Three essays on the socioeconomics of gambling and pathological gambling

PhD thesis submitted to the Faculty of Economics

Institute for economic research

University of Neuchâtel

by

Dimitri Kohler

Supervisor:

Claude Jeanrenaud, Professor of Economics, University of Neuchâtel, Switzerland

Members of the Committee:

Nils Soguel, Professor of Public Finance, Swiss Graduate School of Public Administration, University of Lausanne, Switzerland

François Vaillancourt, Professor of Economics, University of Montreal, Canada

Milad Zarin, Professor of Economics, University of Neuchâtel, Switzerland

Defended in Lausanne, 7 May 2012

UNIVERSITÉ DE NEUCHÂTEL

IMPRIMATUR POUR LA THÈSE

Three Essays on the Socioeconomics of Gambling and Pathological Gambling

Dimitri KOHLER

UNIVERSITÉ DE NEUCHÂTEL

FACULTÉ DES SCIENCES ÉCONOMIQUES

La Faculté des sciences économiques,
sur le rapport des membres du jury

Prof. Claude Jeanrenaud (directeur de thèse, Université de Neuchâtel)
Prof. Milad Zarin (président du jury, Université de Neuchâtel)
Prof. Nils Soguel (Institut de Hautes Etudes en Administration Publique IDHEAP, Lausanne)
Prof. François Vaillancourt (Université de Montréal, Canada)

Autorise l'impression de la présente thèse.

Neuchâtel, le 31 mai 2012

Le doyen

Gerald Reiner

■ Téléphone : +41 32 718 15 00 ■ Fax : +41 32 718 15 01 ■ E-mail : secretariat.seco@unine.ch ■ www.unine.ch

Acknowledgments

With these few lines, I want to thank the people who made this dissertation possible through their help and support.

I would like to thank my supervisor, Professor Claude Jeanrenaud, for giving me the opportunity to achieve this dissertation as well as all my colleagues from the Institute for economic research.

I owe my deepest gratitude to my parents, Carmen and Antoine, for their unconditional love and support during hard and good times, to my brother, as well as to my grandfather for the pride I could see in his eyes during the first years of this work that acted as an important motivational factor.

My sincere gratitude goes to Catherine for her patience and support as well as to all my friends, in particular Simon, David, Jo, Adelio, Lorin and Vincent.

Executive summary

In Switzerland, approximately 1.5% of the population suffers from disordered gambling behaviour. This rate has remained relatively stable over the last decade. Thus, a significant number of individuals must cope with the severe adverse consequences that are associated with this disorder: most notably, depression, debt, divorce, violence and criminality. The efforts to address this public health concern have included several prevention measures that have been implemented at gambling venues and mass media campaigns that have been designed to inform the public about the addictive potential of this activity. Although these efforts appear to have prevented the prevalence of gambling from increasing despite the significant increase in opportunities for gambling, such efforts have not led to a decrease in gambling disorders. There may be several reasons for these results. First, a lack of concern (and thus funding) in the public sector may prevent efficient prevention measures from being implemented. Second, a lack of knowledge regarding the characteristics of at-risk groups may prevent these measures from targeting the appropriate individuals. Finally, because gambling operators encounter an obvious conflict of interest in enforcing measures that are intended to prevent problem gambling, these operators may be less resolute than one would hope in attempting to address the issue.

Through this dissertation, I aim to enhance the research on gambling and its consequences. For this purpose, the dissertation is divided into two main parts. The first part consists of a description of

problem gambling and its health-related consequences. Subsequently, the various prevention measures that can be implemented are discussed. The first section concludes with a description of the gambling landscape in Switzerland. The second portion of the dissertation consists of three empirical essays that provide insight into the consequences and characteristics of problem and pathological gambling and the gambling tax issue. The first essay fills the gap in the literature regarding the social cost of gambling; previous studies have consistently failed to estimate the health-related quality of life (HRQoL) cost associated with gambling and thus significantly underestimate the problem. In Switzerland, I estimated this cost to be more than CHF 3,800 per year per pathological gambler. This result implies that the loss of quality of life resulting from gambling generates more than 60% of the total social cost. The second study is designed to describe the characteristics of gamblers and problem gamblers. First, I highlight the differences between gamblers and non-gamblers. The individuals in the first group are notably more likely to engage in risk-taking behaviours, such as alcohol abuse, drug consumption or tobacco smoking. Subsequently, I compare recreational gamblers with pathological gamblers and find significant differences in terms of their socio-economic characteristics. Moreover, disordered gamblers are at a greater risk for smoking and suffering from depression. Interestingly, the type of gambling activity has a significant influence on one's risk of developing a gambling problem; internet gamblers exhibit a seven-fold increase in risk. The third paper analyses the equity principle and the tax on gambling activities. In this study, I analyse the regressivity of this tax using gambling expenditures.

The results consistently show that lower-income individuals devote a higher proportion of their revenues to gambling than do higher-income individuals.

Keywords: gambling, pathological gambling, health-related quality of life, health utility index, HRQoL, SF-6D, intangible cost, risk factors, socio-economics, gambling tax, progressivity.

Table of contents

"At that point I ought to have gone away, but a strange sensation rose up in me, a sort of defiance of fate, a desire to challenge it, to put out my tongue at it. I laid down the largest stake allowed -four thousand gulden- and lost it. Then, getting hot, I pulled out all I had left, staked it on the same number, and lost again, after which I walked away from the table as though I were stunned. I could not even grasp what had happened to me."

~ Fyodor Dostoevsky, *The Gambler*

Part one: background

Gambling is the origin of a range of pleasant and exciting sensations. The reasons that individuals gamble are diverse and varied. Some gamblers seek challenges, whereas other gamblers want to escape from daily life, but all gamblers aim for the same feeling: pleasure. However, this quest for arousal sometimes develops into an addiction through specific psychological and biological mechanisms. Similar to alcoholism, pathological gambling was originally considered a vice and a weakness; thus, this behaviour was socially condemned for a long time. Individuals who suffered from this disorder were forced to the margins of society, and no real solutions were offered to them. Psychologists, doctors and researchers attempted to explain the factors underlying this deviant behaviour and slowly began to recognise the disorder as a disease. Pathological gambling was officially recognised as a disease in 1980 when the American Psychology Association included this disorder in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) (American Psychiatric Association, 1980). Since then, a growing body of literature has deepened our understanding of this topic by providing insight into what is recognised as a complex mental disorder. From epidemiologists to economists, researchers in many fields have undertaken the difficult task of asking the correct questions and providing the appropriate answers about gambling in a desire to decrease the negative effects of this activity. Because of the complementary nature of this disorder, an interdisciplinary approach is necessary to achieve a comprehensive evaluation of pathological gambling. These first steps generated a better understanding of the disease and its social and economic consequences.

The evaluations of these effects provided an important motivation for institutions focused on prevention to encourage policy makers to exert greater efforts to prevent gambling addiction. Currently, many questions remain unanswered; however, gambling is a growing area of concern, and prevention measures have been implemented throughout the world to reduce the social and economic consequences of gambling addiction.

In Switzerland, more than 60% of the population gambles at least once a year, and approximately 1.5% of the population suffers from gambling disorders and must live with the devastating financial and familial effects of this excessive behaviour. Many prevention measures have been implemented by the two lottery institutions and the casinos to encourage responsible gambling. To address this disorder, the government recently introduced a tax on lottery winnings to prevent pathological gambling. Intercantonal collaborations have been established with this money, and preventive measures have been designed to decrease the prevalence of gambling addiction. However, because all of these interventions were implemented during the last decade, their effectiveness has not yet been evaluated.

This dissertation is divided into two parts. In the first part, I provide definitions of gambling and problem gambling and discuss the health-related effects of this disorder. Using the international literature, I review the main prevention measures and their effectiveness. At the end of this first section, I present a brief overview of the gambling landscape in Switzerland.

The second part of this dissertation consists of three essays based on Swiss data that aim to provide a better understanding of this

disorder and its consequences. Although this work does not intend to answer all of the questions regarding gambling and pathological gambling in Switzerland, this dissertation aims to provide important information to policy makers to assist them in making well-informed choices. For this purpose, the first article estimates the monetary value of the decrease in quality of life that results from problem gambling. Indeed, many social cost studies neglect such cost among pathological gamblers. Because the direct and indirect costs are relatively low for this specific addiction, a failure to consider decreases in quality of life (intangible costs) can lead to a significant underestimation of the social cost of pathological gambling. This study confirms this assumption: intangible costs in Switzerland account for more than 60% of the total national social cost of gambling. The second essay in this dissertation provides insight regarding the various risk factors that are associated with gambling and pathological gambling based on a representative sample from the Swiss population. Here, I analyse the various risk factors that are associated with different levels of gambling. This study provides a better understanding of gamblers and problem gamblers and presents information that should assist policy makers in implementing more targeted prevention measures. For instance, this study shows that gamblers are at a greater risk of substance abuse and are more likely to be Swiss compared to non-gamblers. Moreover, tobacco smoking and major depressive disorders were overrepresented among problem gamblers. Finally, specific gambling activities had a meaningful influence on the probability of developing this mental disorder; indeed, internet gamblers were seven times more likely to suffer from gambling problems. The third essay addresses the effect of the gambling tax on the income distribution among gamblers. Because the initial payers of

this tax are gamblers, this final study analyses whether lower-income individuals spend proportionally more money on gambling compared to higher-income individuals. For this purpose, two methods are used: one method is based on a concentration index, and the second method is based on the income elasticity of the gambling expenditures as reported in the Swiss Health Survey (SHS). This investigation unambiguously shows that lower-income households devote a proportionally greater portion of their incomes to gambling compared with higher-income households. In fact, this tax violates one of the main qualities of a fair tax: vertical equity. In addition, I found that more educated individuals are likely to spend less money on gambling. This pattern highlights another source of inequality that is related to this tax.

Although many questions regarding this specific addiction remain unanswered, I attempt to further our understanding of gambling and problem gambling from an economic perspective. Moreover, I hope to raise several concerns for researchers that may assist us in scrutinising the underlying factors governing this disorder.

1 Definition and history of gambling and pathological gambling

The first part of this dissertation aims to provide a better understanding of gambling and how it has been perceived throughout history. In addition, I provide a description of pathological gambling and describe how it has evolved from being viewed as a vice to being a recognised mental disorder.

1.1 Overview of the history of gambling and its representation

For a long time, human beings have felt the need to court chance and engage in risk-taking activities. The earliest instances of games of chance will most likely remain unknown. Nevertheless, evidence shows that dice were already used in 3000 BC, as they were discovered in an Egyptian tomb (Petry, 2005). Likewise, gambling has also been found to be widespread during Roman times (France, 1902). Because of the intrinsic features of gambling (e.g., chance, mystic beliefs), the representation of this activity evolved with the values that have been associated with different societies through the ages. In fact, gambling was less accepted in the past than in the present. During the Protestant Reformation, gambling was condemned because it was believed to be contradictory to the general principles of work and merit. At that time, the rewards of this activity were described as entirely dependent on chance and thus as completely disconnected from the ideal of the

meritocracy. During the Enlightenment, this idea did not change significantly; Western societies criticised gambling as irrational. The belief in mystical forces conflicted with contemporary social values: namely, the ideal of human reason. During the Industrial Revolution, gambling became less controversial because the aforementioned ideologies had become less influential (Smith et al., 2007). At that time, gambling began to be analysed as a deviant behaviour that was associated with other vices, such as alcoholism. Thus, gambling and gambling behaviours began to be studied rather than merely condemned. At the beginning of the 20th century, Freud (1928a) used psychoanalysis to associate gambling with unresolved childhood conflict. The psychoanalytic approach was further investigated during the century. Sociologists also began to express interest in what could cause a gambler to gamble. Scholars found that gambling served as a method of releasing the pressure and frustration of daily life. Thus, this conclusion provided insight into gambling among individuals from lower socio-economic backgrounds and those with stressful lifestyles. Such ideas inspired large numbers of sociologists beginning in the mid-twentieth century.

Gambling participation throughout the world evolved in a manner that was consistent with the representation of gambling in society. In Europe, most notably in France, gambling was condemned by the Church and forbidden by the State. Nevertheless, gambling bans did not prevent participation in gambling from increasing rapidly due to the increase in gambling-oriented games. As a result, in 1776, the State decided to operate these games itself, principally for financial reasons. The lifting of the ban highlighted the conflict that the State confronted between its budgetary priorities and its desire to prevent gambling

disorders. In 1933, similarly, the French National Lottery was recreated to compensate the victims of World War I and as a means of coping with the economic crisis (Adès et al., 2008). In the United States, participation in gambling increased considerably with the arrival of settlers and then began to decrease during the 19th century (Rose, 1980). After the end of the Civil War, these activities regained popularity. Moreover, the arrival of foreigners who were often adventurers and fortune seekers contributed to the increase in the number of drinking- and gambling-related stories in mining towns (Cahlan, 1964, Edwards, 1995). However, gambling (most notably, lotteries) were criticised as dishonest and corrupt; thus, several states banned these activities (Rose, 1980). Finally, after approximately 50 years of governmental restrictions, some states created strictly controlled lotteries and began to allow casinos within their borders. Today, gambling has been legalised in all states except Utah and Hawaii (National Research Council, 1999, Petry, 2005).

Today, gambling has been widely legalised and regulated throughout the world. This activity is now viewed as a leisure activity rather than as a vice. The use of the word "gambling" exemplifies this trend. Indeed, in this field, the usage of the word has slowly become similar to "gaming", which is associated with ideas of pleasure and leisure rather than with financial loss. Furthermore, the participation rate for this activity in Western societies is estimated to be between 60 and 80% (Smith et al., 2007). The advent of new technologies has significantly increased gambling activities; for instance, internet gambling and video lottery terminals (VLTs) are now popular. These changes, in turn, have altered how people gamble and what form of entertainment they derive from this. In the past, gambling involved social destinations, such as bars, poker halls, neighbourhoods or casinos;

however, it is now possible to gamble alone 24 hours a day, 7 days a week.

Although gambling is a leisure activity for most individuals, this activity can become problematic for a small proportion of gamblers. The perceptions of problem or pathological gamblers also evolved over time before it was recognised as a mental disease. Stories that appear to describe gambling problems date back to Roman times, including stories that describe the gambling patterns of well-known Roman emperors, such as Claudius and Nero. Based on these texts, the emperors would most likely be diagnosed as pathological gamblers (Wildman, 1997) according to our current definition of this disorder. Interestingly, excessive gambling has been recognised as an addiction for a long time (France, 1902). Moreover, the adverse effects of excessive gambling have been feared since the Crusades. King Richard restricted dice playing because he feared the loss of control that the activity could create for his soldiers. Native American tribes also regulated gambling to avoid pathological gambling and its devastating effects; they banned all loans to ensure that individuals could gamble only with their own resources (Petry, 2005). Researchers began to analyse the symptoms and consequences of pathological gambling quite early. In 1838, a physician described symptoms of gambling addiction that are now commonly used to diagnose pathological gambling, such as guilt, shame, neglect of one's family, illegal acts and even suicide (Taylor, 1838). This description is consistent with the earliest findings of Cotton (1674), who described the patterns and symptoms that are associated with what is currently termed pathological gambling. The work of these authors indicates that pathological gambling was already seen as an addiction. Moreover, many writers or historians also described patterns that are

consistent with the actual definition of this disorder (Cotton, 1674, Stith, 1752, Dostoyevsky, 1866, France, 1902, Wildman, 1997, Rosenthal, 1998). At the beginning of the 20th century, this mental disorder began to gain the attention of the field of psychoanalysis. In particular, Freud was interested in this behaviour and in how an individual could intentionally and repeatedly engage in such self-destructive behaviour. He suggested that gamblers are less interested in the money that they could win than in the action of gambling. Moreover, he confirmed that this disorder was an addiction similar to alcoholism and drug dependence (Freud, 1928b). The legalisation process that began during the first part of the 19th century also directed more attention toward this disorder. To assist individuals who were suffering from problem gambling, Gamblers Anonymous (GA) groups were created. The first meeting of this group, which was based on the Alcoholic Anonymous model, was organised in 1957 in Los Angeles (National Research Council, 1999).

Researchers and clinicians began to consider the personality traits that lead people to gamble excessively and the social environment of gamblers (National Research Council, 1999). This move toward medicalization has allowed the disorder to be considered a disease rather than a moral failing. As a result of this shift, the term "problem gamblers" began to be used to refer to individuals with gambling disorders. If the problem was chronic, then an individual was labelled a "compulsive gambler". The last step in the recognition of pathological gambling as a disease was the inclusion of the condition in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1980).

1.2 Definition of gambling and problem gambling

The earlier definition of a gambler differs from the current definition. Indeed, the original definition of a gambler had a negative connotation. A gambler was viewed as a cheater or rook who played for money with high stakes (National Research Council, 1999). This definition then evolved, and gambling became known as the act of wagering money on an event that could randomly generate a given payback. Today, it is understood that the payback from gambling activities does not always depend on chance; rather, this payback may be influenced by a gambler's behaviour. Indeed, gambling includes both games of chance that generate entirely random payback (e.g., slot machines) and activities in which the outcome is partly influenced by skills (e.g., poker).

The definition of problem gambling has also evolved. Initially, problem gamblers were essentially individuals who experience the adverse consequences of gambling. Currently, this condition is recognised as a mental illness; thus, problem gamblers are now considered to be suffering from a mental disorder. This evolution in meaning is similar to the change that occurred in the definition of alcohol abuse and alcoholics (National Research Council, 1999). In 1980, the DSM-III referred to pathological gambling as a psychiatric disorder. Through the successive changes to the DSM, the American Psychiatric Association (APA) indicated its intention to define the underlying criteria for pathological gambling (American Psychiatric Association, 1980, American Psychiatric Association, 1987, American Psychiatric Association, 1994). For this purpose, the APA employed the criteria that

had already been accepted for use with other substance-related dependences. More precisely, the 10 criteria that are used in the 4th edition of the DSM (DSM-IV) to identify pathological gamblers are as follows (American Psychiatric Association, 2000):

1. Preoccupied with gambling
2. Needs to gamble with larger amounts of money
3. Repeated unsuccessful efforts to reduce or stop gambling
4. Restless or irritable when attempting to reduce gambling
5. Gambles to escape problems or relieve negative mood
6. "Chases" lost money; returns to gambling to compensate for losses
7. Lies to others to conceal the extent of gambling
8. Commits illegal acts to support gambling
9. Jeopardises or loses important relationships or jobs because of gambling
10. Relies on others to relieve financial problems caused by gambling

To be diagnosed as a lifetime pathological gambler, an individual must meet at least five of the ten criteria from this list. The DSM-IV describes excessive gambling as an impulse control disorder. Correspondingly, pathological gamblers are also sometimes labelled compulsive gamblers because of their lack of control. The above definition and criteria constitute a widely accepted method of identifying pathological gambling. However, although these criteria assist in the diagnosis of pathological gambling as a mental disorder,

they were not designed or tested as a means of identifying individuals who experience less severe negative consequences. These people are generally labelled problem gamblers. Nevertheless, for practical reasons, thresholds have been tested for the DSM-IV, and problem gamblers have been defined as individuals who exhibit at least one but fewer than five of these symptoms (Lesieur and Rosenthal, 1998). Shaffer et al. (1997) considered these problem gamblers to be in-transition gamblers because they may be pathological gamblers in remission or problem gamblers whose disorders are becoming more severe. However, the researchers also noted that they were not necessarily on the brink of becoming pathological gamblers; problem gamblers could also remain in this state or revert to a healthier way of gambling, thus moving along the continuum of problem severity. The latter concept raises difficulties in identifying the thresholds for either problem or pathological gambling. Indeed, unlike other diseases, such as HIV, gambling disorders are difficult to diagnose because the degree of severity varies.

Several characteristics of pathological gamblers clearly distinguish them from recreational or social gamblers. Unlike pathological gamblers, social gamblers pursue this activity for entertainment purposes and take pleasure in the activity. In addition, social gamblers also limit their stakes and wish to minimise their losses (Shaffer et al., 1997, Custer and Milt, 1985). Although recreational players may also attempt to "chase" their losses, they will do so only occasionally and will not be preoccupied with gambling. Conversely, pathological gamblers experience severe adverse effects in their own daily lives and create negative consequences for their relatives. The factors that may cause individuals to become pathological gamblers are rather complex. Some clinicians suggest that gamblers seek feelings of euphoria that

may be comparable to those caused by the consumption of some drugs. This assessment is confirmed by pathological gamblers who report sweaty palms, increasing heartbeat and nausea as a result of the "rush" that they obtain from gambling (National Research Council, 1999). Interestingly, this feeling is not always an outcome of active gambling. Pathological gamblers can also experience this rush in anticipation of gambling or after exposure to situations or thoughts that remind them of gambling (Rosenthal and Lesieur, 1992). In addition, pathological gamblers may also experience phenomena that include cravings and tolerance, which will encourage them to bet increasing amounts of money and to take greater risks to attain the excitement that they seek (Wray and Dickerson, 1981, Meyer, 1989, Rosenthal and Lesieur, 1992, Lesieur, 1994). Vital aspects of human life, such as sleep, eating and personal health, are also neglected. Excitement is not the only feeling that these gamblers are seeking. According to clinicians, some individuals use gambling as an escape from daily life. Men are more likely to seek excitement through gambling, whereas women are more likely to seek an escape (Lesieur and Blume, 1991a); this pattern also applies to slot machine and video poker players. Regardless of their gender, pathological gamblers report specific symptoms, such as amnesic episodes, trances and dissociative states (Jacobs, 1989, Kuley and Jacobs, 1988, Lesieur, 1994, Lesieur and Rosenthal, 1994, Brown, 1996, O'Donnell and Rugle, 1996). Researchers often observe that pathological gamblers experience cognitive distortions, especially when they deny reality by insisting that specific numbers, days or slot machines have magical properties. Pathological gamblers also generally hold incorrect beliefs regarding the probability of their winning. In 1986, Rosenthal showed that the impression that one could influence the

likelihood of winning increased with the gravity of a gambler's problem.

1.2.1 Pathological gambling as an impulse disorder

In the DSM-IV, pathological gambling is formally classified as an "Impulse-Control Disorder Not Elsewhere Classified". The other four impulse disorders are intermittent explosive disorder (which involves discrete episodes of aggressive behaviour), kleptomania, pyromania and trichotillomania (hair pulling with noticeable loss). Some mental disorders involve impulse control issues (e.g., substance use disorder and antisocial personality disorder); however, these disorders have other characteristics that classify them as part of a more specific category (National Research Council, 1999). An impulse disorder entails "the failure to resist an impulse, drive, or temptation to perform an act that is harmful to the person or the others" (American Psychiatric Association, 1994). Thus, a loss of control is intrinsic to this behaviour. An impulse disorder may also be characterised by tension prior to an action and relief after the act has been committed. If this act is generally enjoyable, then guilt and regret often follow (National Research Council, 1999). This definition is consistent with the specific features of pathological gambling. In addition, gambling and impulsivity are generally found to be correlated (Alessi and Petry, 2003, Blaszczynski et al., 1997b, Castellani and Rugle, 1995, Steel and Blaszczynski, 1998, National Research Council, 1999). Studies have demonstrated a link between greater impulsivity and more severe problem gambling (McCormick et al., 1987, Steel and Blaszczynski, 1998). In New Zealand, Slutske et al. (2005) used a longitudinal population-based study to identify an association between risk taking and impulsivity for

individuals who are 18 years old and problem gambling at the age of 21. This pattern was identical for other substance use disorders (alcohol or cannabis abuse) and for substance dependence (nicotine addiction).

1.2.2 Pathological gambling as an addiction

If pathological gambling is clearly similar to other impulse disorders, then this disorder is also similar to other types of addiction. The DSM-IV associates pathological gambling with symptoms that include preoccupation, tolerance, unsuccessful attempts to stop gambling, irritability associated with gambling cessation and restlessness. In fact, these symptoms suggest physiological dependence (Wray and Dickerson, 1981, Meyer, 1989, Rosenthal and Lesieur, 1992). Potenza et al. (2001) refer to pathological gambling as an "addiction without drugs". In fact, except for their tendency to "chase their losses", pathological gamblers fundamentally resemble drug addicts. These parallels led researchers to conduct further analyses of this topic. Some scholars began to explore whether excessive gambling could have a biochemical trigger and to assess the possible effects of gambling on the brains of pathological gamblers (Hickey et al., 1986, Koepp et al., 1998, Comings, 1998, Lukas, 1998). In 2005, Reuter et al. used functional magnetic resonance imaging to analyse how some regions of the brain (the ventral striatal and ventromedial prefrontal regions) reacted to a guessing game. Interestingly, these regions showed a decrease in activation that was consistent with the severity of a person's gambling problem. Because the same result has been obtained in drug addiction studies, the authors concluded that pathological gambling can be defined as a non-substance-related addiction.

In fact, even if pathological gambling is still formally classified as an impulse disorder, the DSM criteria already underline the similarities between this mental disorder and substance abuse.

1.3 Screening instruments for gambling behaviour

The National Research Council (1999) identified 25 instruments that have been used to screen and measure gambling disorders. However, some of these instruments have been used only sporadically. Moreover, because these instruments are fairly new, their psychometric properties have not always been correctly tested. Some of them were designed to screen for problem gambling and thus may be used for prevalence surveys and for diagnosing problem gambling among medical patients. These screening instruments are generally based on the DSM-IV criteria. Another type of instrument was developed to monitor gambling severity over time (Petry, 2005). However, in this work, I will summarise only some of the most widely used and relevant screening instruments that are employed to assess problem and pathological gambling. More detailed and comprehensive reviews of these instruments are available in the literature (Petry, 2005, National Research Council, 1999, Smith et al., 2007).

1.3.1 The South Oaks Gambling Screen (SOGS)

This screening questionnaire, which was developed by Lesieur and Blume (1987), is a self-administered instrument and is the most commonly used method of assessing gambling problems (Shaffer et al., 1999). The 20 items in this questionnaire are based on the criteria from

the DSM-III. The SOGS has been used throughout the world for clinical purposes and population surveys (Shaffer et al., 1999, National Research Council, 1999). The "yes" answers are summed to obtain a score between 0 and 20. A score of 5 or more generally labels an individual as a probable pathological gambler. The term "probable" is used because this instrument is not diagnostic and thus does not include all of the criteria for diagnosing pathological gambling. The items cover a wide range of behaviours and characteristics that are related to gambling disorders, including chasing losses, hiding evidence, exhibiting irritability with regard to gambling, borrowing money and accumulating debt. The items from the SOGS are shown in Box 1. This instrument can be easily self-administered, as the questions are easy to understand and to answer. In addition, the questionnaire shows good construct validity, internal consistency and test-retest reliability (Petry, 2005, Smith et al., 2007, Lesieur and Blume, 1987). This widely used instrument has been translated into more than 20 languages and exhibits the appropriate psychometric properties (Petry, 2005).

Box 1: Items from the South Oaks Gambling Screen

1. When you gamble, how often do you return another day to win back the money that you lost?
    - Possible answers: "Never"; "Some of the times (less than half of the times) that I lost"; "Most of the times that I lost"; "Every time that I lost"
2. Have you ever claimed to be winning money gambling but weren't really winning? In fact, you were losing?
    - Possible answers: "Never"; "Yes, less than half of the times that I lost"; "Yes, most of the time."
3. Do you feel that you have ever had a problem with gambling?

- Possible answers: “No”; “Yes in the past but not now”; “Yes, now”

4. Did you ever gamble more than you intended to?
    - Possible answers: “Yes”; “No”
5. Have people criticised your gambling?
    - Possible answers: “Yes”; “No”
6. Have you ever felt guilty about the way you gamble or what happens when you gamble?
    - Possible answers: “Yes”; “No”
7. Have you ever felt like you would like to stop gambling but didn’t think that you could?
    - Possible answers: “Yes”; “No”
8. Have you ever hidden betting slips, lottery tickets, gambling money, or other signs of gambling from your spouse, children or other important people in your life?
    - Possible answers: “Yes”; “No”
9. Have you ever argued with people with whom you live regarding how you handle money?
    - Possible answers: “Yes”; “No”
10. If “Yes”, have money arguments ever centred on your gambling?
    - Possible answers: “Yes”; “No”
11. Have you ever borrowed from someone and failed to pay them back as a result of your gambling?
    - Possible answers: “Yes”; “No”
12. Have you ever lost time from work (or school) due to gambling?
    - Possible answers: “Yes”; “No”

If you borrowed money to gamble or to pay gambling debts, from whom or where did you borrow? (Check “yes” or “no” for each)

13. Household money
14. Your spouse
15. Other relatives or in-laws
16. Banks, loan companies, or credit unions
17. Credit cards
18. Loan sharks

19. Cashed in stocks, bonds, or other securities
20. Sold personal or family property
21. Borrowed on your checking account (passed bad check)

Scoring the SOGS:

- Question 9 is not counted.
- For Question 1, an answer of "Most of the times that I lost" or "Every time that I lost" receives 1 point.
- For Question 2, an answer of "Yes, less than half of the times" or "Yes, most of the time" receives 1 point.
- For Question 3, an answer of "Yes, but in the past" or "Yes, now" receives 1 point.
- For the remaining questions, any "Yes" answer will add 1 point to the total score.
- The highest possible score is 20.

Source: Lesieur and Blume (1987)

Nevertheless, some researchers are concerned about the limitations of the SOGS. First, this instrument has never been updated to fit the DSM-IV criteria of the American Psychiatric Association (Petry, 2005). In addition, because this instrument was originally developed for clinical settings, its use with the general population requires some precautions. In fact, a comparison of the rate of pathological gambling that is found using the SOGS with that found using the DSM-IV suggests that the use of the SOGS in the general population leads to overestimates of the number of pathological gamblers (Welte et al., 2001). Finally, some of the items from the SOGS were found to be confusing. This pattern was shown to increase SOGS scores (Ladouceur et al., 2000a).

1.3.2 The Lie/Bet questionnaire

This questionnaire contains only 2 items and was developed in 1997 (Johnson et al., 1997). Initially, the authors constructed a 12-item questionnaire; subsequently, they reduced the number of items to 2 by

choosing those that best discriminated the pathological gamblers from the control group. The two questions are as follows:

1. Have you ever had to lie to people important to you about how much you gambled?
2. Have you ever felt the need to bet more and more money?

These questions are based on the DSM-IV criteria. The first question is related to the DSM criterion that refers to lying about gambling. The phrase "had to lie" was employed to convey a sense of compulsion (Smith et al., 2007). Indeed, although some gamblers may have lied to others about their gambling, if an individual feels that he "had to lie", then a more serious problem may exist. The second question addresses the need to increase the amount of money that is gambled. Johnson et al. (1997, 1998) found that this instrument exhibited good specificity and sensitivity when used with two different samples. However, the pathological gamblers who were selected for these tests were found in Gamblers Anonymous. Götestam et al. (2004) tested the validity of the Lie/Bet test with two samples from the general population. For this purpose, the authors used a sample of 2,014 adults and 3,237 adolescents in Norway. They compared the results that they obtained using the Lie/Bet test with those that were obtained using the DSM-IV criteria. Interestingly, the Lie/Bet test exhibited a strong ability to identify pathological and at-risk gamblers from a normal community sample. This result is meaningful because it indicates the potential usefulness of a brief screening questionnaire. In fact, the unquestionable advantage of this instrument is its brevity.

1.3.3 The Canadian Problem Gambling Index (CPGI)

Unlike most screening instruments that were initially designed to screen gambling behaviour in clinical settings, the Canadian Problem Gambling Index was specifically developed to detect problem gambling among the general population. In addition to serving as a traditional screening instrument, this questionnaire was also designed to collect information regarding the social and environmental factors that are linked to problem gambling (Ferris and Wynne, 2001). The authors included these factors because they aimed to develop an instrument that was not based on and validated in a clinical setting because the socio-demographics of this specific population differ from those of the general population. By including items that consider social contexts, the authors of the questionnaire aimed to create a more accurate index that could capture underrepresented populations (such as women, ethnic minorities, and individuals with lower socio-economic status). In addition, the questionnaire indicates the risk factors that are associated with pathological gambling and the profiles of problem gamblers. The CPGI regroups 31 items, of which 9 items are used to screen for problem gambling. Each answer is given using an intensity scale that varies from "never" to "almost always", and the total score varies between 0 (for individuals who answered "Never" for all items) and 27 (for those who answered "almost always" to every question). Finally, gambling behaviour is assessed using the following cut-off points:

- 0 = non-problem gambler
- 1-2 = low-risk gambler
- 3-7 = moderate-risk gambler
- 8-27 = problem gambler

Box 2: The 9 Items from the Canadian Problem Gambling Index (CPGI) that measures problem gambling

Thinking about the last twelve months…

1. Have you bet more than you could really afford to lose? Would you say never, sometimes, most of the time, or almost always?
    - Possible answers: "Never"; "Sometimes"; "Most of the time"; "Almost always"; "Don't know"; "Refused to answer".
2. Still thinking about the last 12 months, have you needed to gamble with larger amounts of money to get the same feeling of excitement?
    - Possible answers: "Never"; "Sometimes"; "Most of the time"; "Almost always"; "Don't know"; "Refused to answer".
3. When you gambled, did you go back another day to try to win back the money you lost?
    - Possible answers: "Never"; "Sometimes"; "Most of the time"; "Almost always"; "Don't know"; "Refused to answer".
4. Have you borrowed money or sold anything to get money to gamble?
    - Possible answers: "Never"; "Sometimes"; "Most of the time"; "Almost always"; "Don't know"; "Refused to answer".
5. Have you felt that you might have a problem with gambling?
    - Possible answers: "Never"; "Sometimes"; "Most of the time"; "Almost always"; "Don't know"; "Refused to answer".
6. Has gambling caused you any health problems, including stress or anxiety?
    - Possible answers: "Never"; "Sometimes"; "Most of the time"; "Almost always"; "Don't know"; "Refused to answer".
7. Have people criticised your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?
    - Possible answers: "Never"; "Sometimes"; "Most of the time"; "Almost always"; "Don't know"; "Refused to answer".
8. Has your gambling caused any financial problems for you or your household?
    - Possible answers: "Never"; "Sometimes"; "Most of the time"; "Almost always"; "Don't know"; "Refused to answer".

9. Have you felt guilty about the way you gamble or what happens when you gamble?
    - Possible answers: “Never”; “Sometimes”; “Most of the time”; “Almost always”; “Don't know”; “Refused to answer”.

Scoring the CPGI: Each “Sometimes” response is given a score of 1, each “Most of the time” response is given a score of 2, and each “Almost always” response is given a score of 3.

Source: Ferris and Wynne (2001)

Ferris and Wynne (2001) compared the CPGI results with the results that were obtained from other widely accepted screening instruments for gambling. They found that the prevalence rates that were obtained using the CPGI were comparable to those that were obtained using the DSM-IV and the SOGS. For instance, the rate of problem gambling that was found using the CPGI in a general population survey in Canada was 0.9%. This result lies between the rate that was obtained using the SOGS (1.3%) and the rate that was obtained using the DSM-IV (0.7%) with the same population. These results are encouraging but unsurprising given that some of the diagnostic criteria for the CPGI overlap with those that are used in the SOGS and the DSM-IV. In fact, among the nine items of the CPGI, five items are identical or similar to items from the SOGS, and two items are identical or similar to items from the DSM-IV. Moreover, one item appears in both the SOGS and the DMS-IV (Smith et al., 2007). However, this instrument yielded encouraging results when used to screen for problem gambling within the general population.

1.3.4 Gamblers Anonymous 20 Questions (GA-20)

Based on the concept of Alcoholics Anonymous (AA), Gamblers Anonymous (GA) groups have been created to assist individuals in eliminating their dependence on gambling. For this purpose, the organisation developed a set of 20 questions to screen problem gamblers. The scoring for this questionnaire is simple. When a respondent answers "yes" to at least 7 of the 20 questions in Box 3, the individual is identified as a compulsive gambler. Although this instrument is used frequently, few studies have analysed its psychometric properties. In 1998, Ursua and Uribelarrea compared this measure with the SOGS for a sample of problem gamblers who were attending self-help programmes and a control group of non-problem gamblers. Interestingly, the researchers found a strong correlation between the GA-20 and the SOGS. The sensitivity and specificity of the instrument were also high. Nevertheless, the GA-20 has not been subjected to more detailed analysis. Indeed, no published work has reported the details regarding the manner in which the items were selected or an explanation for the cut-off point of 7.

Box 3: Items from Gamblers Anonymous 20 Questions (GA-20)

1. Did you ever lose time from work or school due to gambling?
2. Has gambling ever made your home life unhappy?
3. Did gambling affect your reputation?
4. Have you ever felt remorse after gambling?
5. Did you ever gamble to get money with which to pay debts or otherwise solve financial difficulties?
6. Did gambling cause a decrease in your ambition or efficiency?
7. After losing did you feel you must return as soon as possible and win back your

losses?

8. After a win did you have a strong urge to return and win more?
9. Did you often gamble until your last dollar was gone?
10. Did you ever borrow to finance your gambling?
11. Have you ever sold anything to finance gambling?
12. Were you reluctant to use "gambling money" for normal expenditures?
13. Did gambling make you careless of the welfare of yourself or your family?
14. Did you ever gamble longer than you had planned?
15. Have you ever gambled to escape worry, trouble, boredom or loneliness?
16. Have you ever committed, or considered committing, an illegal act to finance gambling?
17. Did gambling cause you to have difficulty in sleeping?
18. Do arguments, disappointments or frustrations create within you an urge to gamble?
19. Did you ever have an urge to celebrate any good fortune by a few hours of gambling?
20. Have you ever considered self-destruction or suicide as a result of your gambling?

Scoring the GA-20: Score 1 for each "yes" answer.

Source: Gamblers Anonymous

1.3.5 Conclusion and summary

In this section, I described the most common screening instruments that are used to diagnose problem gambling. However, numerous other standard questionnaires are available. Thus, in choosing the most appropriate tool, one must consider the aim and design of the study, including the population under consideration. Indeed, some screening instruments were not designed to be used for the general population, unlike other instruments, such as the Canadian Problem Gambling Index (CPGI). In addition, the response rate is known to depend on the

length of the questionnaire. If a survey includes numerous other questions, then the brevity of the screening instrument will be a substantial advantage in encouraging responses. It is also important to determine whether the psychometric properties of an instrument have already been tested and whether the instrument has been found relevant. Nevertheless, thus far, there have been relatively few psychometric evaluations of these screening instruments; this issue requires further consideration by researchers.

2 Health-related effects of gambling addiction

This mental disorder is generally associated with several negative health effects, as is common with most types of dependencies. In a recent representative study, Kessler et al. (2008) showed that 96.3% of lifetime pathological gamblers also suffer from one or more other health disorders. However, unlike with substance use and abuse, some aspects of the causal relationship between gambling addiction and health-related disorders remain unknown. Because no substance use is involved, it is more complicated to unambiguously link this disorder with specific health consequences. Nevertheless, it is widely accepted that pathological gamblers exhibit a high rate of co-occurring health disorders (National Research Council, 1999, Petry, 2005, Smith et al., 2007).

This section summarises the findings in the literature and is organised as follows. For each co-occurring health disorder that is analysed, I focus on general population surveys that are based on representative samples of the population to enable us to generalise the results. Studies of selected samples of pathological gamblers will also be briefly reviewed. However, the resulting conclusions should always be interpreted with caution and should not be used to draw conclusions beyond the scope of the study. I also discuss studies that attempted to identify a causal path between the disorders that are reviewed and gambling addiction.

2.1 Substance use disorders

In the international literature, it is commonly accepted that substance use disorders are widely associated with pathological gambling. The intensity of this pattern is generally correlated with the intensity of gambling problems (Smith et al., 2007). Here, I review the different types of substance use disorders that are associated with gambling problems.

2.1.1 Substance use disorders in general

General population surveys strongly indicate that problem or pathological gambling is linked with substance use disorders of all types. In a study of adults from Edmonton in Alberta, half of the pathological gamblers were identified as having a life-long substance use disorder (Bland et al., 1993). For non-gamblers, this rate decreased to 19%. Consistent with this finding, a telephone survey of a random sample of Texas adults was conducted. The survey results indicated that approximately one-third of the problem gamblers had a co-occurring lifetime substance use disorder (Feigelman et al., 1998). This relationship was corroborated using the Canadian Problem Gambling Index (Ferris and Wynne, 2001). Individuals suffering from substance dependence or harmful alcohol use were 2.9 times more likely to also be identified as gamblers of moderate or high severity(El-Guebaly et al., 2006). Among lifetime pathological gamblers, the risk of meeting the criteria for substance use disorder was approximately twice as high as the previous result (Kessler et al., 2008).

The results for pathological gamblers who were seeking treatment also highlight this correlation. Indeed, the lifetime prevalence rate for

substance abuse among this population is approximately 60% (Black and Moyer, 1998, Specker et al., 1996). The review by Crockford and El-Guebaly (1998) corroborates these findings, with prevalence rates that range from 25% to 63%. Globally, all studies confirm the high prevalence of substance use disorders among pathological gamblers in treatment (Ladd and Petry, 2003, Ramirez et al., 1983, Stinchfield and Winters, 1996, Stinchfield and Winters, 2001). The same link emerges at substance abuse treatment centres. Indeed, between 10% and 13% of substance abusers were also found to be pathological gamblers (Cunningham-Williams et al., 2000, Langenbucher et al., 2001, McCormick, 1993, Toneatto and Brennan, 2002). The prevalence rate for pathological gambling in the general population is estimated to be between 0.42% and 2% (Bland et al., 1993, Gerstein et al., 1999, Petry et al., 2005, Welte et al., 2001); thus, the relationship between substance use disorders and gambling addiction is straightforward.

2.1.2 Alcohol use disorders

A strong association between alcohol abuse and gambling disorders was identified in a number of nationally based surveys. Based on the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC), which evaluated a sample of more than 43,000 individuals, pathological gamblers were found to have a six-fold increased risk of developing alcohol abuse or dependence during their lifetime (Petry et al., 2005). Other general population surveys have consistently corroborated this evidence (Welte et al., 2001, Petry et al., 2005, Bland et al., 1993, Cunningham-Williams et al., 1998, Smart and Ferris, 1996, Gerstein et al., 1999). This conclusion holds regardless of the severity of the gambling disorder (e.g., problem gambling or

pathological gambling). In fact, alcohol abuse or dependence was found to be between 2 (Smart and Ferris, 1996) and 18 (Welte et al., 2001) times higher among individuals who suffer from gambling disorders.

For the sake of convenience, most studies have focused on treatment-seeking pathological gamblers. Black and Moyer (1998) used television, radio and newspapers advertisements to recruit 30 individuals who exhibited compulsive gambling behaviour. Among the respondents, 63% reported lifetime alcohol abuse or dependence, and 7% reported current alcohol abuse or dependence. At the Hospital Ramón y Cajal in Madrid, 69 patients seeking treatment were evaluated (Ibanez et al., 2001). In this sample, the lifetime prevalence of this disorder was estimated at 35% and the current prevalence at 23%. A number of other studies that focused on treatment-seeking pathological gamblers indicated comparable rates of alcohol abuse or dependence (Ladd and Petry, 2003, Lesieur and Blume, 1991b, Linden et al., 1986, Maccallum and Blaszczynski, 2002, McCormick et al., 1984, Specker et al., 1996).

Thus, general population surveys and studies that are based on selected samples provide highly convergent results that indicate that alcohol abuse is a significant risk factor for gambling addiction.

2.1.3 Tobacco use and dependence

Nicotine dependence is another commonly accepted comorbid condition that is associated with pathological gambling. Focusing on general population surveys, Cunningham-Williams et al. (1998) found that problem gamblers exhibited a two-fold increased risk of nicotine abuse or dependence compared with non-gamblers. The same conclusions can be drawn from the study by Smart and Ferris (1996),

who found that 41.6% of heavy gamblers and 21.3% of non-gamblers were smokers. In this comparison, the figures for recreational gamblers lie between these two estimates, with a reported prevalence rate of nicotine dependence of 30.1%. This finding is consistent with the conclusions of Petry et al. (2005). In addition, the latter concluded that smokers are 6 times more likely to be pathological gamblers.

The findings for treatment-seeking pathological gamblers are also striking. In 2002, Maccallum and Blaszczynski reported that the prevalence of cigarette smoking was 65.3% among poker players who were seeking treatment in Australia. Other studies also reported significantly high rates (i.e., figures between 60 % and 70 %) among treatment-seeking gamblers (Petry and Oncken, 2002, Stinchfield and Winters, 1996).

In sum, substantial evidence indicates that gambling and problem gambling are strongly related to nicotine dependence or cigarette smoking, as has already been demonstrated for other forms of substance use and abuse. This conclusion holds regardless of the sample that is used in the analysis.

2.1.4 Drug consumption

The correlation between drug abuse or dependence and pathological gambling is difficult to estimate because of the small prevalence of the two disorders. Thus, only a few general population studies include a sufficient number of individuals to estimate this pattern. However, the conclusions of these surveys are unequivocal: the rate of drug use increases with the severity of gambling problems, beginning at 2% for non-gamblers and increasing to 38.1% for problem or pathological gamblers (Gerstein et al., 1999, Cunningham-Williams et

al., 1998, Petry et al., 2005). Moreover, individuals with drug use disorders are 4.4 times more likely to be diagnosed as pathological gamblers (Petry et al., 2005). This conclusion is consistent with the earlier findings of Bland et al. (1993).

The correlation between drug use and pathological gambling has been analysed especially among individuals who attend treatment centres for substance use disorders. Among treatment-seeking cocaine abusers, 44% were found to be pathological gamblers (Steinberg et al., 1992). The researchers also reported higher rates of past treatment for alcohol and drug use and greater drug use during the previous month. Finally, problem gamblers were 1.5 times more likely than non-problem gamblers to use opiates and solvents and two times more likely to experience drug overdoses. The overrepresentation of disordered gamblers in this population has been corroborated in many other articles that report a two- to six-fold increased risk of pathological gambling (Lesieur and Heineman, 1988, Lesieur et al., 1986, Steinberg et al., 1992, Lesieur and Rosenthal, 1998, Cunningham-Williams et al., 2000).

2.1.5 The causal link between substance use and abuse and problem gambling

The correlation between substance use/abuse and gambling disorders has been clearly established, but the direction of causality is not clear. In fact, it is difficult to assess the causal relationship between pathological gambling and the related comorbidities. However, this relationship is important for several reasons. First, from a clinical perspective, if we know that, for example, alcohol abuse increases the risk of gambling disorders, then people who are treated for the first

disorder should receive preventive treatment that may reduce their risk of developing gambling problems. Second, in conducting impact studies of gambling addiction, we must know whether this dependence prompts the emergence of other disorders. If so, the effects of the disorders that are attributable to gambling addiction must be considered when we evaluate the total impact of this specific addiction. In fact, problem gambling may influence substance use and abuse and may affect the severity. However, the reverse may also be true; both causal links are intuitively plausible. Here, I review the few studies that have attempted to assess this relationship, and I identify the challenges surrounding the identification of this link.

Recently, Kessler et al. (2008) used the age of onset of different disorders to analyse the causal link between pathological gambling and substance abuse. These authors concluded that problem gambling is a predictor of substance use disorders. These findings are consistent with those of other studies that suggest that mental disorders precede the onset of substance use and abuse (Nelson et al., 1998, Shaffer and Eber, 2002). However, the information regarding the age of onset of the disorders is based on retrospective reports, and such figures are often erroneous (Simon and Von Korff, 1995); thus, the use of these figures may lead to biased estimations. Unlike previous researchers, Cho et al. (2002) deepened the temporal relationship between alcohol use disorders and pathological gambling among 5,176 adult household residents in Korea. These authors concluded that alcohol use disorders tended to emerge prior to pathological gambling for males. Gambling problems were found to occur within two years of the onset of alcohol dependence in 65% of instances (Cunningham-Williams et al., 1998).

These two results may suggest that alcohol use disorders precipitate gambling problems.

According to studies that are based on convenience samples of treatment-seeking pathological gamblers, the diagnosis of substance use is based on past consumption rather than present consumption (Specker et al., 1996, Stinchfield and Winters, 1996, Stinchfield and Winters, 2001, Ladd and Petry, 2003). Thus, such studies suggest that pathological gambling may be a secondary disorder.

This causal link was also investigated among individuals following treatment programmes for substance use or abuse. The onset of gambling was found to precede the onset of cocaine dependence (Hall et al., 2000). Conversely, Cunningham-Williams et al. (2000) concluded that gambling addiction was a secondary disorder and followed other psychiatric and substance disorders. In addition, evidence has shown that individuals with more serious gambling disorders are more likely to be diagnosed as alcohol or drug abusers (Blaszczynski et al., 1991, Taber et al., 1987). However, these results must be interpreted with caution, as they are not drawn from a random sample of the general population. Moreover, the size of the sample of pathological gamblers is relatively small.

These studies highlight the multidimensional pattern that connects various disorders and underline the complexity of the process of precisely defining which disorders appear first. Indeed, neither studies based on the general population nor those based on treatment-seeking individuals suggest a common causality link between the various disorders. Further research using longitudinal studies must be conducted to address this fundamental issue.

2.2 Mood and other psychiatric disorders

Psychiatric disorders are generally overrepresented among pathological gamblers. Again, the international literature provides similar results that highlight the correlation between the two disorders but failed to provide clear conclusions regarding the potential causal link between them.

2.2.1 Mood disorders

The most recent studies show that mood or anxiety disorders are significantly more common among pathological gamblers (El-Guebaly et al., 2006, Kessler et al., 2008). Major depression is consistently identified as a significant risk factor for gambling disorders (Bland et al., 1993, Cunningham-Williams et al., 1998, Petry et al., 2005). The overrepresentation of dysthymia (chronic depressed mood for more than two years) among pathological gamblers is more uncertain; in Canada, pathological gamblers were four times more likely to suffer from this condition (Bland et al., 1993). However, Cunningham-Williams et al. (1998) could not find any significant relationship between the two disorders. Similar mixed conclusions can be drawn regarding the overrepresentation of bipolar disorders among disordered gamblers (Cunningham-Williams et al., 1998, Bland et al., 1993, Petry et al., 2005)

The results that are generated from convenience samples generally indicate the high prevalence of major depression. In fact, in inpatients units, rates of life-long major depression range from 33% to 76% depending on the study (McCormick et al., 1984, Ramirez et al., 1983, Taber et al., 1987, Linden et al., 1986, Specker et al., 1996). Based on their evaluation of patients who were enrolled in an outpatient programme,

Ibanez et al. (2001) also concluded that mood disorders are more likely in these individuals. These findings are consistent with the results of studies of Gamblers Anonymous participants (Linden et al., 1986) and of pathological gamblers recruited through television, radio and newspaper advertisements (Black and Moyer, 1998). Using psychological tests that measure mood in treatment-seeking pathological gamblers, researchers have also found that depressive symptoms are more prevalent among pathological gamblers (Blaszczynski and McConaghy, 1989, Gerstein et al., 1999, Moravec and Munley, 1983). Finally, individuals who suffer from bipolar disorders were found to be overrepresented among pathological gamblers (Specker et al., 1996, Bellaire and Caspari, 1992, Black and Moyer, 1998). However, given the nature and the size of the sample that was used in these studies, it would be unwise to draw conclusions based on these results.

2.2.2 Anxiety and other psychiatric disorders

Anxiety disorders include several forms of abnormal and pathological fear and anxiety: phobias, agoraphobia, panic and obsessive-compulsive disorders. In 1993, Bland et al. estimated that the rate of anxiety disorders among lifetime problem gamblers was 26.7%. More specifically, agoraphobia and obsessive-compulsive disorders were reported to have significantly higher incidence rates among problem gamblers compared with non-problem gamblers. The results of this initial study were corroborated by two more recent surveys that found a significantly higher likelihood ratio for anxiety disorders among problem gamblers (Petry et al., 2005, Kessler et al., 2008). However, Cunningham-Williams et al. (1998) did not find significant results for

generalised anxiety among problem gamblers. Problem gamblers were more likely to suffer from phobias but not from any other type of anxiety. Other specific psychiatric disorders were also investigated in general population surveys and among treatment-seeking gamblers. These disorders include schizophrenia, somatoform disorder, and eating disorders. For these specific disorders, the relationships are more uncertain (Bland et al., 1993, Cunningham-Williams et al., 1998).

The conclusions that are based on convenience samples also presented mixed results. An analysis of Gamblers Anonymous members reported higher rates of generalised anxiety and other specific anxiety disorders (Linden et al., 1986). Other studies did not identify statistically significant differences, perhaps because of the limited size of the samples that were considered in the analysis (Ibanez et al., 2001, Specker et al., 1996, Bellaire and Caspari, 1992, Black and Moyer, 1998, McCormick et al., 1984, Taber et al., 1987).

In fact, these results failed to clearly link this population with anxiety disorders. Nevertheless, as Petry (2005) noted, studies of treatment-seeking individuals may underestimate this association because individuals with severe psychiatric disorders, such as schizophrenia, will be treated first for this disorder and may not pursue treatment for the gambling disorder.

2.2.3 The causal link between mood or anxiety disorders and pathological gambling

The first study that investigated the link between pathological gambling and mood disorders was conducted by McCormick et al. (1984). These researchers based their study on 38 treatment-seeking gamblers who were diagnosed as suffering from major depressive

disorder. In this sample, 76% of the pathological gamblers reported experiencing a major depressive disorder, and 86% declared that the onset of the pathological gambling preceded the onset of the major depressive disorder. Conversely, a more recent study that was based on the National Comorbidity Survey Replication used odds ratios and survival analysis to analyse the temporal relationship between various disorders and their respective years of onset. These results suggest that mood and anxiety disorders predate and predict the onset of pathological gambling (Kessler et al., 2008). Admittedly, one of the shortcomings of this study is the subjective nature of the reported data regarding the ages of participants at the onset of their disorders. Nevertheless, this research is a ground-breaking study because it is, to the author's knowledge, the first study that assesses this temporal link using a general population survey. However, because the two studies mentioned present completely opposite results, it is difficult to draw unambiguous conclusions regarding the direction of the causal link. Thus, further investigation is required.

2.3 Ill health

Ill health due to gambling has been studied less frequently than mental disorders and substance abuse. In 1999, Gerstein et al. (1999) compared how different types of gamblers describe their health. Pathological gamblers were found to be at least twice as likely to report fair or poor health. Morasco et al. (2006a) conducted an interesting study using a model that controlled for demographics and behavioural risk factors. These authors found that pathological gamblers were more

likely to suffer from tachycardia (OR=1.77), angina (OR=2.35), cirrhosis (OR=3.90) and other liver disease (OR=2.98) compared with low-risk individuals. Problem gamblers were more likely to suffer from hypertension (OR=1.72), cirrhosis (OR=3.43) and arthritis (OR=1.57). Finally, at-risk gamblers were more likely than low-risk individuals to suffer from hypertension (OR=1.18) but, interestingly, were less likely to suffer from cirrhosis (OR=0.53). This survey, which was conducted using a large sample, demonstrates that gambling is also related to physical disease. Some of these results are intuitive. Notably, because stress is a possible mediating factor, the overrepresentation of heart-related problems among problem gamblers is unsurprising (Valenzuela et al., 2000, Sharkey et al., 2005). However, the increased risk of cirrhosis and other liver disease among problem and pathological gamblers is interesting, as this risk cannot be attributed to alcohol abuse or dependence (because the analysis controlled for this factor). Surprisingly, at-risk gamblers exhibit a lower risk of suffering from cirrhosis. In this study, playing even five times per year (at-risk status) appears to be associated with health consequences. However, the causal link between health problems and gambling intensity is not unidirectional. Indeed, gambling is considered a sedentary occupation. Thus, individuals with health problems may choose to gamble because of their health limitations (e.g., arthritis, obesity). However, the sedentary nature of gambling also increases potential physical limitations. In addition, although studies tend to demonstrate the link between gambling disorder and physical problems, Desai et al. (2004) suggest that recreational gambling can improve one's general health state. Using a representative sample of 2,417 individuals from the Gambling Impact and Behavior Study, the researchers determined that

older recreational gamblers were 2.49 times more likely to characterise their general health as good or excellent. In fact, two studies (Desai et al., 2004, Morasco et al., 2006a) showed that recreational gambling could be associated with improved health. These results are interesting and may indicate that gambling has the same type of preventive effect as a small quantity of alcohol.

In samples of problem gamblers, the overrepresentation of insomnia, headaches or stomachaches due to gambling has been frequently reported (Ladouceur et al., 1994, Lesieur, 1998). More generally, health and physical problems were found more consistently in these specific samples (Productivity Commission, 1999, Pietrzak et al., 2005).

2.4 Health-related quality of life

Rather than using screening instruments to diagnose specific health disorders, some studies used multi-item standardised instruments to assess the quality of life among pathological gamblers. These instruments evaluate various aspects of daily life and assess a score or index that is based on the impairments that an individual experiences. As expected, pathological gamblers generally receive lower scores for these instruments. In 2006, a standardised measure of quality of life was used: the Short-Form 12 version 2 (Ware et al., 1995). Significantly lower scores on the Physical Health and Mental Health Component Summary were found for pathological gamblers (Morasco et al., 2006b). This result suggests that these individuals experience a significant decrease in physical and mental health. To the author's knowledge, this study is the

only general population study that focuses on this specific consideration.

The first year in which the SF-36 was used for selected pathological gamblers was 2003 (Black et al., 2003). Pathological gambling was associated with several subscales that addressed physical and mental health. Other studies that were based on sample populations were conducted using shorter versions of the SF-36 and indicated that problem or pathological gambling was associated with poorer quality of life (Morasco and Petry, 2006, 2006b, Erickson et al., 2005, Pietrzak et al., 2005). Morasco et al. (2006b) also investigated whether recreational gamblers experienced better quality of life compared with non-gamblers. However, this assumption was not supported, as the former exhibited lower scores on the subscales for this instrument than the latter. Finally, the logistic regression that was based on the SF-8 conducted by Scherrer et al. (2005) suggested that problem and pathological gamblers experience lower quality of life than non-gamblers. This effect was found to be especially significant for the mental subscales. These results unambiguously indicate that pathological and problem gamblers generally suffer from a lower quality of life. This conclusion holds for both the mental health subscales and the physical health subscales.

2.5 Suicidality

As previously shown, problem gambling is associated with serious physical and mental impairments. Additionally, problem gambling can have important negative financial and familial consequences. Thus, the

vicious cycle that is created by this addiction can precipitate several harmful behaviours, such as suicide attempts.

2.5.1 Suicidal ideation and attempted suicide

Mental illness, particularly depression, is considered a major risk factor for suicidal behaviours (Lohnqvist, 2000). The aforementioned underlying relationship between depression and pathological gambling suggests that suicidal behaviours may be overrepresented among addicted gamblers.

Bland et al. (1993) found that 13% of compulsive gamblers attempted suicide. Likewise, Newman and Thompson (2003) used two general population surveys of mental disorders to study suicide attempts and found that pathological gamblers were approximately five times more likely to attempt suicide. Conversely, no relation was found between suicidal thoughts and pathological gambling in St. Louis (Cunningham-Williams et al., 1998).

Suicidal ideation has been widely analysed within specific samples of pathological gamblers. In an early study that was conducted in the United Kingdom, 77% of the 162 members of a Gamblers Anonymous group reported having experienced suicidal thoughts (Moran, 1969). This result was corroborated by further studies that examined Gamblers Anonymous members, inpatient and outpatient individuals and hotline callers. The rates of suicidal ideation in these populations were found to range from 40.4% to 92.0%, and the rates of suicide attempts were found to range from 4% to 36% (Ibanez et al., 2001, McCormick et al., 1984, Specker et al., 1996, Frank et al., 1991, Abt et al., 1985, Schwarz and Lindner, 1992, Petry and Kiluk, 2002). Among college students, 26.8% of individuals who were diagnosed as pathological gamblers reported

suicide attempts compared with 7.2% of non-problem gamblers (Ladouceur et al., 1994).

Generally, research consistently underlines the strong correlation between pathological gambling and both suicide attempts and suicidal thoughts.

2.5.2 Suicidal rate

It is difficult to define the suicide rate among pathological gamblers as a result of several barriers. First, it is sometimes difficult to evaluate whether a death is the result of a suicide or an accident (e.g., drowning). Moreover, after it has been determined that a death was a suicide, it can be even more difficult to determine what trigger led the individual to commit suicide. Grinols (2004) identified the limitations on the information that is available for use in estimating the rate of gambling-related suicides. Moreover, he noted that pathological gamblers often suffer from various comorbid conditions, which may complicate the task of determining the cause of the suicide. However, three methods have principally been used in the literature to approximate suicide rates among pathological gamblers (Productivity Commission, 1999).

One approach uses the available evidence of the prevalence of suicide and suicidal thoughts or attempted suicide. Using this information, one can determine the proportion of suicidal thoughts or attempts that end in suicide. Using this approach, the Productivity Commission (1999) used a survey of clients of counselling agencies and the Victorian Task Force Report (1997) to obtain estimated rates of suicide attempts by men and women. The Victorian task force stated that 20 to 50 suicide attempts were necessary for every male suicide. For females, this ratio was significantly smaller; each successful suicide

required between 150 and 300 attempts. The researchers then used their survey of clients of counselling agencies to determine that approximately 28% of males and 19% of females experienced serious suicidal ideation. These data enabled the authors to conclude that 1,500 males and 1,400 females attempted suicide during the year of the study, and 35 to 60 gambling-related suicides occurred per year.

The second approach relies on the differences among suicide rates in particular regions. If the availability of gambling opportunities is positively associated with gambling addiction and if the latter is positively correlated with suicide and suicide attempts, then regions in which gambling opportunities are abundant should have higher suicide rates. However, when this method is employed, all contributing factor that affect suicide rates must be registered and controlled to avoid confounding effects. Phillips et al. (1997) compared the proportion of suicides in three counties with casinos to the corresponding rate in non-gambling regions. These authors concluded that an increased risk of suicide is associated with gambling-oriented settings. A number of other studies highlighted the positive relationship between gambling opportunities and suicide rates (Campbell et al., 1999, McCleary et al., 2002). In contrast, in a study commissioned by the American Gambling Association, McCleary et al. (1998), failed to find significant differences when comparing the suicide rates of casino and non-casino regions. Using cross-sectional analyses and time series, these authors did not find that gambling opportunities had a significant effect on the suicide rate. This result may be surprising given the consensus regarding the link between gambling addiction and suicide. Nevertheless, gambling-related suicides may have been balanced by a decrease in other causes of suicide that are linked to the attractive and lively environments

provided by gambling venues. However, these methods depend strongly on statistical modelling, and it may be difficult to identify actual effects because of the complexity of the problem and because problem gambling suicides account for only a small proportion of suicides.

Finally, Blaszczynski and Farrell (1998) examined the Victoria coroner's records for gambling-related suicides from 1990 to 1997. In total, 44 gambling-related suicides were recorded and analysed. The number of cases increased over time, possibly because of the increase in gambling opportunities. At the beginning of the period, gambling-related suicides accounted for 1% of the total suicides. This percentage increased to 1.7% at the end of the time period that was analysed. The authors noted the difficulty of identifying gambling as the predominant motivation for the suicides, but they nevertheless support the argument that gambling acted as a catalyst or played a significant role in the suicides. Furthermore, some deaths (e.g., deaths involving car accidents or drowning) may be misdiagnosed as suicides and vice versa. Thus, it is difficult to determine whether such figures are underestimates or overestimates.

These results indicate the difficulties underlying the estimation of gambling-related suicides. Nevertheless, most studies generally indicate that an increased suicide rate is associated with gambling opportunities. As a matter of fact, the intensity of this pattern remains unclear.

2.6 Effects on partners and families

Problem or pathological gamblers often spend significant amounts of money and time on gambling rather than devoting these resources to their families. These gamblers are often stressed, angry about their losses, irritable, and ashamed of their gambling debts and spending. These behaviours and emotions inevitably create tension and mistrust in relationships and generate emotional and physical problems for the immediate families of gamblers. The Productivity Commission (1999) used a survey of gamblers who were seeking assistance to assess the magnitude of the negative effects of pathological gambling on relatives. The results of this analysis are compiled in table 2.1. Partners clearly suffer the most from the negative effects of the gambling of their loved ones, as 46.6% of partners report experiencing major adverse effects. Conversely, 34.3% and 45.2% of the friends and colleagues who were surveyed, respectively, reported no effect at all.

Table 2.1: Reported negative effects on the relatives of gamblers.

	Partner %	Children %	Parents %	Friends %	Colleagues %
No effect at all	10.8	18.2	24.7	34.3	45.2
Minor adverse effect	8.5	21.0	20.0	25.1	13.2
Moderate adverse effect	17.2	14.1	21.3	17.5	8.0
Major adverse effect	46.6	20.7	21.6	15.4	9.4
Not applicable	14.3	24.9	10.3	6.3	20.9
Do not know	2.6	1.1	2.1	1.3	3.3

Source: Productivity Commission (1999)

2.6.1 Effects on partners

In Norway, epidemiological research on family members was conducted using a national postal survey (Wenzel et al., 2008). The participants were screened using a modified Lie/Bet questionnaire to identify individuals who had a problem gambler among their relatives. The majority of the respondents were female, and they were likely to be the spouses of gamblers. In this random sample, two-thirds of the respondents reported conflicts in their families, and one in six respondents reported an impairment in mental health (notably, sleep disorders and feelings of depression) and a decrease in their physical health as a result of gambling in the family. Likewise, 40% of the partners of problem gamblers reported suffering from illnesses related to this stressful situation (Dickerson et al., 1996).

A study of the family members of participants in Gamblers Anonymous programmes found that more than four out of five respondents experienced emotional illness (Lorenz, 1987). Moreover, rates of emotional, verbal and physical abuse were found to be high among the family members of problem gamblers (Lorenz, 1983, Lorenz and Yaffee, 1988). Depression and disordered behaviours (excessive drinking, smoking and overeating) were found to be overrepresented in this population (Bergh and Kuhlhorn, 1994, Lorenz, 1983). In addition, Gaudia (1987) and Lorenz and Yaffee (1988) found that spouses and partners of problem gamblers exhibited a three-fold increased risk of suicide attempts. In addition, the difficulties that are associated with problem gambling often prompt domestic violence (Productivity Commission, 1999, Lorenz and Shuttleworth, 1983).

2.6.2 Effects on children

Because all of the resources within a household are used for gambling, children are often neglected and deprived of basic accommodations and activities: a decent home, holiday celebrations, healthy food, and entertainment. Moreover, because problem gamblers may exhibit mood swings, substance abuse, mental problems and tension with other members of their families, their children are likely to encounter poor household environments. Lorenz et al. (1990) analysed the children of problem gamblers who were enrolled in Gamblers Anonymous and found that 61% of these children suffered from behavioural and mood disorders. Children of problem gamblers were also identified as exhibiting more hazardous behaviours: they were more likely to smoke and use alcohol (Jacobs et al., 1989). These children reported feeling profound sadness and exhibited double the risk of suicide attempts of their peers in other families. The rate of child abuse was found to be two to three times higher in the families with problem gamblers (Lorenz, 1987, Lesieur, 1989). In addition, evidence has shown that gambling addiction may affect multiple generations within a family. It has already been established that children of alcohol and drug abusers are more likely to develop these problems as they transition into adulthood (Goodwin, 1976, Gross and McCaul, 1990). This pattern also appears to apply to pathological gambling. In 1993, Gambino analysed this relationship among patients at a Veterans Administration hospital in Boston. In this sample, 25% of the participants reported having parents with gambling problems, and 10% described their grandparents as disordered gamblers. The respondents who identified their parents as having gambling problems were three times more likely to be identified as probable pathological gamblers. Similarly, Winters et al. (1993) found

that among 702 adolescents, 8.7% were identified as problem gamblers, and 80% of these individuals had at least one parent with a gambling problem. Other studies have presented similar results regarding intergenerational gambling problems (Abbott and Volberg, 1992, Fisher, 1996, Volberg and Abbott, 1994, Volberg, 1994a, Lesieur and Klein, 1987, Lesieur et al., 1986). These examples show that being a pathological gambler also increases the risk that one's children and grandchildren will develop gambling disorders.

In sum, the immediate family members of disordered gamblers have been found to experience significant adverse consequences. Moreover, other individuals in the social networks of disordered gamblers also report negative effects. In fact, it was estimated that between 7 and 17 individuals are affected by the behaviour of excessive gamblers (Lesieur, 1984).

3 Prevention of problem gambling

The previous chapter presents the various effects of pathological or problem gambling on physical and mental health. These effects clearly show that society suffers from a loss of well-being as a result of this disorder. To decrease these negative effects, governments throughout the world have developed various prevention measures, primarily during the last ten years. The intervention of the government in the gambling market is justified through the market failure surrounding this activity as it is characterized by significant externalities (social costs) and information asymmetries.

These prevention measures are separated into two different categories. First, behavioural interventions involving information and awareness campaigns are used to influence the behaviour of individuals through better information. Second, structural interventions aim to change gambling environments to decrease the potential risk factors for gambling addiction. Although prevention programmes have been implemented in most countries, few studies have evaluated their effectiveness because this concern is relatively new for public health institutions. Moreover, the effects of these programmes on prevalence rates are generally not directly discernible because such effects are usually small and thus difficult to detect. Thus, some researchers have examined whether such programmes have actually affected knowledge of gambling and the behaviours of individuals who were targeted by the measures. This chapter describes these programmes and reviews their effectiveness based on the available evidence (Williams et al., 2007).

3.1 Behavioural interventions

The main purpose of this type of measure is to increase the knowledge of gambling and of the risks of gambling addiction. This information can be provided within different contexts (e.g., familial, societal, educational). The strategies that may be used include upstream interventions, mass media information and awareness campaigns, more targeted informational campaigns that disseminate gambling statistics and comprehensive in-school programmes.

3.1.1 Upstream interventions

It is generally accepted that a negative early childhood experience is a significant risk factor for problematic behaviour in adulthood. The concept of upstream intervention is based on this notion. Studies give some credence to the notion that strengthening families and improving parenting strategies can have a beneficial effect on behaviour during adolescence and adulthood (Foxcroft et al., 2005, Kumpfer and Alvarado, 2003, Petrie et al., 2007). For example, the use of this type of primary prevention has proven to be effective in reducing alcohol and drug use among young people (Foxcroft et al., 2005, Gates et al., 2005). This promising conclusion suggests that the same technique could be used to discourage gambling addiction (Williams et al., 2007). Neverthless, no studies have investigated this proposition in depth.

3.1.2 Information and awareness campaigns

These types of mass media campaigns are directed toward the general population. They aim to inform the population about responsible gambling and the problems that can arise from this activity.

Such campaigns are generally designed to achieve the following goals (Williams et al., 2007):

- Encourage individuals to know their limits and to gamble in a responsible manner
- Inform individuals about the statistics of gambling (odds of winning)
- Inform individuals about the development of problem gambling (e.g., potential risks, risk factors, signs)
- Dispel incorrect ideas surrounding gambling
- Inform individuals about where to find help for individuals with gambling problems (e.g., treatment centres, help-lines)
- Provide guidelines to help individual to engage in gambling without acquiring any related disorders

These messages can be transmitted through various means. First, information regarding the odds of winning and responsible gambling may be provided directly on gambling products (e.g., on the back of lottery tickets or on electronic gambling machines). In addition, posters and pamphlets may be used in gambling venues. The strategy of providing information via radio or television, in newspapers or on websites is less targeted measure but may also disseminate this information to the general population. These mass media campaigns have the advantage of being relatively inexpensive and reaching a large audience, but few studies have examined the effects of such campaigns. The dissemination of such information is believed to have only a limited influence if a message is not directly relevant to its recipients. Najavits et

al. (2003) analysed the effect of a campaign that promoted responsible gambling using various media (e.g., radio, newspaper, posters, pens, billboards, press conferences). In this study, only 8% of the general population could recall any information regarding this programme. Nevertheless, 72% of these individuals declared that the information provided them with a better understanding of gambling disorders. In Ontario, a province that is viewed as spending a relatively large amount on problem gambling prevention (Sadinsky, 2005), 66% of the population could not remember any initiative that was intended to reduce problem gambling. Conversely, initiatives that focused on gamblers provided information that had a real effect on the perspective of the gamblers reached (OLG, 2007).

Globally, if awareness campaigns can assist in providing the information that is necessary to increase awareness of gambling problems and positively influence behaviour, then individuals must be specifically concerned about and targeted by such messages.

3.1.3 More directed educational programmes

One of the limitations of awareness campaigns is that it is uncertain whether individuals who could benefit from such prevention messages will be reached. Moreover, these measures are generally broadcasted for short periods of time. These limitations suggest that more directed and long-term programmes may be more effective in preventing gambling problems.

Information regarding the probabilities associated with gambling

Gamblers are generally known to have misperceptions regarding the likelihood of their winning. Thus, it is reasonable to believe that

providing them with relevant information regarding the probability of providing them with relevant information could have a positive influence on their gambling behaviour. Some researchers confirmed this idea and found that this prevention measure had a positive effect on the behaviour of problem gamblers (Ladouceur et al., 2000b, Ladouceur et al., 1998, Sylvain et al., 1997). Nevertheless, the literature that has evaluated the effectiveness of this type of intervention remains inconsistent. In 1969, Lichtenstein et al. found that information regarding the expected value of gambling would inspire only one-third of gamblers to maximise their expected value and one-quarter to pursue the lower expected value.

Other studies that focused on college students analysed the influence of the same type of statistical education and showed that trained students are less susceptible to gambling-related fallacies (Benassi and Knoth, 1993, Schoemaker, 1979, Hertwig et al., 2004, Steenbergh et al., 2004). Moreover, educated college students show better reasoning skills that are necessary to cope with daily challenges (Fong et al., 1993, Kosonen and Winne, 1995). However, enhancing awareness also has pernicious effects. Another study found that asking students to evaluate the winning chances of specific sports teams encouraged them to overestimate these probabilities. In addition, the participants were found to gamble more than students who were not asked to participate in this task (Gibson et al., 1997). However, recent studies have obtained more encouraging results. Floyd et al. (2006) observed that educating students about irrational beliefs led them to exhibit less risky gambling behaviours. Williams and Connolly (2006) concluded that this type of information influenced the capacity of students to resist gambling fallacies and to estimate their likelihood of

winning. However, these improvements did not influence the gambling behaviour of these students.

As Williams et al. (2007) concluded, informing people about the underlying odds of gambling may be comparable to educating smokers about the harmful effects of tobacco or educating alcoholics about the effects of alcohol abuse. In fact, the general population as well as smokers and heavy drinkers are generally aware of these negative consequences. Nevertheless, this knowledge does not necessarily change behaviour. Indeed, information campaigns were not found to be an effective method of preventing alcohol abuse (Babor et al., 2003). Awareness of these negative effects is necessary to change people's conduct, but awareness campaigns must be accompanied by other measures if they are to have a real effect on behaviour.

Early in-school programmes

Prevention programmes can also be focused on elementary and high school students. The use of such programmes are logical because early experience with gambling can encourage future gambling problems (Shaffer and Hall, 1994). If young people have relevant information regarding the addictive potential of gambling as well as misconceptions and incorrect beliefs related to gambling and if they are encouraged to develop high self-esteem and resist peer pressure, such circumstances can influence their future habits. Neverthless, there is a lack of evidence regarding the effectiveness of these programmes, and the results of the studies on this subject are inconsistent. In 1993, Gaboury and Ladouceur evaluated a programme that was focused on 289 juniors and seniors. The programme was designed to improve the knowledge of the participants with regard to the legal issues and

misconceptions that are associated with gambling, including myths related to the likelihood of winning about gambling addiction. The researchers found that the students learned from this intervention, but six months later, the programme had no effect on their gambling behaviour. Another study corroborated these findings (International Centre for Youth Gambling Problems and High-Risk Behaviors, 2004). Encouraging conclusions were drawn based on another school-based programme in Alberta (Ferland et al., 2000). The 1,600 students in the sample who received specific instruction demonstrated better knowledge of gambling and gambling fallacies and exhibited a decrease in gambling behaviour 3-6 months after completing the programme. Nevertheless, the programme did not have an effect on the prevalence of problem gambling. Moreover, evidence from other addiction fields shows that this type of prevention measure has only limited effects (Williams et al., 2007).

3.1.4 Information centres among gambling venues

Recently, on-site intervention has begun to be offered through information and counselling centres at gambling venues. These centres provide necessary information to gamblers regarding the risks of gambling and provide immediate support for individuals who are experiencing gambling problems. This method has been employed at The Crown Casino in Melbourne. The Crown Customer Support Center, which is located next to the casino, provides 24-hour support to individuals who seek assistance. In Korea, the Kangwon Land casino also has a counselling centre of this type (Back, 2006). In North America, the Responsible Gambling Information Centres (RIGCs) have been in operation since 2005. However, because these centres are considered

pilot projects, studies of their effectiveness have not been conducted. In addition, the utilisation rates for these centres are considered relatively low given the number of gamblers at gambling venues.

3.2 Structural interventions

These prevention measures involve modifying gambling environments to decrease risk factors. Such interventions notably include legal restrictions and other measures that can be implemented directly in gambling venues to prevent gambling behaviour from becoming problematic.

3.2.1 Restrictions imposed on gambling providers

Generally, decreases in the availability of games of chance are linked to decreases in gambling problems. The opposite is also true: the legalisation of gambling in the United States has significantly increased the prevalence of gambling disorders (National Research Council, 1999, Shaffer et al., 1997). The situation in Australia supports this relationship, as the prevalence of gambling disorders and the accessibility of gambling are among the highest in the world. This particular link between the availability of gambling and gambling disorders has encouraged governments to analyse the need to restrict gambling opportunities using various measures that have already been found effective in other addiction fields (Babor et al., 2003).

Imposing a cap on the number of gambling venues

In the United States, Welte et al. (2004) found a positive correlation between gambling problems and living within 10 miles of a casino. This

result is supported by the U.S. National Gambling Impact Study (National Gambling Impact Study Commission, 1999), which indicated that the risk of suffering from pathological gambling increased by 50% for individuals who live within 50 miles of a casino. According to Australian studies, the liberalisation of gambling also significantly increased the prevalence of problem gambling (Dickerson and Maddern, 1997, Productivity Commission, 1999). The link between accessibility and gambling problems was also highlighted in studies that were designed to assess the importance of disordered gambling before and after the opening of casinos. These studies have generally concluded that casino openings affected participation rates, gambling expenditures, or problem gambling (Room et al., 1999, Hann and Nuffield, 2005, Jacques et al., 2000). However, Govoni et al. (1998) and Mangham et al. (2006) did not find any significant changes in gambling expenditures or in the prevalence of gambling problems (in the former study) or any effects on problem gambling (in the latter study). Despite these two studies, researchers generally agree that there is a positive relationship between gambling disorders and the accessibility of gambling. This consensus explains why one of the most widely implemented measures is the restriction of the number of casinos and lottery providers or the control of the gambling industry by the government. For example, in Europe, we generally observe either a numerus clausus for casinos and/or gambling halls (in Austria, Belgium, Germany, Portugal, Spain, Slovenia, The Netherlands, Sweden and the United Kingdom) or a single operator is licensed for a specific type of gambling. This is notably the case for casinos in Austria, The Netherlands and Sweden; for horse racing in Cyprus; and for sports betting in France, Greece and the Netherlands (Sychold, 2006).

Restricting harmful gambling activities

In 1993, Griffiths explained the differences between the structural and situational characteristics that may influence the addictive potential of different gambling activities. He distinguished between situational and structural characteristics. The former refers to gambling environments and includes availability, accessibility, and advertising. Structural characteristics are features that are inherent to a gambling activity, such as lighting effects, near misses, and the continuity of the activity. The latter characteristic is important in understanding the relative dangers of various gambling activities. In fact, when there is less time between the stakes and the outcomes, gambling activity is more likely to encourage disordered gambling behaviour (Griffiths, 1999). Furthermore, as the number of times a gambler can rapidly repeat an activity increases, his losses also increase because it will be more difficult for him to control his spending. Thus, all gambling activities may not be considered equally responsible for gambling disorders. As a result, prevention measures have been created to restrict the most dangerous types of games. The products that are generally targeted in these measures are the electronic gambling machines (EGMs) because of the consensus that this activity is one of the most dangerous gambling activities. This observation has encouraged some governments to ban EGMs. Interestingly, those who have banned these machines generally observed a decrease in the number of problem gamblers seeking treatment, attending Gamblers Anonymous groups or calling help-lines. For example, in the United States, South Dakota required a legal shut-down of all EGMs for three months. Subsequently, the number of pathological gamblers at substance abuse treatment centres decreased significantly, although this number subsequently increased after the

three-month shutdown (Carr et al., 1996). The same pattern was observed in South Carolina following the ban of 36,000 EGMs. The number of active Gamblers Anonymous groups decreased significantly, as did the size of the remaining groups (Bridwell and Quinn, 2002). In addition, the most active helpline for gamblers observed a decrease in its monthly phone calls from 200 to 0. European countries have also considered the risks that are associated with EGMs, and some countries (notably, Portugal and Latvia) chose to eliminate these machines. In July 2007, Norway eliminated all of its 15,000 EGMs, as they were considered excessively harmful. However, Norway also planned to install other less harmful EGMs (Honegger, 2006). Similarly, in France, the "rapido" (a lottery game that can be played every five minutes on a screen) was identified as a problematic gambling activity because of its addictive qualities. The French authorities forbid the creation of any new locations that offer this lottery game (Meyer et al., 2008).

Although the effect of these measures on gambling prevalence has not yet been proven, the promising results of similar measures that target other addiction-related behaviours validates this type of structural intervention (Wagenaar and Holder, 1995, Wagenaar and Langley, 1994, Babor et al., 2003).

Restricting the establishment of gambling venues to specific areas

To protect national citizens, gambling venues have historically been restricted to specific locations. In choosing a location for a casino, a tourist area aims to provide a gambling facility that will attract money from outside of the community rather than from the city's inhabitants. However, this type of restriction is more political and financial rather than preventive. Because lower-income individuals are known to be

more vulnerable to problem gambling, such a restriction may also assist in avoiding large urban areas when building casinos to prevent such individuals from having excessive contact with gambling. However, research has not yet proven the effectiveness of such restrictions.

Imposing closing hours for gambling venues

Given the research on alcohol abuse in the literature (Babor et al., 2003), reducing the availability of gambling by limiting the hours of operation of casinos should have a positive effect on the prevalence of problem gambling. This type of restriction can also be used to control specific gambling activities at gambling venues (e.g., the use of EGMs). However, the evidence regarding these specific measures is limited, and no significant effects have been observed. Indeed, closing hours often occur when gambling activity is already low (Centre for Gambling Research, 2005).

3.2.2 Restrictions imposed on individuals

These restrictions are generally designed to protect more vulnerable individuals and may target either individuals who are at risk of developing gambling problems or those who already have gambling problems (thus, preventing their problems from worsening).

Age restriction

The most common measures of this type are the age limitations for gambling activities. Studies often report that beginning gambling at an early age is a significant risk factor for developing gambling problems However, age limits may vary depending on regions and types of gambling activities. Generally, in Europe and in the U.S., the legal age of entry for casinos is at least 18 years old. However, this age limit is

sometimes lower for other gambling activities, such as the lottery and bingo. In North America and Australia, gambling activities, such as EGMs and table games, tend to be isolated in adult-only venues. Thus, young individuals are more likely to play the lottery and buy scratch tickets than to play table games and EGMs (Delfabbro et al., 2005, Felsher et al., 2004). The effectiveness of these age restrictions is difficult to determine because jurisdictions with and without these restrictions do not appear to have different prevalence rates for problem gambling among youths (Shaffer and Hall, 2001). Moreover, in some countries in which youths have access to gambling, lower prevalence rates among adults were found (Williams et al., 2007).

Casino self-exclusion

Another frequently used measure is the identification of problem gamblers and their voluntary or enforced exclusion from gambling activities. This measure was initially employed at the end of the 1980s when a self-exclusion programme was implemented in Manitoba, Canada. In the United States, the first state-wide self-exclusion programme was created in 1996. In Holland, entry bans may be implemented for all Holland Casino establishments. In France, a written request to the Department of the Interior is sufficient to ban an individual from any casino in France for a non-negotiable three-year period. A number of other European countries have also implemented such exclusion possibilities (Sychold, 2006).

One method of analysing the effectiveness of these exclusion policies is to focus on their utilisation rates. In Canada, a study that focused on seven provinces showed that between 0.6 and 7.0% of problem gamblers enrolled in these programmes in 2005 (Williams et al.,

2007). In France, the casino union began to train their employees to detect and advise problem gamblers. This effort resulted in 25,000 self-exclusions (Martignoni-Hutin, 2007). The Netherlands exhibits a high rate of utilisation of these measures. Indeed, approximately 24% of probable pathological gamblers in one study reported having been asked for an entry ban (De Bruin et al., 2001). This high rate also results from the proactive nature of the programme; individuals with high casino visitation rates are automatically approached and informed about the programme (Bes, 2002, Nowatzki and Williams, 2002). However, little is known about the behavioural changes that are initiated via this preventive measure.

3.2.3 Alteration of gambling environment

Modifying the gambling environment also assists in preventing problem gambling. Such modifications can be focused on several aspects of this environment and can include on-site intervention for at-risk gamblers and various types of restrictions. The parameters of games, maximum losses, access to cash and co-occurring consumption can all be controlled. These restrictions are designed to decrease the potential abuse that may result from arousal during gambling.

Trained employees

On-site intervention that focuses on at-risk gamblers is widely used at various casinos. The primary goal of this measure is to provide relevant information and therapeutic intervention to at-risk or problem gamblers in a timely manner. The first step involves training employees of gambling venues to identify problem gambling. When a patron is suspected of having gambling problems, trained employees are then

able to direct him to the available treatment institutions. Such initiatives are enforced by law in some countries such as Belgium, in which all casino and gaming arcade staff must attend training courses that educate them on gambling laws and problems every five years. Gambling venues in other countries, such as Finland, France, Great Britain, the Netherlands, and Sweden, have also assumed social responsibility with regard to gambling; venues in these countries train their staff to use proactive behaviour to intervene when confronted with individuals who demonstrate signs of problem gambling (Sychold, 2006).

Ladouceur et al. (2004) analysed the effectiveness of this measure by focusing their analysis on video lottery terminal (VLT) retailers in Quebec. After having received a 2-hour training course on problem gambling, the trained staff declared that they were more confident in identifying problem gambling among patrons. Moreover, in comparison with retailers who did not attend this training course, those who had received training reported approaching suspected problem gamblers more frequently than new retailers whose staff did not enrol in this course. Nevertheless, the owners of gambling venues must offer the proper incentives to their employees. Indeed, several factors may impair the effectiveness of this measure. It has been demonstrated, notably for alcohol (Ker and Chinnock, 2006, Mosher et al., 2002, Reiling and Nusbaumer, 2006), that servers may be reluctant to implement what they have learned during their training because this implementation may compromise the benefits of their work. In addition, the high turnover among servers increases the difficulty of this type of intervention. Moreover, a lack of enforcement may decrease the effectiveness of such programmes. According to Shaffer and Hall (2002)

and Williams and Wood (2004), these problems also apply to the gambling sector. Indeed, the Productivity Commission (1999) showed that problem gamblers experienced 33% of the total player losses. Thus, approaching all problem gamblers and assisting them in eliminating this disorder will undoubtedly significantly decrease profits at gambling venues. As a result, measures in many countries that require the implementation of intervention programmes by casino staff may be undermined by substantial conflicts of interest.

Automated intervention for suspected disordered gamblers

One promising form of intervention automatically identifies at-risk or problem gamblers based on the frequency of their visits to the casino. This type of intervention has been implemented in the Netherlands, where visitors are required to provide their IDs to enter the casinos. With a computer-assisted system, Holland Casino can analyse whether the visit frequency of a gambler has significantly increased or whether a gambler has made more than twenty visits to the casino within a month during the last three months. If a gambler meets one of these two criteria, then he will automatically be approached and encouraged to limit his visits or sign a self-exclusion agreement (Bes, 2002). This system appears to be effective; De Bruin et al. (2006) showed that 83% of the problem gamblers at Holland Casino were aware of the potential for limited entry and visit bans and that 13% used one of these limitations. In addition, this programme does not appear to disturb patrons; only 18.5% of these interventions were perceived negatively by the gamblers who were approached (Bes, 2002). A similar technique has also been implemented in Canada (Williams et al., 2007). In fact, although this measure is easy to implement, it is not consistently implemented by

gambling venues. This lack of implementation is a shame given that this type of early intervention would likely decrease the negative social effects of gambling.

Modifying EGMs parameters

The gambling environment can be modified using other restrictions and limitations that may prevent gambling problems. Because EGMs have been identified as creating gambling problems because of their specific characteristics (e.g., speed of play, near misses, early big wins), it appears reasonable to impose restrictions on EGMs to reduce harm. Such restrictions may involve reducing the speed of play, limiting the interactive features of EGMs, reducing the number of betting lines available and eliminating near misses. Although these measures are intuitive, there is no consensus regarding their effectiveness (Williams et al., 2007). However, the lack of evidence regarding the effectiveness of these limitations does not prevent EGMs from being consistently proven to be one of the most harmful gambling activities. Thus, any limitations on these gambling machines could have only positive effects on problem gamblers.

Restricting maximum loss and access to money

Because gambling is fundamentally associated with money and because problem gambling results in compulsive behaviour, limiting maximum losses and access to money could prevent excessive expenditures and encourage disordered gamblers to stop playing. Maximum loss limits are rare, and no effectiveness studies have analysed these measures. Although many countries have banned house credit, cash machines (ATMs) are generally available near gambling

venues. Nevertheless, restrictions are sometimes imposed on the location of such machines and on the maximum amount that may be withdrawn. The effectiveness of such restrictions has not been empirically proven, but their potential positive effects are intuitively understandable. Problem gamblers will logically need to use ATMs more frequently because of the compulsive nature of their spending. Moreover, a lack of cash was often reported by problem gamblers as a reason for ceasing gambling (Productivity Commission, 1999). Correspondingly, problem gamblers often identify easy access to money as a risk factor for gambling-related issues (McMillen et al., 2004, Caraniche Pty Ltd., 2005). Though, this type of restriction (especially restrictions on the location of ATMs at casinos) can be easily bypassed. For example, in Belgium, ATMs in casinos are strictly forbidden. However, no laws prevent ATMs from being located directly next to a casino or even at the entrance; such locations can significantly reduce the benefits of the measure.

Restrictions on alcohol consumption and tobacco smoking

Because alcohol use and tobacco smoking often co-occur with problematic gambling (Crockford and El-Guebaly, 1998, Giacopassi et al., 1998, Grant et al., 2002), some indirect prevention measures involve restricting the consumption of these substances. Alcohol use during gambling is linked with increased gambling time and thus with financial losses. Moreover, the disinhibiting effect of alcohol has also been identified as increasing risk-taking behaviours during gambling (Ellery et al., 2005, Baron and Dickerson, 1999, Phillips et al., 2005). This risk factor appears to be well understood in Canada, which does not allow free alcoholic drinks to be served in casinos. Conversely, in the

United States, commercial casinos in six of the eleven states that have them provide free drinks to casino patrons. In addition, other practices that are intended to encourage individuals to drink alcohol are also observed (e.g., low-cost drinks are often offered). In Europe, free drinks or low-cost drinks are commonly banned from gambling venues (Williams et al., 2007).

Tobacco smoking is another habit that is frequently observed among problem gamblers (Petry et al., 2005). Because of the growing concern regarding the health risks of second-hand smoke, jurisdictions throughout the world have begun to ban smoking in public places. Interestingly, these smoking bans constitute an indirect but effective means of preventing gambling disorders. The introduction of smoking bans at gambling venues was found to be closely linked with decreases in their revenues. Given the important role of problem gamblers in generating revenues for casinos, a significant part of this decrease likely results from decreases in the losses of problem gamblers. Because these particular gamblers must stop playing to smoke, they must interrupt their gambling, which introduces an obstacle to their compulsive behaviour. This assumption has been confirmed in Victoria, where 49% of smokers reported that they spent less time playing EGMs after the ban, and only 5% indicated that they spent more time playing these games (Caraniche Pty Ltd., 2005). Moreover, in New Zealand, the first year after the smoking ban was implemented, there was a 15.8% decrease in the number of clients served by government services intended to prevent gambling addiction (Ministry of Health, 2006).

Restrictions on advertising

Recent studies showed that advertising can influence the use of alcohol or tobacco, particularly among young people (Ellickson et al., 2005, Lovato et al., 2006). Thus, gambling prevention policies were designed to limit advertising and promotional activities because such activities were believed to be likely to promote gambling among the most vulnerable groups, including young people and addicted gamblers. In 2001, Grant and Kim reported that half of their sample of pathological gamblers declared that advertising acted as a trigger for gambling. Moreover, to encourage people to gamble, actors in the gambling industry provide incorrect information regarding the odds of winning and the improvement in an individual's well-being that could result from winning a jackpot (Korn et al., 2005). Because many prevention programmes aim to provide correct information and reduce incorrect beliefs regarding games of chance, this type of advertising in the gambling industry is counter-productive. Moreover, problem or pathological gamblers are known to suffer from significant misconceptions regarding gambling. Thus, advertising campaigns that encourage these erroneous beliefs are clearly antithetical to the prevention of this mental disorder. As a matter of fact, there is a lack of evidence regarding the effectiveness of limitations on such advertising.

Increasing the cost of gambling

Increasing the price of substances that have a negative influence on health is a well-known prevention strategy. This strategy is used for tobacco and alcohol and prevents harmful consumption by introducing taxes on these goods. The literature in these fields has shown that these measures have a positive effect by reducing the consumption of such

goods and thus related health problems (Babor et al., 2003). However, it is unclear whether increasing the cost of gambling can have an effect on gamblers because these individuals are not very sensitive to this cost. Indeed, the products that offer lower payback rates (e.g., lotteries) exhibit the highest patronage rates, whereas the opposite is observed for gambling products with higher payback rates (e.g., table games). Thus, it is unlikely that increasing the cost of gambling will have a significant positive effect on gambling addiction and problem gambling.

3.3 Overview of prevention measures and their effectiveness

In summary, a range of programmes could be implemented to prevent gambling disorders. However, the effectiveness of these programmes remains difficult to evaluate, and evidence is relatively scarce. In addition, studies generally focus on intermediate indicators of effectiveness rather than the final indicator: the prevalence of pathological gambling. Thus far, limited results have been associated with most behavioural interventions. This conclusion is consistent with the findings of Babor et al. (2003) regarding alcohol abuse prevention. These interventions have a greater influence on the knowledge of problem gambling than on the actual behaviour. Although it is important to provide such knowledge to change people's behaviour, information is not sufficient.

Moreover, the measures that are most widely implemented are among the least effective, and when more effective measures are implemented, they are designed to avoid significant positive effect on

the prevalence of problem gambling. The institutions and people who design and enforce prevention measures are often not social scientists who are specialised in prevention; rather, these actors are more likely to be government or industry employees (Williams et al., 2007). In addition, conflicts of interest continually arise because these measures are partly enforced by the gambling industry. If gambling providers effectively prevent gambling disorders, then their revenues will decrease significantly. Such conflicts of interest could partly be resolved if the staff who is responsible for prevention at gambling venues were employed by the government rather than by the casinos themselves. Nevertheless, governments are another source of conflict of interest. Governments often collect taxes on gambling revenues, and efficient prevention strategies will inevitably decrease government revenues; thus, it becomes necessary to levy other more unpopular taxes, and the popularity of the government decreases. Finally, the gambling industry is able to allocate money to lobby against government prevention measures that could excessively influence their profits. Indeed, the gambling industry has invested substantially more money in the promotion of gambling than the amounts that can be allocated for prevention.

Table 3.1 summarises the effectiveness of the various prevention measures that are detailed in this section. It remains difficult to determine the effects of these measures on the prevalence of pathological gambling. Nevertheless, to change individual behaviour and achieve the final objective of prevention, prevention measures must combine behavioural intervention, improved knowledge about gambling and structural interventions. In addition, the process of

changing people's behaviour requires substantial and long-term measures and restrictions.

Table 3.1: Overview of the effectiveness of the measures that aim to prevent problem gambling.

Types of prevention measures		High	Moderately high	Moderate	Moderately low	Low
Behavioural interventions	Upstream interventions		X			
	Information and awareness campaigns				X	
	More directed educational programmes					
	Information on the probabilities associated with gambling				X	
	Early in-school programmes			?		
	Information centres among gambling venues			?		
Structural interventions	Restrictions imposed on gambling providers					
	Imposing a cap on the number of gambling venues		X[1]			
	Restriction harmful gambling activities		X[1]			
	Restricting the establishment of gambling venues to specific areas		X			
	Imposing hours of closure for gambling venues				?[1]	
	Restrictions imposed on individuals					
	Age restriction				?	
	Casino self-exclusion				X[2]	
	Alteration of the gambling environment					
	Trained employees				?	
	Automated intervention for suspected disordered gamblers			X		
	Modifying EGM parameters				X[3]	
	Restricting maximum loss and access to money				?	
	Restrictions on alcohol consumption and tobacco smoking		X			
	Restricting on advertising				?	
	Increasing the cost of gambling				?	

Source: Williams, West et al. (2007)

Note: The question marks indicate uncertainty regarding the findings due to insufficient evidence

1. If the reduction is substantial
2. If done dutifully
3. Introducing slower speed of play, eliminating early big wins, avoiding frequent near-miss, lowering the number of betting lines, limiting interactive features, introducing pop-up messages and eliminating bill acceptors

4 Gambling in Switzerland: a portrait

4.1 Legal and institutional framework

In Switzerland, the gambling landscape involves two types of gambling activities. One type includes the lottery and betting, which operate under the supervision of the cantons and are coordinated by the Swiss Lottery and Betting Board (SLBB). The other type is governed by the Federal Gaming Board (FGB) under the authority of the federal government, which monitors the activity of the 19 casinos operating in Switzerland.

4.1.1 Lottery and betting

Two institutions are allowed to operate lotteries and betting in Switzerland. The first institution, the "Loterie Suisse Romande" (LoRo), operates in the western part of the country (the French region), whereas the second institution, "Swisslos", operates in the German- and Italian-speaking regions.

According to the first article of the lottery law, this activity is forbidden in Switzerland, with exceptions only for lotteries and raffles that are organised for recreational purposes that do not provide cash rewards. However, Article 5 stipulates that lotteries are permitted if they benefit the public welfare. As a result, only the LoRo and Swisslos are allowed to operate lotteries in Switzerland.

Professionally organised betting is also forbidden. According to the Federal Court, the time frame during which betting is permitted and the number of participants must be limited. In addition, betting

activities must not generate benefits for organisers. In fact, organisers must return all of the amounts at stake. This definition restricts the control of betting to the LoRo and Swisslos.

4.1.2 Casino gambling

On 18 December 1998, the government adopted the federal gaming and casino law that allowed gambling venues in Switzerland. The Federal Gaming Board (FGB) was required to supervise casino activity and to verify that casinos abide by the law. The FGB determines whether the operation of gambling activities in casinos is safe and transparent manner. This board also verifies that the origin of the money is legal to prevent money laundering. In addition to serving these administrative functions, the FGB is responsible for ensuring the enforcement of the problem gambling prevention measures that are imposed by the law (Stern et al., 2010).

4.2 Supply

4.2.1 Lottery and betting

The LoRo was created in 1937 by the cantons of Vaud, Fribourg, Valais, Neuchâtel and Geneva. The LoRo was the first in Europe to introduce scratch tickets with instant outcomes in 1978. Since 1987, the number of lottery games supplied by the LoRo has increased rapidly; there are currently more than fifteen types of scratch tickets and three online games. In addition, there is one horse betting programme ("PMU Romand"), and bets on sport games are possible. In addition, there is a traditional national lottery (the Swiss Lotto) and a transnational lottery

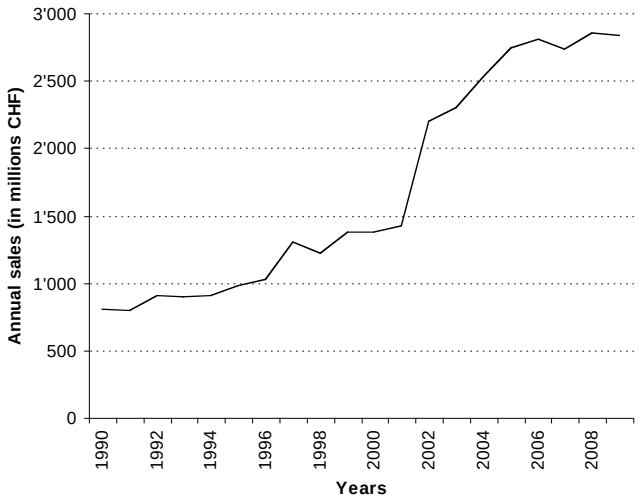
(Euro-Millions). These games are available through a wide network of retailers, notably kiosks and post offices. The LoRo also supplies the western part of Switzerland with two electronic lotteries: the "Tactilo" and the "Loto express". The first lottery provides games that are similar to scratch tickets but are played on a screen with rapid draws. The second lottery is a traditional lottery with draws that are executed every five minutes on a TV screen. Because of the addictive potential of these two games, they are restricted to bars and restaurants. To sell all of its products, the LoRo employs a network of approximately 2,800 dealers in the western part of Switzerland (Arnaud et al., 2009).

Swisslos was created in 1939 to finance the construction of the National Exhibition. This organisation supplies eastern Switzerland with the same type of lottery games as the LoRo and participates in the Swiss lotto and the Euro-Millions. The electronic lottery that is offered by Swisslos is known as "Ecco", is similar in design to "Loto express", and is restricted to bars and restaurants to prevent gambling disorders. The organisation supplies lottery games via a network of 6,000 dealers (Arnaud et al., 2009, Stern et al., 2010).

For approximately thirty years, lottery sales have gradually increased. From 1990 to 2001, the annual sales increased consistently, and the sales figure reached 1.4 billion in 2001. From 2002 to 2006, sales increased rapidly and doubled to reach 2.8 billion. Subsequently, sales remained essentially constant until 2009 and even exhibited a small decline in 2007. A significant factor in the increase in annual sales was the introduction of the Euro-Millions in 2004 and the expansion of the supply of other lottery games. The decrease in 2007 is partly attributable

to a decrease in "Euro-Millions" sales; there were few high jackpots during that particular year.

Figure 4.1: Evolution of annual lottery sales, 1990-2009.



Source: Swiss Lottery and Betting Board

The gross revenue in 2009 for the two lottery institutions was CHF 896 million (1.50 USD/CHF; PPP, 2011). This figure was divided among the traditional number lotteries (CHF 494 million), scratch tickets and "Tactilo" (CHF 347 million) and betting (CHF 55 million). In accordance with Article 5 of the Lottery Law, all of the lottery profits are used to provide public services and support social welfare programmes. As a result, CHF 499 million was transferred to cantonal commissions to be distributed to social and cultural organisations and programmes.

4.2.2 The availability of casinos

During the 19th century, gambling occurred at "kursaals" in which most of the tourists were gamblers. In 1928, the Federal Constitution was modified to ban casinos based on a vote. Only gambling that did not involve a maximum stake higher than 5 CHF was allowed. In 1993,

Swiss citizens voted heavily against this ban, but the new constitutional article could not be enacted before the federal law on casinos was established. On 1 April 2000, the latter law was implemented, and authorised the establishment of 21 casinos provided by the Federal Council. The Council also decided that it would not allow more new casinos to be opened until the fall of 2006. Between 2002 and 2003, 21 casinos were established, but the casinos in Arosa and Zermatt quickly closed. Thus, there were 19 casinos operating in Switzerland at that time. In 2011, having analysed the opportunity to open two new gambling venues, the Federal Council allowed one casino to be opened in Neuchâtel and another casino to be established in Zürich.

Not all gambling venues have the same restrictions. Two types of authorisation ("Type A" and "Type B") can be issued to casinos. Type A casinos do not have any limits on the number of table games or the number of gambling machines. In addition, the maximum stakes are not limited by the law. The second category (Type B) is more limited in its offerings because these gambling venues are not allowed to operate more than three different types of table games and 250 gambling machines. Moreover, these venues must limit both stakes and winnings. Finally, they are not permitted to interconnect its gambling machines with jackpot systems outside of the casino. However, these limitations do not appear to significantly affect the annual revenues of the casinos. In fact, the regulations that are applied to casinos have been softened several times since the ban has been lifted.

In addition, both types of casinos must respect the same laws regarding the owner of the authorisation, transparency, the security of the exploitation, social protection and of the avoidance of money

laundering. The two types of casinos are uniformly distributed across the country, as shown in Figure 4.2. These casinos consist of seven Type A casinos (red triangles) and twelve Type B casinos (blue circles).

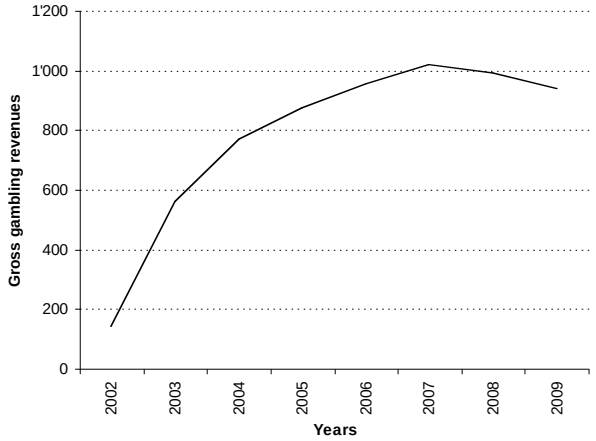
Figure 4.2: Location of the 19 casinos operating in Switzerland.

Source: Swiss Federation of Casinos

Figure 4.3 shows the evolution of gross gambling revenue, which indicates the difference between the amounts that are paid by gamblers and the money that they win. This revenue plays an important role in the Swiss economy because taxes are collected on this basis. The repartition of the tax depends on the type of authorisation of the casino, but both categories must pay a progressive tax that constitutes between 40% and 80% of the gross gambling revenue. However, for Type A casinos, the entire tax is directly transferred to the old-age insurance (OAI) programme, whereas the revenue from this tax is divided between the cantons (40%) and the OAI (60%) for Type B casinos. In 2009, gross gambling revenue accounted for CHF 936 million, of which CHF 757 million was derived from slot machines and CHF 179 million

from table games. The taxes that were collected amounted to CHF 479 million and 406 million and were transferred to the OAI.

Figure 4.3: Evolution of gross gambling revenues from casinos, 2002-2009



Source: Federal gaming board

Figure 4.3 shows a constant increase in gross gambling revenue from 2002 to 2007. Because some casinos were not in operation at the end of 2002, the significant increase that occurred from 2002 to 2003 can be explained as a function of the late opening of some gambling venues. The decrease that began in 2007 is primarily related to tobacco prevention; some cantons began to forbid smoking in public places. According to the Swiss Federation of Casinos (SFC), all cantons that hosted casinos and in which smoking bans were in force in 2008 exhibited a decrease in their gross gambling revenues from 15.4 % in Mendrisio to 0.9% in St. Moritz. Likewise, in 2009, only three casinos reported an increase in their gross gambling revenues. These casinos were located in cantons that did not enact smoking bans until 2010. The negative effect of such bans on casino revenues is not surprising, given that approximately 50% of casino patrons are smokers according to the

SFC. Since 1 May 2010, the smoking ban has been in force throughout the entire country.

4.3 Prevalence of problem and pathological gambling in Switzerland

In Switzerland, the prevalence of problem and pathological gambling is a fairly new subject because casinos were banned prior to 2002. The first prevalence study was conducted in 1998 to estimate the prevalence of pathological and problematic gambling before the increase in gambling opportunities that resulted from the opening of 21 casinos. Bondolfi et al. (2000) used telephone interviews to assess gambling behaviour in the general population over the age of 18. To screen for gambling problems, the researchers used a widely employed standardised and validated instrument: the South Oaks Gambling Screen (SOGS). Using this method, 2,526 interviews were completed. The interviews highlighted the current prevalence of problem gambling (indicated by scores of 3 or 4), which was found in 2.2% of the sample, and a 0.8% rate for pathological gambling was observed (indicated by scores of 5 or higher). After the ban was lifted, Bondolfi et al. (2008) conducted a replication study to compare the prevalence rates before and after the ban. The objective was to analyse whether the increase of gambling opportunities influenced the prevalence rate for gambling disorders. In 2005, conducting telephone interviews with a representative sample from the Swiss adult population (n=2,803), the researchers estimated the gambling prevalence from the previous year to be 0.8% and the rate for pathological gamblers to be 0.5%. Despite the

differences, the authors did not find a statistically significant increase in problem and pathological gambling. These two studies are the only prevalence studies that are based on a representative sample from the Swiss population and that used standardised, validated and internationally accepted screening instruments.

Other prevalence studies have been conducted in Switzerland but have employed screening instruments that may lack empirical validation. In 2007, using the Swiss Health Survey 2007 (SHS 07), the Federal Gaming Board conducted a study to analyse the prevalence of problem and pathological gambling in Switzerland (ESBK, 2009). A representative sample of the population aged 15 and over was surveyed (n=14,939). The screening questions were based on the Lie/Bet questionnaire and on other variables that were designated according to the DSM-IV criteria. Using their own index, the researchers obtained current prevalence rates of 0.5% and 1.5% for pathological gambling and problem gambling, respectively. Although this survey was based on a large representative sample of the Swiss population, the screening instrument for gambling behaviour is not comparable to standardised and validated questionnaires, such as the SOGS. Thus, this study cannot be used in international comparisons. However, the prevalence rates that were obtained in this study are relatively close to those found by Bondolfi et al. (2008). Previously, the FGB had ordered another study to assess the cost of problem gambling in Switzerland (Künzi et al., 2004). The authors constructed their own model and obtained a prevalence rate between 0.62% and 0.84% for gambling disorders. The lack of a theoretical and methodological framework for this study prevents comparison of the data with data from other surveys. In the canton of Tessin, Molo Bettelini et al. (2000) used the SOGS and three other

questions that were derived from the Gamblers Anonymous questionnaire to examine a representative sample of the canton (n=1,044). The researchers found that 0.6% of the population could be diagnosed as problem gamblers, and the same prevalence rate was found for pathological gamblers. Finally, Brodbeck and Znoj (2008) also analysed the importance of gambling disorders among the population of the eastern Switzerland. Using the NODS (National Opinion Research Center DSM-IV Screen for Gambling Problems), the authors found that problem gamblers and pathological gamblers represented 0.7% and 0.5% of this population, respectively.

Despite their methodological differences, these studies provide consistent findings that indicate the relatively low prevalence of this disorder in Switzerland. However, experts in this field tend to consider these results as a lower bound, as individuals may underreport the actual difficulties that they experience as a result of gambling.

4.4 Prevention of problem gambling in Switzerland

Pathological gambling is a relatively new subject in the Swiss political landscape. When the ban was lifted, the Federal Law on Gambling (FLG) was designed to protect gamblers by introducing the "social concept" in gambling venues. In addition, the federal government planned to harmonise the legislation pertaining to lotteries. However, the cantons rejected the revision primarily for budgetary reasons and instead ratified a new treaty in which a new tax was introduced. As a result, since 2006, 0.5% of the lottery and betting profits have been transferred to the cantons for addiction prevention

programmes. Recently, some cantons also pooled their profits to undertake more ambitious research and develop better prevention measures. In addition, the lottery and the casino industry have implemented their own specific programmes to encourage responsible gambling.

4.4.1 Prevention measures among lottery and betting providers

Because the LoRo and Swisslos are aware of the potential behavioural problems that are associated with the games that they provide, these institutions have established a code of conduct to limit the negative social effects of gambling despite the lack of legal requirements for such a code. Nevertheless, LoRo and Swisslos created a responsible gambling programme to prevent excessive gambling.

In the western part of Switzerland, the LoRo provides all of the information regarding the potential risks of gambling at all points of sale and on their website. The LoRo endeavours to regularly inform all of their partners about their responsible gambling programme. At least once per year, these providers are brought together to receive information regarding the different measures that are being developed. Depending on the position of a gambler's partner, s/he may be asked to participate in more intensive training, especially for "Tactilo" providers. Because such gambling activity has significant addictive potential, providers are asked to participate in annual training programmes on responsible gambling. These courses are designed to encourage providers to identify potentially excessive gamblers and to inform them about the available solutions. Nevertheless, this policy has been criticised because of the obvious conflict of interest for the "Tactilo" providers, which receive a percentage of the amounts that are gambled

using these machines. Finally, the sale of scratch tickets is forbidden for people less than 16 years of age, and access to online games and to "Tactilo" gambling should not be provided to minors. To control whether its partners carefully follow its recommendations, the LoRo mandates that "mystery clients" inspect the various points of sale, especially in establishments that provide "Tactilo". If the regulations are not respected, then sanctions may be established. These sanctions may range from simple warnings to the removal of the machines. In 2007, more than 10 removals occurred. Other minor prevention measures were implemented to control the promotion and marketing of gambling products (Arnaud et al., 2009, Stern et al., 2010). All of these measures are consistent with the European Responsible Gambling Standards.

In the eastern part of Switzerland, Swisslos also implemented its own responsible gambling policy (Stern et al., 2010). Because this institution is also a member of the European Lotteries, its responsible gambling policy is consistent with the European Responsible Gambling Standards. Thus, the measures that Swisslos has implemented to prevent problem gambling are comparable to those that have been employed by the LoRo. Specific documentation regarding the issue of responsible gambling is sent to points of sale to increase dealer awareness. For more harmful games, such as the "Ecco" game, providers are allowed to display the game only after having participated in a specific training programme that is intended to increase their knowledge of problem gambling and its prevention. Limitations are also imposed on minors. Finally, advertising and marketing must occur according to the European Responsible Gambling Standards.

4.4.2 Prevention measures among gambling venues

To prevent problem gambling, the casinos implemented a range of prevention measures in collaboration with specialists and the Federal Gaming Board (Arnaud et al., 2009). The FGB is responsible for the enforcement of the prevention measures by casinos. First, the casinos must inform their patrons about the risks that are associated with gambling and about related disorders. The casinos must also provide the addresses of specialists and counselling centres. To promote early intervention, casino staff members are trained to recognise and approach potential problem gamblers. Staff members are able to inform and redirect individuals who request such guidance. To remain effective, such training (which is conducted by specialists) must be continuous and annual.

As in many countries, an exclusion system has been implemented in Swiss casinos. A casino may decide to exclude an individual for specific reasons. For instance, if a gambler is recognised as insolvent, does not fulfil his financial requirements or plays stakes that are disproportionately high compared with his income, a casino must bar this gambler from entering. Voluntary exclusion can also be arranged if a gambler requests such exclusion. This type of exclusion is the rule rather than the exception and is generally requested after a significant loss or after a discussion with the casino staff. The duration of these exclusions is a minimum of one year, and they are enforced within the entire territory because they are registered in a national electronic database to which all Swiss casinos have access. Such exclusions can be lifted only after a detailed examination of the actual situation of each gambler. However, there is no transnational collaboration of this type;

thus, a banned gambler could easily cross the border to enter a foreign gambling venue.

To identify patrons, casinos control access using an ID check at the entrance. This procedure allows the casinos to refuse banned gamblers and individuals who are under 18 years old. But, gambling venues do not use this control mechanism to analyse the visit frequency of the gamblers, as in Holland. This early intervention measure could be easily implemented and would certainly improve efforts to prevent problem gambling.

Access to money is also limited because no cash dispensers are allowed in the gambling area. However, the law does not prevent gambling venues from placing ATMs immediately outside of their facilities. Nevertheless, casinos are not allowed to provide credit or loan money.

Finally, each casino collaborates with a prevention service or a therapeutic institution to ensure effective follow-up for disordered gamblers. Moreover, the SFC supports "la main tendue", which is a free help-line. Although this phone number is not exclusively dedicated to gamblers, such individuals can be redirected to specialised institutions at any time of day (Arnaud et al., 2009).

4.4.3 Prevention measures among cantonal institutions

In 2008, all cantons implemented prevention measures that were intended to prevent problem gambling. Collaborations between cantons were also developed for this specific purpose. In the western part of the country, the French-speaking cantons created the "Programme intercantonal de prevention et de lutte contre la dependence au jeu"

(PILDJ). The aim of the PILDJ is to support prevention-oriented organisations and programmes, such as a free help-line, an internet counselling service and various research programmes. The German-speaking cantons also employ this type of cooperation to prevent problem gambling. There are three different collaborative groups, all of which use the same types of measures as the PILDJ. For instance, they also created an internet website to provide information to individuals who suffer from problem gambling and operate a free help-line in German. In Tessin, the only Italian-speaking canton, the "Gruppo Azzardo Ticino" (GAT) is responsible for the canon's informational website and orchestrates prevention initiatives and relevant research.

4.4.4 Treatment for problem or pathological gamblers in Switzerland

In the western part of Switzerland, only two cantons have treatment centres that are specifically dedicated to gambling: Vaud and Geneva. The Centre for Excessive Gambling (Centre du Jeu excessif) was created in 2001 and is active in the fields of prevention, treatment, training, teaching and research. Annually, the centre has approximately 60 to 80 annual demands, of which two-thirds are specifically linked to gambling. In the canton of Geneva, one institution is completely devoted to pathological gambling: "Rien Ne Va Plus" (RNVP). In 2000, RNVP was created to increase awareness of the problem of gambling and to assist individuals with gambling disorders. The organisation also collaborates with cantonal social services and centres that are designed to treat all types of addictions. In 2007, RNVP conducted 635 consultations, of which 40% were face-to-face consultations and 60% were conducted via email or telephone. Other cantons, such as Valais and Fribourg, used the lottery tax to develop existing institutions or to

finance new institutions that work to prevent problem gambling. In other cantons, pathological gambling is treated by the same institutions that treat other addictions, such as alcohol or drug addiction. Finally, in all cantons, some social institutions, such as Caritas, assist individuals in managing their debts. These organisations are also often aware of the problem of gambling addiction and can connect gamblers with more specialised institutions. In the German- and Italian-speaking parts of the country, different institutions are able to provide assistance to addicted gamblers. No institution is specifically dedicated to pathological gambling, but addicted gamblers and their relatives can generally be treated by a number of hospitals and psychiatric clinics and can attend self-help groups (Arnaud et al., 2009, Stern et al., 2010).

Nevertheless, only a small proportion of problem gamblers use these resources. In 2003, between 1,000 and 1,500 individuals were treated or seen for gambling-related disorders (Künzi et al., 2004). In other words, only approximately 1% of problem or pathological gamblers seek help with their gambling problems. Thus, more efforts should also be dedicated to this tertiary mode of prevention to encourage disordered gamblers to seek treatment.

Part two: empirical work

The second part of this dissertation consists in three empirical essays based on Swiss data. This work aims at filling some of the important gaps surrounding the impacts and consequences of gambling and pathological gambling. The present results give relevant information for policy makers from the cost of gambling addiction to equity concerns of gambling tax.

The first essay focuses on the cost resulting from the loss of quality of life created by this addiction. For this purpose, I focus on pathological gamblers consulting treatment centres in Switzerland. A representative sample of the Swiss population is used as the control group. The results show that pathological gamblers suffer from a significant loss of quality of life. More precisely, this cost accounts for more than 60% of the total social cost. As a matter of fact, this result shows how important it is to take into account of this specific cost to avoid a substantial underestimation of the social burden of this addiction.

The second essay shed light on the socio-economic differences between non-gamblers and gamblers, as well as between gamblers and problem gamblers. Through these comparisons, I show that these populations exhibit significant differences. This conclusion holds for socio-demographics as well as for health related variables. These results allow a better understanding of the different characteristics of the different groups and thus, may help institutions in charge of prevention to implement more targeted measures to struggle problem gambling.

The last essay analyses the progressivity of the gambling tax in Switzerland. Based on a cross-sectional survey (the Swiss Health Survey 2007), the reported gambling expenditures and the reported incomes

were used to compute the first measure of progressivity: the Suits index. This concentration index shows unambiguously that this tax can be labelled as regressive. To corroborate this finding, a second analysis highlighting income elasticity coefficients was undertaken. Interestingly this result was in line with the Suits index. As a matter of fact, this tax increases income inequalities in Switzerland.

5 A monetary valuation of the quality of life loss associated with pathological gambling: an application using a health utility index

5.1 Abstract

The aim of this study was to estimate the Health Related Quality of Life (HRQoL) cost of gambling addiction. Pathological gamblers were recruited in treatment centres in western Switzerland. The difference in HRQoL between pathological gamblers (n=52) and the general population (n=93) was measured through a multi-item instrument, the SF-6D. I used a tobit regression to estimate the effect of pathological gambling on HRQoL controlling for comorbidities and age. Finally, to obtain a monetary value of the HRQoL loss attributable to gambling addiction, I applied an existing value of a life year (VOLY).

The results show that pathological gambling significantly reduces the quality of life by 0.076 quality adjusted life year (QALY). The resulting cost per pathological gambler and per year is estimated at CHF 3,830. This study clearly shows that ignoring the quality of life cost results in an underestimation of the social burden of gambling addiction.

5.2 Introduction

The cost of gambling addiction to society is a fairly new subject in the health economics literature. Politzer et al. (1981) were among the first to assess the cost of this specific addiction in a sample of pathological gamblers in treatment. More recently, Thompson et al. (1996) in Wisconsin, Westphal et al. (1999) in Louisiana, Schwer et al. (2003) in Southern Nevada and Li Fong et al. (2011a) in Macao, investigated the social cost of gambling addiction. On a nationwide level, one existing comprehensive study conducted in the United States focuses on the prevalence as well as the social cost of this particular addiction (Gerstein et al., 1999). Generally, two types of costs are estimated: the expenses of treating the consequences of gambling addiction (direct costs) and the lost productivity due to the habits of the pathological gamblers (indirect costs). In fact, no real focus has been placed on the loss of quality of life – the so-called intangible costs – suffered by the pathological gambler and his or her family. A notable exception is the report on gambling industries conducted by the Productivity Commission in Australia (1999). They produced the most complete study covering all aspects of gambling, including the social burden. It is the first study on problem gambling in which the Health Related Quality of Life (HRQoL) cost is taken into account. It is worth noting that it accounts for more than 90% of the total social burden (direct + indirect + intangible costs). Indeed, for gambling addiction, unlike alcohol abuse or smoking, the treatment costs are relatively low. Economists use to include negative externalities as well as the private costs in the estimation of the social cost. The terminology adopted in cost of addiction studies is however slightly different. Indeed, the social

cost only accounts for the negative externalities i.e the harmful effect to third party, the cost of problem gambler incurred by his/her own activity is considered as an external cost. Nevertheless, to be considered as a private cost, the actor must be fully informed about the potential negative impacts of his behaviour and must act rationally. If these conditions are not met, the cost borne by the problem gambler must be considered as a social cost. (Collins and Lapsley, 2003, Productivity Commission, 1999, Atkinson and Meade, 1974, Markandya and Pearce, 1989). As the gambler is not fully informed, notably on the potential addictive risks and on the odds of winning, and probably not completely rational, I argue that this cost is an externality.

In fact, studies consistently show that gambling disorder is associated with poorer quality of life. Using the Short-Form 12 version 2 (SF-12v2) in a general population survey, Morasco et al. (2006b) showed that pathological gambling was significantly associated with a lower quality of life. This conclusion has been corroborated by a number of other studies based on selected samples of pathological gamblers. Indeed, Black et al. (2003), used the Short-Form 36 (SF-36) to assess the quality of life of pathological gamblers. They showed that this population was associated with lower subscales scores regarding physical and mental health. In 2005, using the SF-12v2 on a sample of older adults, Erickson et al. as well as Pietrzak et al. showed a negative correlation between this disorder and the quality of life. During the same year, Scherrer et al., also highlighted this relationship. In 2006, two studies used the SF-12v2 to assess health related quality of life of pathological gamblers recruited at a dental clinic and at an urban primary care (Morasco et al., 2006b, Morasco and Petry, 2006). In both studies, gambling disorders were found to have a negative impact on

the subscales scores of the SF-12v2. Using a self-rated quality of life measure, Fong et al. (2011b) found a significant lower quality of life for pathological gamblers compared to non-problem gamblers. However, no differences were identified between at risk, problem, and pathological gamblers. Finally, Lin et al. (2010) concluded that the gambling loss to income ratio was a good measure of the quality of life change, and corroborate the previous findings. These results show unambiguously that this particular disorder impairs significantly the wellbeing of pathological gamblers.

This conclusion is confirmed by the important rate of comorbidities associated with pathological gambling (Petry, 2005, Westphal and Johnson, 2007). For example, substance use disorders are commonly observed in this specific population notably alcohol abuse, tobacco consumption and drug use (Johansson et al., 2009, Momper et al., 2010, Westphal and Johnson, 2007, Gerstein et al., 1999, Welte et al., 2001, Petry et al., 2005, Petry, 2005, Fong et al., 2011b). The frequency of mood disorders, particularly depression, is also substantially higher in this population compared to non-gamblers or non-problem gamblers (Bland et al., 1993, Cunningham-Williams et al., 1998, Petry et al., 2005, Petry, 2005, Westphal and Johnson, 2007, Johansson et al., 2009, Momper et al., 2010). Nevertheless, the causal path linking these disorders and problem gambling is rather unclear. On the one hand, according to McCormick et al. (1984), gambling problems may precede the onset of depression. On the other hand, using a general population based survey, Kessler et al. (2008), found that mood and anxiety disorders predate and predict the onset of pathological gambling. However, to estimate the social cost attributable to pathological gambling, it is necessary to know whether the comorbidity precedes the onset of

gambling addiction or is a consequence of this addiction. If the comorbid condition appears first and is unrelated to the gambling addiction, its cost should not be included in the estimation of the social burden of gambling addiction. Conversely, if the comorbidity resulted from the gambling addiction, then its cost must be included in this estimation. Thus, in the analysis I attempt to identify and characterise the comorbidities to avoid attributing all of the HRQoL loss to gambling addiction.

The primary objective of this study is to estimate the HRQoL loss of pathological gambling in Switzerland, in monetary terms. The first step of the valuation process is to estimate the quality of life of pathological gamblers and of a control group. For this purpose, I use a preference-weighted HRQoL questionnaire, the SF-12v2, to obtain a health utility index. Using regressions, I estimate the HRQoL loss attributable to gambling addiction, controlling for comorbidities. The second step is to express this loss in monetary terms using the value of a life year (VOLY). My main assumption is that pathological gambling is associated with a significant HRQoL loss that must be considered in the estimation of the social cost of gambling.

This study was conducted in Switzerland where gambling issues are still partly unknown as it is a fairly new concern for policy makers. Only a few studies based on general population surveys, investigated the prevalence of gambling disorders. Using the South Oaks Gambling Screen (SOGS), two prevalence surveys were conducted, the first in 1998 (Bondolfi et al., 2000) and the second in 2005 (Bondolfi et al., 2008). The aim of these surveys was to analyse whether the opening of 19 casinos in Switzerland in 2002 increased the prevalence of pathological

gambling. In 2005, they estimated the past year prevalence rate of pathological gambling at 0.5% of the population over 18 years of age compared to 0.8% in 1998. They could not identify a significant increase in the prevalence. In 2007, the Swiss Health Survey (SHS) included some of the criteria of the DSM-IV to screen for pathological gambling. Using a composite index, the Federal Gaming Board (ESBK, 2009), concluded that 0.5% of the population aged 15 and over, were considered as pathological gamblers. The social burden of this disorder was assessed in two different studies. The first, mandated by the Federal Gaming Board was conducted in 2004 (Künzi et al., 2004). The authors found an annual cost of gambling addiction of CHF 100 million (1.50 USD/CHF; PPP, 2011). However, they did not consider the HRQoL cost, so this figure is probably largely underestimated. Moreover, this study did not clearly distinguish real costs and transfers. More recently, the direct and indirect costs of casino gambling were estimated at CHF 69.7 million (Künzi et al., 2009).

5.2.1 Sample and data collection

Pathological gamblers were recruited at treatment centres in western Switzerland. The survey was approved by the ethic committee for clinical research of the CHUV (Centre Hospitalier Universitaire Vaudois) in Lausanne, Switzerland. Five treatment centres collected 52 questionnaires between 2008 and 2009. The questionnaires were filled out at the centres according to a standardized protocol. Treatment centres' staff was asked to administer the survey as early as possible in the treatment process. Originally, the gambler's relatives were also asked to complete the questionnaires, but the number of responses was too small to proceed with further analysis. To obtain a control group,

shorter questionnaires were sent to a sample of the Swiss population during the same time period. This sample (n=93) is representative of the Swiss population in terms of age, gender and educational level.

5.2.2 Gambling behaviour assessment

As problem gamblers were recruited in treatment centres, they were generally already screened for their gambling behaviour and identified as problem or pathological gamblers at an early stage of their treatment. However, to validate the diagnosis of the treatment centres I included the Lie/Bet questionnaire (Johnson et al., 1997) in my survey. The two questions of this questionnaire are as follows:

1. Have you ever had to lie to people important to you about how much you gambled?
2. Have you ever felt the need to bet more and more money?

I favoured this instrument because of its brevity so to avoid too many non-responses. In addition, the two questions of the Lie/Bet were proved to be efficient at detecting problem or pathological gamblers (Johnson et al., 1998, Götestam et al., 2004)

5.2.3 Valuation instrument

A widely used method to assess the quality of life is by using the concept of "Quality-Adjusted Life Years" (QALY), firstly approached by Klarman et al. (1968) in a cost-effectiveness analysis for a treatment of chronic renal disease. This concept is based upon the notion that the wellbeing of an individual is a trade-off between the quantity of years he or she will live, balanced with the quality of these years (Drummond

et al., 2005). In fact, one year lived in full health does not bring the same utility to an individual than one year lived with a given disability. This utility index is limited between 0 and 1, representing the worst possible health state (0), and perfect health (1). The interpretation of a QALY is straightforward: an individual with a life expectancy of ten years with a given disability could experience a utility index of 0.6. This weight means that he gives the same value to ten years lived with his disability and 6 years in perfect health. This weight (or health utility index) shows the decrease of utility an individual experience each year because of the disability. In this study, I aim to estimate this index to show how the quality of life of pathological gamblers is reduced each year. In the economic literature, two instruments are commonly used to assess the quality of life, the Standard Gamble (SG), and the Time Trade Off (TTO). The first is based on the expected utility theory developed in 1944 by Von Neumann et al. and the second was developed by Torrance et al. (1972) and can be seen as a simplified version of the Standard Gamble. Both methods face individuals with different choices using probabilities and life expectancy to finally obtain a utility index associated to a specific disability. Other methods, are based on standard self-completed questionnaires that describe on a scale how impaired an individual is in daily activities and social interaction. This is notably the case of the SF-6D, the HUI or the EQ-5D. With a specific algorithm it is now possible to assess a utility index to an individual depending on the answers. The main difference between these questionnaires and the TTO or SG, is that they are descriptive and do not include choices to obtain the health utility index.

In this study, I favoured the second approach, based on standard questionnaires, because of their ease of use. Moreover, these multi-item

instruments generally contain specific questions regarding mental health. I focused my attention on two widely used questionnaires: the SF-6D (Brazier et al., 1998, Brazier et al., 2002) and the EQ-5D (Dolan et al., 1996). Both use an algorithm to obtain a single health utility index. Although both, the SF-6D and EQ-5D, are able to discriminate between different health states, they have specific characteristics. This has been a matter of interest in recent years (Barton et al., 2008, Longworth and Bryan, 2003, Brazier et al., 2004, Petrou and Hockley, 2005, Pickard et al., 2005, Ariza Ariza et al., 2006, Sobocki et al., 2007). Probably the most important differences lie in the range of utility scores and the number of health states defined. The EQ-5D describes 243 different health states and can generate a range of utility values between -0.594 (worst health state) and 1 (best health state). The SF-6D can describe 18,000 potential health states and generates utility values from 0.296 (worst health state) to 1 (best health state) (Brazier et al., 2004). Another difference lies in the valuation method used to obtain the two scoring algorithms: while the EQ-5D's algorithm is based on a TTO survey, the SF-6D uses a SG survey.

Due to these differences, the scores of the two instruments display unique patterns. First, EQ-5D scores show a ceiling effect, whereas SF-6D scores show a floor effect (Kopec and Willison, 2003, Brazier et al., 2004), resulting in greater utility scores found with EQ-5D than with SF-6D for people in very good health. The inverse is true for individuals indicating very poor health (Petrou and Hockley, 2005, Longworth and Bryan, 2003). Moreover, the SF-6D mean score is higher than that produced by the EQ-5D, and the latter exhibits a larger standard deviation (Brazier et al., 2004). Petrou and Hockley (2005) calculated the relative efficiencies of the EQ-5D and SF-6D to capture the ability of

these instruments to detect minimally important differences in external indicators of health status. The relative efficiency is defined as the ratio of the square of the t-statistic of the comparator (in Petrou and Hockley (2005), the SF-6D) to the square of the t-statistic of the reference instrument (the EQ-5D). Using this measure, they concluded in favour of the SF-6D, which was more efficient than the EQ-5D at detecting differences in self-reported health status. This result is important because it implies that the SF-6D requires a smaller sample size to detect minimally important differences in health outcomes. Moreover, the SF-6D includes more specific items focusing on mental health. Due to these important advantages of the SF-6D over the EQ-5D, I chose the SF-6D despite its lower response rate (Brazier et al., 2004, Barton et al., 2008). The SF-6D scores were computed using the QualityMetric Health Outcomes™ Scoring Software 2.0. This instrument makes it possible to compare the HRQoL of pathological gamblers with that of the general population. Thus, using regression analysis, I estimate the share of the total HRQoL loss attributable to pathological gambling after controlling for comorbidities.

5.3 Statistical analysis

HRQoL as measured by the SF-6D is characterized by a significant floor effect. This means that the true variation among very disabled people is not captured, resulting in censored measures. Indeed, the health utility index is not sensitive enough to describe health states below a certain floor threshold. Due to this pattern, the use of a tobit regression (Tobin, 1958, Austin et al., 2000) provides unbiased and

consistent estimates (Maddala, 1983). Tobin argues that we must take into account the concentration of observations at the limiting value to estimate the relationship between a limited variable and other explanatory variables. Thus, an independent variable may have an influence on the probability of limit responses and on the size of the non-limit responses. His idea is to combine a probit analysis for the probability of the response being censored and a multiple regression for the value of the response variable by using maximum likelihood estimation. Unfortunately, this is a parametric model that relies on strong assumptions regarding homoskedasticity and normality of the errors. It has been shown (Arabmazar and Schmidt, 1981) that this model should not be used if these assumptions are not respected because inconsistent estimates may result. Instead, a more robust alternative could be used, such as the censored least absolute deviations estimator (CLAD). This model, introduced by Powell (1984), is an extension of the least absolute deviations (LAD) estimator applied to the censored regression model. Powell developed a consistent semi-parametric estimator. Therefore, it assumes a functional form only for the regression, but no assumptions are made on the distribution of the residuals. This property makes it superior to the tobit, especially when the errors are not normally distributed (Paarsch, 1984). Moreover, this estimator is also robust to heteroskedasticity.

5.4 Variables

Quality of life is measured through a reduced form of the SF-36 (Ware and Gandek, 1994) called the SF-12v2 (Ware et al., 1995). This

standardized questionnaire contains 12 items that collectively produce scores on eight dimensions, namely: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional and mental health. The eight dimensions can be regrouped into two more general scores: physical and mental components. The scores of six dimensions are used in the SF-6D to obtain a health utility index (Brazier et al., 1998, Brazier et al., 2002, Brazier and Roberts, 2004). With this instrument, the impact on HRQoL of various diseases has been estimated, including insomnia (Morgan et al., 2003), asthma (Szende et al., 2004), stroke (Pickard et al., 2005), overweight or obesity (Kortt and Clarke, 2005), age-related macular degeneration (Espallargues et al., 2005) and low back pain (Hollingworth et al., 2002). This index is used as the dependent variable in the regressions. I also include a visual analogue scale (VAS) to check the level of adequacy of our heath utility index. The VAS adopted is similar to the EQ-5D VAS.

To control the regressions, I screened for the comorbidities commonly associated with pathological gambling. Alcohol abuse was identified using the CAGE questionnaire (Mayfield et al., 1974) with a cut-off point of two and over. Given the high rate of depression among pathological gamblers, I also screened for this particular mood disorder by using the PHQ-2 (Whooley et al., 1997, Kroenke et al., 2003). I favoured this instrument because of its brevity and efficacy in detecting depression. Drug abuse and tobacco consumption were assessed with closed questions. A dummy variable was created for each of these comorbidities. To obtain some sense of the causal path between pathological gambling and these comorbidities, I asked respondents whether they started to experience these disorders before or after the onset of their gambling addiction. Naturally, this is auxiliary

information that will not be used in this research to make a definitive statement.

Respondents were also screened for chronic diseases by asking if they were being treated or had ever been treated for diverse chronic diseases, specifically migraine, asthma, diabetes, osteoarthritis/arthritis, gastric/duodenal ulcers, osteoporosis, chronic bronchitis/emphysema, hypertension, myocardial infarction, heart attack, kidney disease/kidney stones, cancer/tumours and hay fever/other allergies. As this list is not exhaustive, a field named "other" was added to check for other diseases. Finally, I asked in an open-ended question whether the respondent suffered from any chronic physical disability. Due to the sample size, I could not create a dummy for each of the chronic diseases. Instead, the chronic diseases and physical disability were grouped into one dummy indicating whether the individual had ever suffered from any of them. To control for age, I constructed three age groups representing individuals aged 18 to 35, 36 to 55 and over 55, respectively.

5.5 Results

5.5.1 Descriptive statistics

The observation group is composed of 52 patients at the Centre for excessive gambling in Lausanne. All were also identified as pathological gamblers according to the Lie/Bet questionnaire answering "yes" for the two questions[1]. For the control group, 93 individuals from the general population were interviewed, resulting in a total of 145 questionnaires.

[1] The answers were given on an intensity scale - never, rarely, often, always-. The "yes" answer was used for rarely, often and always.

The health utility index is summarised in Table 1. As expected, this index shows a strong correlation of 0.67 with the VAS.

Table 5.1: Descriptive statistics of health utility index.

Dependent variable	Control group (n=93)		Observation group (n=52)		*F* *(ANOVA)*
	Mean	**SD**	**Mean**	**SD**	
Health Utility Index (SF-6D)	0.742	0.113	0.623	0.089	42.399***

*p< .05; ** p< .01; ***p<.001

Table 5.1 shows a significantly lower quality of life of the pathological gamblers than the control group. Indeed, pathological gamblers showed a mean quality of life 0.12 units lower than that of the control group. At this stage of the analysis, this difference is not surprising because pathological gamblers experience the negative impacts of their gambling addiction and are more prone to other psychiatric disorders. Table 5.1 shows an average health utility index for the control group at 0.742. Interestingly, using EQ-5D, the health utility of the general population in the French speaking part of Switzerland was higher and estimated at 0.83 (Perneger et al., 2010). However, as I assessed the utility index with the same instrument (SF-6D) for the two populations, the choice of this specific instrument should not influence the results. Indeed, the average weight will be somewhat lower for the two subsamples. In order to control for the comorbidities, the HRQoL loss attributable to pathological gambling will be estimated using regression analysis. As I control for the different comorbidities, I assume that none of these disorder are a consequence of the gambling addiction.

Table 5.2: Descriptive statistics of the discrete variables.

Variables (Discrete)	**Control group (n=93) %**	**Observation group (n=52) %**	χ^2
Age			
18-35	31.2	19.2	2.4
36-55	46.2	55.8	1.2
56 and over	22.6	25.0	0.1
Any chronic disease or physical disability	43.0	63.3	5.1*
Smoking status			
Smoker	33.3	76.9	25.4***
Non-smoker	66.7	23.1	
Depression (PHQ-2)	22.8	44.2	7.2**
CAGE			
< 2	87.1	56.9	16.7***
≥ 2	12.9	43.1	

*p< .05; ** p< .01; ***p<0.01

The descriptive statistics of the independent variables are presented in Table 5.2. According to the univariate analysis of the X^2 statistics, all categorical variables but the age groups exhibited some significant differences between the control group and the pathological gamblers. The pathological gamblers were more likely to suffer from any of the screened chronic diseases or physical disability. Indeed, only 43.0% of the control group reported any health problems, compared to 63.3% of the pathological gamblers. The proportion of smokers among pathological gamblers is more than twice that of the control group. Moreover, 44.2% of the pathological gamblers were identified as suffering from depression according to the PHQ-2 screening

questionnaire. This proportion is about twice as high as the proportion identified among the control group. According to the CAGE screening questionnaire, pathological gamblers also exhibited a rate of alcohol abuse more than three times the rate reported by the control group.

5.5.2 HRQoL loss attributable to gambling addiction

To estimate the loss of quality of life attributable to gambling addiction, I ran three regressions: an ordinary least squares (OLS) regression, a tobit regression, and a CLAD. In this sample, no respondent had the worst possible health state detectable with the SF-6D. However, one individual had a health utility index of one, characterizing perfect health. Due to this pattern, I decided to use a right censoring for the tobit and the CLAD regressions for this value. I controlled the regressions for age, tobacco and alcohol consumption and the screened comorbidities. The results of the regressions are presented in Table 5.3.

Table 5.3: OLS, tobit and CLAD regressions modelling the impacts of demographics, gambling addiction and comorbidities on the QALY

Variables	OLS		Tobit		CLAD	
	Coeff.	**SD**	**Coeff.**	**SD**	**Coeff.**	**SD**
Age (ref: 18-35)						
36-55	0.012	0.021	0.013	0.021	0.012	0.033
56 and over	0.010	0.027	0.012	0.026	0.003	0.041
Depression symptoms (PHQ-2)	-0.099***	0.018	-0.099***	0.018	-0.102***	0.023
Any chronic disease or physical disability	-0.056**	0.020	-0.057**	0.019	-0.069*	0.031
CAGE	-0.043*	0.020	-0.044*	0.020	-0.047*	0.024
Smoker	-0.002	0.018	-0.002	0.018	-0.009	0.023
Pathological gambler	-0.081***	0.020	-0.081***	0.020	-0.071**	0.025
Constant	0.792***	0.018	0.793***	0.017	0.797***	0.025

*p< .05; ** p< .01; ***p<0.001

The coefficients of the three models show the same patterns. No significant effect of age group on the health utility index was found. Problematic alcohol consumption screened by the CAGE, decreases quality of life significantly, by 0.043 for the OLS, 0.044 for the tobit model and 0.047 for the CLAD. In these regressions, smoking status does not seem to have a significant influence on the health utility index. However, a depression diagnosis significantly affects quality of life across all respondents. This effect is the largest of the analysis, decreasing the QALY by 0.099 (OLS and tobit) to 0.102 (CLAD). Having any chronic disease or physical disability also negatively affects the health utility index. Again, the impact is larger for the CLAD estimates

than for the OLS and tobit regressions. Finally, being a pathological gambler has a significant negative impact on quality of life, decreasing the QALY by 0.081 (OLS and Tobit) to 0.071 (CLAD). The results of the three regressions are highly convergent.

Interestingly, the constant term is significant but not equal to 1. However, it would be reasonable to assume that an individual, who is between 18 and 35 years old, does not have any depression symptoms or problematic alcohol consumption, does not smoke, is not a pathological gambler and does not have any chronic disease or physical disability should have a health utility index close to 1. Thus, a second set of OLS and tobit regressions was done, constraining the constant term to be equal to 1. The results are presented in Table 5.4. For technical reasons, it was not possible to implement this constraint for the CLAD model, so only the results of the OLS and tobit are presented.

Table 5.4: OLS and tobit regressions modelling the impacts of demographics, gambling addiction and comorbidities on the QALY with the constant term equal to 1.

Variables	OLS		Tobit	
	Coeff.	**SD**	**Coeff.**	**SD**
Age (ref:18-35)				
36-55	-0.132***	0.025	-0.131***	0.025
56 and over	-0.128***	0.034	-0.123***	0.034
Depression symptoms (PHQ-2)	-0.146***	0.026	-0.146***	0.025
Any chronic disease or physical disability	-0.068*	0.028	-0.070*	0.028
CAGE	-0.059*	0.029	-0.060*	0.028
Smoker	-0.081*	0.024	-0.082**	0.024
Pathological gambler	-0.076*	0.029	-0.076**	0.028
Constant	1.0	n.a	1.0	n.a

*p< .05; ** p< .01; ***p<0.001

Interestingly, adding this constraint increases the impacts of almost all variables on the health utility index. Moreover, the age classes, as well as tobacco use, now significantly decrease quality of life. The impact of pathological gambling on HRQoL decreases slightly but remains highly significant. It is worth noting that the coefficients for pathological gambling remain very similar to the coefficients given by the unconstrained regressions.

In the two sets of regressions, I controlled for the different co-occurring health problems. Thus, I assume that none of these disorders result from gambling addiction to keep conservative estimates. However, the questions related on the onset of the different disorders reported by problem or pathological gamblers highlights some interesting patterns. Particularly among the depression diagnoses where 72.7% of the patients declared that these symptoms followed the onset of their gambling problems. Regarding alcohol consumption, 14.3% reported an increase in their alcohol consumption since the onset of their excessive gambling behaviour. Conversely, the same percentage indicated that their alcohol consumption decreased. The results are also mitigated for tobacco consumption as on the one hand 12.5% of the disordered gamblers began to smoke after their gambling problems appeared and, on the other hand, 11.6% were smokers before their gambling problems and stopped after the onset of the latter.

5.5.3 Monetary value of the HRQoL loss

The statistical analysis estimates the HRQoL loss suffered by the pathological gamblers. According to the constrained tobit coefficients, pathological gamblers' quality of life score is lowered by 0.076. The final step of this estimation is to obtain a monetary value for this loss.

Several studies have estimated the VOLY (Soguel and Van Griethuysen, 2000, Abelson, 2003, EnHealth, 2003, Chilton et al., 2004, Jeanrenaud and Marti, 2007, Scapecchi, 2007). This is the monetary value individuals attach to a year lived in full health. If I combine the loss of quality of life due to pathological gambling with the VOLY estimated for the Swiss population, I obtain the HRQoL cost resulting from pathological gambling.

Jeanrenaud and Marti (2007) estimated the VOLY for the Swiss population. They obtained one estimate of CHF 80,000 and another of CHF 50,400 as the value of a year lived in good health (1.50 USD/CHF; PPP, 2011). To produce a conservative estimate, I use the lower value of 50,400 CHF. This value is in line with a European study that estimated the VOLY for air pollution at EUR 40,000 (Desaigues et al., 2011). To obtain the annual HRQoL cost for an addicted gambler, I multiply the Swiss value by the constrained tobit coefficient (0.076), resulting in a cost of CHF 3,830 per pathological gambler. Using a 95% confidence interval, I obtain a cost range between CHF 1,060 and CHF 6,650 per gambler (Table 5.5).

Table 5.5: Annual HRQoL cost of pathological gambling.

	Lower bound *	**Reference estimate**	**Upper bound ***
HRQol loss (tobit constrained coefficient)	0.021	0.076	0.132
Value of a life year (VOLY)		CHF 50,400	
Annual HRQoL cost of pathological gambling	**1,060**	**3,830**	**6,650**

*α=0.05

5.6 Discussion and limitations

In this study, I assess the HRQoL cost of pathological gambling using a health utility index focusing on in-treatment pathological gamblers. To my knowledge, this is the first time such a health utility index has been estimated for this specific condition. A second original feature of the study is that I was able to assess the net impact of

pathological gambling as I controlled for the different co-occurring disorders. In line with my initial assumption, pathological gambling is associated with a significant loss of quality of life. Furthermore, the different specifications of the regression models did not influence the HRQoL attributable to pathological gambling, suggesting that the findings are robust. Using the VOLY, I estimated the HRQoL cost to be between CHF 1,060 and CHF 6,650, with a reference estimate of CHF 3,830 per year per addicted gambler in 2009 (about 5% of the average yearly gross revenue). In Switzerland, the annual direct and indirect costs of gambling addiction in 2004 were estimated at CHF 2,300 per pathological gambler (Künzi et al., 2004). If I combine this estimate with the HRQoL cost assessed in the present study, the social cost of a pathological gambler over a period of one year add up to CHF 6,130. This example demonstrates the importance of considering the HRQoL cost of gambling addiction. Indeed, when adding the HRQoL cost to the direct and indirect costs already estimated (Künzi et al., 2004), more than 60% of the total social cost of pathological gambling is attributed to the loss of quality of life. This proportion is lower than that presented by the Australian Government Productivity Commission study (Productivity Commission, 1999), which found that this cost accounted for more than 90% of the social cost.

A secondary objective of this study was to test a simple tool for estimating a health utility index. As the SF-6D seems to be sensitive enough for this specific population, future estimates of the social cost of gambling addiction can be made more accurate by including the HRQoL cost. Thus, these standardized questionnaires may be an interesting and more convenient alternative to such traditional economic tools as the Time Trade Off or Standard Gamble.

In this paper, I endeavour to use conservative values for the VOLY to estimate the monetary value of the HRQoL loss. Moreover, in this sample, 72.7% of the pathological gamblers who suffer from depression declare that their depressive symptoms are a consequence of their gambling addiction. This conclusion is supported by McCormick et al. (1984). Therefore, to produce a comprehensive estimation, part of the utility loss due to depression (0.15) should be attributed to gambling addiction. In fact, the regressions are controlled for all comorbidities. This implies that the comorbidities are treated as co-occurring health problems and thus not as a negative side-effect of gambling addiction. The CHF 3,830 figure is thus a conservative estimate of the HRQoL loss attributable to pathological gambling and the true cost – including an appropriate fraction of the cost of depression and other mental health problems – is likely much higher. However, further research based on longitudinal data should focus on the causal pathways between gambling addiction and the different comorbidities to enable a more precise estimate of the loss of quality of life created by pathological gambling. Finally, the relatives of the gamblers are not included in this analysis. However, as shown in the Productivity Commission study (1999), the relatives of pathological gamblers also suffer from a loss of quality of life, which should be taken into account to achieve a comprehensive estimate of the HRQoL cost of gambling addiction.

The results of this analysis should be considered with two main limitations in mind. Firstly, due to the specificity of this analysis, pathological gamblers are not drawn from a random and representative sample. As the proportion of problem gamblers that turns to treatment centres is low, reached individuals may not be representative of the average pathological gambler. Indeed, the mean Lie/Bet score was twice

as high for the pathological gamblers in this study compared to the average Lie/Bet score of the pathological gamblers in the Swiss Health Survey 2007. Thus, these results are more representative of the intangible costs of in-treatment pathological gamblers. Nevertheless, the results of this first study should encourage a larger survey investigating this topic based on a large and representative sample of the population.

6 Risk factors for gambling and problem gambling: an analysis of the Swiss Health Survey 2007

6.1 Abstract

The aim of this study is to use a large representative sample of the Swiss population (n=14'393) to compare non-gamblers, gamblers and problem gamblers according to their socio-economic and health-related characteristics. I also analysed whether the gambling activity influences the risk of developing gambling disorders. Using logistic regressions, I compare non-gamblers with gamblers (n=6'036), then gamblers with problem gamblers (n=213). I show that gamblers and disordered gamblers exhibit more harmful behaviours and are more prone to suffer from health disorders. In addition, gamblers patronising casinos have a two-fold increase of being diagnosed as problem gamblers and those gambling on internet show a seven-fold increase. This study provides a picture of the risk factors for gamblers and problem gamblers in Switzerland. It allows institutions in charge of prevention to implement more targeted measures to prevent this mental disorder and provides relevant information for policy makers.

6.2 Introduction

As problem gambling represents a growing concern for public health, factors associated with the different gambling behaviours has become an increasing treated topic in the literature. Characteristics of

recreational gambling have been studied in several national based surveys and give generally converging results. In 1999, the Productivity Commission in Australia found that males, people between 19 and 24 years old, pensioners, individuals with lower levels of education and people living in non-metropolitan regions were overrepresented groups among regular gamblers. The Swedish Prevalence Survey (SPS), found similar results regarding the overrepresentation of males and individuals who are living outside of major cities. However, regular gamblers were more likely to be aged between 45-64 years old and less likely to have completed university or primary rather than secondary education. Finally, married individuals were overrepresented among regular gamblers in the SPS. A representative national telephone survey in the United States, found that men and women were equally represented among past year gamblers. However, men were more likely to gamble weekly. In this study, weekly gambling was also associated with lower socio-economic status (Welte et al., 2002).

Research about problem and pathological gambling generally emphasize five demographic characteristics commonly associated with this disorder, namely the age, the gender, the marital status, the ethnic minorities and the socio-economic status (Petry, 2005). The age is negatively correlated with problem gambling, the young adults presenting a higher rate of pathological gambling than the older ones (Petry, 2005, Shaffer et al., 1999, Delfabbro, 1998, Volberg and Abbott, 1997, Gerstein et al., 1999, Abbott and Volberg, 2000). If the intensity of this pattern may be different between studies, the conclusion that younger aged people are overrepresented holds for most studies. Male gender is usually linked with a higher rate of pathological gambling (Gerstein et al., 1999, Volberg and Abbott, 1997, Nower et al., 2004,

Welte et al., 2001, Rönnberg et al., 1999, Volberg, 1994b, Welte et al., 2002, Gill et al., 2006, Abbott and Volberg, 2000). In addition, gambling activities seem also to differ between men and women, the former being more attracted by gaming machines and bingo and the latter by animal races, cards and sports (Petry, 2005, Rönnberg et al., 1999). General population surveys give converging results indicating that problem or pathological gamblers are more likely to be unmarried (Cunningham-Williams et al., 1998, Volberg, 1994b, Productivity Commission, 1999, Volberg et al., 2001, Bondolfi et al., 2000, Rönnberg et al., 1999). Nevertheless, the causal link between pathological gambling and marital status is hard to define. In fact, behavioural problems regarding gambling may impair the ability to establish or to maintain a relationship. Conversely, individuals who are not married may gamble more to escape to loneliness feelings. Ethnic minorities are also commonly overrepresented among problem or pathological gamblers. In the United States, African Americans have a higher rate of problem gambling (Gerstein et al., 1999, Welte et al., 2001, Welte et al., 2002) as well as Native Americans (Volberg and Abbott, 1997). In New Zealand, Abbott and Volberg (2000) confirmed the link between ethnic minorities and gambling disorders. These conclusions are in line with the Productivity Commission (1999) that found a positive association between gambling problems and living in a home where English was not spoken. Finally, lower socio-economic status is usually associated with higher rates of gambling addiction. Indeed, the National Research Council (1999) found an overrepresentation of individuals with an annual income lower than USD 25'000. This result is supported by a number of other studies (Productivity Commission, 1999, Petry, 2005, Welte et al., 2002). Moreover, lower educational level is also consistently

associated with problem gambling (Volberg and Steadman, 1989, Rönnberg et al., 1999, Volberg, 1994b, Petry, 2005) as well as living in disadvantaged neighbourhoods (Welte et al., 2004).

In addition to the socio-demographic characteristics brought up above, this specific behavioural disorder is also commonly associated with other mental and physical disorders. In particular, this population is more subject to substance use disorders as well as mood disorders (Welte et al., 2001, Gerstein et al., 1999, Petry et al., 2005, Petry, 2005, Bland et al., 1993). Indeed, Petry et al. (2005) found that lifetime pathological gamblers had a lifetime rate of alcohol abuse or dependence of 73% while the non-gamblers reported a rate of 25%. Bland et al. (1993) found an illicit drug abuse and dependence rate among compulsive gamblers about four times higher than in the non-gamblers population. This result is in line with the findings of the NORC study (Gerstein et al., 1999). The rate of mood disorders, especially depression, is also substantially higher among pathological gamblers compared to the general population (Bland et al., 1993, Cunningham-Williams et al., 1998, Petry et al., 2005). However, the causal path linking these disorders and problem gambling is rather unclear. In fact, only McCormick et al. (1984) concluded that gambling problems precede the onset of depression while Kessler et al. (2008) found that mood and anxiety disorders were predictors of pathological gambling.

In the present paper, the findings are based on a national health survey of the Swiss population; the Swiss Health Survey 2007 (SHS 2007). The principal interest of this approach is to use a large and representative sample to gather enough problem gamblers to perform regression analysis in the scope of identifying factors associated with

gambling and problem gambling. I aim to test the hypothesis that the factors influencing the probability to develop gambling problems and those influencing the probability to gamble may be different. Moreover, that the intensity played for the common risk factors in the probability of gambling or having gambling problems differs significantly. For this purpose, I ran two logistic regressions. The first explains the probability of having gambled during the past twelve months. The second regression is limited to individuals that have gambled during the past twelve months and explains the probability of having gambling problems. Finally, as I was able to distinguish problem gamblers from pathological gamblers, I used an ordered probit model, to analyse the impact of risk factors on the gambling intensity. This analysis is restricted to individuals that have gambled during the last twelve months. These results will enhance the knowledge of this public health concern in Switzerland. They will be useful for the institutions in charge of prevention to focus part of their work on the specific risk factors.

6.3 Method

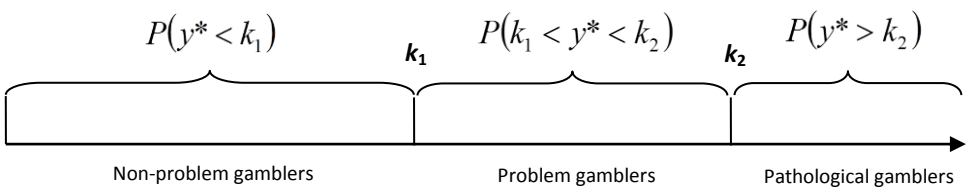
I analyse the data of the Swiss Health Survey 2007 (SHS) which is conducted every five years on a cross-sectional sample of the Swiss population aged 15 years old and over. The sampling method is based on a random stratified sample. The strata are defined by the States. Among each stratum, a two-step random sampling is performed. The households are defined as the primary units, the secondary units being represented by the individuals living in the household. Using this method, 18'760 individuals were interviewed by phone call. Then,

respondents were asked to complete a written survey that included all the gambling questions. From those who accepted, 14'393 sent the written questionnaires back, among which 6'036 have gambled during the past twelve months and 213 were identified as problem gamblers or pathological gamblers.

I modelled the probability of gambling and the probability of developing gambling problems depending on socio-economic and health related variables. As problem gamblers are a subgroup of gamblers, I first investigate if the data were subject to a selection bias. To do so, I used a two-step estimation procedure to model the characteristics of problem gamblers and pathological gamblers. For this test I estimated a bivariate probit selection model (Heckman, 1979, Van de Ven and Van Praag, 1981, Maddala, 1983). However, the result of the different estimations based on this model showed no selection bias in the data.

This finding allows me to run three regressions. In the first, I used a logistic regression to model the characteristics of gamblers compared to the non-gamblers. The second step consisted in analysing the particular features of problem gamblers (incl. pathological gamblers) compared to non-problem gamblers using the same regression specification. To achieve this analysis, I focused my attention on gamblers, by excluding non-gamblers. Finally, based on the assumption that the gambling behaviour lies on a continuum pattern, I used an ordered probit model to explain gambling intensity. This specification is one of the most widely used when modelling the impact of covariates on an ordered categorical variable. The main idea of this model is that there is a latent continuous metric (y*) that underlies the observed categorical variable (y). Thus, this continuum is partitioned by

thresholds (k_i) that correspond to the different ordinal categories. Finally, the latent variable (y*) is defined as a linear combination of some predictors and a disturbance term distributed as a standard normal. In our specific case, it can be graphically represented as follow:



In this model, each significant covariate has an effect on the probability an individual has to be situated in the different categories. If the variable represents a risk factor, the probability of being over the threshold k_1 will increase. Thus, the covariate will have a positive impact on the latent variable. A variable that have a protective effect against gambling behavioural disorders will show the opposite effect.

6.3.1 Variables

Gambling and Problem gambling

Gamblers are defined as individuals having gambled at least once during the last twelve months. Among the SHS, this represents 6'036 individuals. To screen for problem gambling I referred to the screening questions available in the SHS to compute a score to assess gambling behaviour. The scoring algorithm is defined in a report of the Federal Gaming Board (ESBK, 2009) and is based on the DSM-IV criteria. More specifically, the Lie-Bet questionnaire is used (Johnson et al., 1997,

Johnson et al., 1998) as well as other questions based on gambling habits. The resulting score is bordered between 0 and 7. An individual scoring one is identified as problem gambler and scoring two and above is diagnosed as pathological gambler. With this index, I obtain a sample of 158 problem gamblers and 55 pathological gamblers.

Socio-demographics

The age of the respondent is defined in four binary variables; 15-35, 36-55, 56-75 and over 76 years old. The gender is assessed through a binary variable, male gender being the reference category. For the nationality, I distinguish the respondents whose first nationality was Swiss from all other nationalities. The smoking status identifies individuals who do smoke, even occasionally, from those who do not smoke at all. For the marital status, I separated respondents who are married from those who are single, divorced, widowed or separated. The educational level identifies individuals who achieved only compulsory school. The household income variable is adjusted for the family size and is transformed into natural logarithm. The employment status differentiates individuals who are unemployed from the other. Finally, to analyse the proximity criteria I created a variable to identify the respondents who are living in a state hosting a casino.

Physical and mental disorders

As depression symptoms are often present among problem gamblers, I screened major depressive disorders through the CIDI-SF questionnaire (Kessler et al., 1998) and alcohol disorders are screened with the AUDIT questionnaire (Saunders et al., 1993). To analyse if

gambling was associated with other physical symptoms, I include a variable identifying if the individual reported: no or a few physical disorders, some physical disorders, or serious physical disorders.

Type of gambling activity

In the survey, individuals reported all gambling activities they have played during the last twelve months. With this information I identified three types of gambling activities, namely lottery, casino and internet gambling. These variables were constructed to analyse if gambling activities had an impact on gambling intensity or on problem gambling.

6.4 Results

6.4.1 Univariate analysis

Socio demographics

According to the univariate analysis presented in table 6.1, gamblers show some significant socio-economic differences from those who have not gambled during the past year. First, non-gamblers are predominantly female. The smoking prevalence between these two groups is also different, gamblers having a higher rate of smokers. The age distribution differs also significantly. Moreover, non-gamblers have a higher proportion of individuals who achieved only compulsory school. Interestingly, gamblers seem to have a higher income than their comparison group. In this analysis, neither the marital status, the

nationality, the employment status nor the rates of major depressive disorders were significantly different between the two populations.

Table 6.1: Differences in socio-demographics and health related indicators between gamblers and non-gamblers.

Socio-Demographic Characteristics	**Gamblers** %	**Non-Gamblers** %	χ^2
Male	50.5	36.7	240.1***
Age			
15-35	26.3	21.6	346.8***
36-55	40.5	32.3	
56-75	28.9	33.8	
Over 75	4.3	12.2	
Having achieved only compulsory school	10.9	13.4	18.4***
Married	51.1	52.2	1.4
Swiss nationality	90.2	89.7	1.1
Currently unemployed	1.7	1.4	2.1
Smoker	31.8	20.5	206.4***
Major depressive disorder	5.6	4.9	2.9
Physical disorders			
No/a few	37.6	38.7	4.3
Some	37.1	35.2	
Important	25.3	26.1	
Alcohol disorders (AUDIT)	8.4	4.4	84.8***
Living in a canton with casino	75.6	78.2	11.6**

	Mean		**Diff.**
Income (Ln)	8.20	8.16	0.04***

*p< .05; ** p< .01; ***P<0.001

Regarding problem gamblers (incl. pathological gamblers), they show a higher rate of male and smokers than non-problem gamblers. Moreover, a higher proportion of problem gamblers are not married. The educational level seems to be different as a higher proportion of problem gamblers achieved only compulsory school. Finally, differences are also observed between the two populations regarding the age distribution, but no significant differences are observed concerning income, the proxy representing the accessibility, the employment status and the nationality.

Table 6.2: Differences in socio-demographic and health related indicators between problem gamblers and non-problem gamblers, restricted to gamblers.

Socio-Demographic Characteristics	Problem gamblers (%)	Non-problem gamblers (%)	χ^2
Male	58.9	50.2	5.8*
Age			16.9**
15-35	29.4	26.2	
36-55	26.9	40.9	
56-75	37.6	28.6	
Over 75	6.1	4.2	
Having achieved only compulsory school	17.8	10.7	9.9**
Married	37.1	51.6	16.1***
Swiss nationality	86.8	90.4	2.7
Currently unemployed	3.1	1.6	2.3
Smoker	45.7	31.3	18.1***
Major depressive disorder	12.2	5.3	17.2***
Physical disorders			
No/a few	25.3	38.0	14.4**
Some	39.7	37.0	
Important	35.0	25.0	
Alcohol disorders (AUDIT)	13.3	8.3	6.1*
Living in a canton with casino	74.6	75.7	0.7

	Mean		diff.
Income (Ln)	8.15	8.20	0.05

*p< .05; ** p< .01; ***p<0.001

Health related indicators

As described in the univariate analysis presented in tables 6.1 and 6.2, if gamblers do not exhibit a higher rate of major depressive

disorder, problem gamblers show a rate more than twice the rate of non-problem gamblers. Regarding alcohol abuse, both, gamblers and problem gamblers show a higher rate than their comparison groups. Finally, the importance of physical disorders does not differ between gamblers and non-gamblers. This pattern does not hold when comparing problem gamblers with non-disordered gamblers as the first seem to suffer from more physical problems.

6.4.2 Regression models

To complete the univariate analysis I ran three regression models. In the first, I compare gamblers with non-gamblers using logistic regression. In the second, I compare problem gamblers (incl. pathological gamblers) with non-problem gamblers, restricting the analysis to individuals who gambled during the past twelve months (Table 6.3). For this model, I included the gambling activities. The last regression relies upon an ordered probit model with the same sample and independent variables as the latter to analyse their effect on gambling intensity (Table 6.4). The dependent variable used in this model is not binary anymore but includes three types of gambling intensity, namely, non-problem gamblers, problem gamblers and pathological gamblers.

According to Table 6.3, males exhibit a higher probability of gambling during the past twelve months. As a matter of fact, male gender increases the odds of gambling by 69% (*OR=1.69; p<0.001*). Regarding the age, compared to the individuals aged 15 to 35 years old, the likelihood of being a gambler decreases for individuals aged 56 and over. The results show that a higher income increases the probability of gambling (*OR=1.12; p=0.002*). Lower educational level is a significant

explaining factor as individuals having achieved only compulsory school show an increased probability of gambling of more than 20% (*OR=1.22; p=0.004*). According to table 6.3, Swiss individuals have a higher likelihood of gambling (*OR=1.24; p=0.001*). Moreover, smoking increases the odds of gambling by 50% (*OR=1.47; p<0.001*). In this analysis, individuals living in a canton hosting a casino have a lower probability of taking part in this activity (*OR=0.88; p=0.007*). Finally, the employment and marital status do not influence significantly the probability of gambling.

Regarding health related indicators, alcohol abuse are overrepresented among gamblers as alcohol abusers have about 40% more risk of gambling (*OR=1.37; p<0.001*). In addition, individuals experiencing physical disorders (*OR=1.09; p=0.001*) have an increased probability of gambling. However, major depressive disorders are not a risk factor for this population.

Table 6.3: Logistic regressions comparing gamblers with non-gamblers and problem gamblers (incl. pathological gamblers) with non-problem gamblers.

Independent variables	Non-gamblers vs gamblers		Non-problem gamblers vs problem gamblers	
	OR	**SD**	**OR**	**SD**
Gender male	1.69***	0.07	1.24	0.28
Age (ref:15-35)				
36-55	1.01	0.06	1.18	0.34
56-75	0.69***	0.04	2.75**	0.82
Over 75	0.30***	0.03	3.54**	1.72
Having achieved only compulsory school	1.22**	0.09	0.95	0.35
Income (Ln)	1.12**	0.04	0.68*	0.13
Married	0.94	0.04	0.71	0.16
Swiss nationality	1.24**	0.08	0.54*	0.16
Currently unemployed	1.11	0.19	2.14	1.19
Smoker	1.47***	0.07	1.81**	0.39
Major depressive disorder	0.95	0.09	2.35*	0.83
Physical disorders	1.09**	0.03	1.26	0.18
Alcohol disorders (AUDIT)	1.37***	0.12	0.95	0.31
Living in a canton with casino	0.88**	0.04	1.01	0.24
Casino gambling	-	-	1.91*	0.48
Lottery gambling	-	-	2.43	1.30
Internet gambling	-	-	7.47***	1.67

*p< .05; ** p< .01; ***P<0.001

The right-hand part of table 6.3 presents the results of the logistic regression focused on gamblers and explaining the probability of developing gambling problems. Using this model, the gender does not significantly influence the odds of gambling disorders. Interestingly, individuals aged 56 and over are characterised by a higher probability of developing gambling problems. In line with the literature, lower incomes have a higher risk of experiencing gambling problems.

However, the educational level is not a significant risk factor. The nationality plays a role as Swiss individuals have about 50% less probability of having gambling behavioural disorders. No significant association is found regarding the marital and employment status.

In line with general findings, the odds of experiencing gambling disorders increases for smokers by more than 80% (*OR=1.81; p=0.006*). The same conclusion can be drawn regarding major depressive disorders (*OR=2.35; p=0.015*). However, no significant relationship is found between problem gambling and alcohol abuse or physical disorders. Moreover, the link between gambling disorders and living in a canton hosting a casino is not significant. Some very interesting results are given by the odds ratio of the different gambling activities. Indeed, despite an important odds ratio, gambling on lottery does not influence significantly the risk of experiencing gambling problems while, casino gambling almost double this risk (*OR=1.91; p=0.010*). Moreover, internet gamblers have more than a seven-fold increased risk of suffering from gambling problem (*OR=7.47; p<0.001*).

The last step of the analysis is to assess the impact of the same variables on gambling intensity using an ordered probit model. As for the second logistic regression, the sample is restricted to gamblers. However, the dependant variable now has three possible values (non-problem gamblers, problem gamblers, pathological gamblers). The results are presented in table 6.4.

Table 6.4: Ordered probit regression analysing gambling intensity.

Independent variables	Coeff.	SD
Male	0.10	0.10
Age (ref:15-35)		
36-55	0.05	0.13
56-75	0.44**	0.13
Over 75	0.53*	0.23
Having achieved only compulsory school	-0.01	0.17
Income (Ln)	-0.16	0.09
Married	-0.14	0.10
Swiss nationality	-0.34*	0.14
Currently unemployed	0.36	0.27
Smoker	0.29**	0.10
Major depressive disorder	0.44*	0.16
Physical disorders	0.11	0.06
Alcohol disorders (AUDIT)	0.02	0.15
Living in a canton with casino	0.003	0.11
Casino gambling	0.28*	0.11
Lottery playing	0.32	0.22
Internet gambling	0.91***	0.11
k_1	1.39	
k_2	2.04	

*p< .05; ** p< .01; ***P<0.001

As expected, this analysis confirms the second logistic regression. Indeed, being over 56 years old significantly increases gambling intensity, whereas being Swiss have the opposite effect. In this regression, the income variable is not significant anymore (*p=0.07*). The smoking status as well as a major depressive disorder diagnoses significantly increases gambling intensity and the probability to experience gambling disorders. As for the second logistic regression alcohol and physical disorders do not influence significantly gambling intensity. The same conclusions can be drawn regarding casino and internet gambling. Again the coefficient associated with this latter

characteristic shows a very important impact of internet gambling on gambling intensity.

6.5 Discussion

This study is based on a national representative survey in Switzerland used to analyse the factors associated with gambling and gambling addiction. It is the first time such a comprehensive database can be used in Switzerland to study gambling behaviour and related disorders. The present findings are mostly in line with the international literature on this topic, indicating that these characteristics are not country specific.

In this study, the age is negatively correlated with the probability of gambling. Males are overrepresented in this population as well as Swiss natives. Considering household income, I show that this variable is positively correlated with the probability of having gambled during the past twelve months. Nevertheless, the educational level is significantly and negatively associated with the probability of gambling. Interestingly, people living in a canton with casino are less likely to gamble. However, I must hold some reservations about this observation. In fact, Switzerland is a fairly small country so the states borders are not the best indicator of distances. This implies that living in a canton without a casino does not mean a casino is very far away. A higher rate of substance use and abuse is observed among gamblers. Indeed, alcohol abuse and tobacco consumption significantly increases the risk of gambling disorders. This conclusion shows that the gambler population tends to be more involved in risk taking activities or

behaviour. Finally, major depressive disorders are not associated with gambling.

Comparing problem gambling (incl. pathological gambling) with non-problem gambling, the gender does not influence gambling problems. However, individuals aged 56 and older are overrepresented in this population. According to the international literature, problem gambling is associated with lower household income. The intuitive explanation of this pattern is quite simple as individuals with lower socio-economic status may consider gambling as an opportunity to increase their standard of living and not as a leisure activity. Finally, the nationality plays a role as being Swiss native decreases the probability of suffering from gambling behavioural disorders. Living in a canton hosting a casino is not a risk factor for problem gambling. However, I hold the same reservations about the generalisation of this finding as I did above for the gamblers.

Focusing on substance use and abuse, smokers are significantly overrepresented among problem gamblers, conversely to alcohol abuse. As in most international studies major depressive disorder is more than twice as high as in the non-problem gambler population (Petry, 2005). Focusing on the gambling activities, it is very interesting to see that internet gambling seems to be a very important risk factor as internet gamblers have a seven-fold increased risk of suffering from gambling problems.

Interestingly, some socio-demographic variables have an opposite influence when I analyse the risk factors for gambling and problem gambling. Individuals with older ages have a lower probability to gamble, but for those who gamble, they have an important increase in

the risk of developing gambling behavioural disorders. The same pattern is found with income, as higher income individuals have a higher probability to gamble but when I restrict the analysis to gamblers, individuals with lower income are more at risk of gambling problems. This pattern holds for the nationality. These results suggest that the characteristics of gamblers and problem gamblers are significantly different and thus that they represent two different populations.

When I analyse the gambling intensity using an ordered probit model with three categories, I showed that the variables that influence the probability of gambling disorders also influence the intensity of gambling. The only exception is the income variable that turns out to be slightly non-significant.

These results raise some important points for policy makers. As problem gambling is associated with lower income, this is naturally creating some significant inequalities against the most disadvantaged. Indeed, a higher part of their total income is spent in gambling activities resulting in an increasing indebtedness. So it is important to implement prevention measures to struggle this public health concern and lower these inequalities. As I describe more precisely gamblers and problem gamblers, it is now easier to identify the groups at risk and to focus part of the prevention efforts on this population. Moreover, as internet gambling is starting to be legalized in several countries, the results of the present study should draw the attention of policy makers on the potential harm such political decision could have on the prevalence of problem gambling.

This analysis must be read with several limitations in mind. As the Swiss Health Survey, is based on telephone interview, people who are not on the national phone book are automatically excluded from this analysis. Moreover, individuals who do not have a valid phone line cannot be contacted. This is a shortcoming for the identification of problem gamblers as they may not have paid their phone bill due to their gambling problems and thus cannot be reached. In addition, mobile phones are not listed in the phone book. As a matter of fact, individuals without traditional phones are automatically excluded from this survey. This may introduces biases in the estimation of the prevalence of problem gambling. The identification of problem gambling suffers from another shortcoming. In fact, no gold standard criteria, like the DSM-IV or the SOGS, were used in the SHS to identify problem gamblers. As described in the method section, information on several questions suggesting behavioural gambling problem was gathered to obtain an indicator of gambling disorders. This may be a limitation for comparison with other estimations as the screening instrument used in this survey is not a standardized questionnaire. Finally, due to the cross sectional design of the SHS, I did not assess any causality links. However, this could be investigated by using instrumental variables, if an efficient instrument could be found in the SHS. In addition, as it is one of the key issues for a better comprehension of this addiction, future researches should investigate this link using longitudinal data.

7 On the regressivity of gambling taxation in Switzerland.

7.1 Abstract

In this study, the author assesses whether the gambling taxes in Switzerland is regressive using a large, representative sample of the population and the reported gambling expenditures of the Swiss Health Survey 2007 (SHS 07). To analyse the tax incidence, the Suits index was constructed. This result is corroborated by a regression analysis, which highlights the income elasticity of gambling expenditures. The two measures provide converging results and demonstrate the regressive pattern of the gambling tax in Switzerland. As such, this taxation structure contributes to increased income inequality in Switzerland.

7.2 Introduction

In Switzerland, a significant part of the revenues of gambling providers is transferred to the state. A tax on the revenues of gambling providers reflects the expenditures of gamblers, thus raising the question of tax incidence. To analyse this pattern, this study investigates how gambling expenditures change with respect to income. This study examines whether lower income groups devote a higher part of their revenue to gambling expenditures than do higher income groups. If this

assumption is valid, the gambling tax in Switzerland can be said to contribute to increased income inequalities.

This assumption has been corroborated in international studies, in which casino and lottery taxes have been found to be predominantly regressive. Because lotteries are run by the state governments to finance public expenditures in the United States, many of these analyses have been conducted in this country to analyse the equity of this funding channel. Two main methods have been used to assess the regressivity of the gambling tax. The first type of measure is based on a concentration index inspired by the Gini coefficient. The second type of analysis estimates the income elasticity of gambling expenditures to describe the latter based on variations in income.

In 1977, Suits developed a concentration index to analyse the tax incidence (1977b). He used this construct to analyse the regressivity of casino and lottery taxes (Suits, 1977a) in Nevada. In that study, Nevada casino taxation was found to be progressive. However, when Suits restricted his analysis to Nevada residents, the contribution to the casino tax was found to be highly regressive. The author explained this pattern as the result of the significant costs of traveling to Nevada. Mason et al. (1989) highlighted the regressive pattern of the casino tax using income elasticity, and they corroborated this result with the Suits index.

In line with these results, similar studies have found that the lottery tax is also highly regressive. Clotfelter and Cook (1987) used survey data to conclude that the lottery tax in the United States was regressive. This early finding was corroborated by Mobilia (1992) with county-level data from the state of Kansas. Furthermore, a longitudinal study showed increasing regressivity from 1988 to 1992 (Pirog Good

and Mikesell, 1995). In fact, studies have consistently found the lottery tax to be regressive using either income elasticity coefficients or concentration measures (Price and Novak, 1999, Hansen et al., 2000). Two national surveys conducted in Canada and New South Wales (MacDonald et al., 2004, Worthington, 2001) concluded that lower income households spent a higher proportion of their revenues on gambling compared to higher income households. The international literature provides results that support these findings by demonstrating the overrepresentation of individuals with lower socioeconomic status among gamblers, including problem gamblers (Volberg and Abbott, 1997, Gerstein et al., 1999, Productivity Commission, 1999, Abbott and Volberg, 2000, Welte et al., 2002, Volberg and Steadman, 1989, Rönnberg et al., 1999, Volberg, 1994b, Petry, 2005).

The landscape of casino gambling in Switzerland is unique because the establishment and operation of casinos was banned from 1928 to 2000. A new law authorising gambling venues came into force on April 1, 2000. Currently, the casino industry in Switzerland consists of 19 gambling venues that generated CHF 936 million in gross revenues in 2009 (1.50 USD/CHF; PPP, 2011). This amount, which was obtained by subtracting the winnings returned to players from the sums they wagered, is the tax base used to levy the gambling tax, which totalled CHF 479 million in 2009. This amount is allocated to financing the Old-Age Insurance (OAI) and the expenditures of the different cantons that host casinos. The tax schedule consists in a progressive tax between 40% and 80% on the gross revenue. During 2009, CHF 406 million was transferred to the OAI, and CHF 73 million was transferred to the cantons.

According to the first article of the lottery law, lotteries are forbidden in Switzerland. However, exceptions are made for lotteries and raffles organized for recreational events that do not provide cash rewards. Article 5 stipulates that lotteries are allowed if they are designed to serve non-profit organisations or charities. In practice, two firms are allowed to run the lottery and betting business, namely, the Lotterie Suisse Romande (LoRo) in the western part of the country (i.e., the French-speaking part) and Swisslos in the eastern part (i.e., the German- and Italian-speaking part). In the last decade, the number of lottery games increased significantly with the establishment of a transnational lottery and the launch of video lottery terminals. As a result, the annual lottery sales from 2000 to 2009 rose from CHF 1,373 to CHF 2,833 million. In accordance with article 5 of the lottery law, all profit is transferred to cantonal commissions, which distribute this amount to non-profit organizations or charities. In 2009, the gross revenue of lotteries and betting rose to CHF 896 million, and the total profit (CHF 534 million) was transferred to non-profit organisations and charities. In this study, this amount is defined as the implicit tax on the lottery.

Because a significant part of the revenues of gambling providers is taxed by the government, the principle of tax equity must be respected. This golden standard implies that people must contribute to the government's revenues according to their ability to pay. Therefore, individuals with the same income should contribute the same amount to government revenues (i.e., horizontal equity), and those with higher incomes should contribute more (i.e., vertical equity). To test the assumption that the gambling tax is regressive, I focus on the amount transferred by lotteries and casinos to either the state or the cantonal

commissions. I analyse this pattern using two different measures: the Suits index (Suits, 1977b) and the income elasticity of gambling expenditures. The former shows how the tax burden is distributed according to income repartition. The second estimates the variation in gambling expenditures based on variation in income. The results provide insight into the regressivity of the gambling tax in Switzerland. To the best of my knowledge, a study of this type has never been conducted in Switzerland. With this article, I aim to inform decision makers about the impact of the gambling tax on income distribution.

7.3 Data and Method

7.3.1 Sample

To conduct the analyses, I used a representative survey of the Swiss population, the Swiss Health Survey 2007 (SHS). The survey is conducted every five years on a cross-sectional sample of the Swiss population aged 15 years and older, based on a random stratified sample. The cantons constitute the different strata. Two-step random sampling is implemented for each stratum, where the households are defined as the primary units and the individuals living in the households are the secondary units. Using this method, 18,760 individuals were interviewed by phone. Respondents were also asked to complete a written survey that included questions on gambling. Of those who accepted, 14,393 returned the written questionnaires. Of these respondents, 6,036 reported having gambled during the past twelve months.

7.3.2 Measures of tax progressivity

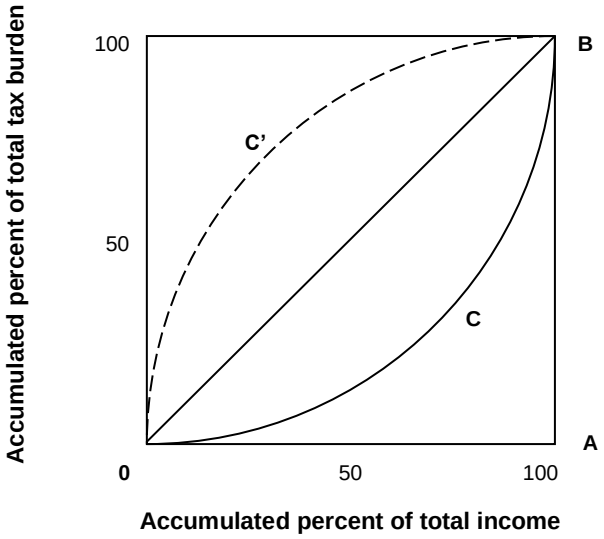
Several methods can be applied to analyse the tax pattern. Point estimations of progressivity are based on an analysis of the tax schedule according to income. This is the case for measures such as marginal rate progression, average rate progression, liability progression and residual income progression (Mottu, 1997). However, these measures only provide a point estimate; they do not consider the tax impact on the entire population. To solve this problem, global measures based on the Lorenz curve and the Gini index can be used to account for the distribution of the tax burden. This is the case for the Suits index, which is used in this study together with a second analysis to verify the consistency of the Suits results. For this purpose, I use regression analysis to estimate the income elasticity coefficients of gambling expenditures.

The Suits index

The Suits index is the first measure used in this study to assess the progressivity of the tax. This index has been one of the most widely used instruments for this purpose since its development by Suits (1977b). It is inspired by the well-known measure of inequality, the Lorenz curve, and the resulting Gini ratio. The Suits index is obtained by plotting the accumulated percentage of the tax burden on the horizontal axis and the accumulated percentage of total income on the vertical axis. We can conclude that the gambling tax is regressive if the percentage of the total tax burden is always higher than the corresponding percentage of total income, as indicated by the C' curve in figure 7.1. If the tax is progressive, the Lorenz curve will show the

same pattern as the C curve shown in figure 7.1. Finally, in the case of perfect proportionality, the Lorenz curve would follow a straight 45-degree line.

Figure 7.1: Illustration of the Suits index



the index is defined as

$$S = 1 - \left(\frac{L}{K} \right),$$

where L is the area *0ABC*, which is the area under the Lorenz curve indicated by the tax, and K is defined by *0AB*, which is the area under a straight 45-degree line that indicates perfect proportionality. The interpretation of S is straightforward. In the case of proportionality, $L=K$, and so $S=0$. If a tax is progressive, the area under the Lorenz curve is

smaller than the area under the 45-degree straight line; as a result, index *S* is positive. Conversely, if the tax is regressive, a higher part of the tax burden is paid by individuals with lower incomes. The Lorenz curve lies above the straight line, and so *S* is negative. This measure has some interesting properties. First, any transfer of the tax burden from lower to higher income groups increases *S*. Second, the index value for several taxes in combination is the weighted average of the index for the individual taxes, and the weights are given by the proportion of the total revenue collected by the taxes.

To construct the Suits index, I need to know the gambling net expenditures to assess the tax burden on each individual. In the SHS, the individual-level monthly gambling budgets are reported. This amount gives the participation of each individual in the gross revenue of casinos and lotteries. Using the average tax rate for gambling, I obtain an estimation of the tax burden on each individual. It must be noted that these data from the SHS are related to the total expenditures on games of chance; I do not have desegregated information to assess the tax incidence of casinos and lotteries separately.

In the survey, the total monthly gambling budget is defined in intervals: less than CHF 10, between 10 and 99, between 100 and 999, between 1,000 and 2,499, between 2,500 and 9,999, and 10,000 and over. I use the middle of the interval to assess the total monthly gambling budget of each respondent. I apply a mean rate burden to these expenditures to obtain the tax burden on each individual. As supported by Blaszczynski et al. (1997a), I assume that the gambling budget reported by the respondents represents the net expenditures, corresponding to the gross revenue of casinos and lotteries. The gross

revenue represents the amounts paid by the gamblers less their winnings. This value is the tax base to levy the gambling tax among casinos. To determine the mean rate burden, I calculate a weighted average of the tax on the 19 casinos and the 2 lotteries in Switzerland. The weights are derived from the gross revenue of each casino and lottery. This calculation results in a mean tax rate of 56% on games of chance in Switzerland. However, it must be noted that changing this rate does not influence the value of the Suits index because the tax rate is the same for all gamblers. That is, the distribution of the tax burden does not change by changing the mean tax rate. The second variable required to calculate this index is the household income. The SHS collects the adjusted income of each individual. This variable represents the sum of the different incomes of the household and is adjusted by family size. This calculation considers the economy of scale of increasing the size of the household. By combining the tax burden and the adjusted household income, I estimate the Suits index.

Income elasticity

Another method of assessing the tax incidence is to analyse income elasticity. As with private goods, I expect the demand for gambling to rise with income because I assume that it is not an inferior good. Nevertheless, I do not know whether this increase will be proportional. To clarify this notion, suppose that all individuals have the same structure of tastes. Thus, with the same income, they all equally value their gambling expenditures and the social good provided by the implicit tax. In this case, individuals with an income of USD 20,000 may be willing to spend USD 2,000 gambling, of which USD 1,000 would

represent the implicit tax (assuming a tax rate of 50% on the gross revenues of gambling). If 1,000 units of the social good are provided, this implies that all individuals with an income of USD 20,000 value 1 unit of the social good at USD 1. If all other individuals with an income of USD 40,000 value the social good at USD 2, a proportional tax rate would apply based on the structure of tastes. If these individuals would be willing to pay only USD 1.50, the appropriate tax pattern would be a regressive schedule. This example shows us how the tax schedule depends on preference patterns. Indeed, if we assume high income elasticity, prices would increase rapidly with income. Nevertheless, if price elasticity is high, this increase will be reduced (Musgrave and Musgrave, 1989). To express this as a formula, I write the income elasticity as

$$\mu_r = \frac{\left(\frac{\Delta Q}{Q}\right)}{\left(\frac{\Delta Y}{Y}\right)}$$

and the price elasticity as

$$\varepsilon_p = \frac{\left(\frac{\Delta Q}{Q}\right)}{\left(\frac{\Delta P}{P}\right)}.$$

using the two expressions, we have

$$\frac{\left(\frac{\Delta P}{P}\right)}{\left(\frac{\Delta Y}{Y}\right)} = \frac{\mu_r}{\varepsilon_p}.$$

The left side of the above formula is the definition of the tax price elasticity with respect to income. Therefore, in the case of a proportional tax, the ratio of tax to income remains constant and is equal to one. In the case of a progressive tax, this elasticity is higher than one. Conversely, it is lower than one for a regressive tax. This also demonstrates how the required schedule is linked to the ratio of income and price elasticity. In this study, to estimate the left side of this equation, I use regression analysis to explain the natural logarithm of a household's gambling budget with the natural logarithm of the household's income, controlling for the socio-economic variables. Indeed, because I assume a constant tax rate on gambling expenses, the resulting elasticity coefficient can be used to assess tax regressivity.

To facilitate comparison between the two estimations, I use the same adjusted household income for both analyses, and I control the regression with socio-demographic characteristics. Age is regrouped into four binary variables indicating the following age intervals: 15-35, 36-55, 56-75 and over 75. The effect of unemployment is captured in a binary variable separating individuals who are unemployed from other individuals. Marital status indicates whether the individual is married or not. Another binary variable is used to identify individuals who are Swiss from other respondents. Finally, the effect of educational level is captured with a categorical variable representing five different levels of scholarly achievement: compulsory school, general education,

vocational education, higher vocational education, and tertiary education.

7.4 Results

7.4.1 Suits index

The summary statistics of the adjusted income and the monthly gambling budget used to calculate the Suits index are shown in table 7.1.

Table 7.1: Summary statistics of the Suits index components, in CHF.

Variable	n	Mean	SD	Min	Max
Monthly adjusted household income	13,725	4,239.12	3,118.53	46.67	80,000
Monthly gambling budget	12,181	25.68	95.70	0	1,750

Income exhibits a mean of CHF 4,239.1 with a standard deviation as high as CHF 3,119.5. This variable is limited to values between CHF 46.7 and CHF 80,000.0. The net monthly expenditures show a mean at CHF 25.7 with a small standard deviation of CHF 95.7. This pattern is explained by the fact that the values of this variable are bounded by CHF 0 and CHF 1,750. To obtain the estimation of the tax burden on each individual, I apply the average tax rate of 56% on gambling expenditures. Using these data, I compute the Suits index using STATA, finding an index of -0.184 and an average tax rate of 0.35% of the household income. This result unambiguously shows that the tax on casinos and lotteries is regressive and that lower income groups contribute proportionally more to the tax revenues than higher income groups.

7.4.2 Income elasticity

The second analysis of this study assesses the tax incidence by determining the income elasticity coefficient. It also analyses the ratio of the percentage change in gambling expenditures to the percentage change in a household's income. To test whether this ratio increases, decreases or remains constant, I perform an ordinary least squares regression using the logarithm of gambling expenditures and income and controlling for socio-economic variables. The summary statistics of the different variables included in the regression are shown in table 7.2. Due to the characteristics of the natural logarithm, the following analysis is limited to individuals who gambled during the previous 12 months and had net expenses greater than 0 (n=6,036).

T**able 7.2**: Summary statistics of the regression variables.

Variables	**Mean**	**SD**	**Min**	**Max**
Monthly gambling budget	54.04	131.65	5.00	1750.00
Income	4245.81	2973.61	200.00	60000.00
Gender (ref: male)	0.505	0.500	0	1
Age				
15-35	0.263	0.440	0	1
36-55	0.405	0.491	0	1
56-75	0.289	0.453	0	1
Over 75	0.043	0.202	0	1
Swiss nationality	0.902	0.297	0	1
Married	0.511	0.500	0	1
Unemployed	0.017	0.129	0	1
Education (5 levels)	2.600	1.273	1	5

According to table 7.2, the monthly expenditures of gamblers range from CHF 5 to 1,750, with a mean value of 54.04 CHF. The

minimum adjusted household income in our sample is CHF 200, and the maximum is 60,000. Moreover, it has an average of CHF 4,246. With the exception of educational status, all other variables are binary variables. In this sample, 50.5% of the respondents are male, and two-thirds of the gamblers are younger than 56 years old. More than half are married, and only 9.8% do not have Swiss nationality. A fairly low unemployment rate is observed in the sample. Finally, the educational variable ranges from 1 to 5, with a mean value of 2.6.

The result of the regression analysis is shown in table 7.3. The adjusted R^2 is slightly higher than 6.5%, indicating that an important part of the variation in the dependent variable remains unexplained by the explanatory variables. However, this result is not unusual in cross-sectional gambling studies. The *F*-statistic demonstrates that the model is statistically significant at the 5% level. This last result allows to validate this model and to interpret its coefficients. In this study, the coefficient of interest is that associated with the income variable. This regression analysis reveals an income elasticity of 0.181 with a standard deviation of 0.036. As suggested by the p-value, this coefficient is statistically significant. This result is interpreted as follows: an increase of 10% in income will increase gambling expenditures by 1.81%. Conversely, a decrease in income will generate a decline in gambling expenditures, but less than proportional compared to the reduction in income. Thus, the tax on games of chance in Switzerland is highly regressive.

Table 7.3: Result of the ordinary least squares regression

Variables	Coefficient	SD
Income (ln)	0.181***	0.036
Gender	0.479***	0.037
Age (ref: 15-35)		
36-55	0.360***	0.046
56-75	0.600***	0.051
76 and over	0.346**	0.102
Swiss nationality	-0.039	0.062
Married	-0.052	0.038
Unemployed	0.165	0.144
Education (5 levels)	-0.115***	0.015
Constant	1.193***	0.291
$R^2 = 0.066$		
$F = 44.42$		
Significant $F < 0.001$		
$N = 5'565$		

*p<0.05; **p<0.01;***p<0.001

For the other independent variables, gender is highly significant, with men spending 61.4% more on gambling than women do. The different age group dummies indicate that compared to individuals aged 15 to 35 years old, older individuals spend much more money on gambling than younger individuals do. Interestingly, the analysis shows that the more educational level increases, the more the gambling budget decreases. The remaining variables in the regression (i.e., nationality, marital status and unemployment) do not seem to have a significant effect on gambling expenditures.

This second analysis corroborates the Suits index estimated above, indicating a highly regressive pattern for gambling tax in Switzerland.

Changing the method did not change the conclusion. Therefore, I consider the results of the present paper robust.

7.5 Discussion and conclusion

This study concludes unambiguously that the tax imposed on gambling activities in Switzerland is highly regressive. Lower income individuals contribute proportionally more to the state revenues than do higher income groups. Indeed, the Suits index shows a negative value of -0.184, indicating a clear regressive tax pattern. This result is corroborated by regression analysis. The income elasticity of 0.181 is clearly and statistically lower than one, providing further proof of a regressive tax pattern. Decreasing income by 10% results in a decrease of only 1.81% in the gambling budget. Therefore, the economic incidence clearly shows that the final distribution of the tax burden is proportionally larger for individuals with lower incomes. Thus, this tax violates one of the main qualities of a fair tax in Switzerland, namely vertical equity. Vertical equity suggests that individuals with higher income should have a larger tax burden. However, this is obviously not the case in the present study.

Analysing horizontal equity, I underline the differences resulting from the gender, the age and the educational level. Thus, males, younger individuals and less educated individual spend more money on gambling. According to the present analysis, state gambling revenues are expected to rise if the population that has access to gambling is poorly educated. My results lead to the surprising conclusion that the revenues to the state from games of chance will be higher if the

population is poor and not well educated. This finding is in line with the findings of Abt et al. (1985).

Why this subpopulation may be encouraged to spend money on gambling is addressed by Wisman (2006). He highlighted three reasons why poor people may be more "vulnerable to the promise of getting rich by 'investing' in gambling" (Wisman, 2006). The first reason is related to human capital. Because they have less access to high-quality schools, poor people have difficulty developing human capital, finding well-paid jobs or accessing credit to start businesses. Second, due to their poor human capital, low-income populations have a higher discount rate, and so they are more oriented toward the present. Poor people generally have a shorter life expectancy and live in a culture that is more preoccupied with the present because of uncertainties about the future. The third reason is that because poor people possess little control over their everyday lives, work or financial means, choosing lucky numbers provides them with a sense of control and participation. The first reason highlighted by Wisman may not be applicable in Switzerland because high-quality schools are accessible to all socio-economic classes. However, the overrepresentation of lower income groups in gambling expenditures may be a combination of a lower discount rate and the quest for the artificial feeling of control provided by gambling.

Several limitations to this study must be considered when interpreting the results. First, I focus the analysis on the tax incidence for gambling in Switzerland. However, I do not consider how the collected tax is spent, thus the whole budgetary incidence (or tax benefit incidence) is not assessed in the present study. This incidence is difficult

to compute for Switzerland because many expenses derived from gambling tax are not earmarked. While part of the tax imposed on casinos is transferred to the OAI, the other part is not earmarked and is given to the cantons, which are free to use this money as they wish. Due to this specific allocation, considering the benefits of casinos may decrease the regressivity of the present study. However, this observation does not hold for the tax lottery redistribution. Because an important part of the revenues collected by this tax are redistributed for cultural or leisure activities, the regressivity may increase. Therefore, if I could properly account for the benefits of this tax, the budgetary incidence may differ for casinos and lotteries. Another limitation of this study is related to how individuals reported their gambling expenditures. Rather than a continuous variable, the answers were designed to be grouped into a categorical variable with six categories, which reduces the precision of the answers. Moreover, the question asked how much the respondent spent on gambling. As shown by Blaszczynski et al. (2006), this question is biased and is subject to ambiguity because the question "how much money do you spend gambling?" may be interpreted in different ways and may lead to misinterpretation. Generally, this question is asked to determine the difference between the amount of money a person has at the beginning of a gambling session and the amount of money he or she has at the end. In other words, the information of interest is the net value of the money spent. Blaszczynski et al. (1997a) concluded that in response to this question, two-thirds of the respondents interpret this as their net expenditures. The rest of the respondents relate their answer to turnover or other alternative interpretations. In this study, I assume that the answer to the question asked in the SHS reflected the net expenditures.

Finally, I was unable to distinguish between casino and lottery expenditures. Because the incomes of these two categories of gamblers may be different, grouping these two types of expenditures may have an impact on the final results.

This study is in line with the international literature that finds that the gambling tax on casinos and lotteries exhibit regressive patterns (Mason et al., 1989). This conclusion was expected because several international studies have shown that poor and uneducated individuals tend to gamble more and to experience gambling problems more often. Thus, it is not unexpected to find that these individuals spend a proportionally larger part of their revenue on games of chance in Switzerland and that this tax violates vertical equity.

A means of restoring this equity and protecting uneducated individuals was proposed by Rivenbark (1998) and consists of introducing a substantial charge for entering casinos. In Switzerland, this is already the case in some, but not all, gambling venues. The aim of such a preventive measure would be to deter poor and less educated individuals from entering casinos. Moreover, this solution could also increase the state's revenues and thus balance the decline generated by this preventive measure. Nevertheless, the fee has to discourage lower income groups to enter to casinos. If it is not the case, this measure would increase the regressivity. The results of this study should be of interest to Swiss policy makers insofar as the tax incidence is an issue that must be addressed whenever a new tax is considered. Finally, a more precise study could be undertaken if the next SHS separated casino and lottery expenditures to allow for separated estimations.

8 Concluding remarks

This chapter contains an overview of the various parts of this dissertation. I will first provide a summary of the introduction's review of literature on the subject and address a few major, unanswered questions. The second part will consist of analysing the content and results of this dissertation's three empirical essays. The main limitations of the studies are likewise mentioned as well as some ideas worthy of further investigation.

8.1 Part one: background

Tales of disordered gamblers have been told ever since Man began playing for money. Gambling was originally deemed a vice before eventually being recognised as an addiction. This shift to medicalization of the condition was initiated by scientists and psychologists before it was officially categorised as a disease in the third revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM). However, the majority of gamblers do not experience any adverse consequences to their gambling activities as they remain recreational gamblers. Nevertheless, the limit between this category and disordered gamblers needs to be defined. Therefore, a range of screening instruments has been developed to identify problem or pathological gamblers. Most of the instruments to screen for the disorder were designed and validated in clinical settings and subsequently used in population based surveys. As this kind of method may introduce a bias in a prevalence survey

among the general population, researchers developed instruments specifically aimed at identifying the disorder in the general public. All the instruments available have standardised, validated criteria to identify problem or pathological gamblers among the various populations studied.

Clarifying the definition of pathological gambling allowed researchers to analyse the different concurrent behaviours and disorders displayed by this specific population. The process revealed that problem gambling is related to several other mental and physical disorders. Indeed, these gamblers are more likely to show substance consumption disorders such as smoking and alcohol abuse. Additionally, mood disorders are overrepresented among this specific population, particularly major depression. The results concerning anxiety disorders are more ambivalent depending on the study. In fact, the association between anxiety-related mental disorders and problem gambling needs to be further investigated through general population surveys. Few studies analysed the link between problem gamblers and physical disorders. However, given common knowledge on the topic, subjects with gambling issues are more likely to report poorer physical health and a lower quality of life than non-problem gamblers or non-gamblers. Nevertheless, if all the above correlations are uniformly admitted, the causal path between comorbidities and problem gambling is as yet unclear. Indeed, a substantial lack of longitudinal studies prevents one from drawing unquestionable conclusions on the correlation between problem gambling and health issues.

To prevent problem gambling and its resulting negative consequences, prevention measures have recently been implemented.

The measures are divided into two groups - behavioural and structural interventions. The first are designed to increase the individuals' cognizance of gambling's potential risks or inform the public about possible treatments. Hence behavioural measures aim to change an individual's behaviour through mass media campaigns or by implementing informative measures targeting more specific subgroups of the population. Despite the relatively low effectiveness of behavioural interventions, they are among the most regularly implemented to prevent problem gambling. Structural interventions consist in modifying the context in which gambling is made available, mainly through restrictions. The most widely implemented measures are notably age limitations, a limitation on the number of gambling venues as well as restrictions on the most harmful types of gambling. These restrictions were shown to have a relatively more substantial impact on problem gambling. However, estimates of such prevention measures' effectiveness focus on intermediate indicators, such as the change in a gambler's behaviour or beliefs rather than a change in the final prevalence rate. As a matter of fact, the conclusions resulting from these studies should not be used to infer potential final effects on the prevalence rate.

In Switzerland, prevention measures were just recently implemented as casinos have only been legalized since 2002. The measures currently consist of a combination of behavioural and structural interventions. Indeed, information about gambling's potential dangers is provided by mass media campaigns within gambling venues as well as on lottery tickets. Swiss legislation imposes a gambling venue cap and gambling activities are only legal in casinos. In addition to banning gambling for individuals under 18 years of age, a self-exclusion

policy is enforced in the entire country. Despite these measures, no significant change in the prevalence of problem gambling has been identified. Thus, the potential increase in problem gamblers resulting from the opening of 19 casinos may have been balanced by these measures. Nevertheless, this assumption has yet to be validated and further research should focus on the effectiveness of such prevention measures.

8.2 Part two: empirical work

The three essays included in this dissertation are based on Swiss data and attempt to fill some gaps in the existing literature on gambling addiction. To that end, the first essay assesses the social cost of pathological gambling resulting from the associated lowering of the addict's quality of life. The main objective of this study is to demonstrate that this additional figure represents a significant part of the total social cost and hence omitting its estimation results in a significant underestimation of the overall burden on society. For this ground-breaking study, I focused on pathological gamblers in Swiss treatment centres and used a representative sample of the Swiss population as the control group. To estimate the loss in quality of life, I used the SF-6D to obtain a Health Related Quality of Life (HRQol) index bordered between 0 and 1. I screened for several common co-morbidities associated with pathological gambling such as tobacco smoking, alcohol abuse, drug use, physical health issues and depression to control regression. Using a tobit regression to take censored data into account, I determined that pathological gamblers suffer from a loss in

quality of life as high as 0.076. Applying a conservative Value of a Life Year (VOLY) found in the literature, the cost of HRQol loss in pathological gamblers comes to CHF 3,830. Combining this estimate with the direct and indirect costs of the addiction found in Swiss literature, I demonstrated that over 60% of the total social outlay lies in HRQol cost. Therefore, one must factor in these HRQol estimated charges when evaluating pathological gambling's overall social cost in order to avoid substantially underestimating said cost.

This study represents the first estimation of pathological gamblers' HRQol based on survey data. Due to the difficulty of identifying this disorder in a population based survey, I focused on gamblers in treatment centres. As a matter of fact, the disordered gamblers in this study may not be representative of the average problem gambler. This study actually succeeded in proving that the SF-6D is sensitive enough for pathological gamblers. It may therefore be viewed as a pilot study for including this standard questionnaire in a national survey such as the Swiss Health Survey. This would enable estimating the HRQoL loss of an entire range of diseases based on a wide, representative sample of the Swiss population.

The second essay of this dissertation aims at identifying the characteristics of non-gamblers, gamblers and problem gamblers as well as what distinguishes these three types of individuals from each other. By analysing the conclusions, the institutions in charge of pathological gambling prevention have an interesting tool to develop more targeted measures. Using a large and representative survey of the Swiss population - the Swiss Health Survey 2007 (SHS 07) - I identified problem gamblers by implementing a validated screening

questionnaire. The comparison between gamblers and non-gamblers shows that gamblers demonstrate more harmful behaviours, notably in that they are more likely to smoke and are prone to alcohol abuse. In terms of socio-demographics, gamblers are more likely to be Swiss males under age 56 who have only received the basic, compulsory education required by Swiss law. Finally, they generally fall into an upper middle class income bracket. Comparing problem gamblers with recreational gamblers, I observed that problem gamblers are more likely to suffer from major depression and to smoke. Moreover, they are less likely to be Swiss and are usually fall within a lower income bracket. To analyse whether or not gambling activities have an impact on the probability of developing gambling problems, I identified three forms of gambling - namely casino, lottery and internet gambling. If casino gambling increases the risk of developing gambling problems by a factor of two, internet gamblers have a seven-fold increase in the risk of being likewise identified as problem gamblers. This last conclusion is crucial as many governments have decided to move towards liberalizing internet gambling. According to my results, such policies will significantly increase the risk of a rise in gambling-related behavioural disorders. The main limitation of this study lies in the standard questionnaire used to screen for problem gambling. Indeed, despite the fact that this particular screening questionnaire was validated in Switzerland, it is not one of the existing gold standard methods used to identify problem gamblers. Therefore one must accept this limitation, which impedes comparisons with international studies. As a matter of fact, including an internationally validated questionnaire to screen for gambling disorders in the next SHS would allow for better comparative studies on this topic.

The final essay focuses on tax equity. I used the SHS 07, which assesses gamblers' expenditures on the lottery and in casinos. As these values represent the base line for levying taxes, a mean tax rate is applied to each individual's expense in order to estimate the amount of tax each respondent disburses. By combining the reported income with this value, two methods are used to assess the tax's progression. The first consists of a concentration measure, the Suits Index. The second analysis uses elasticity coefficients to assess the impact on gambling expenditures due to a change of income. The two methods presented converging results and indicate that gambling tax presents a regressive pattern. Thus, this tax violates the vertical equity principle which stipulates that individuals with higher incomes should contribute proportionally more to the tax burden than individuals with lower incomes. This tax is hence a contributing factor when it comes to a rise in income disparity. However, this conclusion must be considered with two principal limitations in mind. Firstly, the analysis focuses on gambling's tax incidence and not on its budgetary incidence. As a matter of fact, taking into account of the redistribution of tax revenue may decrease the regressivity of the present study, particularly for casinos. Secondly, it was impossible to distinguish casino spending from lottery expenditures given the available data. As these two categories of gamblers may have different income patterns, grouping these two types of expenditure can impact on a study's final results.

The three essays in this dissertation will give professionals in the field better insight into significant issues and the social impact of gambling addiction (as well as occasional gambling) activity in Switzerland. I hope my results will provide policy makers with food for

thought in implementing effective policies to decrease this growing public health issue.

9 References

ABBOTT, M. W. & VOLBERG, R. 1992. Frequent Gamblers and Problem Gamblers in New Zealand: Report on Phase Two of the National Survey of Problem Gambling. Wellington: Department of Internal Affairs.

ABBOTT, M. W. & VOLBERG, R. A. 2000. *Taking the Pulse on Gambling and Problem Gambling in New Zealand: A report on phase one of the 1999 National Prevalence Survey*, Wellington, New Zealand, Department of Internal Affairs.

ABELSON, P. 2003. The value of life and health for public policy. *Economic Record,* 79**,** 2-13.

ABT, V., SMITH, J. F. & CHRISTIANSEN, E. M. 1985. *The business of risk: Commercial gambling in mainstream America*, University Press of Kansas Lawrence, KS.

ADÈS, J., BELMAS, E., COSTES, J. M., CRAIPEAU, S., LANÇON, C., LE MOAL, M., MARTIGNONI, J. P., MASSIN, S., TASSIN, J. P. & VALLEUR, M. 2008. Jeux de hasard et d'argent: contextes et addictions (2008). Gambling: contexts and addictions. Paris: INSERM.

ALESSI, S. & PETRY, N. 2003. Pathological gambling severity is associated with impulsivity in a delay discounting procedure. *Behavioural Processes,* 64**,** 345-354.

AMERICAN PSYCHIATRIC ASSOCIATION 1980. *Diagnostic and statistical manual of mental disorders, 3rd ed.,* Washington, DC, American Psychiatric Association

AMERICAN PSYCHIATRIC ASSOCIATION 1987. *Diagnostic and statistical manual of mental disorders, 3rd ed. rev.,* Washington, DC, American Psychiatric Association

AMERICAN PSYCHIATRIC ASSOCIATION 1994. *Diagnostic and statistical manual of mental disorders, 4th ed.,* Washington, DC, American Psychiatric Association

AMERICAN PSYCHIATRIC ASSOCIATION 2000. *Diagnostic and statistical manual of mental disorders, 4th ed. rev.,* Washington, DC, American Psychiatric Association

ARABMAZAR, A. & SCHMIDT, P. 1981. Further evidence on the robustness of the Tobit estimator to heteroskedasticity. *Journal of Econometrics,* 17**,** 253-258.

ARIZA ARIZA, R., HERNÁNDEZ CRUZ, B., CARMONA, L. & DOLORES, R. M. 2006. Assessing utility values in rheumatoid arthritis: A comparison between time trade off and the EuroQol. *Arthritis Care & Research,* 55**,** 751-756.

ARNAUD, S., INGLIN, S., CHABLOZ, J.-M., GERVASONI, J.-P., NOTARI, L., GMEL, G. & DUBOIS-ARBER, F. 2009. Etude romande sur le jeu. Lausanne: Programme Intercantonal de Lutte contre la Dépendance au jeu (PILDJ).

ATKINSON, A. B. & MEADE, T. 1974. Methods and preliminary findings in assessing the economic and health services consequences of smoking,

with particular reference to lung cancer. *Journal of the Royal Statistical Society. Series A (General)*, 297-312.

AUSTIN, P. C., ESCOBAR, M. & KOPEC, J. A. 2000. The use of the Tobit model for analyzing measures of health status. *Quality of Life Research*, 9, 901-910.

BABOR, T., CAETANO, R., CASSWELL, S., GRIFFITH, E., GEISBRECHT, N., GRAHM, K., GRUBE, J., GRUENWALD, P., HILL, L., HOLDER, H., HOMEL, R., ÖSTERBERG, E., REHM, J., ROOM, R. & ROSSOW, I. 2003. *Alcohol: no ordinary commodity. Research and public policy*, Oxford, Oxford University Press.

BACK, K. J. 2006. The Korean Casino Impact Study. *Alberta Gaming Research Institute's 5th annual conference.* Banff, Alberta.

BARON, E. & DICKERSON, M. 1999. Alcohol Consumption and Self-Control of Gambling Behaviour. *Journal of Gambling Studies,* 15, 3-15.

BARTON, G. R., SACH, T. H., AVERY, A. J., JENKINSON, C., DOHERTY, M., WHYNES, D. K. & MUIR, K. R. 2008. A comparison of the performance of the EQ 5D and SF 6D for individuals aged 45 years. *Health economics,* 17, 815-832.

BELLAIRE, W. & CASPARI, D. 1992. Diagnosis and therapy of male gamblers in a university psychiatric hospital. *Journal of Gambling Studies,* 8, 143-150.

BENASSI, V. A. & KNOTH, R. L. 1993. The intractable conjunction fallacy: Statistical sophistication, instructional set, and training. *Journal of Social Behavior & Personality,* 8, 83-96.

BERGH, C. & KUHLHORN, E. 1994. Social, psychological and physical consequences of pathological gambling in Sweden. *Journal of Gambling Studies,* 10, 275-285.

BES, R. Ten Years of Responsible Gambling Policy at Holland Casino. Responsible Gambling Council of Ontario Discovery 2002 Conference, 2002 Ontario.

BLACK, D. W. & MOYER, T. 1998. Clinical features and psychiatric comorbidity of subjects with pathological gambling behavior. *Psychiatric Services,* 49, 1434-1439.

BLACK, D. W., MOYER, T. & SCHLOSSER, S. 2003. Quality of life and family history in pathological gambling. *Journal of nervous and mental disease,* 191, 124-126.

BLAND, R. C., NEWMAN, S. C., ORN, H. & STEBELSKY, G. 1993. Epidemiology of pathological gambling in Edmonton. *Canadian Journal of Psychiatry,* 38, 108-112.

BLASZCZYNSKI, A., DUMLAO, V. & LANGE, M. 1997a. "How much do you spend gambling?" Ambiguities in survey questionnaire items. *Journal of Gambling Studies,* 13, 237-252.

BLASZCZYNSKI, A., LADOUCEUR, R., GOULET, A. & SAVARD, C. 2006. 'How Much Do You Spend Gambling?': Ambiguities in Questionnaire Items Assessing Expenditure. *International Gambling Studies,* 6, 123-128.

BLASZCZYNSKI, A. & MCCONAGHY, N. 1989. Anxiety and/or depression in the pathogenesis of addictive gambling. *Substance use & misuse,* 24, 337-350.

BLASZCZYNSKI, A., MCCONAGHY, N. & FRANKOVA, A. 1991. A comparison of relapsed and non-relapsed abstinent pathological gamblers following behavioural treatment. *Addiction,* 86**,** 1485-1489.

BLASZCZYNSKI, A., STEEL, Z. & MCCONAGHY, N. 1997b. Impulsivity in pathological gambling: the antisocial impulsivist. *Addiction,* 92**,** 75-87.

BLASZCZYNSKI, A. P. & FARRELL, E. A case series of 44 completed gambling-related suicides. Twelfth National Conference on Problem Gambling, 18-21 June 1998 Las Vegas.

BONDOLFI, G., JERMANN, F., FERRERO, F., ZULLINO, D. & OSIEK, C. 2008. Prevalence of pathological gambling in Switzerland after the opening of casinos and the introduction of new preventive legislation. *Acta Psychiatrica Scandinavica,* 117**,** 236-239.

BONDOLFI, G., OSIEK, C. & FERRERO, F. 2000. Prevalence estimates of pathological gambling in Switzerland. *Acta Psychiatrica Scandinavica,* 101**,** 473-475.

BRAZIER, J., ROBERTS, J. & DEVERILL, M. 2002. The estimation of a preference-based measure of health from the SF-36. *Journal of Health Economics,* 21**,** 271-292.

BRAZIER, J., ROBERTS, J., TSUCHIYA, A. & BUSSCHBACH, J. 2004. A comparison of the EQ 5D and SF 6D across seven patient groups. *Health economics,* 13**,** 873-884.

BRAZIER, J., USHERWOOD, T., HARPER, R. & THOMAS, K. 1998. Deriving a preference-based single index from the UK SF-36 Health Survey. *Journal of clinical epidemiology,* 51**,** 1115-1128.

BRAZIER, J. E. & ROBERTS, J. 2004. The estimation of a preference-based measure of health from the SF-12. *Medical care,* 42**,** 851-859.

BRIDWELL, R. R. & QUINN, F. L. 2002. From mad joy to misfortune: The merger of law and politics in the world of gambling. *Mississipi Law Journal,* 72**,** 565-729.

BRODBECK, J. & ZNOJ, H. 2008. Pathological, problem and at-risk gambling in German-and Italian-speaking Switzerland assessed with a DSM-IV-based instrument. *European Psychiatry,* 23**,** S60.

BROWN, R. I. F. 1996. Role of Dissociative Experiences in Problem Gambling. *Second European Conference on Gambling and Policy Issues.* Amsterdam.

CAHLAN, J. 1964. It was always with us. *Nevada Centenial Magazine, 1864-1964,* 151-155.

CAMPBELL, F., SIMMONS, C. & LESTER, D. 1999. The impact of gambling on suicidal behavior in Louisiana. *Omega : The Journal of Death and Dying,* 38**,** 235-239.

CARANICHE PTY LTD. 2005. Evaluation of electronic gaming machine harm minimisation measures in Victoria. Victorian Gambling Research.

CARR, R. D., BUCHKOSKI, J. E., KOFOED, L. & MORGAN, T. J. 1996. "Video lottery" and treatment for pathological gambling. A natural experiment in South Dakota. *South Dakota journal of medicine,* 49**,** 30-32.

CASTELLANI, B. & RUGLE, L. 1995. A comparison of pathological gamblers to alcoholics and cocaine misusers on impulsivity, sensation seeking, and craving. *Substance use & misuse,* 30**,** 275-289.

CENTRE FOR GAMBLING RESEARCH 2005. Review of the ACT Government's Harm Minimisation Measures. Australian National University's Centre for Gambling Research for the ACT Gambling and Racing Commission.

CHILTON, S., COVEY, J., JONES-LEE, M., LOOMES, G. & METCALF, H. 2004. Valuation of health benefits associated with reduction in air pollution, final report. UK: Department for Environment Food and Rural Affairs.

CHO, M. J., HAHM, B.-J., SUH, T., SUH, G.-H., CHO, S.-J. & LEE, C. K. 2002. Comorbid mental disorders among the patients with alcohol abuse and dependence in Korea. *Journal of Korean Medical Science,* 17**,** 236-241.

CLOTFELTER, C. T. & COOK, P. J. 1987. Implicit Taxation in Lottery Finance. *National Tax Journal,* 40**,** 533-546.

COLLINS, D. & LAPSLEY, H. 2003. The Social Costs and Benefits of Gambling: An Introduction to the Economic Issues. *Journal of Gambling Studies,* 19**,** 123-148.

COMINGS, D. 1998. The molecular genetics of pathological gambling. *CNS spectrums,* 3**,** 20-37.

COTTON, C. 1674. *Games and Gamesters of the Restoration. The Compleat Gamester* Port Washington, NY, Kennikat Press.

CROCKFORD, D. N. & EL-GUEBALY, N. 1998. Psychiatric comorbidity in pathological gambling: a critical review. *Canadian Journal of Psychiatry,* 43**,** 43-50.

CUNNINGHAM-WILLIAMS, R., COTTLER, L., COMPTON, W. & SPITZNAGEL, E. 1998. Taking chances: problem gamblers and mental health disorders--results from the St. Louis Epidemiologic Catchment Area Study. *American Journal of Public Health,* 88**,** 1093-1096.

CUNNINGHAM-WILLIAMS, R. M., COTTLER, L. B., COMPTON, W. M., SPITZNAGEL, E. L. & BEN-ABDALLAH, A. 2000. Problem gambling and comorbid psychiatric and substance use disorders among drug users recruited from drug treatment and community settings. *Journal of Gambling Studies,* 16**,** 347-376.

CUSTER, R. & MILT, H. 1985. When luck runs out. Warner Books.

DE BRUIN, D. E., LEENDERS, F. R. J., FRIS, M., VERBRAECK, H. T., BRAAM, R. V. & VAN DE WIJNGAART, G. F. 2001. Gasten van Holland Casino. Effectiviteit vanhet preventiebeleid kansspelverslaving [Guests of Holland Casino. Effectiveness of the prevention policy for gambling addiction]. Utrecht: Centrum voor Verslavingsonderzoek (Addiction Research Centre).

DE BRUIN, D. E., MEIJERMAN, C. J. M., LEENDERS, F. R. J. & BRAAM, R. V. 2006. Verslingerd aan meer dan een spel: Een onderzoek naar de aard en omvang van kansspelproblematiek in Nederland. Den Haag: Research and Documentation Centre of the Ministry of Justice.

DELFABBRO, P. 1998. A psychological investigation of gambling in South Australia: with particular reference to the demographic, behavioral and cognitive factors underlying regular poker/slot machine gaming. Adelaide: University of Adelaide.

DELFABBRO, P., LAHN, J. & GRABOSKY, P. 2005. Adolescent Gambling in the Australian Capital Territory (ACT): Report to the ACT Gambling and Racing Commission. Canberra: Centre for Gambling Research.

DESAI, R. A., MACIEJEWSKI, P. K., DAUSEY, D. J., CALDARONE, B. J. & POTENZA, M. N. 2004. Health correlates of recreational gambling in older adults. *The American Journal of Psychiatry,* 161**,** 1672-1679.

DESAIGUES, B., AMI, D., BARTCZAK, A., BRAUN-KOHLOVÁ, M., CHILTON, S., CZAJKOWSKI, M., FARRERAS, V., HUNT, A., HUTCHISON, M. & JEANRENAUD, C. 2011. Economic valuation of air pollution mortality: A 9-country contingent valuation survey of value of a life year (VOLY). *Ecological Indicators,* 11**,** 902-910.

DICKERSON, M. G., ALLCOCK, C., BLASZCZYNSKI, A., NICHOLLS, B., WILLIAMS, R. & MADDERN, R. 1996. An examination of the socio-economic effects of gambling on individuals, Families and the community including research in the costs of problem gambling in New South Wales. Casino Community Benefit Fund.

DICKERSON, M. G. & MADDERN, R. 1997. The extent and impact of gambling in Tasmania with particular reference to problem gambling: A follow up to the Baseline Study conducted 1994.

DOLAN, P., GUDEX, C., KIND, P. & WILLIAMS, A. 1996. The time trade off method: Results from a general population study. *Health economics,* 5**,** 141-154.

DOSTOYEVSKY, F. 1866. The gambler. *In:* GARNETT (ed.) *The gambler and Other Stories.* New York: Macmillan.

DRUMMOND, M. F., SCULPHER, M. J. & TORRANCE, G. W. 2005. *Methods for the economic evaluation of health care programmes*, Oxford University Press, USA.

EDWARDS, J. E. 1995. Gambling and politics in Nevada. *In:* LOWITT, R. (ed.) *Politics in the postwar American West.* University of Oklahoma Press.

EL-GUEBALY, N., PATTEN, S. B., CURRIE, S., WILLIAMS, J. V. A., BECK, C. A., MAXWELL, C. J. & WANG, J. L. 2006. Epidemiological associations between gambling behavior, substance use & mood and anxiety disorders. *Journal of Gambling Studies,* 22**,** 275-287.

ELLERY, M., STEWART, S. H. & LOBA, P. 2005. Alcohol's Effects on Video Lottery Terminal (VLT) Play Among Probable Pathological and Non-Pathological Gamblers. *Journal of Gambling Studies,* 21**,** 299-324.

ELLICKSON, P. L., COLLINS, R. L., HAMBARSOOMIANS, K. & MCCAFFREY, D. F. 2005. Does alcohol advertising promote adolescent drinking? Results from a longitudinal assessment. *Addiction,* 100**,** 235-246.

ENHEALTH 2003. Guidelines for economic evaluation of environmental health planning and assessment. Department of health and Ageing and EnHealth Council.

ERICKSON, L., MOLINA, C. A., LADD, G. T., PIETRZAK, R. H. & PETRY, N. M. 2005. Problem and pathological gambling are associated with poorer mental and physical health in older adults. *International journal of geriatric psychiatry,* 20**,** 754-759.

ESBK 2009. Glücksspiel: Verhalten und Problematic in der Schweiz. Bern: Eidgenössische Spielbankenkommission (ESBK).

ESPALLARGUES, M., CZOSKI-MURRAY, C. J., BANSBACK, N. J., CARLTON, J., LEWIS, G. M., HUGHES, L. A., BRAND, C. S. & BRAZIER, J. E. 2005. The impact of age-related macular degeneration on health status utility values. *Investigative ophthalmology & visual science,* 46**,** 4016-4023.

FEIGELMAN, W., WALLISCH, L. S. & LESIEUR, H. R. 1998. Problem gamblers, problem substance users, and dual-problem individuals: an epidemiological study. *Am J Public Health,* 88**,** 467-470.

FELSHER, J. R., DEREVENSKY, J. L. & GUPTA, R. 2004. Lottery playing amongst youth: Implications for prevention and social policy. *Journal of Gambling Studies,* 20**,** 127-153.

FERLAND, F., LADOUCEUR, R. & JACQUES, C. 2000. Evaluation of a gambling prevention program for youth. *14th National Conference on Problem Gambling.* Philadelphia, PA, USA.

FERRIS, J. & WYNNE, H. 2001. The Canadian Problem Gambling Index: Final Report. Ottawa: Canadian Centre on Substance Abuse (CCSA).

FISHER, S. E. 1996. Gambling and Problem Gambling Among Casino Patrons.

FLOYD, K., WHELAN, J. P. & MEYERS, A. W. 2006. Use of warning messages to modify gambling beliefs and behavior in a laboratory investigation. *Psychology of addictive behaviors,* 20**,** 69.

FONG, D. K. C., FONG, H. N. & LI, S. Z. 2011a. The social cost of gambling in Macao: before and after the liberalisation of the gaming industry. *International Gambling Studies,* 11**,** 43-56.

FONG, G. T., KRANTZ, D. H. & NISBETT, R. E. 1993. The effects of statistical training on thinking about everyday problems. *In:* NISBETTE, R. E. (ed.) *Rules for reasoning.* Hillsdale, New Jersey: Erlbaum.

FONG, T. W., CAMPOS, M. D., BRECHT, M. L., DAVIS, A., MARCO, A., PECANHA, V. & ROSENTHAL, R. J. 2011b. Problem and Pathological Gambling in a Sample of Casino Patrons. *Journal of Gambling Studies,* 27**,** 1-13.

FOXCROFT, D. R., IRELAND, D., LOWE, G. & GREEN, R. 2005. Primary prevention for alcohol misuse in young people. *Cochran Library 2006,* 1.

FRANCE, C. 1902. The Gambling Impulse. *The American Journal of Psychology,* 13**,** 364-407.

FRANK, M. L., LESTER, D. & WEXLER, A. 1991. Suicidal behavior among members of Gamblers Anonymous. *Journal of Gambling Studies,* 7**,** 249-254.

FREUD, S. 1928a. *Dostoevsky and parricide,* London, Hogarth Press.

FREUD, S. 1928b. Dostoevsky and parricide. Standard Edition, 21: 177-196. *In:* STRACHEY, J. (ed.) *Standard Edition of the Complete Psychological Works of Sigmund Freud.* London: Hogarth Press, 1961.

GABOURY, A. & LADOUCEUR, R. 1993. Evaluation of a prevention program for pathological gambling among adolescents. *The Journal of Primary Prevention,* 14**,** 21-28.

GAMBINO, B. 1993. Perceived family history of problem gambling and scores on SOGS. *Journal of Gambling Studies,* 9**,** 169-184.
GATES, S., MCCAMBRIDGE, J., SMITH, L. A. & FOXCROFT, D. R. 2005. Interventions for prevention of drug use by young people delivered in non-school settings. *Cochran Library 2006,* 1.
GAUDIA, R. 1987. Effects of Compulsive Gambling on the Family. *Social Work,* 32**,** 254-256.
GERSTEIN, D. R., VOLBERG, R. A., TOCE, M. T., HARWOOD, H., JOHNSON, R. A. & BUIE, T. 1999. Gambling Impact and Behavior Study: Report to the National Gambling Impact Study Commission. Chicago: National Opinion Research Center.
GIACOPASSI, D., STITT, B. G. & VANDIVER, M. 1998. An Analysis of the Relationship of Alcohol to Casino Gambling Among College Students. *Journal of Gambling Studies,* 14**,** 135-149.
GIBSON, B., SANBONMATSU, D. M. & POSAVAC, S. S. 1997. The effects of selective hypothesis testing on gambling. *Journal of Experimental Psychology: Applied,* 3**,** 126.
GILL, T., GRANDE, E. D. & TAYLOR, A. W. 2006. Factors associated with gamblers: a population-based cross-sectional study of south Australian adults. *Journal of Gambling Studies,* 22**,** 143-164.
GOODWIN, D. W. 1976. Adoption studies of alcoholism. *Journal of Operational Psyciatry,* 7**,** 54-63.
GÖTESTAM, K., JOHANSSON, A., WENZEL, H. & SIMONSEN, I. 2004. Validation of the lie/bet screen for pathological gambling on two normal population data sets. *Psychological Reports,* 95**,** 1009-1013.
GOVONI, R., FRISCH, G. R., RUPCICH, N. & GETTY, H. 1998. First year impacts of casino gambling in a community. *Journal of Gambling Studies,* 14**,** 347-358.
GRANT, J. E. & KIM, S. W. 2001. Demographic and clinical features of 131 adult pathological gamblers. *Journal of Clinical Psychiatry*.
GRANT, J. E., KUSHNER, M. G. & KIM, S. W. 2002. Pathological gambling and alcohol use disorder. *Alcohol Health and Research World,* 26**,** 143-150.
GRIFFITHS, M. 1993. Fruit machine gambling: The importance of structural characteristics. *Journal of Gambling Studies,* 9**,** 101-120.
GRIFFITHS, M. 1999. Gambling Technologies: Prospects for Problem Gambling. *Journal of Gambling Studies,* 15**,** 265-283.
GRINOLS, E. L. 2004. *Gambling in America: Costs and benefits,* Cambridge Univ Pr.
GROSS, J. & MCCAUL, M. E. 1990. A comparison of drug use and adjustment in urban adolescent children of substance abusers. *Substance use & misuse,* 25**,** 495-511.
HALL, G. W., CARRIERO, N. J., TAKUSHI, R. Y., MONTOYA, I. D., PRESTON, K. L. & GORELICK, D. A. 2000. Pathological gambling among cocaine-dependent outpatients. *The American Journal of Psychiatry,* 157**,** 1127-1133.
HANN, R. G. & NUFFIELD, J. 2005. Local Community Impacts of the Charity Casinos: Final Study Report. Ontario Ministry of Health and Long-Term Care, Addiction Programs.

HANSEN, A., MIYAZAKI, A. D. & SPROTT, D. E. 2000. The tax incidence of lotteries: Evidence from five states. *Journal of Consumer Affairs,* 34**,** 182-203.

HECKMAN, J. J. 1979. Sample selection bias as a specification error. *Econometrica,* 47**,** 153-161.

HERTWIG, R., BARRON, G., WEBER, E. U. & EREV, I. 2004. Decisions from Experience and the Effect of Rare Events in Risky Choice. *Psychological Science,* 15**,** 534-539.

HICKEY, J., HAERTZEN, C. & HENNINGFIELD, J. 1986. Simulation of gambling responses on the Addiction Research Center Inventory. *Addictive Behaviors,* 11**,** 345-349.

HOLLINGWORTH, W., DEYO, R. A., SULLIVAN, S. D., EMERSON, S. S., GRAY, D. T. & JARVIK, J. G. 2002. The practicality and validity of directly elicited and SF 36 derived health state preferences in patients with low back pain. *Health economics,* 11**,** 71-85.

HONEGGER, R. 2006. Norway: Gambling Machines to Be Banned from Next July. Toronto: Responsible Gambling Council.

IBANEZ, A., BLANCO, C., DONAHUE, E., LESIEUR, H. R., PÉREZ DE CASTRO, I., FERNÀNDEZ-PIQUERAS, J. & SÀIZ-RUIZ, J. 2001. Psychiatric comorbidity in pathological gamblers seeking treatment. *The American Journal of Psychiatry,* 158**,** 1733-1735.

INTERNATIONAL CENTRE FOR YOUTH GAMBLING PROBLEMS AND HIGH-RISK BEHAVIORS 2004. New CD ROM prevention tool.

JACOBS, D. 1989. A general theory of addictions: Rationale for and evidence supporting a new approach for understanding and treating addictive behaviors. *In:* SHAFFER, H. J., STEIN, S., GAMBINO, B. & CUMMINGS, T. N. (eds.) *Compulsive Gambling: Theory, Research and Practice.* Lexington, MA: Lexington Books.

JACOBS, D. F., MARSTON, A., SINGER, R., WIDAMAN, K., LITTLE, T. & VEIZADES, J. 1989. Children of problem gamblers. *Journal of Gambling Studies,* 5**,** 261-268.

JACQUES, C., LADOUCEUR, R. & FERLAND, F. 2000. Impact of availability on gambling: A longitudinal study. *Canadian Journal of Psychiatry,* 45**,** 810-815.

JEANRENAUD, C. & MARTI, J. The cost of reduced life expectancy due to air pollution: assessing the Value of a Life Year (VOLY) using contingent valuation. IHEA 6th World Congress: Exploration in Health Economics Paper, 2007.

JOHANSSON, A., GRANT, J. E., KIM, S. W., ODLAUG, B. L. & GÖTESTAM, K. G. 2009. Risk factors for problematic gambling: A critical literature review. *Journal of Gambling Studies,* 25**,** 67-92.

JOHNSON, E., HAMER, R. & NORA, R. 1998. The Lie/Bet Questionnaire for screening pathological gamblers: a follow-up study. *Psychological Reports,* 83**,** 1219-1224.

JOHNSON, E., HAMMER, R., NORA, R. M., TAN, B., EISENSTEIN, N. & ENGELHART, C. 1997. The Lie/Bet questionnaire for screening pathological gamblers. *Psychological Reports,* 80**,** 83-88.

KER, K. & CHINNOCK, P. 2006. Interventions in the alcohol server setting for preventing injuries. *Cochrane Database of Systematic Reviews,* 3.

KESSLER, R. C., ANDREWS, G., MROCZEK, D., USTUN, B. & WITTCHEN, H. U. 1998. The World Health Organization Composite International Diagnostic Interview Short Form (CIDI SF). *International journal of methods in psychiatric research,* 7**,** 171-185.

KESSLER, R. C., HWANG, I., LABRIE, R., PETUKHOVA, M., SAMPSON, N. A., WINTERS, K. C. & SHAFFER, H. J. 2008. DSM-IV pathological gambling in the National Comorbidity Survey Replication. *Psychological Medicine,* 38**,** 1351-1360.

KLARMAN, H. E., FRANCIS, J. O. S. & ROSENTHAL, G. D. 1968. Cost Effectiveness Analysis Applied to the Treatment of Chronic Renal Disease. *Medical care,* 6**,** 48-54.

KOEPP, M., GUNN, R., LAWRENCE, A., CUNNINGHAM, V., DAGHER, A., JONES, T., BROOKS, D., BENCH, C. & GRASBY, P. 1998. Evidence for striatal dopamine release during a video game. *Nature,* 393**,** 266-267.

KOPEC, J. A. & WILLISON, K. D. 2003. A comparative review of four preference-weighted measures of health-related quality of life. *Journal of clinical epidemiology,* 56**,** 317-325.

KORN, D., HURSON, T. & REYNOLDS, J. 2005. Commercial Gambling Advertising: Possible Impact on Youth Knowledge, Attitudes, Beliefs and behavioural Intentions. Ontario Problem Gambling Research Centre.

KORTT, M. A. & CLARKE, P. M. 2005. Estimating utility values for health states of overweight and obese individuals using the SF-36. *Quality of Life Research,* 14**,** 2177-2185.

KOSONEN, P. & WINNE, P. H. 1995. Effects of teaching statistical laws on reasoning about everyday problems. *Journal of educational psychology,* 87**,** 33-46.

KROENKE, K., SPITZER, R. L. & WILLIAMS, J. B. W. 2003. The Patient Health Questionnaire-2: validity of a two-item depression screener. *Medical care,* 41**,** 1284-1292.

KULEY, N. & JACOBS, D. 1988. The relationship between dissociative-like experiences and sensation seeking among social and problem gamblers. *Journal of Gambling Studies,* 4**,** 197-207.

KUMPFER, K. L. & ALVARADO, R. 2003. Family-strengthening approaches for the prevention of youth problem behaviors. *American psychologist,* 58**,** 457-465.

KÜNZI, K., FRITSCHI, T. & EGGER, T. 2004. Glücksspiel und Spielsucht in der Schweiz. Bern: Büro für Arbeits-und Sozialpolitische Studien.

KÜNZI, K., FRITSCHI, T., OESCH, T., GEHRING, M. & JULIEN, N. 2009. Soziale Kosten des Glücksspiels in Casinos. Bern, Switzerland: Büro Für Arbeits- und Sozialpolitische Studien.

LADD, G. T. & PETRY, N. M. 2003. A Comparison of Pathological Gamblers With and Without Substance Abuse Treatment Histories. *Experimental and clinical psychopharmacology,* 11**,** 202-209.

LADOUCEUR, R., BOISVERT, J., PEPIN, M., LORANGER, M. & SYLVAIN, C. 1994. Social cost of pathological gambling. *Journal of Gambling Studies,* 10**,** 399-409.

LADOUCEUR, R., BOUCHARD, C., RHEAUME, N., JACQUES, C., FERLAND, F., LEBLOND, J. & WALKER, M. 2000a. Is the SOGS an accurate measure of pathological gambling among children, adolescents and adults? *Journal of Gambling Studies,* 16**,** 1-24.

LADOUCEUR, R., BOUTIN, C., DOUCET, C., DUMONT, M., PROVENCHER, M., GIROUX, I. & BOUCHER, C. 2004. Awareness promotion about excessive gambling among video lottery retailers. *Journal of Gambling Studies,* 20**,** 181-185.

LADOUCEUR, R., SYLVAIN, C. & BOUTIN, C. 2000b. Pathological gambling. *In:* HERSON, M. & BAGGIO, M. (eds.) *Effective brief therpies: A clinician's guide.* San Diego: Academic Press.

LADOUCEUR, R., SYLVAIN, C., LETARTE, H., GIROUX, I. & JACQUES, C. 1998. Cognitive treatment of pathological gamblers. *Behaviour research and therapy,* 36**,** 1111-1119.

LANGENBUCHER, J., BAVLY, L., LABOUVIE, E., SANJUAN, P. M. & MARTIN, C. S. 2001. Clinical features of pathological gambling in an addictions treatment cohort. *Psychology of addictive behaviors,* 15**,** 77-79.

LESIEUR, H. 1994. Epidemiological surveys of pathological gambling: Critique and suggestions for modification. *Journal of Gambling Studies,* 10**,** 385-398.

LESIEUR, H. & BLUME, S. 1987. The South Oaks Gambling Screen (SOGS): A new instrument for the identification of pathological gamblers. *American Journal of Psychiatry,* 144**,** 1184-1188.

LESIEUR, H. & BLUME, S. 1991a. When lady luck loses: Women and compulsive gambling. *In:* VAN DEN BERGH, N. (ed.) *Feminist Perspectives on Addictions.* New York: Springer.

LESIEUR, H. & ROSENTHAL, R. 1998. Analysis of pathological gambling. *In:* WIDIGER, T. A., FRANCES, A. J., PINCUS, H. A., ROSS, R., FIRST, M. B., DAVIS, W. & KLINE, M. (eds.) *DSM-IV Sourcebook.* Washington, DC: American Psychiatric Association.

LESIEUR, H. R. 1984. *The Chase: Career of the Compulsive Gambler*, Schenkman Books Inc.

LESIEUR, H. R. 1989. Children of gamblers anonymous members. *Journal of Gambling Studies,* 5**,** 269-278.

LESIEUR, H. R. 1998. Costs and treatment of pathological gambling. *ANNALS, AAPSS,* 556**,** 153-159.

LESIEUR, H. R. & BLUME, S. B. 1991b. When Lady Luck loses: The female pathological gambler. *In:* BERGH, I. N. V. D. (ed.) *Feminist perspectives on addictions.* New York: Springer.

LESIEUR, H. R., BLUME, S. B. & ZOPPA, R. 1986. Alcoholism, drug abuse, and gambling. *Alcoholism: clinical and experimental research,* 10**,** 33-38.

LESIEUR, H. R. & HEINEMAN, M. 1988. Pathological gambling among youthful multiple substance abusers in a therapeutic community. *British journal of addiction,* 83**,** 765-771.

LESIEUR, H. R. & KLEIN, R. 1987. Pathological gambling among high school students. *Addictive Behaviors,* 12**,** 129-135.

LESIEUR, H. R. & ROSENTHAL, R. J. 1994. Self-reported physiological and dissociative experiences among pathological gamblers. *Conference on Gambling Behavior of the National Council on Problem Gambling.* Seattle: Institute for Problem Gambling.

LICHTENSTEIN, S., SLOVIC, P. & ZINK, D. 1969. Effect of instruction in expected value on optimality of gambling decisions. *Journal of Experimental Psychology,* 79**,** 236-240.

LIN, E. Y. J., CASSWELL, S., EASTON, B., HUCKLE, T., ASIASIGA, L. & YOU, R. Q. 2010. Time and money spent gambling and the relationship with quality-of-life measures: A national study of New Zealanders. *Journal of Gambling Issues***,** 33-53.

LINDEN, R. D., POPE, H. G. & JONAS, J. M. 1986. Pathological gambling and major affective disorder: preliminary findings. *The journal of clinical psychiatry,* 47**,** 201-203.

LOHNQVIST, J. 2000. Psychiatric aspects of suicidal behaviour: Depression. *In:* HEERINGEN, K. H. K. V. (ed.) *The international handbook of suicide and attempted suicide.* New York: Wiley.

LONGWORTH, L. & BRYAN, S. 2003. An empirical comparison of EQ 5D and SF 6D in liver transplant patients. *Health economics,* 12**,** 1061-1067.

LORENZ, V. C. 1983. The impact of pathological gambling on the spouse of the gambler. *Journal of community psychology,* 11**,** 67-76.

LORENZ, V. C. 1987. Family dynamics of pathological gamblers. *In:* GALASKI, T. (ed.) *The handbook of pathological gambling.* Springfield, Il: Charles C. Thomas.

LORENZ, V. C., POLITZER, R. & YAFFEE, R. A. 1990. Final report on gambling addiction in Maryland. Baltimore: Department of Health and Mental Hygeine.

LORENZ, V. C. & SHUTTLEWORTH, D. 1983. The impact of pathological gambling on the spouse of the gambler. *Journal of community psychology,* 11**,** 67-76.

LORENZ, V. C. & YAFFEE, R. A. 1988. Pathological gambling: Psychosomatic, emotional and marital difficulties as reported by the spouse. *Journal of Gambling Studies,* 4**,** 13-26.

LOVATO, C., LINN, G., STEAD, L. F. & BEST, A. 2006. Impact of tobacco advertising and promotion on increasing adolescent smoking behaviour. *Cochran Database of Systematic Reviews,* 3.

LUKAS, S. E. 1998. Brain Imaging of Altered Mood States: Implications for Understanding the Neurobiological Bases of Gambling. *In:* COUNCIL, N. R. (ed.). Cambridge, MA: McLean Hospital.

MACCALLUM, F. & BLASZCZYNSKI, A. P. 2002. Pathological gambling and comorbid substance use. *Australian and New Zealand journal of psychiatry,* 36**,** 411-415.

MACDONALD, M., MCMULLAN, J. L. & PERRIER, D. C. 2004. Gambling households in Canada. *Journal of Gambling Studies,* 20**,** 187-236.

MADDALA, G. S. 1983. *Limited-dependent and qualitative variables in econometrics,* Cambridge, Cambridge University Press.

MANGHAM, C., CARNEY, G., BURNETT, S. & WILLIAMS, R. J. 2006. Determining Socio-Economic Impacts of New Gaming Venues in Four

Lower Mainland Communities: First Impact Measures Report. Ministry of Public Safety and Solicitor General, Government of British Columbia.
MARKANDYA, A. & PEARCE, D. W. 1989. The social costs of tobacco smoking. *British journal of addiction,* 84**,** 1139-1150.
MARTIGNONI-HUTIN, J. P. G. 2007. Les paradoxes du contrôle aux entrées des casinos. *revue Espaces,* 247**,** 14-16.
MASON, P. M., SHAPIRO, S. L. & BORG, M. O. 1989. Gaming tax incidence for three groups of Las Vegas gamblers. *Applied Economics,* 21**,** 1267-1277.
MAYFIELD, D., MCLEOD, G. & HALL, P. 1974. The CAGE questionnaire: validation of a new alcoholism screening instrument. *American Journal of Psychiatry,* 131**,** 1121-1123.
MCCLEARY, R., CHEW, K., FENG, W., MERRILL, V., NAPOLITANO, C., MALES, M. & GRADFFEO, B. 1998. Suicide and Gambling: An Analysis of Suicide Rates in US Counties and Metropolitan Areas. California: a report prepared for the American Gaming Association.
MCCLEARY, R., CHEW, K. S. Y., MERILL, V. & NAPOLITANO, C. 2002. Does legalized gambling elevate the risk of suicide?: An analysis of U.S. counties and Metropolitan areas. *Suicide & Life - Threatening Behavior,* 32**,** 209-221.
MCCORMICK, R., TABER, J., KRUEDELBACH, N. & RUSSO, A. 1987. Personality profiles of hospitalized pathological gamblers: The California Personality Inventory. *Journal of Clinical Psychology,* 43**,** 521-527.
MCCORMICK, R. A. 1993. Disinhibition and negative affectivity in substance abusers with and without a gambling problem. *Addictive Behaviors,* 18**,** 331-336.
MCCORMICK, R. A., RUSSO, A. M., RAMIREZ, L. F. & TABER, J. I. 1984. Affective disorders among pathological gamblers seeking treatment. *The American Journal of Psychiatry,* 141**,** 215-218.
MCMILLEN, J., MARSHALL, D. & MURPHY, L. 2004. The Use of ATMs in ACT Gaming Venues: An Empirical Study. Canberra: ACT Gambling and Racing Commission.
MEYER, G. 1989. *Glücksspieler in Selbsthilfegruppen: erste Ergebnisse einer empirischen Untersuchung,* Hamburg, Neuland.
MEYER, G., HAYER, T. & GRIFFITHS, M. 2008. *Problem gambling in Europe: Challenges, prevention, and interventions,* Springer Verlag.
MINISTRY OF HEALTH 2006. Poorer people still hardest hit by problem gambling. New Zealand.
MOBILIA, P. 1992. A little bit more evidence of lottery regressivity: The Kansas State Lottery. *Journal of Gambling Studies,* 8**,** 361-369.
MOLO BETTELINI, C., ALIPPI, M. & WERNLI, B. 2000. An investigation into pathological gambling. Mendrisio: Centro di Documentazione e Ricerca, Organizzazione Sociopsichiatrica Cantonale.
MOMPER, S. L., DELVA, J., GROGAN-KAYLOR, A., SANCHEZ, N. & VOLBERG, R. A. 2010. The association of at-risk, problem, and pathological gambling with substance use, depression, and arrest history. *Journal of Gambling Issues***,** 7-31.

MORAN, E. 1969. Taking the final risk. *Mental Health***,** 21-22.
MORASCO, B. J. & PETRY, N. M. 2006. Gambling problems and health functioning in individuals receiving disability. *Disability and Rehabilitation,* 28**,** 619-623.
MORASCO, B. J., PIETRZAK, R. H., BLANCO, C., GRANT, B. F., HASIN, D. & PETRY, N. M. 2006a. Health problems and medical utilization associated with gambling disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychosomatic medicine,* 68**,** 976-984.
MORASCO, B. J., VOM EIGEN, K. A. & PETRY, N. M. 2006b. Severity of gambling is associated with physical and emotional health in urban primary care patients. *General hospital psychiatry,* 28**,** 94-100.
MORAVEC, J. D. & MUNLEY, P. H. 1983. *The Moral Order: An Introduction to the Human Situation,* Beverley Hills, CA, Sage Press.
MORGAN, K., DIXON, S., MATHERS, N., THOMPSON, J. & TOMENY, M. 2003. Psychological treatment for insomnia in the management of long-term hypnotic drug use: a pragmatic randomised controlled trial. *The British Journal of General Practice,* 53**,** 923-928.
MOSHER, J. F., TOOMEY, T. L., GOOD, C., HARWOOD, E. & WAGENAAR, A. C. 2002. State laws mandating or promoting training programs for alcohol servers and establishment managers: An assessment of statutory and administrative procedures. *Journal of Public Health Policy,* 23**,** 90-113.
MOTTU, E. 1997. Progressivité de l'impôt fédéral direct et de la TVA en Suisse. *Swiss Journal of Economics and Statistics (SJES),* 133**,** 709-740.
MUSGRAVE, R. A. & MUSGRAVE, P. B. 1989. *Public finance in theory and practice,* McGraw-Hill New York.
NAJAVITS, L. M., GRYMALA, L. D. & GEORGE, B. 2003. Can Advertising Increase Awareness of Problem Gambling? A Statewide Survey of Impact. *Psychology of addictive behaviors,* 17**,** 324-327.
NATIONAL GAMBLING IMPACT STUDY COMMISSION 1999. Final Report. Washington , DC.
NATIONAL RESEARCH COUNCIL 1999. *Pathological Gambling: A Critical Review,* Washington, National Academy Press.
NELSON, C. B., HEATH, A. C. & KESSLER, R. C. 1998. Temporal progression of alcohol dependence symptoms in the U.S. household population: results from the National Comorbidity Survey. *Journal of Consulting and Clinical Psychology,* 66**,** 564-574.
NEWMAN, S. C. & THOMPSON, A. 2003. A population-based study of the association between pathological gambling and attempted suicide. *Suicide & Life - Threatening Behavior,* 33**,** 80-87.
NOWATZKI, N. R. & WILLIAMS, R. J. 2002. Casino self-exclusion programs: A review of the issues. *International Gambling Studies,* 2**,** 3-25.
NOWER, L., DEREVENSKY, J. L. & GUPTA, R. 2004. The relationship of impulsivity, sensation seeking, coping, and substance use in youth gamblers. *Psychology of addictive behaviors,* 18**,** 49-55.

O'DONNELL, R. & RUGLE, L. R. 1996. Gambling Severity and Dissociation in a Group of Inpatient Gamblers. *Tenth National Conference on Gambling Behavior*. Chicago.

OLG 2007. Ontario Lottery & Gaming Corporation (OLG) Responsible Gaming. Betty Palantzas to OPGRC and Belleville Research Team.

PAARSCH, H. J. 1984. A Monte Carlo comparison of estimators for censored regression models. *Journal of Econometrics,* 24**,** 197-213.

PERNEGER, T. V., COMBESCURE, C. & COURVOISIER, D. S. 2010. General Population Reference Values for the French Version of the EuroQol EQ 5D Health Utility Instrument. *Value in health,* 13**,** 631-635.

PETRIE, J., BUNN, F. & BYRNE, G. 2007. Parenting programmes for preventing tobacco, alcohol or drugs misuse in children < 18: a systematic review. *Health Education Research,* 22**,** 177-191.

PETROU, S. & HOCKLEY, C. 2005. An investigation into the empirical validity of the EQ 5D and SF 6D based on hypothetical preferences in a general population. *Health economics,* 14**,** 1169-1189.

PETRY, N. 2005. *Pathological gambling: Etiology, comorbidity, and treatment,* Washington, DC, American psychological association

PETRY, N. M. & KILUK, B. D. 2002. Suicidal ideation and suicide attempts in treatment-seeking pathological gamblers. *The Journal of nervous and mental disease,* 190**,** 462.

PETRY, N. M. & ONCKEN, C. 2002. Cigarette smoking is associated with increased severity of gambling problems in treatment-seeking gamblers. *Addiction,* 97**,** 745-753.

PETRY, N. M., STINSON, F. S. & GRANT, B. F. 2005. Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *The journal of clinical psychiatry,* 66**,** 564-574.

PHILLIPS, D., WELTY, W. & SMITH, M. 1997. Elevated suicide levels associated with legalized gambling. *Suicide & Life - Threatening Behavior,* 27**,** 373-378.

PHILLIPS, J. G., TRIGGS, T. J., COMAN, G. J. & OGEIL, R. P. 2005. Intoxication and Decision Aiding during Computer Blackjack: Preliminary Analysis. *Gambling Research,* 17**,** 17-24.

PICKARD, A. S., JOHNSON, J. A. & FEENY, D. H. 2005. Responsiveness of generic health-related quality of life measures in stroke. *Quality of Life Research,* 14**,** 207-219.

PIETRZAK, R. H., MOLINA, C. A., LADD, G. T., KERINS, G. J. & PETRY, N. M. 2005. Health and psychosocial correlates of disordered gambling in older adults. *The American Journal of Geriatric Psychiatry,* 13**,** 510-519.

PIROG GOOD, M. & MIKESELL, J. L. 1995. Longitudinal Evidence of the Changing Socio Economic Profile of a State Lottery Market. *Policy Studies Journal,* 23**,** 451-465.

POLITZER, R. M., MORROW, J. S. & LEAVEY, S. B. 1981. Report on the societal cost of pathological gambling and the cost-benefit/effectiveness of treatment. *5th National Conference on Gambling and Risk Taking.*

POTENZA, M., STEINBERG, M., MCLAUGHLIN, S., WU, R., ROUNSAVILLE, B. & O'MALLEY, S. 2001. Gender-related

differences in the characteristics of problem gamblers using a gambling helpline. *American Journal of Psychiatry,* 158**,** 1500-1505.
POWELL, J. L. 1984. Least absolute deviations estimation for the censored regression model. *Journal of Econometrics,* 25**,** 371-383.
PRICE, D. I. & NOVAK, E. S. 1999. The tax incidence of three Texas lottery games: Regressivity, race, and education. *National Tax Journal,* 52**,** 741-752.
PRODUCTIVITY COMMISSION 1999. Australia's Gambling Industries. Canberra: Productivity Commission.
RAMIREZ, L. F., MCCORMICK, R. A., RUSSO, A. M. & TABER, J. I. 1983. Patterns of substance abuse in pathological gamblers undergoing treatment. *Addictive Behaviors,* 8**,** 425-428.
REILING, D. M. & NUSBAUMER, M. R. 2006. When problem servers pour in problematic places: alcoholic beverage servers' willingness to serve patrons beyond intoxication. *Substance use & misuse,* 41**,** 653-668.
REUTER, J., RAEDLER, T., ROSE, M., HAND, I., GLÄSCHER, J. & BÜCHEL, C. 2005. Pathological gambling is linked to reduced activation of the mesolimbic reward system. *Nature Neuroscience,* 8**,** 147-148.
RIVENBARK, W. C. 1998. The tax incidence of casino gaming in Mississippi. *Public Finance Review,* 26**,** 583-598.
RÖNNBERG, S., VOLBERG, R. A., ABBOTT, M. W., MOORE, W. L., ANDRÉN, A., MUNCK, I., JONSSON, J., NILSSON, T. & SVENSSON, O. 1999. *Gambling and problem gambling in Sweden. Report No. 2,* International Gambling Research Team of Sweden.
ROOM, R., TURNER, N. E. & IALOMITEANU, A. 1999. Community effects of the opening of the Niagara casino. *Addiction,* 94**,** 1449-1466.
ROSE, I. 1980. Legalization and Control of Casino Gambling, The. *Fordham Urban Law Journal,* 8**,** 245-300.
ROSENTHAL, R. & LESIEUR, H. 1992. Self-Reported Withdrawal Symptoms and Pathological Cambling. *American journal on addictions,* 1**,** 150-154.
ROSENTHAL, R. J. 1998. The Medicalization of Gambling: Its History as Addiction, Compulsion, and Disease. Los Angeles: Department of Psychiatry, University of California.
SADINSKY, S. 2005. Review of the problem-gambling and responsible-gaming strategy of the Government of Ontario. Toronto, Canada: Onatario Ministry of Health and Long-term Care and the Ministry of Economic Development and Trade.
SAUNDERS, J. B., AASLAND, O. G., BABOR, T. F., FUENTE, J. R. & GRANT, M. 1993. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption II. *Addiction,* 88**,** 791-804.
SCAPECCHI, P. 2007. Use of Evaluation Tools in Policymaking and Health Implications for Children. *OECD, Paris.* Paris: OECD.
SCHERRER, J. F., XIAN, H., SHAH, K. R., VOLBERG, R., SLUTSKE, W. & EISEN, S. A. 2005. Effect of genes, environment, and lifetime co-

occurring disorders on health-related quality of life in problem and pathological gamblers. *Archives of general psychiatry,* 62**,** 677-683.

SCHOEMAKER, P. J. 1979. the role of statistical knowledge in gambling decisions: Movement versus risk dimension approaches. *Organizational Behavior and Human Decision Processes,* 24**,** 1-17.

SCHWARZ, J. & LINDNER, A. 1992. Inpatient treatment of male pathological gamblers in Germany. *Journal of Gambling Studies,* 8**,** 93-109.

SCHWER, R. K., THOMPSON, W. N. & NAKAMURO, D. Beyond the limits of recreation: Social costs of gambling in southern Nevada. Far West and American Popular Culture Association meeting, 2003 Las Vegas, NV. Citeseer.

SHAFFER, H., HALL, M. & VANDER BILT, J. 1997. *Estimating the prevalence of disordered gambling behavior in the United States and Canada: A meta-analysis,* Cambridge, MA, Harvard Medical School Division on Addictions.

SHAFFER, H., HALL, M. & VANDER BILT, J. 1999. Estimating the prevalence of disordered gambling behavior in the United States and Canada: a research synthesis. *American Journal of Public Health,* 89**,** 1369-1376.

SHAFFER, H. J. & EBER, G. B. 2002. Temporal progression of cocaine dependence symptoms in the US National Comorbidity Survey. *Addiction,* 97**,** 543-554.

SHAFFER, H. J. & HALL, M. N. 1994. The Emergence of Youthful Gambling and Drug Use: The Prevalence of Underage Lottery Use and the Impact of Gambling. Boston: Harvard Medical School, Division on addictions.

SHAFFER, H. J. & HALL, M. N. 2001. Updating and refining meta-analytic prevalence estimates of disordered gambling behavior in the United States and Canada. *Canadian Journal of Public Health,* 92**,** 168-172.

SHAFFER, H. J. & HALL, M. N. 2002. Longitudinal patterns of gambling and drinking problems among casino employees. *The Journal of Social Psychology,* 142**,** 405-424.

SHARKEY, S. W., R., L. J., ZENOVICH, A. G., MARON, M. S., LINDBERG, J., LONGE, T. F. & MARON, B. J. 2005. Acute and reversible cardiomyopathy provoked by stress in women from the United States. *Circulation,* 111**,** 472-479.

SIMON, G. E. & VON KORFF, M. 1995. Recall of psychiatric history in cross-sectional surveys: implications for epidemiologic research. *Epidemiologic Reviews,* 17**,** 221-227.

SLUTSKE, W., CASPI, A., MOFFITT, T. & POULTON, R. 2005. Personality and problem gambling: a prospective study of a birth cohort of young adults. *Archives of general psychiatry,* 62**,** 769-775.

SMART, R. G. & FERRIS, J. 1996. Alcohol, drugs and gambling in the Ontario adult population, 1994. *Canadian Journal of Psychiatry-Revue Canadienne De Psychiatrie,* 41**,** 36-45.

SMITH, D., HODGINS, D., WILLIAMS, R. & CORPORATION, E. 2007. *Research and measurement issues in gambling studies*, Elsevier/Academic Press.

SOBOCKI, P., EKMAN, M., ÅGREN, H., KRAKAU, I., RUNESON, B., MÅRTENSSON, B. & JÖNSSON, B. 2007. Health Related Quality of

Life Measured with EQ 5D in Patients Treated for Depression in Primary Care. *Value in health,* 10**,** 153-160.
SOGUEL, N. & VAN GRIETHUYSEN, P. 2000. Evaluation contingente, qualité de l'air et santé: une étude en milieu urbain. Lausanne: Institut des Hautes Etudes en Administration Publique (IDHEAP), Université de Lausanne.
SPECKER, S. M., CARLSON, G. A., EDMONSON, K. M., JOHNSON, P. E. & MARCOTTE, M. 1996. Psychopathology in pathological gamblers seeking treatment. *Journal of Gambling Studies,* 12**,** 67-81.
STEEL, Z. & BLASZCZYNSKI, A. 1998. Impulsivity, personality disorders and pathological gambling severity. *Addiction,* 93**,** 895-905.
STEENBERGH, T. A., WHELAN, J. P., MEYERS, A. W., MAY, R. K. & FLOYD, K. 2004. Impact of warning and brief intervention messages on knowledge of gambling risk, irrational beliefs and bheaviour. *International Gambling Studies,* 4**,** 3-16.
STEINBERG, M. A., KOSTEN, T. R. & ROUNSAVILLE, B. J. 1992. Cocaine abuse and pathological gambling. *American journal on addictions,* 1**,** 121-132.
STERN, S., MENEGALE, S., ZANDONELLA, R. & VON STOKAR, T. 2010. Evaluation des mesures prises par les cantons dans le domaine des loteries et des paris. Zürich: INFRAS.
STINCHFIELD, R. & WINTERS, K. C. 2001. Outcome of Minnesota's gambling treatment programs. *Journal of Gambling Studies,* 17**,** 217-245.
STINCHFIELD, R. D. & WINTERS, K. C. 1996. Effectiveness of six state-supported compulsive gambling treatment programs in Minnesota. St. Paul: Minnesota Department of Human Services.
STITH, W. 1752. The Sinfulness and Pernicious Nature of Gaming. *A Sermon Preached before the General Assembly of Virginia: At Williamsburg, March 1st.*
SUITS, D. B. 1977a. Gambling taxes: regressivity and revenue potential. *National Tax Journal,* 30**,** 19-35.
SUITS, D. B. 1977b. Measurement of Tax Progressivity. *The American Economic Review,* 67**,** 747-752.
SYCHOLD, M. 2006. Study of Gambling Services in the Internal Market of the European Union: Executive Summary. Swiss Institute of Comparative Law.
SYLVAIN, C., LADOUCEUR, R. & BOISVERT, J. 1997. Cognitive and behavioral treatment of pathological gambling: A controlled study. *Journal of Consulting and Clinical Psychology,* 65**,** 727-732.
SZENDE, A., SVENSSON, K., STAHL, E., MESZAROS, A. & BERTA, G. Y. 2004. Psychometric and utility-based measures of health status of asthmatic patients with different disease control level. *Pharmacoeconomics,* 22**,** 537-547.
TABER, J. I., MCCORMICK, R. A., RUSSO, A. M., ADKINS, B. J. & RAMIREZ, L. F. 1987. Follow-up of pathological gamblers after treatment. *The American Journal of Psychiatry,* 144**,** 757-761.
TAYLOR, J. S. 1838. *The victims of gambling: Being extracts from the diary of an American physician,* New York.

THOMPSON, W., GAZEL, R. & RICKMAN, D. 1996. The social costs of gambling in Wisconsin. Thiensville: Wisconsin Policy Research Institute.

TOBIN, J. 1958. Estimation of relationships for limited dependent variables. *Econometrica,* 26**,** 24-36.

TONEATTO, T. & BRENNAN, J. 2002. Pathological gambling in treatment-seeking substance abusers. *Addictive Behaviors,* 27**,** 465-469.

URSUA, M. & URIBELARREA, L. 1998. 20 Questions of Gamblers Anonymous: A psychometric study with population of Spain. *Journal of Gambling Studies,* 14**,** 3-15.

VALENZUELA, T. D., ROE, D. J., NICHOL, G., CLARK, L. L., W., S. D. & HARDMAN, B. S. 2000. Outcomes of rapid defibrillation by security officers after cardiac arrest in casinos. *New England Journal of Medicine, The,* 343**,** 1206-1209.

VAN DE VEN, W. & VAN PRAAG, B. M. S. 1981. The demand for deductibles in private health insurance. *Journal of Econometrics,* 17**,** 229-252.

VOLBERG, R. & ABBOTT, M. W. 1994. Lifetime prevalence estimates of pathological gambling in New Zealand. *International Journal of Epidemiology,* 23**,** 976-983.

VOLBERG, R. A. 1994a. The prevalence and demographics of pathological gamblers: implications for public health. *American Journal of Public Health,* 84**,** 401-402.

VOLBERG, R. A. 1994b. The prevalence and demographics of pathological gamblers: implications for public health. *American Journal of Public Health,* 84**,** 237-241.

VOLBERG, R. A. & ABBOTT, M. W. 1997. Gambling and problem gambling among indigenous peoples. *Substance use & misuse,* 32**,** 1525-1538.

VOLBERG, R. A., ABBOTT, M. W., RÖNNBERG, S. & MUNCK, I. M. E. 2001. Prevalence and risks of pathological gambling in Sweden. *Acta Psychiatrica Scandinavica,* 104**,** 250-256.

VOLBERG, R. A. & STEADMAN, H. J. 1989. Prevalence estimates of pathological gambling in New Jersey and Maryland. *The American Journal of Psychiatry,* 166**,** 1618-1619.

VON NEUMANN, J., MORGENSTERN, O., RUBINSTEIN, A. & KUHN, H. W. 1944. *Theory of games and economic behavior*, Princeton University Press.

WAGENAAR, A. C. & HOLDER, H. D. 1995. Changes in alcohol consumption resulting from the elimination of retail wine monopolies: Results from five U.S. states. *Journal of Studies on Alcohol,* 56**,** 566-572.

WAGENAAR, A. C. & LANGLEY, J. D. 1994. Alcohol licensing system changes and alcohol consumption: introduction of wine into New Zealand grocery stores. *Addiction,* 90**,** 773-783.

WARE, J. E. & GANDEK, B. 1994. The SF-36 Health Survey: Development and use in mental health research and the IQOLA Project. *International Journal of Mental Health,* 23**,** 49-73.

WARE, J. E., KOSINSKI, M. & KELLER, S. D. 1995. How to score the SF-12 physical and mental health summary scales. Boston, MA: The Health Institute, New England Medical Center.

WELTE, J., BARNES, G., WIECZOREK, W., TIDWELL, M. & PARKER, J. 2001. Alcohol and gambling pathology among US adults: prevalence, demographic patterns and comorbidity. *Journal of Studies on Alcohol and Drugs,* 62**,** 706-712.

WELTE, J. W., BARNES, G. M., WIECZOREK, W. F., TIDWELL, M. C. & PARKER, J. 2002. Gambling participation in the US—results from a national survey. *Journal of Gambling Studies,* 18**,** 313-337.

WELTE, J. W., WIECZOREK, W. F., BARNES, G. M., TIDWELL, M.-C. & HOFFMAN, J. H. 2004. The relationship of ecological and geographic factors to gambling behavior and pathology. *Journal of Gambling Studies,* 20**,** 405-423.

WENZEL, H. G., OREN, A. & BAKKEN, I. J. 2008. Gambling problems in the family--a stratified probability sample study of prevalence and reported consequences. *BMC public health,* 8**,** 412-416.

WESTPHAL, J. & JOHNSON, L. J. 2007. Multiple co-occurring behaviours among gamblers in treatment: Implications and assessment. *International Gambling Studies,* 7**,** 73-99.

WESTPHAL, J. R., JOHNSON, L. J. & STEVENS, L. 1999. Estimating the social costs of gambling disorders in Louisiana for 1998. Shreveport: Louisiana State University Medical Center, Gambling Studies Unit.

WHOOLEY, M. A., AVINS, A. L., MIRANDA, J. & BROWNER, W. S. 1997. Case-finding instruments for depression: two questions are as good as many. *Journal of General Internal Medicine,* 12**,** 439-445.

WILDMAN, R. 1997. *Gambling: An attempt at an integration,* Edmonton, Wynne Resources Alberta, Canada.

WILLIAMS, R. J. & CONNOLLY, D. 2006. Does learning more about the mathematics of gambling change gambling behaviour? *Psychology of addictive behaviors,* 20**,** 62-68.

WILLIAMS, R. J., WEST, B. L. & SIMPSON, R. I. 2007. Prevention of Problem Gambling: A Comprehensive Review of the Evidence. Guelph, Canada: Ontario Problem Gambling Research Centre.

WILLIAMS, R. J. & WOOD, R. T. 2004. Demographic Sources of Ontario Gaming Revenue. Ontario Problem Gambling Research Centre.

WINTERS, K. C., STINCHFIELD, R. & FULKERSON, J. 1993. Patterns and characteristics of adolescent gambling. *Journal of Gambling Studies,* 9**,** 371-386.

WISMAN, J. D. 2006. State lotteries: Using state power to fleece the poor. *Journal of Economic Issues,* 40**,** 955-966.

WORTHINGTON, A. C. 2001. Implicit finance in gambling expenditures: Australian evidence on socioeconomic and demographic tax incidence. *Public Finance Review,* 29**,** 326-342.

WRAY, I. & DICKERSON, M. 1981. Cessation of high frequency gambling and "withdrawal" symptoms. *British journal of addiction,* 76**,** 401-405.