The Market for International Charity Donations

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More than 200 million people in the world are in need of financial help. However, in 2018, only half of U.S. households donated to a charity, the worst number in decades. More importantly, less than 6% of charitable dollars went to international causes. We investigate the mechanisms that lead people to donate and the reasons why they are not donating as much to international charities. We conduct a survey to analyse donors' preference in international charity donations. We identify key features that need to be addressed in this market failure to increase the amount of cross-border charity donations. We then design a Web App "Kara.co" to implement our suggested solutions. In particular we match donors to international recipients using a specific algorithm informed by our survey take-aways.

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1 Introduction

1.1 Philanthropy in the U.S.

Donors in G7 countries contributed on average 0.47% of their Gross Domestic Product (GDP) to charities in 2016 (Charities Aid Foundation Gross Domestic Philanthropy report). The United States is the country where people give the most -in 2021, they donated $485 billions or 2% of their GDP to charity organization. The largest source of charitable donatoins came from individuals who represented 67% of total giving, totalling $326.87 billions (Giving USA 2021 Annual Report). Philanthropy is an integral part of the American culture (Schwarz 1970) and in fact, since 1968 the growth of charitable donations doubled the growth of the Standard & Poor's 500 (List 2009). However, for the first time twenty years, only half of U.S. households donated to a charity in 2018 (Indiana University's Lilly Family School of Philanthropy 2021). Donations amount are increasingly unequal as high income household now represent an over-sized share of all charitable donations. Indeed, individuals in the top 1% provide about a third of all donations. Thus, while charitable donations are reaching record highs, they are increasingly coming from smaller group of rich Americans. This raises the concern that charities will become a selective habit of wealthy people. Nonetheless, the portion of income that is donated to charity declines slightly with the income level -households earning less than $200,000 donated 9.7% of their income, while those earning $500,000-$2 million donated 8.3% (Study of High Net Worth Philanthropy). Furthermore, those donations have been polarized by a few sectors as more than half of charitable dollars in 2021 went to religion, education and public-society benefit.

1.2 Why people donate

Charity donations are driven by egoistic and altruistic utilities realized from different factors (Andreoni 1990).

On the one hand, a donor can derive egoistical utility from the donation act, regardless of its outcome. This utility can materialise in many ways. In particular, it could take the form of a positive emotional feeling, the "warm glow" effect where donors feel like they have helped in acause they believe in (Andreoni 1989). This utility could also materialise in creating a positive self-image and social-image that raise the donor's perception of his self and his reputation. This could eventually lead him to obtain desirable positions in society and maintain relationships (DellaVigna et al. 2012).

On the other hand, a donor can derive altruistic utility, from the impact his donation has on helping others (Becker 1974, Andreoni 1988). This utility materializes conditional on the recipient achieving his objective, and thus is uncertain at the time of the donation. While the donor derives altruistic utility from the welfare of others, this utility level depend on the total welfare the donation enables. Said differently, this corresponds to the total impact of the project. The notion of impact is hard to measure. Does a donation of $50 to buy notebooks for a school as impactful as a donation of $50 to provide food and water to a 6-people family for a month? The answer to the previous is likely subjective. However, we can classify the impact of a project into 4 categories:

1. Saves a life (water, food, health)
2. Helps with basic necessities (hygiene, housing)
3. Helps with development needs (education)
4. Something else (art, religion..)

Donors can then assess which groups above provide more or less impact depending on their personal perceptions, values and core beliefs.

1.3 Why people don't donate to international humanitarian charities

While donations increased steadily over the past decades, only 10% of donations were targeted at people who were in need of help. This is often explained by the fact that people perceive it is the role of the government to provide insurance for those in need rather than charities (Roberts 1984). While the provision of basic needs to its citizens by the government is obvious is most developed countries, it is often not the case in developping countries.

In 2022, there are 274 million people in the world in need of help (UN OCHA 2022). This number is expected to increase in the coming years as more populations face famine, wars and insecurities exacerbated by climate-change. While people in developed countries are often willing to provide help to those in need; only a few of them end up doing so. Indeed, less than 6% of US households donated to international causes (Center on Philanthropy at Indiana University 2010). This small number is primarily explained by the following reasons (2020 Global Trends in Giving Report) :

- Lack of time to find the right charity (*High search costs*)
- Distrust of international charity organizations (*Lack of transparency*)
- Difficulty in assessing the impact of their donations (*Lack of visibility*)
- No habit of donating internationally (*Behavioral attitudes*)

A simple Google search for "Donate humanitarian aid" yields more than 20 million of results with numerous international organizations sponsored. Picking the 'right' charity would take considerable time for a new donor. High search costs likely imply that a greater share of consumers exit the market without searching at all (Gonzalez, Sandor and Wildenbeest 2013, Seiler 2011). Thus potential donors may give up on donations as they spend too much time trying to find the adequate charity. Furthermore, people unwilling to help charities often claim that they are reluctant to do so as they fear their money may be used personally by charity members. In fact, Americans' Trust in charity has droppped to an all-time low - in 2020, Americans trust on average only 50% of organizations (2020 Edelman Trust Barometer). Another reason donors are reluctant to send money is when they cannot see the impact of their donation. International charities often

help populations in different cities or countries than that of the donor. On the one hand, this implies that they often cannot see the impact of their donation. This likely prevents potential donors who would need to witness the direct impact of their donation from entering the market for donations. On the other hand, this also implies that donors feel less connected to the cause. This may lower the donation amounts as people are more likely to donate when they feel personally connected to the cause, and for those who donate, their donation amount increase as well (Koo and Fishbach 2016). Not only does the lack of connectedness directly impact donation amounts, but it also impacts donation habits indirectly. Indeed, people feel happier after giving to a charity, but only when they give to a cause or to a person they feel connected to (Aknin et al. 2013). In an era of social networking, we have integrated new habits introduced by these new social-networking platforms. We scroll Instagram to get updates on our favorite people, we get our news from Twitter, we pick an event to attend through Facebook and book someone's flat to spend our holidays through AirBnb. But, we have not introduced a habit of donating yet. In fact, young Americans donate less than older generations in part because the Great Recession made it hard for them to establish a habit of donating (Indiana University's Lilly Family School of Philanthropy 2021). If people were to donate once to a cause or other people they feel connected to, they would derive happiness from it which would likely imply they would donate again.

1.4 The missing market

We identify a missing market. On one side we have millions of people in developing countries who are in need of financial help. Sometimes, small amounts such as $5 a day could have a huge impact on their lives. On the other hand, we have millions of people in the developped world, who could be willing to help but are reluctant to do so. As discussed above, people like to donate for altruistic or egoistic motives. In choosing a project to donate to, factors such as connectedness to the cause and impact matter the most.

We distinguish three types of donors in developed countries.

1. Those who already donate. Per the facts given above, they exclusively donate to domestic causes. However, if some of these people valued a lot the impact of their donations, they may be better-off by donating to international causes.

2. Those who do not donate but could donate. This population has income left over to donate but they do not do so.

3. Those who do not donate and couldn't donate. This population has no income left over to donate.

Due to high search costs, lack of transparency of organizations, lack of visibility of their donations and behavioural attitudes towards donating, populations 1 and 2 are likely donating less to international causes then they would like to. Not only do these factors reduce international humanitarian donations amounts but they also prevent potential donors from entering the market for international humanitarian donations. On the other side, this prevents millions of people in the world from getting the financial help they need.

Consequently, this could represent millions of dollars that are not donated internationally even if they would make both sides better off. We thus an unexplored market where the supply and demand groups are large, disconnected and where their needs are unmet. To effectively design a platform that would meet the needs of the market, we need to address the below points:

- *High search costs* : Donors should be shown potential causes that they care about without searching for them.
- *Lack of transparency* : The money donation must be a direct transfer sent from the donor to the recipient and received by the recipient. There must be no intermediary in the money transaction.The transaction must be traceable and verifiable.
- *Lack of visibility* : The donation must be sent for a specific purpose and the donor must be able to verify that the money has indeed been used by the recipient for that specified purpose.
- *Behavioral attitudes* : Donors should feel connected to the cause they donate to. Donors should be reminded to make donations at regular intervals.

If the platform is trustworthy, donors will be confident that the full amount of their donation is used by the recipient. Furthermore, if that platform allowed donors to see the direct impact of their donations, this would likely incentivize people to donate more. In that case, part of the donation amounts of donors of type 1 could be diverted to international humanitarian causes and donors of type 2 could be incentivized to enter the market.

If the donors are directly shown potential causes to donate money, this could lead donors of type 1 and 2, who never entered the market due to high search costs, to now participate and donate. Finally, if that platform also allowed donors to feel connected to the people they help, this would directly increase the donations (as people donate to causes they feel connected to) and also provide greater happiness to donors. This could eventually be the first step in building a habit of donating (Judah et al. 2018). To strengthen the habit component, we could imagine a platform that sends regular reminders to donate.

Furthermore, as noted in 1.1, an increasing number of donations is given by the wealthiest households. Thus, the market for cross-border charity donations likely leaves aside an increasing number of middle-class potential donors who may in fact want to participate. Thus, the platform should aim to target these populations as well to democratize donations by being easy-to-use, with an intuitive user interface. It should also allow donors to donate heterogenous amounts at any time, so that middle-class, low-income and high-income individuals can equally benefit from the platform by sending whichever amount their earnings allow.

1.5 Online platforms for charity donations

There are currently a few online platform for charity donations. We describe below five of the most popular online platforms.

- *GoFundme* : Crowdfunding platforms where individuals who need help with personal expenses (medical bills, college tuition..) can look to fund their specific initiative. Inidividuals are responsible for their own fundraising and can share the link to their donation page with their friends and family. Users can manage donations as they come in.

- *DonorsChoose* : Crowdfunding platform where teachers can fundraise for a specific classroom projects. Donors can pick a project accross the US to donate to.

- *Kiva* : Micro-lending platform where individuals and non-profits in all accross the world can look for a loan for a specific project, need or idea. The platform allows donors to get their money back as they lend it to individuals to fulfill a specific objective.

- *KickStarter* : Crowdfunding platform where creaters who need support in an artistic project can find funding through this platform. The idea is that by letting donors choose whether to fund them or not, artists can continue doing their creative projects without worrying about the constraints of a specific grant.

- *Facebook FundRaising* : Nonprofit organizations can register with Facebook after providing a proof of their nonprofit status. They can then start fundraising and also ask individuals on Facebook to fundraise on their behalf.

In the below table, we summarize the attributes of interests of the above platform.

Table 1: Characteristics of current charity donations online platforms

Platform	International Donations from rich to poor	Low Search Costs	Transparency	Visibility	Sense of Connectedness	Supports Donation Habit
GoFundMe	No	Yes	Yes	No	Yes	No
DonorsChoose	No	Yes & No[1]	Yes	Yes	No	No
Kiva	No	Yes & No[2]	Yes	Yes	No	No
KickStarter	No	No	Yes	No	No	No
Facebook FundRaising	No	Yes	No	No	Yes	No

Thus, while there are many online platforms for donations, none of them seem to address our particular concern. However, there is (perhaps) one exception that we describe below.

In 2020, the UNHCR launched its application *Connecting Worlds.* The app matches donors with a protege based on their interest, gender and the kinds of conversations they would like to have. Donors can choose the length of time they'd like to stay in touch. Donors are then asked for monthly payments to help proteges pay for basic needs. Their application seem to fit all the criteria we have elaborated above : it

[1] Donors are recommended projects based on their locations but can also search for any project

[2] Donors are recommended projects based on the completion rate but can also search for any project

allows for international donations from rich people to proteges, it has low search cost due to a matching of donors-proteges, creates a sense of connectedness via a messaging platform and promotes a donation habit. However, this app was a total flop. Since its release, the app has had less than 500 downloads. We suspect this is due to some combination of the reasons below:

1. To use the app, a donor and protege must first be registered with the UNHCR directly on their websites. This is quite cumbersome, and may in fact constitute a high initial cost for donors.

2. The app is available for donors only in a limited number of countries (Australia, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Thailand and the UAE).

3. If people initially distrust international organizations like the UNHCR, it is unlikely that they would trust their app.

4. The app doesn't allow user to send the money directly to the protege. The money transfer has to go through the UNHCR who then gives it to the protege after a lag. This may lead donors to doubt that the full amount of their donation goes to the protege. The lag can also further delay the gratification that donors get.

Thus, from our market overview, we conclude that there currently exists no online platform on the market that targets international charity donations from donors in developed countries to people in developing countries with the desirable properties that we defined above.

This makes us confident that we can create a successful online platform for international charity donations. If we carefully design it according to the properties specific above (low seach costs, transparency, visibility, sense of connectedness, supports donation habit, and seamless to use) then we can meet the needs of a missing market and increase the number of cross-border charity donations.

2 Donors' preferences

In order to understand the preferences of donors in this market, we created a Qualtrics survey that we run using Facebook ads over 3 weeks from November 1st to November 21st 2022. To minimize sample selection bias, the ads did not hint at our research question or suggest that the study was related to charity donations. To be eligible, participants had to be a U.S. resident between 18 and 64 years old. On the first screen of our survey it read :

"Hello! We are a team of researchers and computer scientists from Stanford. We are deeply moved by the current events in the world. There are many people in need of financial help in the world. On the other side, there are many people who would be willing to help, but do not do so. This is may be due to many reasons such as donors not knowing how to donate, not having the time to search for a charity, not seeing the impact of their donations, distrusting charities... This is an unfortunate market failure. However, we believe that we can create a platform to solve this problem by combining economics and computer science.

First, we need to understand the market for charity donations. Here are some sample questions that we are interested in: Why do people donate money ? Do people donate as much as they would want to ? How to increase/reduce a donation amount ? What are some factors that prevent people from donating their ideal amount ? We have designed this survey to give us some direction on how to tackle these questions and design an optimal platform for donations. If you have any question, please contact Houda Naït El Barj at hnait@stanford.edu. Thank you so much for helping us on this important topic!"

We provide the survey questionnaire in the appendix A. 747 participants took our survey. As we show in figure 1 below, our survey takers had varied demographics accross all dimensions considered. Indeed, our sample was composed of men as well as women, highly educated as well as low eduated, urban and rural residents, as well as people from various religious backgrounds.

Figure 1: Demographics of the survey participants

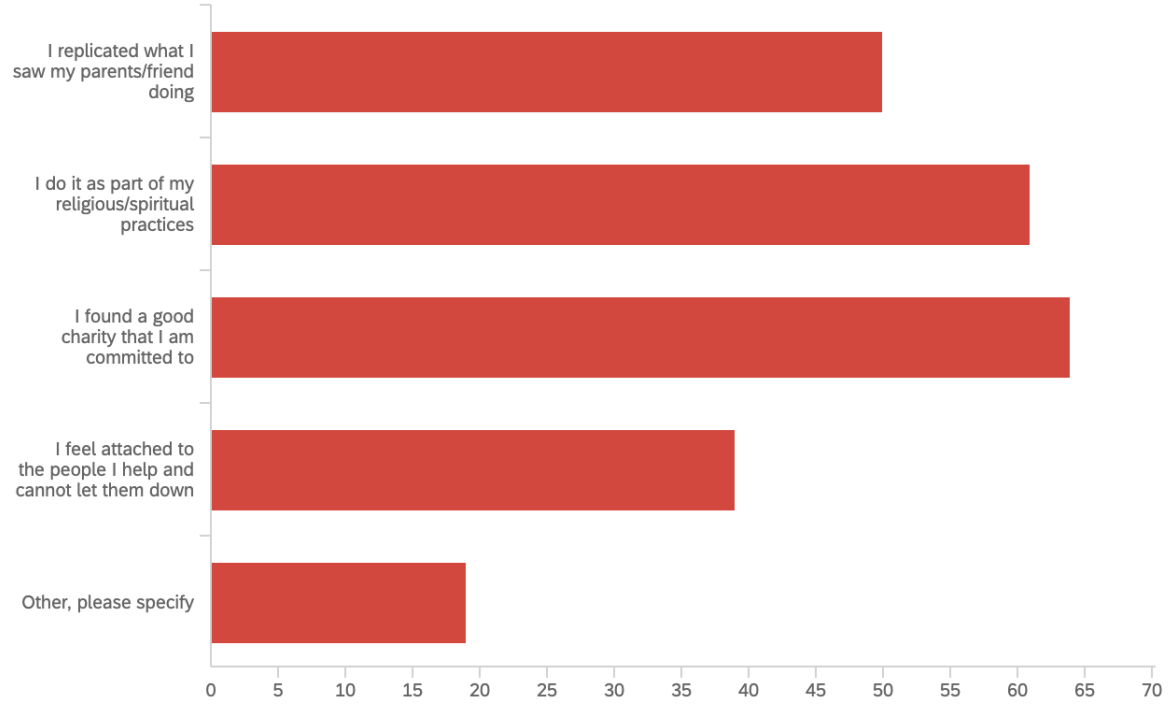
From top to bottom and left to right:
The first subplot shows the gender of the survey participants. The second subplot shows the highest degree obtained. The third subplot shows the participant employment income range in 2021. The fourth subplot shows where a participant lives (urban vs rural areas). Finally, the fifth subplot shows the religion of our paticipants.

2.1 Who are the people who donate?

The main goal of our survey was to understand the characteristics of the people who donate as well as those who don't. In particular, we wanted to understand how fixed characteristics such as education, income and religion affect donation behaviour. We are interested in comparing the relevance of those factors with personality traits such as empathy, thriftiness as well as cognitive perception factors like feeling of loneliness and attention to public image.

85% of our participants said that they donated at least once in 2021 (from here onwards, we will refer to a donor as a survey participant who declared they donated at least once in 2021). In our donors pool, 27% donated on a monthly basis while 36% donated once per quarter. 51% of donors said they have a habit of donating rather than doing one-off donations. Since we are interested in how donation habits formed, we asked those who had a habit of donating what created that habit. Results are summarized in figure 2. We notice that there are many mechanisms through which the habit of donating gets formed. Socio-cognitive factors depending on the donor matter as expected: one third of our sample who have a habit of donating say they do so as they replicate their social environment or as part of their set of moral values enforced by institution such as religion. However, surprisingly, factors that depend on the charity itself mattered as well. 30% of our sample declare that they built a habit of donating because they found a reliable charity or because they feel attached to it.

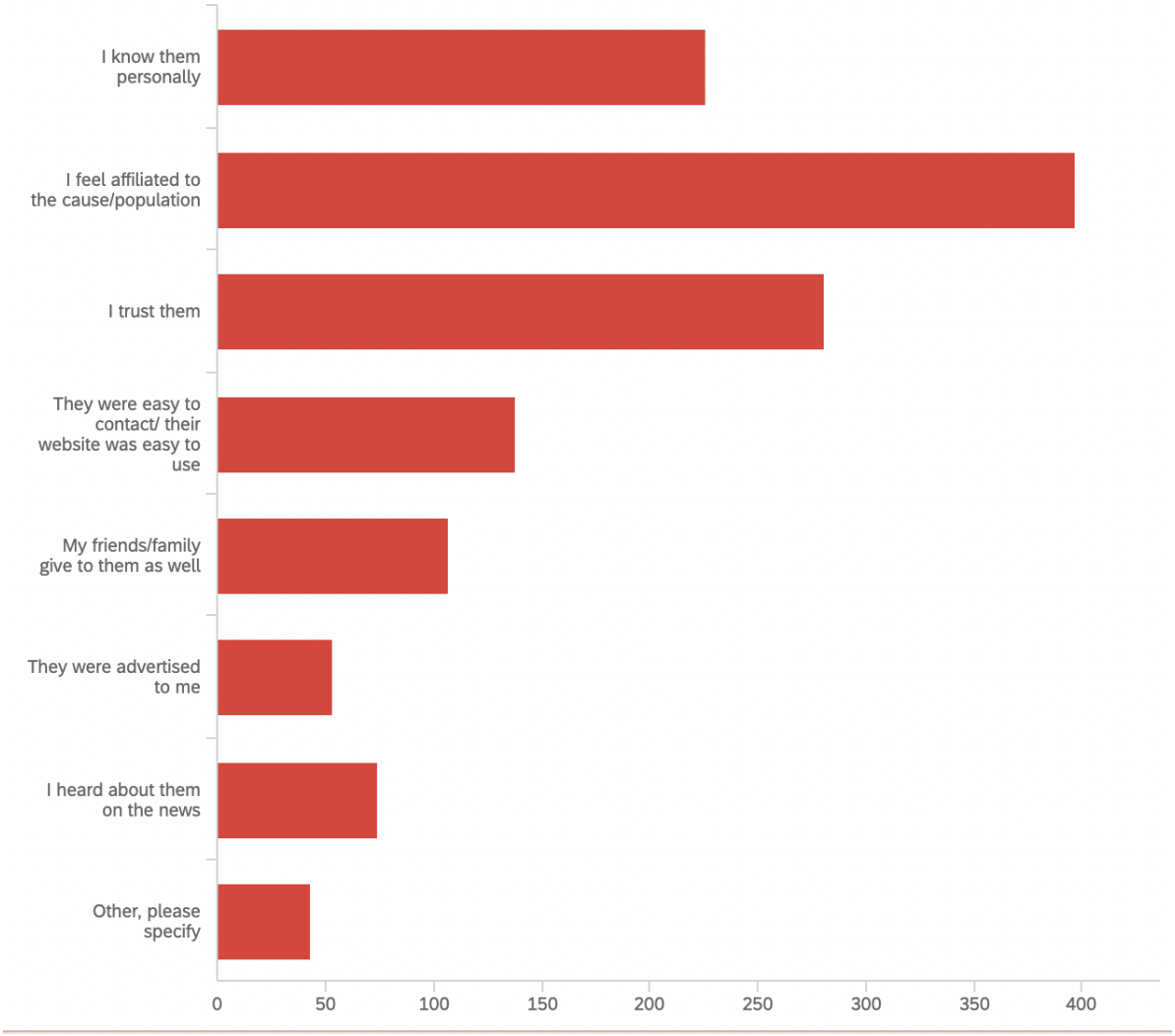
Figure 2: How donors who have a habit of donating built that habit



The survey asked, "How did you build a habit of donating?" to participants who stated that they have a habit of donating in previous questions. 'Other, please specify' included responses such as "I worked for nonprofits so that helped me", "my husband brings it up", "holidays and annual giving months", "Peter singer convinced me that it was morally required".

When it came to the donation patterns, 70% of donors in our survey usually donate less than $50 while less than 2% donate more than $500. Donors like to vary the recipients of their donations, -indeed, 65% of them said they donate to different multiple charities over time. One of the main points we need to understand is what determines the choice of which charities people donate to. We asked that question to our donors, and summarize the results in figure 3. From our data, it seems that the major factor determining which charities donors give to is a sense of connection, affiliation and trust for them. Other factors such as being recomended the charity by friends or family, as well an easy to use platform matter but less.

Figure 3: How donors pick charities

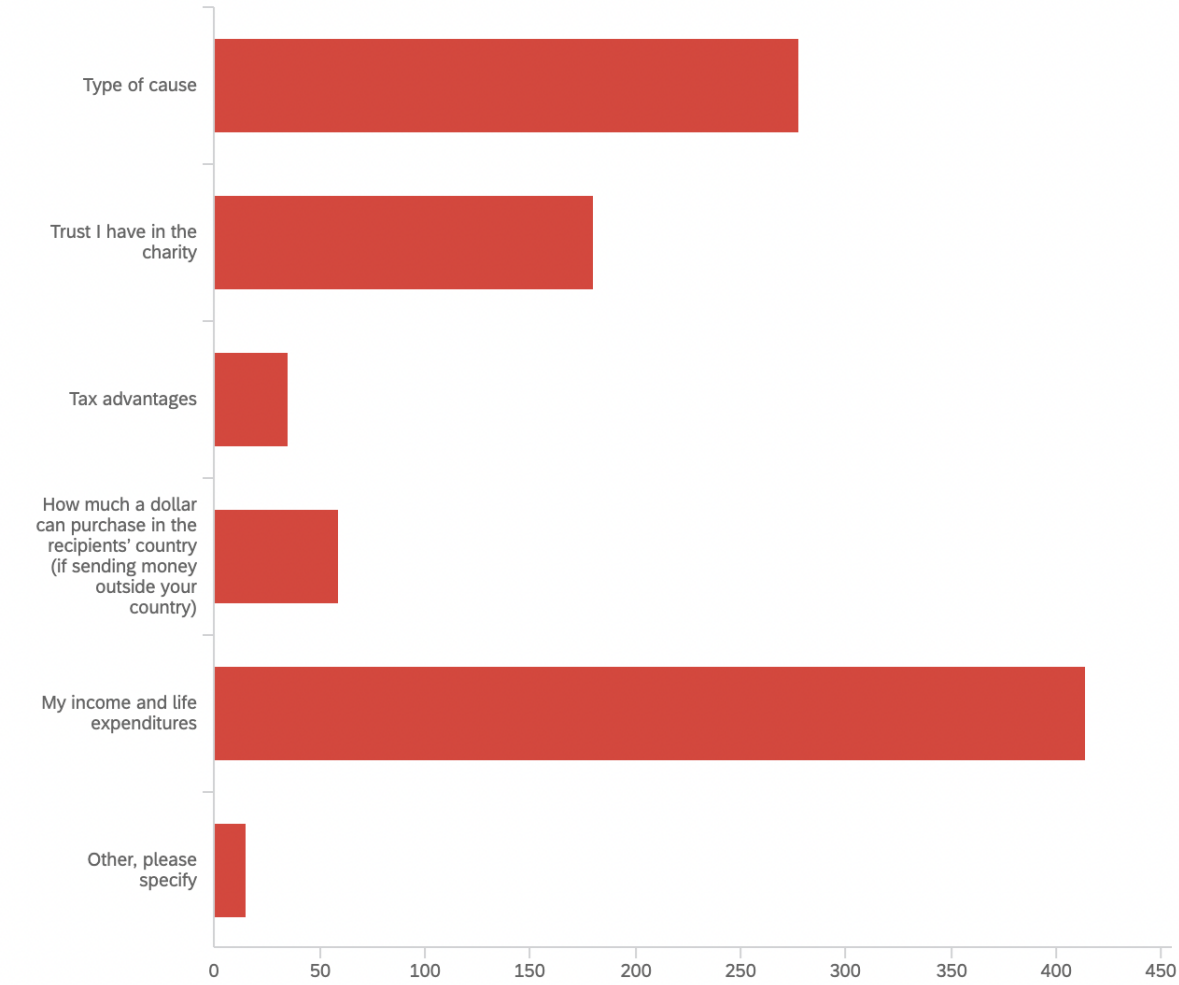


The survey asked, "What determined your choice of which charities/people to donate to ?" to participants who stated that they donated at least once in 2021. 'Other, please specify' included responses such as "I am a monthly donor to Planned Parenthood. Not much. $10 per month. but I've done this because I received care from them when I needed it and want to pay it forward. I also donate to veterans healthcare groups because my Grandpa received a purple heart.", "Facebook friends requested donations to a given charity", "I can see that they are hurt and need help immediately", "Social media influence. Ads", "I see them on the street", "It's easy to donate", "I buy groceries for people in the streets if they ask me to".

Furthermore, we need to understand what determines the amount that people donate. We asked our survey participants who donated at least once in 2021 what determined the amount of money they donate. We summarize the results in figure 4. Unsurprisingly, income and life expenditures are the major factor determining donation amounts. We were more surprised to see that tax advantages mattered for less than 10% of our donors. Finally, factors such as the type of cause as well as trust towards the entity matter as

expected.

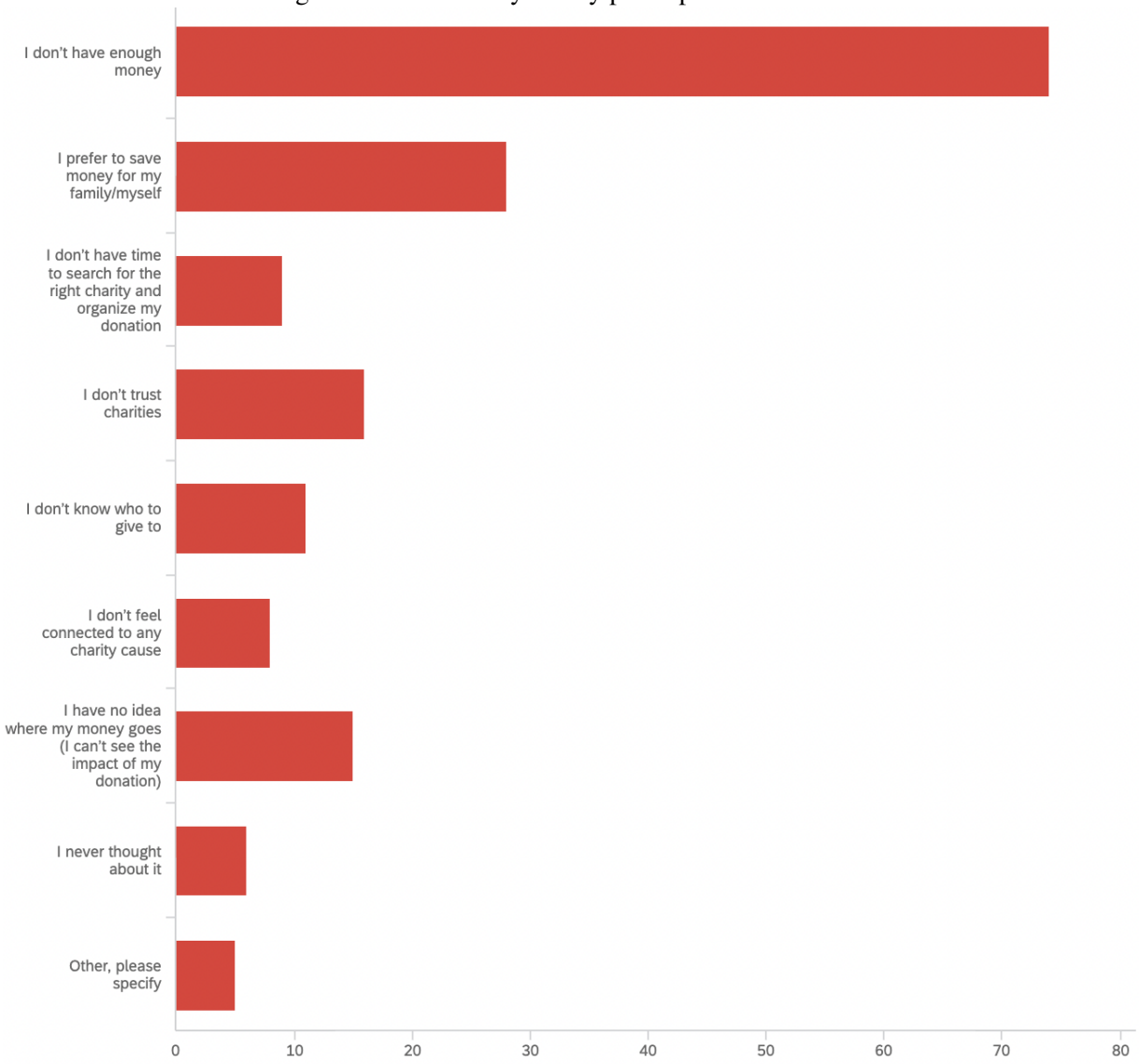
Figure 4: Factors that determine donation amount



The survey asked, "What determined the amount you donate?" to participants who stated that they donated at least once in 2021. 'Other, please specify' included responses such as "Multiples of $18 because of religious tradition", "I give more generously to actual people ", "How much money goes directLy to support rather than fees or overhead", "Religious 10 percent" (answers similar to this one, i.e. 10% came 6 other times, we presume this refers to the ma'aser kesafim of Jewish religion)

Finally, we look at the reasons why those do never donated in 2021 did so. We summarize our results in 5. As expected, income and egoistic factors matter the most, 59% of those who didn't donate in 2021 said they did so because they didn't have enough money or prefered to save their money for themselves and relatives. Furthemore, factors such as lack of trust to a charity and opacity of money donation also led people to avoid donating in 2021.

Figure 5: Reasons why survey participants did not donate



The survey asked, "Why didn't you donate?" to participants who stated that they didn't donate at all in 2021.

2.2 Who are the people interested in our platform?

Besides, we are interested in understanding who are the people interested in our platform. After asking survey participants about their donation patterns, a survey screen read

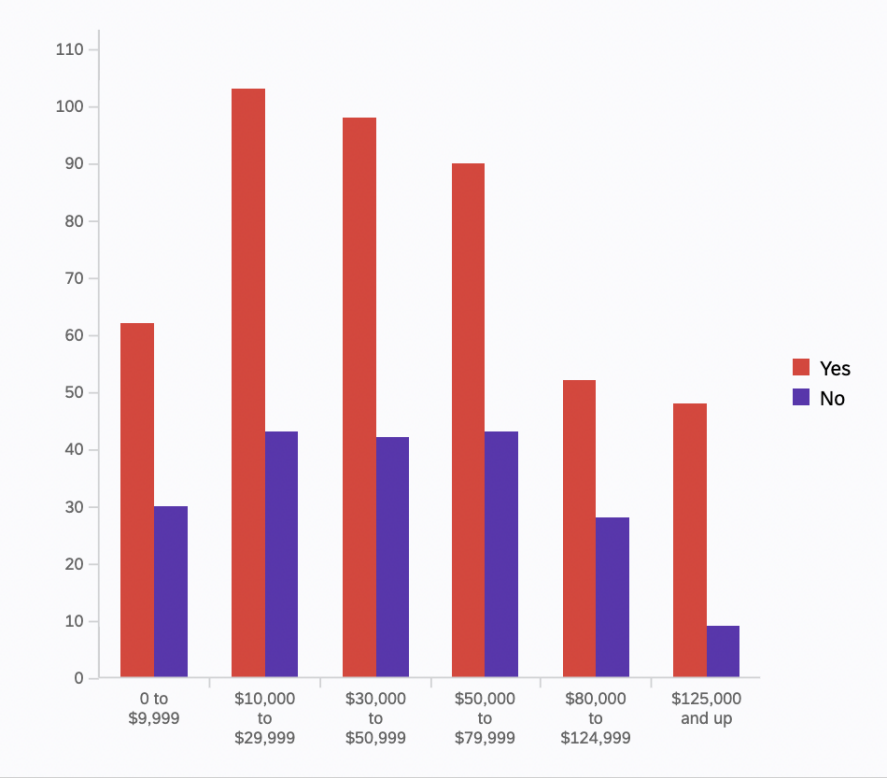
"We are creating a platform (a mobile app) that would connect donors (mentors) with people in need of financial help (protégés).

Our goal is to design an app that is easy-to-use and where mentors are matched to protégés according to their preferences. The app would also allow mentors to directly see the impact of their donations and to

be in contact with their protégé."

We next asked our participants whether they'd be interested in using our platform. 70% of surveyed participants declared that they'd be willing to use our platform. Surprisingly, their willingness to use our platform seem to be independent of their income, see figure 6.

Figure 6: Willingness of participants to use our platform by income brackets



The survey asked "Would you be interested in using our app ?" to survey participants.

While we do not want to enter causal inference territory in this paper, we still run a basic OLS regression in order to understand factors that determine whether participants want to use our platform or not. In particular, we regress the binary variable of whether or not a participant wants to use our platform on gender, education, income, religion, a variable indicating how busy they feel and a binary variable indicating whether or not they donated in 2021. We summarize the results in the below table 2. Analysing the corresponding t-value, we notice that participants who felt somewhat busy but still had some free time were significantly more likely to want to use our platform. This is the most determinant factor when we look at both the magnitude and significance. This could be explained by the fact that people perceive that using an application will require some of their personal time, but could also be explained by confounding factors. Then, the variables that determined the propensity to use the app were income between $30,00 and $50,999 or income greater than 125,000 USD, possessing a graduate degree and being a donor previously. We quickly note that higher education is associated with lower propensity to use the platform.

Table 2: **OLS results of factors affecting propensity to want to use the platform**

Variable	Description	(1) Point estimate	(2) Standard Error	(3) t value
Intercept		5.36e-01	1.04e-01	5.12
Income	$125k +	1.95e-01	7.47e-02	2.61
	$30k - 50k	-8.69e-03	5.44e-02	-0.16
	$50k - 80k	-8.49e-04	5.62e-02	-0.02
	$80k - 125k	-4.24e-02	6.55e-02	-0.65
	$0 - 10k	-2.11e-02	6.1e-02	-0.35
Gender	Male	6.70e-05	4.32e-02	0.01
	Non-binary	1.58e-01	9.12e-02	1.74
Education	Bachelor	-1.20e-01	6.64e-02	-1.81
	Graduate	-2.13e-01	6.78e-02	-3.16
	High School	2.75e-02	7.92e-02	0.35
	$<$ High School	6.86e-02	1.79e-01	0.38
	Some college	1.14e-02	6.80e-02	0.17
Donor	Donated in 2021	1.04e-01	4.93e-02	2.12
Busy Feeling	Sometimes busy	3.76e-02	6.36e-02	0.59
	Somewhat busy	1.97e-01	5.94e-02	3.32
	Very busy	1.21e-01	6.69e-02	1.82
Lonely	Feel lonely	3.45e-02	6.45e-02	0.52

We thus asked participants who said they wouldn't be interested in using our platform why they chose so. This was an open question, as we were really interested in understanding people's perceptions in their own words. However, we can group the majority of answers by common theme and we summarize them in table 3. The major themes that emerged are related to financial limitations as well as the fact that people seem not to trust applications and already have too many of them. Furthermore participants who said they wouldn't be interested seemed to already be tied to local charities.

Table 3: Reasons why survey participants didn't want to use the platform

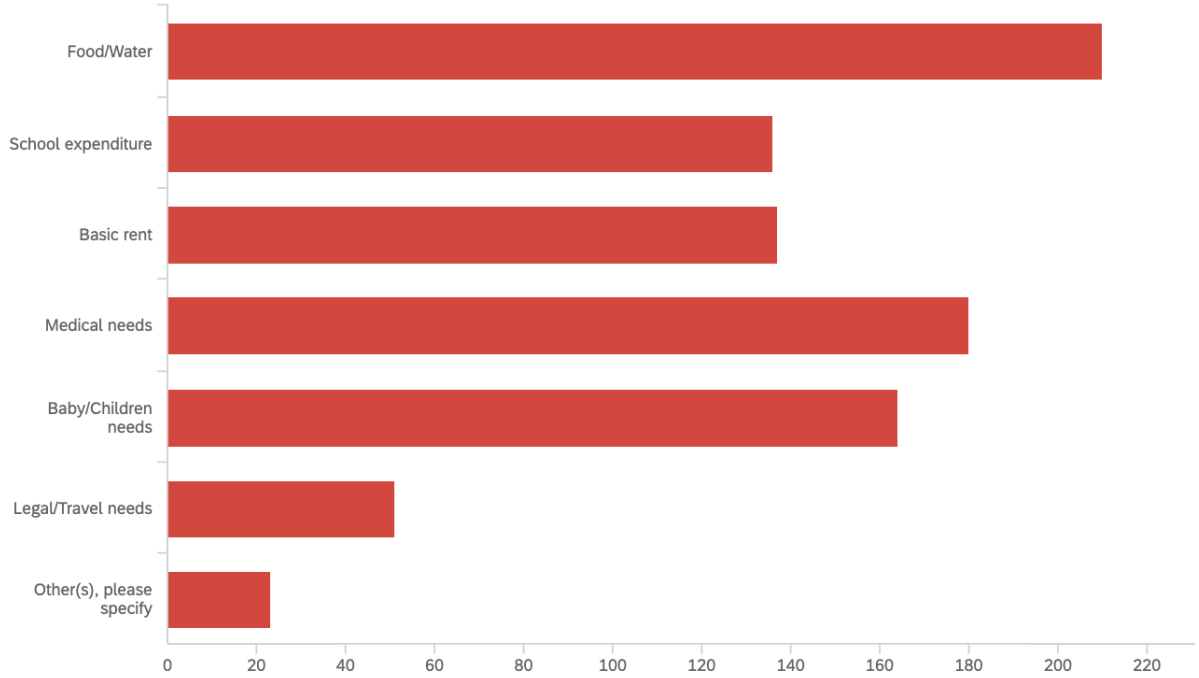
Reason	Frequency
Reluctant to having more apps	35/195
Prefer current local charities	17/195
No money	33/195
Prefer to choose by themselves	6/195

2.3 Desired features of the platform

We look into the desired features for the participants who said they'd be willing to use our platform, we will call them potential users henceforth. All the participants who took our surveys are potential donors. In

our terminology we call them mentors and we call the recipient of their donation, their protegé. There are many aspects to consider. Do they want a one-to-one relationship with a matched protégé, or would they prefer a one-off donation? If we want to design a matching algorithm, then we need to establish upon which criteria the stability of the relationship is based. Since we do not have data yet on the dynamical behaviour of mentors-proteges pairs after we matched them, we need to start with some heuristics. As such, we need to understand what the ideal protégé looks like for a given mentor? In section 1.2 and 1.3 we established that sense of connectedness towards the individual, sense of helping them achieve their goal, trust in the medium of money exchange, ability to derive pleasure from their donation in public and visibility of its impact all determine whether or not a person donates money and how much they donate. As such, we wanted to survey our participants on how they feel those variables matter. Unsurprinsingly, 82% of potential users said they have preferences over the type of proteges they would like to help. When asked to describe what the ideal population looks like in their own words, we were surprised to see a lot of variation. We quote below some participants : "Single parents", "Cancer patients", "Moms", "Living in the streets", "Anyone in need", "Children low income", "Marginalized people whose basic needs I can help with", "Real people in real need", "No [type of protege in mind] but I would like variety", "orphans", "People who need help paying medical bills", "Hunger", "Someone that my level of donation would be meaningful to", "Muslim", "Jewish", "People of color", "I feel like I would be more inclined to give to a protégé/population that I relate to on some level.", "proteges", "People from Burkina Faso", "Regions where people don't have access to clean water", "Whatever I feel in that moment in time". When we analyse the answer to this question given the demographics of the respondent, we find that unsurprisingly, they tend to describe a population they share something in common with (ethnicity, religion, gender). More generally, when we asked them what determines that ideal population, 57% of our sample specified that the most determinant factors are "What the protege will use their money for" and "Why they are in position where they need help". As such, we deduce that, even if common demographics initially influence the donation, donors mostly care about why the protege needs their money and how they will spend their money. Consequently, an ideal platform should match donors with proteges that share a common demographic background as them. Most importantly, it should emphasize on making sure the matched protege will spend money for something the donor would want and should ensure that the protege has a real story as to why they are in a position of help that the donor can easily access and verify. Thus, even if the protege-mentor don't share strong common demographic element, having the protege display a strong sorry of why they need money and having them spend the donation on an item the donor would agree with should contribute to forming stable matched pairs. In order to better understand preferences on money spending, we then asked what type of categories the donor would like their protege to spend money on. We found that there was a lot of heterogeneity in people's preferences, which we believe will help make the market thick.

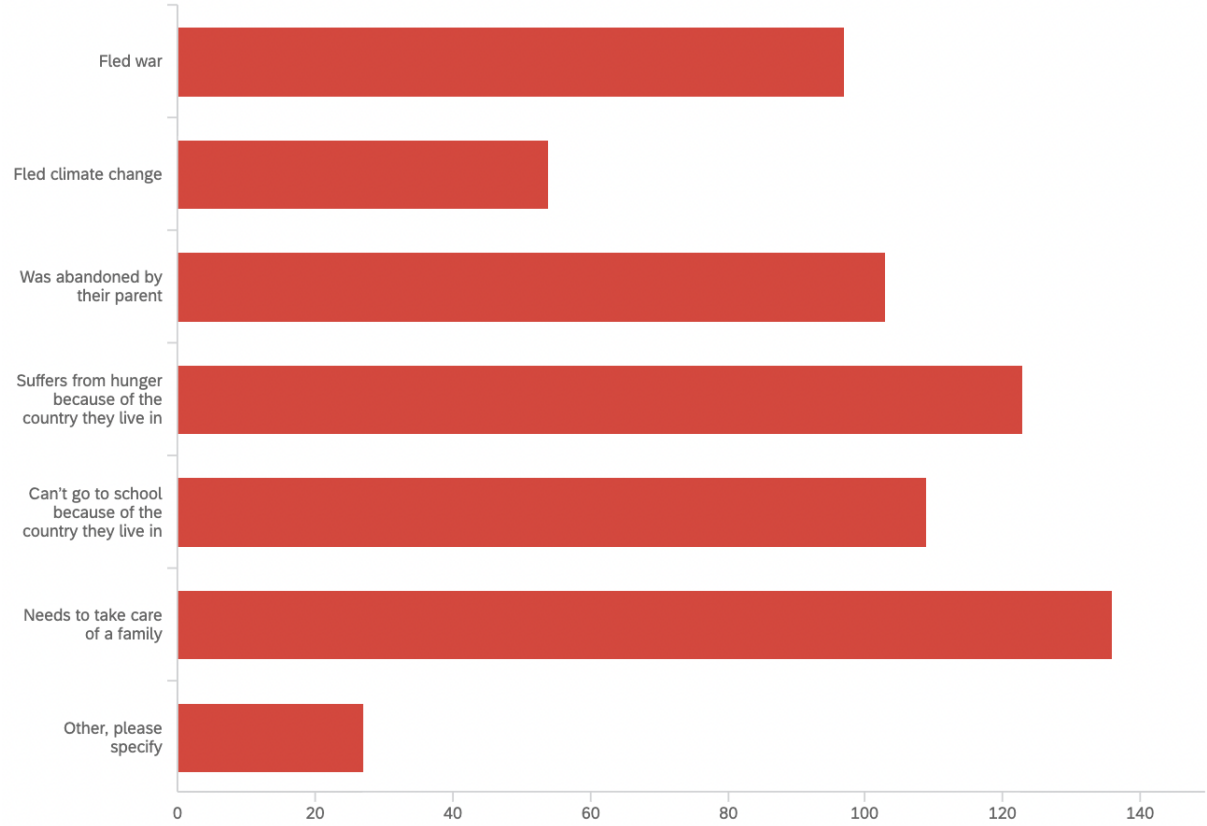
Figure 7: Donors' preferred categories of money spending



The survey asked, "I prefer to send money to someone who will spend it on:" to participants who stated that they would be willing to use our platform for international charity donations. Other(s), please specify included "Education", "Starting a business", "Emergency".

Since the profile of the protege matters so much, we further asked participants what does the ideal protege look like. Once again, we found a lot of heterogeneity, which makes us confident in having a thick market, as very likely, there will be plenty of proteges in each category.

Figure 8: Donors' ideal protege profile



The survey asked, I prefer to send money to someone who:" to participants who stated that they would be willing to use our platform for international charity donations. Other(s), please specify included "Needs it for basic life necessities", "Is being persecuted", "Was abandoned by their family", "Finds themselves in a tough financial position that they didn't cause",

Furthermore, 40% of the potential users declared that they prefer to be matched with a protege and donate to them over time rather than send a one-off donation whenever they go on the app. Consequently, to satisfy both type of donors, an ideal platform should make sure that a donor can either be matched to a protege and be able to send them money donation over the time of their relationship or have the ability to donate without commitment when they want. For those who said they'd want to be matched with a protege, 71% declared that they'd be willing to form a relationship with them. Approximately 80% of them declared that the below characteristics were "Very important" or "Moderately important" in shaping the ideal relationship with their protege

- How often they communicate
- How easily either can reach out to the other
- How they communicate

- How often they need money
- How much money they need
- How well they documented they've met their needs with their donations

When we look into each component, we once again find heterogeinity in preferences. 60% of users prefer to communicate only sometimes, while 20% prefer to communicate often, and the rest rarely. 31% of potential users prefer to be the one who reach out while 51% prefer to be contacted, and the rest was indifferent. Most interestingly, we saw the most heterogeinity in how often a donor would like to perform a donation, 26% want to donate every month, 35% every three month, 33% every six month, and the rest every two weeks. 73% of potential users said they'd like to make donations of less than $50, while 25% of them said they'd like to make donations ranging from $50 to $500, and the rest said they prefer donations larger than $500. Finally, the great majority of our sample declared that they prefer messages to calls (80% of them). Consequently, an ideal platform should allow donors to specify their preference set (being matched or not, how often they communicate, how they want to donate money, how much money they want to donate) and match them with a protege that will have the same characteristics.

Finally, we are interested in what potential users feel are the most important broad aspects the platform should ensure. We allowed participant to rank 9 categories from most important to least important: "Transparency of donations", "Easy to use platform", "Ability to immediately find someone when they go on the app", "Match with someone who fits my preferences", "Ability to see the impact of my donations", "Security of money transfer", "Privacy over my information", "Easiness to opt-out of a relationship & into a new one", "Ability to keep in touch with my protege". 55% of them declared that ensuring "transparency of donations" is the most or second most important aspect. Similarly, 40% of them ranked "easy to use platform" as the most or second most important aspect. Approximately 32% of them ranked "security of money transfer" as most or second most important and 25% of them ranked "privacy over my information" as most or second most important. Other items were ranked much less important.

There are a few conclusions we draw from this survey. First, some people seem to distrust technology. As such, even before wondering whether they'd be donors or not, a population self-exclude themselves from being potential target users because they do not trust softwares in general. Consequently, we would need to build a transparent and easy platform, where donors have visibility over their secure money transfer and where they retain privacy over their information. Then, the platform should allow some flexibility over whether donors who sign up get matched and maintain a relationship with their protege or give on one-off occasions. To increase the number of donations and their amount, protege need to have a visible profile where they expose and justify why they are in a position of help. Donations should have a specific purpose and mentors/protege should be matched on that purpose generally. Finally, donors should be matched with a protege who fits their preferences in terms of (how often they communicate, how often they will request a donation, how much money they will need). In particular, a donor should never be asked more money then they can donate, because that gives them a feeling of frustration in helping someone achieve their

need, which may take them away from using the app. Finally, implicit factors will matter unconciously in determining the donation such as how much a donor can relate to their protege. Consequently, we should try make matched pairs share common characteristics (ethnicity, religion, personal story).

3 Proposed platform for cross-border charity donations

3.1 Features of the platform

In section 1 we surveyed the literature to understand the motives that push people to donate money to charities. We investigated the market of international charity donations, where donors in developed countries donate money to recipient in developping countries. We identified the current features of the market preventing higher donation flows. Consequently, we identify a potential market failure and construct a product to respond to it. To better understand what features our product should integrate, we surveyed 747 participants on their preferences and attitudes towards international charity donations and which features our platform should emphasize (see section 2) Combining the research, the survey, and our vision, we constructed a website, Kara (accessible at kara.co), which we believe provides a solution to this market failure.

We design Kara as a social network platform that connects people in need in developping countries (protégés) with people looking to help them in developed countries (mentors). Mentors and protégés sign up to the platform and have social profiles. We match protégés to mentors following their specified preferences. This targets the problem of high search cost from the mentors side. The protégé specifies a financial need, and the mentor has the opportunity to directly send them money to meet that need. This targets the point made by donors in the survey where they emphasized the importance of the transparency of their donation. The platform allows the mentors to directly see the impact of their donation via a picture. This targets the problem of lack of transparency of charities and lack of visibility after donating. We also designed the platform in an intuitive manner so it should be easy to use. Mentor/Proteges are matched based on preferences elicited in the sign-up form (see section 3.4), and we carefully ensure that no mentor is matched with a protege who would request a higher donation amount that they can provide. This goes in hand with the literature and our survey, where donors need to feel that their donation amount can help achieving a goal. In the reverse they may feel helpless and frustrated and eventually cease using the app. We partner with Stripe to ensure the paymens are safe and secure, which was one of the main concern of our potential users. We also target the implicit concern that using the app will be time-consuming by ensuring fast sign up and quick interactions as well as immediate way to donate.

Proteges have a profile, with their personal information (photo, name, location, passions, goals in life ...). They also have permanent pictures and videos that display their living conditions and serve as a proof for my poor socio-economic situation. This targets the point made by donors in the survey that they need to know why a person need help. The platform's features are designed to incentivise donors to adopt a habit of donating. Mentors' profiles have a 'Karma Points' section, quantifying how much help they've given out. This will make them feel good about themselves, and provide an immediate sense of self-satisfaction,

as literature suggest this is determinant in donations. Even if people are not inherently altruistic, or do not derive a sense of purpose from donating money, they may care about their self image relative to others. Since mentors have social profiles, they can follow their friends, colleagues and family members. This will allow them to see one another's Karma Points and incentivize them to donate.

Proteges specify a need. Then, their corresponding mentors get a pop-up notification displaying that need. They are asked whether they want to help or not. If they click on "Yes", the specified amount of the need will be automatically sent to the protégé. Protégés then get a notification that their mentor has helped them with their need. As soon as they receive the money, they need to spend it on the specified object. Then, they must prove that they have indeed spent it to satisfy that need. They can do this either by taking a picture or a video. Until they prove their need-satisfaction as describe, they won't be able to request any other amount on the network. If they don't prove their need-satisfaction by a certain period, they will be banned from the network. When mentors help their protégé satisfy their need,, it gets added to their Karma Points on my profile.

The network allows protégé and mentors to develop a meaningful 1-1 relationship and to have a strong connection over time. Mentors and protegés can discuss via a messaging platform. This is to create a long-term personal relationship, and not simply a monetary one as we have seen that some donors are interested in forming a relationship and this could potentially increase their donation as they feel more and more connected.

To establish trust in the platform, we initially restrict the proteges who can join. We restrict our first population to proteges. We have a database of Syrian, Ukrainian and Palestinian proteges we've met and can verify their status using UNHCR registers. Then we will allow more proteges to join the platform, but they would need to be referred by at least 5 users (we haven't defined the threshold yet, somewhere from 3 to 5). Furthermore, to restrict the amount of flows at anytime and prevent money laundering, we allow proteges to have only one need at any moment in time. They cannot add another need until the current need is met (per the process above, which includes proving that the need has been met by photo or video). Initially, we limit the amount of a need to $30 USD until the platform builds a good reputation. Protege have a verifiable profile with a profile timeline of all the achievements they were able to accomplish thanks to their my mentors. To protect the privacy of both mentors and protege, each of them has the option to hide or display their achievements from their profile, which can be either public or private.

Some mentors specified that they may not want to be committed to a long-term relationship with a specific protege. Instead they may want to simply donate a one-off amount to some protege need. The platform will also allow that eventually (we haven't built-in the feature yet). Mentors will have the option to specify at any given time that they want to give a specific amount without commitment. They can specify some preferences (for e.g. how much money, what category of spending) and the algorithm will match me with the most adequate user. This means that a protege can receive money from committed mentors, or from an uncommitted random mentor. Of course, a committed mentor has priority to help their protege. If a protege has their need unmet after a certain period of tiem (for e.g. 5days, but this is still to be determined

once we have some data on average time of fulfilment..) then the protege can be matched with a random uncommitted mentor. Thus mentors can have multiple proteges, and proteges can have multiple committed and uncommitted mentors.

In the table below, we provide a summary of all the design solutions we brought with Kara in the cross-border charity donations market.

Table 4: Kara design solutions to cross-border charity donations

Current Market **Problem**	**Kara** **Designed solution**
High Search Cost	Instant matching
Lack of transparency	- Automatic payment C2C via Stripe with no intermediary - Specific amount set for a pre-specified need
Lack of visibility	- Compulsory material proof after need is met
Lack of credibility	- Verifiable feed of needs and transactions - Identity verification (using computer vision tools like AirBnb) & situation of need verification - Ability to engage in voice/video calls, messages
Donors don't feel connected to recipients	- Matching based on common characteristics - Calls & messages to engage and ability to follow their lives through feeds
No habit of donation	- Reminder to donate via notification at the chosen frequency - Herd effect by following friends' donations - Karma points to create a streak (as in DuoLinguo)
Convoluted platforms	- Easy-to-use & intuitive platform
No flexibility in donation amount	- Donors can be comitted or come for a one-off donation - Donors specify their ideal donation amount ex-ante but can dynamically respond to a specific need amount over time

3.2 The matching problem

On Kara, we want to match donors to proteges. This is a many-to-many dynamic matching. Our objective is to maximise the amount of donations on the platform. More precisely, given the structure of our platform, we want to maximise the amount of proteges' needs met, by matching them to donors. Kara is a long-term project that we are pursuing, and as such, we hope that the methods developed here will evolve as we continue our research, but also as we gather and analyse data from our first users. After talking with a few people who develop the same type of matching algorithms (Liam McGregor CEO of the Marriage Pact and Justin McLeod CEO of Hinge), we were advised to first start with a simple model and heuristical algorithm.

Initially, we consider this market to be static, to derive some intuition about how to proceed. We are trying to maximise the amount of needs met on the plateform. These needs depend on the voluntary donation of the donors. In our setting, donors donate if and only if they derive utility from donating on our plateform, and the higher utility they get from donating, the more donations they give (conditional on their income and

other life expenses). Donors are free to choose whether or not to donate, how much to donate, to whom they can donate, but also whether or not to use the platform at all. Consequently, if we want to maximise the amount of donations on the platform, we should maximise the utility donors get from donating on our platform.

Let $\mathscr{P}$ be the set of proteges and $\mathscr{D}$ be the set of donors on our platform. Donors have to decide how to best allocate their income, Y, between their personal life expenditures S, and charity donations, D. Donors donate for altruistic motives, in the sense that they yield utility from helping others and seeing the impact their donation has on that person's life. On the other hand, donors also donate for egoistic motives, as their donation gives them a "Warm Glow" effect, enhancing their own perception of themselves. When donors donate for altruistic motives, the utility associated with it is related to their donation amount, D. However, when they donate for egoistic motives, the utility generated depends on how they perceive and like the recipient of the donation. We thus follow the classic model of Andreoni (1990) where donors utility is a Cobb-Douglas specification with both altruistic and egoistic components:

$$U = \alpha \log D + (1-\alpha)\log S + \sum_{j \in \mathscr{P}} \gamma_j \log d_j.$$

Here, $0 < \alpha < 1$ quantifies how much a donor's altruistic motives impact his utility. A higher α corresponds to more altruistic donor who will tend to donate more regardless of who they are matched to. For a protege $j \in \mathscr{P}$ that the donor donates to, d_j correspond to the amount of the donation ($D = \sum_{j \in \mathscr{P}} d_j$). Here, γ_j captures the "warm glow" effect of egoistic motives for donations.

Getting back to our matching problem, we would like to maximise the amount of donations in our platform by maximising the utility of our donors. If there were no frictions on our platform (for e.g. if using it is perfectly costless or if donors had no time-constraints in using it) and if matching donors to an additional protege didn't have an associated cost (for e.g. if a match didn't require them to maintain the protege-donor relationship through communication), then we could aritifically match everyone to everyone. Howevever, it is likely that in order to maximise the amount of donations on the platform, we need to limit the number of proteges a donor can be matched to. Consequently, we need to estimate what is the counterfactual amount a donor will donate to each protege on the platform, and then match them with those for which they donate the most.

First, recall that a donor yields some altruistic utility depending on their donation amount and how altruistic they are. In particular, this means that donors need to ensure their donation will be impactful for the recipient. Indeed, as long as $\alpha > 0$, we need to ensure that donors are matched to proteges who will request amount less than or equal to what the donors is willing to donate. If donors could donate only partial amount to help towards a goal, that wouldn't be so much of an issue (although the higher α and the lower their donation relative to the need imply that they may not donate altogether). But since our platform only allows donors to donate the full need amount we need to exclude such cases here. Consequently, for a specific donor, to maximise their altruistic component of the utility, we need to ensure that they are only

matched to proteges who will require amounts less or equal than what a donor is willing to give. Thus for a specific donor, we only consider such proteges. Given that first restrition in the set of proteges to consider, now let's look at the egoistic component of the utility.

We take a protege k. Donors decide how much to donate to protege k (d_k) in order to maximize their utility :

$$\max_{d_k} U_i = \max_{d_k} [\alpha \log D + (1-\alpha)\log S + \sum_{j \in R} \gamma_j \log d_j]$$

such that $D = \sum_{j \in \mathscr{P}} d_j$, $Y = S + D$ and $D_{-k} = D - d_k$.

We substitute the budget constraints into the utility to get

$$\max_{d_k} U_i = \max_{d_k} [\alpha \log(D) + (1-\alpha)\log(Y-D) + \sum_{j \in R} \gamma_j \log d_j]$$

Note $\frac{\partial D}{\partial d_k} = \frac{\partial}{\partial d_k} \sum_{j \in R} d_j = 1$ By first order conditions :

$$\frac{\partial U_i}{\partial d_k} = \frac{\partial}{\partial d_k} [\alpha \log(D) + (1-\alpha)\log(Y-D) + \sum_{j \in R} \gamma_j \log d_j] = 0$$

$$\frac{\alpha}{D} - \frac{1-\alpha}{Y-D} + \frac{\gamma_k}{d_k} = 0$$

$$\frac{\alpha}{D} + \frac{\gamma_k}{d_k} = \frac{1-\alpha}{Y-D}$$

$$\frac{\alpha Y}{D} - \alpha + \frac{\gamma_k (Y - D_{-k})}{d_k} - \gamma_k = 1 - \alpha$$

$$\frac{\alpha Y}{D} + \frac{\gamma_k (Y - D_{-k})}{d_k} = 1 + \gamma_k$$

$$\alpha Y + \frac{\gamma_k (Y - D_{-k}) D_{-k}}{d_k} + \gamma_k (Y - D_{-k}) = (1 + \gamma_k) D$$

$$\gamma_k (Y - D_{-k}) D_{-k} + [\alpha Y + \gamma_k (Y - D_{-k}) - (1 + \gamma_k) D_{-k}] d_k - (1 + \gamma_k) d_k^2 = 0$$

$$\gamma_k (Y - D_{-k}) D_{-k} + [(\alpha + \gamma_k) Y - (2\gamma_k + 1) D_{-k}] d_k - (1 + \gamma_k) d_k^2 = 0$$

We retrieve d_k with the quadratic formula

$$d_k = \frac{[(\alpha+\gamma_k)Y-(2\gamma_k+1)D_{-k}] \pm \sqrt{[(\alpha+\gamma_k)Y-(2\gamma_k+1)D_{-k}]^2+4(1+\gamma_k)[\gamma_k(Y-D_{-k})D_{-k}]}}{2(1+\gamma_k)} \quad (1)$$

We can vectorize d_k in order to account for all the donor-to-protege donations that are possible. Let $\mathbf{d} \in \mathbb{R}^{|\mathscr{D}|\times|\mathscr{P}|}$ be the vector of all the $d$for each donor-protege pair, given by equation (1) above. D_{-k} can be obtained through an iterative process calculation. However, in order to calculate $\mathbf{d}$we need information on other components of the function. I is a donor income which we could gather in a questionnaire upon sign-up, but realistically people are uncomfortable about disclosing that type of information and so that may push them away from using our platform. $\alpha$is unique to each donor and is dependent on how altruistic they are. This is not an information that a donor can perceive in an objective way and share with us. We cannot infer their αwithout having some past donation data about them. Similarly, γ_k captures how much a donor likes the protege k and will need to be estimated. However, unlike α, we can provide a proxy estimate of $\gamma$for a donor without needing past data about them.

First, we define γ. Donors have preferences over the type of proteges they want to help. These preferences depend on the features of the proteges (ethnicity, country of residence..). Assume there are $g \in \mathbb{N}$ features over which donors have preferences and for define $\boldsymbol{x}_j$ as the features of protege j, $\boldsymbol{x}_j \in \mathbb{R}^g$. Donors might themselves have idyosyncratic attributes that affect their egoistic utility for a given protege but that are independent of the features of the protege (for e.g. their risk preference for that type of protege). Let β_i represent the value of the combinations of these attributes for donor i. Therefore, we can define γ_{ij} for donor $i$and protege j as

$$\gamma_{ij} = \mathscr{W}_i \cdot \boldsymbol{x}_j + \beta_i$$

where $\mathscr{W}_i \in \mathbb{R}^g$ vaptures the preferences of donor i. The utility could be simplified by incorporating β into the matrix multiplication by defining $\mathscr{W}_i^+ := [\mathscr{W}_i; b]$ as $\mathscr{W}$ with b appended at the end and $x_j^+ = [x_j; 1]$ as x with 1 appended at the end. Therefore, the previous equation could be rewritten as

$$\gamma_{ij} = \mathscr{W}_i^+ \cdot x_j^+.$$

To ensure γ_{ij} is between 0 and 1 for the Cobb-Douglas specification, we take the cosine similarity between $\mathscr{W}_i^+$and x_j^+,which results in a value between -1 and 1, then add 1 and divide it by -1.

$$\gamma_{ij} = \frac{1}{2}\left(\frac{\mathscr{W}_i^+ \cdot x_j^+}{||\mathscr{W}_i^+||_2||x_j^+||_2}+1\right).$$

Now let's go back to D_{-k}. To calculate D_{-k}, we take an iterative approach. We assume that the donor has a preference list of all the proteges. This preference list can be expressed as the list of proteges from the largest γ to the smallest γ since γ denotes how much a donor likes donating to a protege. For each donor, order the proteges based on the preference list. At each step t, we consecutively go through the proteges in

that list. This means that in step 1, w consider the protege $k$with the highest γ.At $t = 0$, $D_{-k}^{(0)} = 0$ since they have not donated anything. This means

$$d_k^{(0)} = \frac{[(\alpha+\gamma_k)Y] \pm \sqrt{[(\alpha+\gamma_k)Y]^2}}{2(1+\gamma_k)} = \frac{[(\alpha+\gamma_k)Y] \pm [(\alpha+\gamma_k)Y]}{2(1+\gamma_k)}$$

Thus either $d_k^{(0)} = 0$ or $d_k^{(0)} = \frac{(\alpha+\gamma_k)}{(1+\gamma_k)}Y$. We take the positive value instead of the 0. Otherwise, there would be no donations to any of the proteges. At the next step, we update $D_{-k}^{(t)}$ by adding the donation amount to it and update $\mathbf{d}$ with the new $D_{-k}^{(t)}$. We also remove the proteges that were already donated to until there are no more non-zero donations left. Mathematically, we can describe D_{-K}as

$$D_{-K}^{(t+1)} := D_{-K}^{(t)} + \mathbf{d}^{(t)} \cdot h(\mathbf{d}^{(t)})$$

where at each step h is a function that returns a vector of 0 and 1 indicating for each protege whether or not the donor donate to them at time t. In particular, since we are maximizing the amount donated, $h(\mathbf{d}^{(t)})$ is the max function, where at every iteration, it returns the protege for which the donor will make the maximum donation. In practice our algorithm stops when the donor exhausted the total amount they want to donate (D) or until there are no more proteges that they like enough to make a donation to.

Let's go back to our matching problem. Recall that we have a set $\mathscr{P}$ of proteges and a set $\mathscr{D}$ of donors. Let $\mathscr{N} \in \mathbb{R}^{|P|}$ represent the needs of proteges which are defined as the amount of money they need. Let $\zeta \in \mathbb{R}^{|\mathscr{D}|\times|\mathscr{P}|}$ be a matrix where $\zeta_{ij} \geq 0$ indicates the donation transferred from donor $i$to protege j. Since the donation of a donor to a specific protege depends on how much they like them but also who are the other proteges they can donate to, ζ will essentially depend on which set of proteges we are considering for a potential donor to be matched. Because there are inherent cost to matches, we are imposing quotas on the match. We thus match each donor to a subset of proteges of size m, and each proteges to a subset of donors of size. Note that $m \neq n$ as proteges may have more time to dedicate to the platform for instance. In pratice, $m$and $n$can also depend on the donors or protege themselves, as some may wish to be matched with more donors or proteges than others.

Let μ be a matching algorithm indicating which donor-protege pairs are matched. A matching algorithm μ^* is considered optimal for this market if

$$\mu^*(D,R) = \arg\min_{\zeta} ||\mathscr{N} - (\mathbf{1}_D\zeta)^T||_1.$$

3.3 Extensions

To find the appropriate ζ matrix that will satisfy the optimal matching algorithm condition, we could do an iterative search. Let $\mathscr{M} \in \mathbb{R}^{|\mathscr{D}|\times|\mathscr{P}|}$be the matches such that $\mathscr{M}_{ij} = \mathbb{1}[\zeta_{ij} > 0]$. We could find the optimal matches using a brute force algorithm that checks every variation of $\mathscr{M}$. However, that will be computationally infeasible as the space to search is about $2^{|\mathscr{D}|\times|\mathscr{P}|}$ due to the options for $\mathscr{M}$. We could set constraints in

order to reduce the space that we have to search. We could further reduce the computational need by using Similarity-based collaborative filtering. We assume that we have the preferences $\mathscr{W}$ of the different donors. These can be easily obtained by asking the donors a series of questions upon sign up. Let donor $i$and donor j have the preferences $\mathscr{W}_i$and $\mathscr{W}_j$. Let θ_{ij} be the result of the cosine similairty of these two preference vectors

$$\theta = \frac{\mathscr{W}_i^+ \cdot x_j^+}{||\mathscr{W}_i^+||_2 ||x_j^+||_2}$$

If $\theta > 1 - \varepsilon$, where ε is a small margin of error, then we can consider donor $i$and donor j to be similar. Therefore, we can assume that their donations to the different proteges will be the same as well. This allows us to compute the donation strategy for one of the donors and get the donation strategy of the other donor. Thus one computation holds for two donors. While all of these methods are interesting, we believe they could still be tremendeously costly. Consequently, in section 3.4we describe the actual algorithm we use, which is inspired from the matching and computer science litteratures.

Before moving on to the next section, we need to make a careful point, Throughout our analysis, we considered a static many-to-many donation market. However, our platform is dynamic, as donors and refugees enter and exit at various times. Desigining a dynamic market is difficult as getting the optimal matches is nearly impossible. However following Akbarpour, Li and Gharan (2020), we can model our dynamic market as a Markov decision process. We recall their distinction of greedy versus patient algorithms : in a dynamic matching market, a greedy algorithm attempts to match new agents as soon as possible while a patient algorithm only matches critical agents that would leave the platform otherwise.

We provide some intuition as to why using the greedy approach is better for our donation market *when a donor enters the platform*. In our case, we are interested in maximising the utility of the donors. Indeed, donors are the ones upon whom the donations depend. If they do not derive utility from using our platform, then there are no donations at all. Consequently, we should aim to optimise their experience at all time. When a new donor enters the platform, if we let them wait until they are matched, there is a risk that may leave our platform while waiting, and so we forego on their total future donation amount. However, if we instantly match them to the protege for whom they will donate the most, then we provide them with some instant utility and some instant ability to enjoy the platform.

Conversely, we provide some intuition as to why the patient algorithm is a better choice *when a protege enters the platform*. If there are donors that still have amounts to donate and have the matching slots to do so then we match them to the protege. Otherwise, the proteges who enter the platform wait until a new donor, willing to donate to them given their type, comes into the market. The proteges can wait since they can come back to the paltform once a match is made.

3.4 Our (heuristic) matching algorithm

In this section, we describe how we match donors to proteges in practice. We are still at the beginning of our research, so we are looking to improve on our algorithm as we gain more data and as we perform more

research.

Recall that our objective is to maximise the amount of donations on the platform as proteges and donors enter and exit. To do so, we aim to match many proteges to many donors. We focus on the utility of the donors. Indeed, proteges have a high incentive to stay on the platform and get their needs satisfied whereas donors need to derive some utility from their donations by being matched to an ideal protege according to their preferences. Implicitly, we assume that proteges do not have preferences over donors : they like all donors equally, as long as they fulfill their need. Obviously, some donors may be more responsive and fulfill proteges needs more often, and they will thus be highly desirable for most proteges. However, we cannot know the types of donors before running the platform and gathering some data. As such, we omit proteges preferences for now.

It would be nice to use the literature on many-to-many matchings to our problem (Echenique & Oviedo 2004, Echenique & Oviedo 2006, Roth & Sotomayor 1990, Roth 1984), however our problem is slightly complex to apply the theorems and properties.

Following Echenique & Oviedo 2006, if we could assume that donors preferences are substitutable and proteges preferences are strongly substituable (or the reverse), then setwise stable matchings exist and we can use their T-algorithm to find a matching in the individually rational core that is setwise stable. However, subsitutable preferences for donors imply that if matching to a protege p is optimal when the set of available proteges is $\{p\}\bigcup S^{'}$, and S is a subset of $S^{'}$, then matching with protege p must still be optimal when the set of available proteges ers is $\{w\}\bigcup S$. We cannot guarantee this. Indeed, whether or not a donor match to a protege, depends on the donation amount that they give to them, which itself depend on how much they like that donor *relative to* other donors. Furthermore, the T-algorithm procedure requires to start with a pre-matching and to iterate over a map describing better available partners for both market sides conditional on the previous matching. This iteration may take some time and can only be considered for a thick market. This may be problematic in our dynamic market as it would require us to wait until both sides are thick enough. We want to avoid waiting as donors are critical agents which we hence want to match as soon as they enter the platform (see 3.3).

Consequently, we come up with a different algorithm which tries to answer our specific matching problem. We are well aware that this may be far from optimal, but this is just our starting point and we are looking to much improve on it in the future months (years).

For now, we assume that each protege can be matched to 5 donors, and that each donor can be matched to 5 proteges. From our survey (see 2), we identify features that impact donors' donations to a specific protege. These are :

1. Whether the protege and the donor share a common language
2. The main category of spending the protege will need money for
3. The reason why the protege is in a situation in which they need help

4. Whether the donor and the protege share a common ethnicity, country of citizenship or religion
5. The ethnicity of the protege
6. The religion of the protege
7. Where does the protege live
8. How many kids does the protege have
9. Whether the donor and the protege share a common language

These features can be represented numerically through a hot-one encoding. The egoisitic utility of each donor depend on the value of these features given their preferences. Upon sign up, we ask donors and proteges about these features but also about their ideal donation amount and frequency, i.e., donors specify how often and how much they want to donate, and proteges specify how often and how much money they need. Here feature 1 is a hard constraint. All proteges who do not share at least one language in common with the donor, are not considered in the set of proteges for that donor in the match.

Matching Algorithm

Step 1 We randomly pick a donor, that donor specified a desired monthly donation amount of D, and a desired frequency of donation. We then select the set of proteges whose specified need is less than or equal to D, whose frequency of donation match that of the donor, and who share a common language with the donor.

Step 2 We calculate the cos-sine similarity for that donor and that set of protege using the encoded features.[3] We then rank the proteges from the most liked and the ones least liked.

Step 3 We start from the favourite protege and deduce their need d from the total donation Dthat the donor wants to make.

Step 4 If $D-d>0$, repeat step 3 with the second favourite protege, and then the 3rd favourite protege ... until If $D-d=0$ or until the donor is matched to 5 proteges.

Step 5 Pick another donor, and repeat steps 1-4 with that donor. However, once a protege has reached 5 donors, they cannot be considered in the set of proteges to be matched in step 1.

Step 6 Repeat step 5 until all donors are matched, or until all proteges have reached 5 donors.

For now we choose an arbitrary and symetric threshold of 5. However, we will likely change that number as we gather more data. First, if the pool of proteges is much greater than the pool of donors, we would need to match more proteges to a donor if we want to ensure all proteges have some chance in getting their need met. However, if donors need to maintain a relationship with their proteges, that may not be efficient, and may lead them to donate less to all their proteges at once. At first, we really want to ensure the donors have the most seamless and enjoyable experience as possible, and consequently, we need to ensure they don't get too many matches that would become very unsustainable to follow. An alternative would be to directly ask how many proteges do they want to be matched with, and run the algorithm conditional on that information.

[3]For now we assign equal weights to all these features as we don't have data yet as to which ones matter more than others.

4 Conclusion

While a majority of US households donate yearly, only a tiny fraction of them donate to international causes. Yet, this seems at odds with classical microeconomic theory, whereby agents view donations as investment and derive utility from its impact. We investigate why the amount of international charity donations is so low. We find that potential donors are reluctant to make cross-border donations as they often don't trust the charities involved and cannot witness the impact of their donations. Furthermore, picking the right charity would require considerable search efforts, which end up detterring potential donors. Potential donors feel disconnected with the suggested recipient as they often have no idea of who they are donating money to and cannot get in touch with them. Consequently, potential donors never built a habit of donating internationally. This contrasts with the huge amount of people in developping countries who need help, and where small donation amout can have the most impact.

We then run a survey to understand the dynamics at the heart of international charity donations and donors' preferences. We find that more than 70% of our participants would be willing to use an independent platform that reduce search costs, allows for transparent and safe transfers and provides them with the ability to connect with the person they would be helping. To maximise the amount of donations, donors should be connected to proteges with whom they share something in common (ethnicity, religion, common life experiences).. Donors have preferences over the type of protege they want to help, and what the money should be used for which should be ensured by the platform. Furthermore, donors should be matched with proteges who will request a donation amount less or equal than what the donor is willing to give at their desired frequency. Finally, the ideal platform should allow for flexibility in terms of donations : donors should be able to donate as a one-off rather than commit to a particular protege.

We develop a C2C Web App "kara.co" to target all the underlying problems in the (failing) market for cross-border charity donations. We address each point by a suggested designed solution. In our language a protege is a person who need help, and a mentor is a donor. Proteges and mentors can sign up to the platform independently. Each of them has a social profile. Proteges get matched to mentors according to our matching algorithm takes into account the factors detailed above (common demographics, category of need, type of protege, donation amount, donation frequency, desire to connect). Protege can add a need for a specific target and mentor can automatically send them money to help them achieve their need, after which proteges need to upload a proof of achievement.

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Online Appendix

The Market for Interntional Charity Donations

Jhonatan Ewunetie and Houda Nait El Barj

Table of Contents

A Survey Questionaire

Platform for donations - Donors

Start of Block: Default Question Block

Q2 STUDY OVERVIEW

Hello! We are a team of researchers and computer scientists from Stanford. We are deeply moved by the current events in the world. There are many people in need of financial help in the world. On the other side, there are many people who would be willing to help, but do not do so. This is may be due to many reasons such as donors not knowing how to donate, not having the time to search for a charity, not seeing the impact of their donations, distrusting charities... This is an unfortunate market failure. However, we believe that we can create a platform to solve this problem by combining economics and computer science. First, we need to understand the market for charity donations. Here are some sample questions that we are interested in: Why do people donate money ? Do people donate as much as they would want to ? How to increase/reduce a donation amount ? What are some factors that prevent people from donating their ideal amount ? We have designed this survey to give us some direction on how to tackle these questions and design an optimal platform for donations. If you have any question, please contact Houda Naït El Barj at hnait@stanford.edu. Thank you so much for helping us on this important topic!

End of Block: Default Question Block

Start of Block: Demographics

Q3 Are you a:

o Male (1) o Female (2) o Non-binary / third gender (3)

Q5 What is the highest degree or level of schooling that you have completed? o Less than a high school diploma (1) o High school diploma or equivalent (for example: GED) (2)

o Some college but no degree (3) o Associate's degree (4) o Bachelor's degree (5) o Graduate degree (for example: MA, MBA, JD, PhD) (6)

Q6 What was your total income in 2021? Please include only employment income (wages, salary, bonuses, tips, and any income from your own businesses). o 0 to $9,999

(1) o $10,000 to $29,999 (2) o $30,000 to $50,999 (3) o $50,000 to $79,999 (4) o $80,000 to $124,999 (5) o $125,000 and up (6)

Q7 Do you live in the US?

o Yes (1) o No (2)

Display This Question: If Do you live in the US? = No

Q9 In which country do you live? _____

Q43 What type of area do you live in?

o Rural (1) o Suburban (2) o Urban (3)

Q10 What is your present religion, if any?

o Protestant (1) o Roman Catholic (2) o Orthodox (3) o Jewish (4) o Muslim (5) o Buddhist (6) o Hindu

(7) o Atheist (8) o Agnostic (9) o Other, please specify (10)

End of Block: Demographics

Start of Block: Lifestyle

Q11 How many hours a week do you work?

o More than 50 hours (1) o 30-50 hours (2) o 10-30 hours (3) o Less than 10 hours (4) o I am currently not working (5)

Q12 How busy do you feel?

o I feel very busy, I don't have much free time (1) o I feel somewhat busy, I have a bit of free time (2) o I feel sometimes busy, I have some free time (3) o I don't feel busy at all, I have a lot of free time (4)

Page Break

Q13 How much time do you spend on social medias (Facebook, Instagram, Twitter, Snapchat, TikTok..) everyday ?

o More than 3 hours (1) o 1-3 hours (2) o Less than an hour (3) o I don't use social media every day (4) o I don't have social media (5)

Q14 In the last month, how often have you adopted an opinion, a habit or tried something new because you saw it on social media ? Examples: You listened to a podcast recommended by a friend on Facebook, you put a Ukrainian flag next to your twitter name after seeing it on someone else's profile, you tried a facial mask you saw on TikTok ..

o Very often (I can think of 10+ such things) (1) o Often (I can think of 5-10 such things) (2) o Not so often (I can think of less than such 5 things) (3) o Never (I cannot think of any such thing) (4)

End of Block: Lifestyle

Start of Block: Personality

Q15 This section is voluntary, as this involves questions about your personality. If you don't want to respond you can skip to the next page. However if you do respond, this would incredibly help our research. We remind you that this questionnaire is completely anonymous. If you choose to answer, please try to answer as truthfully as possible.

Page Break

Q17 Talking of you, you'd say that...You care about others (1) You like to spend money on your friends and family (2) You feel deeply connected to others (3) You feel lonely (4) You care about your public image (5)

Always o Very often o Sometimes o Rarely o Never o

End of Block: Personality

Start of Block: Current and past donation behaviours

Q18 In the past year, approximately how often did you donate money?

o Monthly (1) o Once per quarter (2) o Once in the year (3) o Never (4)

Display This Question: If In the past year, approximately how often did you donate money? != Never

Q19 Do you have a habit of donating as part of your spending, or do you donate once in a while when a cause strikes your interests?

o I have a habit of donating (1) o I only donate when something touches my heart (2) o Both (3)

Display This Question: If Do you have a habit of donating as part of your spending, or do you donate once in a while when a... = I have a habit of donating

Q20 How did you build that habit of donating?

- I replicated what I saw my parents/friend doing (1) - I do it as part of my religious/spiritual practices (2)

- I found a good charity that I am committed to (3) - I feel attached to the people I help and cannot let them down (4)

- Other, please specify (5) _____

Display This Question: If In the past year, approximately how often did you donate money? != Never

Q21 What amount do you usually donate?

o Small amounts (< $50) (1) o Medium amounts ($50-$500) (2) o Big amounts (> $500) (3)

Display This Question: If In the past year, approximately how often did you donate money? != Never

Q22 Did you donate to multiple charities/people or did you donate to the same set of charities/people multiple times?

o I donate to the same set of charities/people multiple times (1) o I donate to multiple charities/people (2)

Display This Question: If In the past year, approximately how often did you donate money? != Never

Q23 What determined your choice of which charities/people to donate to ?

- I know them personally (1) - I feel affiliated to the cause/population (2) - I trust them (3)

- They were easy to contact/ their website was easy to use (4) - My friends/family give to them as well (5)

- They were advertised to me (6) - I heard about them on the news (7)

- Other, please specify (8) _____

Display This Question: If In the past year, approximately how often did you donate money? != Never

Q24 What determines the amount you donate?

- Type of cause (1) - Trust I have in the charity (2) - Tax advantages (3)

- How much a dollar can purchase in the recipients' country (if sending money outside your country) (4) - My income and life expenditures (5)

- Other, please specify (6) _____

Display This Question: If In the past year, approximately how often did you donate money? != Never

Q25 What determines how often you donate?

- I give when I think about it (1) - I give when I have time (2) - I give when I have money (3)

- I give when I hear that people around me gave (4) - Someone else takes care of my donations (accountant, partner..) (5)

- Other, please specify (6) _____

Display This Question: If In the past year, approximately how often did you donate money? = Never

Q26 Why didn't you donate?

- I don't have enough money (1) - I prefer to save money for my family/myself (2)

- I don't have time to search for the right charity and organize my donation (3) - I don't trust charities (4)

- I don't know who to give to (5) - I don't feel connected to any charity cause (6)

- I have no idea where my money goes (I can't see the impact of my donation) (7) - I never thought about it (8)

- Other, please specify (9) _____

End of Block: Current and past donation behaviours

Start of Block: App Design

Q27 We are creating a platform (a mobile app) that would connect donors (mentors) with people in need of financial help (protégés).

Our goal is to design an app that is easy-to-use and where mentors are matched to protégés according to their preferences. The app would also allow mentors to directly see the impact of their donations and to be in contact with their protégé.

Page Break

Q28 Would you be interested in using our app ?

o Yes (1) o No (2)

Display This Question: If Would you be interested in using our app ? = No

Q29 Sorry to hear. Could you briefly tell us why that is the case? _____

Display This Question: If Would you be interested in using our app ? = Yes

Q30 Great! Let's learn more about what "the best app" look like for you.

As a reminder, the app would directly connect you with a person in need, which we call a protégé. You would be able to send money to that person for their specific needs and interact with them via a messaging platform.

Display This Question: If Would you be interested in using our app ? = Yes

Q31 If you had a fixed sum to give, do you have preferences over the type of protégés that you would help?

o Yes (1) o No (2)

Display This Question: If If you had a fixed sum to give, do you have preferences over the type of protégés that you would... = Yes

Q32 Do you have a specific type of protégé or population in mind? _____

Display This Question: If If you had a fixed sum to give, do you have preferences over the type of protégés that you would... = Yes

Q33 More specifically, what determines your preference?

- Their ethnicity (1) - Their age (2) - Their gender (3) - Their location (4)

- Their religion (5) - What they will use my money for (6) - Why they are in a position where they need money (7)

- Other(s), please specify (8) _____

Display This Question: If More specifically, what determines your preference? = What they will use my money for

Q34 I prefer to send money to someone who will spend it on:

- Food/Water (1) - School expenditure (2) - Basic rent (3) - Medical needs (4)

- Baby/Children needs (5) - Legal/Travel needs (6) - Other(s), please specify (7) _____

Display This Question: If More specifically, what determines your preference? = Why they are in a position where they need money

Q35 I prefer to send money to someone who:

- Fled war (1) - Fled climate change (2) - Was abandoned by their parent (3)

- Suffers from hunger because of the country they live in (4) - Can't go to school because of the country they live in (5)

- Needs to take care of a family (6) - Other, please specify (7) _____

Display This Question: If Would you be interested in using our app ? = Yes

Q36 Would you prefer to be matched with a protégé and help them on multiple occasions over time, or donate as a 'one-off' whenever you go on the app?

o I prefer to be matched with a protégé and donate to them over time. o I prefer to send a one-off donation whenever I go on the app. (2)

Display This Question: If Would you prefer to be matched with a protégé and help them on multiple occasions over time, or d... = I prefer to be matched with a protégé and donate to them over time.

Q37 Would you be interested in having a form of virtual social relationship (virtual friendship, mentorship..) with your protégé? By virtual social relationship, we mean that the app would give you the opportunity to call, message and follow that person over time. This would allow you to see how you've impacted their life and how they've grown (partly thanks to you!).

o Yes, I'd be interested in forming a relationship with them. (1) o No, I just want to give to a protégé without commitment. (2)

Display This Question: If Would you be interested in having a form of virtual social relationship (virtual friendship, ment... = Yes, I'd be interested in forming a relationship with them.

Q38 Thinking about what the ideal relationship with a protégé would look like to you, how important are the below items ?

How often we communicate (1) How easily they can reach out to me (2) How easily I can reach out to them (3) How we communicate (4) How often they need money (5) How much money they need (6) How well they have documented that they've met their needs with my donations (7)

Display This Question: If Thinking about what the ideal relationship with a protégé would look like to

you, how important a... != How often we communicate [Not important] And Would you be interested in using our app ? = Yes

Q41 You prefer to communicate..

o Often (1) o Sometimes (2) o Rarely (3)

Display This Question: If Thinking about what the ideal relationship with a protégé would look like to you, how important a... != How easily they can reach out to me [Not important] Or Thinking about what the ideal relationship with a protégé would look like to you, how important a... != How easily I can reach out to them [Not important] And If Would you be interested in using our app ? = Yes

Q42 You prefer .. o To be the one who reaches out to them

(1) o To be contacted by them (2) o That either of you should feel free to reach out (3)

Display This Question: If Thinking about what the ideal relationship with a protégé would look like to you, how important a... != How we communicate [Not important] And Would you be interested in using our app ? = Yes

Q43 You prefer ..

- Phone Calls (1) - Video Calls (2) - Messages (3)

Display This Question: If Thinking about what the ideal relationship with a protégé would look like to you, how important a... != How often they need money [Not important] And Would you be interested in using our app ? = Yes

Q44 Ideally, they would need help..

o Every two weeks (1) o Every month (2) o Every three months (3) o Every six months (4)

Display This Question: If Thinking about what the ideal relationship with a protégé would look like to you, how important a... != How well they have documented that they've met their needs with my donations [Not important] And Would you be interested in using our app ? = Yes

Q45 Ideally, they would need..

o Small amounts (< $50) (1) o Medium amounts ($50-$500) (2) o Big amounts (> $500) (3)

Display This Question: If Would you be interested in using our app ? = Yes

Q46 What would the best app ensure? Please rank from most important to least important.

_____ Transparency of donations (1)

_____ Easy to use platform (2)

_____ Ability to immediately find someone to send money to when I go on the app (3)

_____ Match me with someone who fits my preferences (4)

_____ Ability to see the impact of my donation (5)

_____ Security of money transfer (6)

_____ Privacy over my information (7)

_____ Easiness to opt-out of a relationship & into a new one (8)

_____ Ability to keep in touch with my protégé (9)

End of Block: App Design

Start of Block: Block 6

Q47 Do you have any feedback/suggestions/comments for us ? _____

End of Block: Block 6

Start of Block: Block 7

Appendix

$$h(U_i^{(D)}(j), \mathscr{N}_j) = \alpha^{ego} \log d_j + \alpha^{alt} \frac{1}{1+e^{(\mathscr{N}-d_j)}} + \alpha^{outside} \log(\mathscr{D}_i - \sum_{k \in R} d_k).$$

such that $d > 0$ and

We can take a multivariate approach to account for all the various donations that could happen

$$h(U_i^{(D)}, \mathscr{N}) = ||\alpha^{ego} \log \mathbf{d} + \alpha^{alt} \sigma(\mathbf{d})||_1 + \alpha^{outside} \log(\mathscr{D}_j - ||\mathbf{d}||_1).$$

where σ is the sigmoid function with the midpoint at $\mathscr{N}$ such that it is defined as $\sigma(x) = \frac{1}{1+e^{(\mathscr{N}-x)}}$. The sigmoid function gives us a method to limit the amount of utility an individual feels after satifying the need of a protege.

$$C = .$$