

**UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ**

**Colegio de Administración y Economía**

**Risk Aversion, Advantageous Selection and Demand for  
On-Demand Insurance: Lab Experiment**

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**Economía**

Trabajo de integración curricular presentado como requisito  
para la obtención del título de  
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**UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ**  
**Colegio de Administración y Economía**

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On-Demand Insurance: Lab Experiment**

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## RESUMEN

A medida que las nuevas tendencias y la tecnología se vuelven más importantes en la vida cotidiana, los servicios deben ajustarse para satisfacer las necesidades de sus consumidores. Los seguros On-Demand son un nuevo modelo de seguros que está adquiriendo gran aceptación y éxito en los mercados internacionales. Con este seguro, los términos de la póliza, como la cobertura de tiempo y las primas, son flexibles y a discreción del consumidor. Considerando el gran potencial que tiene el mercado de seguros en la región y específicamente en el país, esta investigación intenta establecer una demanda para este seguro. Mostramos, a través de un experimento de laboratorio con estudiantes en la Universidad San Francisco de Quito, la probabilidad de adquirir este servicio y las características necesarias para que esta demanda sea rentable y sostenible. Con una muestra limitada, encontramos una probabilidad máxima de adquirir este seguro del 71%. La aversión al riesgo, la disposición a pagar y la selección adversa o ventajosa se analizan y determinan para la muestra.

Palabras clave: Aversión al riesgo, seguros On-Demand, selección adversa, selección ventajosa, disponibilidad a pagar, riesgo moral.

## ABSTRACT

As new trends and technology are becoming more important in everyday life, services have to adjust to satisfy consumers' needs. On-Demand Insurance is a new insurance product that is acquiring big acceptance and success in international markets. With this insurance, model terms of the policy, such as time coverage and premiums, are flexible and at consumer's discretion. Considering the big potential that the insurance market has in the region and specifically in the country, this research tries to establish the demand for this insurance product. We show, through a laboratory experiment with students at Universidad San Francisco de Quito, the probability of acquiring this service and the needed characteristics for this demand to be profitable and sustainable. With a limited sample, we found a maximum probability of acquiring this insurance of 71%. Risk aversion, willingness to pay and adverse or advantageous selection are analyzed and determined for the sample.

**Key words:** Risk aversion, On-Demand insurance, adverse selection, advantageous selection, willingness to pay, moral hazard.

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## Introduction

In a world dominated by technology, social networks and a society that is constantly changing, it is necessary to offer products that are aligned with the needs of people, who are characterized for demanding agility, transparency and adaptability to their lifestyle. There are multiple risks that people want to cover, but many "believe that taking insurance policies is too expensive and they cannot afford it" (Genesis, 2017). Likewise, many times people do not have enough money to pay for a full insurance policy -which usually lasts a year- or they do not feel the need for such long coverage, because people do not think they are at risk all the time. (El Universo, 2018) On-Demand insurance is a new insurance model that adjusts to the specific needs of the client among the multiple existing insurance products, offering flexibility of coverage, time, price, and characteristics.

People who contract insurance are at least moderately risk averse. It has been shown in various investigations that human beings generally prefer certainty to uncertainty. People will prefer to pay a price (premium) to ensure the outcome of a possible future unfortunate event. There is evidence that the most cautious individuals are those who invest the most in caution, (Einav, Finkelstein; p. 126; 2011) for this reason, they are expected to contract insurance. Among the most widely used and applicable insurance for the On-Demand model are vehicles and mobile technology insurance, mainly focused on cell phones and laptops. "Now 93% of millennials in the United States say they are willing to buy [On-Demand] usage-based insurance policies as long as prices stay the same" (Merrey, Kokins; 2017).

In the present paper, I expect to find sufficient demand for On-Demand insurance with characteristics that make it sustainable for insurance companies and that guarantee its acquisition. As mentioned above, the most risk-averse people are expected to worry about not

being exposed. Thus, they will be cautious in their daily lives and, as part of their decisions, they will prefer to take out insurance products to protect themselves.

By having On-Demand insurance with a lower total price than a full policy, more people with risk-averse characteristics can purchase insurance. Then, demand will have an advantageous selection quality, due to its risk aversion and risk avoidance characteristics. Whoever is going to purchase this insurance will not have a very high probability of having a claim, for which the insurer must pay very frequent and unsustainable indemnities. It means that the demand comes from people who want to protect themselves with flexibility, but who do not expose themselves to frequent risks.

In order to know the possible demand for this insurance model, an experiment was carried out with students from Universidad San Francisco de Quito, through which their willingness to pay for On-Demand insurance was obtained and thus determine the demand for this niche for insurance. With the quantitative data of the availability to pay of each participant, an aggregate demand curve was constructed and with this, the marginal costs and the average costs of an Insurance Company must be derived to determine if said demand is adverse or advantageous. Risk aversion, which is shown with a negative coefficient, is observed with a questionnaire at the end of the experiment.

The insurance share of GDP in Ecuador is only 1.7%; compared to the Region's, which on average reaches 3.2% and in developed countries reaches 10%. Despite the fact that, since 2016, insurance recruitment has increased, it is still below the regional average. (CMV; El Mercurio; 2018) The insertion of a new insurance model in the market could increase insurance contracting. This study is beneficial for both consumers and insurance producers, because, if there is a demonstrated demand for them, insurers will have a better income and consumers will be able to access a product that benefits them best.

I expect to find demand for On-Demand Insurance with advantageous selection in the young adult population of upper-middle class in the city of Quito. I will determine the probability of these people to purchase On-Demand insurance; as well as consumers' willingness to pay, their risk characteristics and if there is an adverse or advantageous selection for this insurance's demand.

## Literature Review

There are several factors to consider so that the demand, if it exists, is profitable for the suppliers to offer it. Various experiments about demand for insurance have been carried out, showing important characteristics of this demand. Among these topics are the population's risk aversion, the willingness to pay and its determining factors, the adverse (or advantageous) selection of demand, moral hazard, prospective theory and the inclusion of new technologies. All this makes the current demand for insurance different and also varies in different areas of the world.

As mentioned above, risk aversion is the trait by which people prefer to avoid uncertainty; people do not like taking risks. It is thanks to this that insurance exists. "Decision makers tend to be reluctant to ambiguous events with unknown or little-known probabilities" (Carter, Elabed. P. 154; 2015) In the insurance industry, several cases have been found regarding this type of insurance. In other words, many people insure themselves for small risks or purchase insurance with premiums that result in a higher cost than the expected losses. (Eeckhoudt, Fiori, Gianin; 2018)

In the case of On-Demand insurance, as well as indexed insurance, "perhaps the most important question is whether risk aversion [...] is common enough and large enough to influence the aggregate uptake of [these insurance]" (Carter, Elabed; p. 151; 2015) For this reason, it is important to consider the design of the experiment, so that it reflects the participants' true risk aversion. Like Elabed and Carter, this experiment is designed as close as possible to the reality of the participants so that they make decisions that they would make in their daily lives, in order to truly calculate their risk aversion and their willingness to pay. "We hoped that, the framing would lessen any tendency for participants to view experiments as "just a game" and invoke behaviors of interest from the real world" (Carter, Elabed; p157; 2015).

New technologies and blockchain are the future of all services and companies. They generate benefits for both companies and consumers. Likewise, the On-Demand insurance system is based on these two components. The paper *How Much Are Insurance Consumers Willing to Pay for Blockchain and Smart Contracts? a Seung Oh Nam Contingent Valuation Study* analyzes consumers' willingness to pay for this new insurance structure. It resembles several methods used in this research and complements important factors about part of the added value of technology and blockchain for On-Demand insurance.

“Keeping everything constant, the willingness to pay for insurance is increasing in risk aversion and risk” (Einav, Finkelstein; Page 124.) For this reason, it is vital to understand risk aversion and the type of demand, very risky or not risky, which is taken to determine if it faces adverse or advantageous selection. In other research and experiments, such as that of Carter and Galarza (2015) in Peru, various estimates suggest the existence of a moderate to relatively high degree of risk aversion.

As Seung Oh Nam (2018) shows in the study conducted in Korea, people with high income, higher education, and more insurance contracts are more likely to pay extra for insurance policies that use blockchain and smart contracts. About 65% of the respondents in the sample responded that they are willing to pay an additional premium for blockchain and smart contracts. Likewise, it is expected to find greater acceptance of On-Demand insurance in this population. "Strategic development of the insurance product targeting educated, high-income consumers will increase the number of policyholders, which in turn can increase insurance premium income." (Seung Oh Nam; p. 9; 2018)

Several insurance products, like indexed insurance, have the problem of base risk. This means that the target population does not trust this product because it does not ensure coverage of a risk that they think is highly probable. For this reason, they decide not to take out insurance.

"Burkina's experiments show that restructuring an actuarially identical insurance contract at an uncertain cost has a strong impact on farmers' willingness to pay for insurance." (Carter, Elabed, Serfilippi; p. 9; 2015). In the case of On-Demand insurance, the base risk is faced by insurers due to the variability of coverage time and the moral hazard of their clients. Therefore, each insurance contract is offered with a base premium greater than the unit value per unit of normal policy coverage.

A determining factor is knowing whether there is adverse or advantageous selection. In *The Market for "Lemons": Quality Uncertainty and the Market Mechanism* article, Akerlof shows the adverse selection problem related to asymmetric information and dishonesty and how this leads to the disappearance of a market. "The presence of people in the market who are willing to offer inferior products tends to make the market cease to exist, [...]. It is this possibility that represents the main costs of dishonesty, since dishonest deals tend to make honest businesses go out of the market" (Akerlof; p. 495; 1970).

In this sense, clients have additional information, that insurers do not, about their condition and their risks, generating a disadvantage towards the insurers (adverse selection). For this reason, it is possible that very risky people are those who prefer to take this insurance, or, when they know of an imminently risky event. Thus, the insurance company would have to compensate its policyholders more frequently, generating important losses. In this way, the company would have to raise its premiums to cover its costs and honest demand would go out of the market. Then, little by little the market for this insurance would gradually disappear.

Adverse selection is the phenomenon where "people who have private information that they are at higher risk, self-select into the insurance market, generating a positive correlation between insurance coverage and observed claims" (Einav, Finkelstein; pg. 129; 2011).

"Adverse selection appears (or at least is possible) as long as the individual or group insured is free to buy or not to buy, to choose the amount or the insurance plan and to continue or discontinue as the policy holder" (Akerlof; p. 493; 1970). This statement is the biggest drawback for On-Demand insurance, as it is exactly what it offers. As Einav and Finkelstein (2011) show, if high-risk individuals are less risk averse and the heterogeneity in risk aversion is large enough, advantageous selection may emerge. For this reason, part of the aim of this experiment is to find out if advantageous selection exists for On-Demand insurance. On-Demand insurance with base premiums to cover adverse selection already exists in several countries and, despite being a recent model, it is a market that has grown in several countries. Similarly, there are companies, such as Lemonade, that have managed to overcome the barrier of dishonesty.

As Kahneman and Tversky (1979) show in prospect theory, most people tend to give more weight to the importance of uncertain negative events. "When the payment of a monthly insurance premium is framed as a profit, -pay now for the help later-, it is more probable that people avoid risks and take out insurance. But when paying a monthly insurance premium is framed as a loss: people feel they are losing money every month, they will take the risk and finally won't get an insurance policy." (John Peters; 2017). Here we can see the compensation: the uncertain event leads to taking out insurance to avoid negative results, but if the cost of acquiring this insurance is higher than the agent expects, it will be seen as a loss and will not be acquired. Consequently, it is expected that, by prospect theory, people will give more weight to the possible risks they face and, with the flexibility of On-Demand insurance, will see the insurance as a profit, generating a demand with advantageous selection.

## Methodology and experimental design

A laboratory experiment was carried out with students from Universidad San Francisco de Quito aged between 18 and 27 years. Subjects were presented with the general concept of On-Demand insurance and how it works. Later, subjects were introduced to its use with two products: vehicle insurance and insurance for mobile technology such as cell phones and laptops. Subjects were rewarded with points in different classes from the University in relation to their initial endowment and performance in the experiment. The experiment lasted about 45 minutes and consisted of four parts.

The game starts with a preliminary task where subjects earn their endowment according to a performance-based payoff. This performance relies on a series of 10 mathematical, logical, and verbal games, where if they get the correct answer, they earn \$20 each time, and earn \$0 if the answer is incorrect. Thus, if someone does everything right, they would earn \$200 the first time they play. This endowment would reflect the monetary value of an object subject owns that will be exposed to a certain risk. The aim of doing these tasks is to make sure that the individual knows the value of their object and do not consider it as a gift, which could affect their risk aversion.

In the second part of the experiment, the insurance mechanics is explained. The probability of them losing their endowment is presented (as *high* or *low*) and participants begin to choose between On-Demand insurance, no insurance, or a normal 12-period policy on each period. Every period is independent of the last and of other players. They play a total of twelve periods, resembling a full-year policy. The referential risk rates for this section were obtained from *Actuaria*, based on real market premium rates.

Participants see the probability of the risk and then they decide if they want On-Demand insurance, a normal policy, or no coverage. Then, if they chose the On-Demand insurance, they



are asked how much they are willing to pay for it, given their endowment value. Afterwards, they are presented with the premium for On-Demand insurance for that period and are asked if they are willing to pay that given price for the insurance. If they are not, they go through the risk without any coverage; if they do, the premium is subtracted from their endowment and then they go through the risk. Later, they could see if the risk happened or not and the final value of their endowment.

The experiment was framed this way to simulate real decisions. People usually identify a potential risk first, then they look for coverage options. They form their expectations about the possible products and if they like one, they ask for more information about it. If they like it but its *cost* is higher than their personal value, they will not take it in the end. Whereas if its benefits seem to be higher than its *cost*, they will continue with the purchase. Giving people the option of not choosing On-Demand insurance when the premium is shown, after they already said they would take the On-Demand insurance is important, because it shows if people wanted the insurance but didn't accept the given price of it.

After the twelve periods, subjects are presented with a demographic and control questionnaire. Finally, a risk Aversion questionnaire is applied: A set of 90 questions from the Domain Specific Risk-Taking questionnaire (DOSPERT). This questionnaire measures the probability of risk taking in different situations, perceived risks of those activities and the expected benefits of them. The options for subject's risk exposure, perceived risk and expected benefits were presented in a scale from 1 to 5, being 1 the lowest score and 5 the highest.

With the data from willingness to pay the aggregate demand curve was estimated. The information collected in the experiment is based on the willingness to pay of the participants (willing and unwilling for On-Demand insurance) and subsequently the establishment of their willingness to pay (specific value) as well as their perception of risk and exposure to it, as an

approximation to their risk aversion. Finally, control variables are used to test the validity of the experiment and understand the demographic characteristics of the sample.

Subjects' risk aversion was determined with the DOSPERT questionnaire, as it considers real subject's risk characteristics and environment. "The Domain Specific Risk Taking questionnaire and scale is a validated measure of the risk attitude as a personality trait, that takes into account and weights several different domains in which risk attitudes can play a role, i.e., ethical, financial (further decomposed into gambling and investment), health/safety, social, and recreational decisions" (Crosetto, Filippin; pg. 7; 2012).

Carter and Elabed use a method that "extends the Multiple Price List method by asking the participant to simply choose at what price the indexation insurance contract will change. We adopted this method because of its simplicity in relation to the standard MPL procedure" (Carter, Elabed, page 159, 2015). The experiment attempts to ask a similar question, asking participants how much they would pay for On-Demand Insurance in relation to the premiums of a simple policy.

After obtaining the data, an econometric analysis is performed to identify the probability that subjects have to acquire the On-Demand insurance product, their risk characteristics, their willingness to pay and their demand. This is needed to determine whether there is advantageous or adverse selection, by comparing it with the marginal cost and average cost faced by an insurance company.

## Results

The average time of the experiment was 45 minutes. There was a total of 32 participants, aged from 18 to 27 years, with the majority younger than 21, where 56% were women and 44% men. They were coursing a variety of semesters, from 1st to 10th, and different majors, being 59% of them from CADE which is the Business, Finance, Marketing, and Economics Faculty.

Out of the 32 participants, only one did not understand what the On-Demand insurance was, representing 3.1% of the sample. In the end of the experiment subjects were asked if they would contract On-Demand insurance, 84% of the subjects said they would. Of those who said they would not purchase the insurance, the common reasons were that they didn't have enough money to pay for it, they thought risks are always there or that they don't believe in insurance. Later they were asked about whether they would purchase the insurance for specific belongings: 44% said they would acquire it for their cell phone, 66% for their Laptops and 57% for their cars.

As stated before, we expect that people with higher income and more insurance contracts will be more likely to acquire this insurance. Seung Oh Nam (2018) showed that 65% of respondents are willing to pay for a similar service. The average household income of the sample is between 30 000 USD and 50 000 USD and 85% of the sample already had insurance contracts. The household income for the people who had previous insurance policies is, on average, higher than the income of the whole sample (more people on the 50 000- 70 000 USD range). Out of the 27 people who already had insurance, 85% said they would purchase On-Demand insurance.

As subjects had to decide whether or not to choose On-Demand insurance on each period in the experiment, the mean of these choices showed that on average, 34% would take the insurance. This probability is considerably lower than the 84% answered in the end of the

questionnaire. There are two important considerations for this difference. First of all, most of the people don't behave the way they say they would. So, when they were asked if they would acquire the insurance, most said yes (84%), but on practice, they didn't choose this option, just 34%. Also, they were presented first with the options in the game and then asked if they would purchase it. Therefore, they might have not chosen the On-Demand during the experiment, but in the end decided that they did like it and found it useful, so finally they answered they would purchase it.

Subjects had a general fixed value for the risk premium rate of 20% of their endowment. They were first asked how much they are willing to pay (in USD) for the On-Demand insurance to preserve their endowment. The average willingness to pay was 6.5%, which is higher than the highest average risk premium of a normal policy (5%) so we can say that, on average, the need to have a higher "base risk premium" for On-Demand insurance is covered. Then, they were presented with the "market price" of the On-Demand insurance and were asked if they were willing to pay the given amount for it. The premium acceptance variable was obtained as the average willingness to pay for the given premium in the choosing periods by each subject; so, on average, the acceptance of the risk premium is of 28%. It is important to note that only 20% of the sample is willing to pay a premium rate of 20% or more when they are asked for their willingness to pay.

The values for subject's risk exposure from the DOSPERT questionnaire were shown in a scale from 1 to 5, being 1 *not at all likely* to take the risk, 2 *unlikely*, 3 *uncertain*, 4 *likely* and 5 *very likely to take it*. The average respondents answered with a tendency of taking less risks, showing a risk aversion tendency within this demand.

**Table 1: Descriptive statistics**

	On-Demand period purchase	Given premium acceptance	Premium rate WTP	Subject's Risk exposure
Mean	34%	28%	6.50%	2.9
Median	29%	17%	6.00%	2.85
Mode	8%	17%	2.50%	2.7
Standard Deviation	29% <sup>1</sup>	27%	6.59%	0.41

I ran a Logit regression that best fitted the data, as it doesn't have a normal distribution, (especially because of its size). Table 3 shows the coefficients and standard errors for the explanatory variables.

**Table 2: Descriptive statistics**

Variable	Type	Description
sex	binary	1 = subject is woman
endow	scale	endowment of each subject
rt	scale	risk-taking coefficient from each subject
pt	scale	coefficient for subject's perceived risk
riskPer	binary	1 = high risk probability given in the experiment
odChoices	binary	1 = subject chose the On-Demand insurance in a period
primeAccept	binary	1 = subject accepted the given premium
PreviousIns	binary	1 = subject already had an insurance policy

In general, women seem to prefer On-Demand insurance less than men and the earned endowment variation seems to have the least effect in the decision. On the other hand, risk taking, and perception of risk lowers the probability of acquiring the insurance. Risk perception decreases the intake more than the risk taking, showing the common risk aversion of people. In relation to risk taking, more risk averse people won't be willing to take too many risks, so the risk-taking variable is an inverse to risk aversion. Therefore, perceived risk in the given

<sup>1</sup>I do not consider the standard deviation in this part of the analysis as I expect that it diminishes as the sample increases.

choosing moment is more determinant than risk aversion. As the variable of risk perception on each period was given as *high* equals 1 and *low* equals 0, it is coherent that when the perception is of high-risk probability, the probability of subjects taking the On-Demand insurance increases.

The experimental choices were designed to simulate real decisions, so its positive coefficient show the tendency: if subjects took the On-Demand insurance previously in the experiment, the probability of them actually taking the insurance increases. Nevertheless, this variable has one of the highest standard error. As it is not a big sample, the negative coefficient of the prime acceptance variable might seem contradictory. This means that the probability of subjects to take the insurance, diminishes as they accepted the given premium in the experiment.

The possible explanation for this, is that the premium might have been too *expensive* in the experiment, such that it drove demand away. In the experiment people did accept the premium, but with the expectation of these prices being the real-world prices (20% of their endowment), they finally would not contract On-Demand insurance. In any case, in terms of its average partial effect and partial effect at the average, this variable has the highest standard error.

As expected by Seung Oh Nam (2018), the previous acquisition of an insurance policy has a positive influence in the probability of acquiring On-Demand insurance. Therefore, people who already have insurance policies are the most probable target demand for On-Demand Insurance.

**Table 3 Logit: Probability of people acquiring On-Demand Insurance**

Dependent variable: Probability of people acquiring On-Demand insurance						
<b>Independent</b>	<b>Logit</b>	<b>p-value</b>	<b>Logit (APE)</b>	<b>p-value</b>	<b>Logit (PEA)</b>	<b>p-value</b>
sex	-1.0746 (2.49835)	0.6671	-0.07017 (0.1503409)	0.6365	-0.03731 (0.07894783)	0.6407
endow	0.01523 (0.01972)	0.4401	0.00107 (0.0015484)	0.5069	0.00054 (0.00081634)	0.4885
rt	-0.14304 (0.09886)	0.1479	-0.01008 (0.0096487)	0.3338	-0.00509 (0.00526659)	0.2963
pt	-0.26926 (0.14562)	0.0645	-0.01897 (0.0164291)	0.2564	-0.00958 (0.00844238)	0.2483
riskPer	0.39336 (6.75655)	0.9536	0.02771 (0.4761077)	0.9528	0.01400 (0.2366434)	0.9536
odChoices	9.54862 (14.87104)	0.5208	0.67269 (1.1259698)	0.4534	0.33977 (0.45317655)	0.5502
primeAccept	-2.87665 14.04033	0.8377	-0.20266 (0.9944721)	0.8278	-0.10236 (0.47055295)	0.8385
PreviousIns	1.4419 (2.0936)	0.491	0.12460 (0.2070814)	0.6656	0.08495 (0.19654979)	0.5474
Intercept	31.47422 (16.66352)	0.0589				
Observations	384					
R2	0.4511672					
Log-likelihood	-7.6116					

We took the mean of each sample to replace on each variable, distinguishing between men and women and considering a risk Perception of *high* (because On-Demand insurance is supposed to be activated in these times) and we obtained that the average woman, with the given conditions would have a probability of 50% of accepting the On-Demand insurance and a man, with the same characteristics, would have a probability of almost 53%. On the other hand, the average probability for women to choose On-Demand insurance is almost 64% and that of men is almost 71%. The first percentages only consider the average person in the sample, whilst this last percentages includes the average of every individual's characteristics of the sample.

**Table 4 Probability of the average subject of choosing On-Demand insurance by sex**

<b>PEA</b>	
Women	0.49608
Men	0.53338

**Table 5 Average of the subjects of choosing On-Demand insurance by sex**

<b>APE</b>	
Women	0.64081
Men	0.71101

**Demand and Willingness to Pay (WTP)**

As stated before, only 20% of the sample is willing to pay a premium rate of 20% or more. The common willingness to pay is driven by risk perception, level of endowment and risk aversion. A Tobit regression was made, as results for willingness to pay were zero for those who didn't choose On-Demand. Results from this regression show that the most important determinant for the willingness between these three factors is the risk perception at the moment of the possible high risk. This result has a very big standard error, so it should be re-estimated with more data to see if it is still the most important. On the other hand, if people take more risks, their willingness to pay for the insurance will decrease, then they would be less likely to pay for this insurance. This occurs as their risk aversion is lower so they don't value the insurance as others with more risk aversion. The change in value of their insured endowment has a positive relation to their willingness to pay for its insurance. If their good is more expensive, they are willing to pay more to maintain it in its current condition.



**Table 6 Participants' willingness to pay for the On-Demand insurance in terms of risk premium rates.**

Willingness to Pay	
Independent	Tobit
endow	0.2771 (0.3106)
rt	-1.3758 (1.1041)
riskPer	13.9325 (91.6571)
R2	0.059
Log-Likelihood	-148.1085

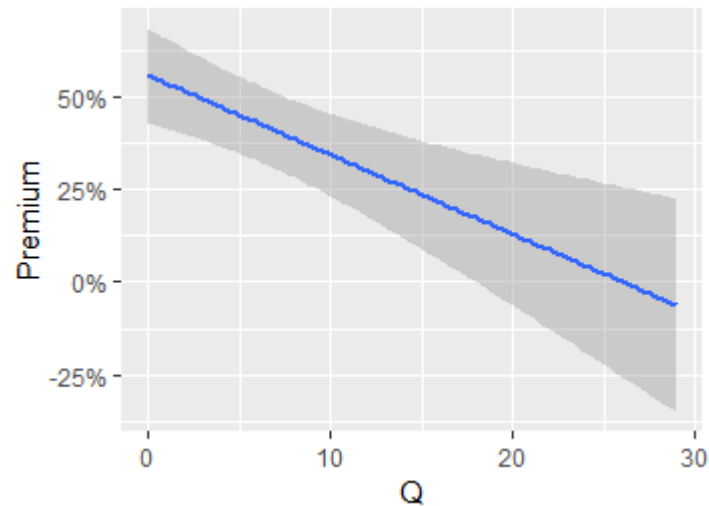
With the given willingness to pay for On-Demand insurance, at each level of endowment and risk perception during the periods, an aggregate demand curve was obtained. Assuming a linear demand curve, its price-elasticity is -9.78% between the risk premium rates of 5% and 20%, showing an inelastic behavior. This must be closely analyzed, as only 20% of the sample were willing to pay a premium of 20% or more. There are two things to consider. First, as it seems to be an inelastic demand, if premium rates raise from 5 to 20 percent, it doesn't seem to drive the demand away. On the other hand, subjects might be driven away because only 20% would pay more, meaning that the majority won't pay 20%, and as shown in table 1, the mean of the willingness to pay is 6.5%, with a mode of 2.5%, showing that people don't want to pay rates closer to 20%.

**Table 7 Estimated Aggregate Demand Curve (premium-amount of demand)**

$$Q = 26.098 - 46.512P$$

**Table 8 Price Elasticity of the Demand**

Q	P
23.7724	5%
16.7956	20%
Elasticity	-9.78%

**Figure 1 Aggregate Demand Curve****DOSPERT questionnaire**

A negative coefficient shows risk aversion behavior, and a positive one shows risk seeking behavior. Results of the questionnaire exhibit the coefficient of perceived risk as negative, showing the risk aversion behavior; but the expected benefits of these same risks is positive, weighting more than the risk aversion into the risk-taking decision. Therefore, this sample on average, takes risks based more on expected benefits than on perceived risks, as benefits influences their decisions more than potential of risks diminishes it. This might cause adverse selection.

**Table 9 DOSPERT results for subjects' risk exposure**

Subject's Risk exposure	
Independent	MLR
Subject's Perceived risk	-0.2065 (0.1956)
Subject's Expected benefits	0.7157

	(0.1510)
R2	0.437

**Table 10 Initial analysis for advantageous or adverse selection.**

β1	risk perception	-0.2065
β2	expected benefits of risk	0.715

|β1 < β2|      The effect of risk perception is lower than the effect of the expected benefits of taking the risk on the decision of Risk taking.

We consider the possibility of adverse selection given the relation between the two coefficients above. What these coefficients show is that if people decide based on their expected benefits more than on their perceived risks, their risk aversion will be smaller, and they will take more risks. In this case, they will be riskier for the company with On-Demand contracts, making this supply unprofitable for companies, as the probability of having to pay losses increases with more risk-taking.

Nevertheless, in the sample, individuals with the highest willingness to pay were not the ones with the highest risk exposure characteristics. As it was mentioned before, “if high-risk individuals are less risk averse and the heterogeneity in risk aversion is sufficiently large, advantageous selection may emerge.” (Einav, Finkelstein; pg. 124; 2011) Therefore, this needs to be demonstrated by comparing the demand curve with the typical (or a specific) insurance company’s average and marginal costs, to determine the true selection characteristic.

## **Limitations of this study**

The expected sample for this study was of about 385 students, with 16 programmed sessions in the experimental laboratory. Given the sanitary emergency in the city (and the world), only two sessions of the experiment were carried out. Because of this, only 32 subjects were evaluated. All of the analysis made above need to be retested with a bigger sample to check its validity, as well as the model's and the change on the Demand's curve. The maximum correlation between the variables is 0.3144, so we do not have perfect collinearity. And, as it was randomized, no endogeneity is expected.

## **Conclusion**

As On-Demand insurance continues to grow, its study in different parts of the world is needed. With this experiment we explored the characteristics of the possible demand for this new trendy insurance in the young-adult population of middle-classed Quito at USFQ to test the feasibility of its development in the city.

In the sampled population of USFQ, 96% of the subjects understood what On-Demand insurance was and how it works. There seems to be a connection between higher income, previous insurance purchase and an increasing probability of acquiring On-Demand insurance. Demand is risk averse, but its decisions are driven more by expected benefits than by risk perceptions. Women are less probable to contract this kind of insurance than men as a whole. The willingness to pay seems to be enough to cover the basis risk of risk premiums for insurance companies to offer the insurance. The average and most commonly accepted risk premium were between 6% and 7% and the highest probability considered was of 71% with experimental data, in contrast to an 84% of acceptance given by subjects when asked if they would purchase it.

Given that the insurance is thought to be contracted when mostly needed, the risk perception of the possible event happening is one of the biggest determinants for the demand of this insurance, even if the normal behavior of the subject doesn't show risk taking behavior. There are ambiguous results about advantageous or adverse selection qualities in the sample, so further research needs to be developed, applied to an insurance company and with a bigger sample.

From this paper, companies can analyze the possibility of implementing this insurance in the country, considering consumers' characteristics and preferences. Further experiment should be made with the incentive of money instead of points for more precise results. Adverse selection should be determined with insurance companies' real costs and the experimental premium rates to be presented to subjects have to be evaluated in anticipation to the experiment to avoid unrealistic expectations of the premium. Another interesting research is the application of On-Demand insurance on experiments of specific goods, such as cell phones, laptops, and cars, to see differences with the On-Demand insurance general concept acceptance.

## Bibliography

- Actuaria. (February 5, 2020) Tasas de siniestralidad. Interview with Esteban Vargas. Quito, Ecuador
- Bowles, S. (2004) *Microeconomics. Behavior, Institutions and Evolution*. Russell Sage Foundation. (MBIE)
- Carter, M. Elabed, G. Serfilippi, E. (2015) *Behavioral economic insights on index insurance design*. University of California, Davis, California, USA; Mathematica Policy Research, Washington, District of Columbia, USA; University of Namur, Namur, Belgium. Emerald Group Publishing Limited
- Cedatos. (2011) *La inseguridad en el Ecuador*. Retrieved from [http://www.cedatos.com.ec/detalles\\_noticia.php?Id=86](http://www.cedatos.com.ec/detalles_noticia.php?Id=86)
- CMV. (2018) *¿Por qué los ecuatorianos no contratan seguros?* El Mercurio. Retrieved from <https://ww2.elmercurio.com.ec/2018/08/03/por-que-los-ecuatorianos-no-contratan-seguros/>
- El Comercio. (2018) *La pérdida del celular sale cara*. Retrieved from <https://www.elcomercio.com/actualidad/negocios/perdida-del-celular-sale-cara.html>
- El Mercurio. (2018) *El consumo de seguros en Ecuador es intermitente*. Retrieved from <https://www.eltiempo.com.ec/noticias/empresarial/1/el-consumo-de-seguros-en-ecuador-es-intermitente>
- El Universo. (2018) *Cultura sobre seguros, con una baja penetración en Ecuador*. Retrieved from <https://www.eluniverso.com/noticias/2018/04/03/nota/6695959/cultura-sobre-seguros-baja-penetracion>
- El Universo. (2019) *Robos a personas aumentaron en Quito*. Retrieved from <https://www.eluniverso.com/noticias/2019/02/19/nota/7196246/robos-personas-aumentaron-quito>
- Genesis. (2017) *Cinco malas razones por las cuales las personas no contratan un seguro*. Retrieved from <https://blog.genesis.es/cinco-malas-razones-por-las-cuales-las-personas-no-contratan-un-seguro/>
- G. Elabed and M. R. Carter. (2015) Compound-risk aversion, ambiguity and the willingness to pay for microinsurance. *Mathematica Policy Research, USA, University of California, Davis, USA, NBER, USA. ELSEVIER, USA. Journal of Economic Behavior & Organization* 118 (2015) 150–166
- George A. Akerlof. (1970) *The Market for "Lemons": Quality Uncertainty and the Market Mechanism*. *The Quarterly Journal of Economics*, Vol. 84, No. 3, pp. 488-500
- INEC. (2017) *Tras las cifras de Quito*. Retrieved from <http://www.ecuadorencifras.gob.ec/tras-las-cifras-de-quito/>

- Kahneman, D. Tversky, A. (1979) *Prospect Theory: An Analysis of Decision under Risk*. *Econometrica*. Vol. 47, No. 2 (Mar, 1979), pp. 263-291. The Econometric society
- Liran Einav, Amy Finkelstein. (2011) *Selection in Insurance Markets: Theory and Empirics in Pictures*. *Journal of Economic Perspectives*—Volume 25, Number 1—Winter 2011—Pages 115–138
- Merrey, P. Kokins, A. (2017) *Will On-Demand insurance become mainstream?* KPMG LLP. UK
- Robert H. Brook, John E. Ware, William H. Rogers, Emmett B. Keeler, Allyson Ross Davies, Cathy Donald Sherbourne, George A. Goldberg, Kathleen N. Lohr, Patti Camp, and Joseph P. Newhouse. (1984) *The Effect of Coinsurance on the Health of Adults: Results from the RAND Health Insurance Experiment*. Santa Monica, Calif.: RAND Corporation, R-3055-HHS
- Seung Oh Nam. (2018) *How Much Are Insurance Consumers Willing to Pay for Blockchain and Smart Contracts? A Contingent Valuation Study*. Department of IT-Finance Management, Soonchunhyang University, 646 Eupnae-ri, Shinchang-myeon, Asan-si 31538, Choongchungnam-do, Korea
- Seguro por días. (2019) *Calcula tu Seguro temporal de Coche*. Retrieved from <https://www.seguropordias.com/vehiculos/coche.php>
- Urs Fischbacher, z-Tree: Zurich Toolbox for Ready-made Economic Experiments, *Experimental Economics* 10(2), 171-178.

## **Appendix**

### **Appendix A. Instructions**

Welcome.

This experiment is designed to determine the feasibility of implementing a new insurance model.

Your participation in this experiment is voluntary and you are free to leave at any time.

However, if for any reason you have to withdraw, you will not be able to return to the experiment and you will not receive any payment.

Please turn off your cell phone.

If during the experiment you have a question, please raise your hand to receive help. This is an experiment about decision making. You will be remunerated for your participation in the experiment, and the amount of points you will receive depends on the decisions that you make. The whole experiment should be completed within an hour and a half. Your payment will be expressed in dollars.

To keep your decisions private, you are asked not to share your decisions with any other participant.

Please read the instructions carefully and make sure you understand them in their entirety.



## Appendix B. Experiment Structure

The experiment has three parts and a final questionnaire.

