Value (USD)	5,440,015	5,098,868	341,147
Mean No. Destinations	2.3	2.6	-0.4
Mean No. Distinct HS6 Exported Products	7.4	7.8	-0.4
Total Export Volume (USD)	128,560,425	121,844,503	6,715,922
Mean Import Value (USD)	3,831,869	2,217,583	1,614,286
Mean No. Sources	2.7	3.3	-0.6**
Mean No. Distinct HS6 Imported Products	19.6	19	0.7
Total Import Volume (USD)	90,676,481	52,497,072	38,179,409

Note: Mean variables in the first column denote the average value for the respective variables for each firm within the specific panel period. 'Total Import Volume' and 'Total Export Volume' variables indicate the cumulative trade volume for each firm during the specific panel period. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

# Indonesia

Technology Adopter Types Among Indonesian Importers and Exporters

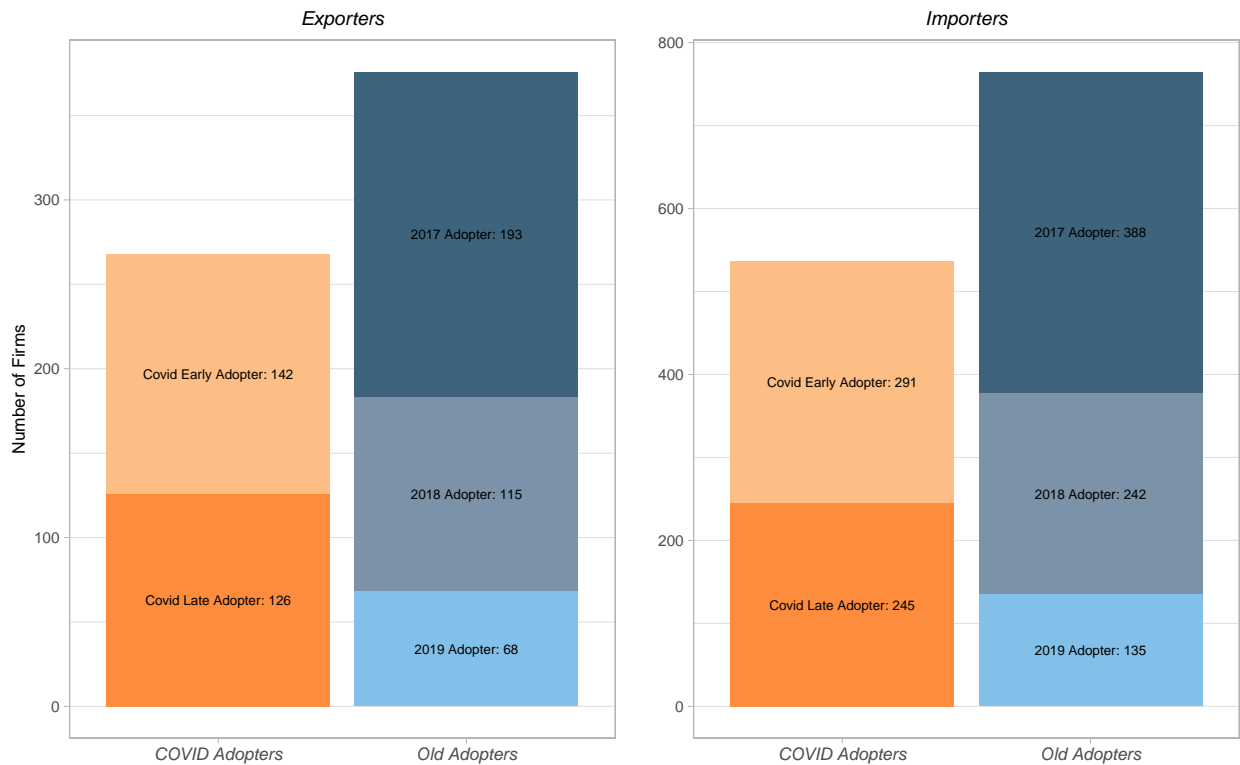




Table 7: Indonesia - T-Tests Comparing Average Characteristics of Covid Adopter and Old Adopter During Pre-Covid and Covid Periods

	Mean Covid Adopter	Mean Old Adopter	Difference
<b>Panel A: Pre-Covid Period (Feb 2019 - Dec 2019)</b>			
Mean Export Value (USD)	3,344,606	1,779,712	1,564,894*
Mean No. Destinations	4.9	4.6	0.4
Mean No. Distinct HS6 Exported Products	4	4.8	-0.8
Total Export Volume (USD)	32,714,972	17,322,268	15,392,704*
Mean Import Value (USD)	1,491,310	1,341,633	149,677.7
Mean No. Sources	3.4	3.2	0.3
Mean No. Distinct HS6 Imported Products	11.9	12.2	-0.3
Total Import Volume (USD)	14,356,996	12,746,605	1,610,391
<b>Panel B: Covid Period (Jan 2020 - Sep 2021)</b>			
Mean Export Value (USD)	4,499,620	2,364,254	2,135,366*
Mean No. Destinations	4.3	4.1	0.2
Mean No. Distinct HS6 Exported Products	3.5	4.5	-0.9*
Total Export Volume (USD)	83,659,709	46,873,686	36,786,024
Mean Import Value (USD)	1,549,271	1,196,888	352,382.8
Mean No. Sources	3.1	2.9	0.2
Mean No. Distinct HS6 Imported Products	11.2	11.5	-0.3
Total Import Volume (USD)	24,841,327	19,797,543	5,043,784

Note: Mean variables in the first column denote the average value for the respective variables for each firm within the specific panel period. 'Total Import Volume' and 'Total Export Volume' variables indicate the cumulative trade volume for each firm during the specific panel period. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 8: Indonesia - T-Tests Comparing Average Characteristics of Covid Early Adopter and Covid Late Adopter During Pre-Covid and Covid Periods

	Mean Covid Early Adopter	Mean Covid Late Adopter	Difference
<b>Panel A: Pre-Covid Period (Feb 2019 - Dec 2019)</b>			
Mean Export Value (USD)	2,278,934	4,537,795	-2,258,861
Mean No. Destinations	3.8	6.2	-2.5**
Mean No. Distinct HS6 Exported Products	3.2	4.8	-1.6*
Total Export Volume (USD)	22,845,883	43,764,978	-20,919,096
Mean Import Value (USD)	1,229,096	1,805,515	-576,418.4
Mean No. Sources	3.2	3.7	-0.5
Mean No. Distinct HS6 Imported Products	9.6	14.6	-4.9**
Total Import Volume (USD)	11,794,127	17,428,019	-5,633,892
<b>Panel B: Covid Period (Jan 2020 - Sep 2021)</b>			
Mean Export Value (USD)	3,413,337	5,723,843	-2,310,507
Mean No. Destinations	3.4	5.3	-1.9**
Mean No. Distinct HS6 Exported Products	2.8	4.3	-1.5*
Total Export Volume (USD)	56,518,106	114,247,865	-57,729,760
Mean Import Value (USD)	1,464,516	1,649,939	-185,423.6
Mean No. Sources	2.9	3.4	-0.5*
Mean No. Distinct HS6 Imported Products	9	13.8	-4.8**
Total Import Volume (USD)	22,299,333	27,860,593	-5,561,259

Note: Mean variables in the first column denote the average value for the respective variables for each firm within the specific panel period. 'Total Import Volume' and 'Total Export Volume' variables indicate the cumulative trade volume for each firm during the specific panel period. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Since BuiltWith for Indonesia is only available from 2017 onwards, to compare adopters within the ‘old adopters’ category, we draw a comparison between firms that adopted the technology before 2018, and firms that adopted the technology during the 2018-2019 period.

Table 9: Indonesia - T-Tests Comparing Average Characteristics of Pre 2018 Adopter and 2018 To 2019 Adopter During Pre-Covid and Covid Periods

	Mean Pre 2018 Adopter	Mean 2018 to 2019 Adopter	Difference
<b>Panel A: Pre-Covid Period (Feb 2019 - Dec 2019)</b>			
Mean Export Value (USD)	1,838,019	1,719,699	118,320.2
Mean No. Destinations	4.9	4.2	0.8
Mean No. Distinct HS6 Exported Products	4.5	5	-0.5
Total Export Volume (USD)	18,304,432	16,311,385	1,993,047
Mean Import Value (USD)	1,403,606	1,276,535	127,071.3
Mean No. Sources	2.9	3.4	-0.5*
Mean No. Distinct HS6 Imported Products	11.8	12.6	-0.8
Total Import Volume (USD)	12,966,412	12,515,715	450,697
<b>Panel B: Covid Period (Jan 2020 - Sep 2021)</b>			
Mean Export Value (USD)	2,420,882	2,304,531	116,350.8
Mean No. Destinations	4.4	3.8	0.5
Mean No. Distinct HS6 Exported Products	4.5	4.5	0
Total Export Volume (USD)	49,724,315	43,867,284	5,857,031
Mean Import Value (USD)	1,340,157	1,049,439	290,718.7
Mean No. Sources	2.8	3.1	-0.3
Mean No. Distinct HS6 Imported Products	11.4	11.5	-0.1
Total Import Volume (USD)	21,287,747	18,263,858	3,023,889

Note: Mean variables in the first column denote the average value for the respective variables for each firm within the specific panel period. 'Total Import Volume' and 'Total Export Volume' variables indicate the cumulative trade volume for each firm during the specific panel period. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .