Licensing Effect and Insurance Fraud

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Motivation

- Insurance fraud is an important issue for insurers: the insurance fraud cost is estimated at €2.5 B. per years and the insurers’ fight against it permitted to recovered €265 M. in 2016 (2016, FFA, France).
- Difficulty to collect empirical data about fraud behaviors...
- A growing up literature on this topic from an experimental point of view:
  - Effects of control type (bonus-malus vs audit): Gabaldón et al. (2014)
  - Effects of contract design (full coverage or deductible): Lammers and Schiller (2010)

In the insurance fraud literature, economic agents are or are not fraudsters whatever the past context (Picard 1996, 1999), Dionne et al. (2003, 2005), Deghampour and Rezvani (2013).

The purpose of this paper is to determine the conditions leading economic agents to adopt dishonest behavior.
Motivation

Why talking about Licensing effect in Insurance fraud?

- **The licensing effect** is defined as people allow themselves to do something bad (e.g. immoral) after doing something good (e.g. moral) (Khan and Dhar(2006)): “*Past good deeds can liberate individuals to engage in behaviors that are immoral, unethical, or otherwise problematic, behaviors that they would otherwise avoid for fear of feeling or appearing immoral*”.

Motivation

- In insurance, the licensing effect could appear when insured has paid for many years without declaring any sinister and has incentive to build-up their amount of claim (i.e. fraud behavior) in order to compensate previous expenses.

- When an insured receive from the insurer the call for the annual premium, how does she perceive the payment of the last year premium (without claim)?
  - as a cost: which covered her against a risk?
  - or as a dead-loss?

- Licensing effect of fraud could explain small (built-up fraud) but frequent fraud behaviors from an important part of the population: Ichino and Muehlheusser (2008),

Ichino and Muehlheusser (2008),
Experimental Approach

What we want to test?

- The effects of contract design: full coverage or deductible (controlling selection effects)
- The effects of time, frequency and amount of loss (with different frequency and sequences of loss events)

What we have to control?

- Individuals’ honesty
- Risk aversion
1. Elicitation of honesty behaviors (Mouminoux and Rullière, 2018)
2. Insurance game with self-claim of loss amount
3. Elicitation of risk aversion in the gain and loss domain (Holt and Laury, 2002)
Elicitation of honesty behaviors (Mouminoux and Rullière, 2018)

- Cohn et al. (2019) ⇒ Civic Honesty around the globe (Science)
- Cohn et al. (2015) ⇒ honesty based on a deviation from an explicit rule but not at the individual level
Elicitation of honesty behaviors (Mouminoux and Rullière, 2018)

With the following instruction:

- For each green ball, you can take a coin;
- For each red ball, you should leave a coin.

No way to identify defection

This part is followed by a questionary asking subjects: How much would you take if you had received the following draw? (displaying all distributed draws)

→ this part allows us to correct our individual honesty measure with respect to lucky vs. unlucky draws (Mouminoux and Rullière, 2018).
**Individual environment**
- Wealth $W$
- Probability of loss: $p$
- Insurance contract: CP (Premium); D (Deductible)

**No Loss**
- Payoff: $W - CP$

**Loss**
- Amount of Loss: $R$

**Claims**
- Claim amount: $V$
- Probability of control: $q(V) = V/W$

**Control**
- Refund accepted ($V \leq R$)
  - Payoff: $W - CP - D + V - L$
- Refund rejected ($V > R$)
  - Payoff: $W - CP - R$

**No claims**
- Payoff: $W - CP - R$
Parameters:

- 20 dependant periods with the following information about the loss probability:”During a period of 10 years, people have in average 2 losses” without information about the average amount of loss in order to avoid reference point effect. (i.e. wealth is initialized and the same at the beginning of each period: 200 ECU).

- Two contract types: 100% or 75% coverage (randomly assigned) with an equal loading factor of 5%.

- Losses are randomly drawn between 50, 100 and 150 ECU.

- Two loss frequencies (randomly assigned) 15% (i.e. 3 losses in 20 periods) or 25% (i.e. 5 losses in 20 periods) with different temporal interval treatment (randomly assigned):
  - Equal periods number between each loss event (Control)
  - One loss in an early stage and others in the later stages (Treatment 1)
  - All loss events in the later stages (Treatment 2)
Without taking into account past insurance history and under her risk aversion level $r_i$, for each period $t$, a subject $i$ having a loss $R_{i,t}$ maximizes:

$$\max_{V_{i,t}} \begin{cases} (1-q(V_{i,t}))U(W - CP_i - D_i + V_{i,t} - R_{i,t} \mid r_i) + q(V_{i,t})U(W - CP_i - R_{i,t} \mid r_i) \\ U(W - CP_i - D_i + V_{i,t} - R_{i,t} \mid r_i) \end{cases} \quad V_{i,t} \in ]R_{i,t}, W]\quad V_{i,t} \leq R_{i,t}$$

(1)

Where $V_{i,t}$ is the individual decision variable corresponding to the loss claim amount.
Model prediction

Theoretical results:

- individuals never declare $V_{i,t} < R_{i,t}$
- a decrease of loss amount leads to an increase of fraud frequency
- a decrease of risk aversion leads to increase of fraud amount and frequency (built-up)
- a partial coverage increases fraud behaviors: contract including deductible encourages fraud behaviors.
Potential behavioral evidences:

- an increase of honesty leads to a decrease of fraud?
- an increase of loss frequency leads to an increase of fraud? (unlucky effects)
- past audit leads to a decrease of fraud behaviors? (educative virtue of monitoring, in favor of a probabilities distortion biase)
- late loss event leads to an increase of fraud? (licensing effects)
Experimental Results

Only one experimental session of 20 subjects (pilot stage) ... but encouraging results!

<table>
<thead>
<tr>
<th>Losses / Claims</th>
<th>50</th>
<th>60</th>
<th>65</th>
<th>75</th>
<th>100</th>
<th>110</th>
<th>115</th>
<th>150</th>
<th>% of fraud</th>
<th>Average Built-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>20</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23%</td>
<td>15.8</td>
</tr>
<tr>
<td>100</td>
<td>19</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17%</td>
<td>11.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>24</td>
<td>0</td>
<td>0</td>
<td></td>
<td>0</td>
<td>0</td>
<td>18%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Contract Type**

<table>
<thead>
<tr>
<th></th>
<th>Number of claims</th>
<th>% of Fraud</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full coverage</td>
<td>19</td>
<td>0%</td>
</tr>
<tr>
<td>Partial Coverage</td>
<td>54</td>
<td>18%</td>
</tr>
</tbody>
</table>

**Observed Fraud**

<table>
<thead>
<tr>
<th>Observed Fraud</th>
<th>Q^*_nb. From safe to risky option</th>
<th>Honesty deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>3,38</td>
<td>0,15 €</td>
</tr>
<tr>
<td>No</td>
<td>4,13</td>
<td>0,06 €</td>
</tr>
</tbody>
</table>

**Nb period without claims**

<table>
<thead>
<tr>
<th>Nb period without claims</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>11</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fraud = no</td>
<td>7</td>
<td>14</td>
<td>16</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Fraud = Yes</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>15</td>
<td>17</td>
<td>2</td>
<td>8</td>
<td>3</td>
<td>10</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>%</td>
<td>22%</td>
<td>7%</td>
<td>6%</td>
<td>0%</td>
<td>17%</td>
<td>0%</td>
<td>30%</td>
<td>17%</td>
<td>0%</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Conclusion

- Needs of more experimental session...
- Idea on dynamic fraud decision modelling with endogeneous control in order to integrate licensing effect in our prediction model.
- All your comments, remarks, questions, and literature suggestions are really welcomed!


<table>
<thead>
<tr>
<th>Round number</th>
<th>Your wealth: $W$</th>
<th>Your insurance contract: Premium: $CP$ Deductible: $D$</th>
<th>Nature of risk: During a period of 10 years, people have in average 2 losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix

<table>
<thead>
<tr>
<th>Round number</th>
<th>Your wealth: W</th>
<th>Your insurance contract: Premium: CP Deductible: D</th>
<th>Nature of risk: During a period of 10 years, people have in average 2 losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You are incurring a loss amounting to R1.

- Claim the loss
- Next round
You are incurring a loss amounting to R1. Please claim your loss below.

Your claim: 0
Chance to be control: 0
Round number: 1/20

Your wealth: \( W \)

Your insurance contract:
- Premium: \( CP \)
- Deductible: \( D \)

Nature of risk:
During a period of 10 years, people have an average of 2 losses

You are incurring a loss amounting to \( R_1 \).
Please claim your loss below.

\[ 0 \quad R_1 \quad \bar{V} \]

Your claim: \( V_1 \)
Chance to be control: \( V_1/\bar{V} \)

Return
Previous Rounds' Results
Submit my claims
### Appendix

#### Licensing Effect

**Your wealth:** $W$

**Your insurance contract:**
- **Premium:** $CP$
- **Deductible:** $D$

**Nature of risk:**
*During a period of 10 years, people have in average 2 losses*

---

**You have been controlled.**

*Your claims is larger than the loss observed, there is no refund.*

#### Rounds Summary

<table>
<thead>
<tr>
<th>Round Number</th>
<th>Loss</th>
<th>Claims Amount</th>
<th>Control</th>
<th>Loss Observed</th>
<th>Refund Accepted</th>
<th>Your Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>✓</td>
<td>V1</td>
<td>✓</td>
<td>R1</td>
<td>✗</td>
<td>$W-CP-R1 = X$</td>
</tr>
</tbody>
</table>

---

[Next round]
<table>
<thead>
<tr>
<th>Round number</th>
<th>Your wealth: W</th>
<th>Your insurance contract:</th>
<th>Nature of risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/20</td>
<td></td>
<td>Premium: CP</td>
<td><em>During a period of 10 years, people have in average 2 losses</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deductible: D</td>
<td></td>
</tr>
<tr>
<td>Round number</td>
<td>Your wealth: ( W )</td>
<td>Your insurance contract:</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------</td>
<td>-------------------------</td>
<td></td>
</tr>
<tr>
<td>2/20</td>
<td></td>
<td>Premium: CP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deductible: D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nature of risk:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>During a period of 10 years, people have in average 2 losses</td>
<td></td>
</tr>
</tbody>
</table>

You are incurring a loss amounting to R2.

- Claim the loss
- Next round
<table>
<thead>
<tr>
<th>Round number</th>
<th>Your wealth: W</th>
<th>Your insurance contract:</th>
<th>Nature of risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/20</td>
<td></td>
<td>Premium: CP</td>
<td>During a period of 10 years, people have in average 2 losses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deductible: D</td>
<td></td>
</tr>
</tbody>
</table>

You are incurring a loss amounting to R2. Please claim your loss below.

Your claim: 0  
Chance to be control: 0

Return  Previous Rounds’ Results  Submit my claims
### Rounds Summary

<table>
<thead>
<tr>
<th>Round Number</th>
<th>Loss</th>
<th>Claims Amount</th>
<th>Control</th>
<th>Loss Observed</th>
<th>Refund Accepted</th>
<th>Your Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>✅</td>
<td>V1</td>
<td>✅</td>
<td>R1</td>
<td>✗</td>
<td>W-CP-R1 = X</td>
</tr>
</tbody>
</table>

You are incurring a loss amounting to R2. Please claim your loss below.
Appendix

Round number: 2/20

Your wealth: $W$

Your insurance contract:
- Premium: $CP$
- Deductible: $D$

Nature of risk:
During a period of 10 years, people have an average of 2 losses

You are incurring a loss amounting to $R_2$. Please claim your loss below.

Return

Previous Rounds’ Results

Submit my claims

Your claim: $V_2$
Chance to be control: $V_2/\bar{V}$
### Rounds Summary

<table>
<thead>
<tr>
<th>Round Number</th>
<th>Loss</th>
<th>Claims Amount</th>
<th>Control</th>
<th>Loss Observed</th>
<th>Refund Accepted</th>
<th>Your Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>✓</td>
<td>V1</td>
<td>✓</td>
<td>R1</td>
<td>✗</td>
<td>W-CP-R1 = X</td>
</tr>
<tr>
<td>2</td>
<td>✓</td>
<td>V2</td>
<td>✗</td>
<td>-</td>
<td>✓</td>
<td>W-CP-D+V2 = Y</td>
</tr>
</tbody>
</table>

You have not been controlled.
Your refund is equal to V2-D=G2.
| Round number | Your wealth: W | Your insurance contract: Premium: CP, Deductible: D | Nature of risk: 
During a period of 10 years, people have in average 2 losses |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3/20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Play the round
### Appendix

**Claire Mouminoux (SAF)**

**Licensing Effect**

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<table>
<thead>
<tr>
<th>Round number</th>
<th>Your wealth: W</th>
<th>Your insurance contract:</th>
<th>Nature of risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/20</td>
<td></td>
<td>Premium: CP</td>
<td>During a period of 10 years, people have in average 2 losses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deductible: D</td>
<td></td>
</tr>
</tbody>
</table>

You are incurring a loss amounting to R3.

- Claim the loss
- Next round
### Appendix

#### Licensing Effect

<table>
<thead>
<tr>
<th>Round number</th>
<th>Your wealth: $W$</th>
<th>Your insurance contract:</th>
<th>Nature of risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/20</td>
<td></td>
<td>Premium: CP</td>
<td>During a period of 10 years, people have in average 2 losses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deductible: $D$</td>
<td></td>
</tr>
</tbody>
</table>

You are incurring a loss amounting to R3. Please claim your loss below.

- **Your claim:** 0
- **Chance to control:** 0

[Diagram showing a claim process]

- Return
- Previous Rounds’ Results
- Submit my claims
You are incurring a loss amounting to R3. Please claim your loss below.

Round number: 3/20

Your wealth: W

Your insurance contract:
Premium: CP
Deductible: D

Nature of risk:
During a period of 10 years, people have an average of 2 losses

Return
Previous Rounds’ Results
Submit my claims

Your claim: V3
Chance to be control: V3/\bar{V}
You have been controlled.  
Your refund is accepted and equal to V3-D=G3

<table>
<thead>
<tr>
<th>Round Number</th>
<th>Loss</th>
<th>Claims Amount</th>
<th>Control</th>
<th>Loss Observed</th>
<th>Refund Accepted</th>
<th>Your Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>✓</td>
<td>V1</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>W-CP-R1 = X</td>
</tr>
<tr>
<td>2</td>
<td>✓</td>
<td>V2</td>
<td></td>
<td></td>
<td>✓</td>
<td>W-CP-D+V2 = Y</td>
</tr>
<tr>
<td>3</td>
<td>✓</td>
<td>V3</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>W-CP-D+V3 = Z</td>
</tr>
</tbody>
</table>

Next round
<table>
<thead>
<tr>
<th>Round number</th>
<th>Your wealth: W</th>
<th>Your insurance contract:</th>
<th>Nature of risk:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/20</td>
<td></td>
<td>Premium: CP</td>
<td>During a period of 10 years, people have in average 2 losses</td>
</tr>
</tbody>
</table>