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RESEARCH PAPER

Tunisians' Dependence on International Remittances during the COVID-19 Pandemic

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Abstract

In this study, we assess the degree of Tunisian households' dependence on migratory remittances during the first wave of the COVID-19 crisis and how much this dependence intersects with economic vulnerability in Tunisia. For this objective, we identify three variables needed for our analysis that reflect remittance dependency, economic vulnerability, and infrastructure inadequacy. Using data from wave eight of the Afro-barometer Household Survey, conducted in 2020, we estimated a multinomial logistic model. The findings show that a significant probability of the most economically vulnerable Tunisians is considered highly dependent on international remittances. Also, we are finding a likelihood of increased receipt of funds through official channels during the lockdown. However, Tunisians dependent on remittances face more economic shortages which are further exacerbated when they intersect with the infrastructure deficit and fewer digital resources. These households will therefore be less able to adapt to a restriction on in-person remittance services during a lockdown to contain the COVID-19 virus. As a result, the paradigm shift from cash to digital money is necessary.

Keywords: COVID-19, Economic Vulnerability, Infrastructure Inefficiency, Multinomial Logistics Model, Remittances.
JEL Classification: F22, F24, I10, O15, R2.

1. Introduction

Household exposure to the different crises that hit the economy remains an important reason behind social and economic vulnerability in developing countries (Nguyen et al., 2020; Edelbloude et al., 2017; Yang, 2008). One of the economic shock experienced by households around the world was SARS-CoV-2, or severe acute respiratory syndrome coronavirus 2 which was discovered in December 2019 in Wuhan City in China (Singhal, 2020). In March 2020, the World Health Organization (WHO) officially named the virus-related disease "Coronavirus

Disease 2019, COVID-19" (Cucinotta and Vanelli 2020). To manage the burden of the COVID-19 pandemic and to mitigate its negative impact on society and the economy, many governments have imposed restrictions on mobility. They have locked down a large part of their society due to strict social distancing measures and workplace closures put in place to limit the spread of the virus during the first wave (Martin et al., 2020). This will have serious repercussions on the world economic outlook (Béland et al., 2020; Mckibbin and Fernando, 2020; Nicola et al., 2020; Ozili, 2020). Indeed, this shock is not equally borne by society as a whole, particularly low-income households already suffering from declining income and poverty. In the literature, several studies have revealed many job losses that have affected income, in particular for low-income and vulnerable groups (ILO, 2020; Krafft et al., 2021).

Migration remittances are one of the major concerns of the sustainable development agenda, adopted by the United Nations in 2015. In order to achieve the target 7 of the objective 10 of this program which suggests to reduce, by 2030, the cost of migrant remittances to less than 3% (UNDP, 2015), remittances are identified as an automatic stabilizer in response to shocks in the origin countries (Habib, 2022; Bettin et al., 2014; Barajas et al., 2009). However, these international remittances, which are part of the globalization cycle, have also been affected by the health pandemic. The potentially significant impact of the COVID-19 crisis on the flow of remittances is due to the loss of employment of migrant workers and mobility restrictions that prevent individuals from meeting remittance service providers in countries of origin and host (Krafft et al., 2021; Asare et al., 2020; Bisong et al., 2020; Gagnon, 2020). Fasani and Mazza (2021), for example, find that COVID-19 is exposing around nine million migrant workers to involuntary unemployment in Europe. In this context, the World Bank's 2020 report announces that migratory remittances are expected to decline an unprecedented rate in recent history as a result of the spread of COVID-19, from $716 billion in 2019 to $665 billion in 2020, a decrease of 7%. This collapse is worth about $50 billion. In low- and middle-income countries, the projected decline is $554 billion to $508 billion, a decrease of 7.1%. Since 2000, the 5% decline in remittances has occurred during the global financial crisis of 2008-2009. Indeed, removing a major source of additional income for many households strongly affects their ability to cope with and emerge from the crisis.

Tunisia is among the countries in the MENA region that received significant remittance amounts of around $2050 million in 2019. This improvement has started to bear fruit in terms of the country's development. According to World Bank data in 2020, Tunisia recorded a share of remittances in GDP of 5.7%. However, as in many countries around the world, this progress will certainly be interrupted by border closures, social distancing and lockdowns. In this context, Tunisia, recorded a significant decline in remittances of -14.8% in 2020 compared to the previous year, going from $2050 million in 2019 to $1747 million in 2020. This loss is the result of the total lockdown imposed in the country during the first wave to contain the pandemic. These flows into Tunisia come from different countries of origin, mainly Europe (Habib, 2022). A more diversified flow of remittances in terms of countries of origin may be better protected against the effects of the pandemic as it has not affected all countries to the same degree simultaneously. Indeed, the decline in remittances is considered among the main exogenous impacts of exposure to the COVID-19 shock on beneficiary households. Declines of this magnitude will affect some populations differently than others. Accordingly, the greatest impact of the health crisis can be expected on households that are most dependent on remittances, and where this dependence, in addition to the infrastructure deficit, intersects with economic difficulties to adapt to the crisis.

During the first wave of the COVID-19 pandemic, the majority of studies focus on estimating economic impacts on global economic indicators including poverty, growth, employment, etc. (ILO, 2020; Nicola et al., 2020; World Bank, 2020). Despite the idea has importance in the contemporary political paradigm, these models have failed to assess the consequences of the pandemic and the associated lockdown policies on household well-being and their degree of dependence on international remittances. Indeed, severe social measures to limit the spread of the virus, including workplace closures have been accompanied by job losses and income volatility (Aggarwal et al., 2022; Krafft et al., 2021). Consequently, this may have affected the well-being of low-income households by reducing their ability to meet basic needs (Torero, 2020).

For Tunisia, studies about these issues are limited. Therefore, the contribution of this paper is twofold. First, there are few empirical studies on the effects of COVID-19 on household well-being. To the best of our knowledge, this study is among the first studies to examine its implications in Tunisia, where the

standard of living of many households depends on the support of a migrant abroad. Second, we used the Afrobarometer survey[1] where it offers a new perspective, which allows us to examine the characteristics of households' dependent on remittances that could potentially make them more or less vulnerable to the COVID-19 crisis. In our analysis, we do not examine all possible dimensions of a population's vulnerability, but rather focus on those aspects that are relevant to households' dependent on remittances and are covered by the survey, including the labor market situation and liquidity problems. Indeed, this survey aims to produce reliable data on the experiences and assessments of households relating to democracy, governance and life quality. Therefore, this study contributes to understanding the potential economic implications of the COVID-19 crisis by focusing on its potential implications lent to remittances using Tunisian households as a case study and examining the problem from two angles, the gain in well-being and the risk of dependence.

The objective of this study is to explore the impact of the COVID-19 lockdown on the dependence of Tunisian households most economically vulnerable on remittances and the importance of the availability of financial and digital infrastructure. First, we constructed variables needed for our analysis that reflect remittance dependency, economic vulnerability, and infrastructure inadequacy within the limits of the availability of the survey data used. Second, we used a multinomial logistic model to examine the degree of dependence of Tunisians on international remittances. This model is considered flexible because the dependent variable is not limited to two categories. Also, this empirical analysis contributes to the emerging literature and complements existing knowledge to inform and guide policymakers to examine the characteristics of households' dependent on remittances and to better design coping mechanisms during the COVID-19 pandemic at the local level.

For the purposes of our analysis, we seek to analyse the following hypotheses: if households are dependent on remittances, we assume that they are the most likely to see their economic situation negatively affected by a sudden drop in remittances due to an exposure to the COVID-19 shock. Also, we assume that households without jobs and with liquidity problems can be considered the most vulnerable because they lose a safety net to solve these problems. Indeed, if

[1]. The dataset used in this study is from wave eight of the 2020 Afrobarometer survey, which was released in 2021. It is available at https://dial.ird.fr/enquetes-statistiques/enquetes-afrobarometre

households' dependent on remittance and with limited access to digital infrastructure, we assume that these households will have less opportunities to receive remittances in the event of a mobility blockage in their country.

The results show that: First, households characterized by the still experiencing shortages of cash and jobless are highly dependent on remittances. These households are considered the most economically vulnerable to the shock induced by the pandemic. Second, a high probability of Tunisian households that have access to a bank are highly dependent on remittances. This may be explained by the increased receipt of funds through official channels during the lockdown. However, those households that are dependent on remittances have less digital resources and face more economic shortages. Furthermore, these results suggest important policy implications. The country's decision-makers can facilitate the circulation of migration funds. This requires reducing the cost of remittances to help mitigate the COVID-19 crisis. Also, digital remittance services are often cheaper and less likely to spread the virus than in-person services which are feared as a potential pathway of contagion.

The rest of this paper is structured into five sections. The second presents a literature review. The third section focuses on a detailed description of our methodology. The fourth section is a summary of the results obtained. The last section concludes and proposes the implications of economic policies.

2. Literature Review

Contrary to the Neoclassical Economics, the New Economics of Labor Migration (NELM), founded by Stark and Bloom (1985), shows that migration is a collective strategy and not an individual decision in order to remedy the situations harmful to development that characterize developing countries (income inequality, poverty, unemployment, low growth) and to improve the standard of living of resident households in the origin countries through remittances (Acosta et al., 2008; Barham and Boucher, 1998). In this context, emigration constitute, at the individual and family levels, a strategy for diversifying sources of income given the situation of ambient uncertainty which requires vulnerable households to seek additional income (Maharjan et al., 2020; Singh and Basu, 2019). Thus, migrants' remittances are the main bridge linking migrants to their families in countries of origin (Gubert, 2017).

Remittances are among the main factors of economic growth and poverty reduction in several developing countries (Majeed, 2015; Barajas et al., 2009; Acosta et al., 2008; Lucas and Stark, 1988). Most studies highlight the altruistic motivation of migrants to send funds to their origin countries (Agarwal and Horowitz, 2002; Elbadawi and Rocha, 1992). Following this assumption, remittances can be an important lifeline for development supporting adaptation to political, economic, natural and health crises. (Gagnon, 2020; World Bank, 2020; Akhter and Islam, 2019; Mawejje, 2019; Edelbloude et al., 2017; Bettin et al., 2014; Radha, 2005).

Several previous studies examine the hypothesis that remittances counter-cyclically respond to an economic shock (Mouhoud, 2016; Ebeke, 2010; Neagu and Schiff, 2009 Radha, 2005). They increase during periods of economic downturn or after a natural disaster, helping beneficiary households to maintain their level of well-being. Indeed, the support provided to the family budget by migrants' remittances constitutes a form of insurance against the precarious living conditions of the beneficiary households. But, the regularity of remittances allows households to settle in a situation of dependence. This dependence on foreign remittances is similar to what economists call the “liquidity trap” (Daffé, 2008). This is explained by the certainty that households receive regular remittances. So, any additional flow of remittances is quickly lost through misuse when they are no longer limited to smoothing the necessary expenses. As several studies have shown, regular remittance flows can lead beneficiary households to reduce their work effort and increase their leisure time, which contributes to reinforcing the dependence between the migrant and his family in the origin country (Habib, 2022; Murakami et al., 2021; Chami et al., 2018).

In the context of the COVID-19 pandemic, the term of Contra-cyclicity of remittances loses its meaning. The World Bank (2020) predicts a significant reduction in this global flow. Thus, Orozco (2020) estimates that around 35% of migrants to send less than 5% of their previous remittance volumes during COVID-19. This decline in remittances is mainly due to the loss of employment of migrant workers and the risks of being stuck in vulnerable situations (Fasani and Mazza, 2021; Callaham, 2020; Gagnon, 2020; Hubbard, 2020) and the impact of containment and lockdown measures on households' ability to access the remittance service (Mora and Rutkowski, 2020; Orcozo et al., 2020). Thus, an exogenous shock has had various socio-economic and political consequences in all

countries (Béland et al., 2020; Ozili, 2020). In addition, these mobility bans in most countries around the world lead to a reduction in international migration, which reduces the number of migrants sending funds to their origin countries (Clemens, 2020).

The containment policies taken due to the COVID-19 pandemic will jeopardize the level of consumption and savings of low-income households' dependent on labor income through the reduction of the number of working hours (Baldwin and Weder di Mauro, 2020; Arendt et al., 2020). Kansiime et al. (2021) report that low-income Kenyan and Ugandan families who depend on labor income are more vulnerable to income shock during the COVID-19 pandemic. In the same context, Habib's study (2020) on Tunisian and Moroccan households shows a certain degree of dependence of the most vulnerable families on the amounts sent by their resident members abroad during the COVID-19 crisis. This dependence has devastating consequences, in particular the increase in unemployment and the economic shortage of households in the event of lockdown measures in response to the COVID-19 health crisis. Furthermore, Bisong et al. (2020) examine the effects of a decrease in the consumption of remittance-dependent households during the lockdown period due to a work stoppage in the receiving countries of migrants. In a comparative study between a set of African countries, Kalantaryan and McMahon (2021) showed that a drop in remittances contributes to worsening the economic situation for households who report being dependent on these foreign incomes during the pandemic. The authors also show that the containment measures adopted by countries are likely to limit people's ability to send and receive funds in person. However, the economic implications of COVID-19 could be further compounded when they intersect with the exclusion of financial and digital infrastructure to adapt to the crisis. Closures of banks and offices of Western Union and other transfer operators have been reported in many countries around the world (Win and Barkawi, 2020; Zaatari, 2020; Miles, 2020). By contrast, Afford (2020) shows that in the UK, remittance operators have been recognized as an "essential business" that can remain open during the crisis. Also, Bossone (2020) highlights how the payment system can be further improved to facilitate the circulation of remittance flows.

This decline in the remittance flows due to the current global health crisis will have different implications on the recipient households most dependent on these foreign incomes. So, these remittances can be a gain in the face of the

beneficiaries' precarious living conditions and the instability of the macroeconomic environment, as they can be a loss due to the risk of dependency.

3. Data and Methodology

3.1 Sample Selection and Data Collection

To study the impact of Tunisian households' dependence on remittances on economic vulnerability and to assess the policy responses in a rapidly changing context, reliable data are imperative. In this regard, we analyse micro-data from the Afrobarometer survey, a panafricain research network capturing attitudes towards social, political and economic issues. It collects detailed information on a wide range of topics, including household demographics, education, markets, governance, quality of life, and other aspects of development. Thus, seven rounds of surveys were conducted in 38 countries between 1999-2018. In particular, we use data from round eight, conducted in Tunisia during the period 2019-2020. Afrobarometer conducts face-to-face interviews in the language chosen by the respondent at the national level.

The Afrobarometer survey in Tunisia is led by the national partner, “One to One for Research and Polling”. It interviewed a random and nationally representative sample that includes 1200 Tunisian households aged 18 and over, which is stratified by the main subnational unit of government (province, region) and by urban or rural location. A randomly selected sample of n=1,200, gives results at the country level with a margin of error of +/- 3 percentage points at a 95% confidence level. The survey base was created on the basis of the final results of the last census carried out in Tunisia in 2014 by the National Institute of Statistics (INS).

Based on the availability of the survey data used, to analyse the interest variable, the dependence on remittances, we use an Afrobarometer survey item that indicates whether respondents received or not remittances. The question asked is: “Considering all the activities you engage in to secure a livelihood, how much, if at all, do you depend on receiving remittances from relatives or friends living in other countries?” Responses were divided into four categories based on how frequently respondents received remittances: (1) Not at all i.e. there are no remittances, (2) A little dependent, (3) somewhat dependent, and (4) lot dependent.

To analyse economic vulnerability, we use two items from the Afrobarometer survey relating to labor market status and the liquidity problems

they report facing. The question asked about the employment situation is: "Do you have a job that pays a cash income?" The possible answers are: (1) employed, part-time and full-time and (2) unemployed. And, the question of the lack of liquidity is the following: "Over the past year, how often, if ever, have you or anyone in your family: Gone without a cash income?" The possible answers are: (1) Never lack liquidity, (2) Sometimes, (3) Several times and (4) Always, lack liquidity.

Finally, to analyse the level of inadequacy of the digital and financial infrastructure, we use three questions from the Afrobarometer survey relating to the availability of a bank in the residential area, the availability of a bank account and the availability of internet access. So, the questions asked are: "Are the following infrastructures available in or within walking distance of this sampling unit/enumeration area? Banks." The possible answers are: (1) Yes, with access to a bank and (2) No, without access to a bank. "Which of these things do you personally own: Bank account?" The possible answers are: (1) Yes, has a bank account and (2) No, no one in the household has a bank account. And the last question: "Which of these things do you personally own: Mobile phone? [If "Yes"] Does your phone has access to the internet?" The possible answers are: (1) Yes, with internet access and (2) No, without internet access.

3.2 Methodology

3.2.1 Variables of Interest

Following the methodology adopted by Kalantaryan and McMahon (2021), we identify the following three variables in order to analyse the degree of dependence of the Tunisian households' dependence on remittances sent by their members abroad. Also, we analyse the economic vulnerability which could be further exacerbated by the unavailability of the financial and digital infrastructures necessary to adapt to the COVID-19 crisis.

1-Remittance Dependency

Some beneficiary households consider migration remittances as an essential lifeline when there is a lack of money problems (Mouhoud, 2016; Radha, 2005). However, the durability of remittances can contribute to reinforcing the dependence on these remittances between the migrant and their family of origin and to decreasing labour market participation (Habib, 2022; Chami et al., 2018). Households' dependent on remittances are the respondents to the question, if they receive remittances, to what extent they depend on them. These households may

respond “A little”, “Somewhat” and “A lot” dependent on migration remittances. The sum of these three responses indicates the proportion of the population that depends on remittances in Tunisia. Thus, we propose the hypothesis that these households are the most likely to see their economic situation negatively affected by a sudden drop in remittances due to the COVID-19 crisis.

2-Economic Vulnerability

In general, the concept of vulnerability is a tool to describe the states of insecurity of physical and social systems and to guide the normative analysis of actions to improve well-being through risk reduction (Hoddinott and Quisumbing, 2003). This concept has been adopted in several disciplines. For example, in the field of economics, this risk has been often the proportion to suffer from a significant well-being shock which can itself limit the resilience capacities of individuals (Alwang et al., 2001; Chambers, 1989). Several studies insist on the relationship between risks and coping capacity. Indeed, the differential vulnerability of individuals and groups increases when the risks increase and vice versa. This notion is widely used in studies of vulnerability to natural shocks and climate change and their impacts on society (Schilling et al., 2020; Afriyie et al., 2018; Bettin et al., 2014; Adger and Kelly, 1999; Liverman, 2013). In theory, economic vulnerability is the amalgamation of several factors. In our study, it is de facto assimilated to exposure to the COVID-19 shock, through the degree of household dependence on remittances. Notably, economic vulnerability is not only the share of families’ dependent on remittances that face cash flow problems, but also the share of those families that they are unemployed. Indeed, in the context of the COVID-19, many jobs are at risk. Based on data from a survey by the Economic Research Forum (ERF), Krafft et al. (2021) show that around 16% of salaried workers in Tunisia lost their jobs in October 2020.

Survey data indicate that households that report being dependent on remittances are the most or least economically vulnerable. This can be taken according to their labor market situations (with or without employment) and the lack of liquidity (lack of money) that may be faced. Thus, in a context of confinement where remittances are interrupted, we propose the hypothesis that households without jobs and with cash flow problems can be considered the most vulnerable because they lose a safety net to solve these problems.

3-Insufficient Infrastructure

The economic effects of COVID-19 are worsening with the problems of inadequate infrastructure in the countries. Indeed, closures of banks and money transfer operators have been reported in several countries around the world during the crisis (Miles, 2020; Zaatari, 2020). These measures have an influence on the amounts of remittances as they can affect individuals to meet with the intermediaries of remittances and service providers. Bisong et al. (2020) indicate the transition to digital remittances is needed as a solution to this challenge. This type of remittances does not require individuals to physically visit an office and responds to lockdown and social distancing measures. Also, according to the World Bank, digital remittances are often around 50% less expensive than traditional remittance channels. Indeed, the availability of the digital infrastructure for sending and receiving funds depends on a bank account and an internet connectivity.

The survey data focuses on households receiving remittances who reside in areas without a bank, do not have a bank account, and do not have access to the Internet. These indices give an idea of the level of inadequacy of the digital and financial infrastructure. Thus, we propose the hypothesis that households' dependent on remittance and with limited access to digital infrastructure, will have less opportunities to receive remittances in the event of a mobility blockage in their country.

Table 1. Construction of Variables

Variables	**Modalities**
Remittance Dependency (RD)	DR1: Share of the population dependent "A little" on remittances. DR2: Share of the population "Somewhat" dependent on remittances. DR3: Share of the population dependent "A lot" on remittances.
Economic vulnerability (EV)	*Lack of cash (LC)* *EV1:* Share of the population dependent on remittances, facing cash problems "Sometimes" per year. *EV2:* Share of the population dependent on remittances, facing cash problems "Several times" per year. *EV3:* Share of the population dependent on remittances, facing cash problems "Always"

	Unemployed (U) *EV4:* Share of the population dependent on remittances and unemployed.
Insufficient infrastructure (II)	*Access to a Bank (B)* *II1:* Share of the population dependent on remittances, resides in areas without a bank. *Has a bank account (BA)* *II2:* Share of the population dependent on remittances, without a bank account. *Internet access (I)* *II3:* Share of the population dependent on remittances, without access to the Internet by mobile phone.

Source: Research finding, based on the Afrobarometer survey.

3.2.2 Empirical Method

The qualitative data was analysed using a multinomial logistic model which was used to highlight the likelihood if the expected decrease in remittances creates a significant impact on the households that are the most dependent on it, and those who have cash shortages. Long and Freese (2001), Heck et al. (2014) and Field (2018) have shown that the use of a multinomial logistic regression is to predict the probability of several independent variables to belong to a category of a dependent variable. As in a binary logistic regression, multinomial logistic regression uses the maximum likelihood estimation to assess the probability of categorical membership. Then, this type of model allows for determine the decision probability of a respondent in a particular discrete multinomial choice, conditioned by the values of the independent variables. Nevertheless, this type of model does not allow for directly reading the model's coefficient estimation results. Indeed, it is necessary first to calculate the relative risk ratio (RRR) in order to be able to interpret the results.

In our study, we will use the multinomial logit model where the dependent variable, dependent remittances (RD_i), can take more than two categories ($m>2$) (Heck et al., 2014). We assume that the number of categories ($m_i = 0, 1, 2, \ldots M_i$ *with* $M_i = 3$) of a qualitative dependent variable RD_i, observed for the i^{th} individual ($i = 1, \ldots N$ *with* $N = 1200$). We will limit ourselves to the simpler case where this number is assumed to be fixed for the entire sample. Equation (1) expresses which of the independent variables (Xi) significantly predict(s) whether a household chooses the categories "A little dependent" (coded 1), "Somewhat dependent"

(coded 2) or "A lot dependent" (coded 3) against the reference category "No dependency" (coded 0).

$$Prob\left(RD_i = m — X_i = X_1, X_2, \dots X_N\right) = Prob\left(RD_i = m — N\right) \; ; \quad m = 0, 1 \dots M \tag{1}$$

The aim is to find the m probabilities $(Prob(RD_i = 1), Prob(RD_i = 2), \dots, Prob(RD_i = m))$ $car\ Prob(RD_i = 0) = 1 - \sum_{m=1}^{M} P(RD_i = m)$. Each of these probabilities is written as a function of the independent variables X_i and a vector of parameters β. The response probability of the individual who chooses the modalities ($m = 1, \dots M$) is defined by the following equation:

$$Prob(RD_i = m \,/\, X_i) = \frac{\exp(X_i \beta_m)}{1 + \sum_{h=1}^{M}(X_i \beta_h)} = Prob_m(X_i, \beta); m = 1, \dots M \tag{2}$$

Thus, Equation (3) defines the probability of the reference category ($m = 0$):

$$Prob(RD_i = 0 \,/\, X_i) = \frac{1}{1 + \sum_{h=1}^{M}(X_i \beta_h)} = Prob_0(X_i, \beta) \tag{3}$$

We used the maximum likelihood estimator (MLE) to estimate the model's parameters (β) which are expressed by the relative-risk ratios (RRR). This method is expressed by Equation (4) as follows:

$$L(\beta) = \sum_{i=1}^{n} \sum_{m=0}^{M} 1[RD_i = m] \; log[Prob_m(X_i, \beta\,)] \tag{4}$$

The maximum likelihood estimator ($\tilde{\beta}$) is convergent and asymptotically distributed according to a logistic law on the real value of the model's parameters (β).

3.2.3 Empirical Model Specification

We follow the methodology adopted from McFadden (1972), estimating the following model:

$$RD_i = \alpha_i + \beta_0 EV_i + \beta_1 II_i + \beta_2 X_i + \varepsilon_i \tag{5}$$

The following equation details the components of each variable in our model as follows:

$$RD_i = \alpha_i + \beta_0 LC_i + \beta_1 U_i + \beta_2 B_i + \beta_3 CB_i + \beta_4 I_i + \beta_5 X_i + \varepsilon_{it} \quad (6)$$

The independent variables are: *EVi* et *IIi* respectively denote economic vulnerability under the two categories, Lack of cash (LC_i) and unemployed (U_i) and the inadequacy of the infrastructure which consists of the three variables, access to a bank in the area who resides (B_i), has a bank account (CB_i) and access to the internet (I_i).

For the purposes of this study, we include other control variables conceptualized in a vector denoted *Xi* (gender, age category, geographical location, region, number of adults in the household, level of education). α_i is the fixed effects that capture the unobserved heterogeneity, in other words, the characteristics specific to each individual. And, ε_{it} is the error term.

4. Results and Discussion

4.1 Descriptive Analysis

Table 2 shows the statistics of socio-demographic characteristics which show that Tunisian respondents share similar proportions in terms of gender, male (50.13%) and female (49.87%). Age categories record about half of respondents aged 26-45 (45.2%), followed by respondents aged 46-59 (25.27). In addition, the survey considered that a large part of the respondents had a primary education level of 38.62% followed by respondents with a secondary education level (35.36%). In addition, the large percentage of respondents is for households with a maximum of two members (46.12%). Also, households with three to four members recorded a significant proportion of respondents (37.28%). On the location side, about two-thirds of respondents live in urban areas (67.97%).

Since the Afrobarometer does not ask respondents how much they receive, we grouped together all those who receive remittances, regardless of the frequency (a little, somewhat, and lot dependent). Grouping remittance recipients in this way, the descriptive statistics of the survey data used show that more than 16% of respondents in Tunisia reported some degree of dependency on remittances. These households are the most likely to encounter a vulnerable economic situation and be negatively affected by a sudden drop in remittances sent from abroad following a country closure in response to the COVID-19 pandemic.

Also, one of the main results described that the current economic reality of Tunisia is fair or bad. Indeed, the lack of liquidity and employment are among the most important problems identified by the sample. In the same way, we have

grouped together all those who declare that they are in a situation of liquidity shortage, whatever the frequency (Sometimes, Several times and Always). The data shows around half of the respondents say they are dependent on remittance and that they are in a situation of lack of cash, i.e. 48.2% and around 38.6% of households' dependent on remittances, report they do not have a job. This highlights how migration remittances are a vital currency source for these households as they are less able to solve their difficulties without this additional income which can be like a safety net in some situations.

On the other hand, the statistics of the responses show that the financial infrastructure in Tunisia is insufficient to meet the needs of the population in a context of closure and social distancing measures. More than half of Tunisian households that receive remittances report that they do not have access to a bank in the enumeration area, i.e. 50.6% and about 32.8% of respondents did not have a bank account. Also, statistics show that digital connectivity is not widely available, about 62.2% of remittance-dependent households do not have access to the internet through a mobile phone. This does not allow households to adapt the way they receive remittances to the restrictions imposed during a lockdown due to the COVID-19. So, the infrastructure challenges indicate that Tunisia's preparedness and the authorities' responses to handling the COVID-19 crisis were uncertain.

Table 2. A Summary of Respondent Responses

Questions	Variables	Modality	N	%
Residence area = PSU/EA	Location	Rural Urban	384 815	32.03 67.97
Gender	Gender	Female Male	601 598	50.13 49.87
Total number of adult citizens in the household?	Adult	1-2 3-4 ≥5	553 447 199	46.12 37.28 16.60
How old are you?	Age	18-25 26-45 46-59 60+	182 542 303 172	15.18 45.20 25.27 14.35
What is your highest level of education?	Education level	Without level Primary Secondary	97 463 424	8.09 38.62 35.36

		University	215	17.93
How much, if at all, do you depend on receiving remittances from relatives or friends living in other countries?	Dependence on Remittances (DR)	No dependency A little Somewhat A lot	1.006 119 44 30	83.90 9.92 3.67 2.50
In the past 12 months, how often have you (or a member of your family) had to deal with lack of money?	Lack of Cash (LC)	Never Sometimes Several times Always	621 359 205 14	51.79 29.94 17.10 1.17
Do you do salaried work?	Unemployement (U)	With employment Without employment	736 463	61.38 38.62
Are the following infrastructures available in or within walking distance of this sampling unit/enumeration area? Banks.	Access to a Bank (B)	With access to a bank Without access to a bank	592 507	49.37 50.63
Which of these assets do you own? [If no]: Does another member of your household own one Bank account?	Has a bank account (BA)	With a bank account Without a bank account	805 394	67.14 32.86
Does your phone has access to the internet?	internet access (I)	With internet access Without internet access	453 746	37.78 62.22

Source: Research finding, based on the Afrobarometer survey.

4.2 Remittance Dependency

Table 3 highlights the results of estimating a multinomial logit model of the determinants if the degree of household dependence on remittances affects their economic vulnerability during the COVID-19 pandemic and if exclusion of digital and financial infrastructure intersects with this vulnerability. Indeed, the relative risk ratio (RRR) represents the predicted multiplicative change in the relative risk of belonging to a comparison class of degree of dependence on remittances (a little, somewhat or a lot) by compared to the reference class where respondents are included in the basket no dependency (i.e. no remittances).

Individuals identified as female are 0.4462 times more likely than male respondents to be in the “no dependency” on remittances basket and a lower

probability of being in the "a lot dependent" on remittances class. This is partly due to the fact that men are the main beneficiaries of the additional income. Therefore, they are the most likely to see their economic situation negatively affected by a sudden drop in remittances due to the COVID-19 crisis. Since the "age" variable was treated as a categorical, each older category is compared to a younger category (18-25 years, coded 0). We find that the odds of individuals aged 46-59 and +64 are respectively 0.1141 times and 0.0415 times more likely to be included in the baseline "no dependency" on remittances than those aged between 18-25 year who are in a basket of major dependence on international funds. The RRR of the education level variable indicates that respondents with basic and secondary education levels are respectively 0.1245 and 0.4051 times more likely to be in the "no dependency" on flows of foreign funds class than individuals with lower basic education level who are more likely to be in a situation of major dependence on foreign remittances. The "Adults" variable, which refers to the size of adults in the household, indicates that households with more than three members have significant probabilities of 1.3927 times and 1.3169 times to belong to the comparison modality where there is a major dependence on remittances compared to households with only one or two members.

In terms of geographical location, our results suggest that households living in cities have a significant probability of 1.6634 times to be in the "a lot dependent" on remittances class than those living in rural households. We also find that the South East region of Tunisia has a significant probability of 2.5234 times more likely to be included in the major remittance dependency class. This is explained by the fact that historically this region has traditionally been a departure zone for foreign countries. Indeed, the North-East and Center-East regions have significant probabilities of 0.1225 times and 0.4697 times respectively of being included in the "somewhat" dependent on remittances modality compared to the basic modality "no dependency".

In addition, the economic vulnerability of households is measured in our model by the two variables, liquidity shortage and the jobless situation on the Tunisian labor market. Indeed, the RRR of the "lack of cash" variable indicates that respondent households who sometimes lack cash have a significant probability of 1.8624 times more likely to be in the basket "little dependent" on remittances compared to respondents who report that they do not have cash flow problems and who are more likely to be in the basket "no dependency" on remittances. In

addition, the results indicate that respondents with always a shortage of cash have a highly significant probability of 6.3681 times that they have failed to exit the basket of major dependence on foreign money. Regarding the devastating consequences of COVID-19 on employment status and income, salaried individuals may encounter difficulties in accessing markets and have lost their jobs, mainly in the case of the restriction measures adopted by the Tunisian authorities (Krafft et al., 2021). Then, the "lack of employment" variable indicates that unemployed Tunisian households have a significant probability of 1.8393 times to belong to the comparison modality where there is a major dependence on remittances compared to respondents who declare never having a lack of employment. Thus, households in a situation always with liquidity problems and unemployed, have a major dependence on remittances. However, the disruption of remittances to dependent households due to COVID-19 lockdowns removes a safety net to address these issues. So these households can be considered as the most economically vulnerable.

The efficiency of Tunisia's financial and digital infrastructure is analysed through the availability of a bank, a bank account and internet connectivity. Indeed, the results of our study highlight that respondents with access to a bank in the area they reside have a significant expected probability of 0.3954 times to be included in the basket of a major dependency on remittances. These results are consistent with the findings of several studies where we find that geographic mobility restrictions due to COVID-19 blockages have made it more difficult to transport cash across borders. As a result, one of the positives of this pandemic has been the increase in electronic (official) remittances, which has become the only option for many migrants to support their low-income households. However, this increase recorded during the pandemic could be due to a shift from informal to formal channels (Kpodar et al., 2021; Cattan and Gayol, 2020). In the same context, Bossone (2020) highlights the importance of improving the payment system to facilitate the circulation of remittance flows. Households that report not having a bank account are 2.1598 times more likely to belong to a basket "somewhat dependent" on foreign funds than respondents with a bank account. Also, respondents who do not have internet connectivity are little dependent on foreign funds with a significant probability of 1.5209 times to be in this dependency basket. So these households have a high probability of finding some degree of remittance dependency. In a context of lockdown and social distancing to surround the spread

of the virus, they will have fewer digital tools to continue to receive remittances without leaving their homes.

Table 3. Multinomial Logistic Regression of the model

Basic Modality : **No dependency**	Comparison Modality #		
	Dependent 'A little'	**Dependent ' Somewhat'**	**Dependent 'A lot'**
Socio-Demographic Characteristics			
Gender			
Female	0.8165	0.9382	0.4462*
Age			
18-25 (basic)			
26-45	0.4667***	0.6230	0.4886
46-59	0.4044***	0.1901**	0.1141***
+60	0.3775***	0.6774	0.0415***
Education			
Less than basic (basic)			
Basic	1.5890	0.7799	0.1245***
Secondary	1.5008	0.9963	0.4051*
Higher education	2.2354	2.5462	0.3831
Adult			
1-2 (basic)			
3-4	0.9264	0.6633	1.3927**
≥ 5	1.0009	0.9777	1.3169*
Location			
Urban	0.9408	1.0746	1.6634*
Region			
Great Tunis (basic)			
North East	1.0794	0.1225**	1.2167
North West	0.2685**	1.6514	1.7746
Center East	1.0050	0.4697*	1.3267
Center West	0.9091	1.2883	0.8986
South East	1.6074	0.4546	2.5234*
South West	1.0537	0.3319	2.3214
Economic vulnerability			
Lack of cash			
Never (basic)			
Sometimes	1.8624***	0.8928	0.6392
Several times	0.6570	0.8668	0.9962
Always	2.4292	4.21e-06	6.3681*
Lack of employment			
With job (basic)			
Unemployed	1.0371	0.9055	1.8393*

Infrastructure			
Access to a bank			
With access to a bank (basic)			
Without access to a bank	1.1594	1.1010	0.3954*
Has a bank account			
With a bank account (basic)			
Without a bank account	1.0697	2.1598*	0.5888
Internet access			
With Internet access (basic)			
Without internet access	1.5209*	1.6823	0.7988
Observations		1200	
LR chi2(72)		144.87	
Prob > chi2		0000	
Log Maximum Likelihood		-635.09	

Source: Research finding, based on the Afrobarometer survey.

Note: Robust standard errors, ***=p<0.01, **=p<0.05, *=p <0.1.

[#] The comparison modalities of remittance dependency are 1=A little, 2= Somewhat, 3=A lot, against a reference modality 0=No dependency.

5. Conclusion and Policy Recommendation

The COVID-19 pandemic and the lockdown to contain it reveal the social vulnerability of migrant workers and their families. In a context of broader economic decline as governments seek to contain the virus, a decline in international remittances (World Bank, 2020), will remove a safety net for many poor and vulnerable families in developing countries. Thus, this decline can register a major impact on individuals and households, even in countries that do not receive particularly large remittance inflows at the macroeconomic level.

In order to reflect on the potential socio-economic implications of the COVID-19 crisis on migrant remittances, we rely on microeconomic data from the Afrobarometer survey conducted in Tunisia in 2020. Using a multinomial logistic model, we described the extent to which Tunisians are more or less dependent on remittances, and how these households are potentially economically vulnerable in a context of "staying at home" in the country.

The results show: first, households in a situation still with liquidity problems and unemployed have a major dependency on remittances. Thus, the disruption of these remittances due to COVID-19 containment measures removes a safety net to address these issues. These households can be considered the most economically vulnerable. Second, households with access to a bank in the area where they reside have a major dependence on remittances. We explain this result by the increase in

official remittances at the expense of informal remittances, which have become the only option for migrants during the border closures. Third, Tunisians who do not have a bank account and internet connectivity have some degree of dependency on remittances. So, in a context of lockdown and social distancing to surround the spread of the virus, these households will have fewer digital tools to continue to receive remittances without leaving their homes. Thus, the lack of digital infrastructure increases the economic vulnerability of Tunisian households' dependent on remittances to adapt to the crisis.

In addition, the Tunisian government needs to address a clear set of clear policies and guidelines to respond to the new normal emerging in the cross-border movement of workers affected by COVID-19. Therefore, it is necessary to identify some economic and political implications that may be relevant to mitigate in particular the impact of dependence on international remittances on economic vulnerability. First, the frequency with which Tunisian households find themselves without cash and jobs and experience the cessation of remittances underlines the need for social protection measures to protect these families against the shocks induced by the national lockdown. Also, the Tunisian government should extend social protection coverage to returning migrants who are pushed into transitory poverty due to the devastating consequences of the COVID-19 pandemic. Second, despite fears of a major collapse, remittance flows to developing countries resisted during COVID-19. This increase may have reflected a shift from informal to formal channels. However, the rise in official remittances during the pandemic is increasing remittance costs. Given that these flows are a lifeline for many poor and vulnerable households, it will be important on the one hand, to consider remittance services as essential and not be subject to mandatory closure in the country like many countries in the world, on the other hand, to facilitate the circulation of these international funds. The latter policy requires reducing the cost of money transfer to help mitigate this crisis, in line with the Sustainable Development Goals (SDGs), in particular Goal 10, which aims to reduce the transaction costs of migrants' remittances to less than 3%. Third, to adapt to the requirements of public authorities to fight the pandemic, technology plays a crucial role in helping households to receive money by supporting remittance through digital channels. So the Tunisian government can encourage and support digital remittance service providers. This requires promoting financial and digital literacy among beneficiary households and improving internet connectivity in the country. Fourth, the

coronavirus is a global disease and we do not know how long it will continue to threaten individuals. In this scenario, the concepts of resilience and sustainability are fundamental to the development of future social actions. Indeed, it is necessary to employ adaptation and mitigation strategies based on sustainable investment. This can mitigate the income shock and build resilience to future disruptions.

These measures would reduce the harm of additional income loss that is essential for many households and help support a sustainable and resilient economic recovery. Indeed, among the lessons learned from the COVID-19 pandemic is that we need to ensure that the resources we use to rebuild are sustainable and that the solutions are long-term.

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