Dynamics in Markets with Adverse Selection

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(Preliminary and incomplete)

1 Introduction

This paper uses experiments to explore the dynamics of contract offers and acceptances in competitive markets with asymmetric information. The experiments are designed around the prototype of such markets, namely, Rothschild and Stiglitz' (RS) insurance markets. RS originally proposed a plausible notion of competitive equilibrium, which however opened up the possibility of nonexistence of equilibrium and, even if it exists, sub-optimality. Subsequent theoretical work[1] advanced other notions of equilibrium, based on different principles of equilibration, and restored generic equilibrium existence, if not optimality. It is an open question, however, what principles of equilibration are at work in actual markets. This is ultimately an empirical question, which this paper attempts to address. The different notions of equilibrium all have their own logic and some may be more persuasive theoretically than others, but it is ultimately the data that should determine which is more relevant.

In cases where the RS equilibrium exist, Asparouhova [2003] demonstrated that the RS insurance markets move towards equilibrium contract choices. The speed of convergence seems to be affected, though, when the RS equilibrium is sub-optimal. The experiments in Asparouhova [2003] provide a unique testbed to discriminate between the key principles about equilibration dynamics that have been proposed in the literature to address the problem of equilibrium non-existence. These are: (i) pooling contracts are expected to be taken disproportionately by agents who have more to gain; (ii) insurers only consider offering contracts that are close to those already available in the marketplace. In the original RS equilibrium, different insuree types take pooling contracts in the population proportion, and insurers consider offering any contract, not only marginally improving ones.

It would be inappropriate to study these principles in a situation of nonexistence of RS equilibrium: while competing notions of equilibrium do make precise predictions about outcomes in such situations, it is not clear what should happen if the principles behind the RS equilibrium are correct. Observing that none of the competing equilibria come about, it would be presumptuous to conclude that therefore the RS principles are the correct ones. In cases where the RS equilibrium does exist (as in the experiments of Asparouhova [2003]), the eventual outcomes are the same under all notions of equilibrium; only the paths towards equilibrium differ substantially. Since equilibrium has been demonstrated to eventually obtain, these experiments provide a non-controversial setting in which to study equilibration dynamics.

[1] Only a short list of which is comprised by the papers of Wilson [1977], Miyazaki [1977], Spence [1978], Riley [1979], and the more recent ones by Dubey and Geanakoplos [2002] and A.B. Ania at al. [2002].

The experimental setup can be briefly described as follows. A group of subjects[2] can each offer (through an open-book system) contracts that correspond to the RS insurance contracts. Subjects from another group can each accept any one from those contracts offered in the marketplace. Each participant from this second group has private information about his/her type. The proportion of the two possible types in the population, however, is public information. Each experimental session consists of ten to fifteen periods that are replications of the same situation. Periods are independent. In each period the market opens, and after a pre-announced length of time elapses, it closes. Offers and corresponding acceptances can be submitted at any time during open market. A participant's final earnings are the cumulative earnings from all periods. Subjects earned on average $35, with a minimum of $0,[3] and a maximum of $90 for an approximately two-hour experiment. The parameters in the experimental design are chosen so that the RS equilibrium exists. This paper presents the results from six such experiments.

In all experimental sessions, contract choices move towards the RS equilibrium pair of contracts. The process is not instantaneous, it takes time for the markets to discover equilibrium. Throughout the equilibration process, however, about 90% of the contract recipients accept *undominated* offers: from the set of available offers, they choose the ones that maximize their monetary payoffs. Undominated acceptances are necessary for testing the aforementioned principles of equilibration. The first of the two conjectures, that pooling contracts would be taken disproportionately by agents who have more to gain, is not supported in the data analysis. Whenever pooling contracts are offered, they are taken by any of the two types agents in their proportion in the population independent of the magnitude of the marginal gains from trade. Also, when contract issuers compete in providing contracts, they *do not* always take local steps as suggested by several models (see next section). The hypothesis that they do so is strongly rejected by the data. Thus, this study suggest that the principles outlined in the seminal RS paper are borne out in the data. Different insuree types do take pooling contracts in their population proportions, and insurers do consider offering contracts globally.

The rest of the paper is organized as follows. The next section provides brief literature review along with a few motivational remarks. Section 3 goes through the theoretical overview. Section 4 explains the experimental setup, while section 5 describes the data. The results of the experiments are in section 6. Section 7 concludes.

[2]The subjects were undergraduate and graduate students from Caltech, UCLA, and Sofia University in Bulgaria.

[3]A bankruptcy rule is imposed in all experiments. If a participant's cumulative earnings remain negative for two periods in a row, he or she is excluded from further trading. Those with $0 earnings are the bankrupted participants.

2 Brief Literature Review and Motivation

In general, to cope with the non-existence problem of RS equilibrium, other notions of equilibrium have been proposed; among them are the ones presented in Wilson [1977], Miyazaki [1977], Spence [1978], and Riley [1979]. Each adds a degree of sophistication on the beliefs that contract issuers hold: in Wilson [1977]'s model it is the anticipation of immediate withdrawal of all unprofitable offers from the market that keeps insurance companies from offering equilibrium-destroying contracts. Miyazaki [1977] and Spence [1978] employ a similar anticipation concept that helps sustain equilibrium when multiple contracts can be offered. Riley [1979]'s contract providers anticipate further entries in the market when they decide to offer a new contract. This anticipatory behavior supports the existence of equilibrium here as well. Interestingly, the above modifications of the RS equilibrium concept can be paralleled to the coalition-proofness "modification" used as a solution concept when the core of an economy is empty.

Dubey and Geanakoplos [2002] (DG) study markets with adverse selection characterized by generic existence of equilibrium.[4] In order to prevent the indeterminacy of their model, DG introduce a refinement of market participants' beliefs regarding the profitability (rates of delivery of promised returns) of contracts were they to be offered in markets that are inactive in equilibrium. DG justify their using the particular refinement by:[5]

> Rothschild and Stiglitz might have argued that instead of thinking of the pools as strategic dummies, we could imagine that they were each run by some entrepreneur. ... We have in mind a competitive world with many small agents. If the little entrepreneur's gambit is to be successful, he must lure new reliable households at κ^*, who were unwilling to contribute at κ_J. But it is the unreliable, already willing to contribute at κ_J, who will be even more eager to contribute at κ^*, and likely to get to him first. If so, his meagre wealth will certainly not be enough to stand guarantee for his exorbitant offer of κ^*, and he will suffer a disaster.

DG bring forward questions that may turn crucial for understanding the workings of markets with asymmetric information. When a contract is beneficial to several recipients, is it the case that the recipients with the highest gains from trade react among the first and take those contracts. The latter can be a problem, as pointed out by DG, if contract providers are wealth constrained and the first acceptances incur losses that exceed their wealth. Alternatively, imagine that pooling contracts (whose profits are conditional upon the two types accepting them in their population proportion) are not offered in quantities sufficient to cover the entire demand. In this case

[4] DG work in a general equilibrium framework.

[5] DG have reliable and unreliable households instead of high-risk and low-risk types of agents.

the high-risk types' swift reaction would result in ex-post aggregate acceptances of pooling contracts that do not reflect the two types' proportion in the population. Contract providers will find themselves not meeting their profit expectations if not incurring losses. In either case providers would eventually learn not to offer such contracts.

These questions are irrelevant in the original Rothschild-Stiglitz model. RS' contract providers are endowed with infinite wealth. They "specialize" in offering a single type of contract and are obliged to supply the entire market (populated with continuum of recipients) with it. Those conditions guarantee that if a pooling contract is offered (and the recipients are assumed rational), it would be taken by any of the types in their population proportion independent of the issuers' beliefs.

However, in reality contract providers are wealth constrained, offer multiple contracts and usually in quantities not sufficient to meet the entire demand for those contracts. This is the also the case in our experiments, thus all of the above questions remain pertinent within the experimental markets.

The refinement in DG also brings up the issue of local versus global adjustments. When market participants experiment, do they do so locally, around the markets that are already opened and prices that have already formed. By requiring that beliefs regarding unopened markets be confirmed only for local deviations, DG's study suggests that agents take small steps when competing against each other.

The issue of local adjustments arises in the model presented in A.B. Ania at al. [2002] (ATW) as well. ATW provide an evolutionary version of the RS' equilibrium where the dynamics are built on imitation and experimentation.[6] Analogously to DG, ATW obtain the result that if the experimentation is confined to be only local, equilibrium always exists. In their interpretation the manager of an insurance company...

> ... might have an incentive to confine herself to local experiments. She might fear that the performance of a nonlocal experiment can differ too much from that of the contracts previously on the market, such that the failure of such an experiment would be disastrous for her evaluations.

While there is great intuitive and theoretical appeal, the empirical success of the above conjectures is yet to be proven. It is apparent that the existence of equilibrium and contract allocation results of the belief-based models can change dramatically if the assumed beliefs are not upheld. Same is valid about the issue of global vs. local adjustments that is studied here. Predictions of models of equilibration can differ substantially depending on the assumption they make about agents optimizing locally or globally. The relevance of those principles of

[6]Note that despite each providing a dynamic story to justify the use of a particular belief formation, all of the before-cited models are static.

dynamics goes well beyond the markets studied here.[7] Both components, beliefs and nature of adjustments, are necessary to determine which is the equilibrium (if any) that prevails in markets with adverse selection. Experiments provide an excellent venue for studying those problems and potentially for providing some guidance in the choice of appropriate equilibrium concept.

3 Theory Overview and Notation

We study markets for contracts under asymmetric information that takes the form of adverse selection. Although we adhere to contracts that correspond to the RS's insurance contracts, their exact interpretation is irrelevant for this study. The participants in our markets are providers (or issuers), and recipients of contracts. The providers can offer any contracts from an exogenously specified set S. They can also withdraw any of their outstanding contracts from the market. There are two types of potential recipients – high-risk, called H-type, and low-risk, called L-type. Recipients know their types while issuers only know the proportion λ of H types in the population. Each contract in the set S is defined by its four contingent payoffs, namely U^r_H, U^r_L, U^i_H, and U^i_L. U^r_H is the payoff to recipients of the H type, while U^r_L is the payoff to recipients of the L type. U^i_H is the payoff to the issuer when the contract recipient is of the H type. Similarly, U^i_L is issuer's payoff when the recipient is of the L type.[8] When a contract is offered on the market, it can be accepted by a recipient of either type if she finds it in her best interest to do so. Each acceptance is final, recipients cannot cancel their acceptances.

Time is discrete and advances with market activity. Contract offerings, acceptances, and withdrawals are what constitute activities in the market. Providers can offer and withdraw contracts one at a time. Recipients are allowed to accept at most one contract.

Given the nature of available contracts, the issuers have the opportunity to "screen" the potential receivers. This can be done by wisely choosing what contracts to offer, so that each contract lands in the hands of a receiver of a type upon which the issuer has calculated his ex-ante profits.

Rothschild and Stiglitz were the first to show that a competitive equilibrium in markets similar to the

[7] The tatonnement based models in the 60s and 70s assume that agents submit globally optimal net trades (for a survey on the topic see [9]), while more recent models like [4] and [5] rely on local optimization.

[8] As in RS we restrict those payoffs to be each functions of two parameters (α, β) corresponding to the coverage and the premium of the RS' insurance contracts. Thus $S \subset \mathbb{R}^2$. Moreover the payoffs for the recipients are required to satisfy the discrete single-crossing property (or strict increasing differences).

one described above might fail to exist.[9] Whenever it exists, the RS equilibrium is comprised of a pair of contracts, each yielding zero profit for the providers and maximizing the recipients' payoffs subject to the incentive constraints.

An important feature that distinguishes the markets here from the original RS' markets is the dynamic setting. Such a setting is necessary to study the principles that take markets to equilibrium, or prevent them from ever reaching one.

The following notation although somewhat cumbersome, is necessary to define the hypotheses informally spelled out in the previous sections.

Definition 3.1 *$S_M(t)$ is the set of all contracts offered in the marketplace after the activity at time t has taken place.*

$S_M(t)$ belongs to the *multiset* of S.[10] If the activity at time t is an offering of a contract, then $S_M(t)$ is equal to $S_M(t-1)$ with the newly offered contract added to it. Similarly, if the activity is a withdrawal or acceptance of a contract, $S_M(t)$ is equal to $S_M(t-1)$ minus the contract withdrawn or accepted at time t.

Definition 3.2 *$s(t)$ denotes a contract that is offered, accepted or withdrawn at time t; $s(t) \in S$*

In the present case the contract space is given by 345 contracts, labelled as follows.

$$S = \begin{bmatrix} A1 & B1 & \cdots & N1 & O1 \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ A23 & B23 & \cdots & N23 & O23 \end{bmatrix}. \tag{1}$$

If a contract, say $C5$, is offered, accepted or withdrawn at some time t, then $s(t) = C5$.

Definition 3.3 *$U(\cdot)$ is a vector function from S to $\mathbb{R}^4$; $U(\cdot) = (U_H^r(\cdot), U_L^r(\cdot), U_H^i(\cdot), U_L^i(\cdot))$.*

For example, in the experimental setup $U(C5) = (50, 45, -16, 29)$.

Definition 3.4 *$S_x^*(t)$, $x \in \{H, L\}$, is the set of contracts from $S_M(t)$ that give the x-type recipients the highest payoff, i.e. for all $s^* \in S_x^*(t)$, $U_x^r(s^*) = max_{s \in S_M(t)} U_x^r(s)$.*

[9]RS' s model is static in nature. They take S to be isomorphic to $\mathbb{R}^2_+$. The main role of the contract issuers in their model is to stand ready to offer a contract if a profitable opportunity arises. Thus, the equilibrium consists of a set of contracts s.t. when contract recipients choose contracts to maximize their payoff the following hold: (i) no contract in the equilibrium set makes negative expected profits; and (ii) there is no contract outside the equilibrium set that, if offered, will make a nonnegative profit.

[10]The multiset of the set S is the collection of all subsets of S where repetition of elements of S is also allowed.

An acceptance of a contract is called *undominated* if the recipient has chosen a contract that gives her the highest payoff from all the contracts in S_M.In other words, if a contract s is an undominated acceptance at time t by a recipient of type x then it must be the case that $s \in S_x^*(t-1)$. Note that choosing undominated contracts allows for myopia. The condition is weaker than imposing full rationality which would require to optimal timing as well. This minimal degree of rationality is needed to test the principles of equilibration as described in section 2. If recipients choose dominated contracts, accept orders at random, or follow some other rule, the theory must be adapted to this behavior accordingly. This motivates the first hypothesis.

HYPOTHESIS 3.5 *Recipients accept undominated offers.*

If recipients accept only undominated offers then one expects the issuers to offer "relevant" contracts as defined below.

Definition 3.6 *A contract s that is offered at time t is called* relevant *if $s \in S_H^*(t) \cup S_L^*(t)$.*

Thus, a contract is *relevant* if it is among the contracts that provide the highest payoffs for at least one of the types. All contracts that are not relevant are called *irrelevant*. It is costless to the issuers to offer irrelevant contracts that provide them high payoffs hoping that recipients will err and take some of them. This is the second hypothesis.

HYPOTHESIS 3.7 *If not all acceptances are undominated, issuers will offer some contracts that are not relevant.*

Definition 3.8 *A contract s that is accepted at time t is called a* pooling *contract if $s \in S_H^*(t-1) \cap S_L^*(t-1)$, and $U_x^i(s) \geq max_{s \in S_x^*(t-1)} U_x^i(s)$, $x \in \{H, L\}$.*

The first condition is that a *pooling* contract must provide the highest payoff to both types. The second requires the payoff to the issuer be the highest among marketed contracts that provide payoffs to the recipients equal to their payoffs from the pooling contract. This excludes contracts such as the RS equilibrium one, designed for the L-type recipients and providing the highest payoff to both types, from being qualified as pooling. This is because the H-types are indifferent between the contract designed for them and the one designed for the L types. However, the contract designed for L also provides lower payoff to the issuers compared the the H-contract, when taken by an H-type recipient. Thus, the L-contract satisfies the first condition in the definition but not the second. Exclusion of such contracts in the definition of *pooling* contracts is necessary to avoid biases in the estimation of the relative frequency with which such contracts are taken by the two types of recipients. A *marginal* gain for an x-type recipient from a pooling contract s is equal to the difference between the pooling contract's payoff and the payoff of the contract that was the best available to the x-type before the pooling contract was offered. The next hypothesis can be now stated.

HYPOTHESIS 3.9 *Whenever pooling contracts are offered they are taken by the type with higher marginal gain in proportion that exceeds this type's proportion in the population.*

The above hypothesis reflects the first of the two principles discussed in the previous section. We now turn to addressing the second one. It is fairly challenging how to define local vs. non-local moves in the markets described here. The idea of local movements stems from conjectures about agents' cognitive limitations. They choose contracts that are close (in terms of the metric in the contract space) to the ones that are already offered. In this study we take a more relaxed definition of a local contract. A contract is local if it is close to an already offered contract either in the contract space or in the utility space. Intuitively, an offer would not be qualified as "local" if there are other offers that would have been viable if made in place of this one, that are "closer" in the contract space to the already marketed ones and that provide higher payoff to the providers. The complement of this set is what is going to be defined as "local" move. Thus, if anything, the definition is biased towards accounting too many offers as local (and therefore an acceptance of the null that all offers are local would not be very informative). The next definitions formalize the above.

Definition 3.10 *The distance between two contracts s' and s'' in S_M, denoted $d(s', s'')$ is the city-block distance*[11] *between them in $\mathbb{R}^2$.*

Definition 3.11 *A contract s that is offered at time t is called x*-best*, $x \in \{H, L\}$, if $U^r_x(s) > max_{s\in S_M(t-1)} U^r_x(s)$, and $U^r_{\neg x}(s) \leq max_{s\in S_M(t-1)} U^r_{\neg x}(s)$; i.e. this is a contract that strictly improves on the payoff of the x-type recipients but not upon the $\neg x$-type.*

Definition 3.12 *A contract s_b is* between *contracts s^*, an x-best contract offered at time t, and $s_o \in S^*_x(t-1)$ (one of the best contracts for type x at time $t-1$), $x \in \{H, L\}$, if:*

(1) Contract s_b's payoff to the x-type recipients is higher that their payoff under s_o, i.e. $U^r_x(s_b) > U^r_x(s_o)$.

(2) s_b is incentive compatible with respect to the best outstanding contracts for type $\neg x$ recipients, i.e. $U^r_{\neg x}(s_b) \leq U^r_x(s_*)$, $s_* \in S^*_{\neg x}(t-1)$

(3) The profit for the contract issuer from s_b is greater than the profit from s^*, i.e. $U^i_x(s_b) \geq U^i_x(s^*)$.

[11] The city-block distance is the Minkowski distance $d(x, y) = \sqrt[r]{\sum_k |x_i - y_i|^r}$, $x, y \in \mathbb{R}^k$ when $r = 1$.

Note that the definition of betweenness involves only x-best contracts. Offers that are not relevant are excluded from consideration here. The definition therefore assumes that recipients are rational, and that sellers know this, so that they ignore irrelevant contracts when making decisions about introducing new contracts. It also implicitly assumes that markets approach equilibrium from "below". In other words, embodied in this definition is the assumption that contract providers start with "safe" offers that give them higher payoff compared to their equilibrium payoff (as opposed to offering negative profit contracts first and then withdrawing them from the market). Confirming or rejecting this conjecture is again an empirical question. Moreover, pooling offers are excluded as well. The latter is for technical reasons as there is no unique way of defining betweenness for such contracts.[12]

Definition 3.13 *If the activity at time t is an offer and it is x-best, denoted s_x^* , and $s_o \in S_x^*(t-1)$ then $B_x(s_o, t) = \{s_b | s_b \in S_M(t); s_b$ is between s_o and $s_x^*\}$.*

Definition 3.14 *Whenever a new offered contract $s(t)$ is x-best, $x \in \{H, L\}$, and $B_x(s_o, t) = \emptyset$ for some $s_o \in S_x^*(t-1)$ then $s(t)$ is called* marginal *contract with respect to s_o.*

Definition 3.15 *Whenever a contract $s(t)$, offered at time t is x-best,$x \in \{H, L\}$, and $B_x(s_o, t) \neq \emptyset$, then $s(t)$ is called* minimal distance *contract with respect to s_o if $d(s_o, s(t)) \leq min\{d(s_o, s_b) | s_b \in B_x(s_o, t)\}$.*

Our proxy for a local contract will be an x-best newly offered contract that is either marginal or one of minimal distance with respect to some contract from $S_x^*(t-1)$. Thus, if anything, our tests are going to be biased towards accepting more contracts as local than there would be according to some alternative definition. This leads to the following hypothesis.

HYPOTHESIS 3.16 *Each time an x-best contract is offered, this contract is either* marginal *or* minimal distance *contract with respect to some $s_o \in S_x^*(t-1)$.*

We use data from financial market experiments to test the above hypotheses. Our experiments are characterized by a parameterization of the RS model in which the RS equilibrium exists.[13] The following section is devoted to describing the experimental setup and procedures.

[12] Only one of the many problems is caused by the fact that betweenness must be defined with respect to the pooling contract at hands and two other contracts: $s_o^H \in S_H^*(t-1)$ and $s_o^L \in S_L^*(t-1)$.

[13] The parameterization is presented in [3].

4 Experimental Markets

A detailed description of the experimental markets can be found in [3]. We use the data from six experiments, conducted at Caltech, UCLA, and Sofia University in the period between May 2001 - September 2002. Briefly, the experiments are organized as a sequence of ten to fourteen replications of the same situation. Each such replication is called a period. The number of participants in an experimental session ranges from 13 to 23. In the beginning of each session the participants are divided into two groups - contract providers (called sellers), and contract recipients (called buyers). The contract recipients are then further divided into two types - called "red" type, corresponding to the high-risk type in the model, and "blue" type, corresponding to the low-risk type in the model.[14] Next, instructions describing in detail the markets as well as the rules according to which contract are offered and accepted are read aloud to the participants. The type of a recipient remains private information throughout the experiment.[15] However, the proportion of H-type recipients, λ, is publicly announced. The contract issuers are presented with a set of contracts that they can choose from and offer to the recipients. The recipients can choose only one contract per period from the contracts offered on the market. They are allowed to accept a contract at any time during a period. Recipients learn their payoff immediately after a successful acceptance. The issuers learn their payoff from each of their transactions in the end of each period. The contracts are organized in a table as the one presented in Figure 1. The contract space is a two-dimensional discrete grid, with the first coordinate denoted by a letter, while the second is a number.[16] Each contract specifies the four payoffs U^r_H, U^r_L, U^i_H, and U^i_L.[17] All payoffs are presented in a notional currency, called francs. For example, the contract $G8$ has $U^r_H = 102$, $U^r_L = 87$, $U^i_H = -52$, and $U^i_L = 46$. In the end of each experiment the earning of each participant are converted to dollars using an exchange rate announced privately to each participant in the beginning of the experiment. In all experiments the proportion of H-type recipients is such that RS equilibrium exist.[18] Three of the experiments are manual, while the other three are computerized.[19]

[14]As usual the terms insurance contracts, high-risk, or low-risk recipients are not mentioned to the participants.

[15]In some of the experiments the type of a given recipient changed from period to period but the proportion of H-types remained the same in all periods.

[16]The letters are in alphabetical order from A to O, while the numbers are from 1 to 23, for a total of 345 contracts in S.

[17]U^i_H and U^i_L are in bold on the first row of every cell, while the corresponding U^r_H and U^r_L are below them in parentheses. Also, because the recipients need not know the payoffs of the issuers or the other type of recipients, they are presented with a very simplified version of the payoff table with their own payoff in each cell only.

[18]The equilibrium contract designed for the L-type recipients is $D4$, while for the H-type recipient (due to the discretization of the contract space) there are two possible contracts - $L16$ and $M18$ that can emerge in equilibrium.

[19]The experiment instructions are the same in both computerized and manual experiments except in the parts where it is explained how to submit and accept contract offers. In the computerized experiments all communication was realized through the

Each experiment starts with a practice period, followed by the actual periods.[20]

5 Description of the Data

The data collected from each experimental session was in common format:[21] time stamp, action (offer, acceptance, or cancellation), contract name, and contract provider ID. If the action was an acceptance of a contract, the recipient ID, her type, as well as the payoffs to both parties in the transaction were recorded as well. Table 1 provides the numbers for each of the three market activities broken by types of experiments (manual vs. computerized). Inspection of the table reveals that computerizing of the experiments dramatically increases the number of the offerings and cancellations.

6 Results

In analyzing the data, we abstract from the problem of whether experimental markets reach equilibrium. That they actually do is reported in a companion paper [3].

The minimal rationality requirement on the recipients, namely that they only choose undominated contracts, is tested first. The results from our experiments show that recipients rarely choose suboptimal contracts[22] from the set of marketed contracts. Table 2 displays the *dominated* acceptances by types. The proportion of dominated acceptances is 0.08 in the manual experiments, 0.21 in the computerized, and 0.16 for the pooled data. If only the second half of each experiment is considered, then the numbers are 0.03, 0.08, and 0.07 respectively. Those findings provide support for Hypothesis 3.5. If there are any dominated acceptances they are almost entirely eliminated in the second half of the experiments. This renders any belief of recipients being "irrational" in the above sense implausible. Thus, one cannot use such beliefs to support equilibrium. It is possible that the higher proportion of dominated acceptances in the computerized experiments is caused by the enormous amount of offers that recipients have to process before making a decision on accepting one.[23] Interestingly, once

internet. The trading screen was updated automatically after each offer or acceptance. In the manual experiments offers were submitted using open outcry system. All information was recorded on a blackboard and the updating was done manually by one of the experimenters. In all experiments contract providers were allowed to cancel any of their outstanding offers.

[20]Instructions and screens for the computerized experiments can be viewed a http://eeps4.caltech.edu/market-020603. To log on as a viewer use an identification number 1 and a password *a*.

[21]The data files are available from the author upon request

[22]A suboptimal contract from the set S_M of marketed contracts is one that does not maximize the recipient's payoff.

[23]If recipients make more mistakes as the number of offers increases this would prompt issuers to offer even more irrelevant

providers discover that recipients make small mistakes they can exploit this by offering irrelevant contracts as posed in Hypothesis 3.7. Table 3 presents the raw statistics for the offers from the manual and computerized experiments. The table also displays the number of x-best offers. Approximately only a third of the offers in each of the two sets of experiments are *relevant*. If some of those irrelevant offers were caused by confusion one should expect their proportion to decrease in the second half of the experiments. Those results are reported in Table 4. The proportion of relevant offers increases in the computerized experiments but decreases in the manual. Thus despite the fact that in all experiments we observe conversion to equilibrium, the proportion of irrelevant offers overall does not decrease. The reasoning that it is costless for the providers to offer irrelevant contracts in hope to get mistaken recipients is one explanation. Another is that offering irrelevant contracts might serve an auxiliary purpose such as attracting the attention of the recipients into certain area of contracts. Other possible explanations for this finding and/or confirmation of the above ones are left for further investigation.

Next we turn to testing Hypothesis 3.9. In our experimental markets we are able to verify what pooling contracts are offered and accepted in the marketplace, and also compute the marginal gains from such contracts for both types.[24] Table 5 displays the raw statistics for acceptances of pooling contracts in all six experiments.[25] The Pearson χ^2 test cannot reject the hypothesis that the frequency of H-type acceptances of pooling contracts coincides with λ (the table also shows the different values for λ in the six sessions). In order to test Hypothesis 3.9, the marginal gains from trade should be accounted for. We split the sample of pooling acceptances into two groups. The first consists of pooling contract acceptances when the high-risk types have higher marginal gains from taking the contract. In this subsample the Pearson χ^2 test again cannot reject the hypothesis that the frequency of H-type acceptances of pooling contracts coincides with λ. The same result obtains for the second subsample with acceptances for which the low-risk recipients have higher gains from trade.

The latter findings does not provide support for the conjecture that the DG-type beliefs are confirmed when pooling off-equilibrium contracts are actually offered.

Despite providing no empirical evidence for one of the possible beliefs that can keep issuers from offering pooling contracts, we are still faced with the question of whether issuers take only local steps in competing with each other. In other words, do contract providers compete by offering contracts that are "similar" to the ones that are already offered. Or, do they offer non-local contracts as well, and by doing so skip contracts that would

contract to "confuse" the recipients.

[24]Note that marginal gains are hard if not impossible to compute with field data for it requires knowledge of not only what contract was taken but also what the best possible alternative was before this contract was offered.

[25]All pooling contracts are presented in Table 8.

be viable if offered instead of the new contract.

To test Hypothesis 3.16 we only consider offers that strictly improve on exactly one of the types, i.e. we look at the x-*best* offers, $x \in \{H, L\}$.

Each x-best offer made at time t falls in one of the three categories - minimal distance, non-minimal distance, or marginal offer with respect to each contract in $S_x^*(t-1)$. Due to the design of the payoffs the set $S_x^*(t-1)$ was almost always singleton. Table 6 displays the break down of the non-pooling best offers into those three classes.[26] The average distances in each of the classes are given in parentheses.

Hypothesis 3.16 is rejected in the data. Two fifths of the offers considered are contracts that are neither marginal nor of minimal distance. Thus the claim that agents make only local adjustments is not borne by the data. This suggest that equilibria based on a local adjustment assumption are not likely to be observed when dropping the assumption results in non-existence of equilibrium.

7 Conclusions

This paper uses experimental evidence to test several hypotheses about individual behavior in markets with adverse selection. The first main conjecture that is tested is that when pooling contracts are offered they are taken by the type of recipients with higher marginal gains in proportion that exceeds their proportion in the population. The data does not support the above hypothesis. We find that when a pooling contract is offered, it is taken by the two types of recipients in their proportion in the population independent of the gains from trade. The other significant finding is that agents do not take only local steps in the process of approaching equilibrium. Approximately two fifths of the time they make non-local moves. With abundance of experimental data the local adjustment hypothesis can be tested in other setting as well. This would provide further guidance in constructing theoretical models of market behavior. In markets with adverse selection, however, agents' behavior has little resemblance to what such local movement theories predict.

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Tables and Figures

Table 1: Experimental Market Activity

	Offers	Cancelations	Acceptances	All Activities
manual	1644	4	303	1951
computer	10024	525	561	11110
total	11668	529	864	13061

Table 2: Undominated Acceptances

	Undominated H	Undominated L	All Acceptances
manual	152	128	303
computer	257	185	561
totals	409	313	864

Table 3: Raw Statistics from All Experiments, All Periods

	All Offers	Relevant	Best
manual	1644	676	125
computer	10024	2743	302
totals	11668	3419	427

Table 4: Raw Statistics from All Experiments, Second Half

	All Offers	Relevant	Best
manual	808	295	51
computer	5689	1886	128
totals	6497	2181	179

Table 5: Purchases of Pooling Contracts

Date	Pooling Contracts	Accepted by H	Accepted by L	λ
10625	6	2	4	5/9
10817	1	0	1	6/11
10818	19	8	11	6/11
20603	21	12	9	8/15
20718	4	2	2	9/14
20919	6	5	1	9/17
Total	57	29	28	

Table 6: Raw Statistics from All Experiments

	Best	Minimal	Marginal	Non-Minimal
manual	125	8	26	42
		(6.5)	(5.1)	(14)
computer	302	48	82	71
		(2.9)	(5.4)	(12.2)
totals	427	56	108	113
		(3.4)	(5.3)	(12.9)

Table 7: Raw Statistics from All Experiments

	Minimal	Marginal	Non-Minimal
	Minimal	Marginal	Non-Minimal
010625	0	8	11
		(7.1)	(15.8)
010817	5	11	14
	(5.2)	(7.8)	(12.6)
010818	3	7	17
	(8.7)	(3.9)	(13.9)
020603	21	47	19
	(2.2)	(5.4)	(10.8)
020718	10	23	17
	(3.2)	(6.6)	(17.2)
020919	17	12	35
	(3.5)	(6.0)	(10.6)

Table 8: Pooling Contracts from All Experiments

Date	Marg. Gain L[b]	Marg. Gain H[c]	U_L^r	U_H^r	U_L^i	U_H^i	Type[a]
10625	98	230	125	195	62	-149	*L*
	98	230	125	195	62	-149	*L*
	98	230	125	195	62	-149	*L*
	98	230	125	195	62	-149	*L*
	176	284	164	222	34	-188	*H*
	176	284	164	222	34	-188	*H*
10817	168	196	110	129	44	-78	*L*
10818	33	6	26	82	104	-18	*L*
	33	6	26	82	104	-18	*L*
	33	6	26	82	104	-18	*L*
	33	6	26	82	104	-18	*H*
	225	204	120	148	49	-96	*H*
	225	204	120	148	49	-96	*L*
	225	204	120	148	49	-96	*L*
	225	204	120	148	49	-96	*H*
	225	204	120	148	49	-96	*L*
	108	336	72	192	99	-146	*H*
	33	66	87	102	46	-52	*L*
	33	66	87	102	46	-52	*H*
	129	381	119	207	67	-167	*H*
	129	381	119	207	67	-167	*H*
	129	381	119	207	67	-167	*L*
	129	381	119	207	67	-167	*L*
	129	381	119	207	67	-167	*L*
	129	381	119	207	67	-167	*H*
	129	381	119	207	67	-167	*L*
20603	315	183	120	148	49	-96	*H*
	315	183	120	148	49	-96	*L*
	315	183	120	148	49	-96	*H*
	156	177	120	148	49	-96	*L*
	156	177	120	148	49	-96	*H*
	51	237	85	159	88	-101	*L*
	51	237	85	159	88	-101	*H*
	51	237	85	159	88	-101	*L*
	177	303	127	181	58	-131	*L*
	177	303	127	181	58	-131	*L*
	27	237	85	159	88	-101	*H*
	27	237	85	159	88	-101	*H*
	27	237	85	159	88	-101	*H*
	27	237	85	159	88	-101	*H*
	27	237	85	159	88	-101	*H*
	27	237	85	159	88	-101	*L*
	27	237	85	159	88	-101	*H*
	27	237	85	159	88	-101	*L*
	27	237	85	159	88	-101	*H*
	27	237	85	159	88	-101	*H*
	27	237	85	159	88	-101	*L*
20718	255	66	87	102	46	-52	*L*
	255	66	87	102	46	-52	*L*
	210	66	87	102	46	-52	*H*
	210	66	87	102	46	-52	*H*
20919	75	134	40	120	113	-53	*H*
	114	80	40	120	113	-53	*H*
	114	80	40	120	113	-53	*H*
	33	20	26	82	104	-18	*H*
	33	20	26	82	104	-18	*L*
	222	98	110	129	44	-78	*H*

[a]Records the type of agent who has accepted the pooling contract.

[b]The marginal gain in US cents or BG stotinki of the accepted pooling contract for agents of type L.

[c]The marginal gain for H-type agents.

Figure 1: The Payoff Table for the Sellers

	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O	
1	**-22**	**-4**	**-84**	**-49**	**-116**	**-71**	**-139**	**-88**	**-162**	**-104**	**-224**	**-149**	**-302**	**-204**	**-388**	**-266**	**-466**	**-321**	**-543**	**-377**	**-621**	**-432**	**-699**	**-488**	**-738**	**-516**	**-777**	**-543**	**-816**	**-571**
	(41)	(47)	(99)	(131)	(127)	(170)	(147)	(199)	(166)	(227)	(216)	(297)	(272)	(377)	(326)	(455)	(369)	(516)	(406)	(568)	(436)	(612)	(461)	(647)	(470)	(661)	(479)	(672)	(485)	(682)
2	**8**	**26**	**-54**	**-19**	**-86**	**-41**	**-109**	**-58**	**-132**	**-74**	**-194**	**-119**	**-272**	**-174**	**-358**	**-236**	**-436**	**-291**	**-513**	**-347**	**-591**	**-402**	**-669**	**-458**	**-708**	**-486**	**-747**	**-513**	**-786**	**-541**
	(17)	(8)	(76)	(94)	(105)	(134)	(125)	(164)	(145)	(192)	(196)	(265)	(254)	(347)	(310)	(428)	(355)	(492)	(394)	(547)	(426)	(593)	(452)	(631)	(463)	(646)	(472)	(659)	(480)	(670)
3	**38**	**56**	**-24**	**11**	**-56**	**-11**	**-79**	**-28**	**-102**	**-44**	**-164**	**-89**	**-242**	**-144**	**-328**	**-206**	**-406**	**-261**	**-483**	**-317**	**-561**	**-372**	**-639**	**-428**	**-678**	**-456**	**-717**	**-483**	**-756**	**-511**
	(-9)	(-32)	(53)	(55)	(82)	(97)	(103)	(127)	(123)	(156)	(176)	(231)	(235)	(316)	(294)	(400)	(341)	(467)	(381)	(524)	(415)	(573)	(443)	(613)	(455)	(630)	(465)	(644)	(474)	(657)
4	**68**	**86**	**6**	**41**	**-26**	**19**	**-49**	**2**	**-72**	**-14**	**-134**	**-59**	**-212**	**-114**	**-298**	**-176**	**-376**	**-231**	**-453**	**-287**	**-531**	**-342**	**-609**	**-398**	**-648**	**-426**	**-687**	**-453**	**-726**	**-481**
	(-35)	(-74)	(28)	(15)	(58)	(58)	(80)	(89)	(101)	(119)	(155)	(196)	(216)	(284)	(277)	(370)	(325)	(440)	(368)	(500)	(404)	(552)	(434)	(594)	(446)	(612)	(457)	(628)	(467)	(642)
5	**78**	**96**	**16**	**51**	**-16**	**29**	**-39**	**12**	**-62**	**-4**	**-124**	**-49**	**-202**	**-104**	**-288**	**-166**	**-366**	**-221**	**-443**	**-277**	**-521**	**-332**	**-599**	**-388**	**-638**	**-416**	**-677**	**-443**	**-716**	**-471**
	(-43)	(-89)	(20)	(2)	(50)	(45)	(72)	(76)	(93)	(106)	(147)	(184)	(210)	(273)	(271)	(360)	(320)	(431)	(363)	(492)	(400)	(544)	(430)	(588)	(443)	(606)	(455)	(623)	(464)	(637)
6	**108**	**126**	**46**	**81**	**14**	**59**	**-9**	**42**	**-32**	**26**	**-94**	**-19**	**-172**	**-74**	**-258**	**-136**	**-336**	**-191**	**-413**	**-247**	**-491**	**-302**	**-569**	**-358**	**-608**	**-386**	**-647**	**-413**	**-686**	**-441**
	(-70)	(-133)	(-6)	(-40)	(25)	(4)	(48)	(36)	(70)	(67)	(125)	(147)	(190)	(238)	(253)	(329)	(304)	(402)	(349)	(466)	(387)	(521)	(420)	(567)	(433)	(587)	(446)	(604)	(456)	(620)
7	**168**	**186**	**106**	**141**	**74**	**119**	**51**	**102**	**28**	**86**	**-34**	**41**	**-112**	**-14**	**-198**	**-76**	**-276**	**-131**	**-353**	**-187**	**-431**	**-242**	**-509**	**-298**	**-548**	**-326**	**-587**	**-353**	**-626**	**-381**
	(-126)	(-225)	(-59)	(-128)	(-26)	(-82)	(-3)	(-48)	(-20)	(-15)	(79)	(68)	(147)	(165)	(214)	(262)	(269)	(340)	(318)	(409)	(360)	(470)	(396)	(521)	(412)	(544)	(426)	(564)	(439)	(582)
8	**228**	**246**	**166**	**201**	**134**	**179**	**111**	**162**	**88**	**146**	**26**	**101**	**-52**	**46**	**-138**	**-16**	**-216**	**-71**	**-293**	**-127**	**-371**	**-182**	**-449**	**-238**	**-488**	**-266**	**-527**	**-293**	**-566**	**-321**
	(-185)	(-323)	(-114)	(-222)	(-81)	(-174)	(-56)	(-138)	(-32)	(-104)	(30)	(-16)	(102)	(87)	(173)	(189)	(232)	(272)	(284)	(347)	(330)	(413)	(370)	(470)	(387)	(495)	(403)	(518)	(418)	(538)
9	**288**	**306**	**226**	**261**	**194**	**239**	**171**	**222**	**148**	**206**	**86**	**161**	**8**	**106**	**-78**	**44**	**-156**	**-11**	**-233**	**-67**	**-311**	**-122**	**-389**	**-178**	**-428**	**-206**	**-467**	**-233**	**-506**	**-261**
	(-247)	(-427)	(-173)	(-322)	(-138)	(-271)	(-112)	(-234)	(-87)	(-198)	(-22)	(-106)	(53)	(2)	(129)	(110)	(191)	(199)	(247)	(279)	(297)	(350)	(341)	(412)	(360)	(440)	(378)	(466)	(394)	(489)
10	**348**	**366**	**286**	**321**	**254**	**299**	**231**	**282**	**208**	**266**	**146**	**221**	**68**	**166**	**-18**	**104**	**-96**	**49**	**-173**	**-7**	**-251**	**-62**	**-329**	**-118**	**-368**	**-146**	**-407**	**-173**	**-446**	**-201**
	(-311)	(-536)	(-235)	(-427)	(-198)	(-374)	(-171)	(-336)	(-144)	(-298)	(-77)	(-201)	(2)	(-88)	(82)	(26)	(148)	(120)	(208)	(205)	(261)	(282)	(308)	(349)	(330)	(380)	(350)	(408)	(368)	(434)
11	**468**	**486**	**406**	**441**	**374**	**419**	**351**	**402**	**328**	**386**	**266**	**341**	**188**	**286**	**102**	**224**	**24**	**169**	**-53**	**113**	**-131**	**58**	**-209**	**2**	**-248**	**-26**	**-287**	**-53**	**-326**	**-81**
	(-449)	(-773)	(-367)	(-655)	(-327)	(-598)	(-298)	(-556)	(-269)	(-515)	(-195)	(-410)	(-109)	(-286)	(-21)	(-161)	(53)	(-56)	(120)	(40)	(181)	(127)	(236)	(206)	(261)	(241)	(284)	(275)	(306)	(306)
12	**498**	**516**	**436**	**471**	**404**	**449**	**381**	**432**	**358**	**416**	**296**	**371**	**218**	**316**	**132**	**254**	**54**	**199**	**-23**	**143**	**-101**	**88**	**-179**	**32**	**-218**	**4**	**-257**	**-23**	**-296**	**-51**
	(-485)	(-835)	(-401)	(-715)	(-361)	(-657)	(-331)	(-615)	(-302)	(-573)	(-227)	(-466)	(-138)	(-339)	(-48)	(-211)	(27)	(-103)	(96)	(-5)	(159)	(85)	(216)	(166)	(242)	(203)	(266)	(238)	(289)	(271)
13	**528**	**546**	**466**	**501**	**434**	**479**	**411**	**462**	**388**	**446**	**326**	**401**	**248**	**346**	**162**	**284**	**84**	**229**	**7**	**173**	**-71**	**118**	**-149**	**62**	**-188**	**34**	**-227**	**7**	**-266**	**-21**
	(-522)	(-900)	(-437)	(-777)	(-395)	(-718)	(-365)	(-675)	(-335)	(-632)	(-259)	(-523)	(-168)	(-394)	(-76)	(-262)	(1)	(-152)	(72)	(-51)	(136)	(42)	(195)	(125)	(222)	(164)	(247)	(200)	(271)	(234)
14	**588**	**606**	**526**	**561**	**494**	**539**	**471**	**522**	**448**	**506**	**386**	**461**	**308**	**406**	**222**	**344**	**144**	**289**	**67**	**233**	**-11**	**178**	**-89**	**122**	**-128**	**94**	**-167**	**67**	**-206**	**39**
	(-599)	(-1032)	(-510)	(-906)	(-467)	(-844)	(-436)	(-800)	(-405)	(-755)	(-325)	(-642)	(-231)	(-507)	(-135)	(-370)	(-54)	(-254)	(21)	(-148)	(89)	(-50)	(151)	(39)	(180)	(80)	(207)	(119)	(233)	(156)
15	**648**	**666**	**586**	**621**	**554**	**599**	**531**	**582**	**508**	**566**	**446**	**521**	**368**	**466**	**282**	**404**	**204**	**349**	**127**	**293**	**49**	**238**	**-29**	**182**	**-68**	**154**	**-107**	**127**	**-146**	**99**
	(-678)	(-1171)	(-586)	(-1040)	(-542)	(-976)	(-509)	(-930)	(-477)	(-884)	(-394)	(-766)	(-297)	(-627)	(-196)	(-483)	(-112)	(-362)	(-33)	(-250)	(39)	(-147)	(105)	(-53)	(135)	(-9)	(164)	(32)	(192)	(72)
16	**678**	**696**	**616**	**651**	**584**	**629**	**561**	**612**	**538**	**596**	**476**	**551**	**398**	**496**	**312**	**434**	**234**	**379**	**157**	**323**	**79**	**268**	**1**	**212**	**-38**	**184**	**-77**	**157**	**-116**	**129**
	(-718)	(-1242)	(-625)	(-1109)	(-580)	(-1045)	(-547)	(-997)	(-514)	(-951)	(-430)	(-830)	(-331)	(-688)	(-228)	(-542)	(-142)	(-419)	(-61)	(-304)	(13)	(-198)	(80)	(-101)	(112)	(-56)	(142)	(-13)	(170)	(27)
17	**708**	**726**	**646**	**681**	**614**	**659**	**591**	**642**	**568**	**626**	**506**	**581**	**428**	**526**	**342**	**464**	**264**	**409**	**187**	**353**	**109**	**298**	**31**	**242**	**-8**	**214**	**-47**	**187**	**-86**	**159**
	(-759)	(-1315)	(-665)	(-1180)	(-619)	(-1114)	(-585)	(-1066)	(-552)	(-1019)	(-467)	(-896)	(-365)	(-751)	(-261)	(-602)	(-172)	(-476)	(-90)	(-359)	(-14)	(-250)	(55)	(-151)	(88)	(-104)	(119)	(-60)	(148)	(-18)
18	**718**	**736**	**656**	**691**	**624**	**669**	**601**	**652**	**578**	**636**	**516**	**591**	**438**	**536**	**352**	**474**	**274**	**419**	**197**	**363**	**119**	**308**	**41**	**252**	**2**	**224**	**-37**	**197**	**-76**	**169**
	(-773)	(-1339)	(-678)	(-1203)	(-632)	(-1138)	(-598)	(-1089)	(-565)	(-1042)	(-479)	(-919)	(-377)	(-773)	(-272)	(-623)	(-183)	(-496)	(-100)	(-377)	(-23)	(-268)	(47)	(-168)	(80)	(-121)	(111)	(-76)	(141)	(-34)
19	**728**	**746**	**666**	**701**	**634**	**679**	**611**	**662**	**588**	**646**	**526**	**601**	**448**	**546**	**362**	**484**	**284**	**429**	**207**	**373**	**129**	**318**	**51**	**262**	**12**	**234**	**-27**	**207**	**-66**	**179**
	(-787)	(-1364)	(-692)	(-1227)	(-645)	(-1161)	(-611)	(-1113)	(-578)	(-1065)	(-491)	(-941)	(-389)	(-794)	(-283)	(-643)	(-193)	(-515)	(-110)	(-396)	(-33)	(-286)	(38)	(-185)	(71)	(-137)	(103)	(-92)	(133)	(-49)
20	**748**	**766**	**686**	**721**	**654**	**699**	**631**	**682**	**608**	**666**	**546**	**621**	**468**	**566**	**382**	**504**	**304**	**449**	**227**	**393**	**149**	**338**	**71**	**282**	**32**	**254**	**-7**	**227**	**-46**	**199**
	(-816)	(-1414)	(-719)	(-1276)	(-672)	(-1209)	(-638)	(-1160)	(-604)	(-1112)	(-516)	(-986)	(-412)	(-838)	(-305)	(-685)	(-214)	(-555)	(-130)	(-434)	(-51)	(-322)	(21)	(-219)	(55)	(-171)	(87)	(-125)	(117)	(-81)
21	**778**	**796**	**716**	**751**	**684**	**729**	**661**	**712**	**638**	**696**	**576**	**651**	**498**	**596**	**412**	**534**	**334**	**479**	**257**	**423**	**179**	**368**	**101**	**312**	**62**	**284**	**23**	**257**	**-16**	**229**
	(-859)	(-1490)	(-760)	(-1350)	(-713)	(-1282)	(-678)	(-1232)	(-643)	(-1183)	(-554)	(-1056)	(-449)	(-904)	(-339)	(-748)	(-247)	(-616)	(-160)	(-492)	(-80)	(-378)	(-6)	(-272)	(29)	(-222)	(62)	(-175)	(93)	(-130)
22	**808**	**826**	**746**	**781**	**714**	**759**	**691**	**742**	**668**	**726**	**606**	**681**	**528**	**626**	**442**	**564**	**364**	**509**	**287**	**453**	**209**	**398**	**131**	**342**	**92**	**314**	**53**	**287**	**14**	**259**
	(-902)	(-1568)	(-803)	(-1425)	(-754)	(-1356)	(-719)	(-1306)	(-684)	(-1256)	(-593)	(-1126)	(-486)	(-972)	(-374)	(-814)	(-280)	(-678)	(-191)	(-552)	(-109)	(-435)	(-33)	(-326)	(2)	(-276)	(36)	(-227)	(69)	(-180)
23	**868**	**886**	**806**	**841**	**774**	**819**	**751**	**802**	**728**	**786**	**666**	**741**	**588**	**686**	**502**	**624**	**424**	**569**	**347**	**513**	**269**	**458**	**191**	**402**	**152**	**374**	**113**	**347**	**74**	**319**
	(-992)	(-1727)	(-889)	(-1581)	(-839)	(-1509)	(-803)	(-1457)	(-767)	(-1405)	(-673)	(-1272)	(-562)	(-1113)	(-446)	(-948)	(-348)	(-807)	(-256)	(-676)	(-170)	(-553)	(-90)	(-439)	(-53)	(-386)	(-17)	(-335)	(17)	(-285)