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The political economy of regulating gambling

Illustrated with the Danish case

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Abstract:

The gambling sector is regulated in order to collect taxes and control the gambling problem of addiction. The regulation may be done without or through a gambling state owned enterprise with monopoly to some or all of the range of gambling products. A macro model is presented to identify the problem as excess net gambling expenditure and a dead weight loss. The model is calibrated using Danish data, to give estimates of the aggregate cost to society of the gambling problem. The rents from public gambling monopolies are often distributed by a special found that create stakeholders. Those afflicted by the gambling problem are few and they are unorganized. Politicians are under many pressures to spend, and the stakeholders are normally powerful groups. Consequently, the goal of tax collection comes to dominate the goal of reducing the gambling problem.

Keywords: Gambling regulation, political economy of state monopoly

Jel: H41, H44, L83

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1. Introduction: Three types of regulation with two purposes

Gambling[2] is a range of service products that is regulated in most countries. The purpose of this article is to discuss the political economy of this regulation. Regulation is done for three reasons of which the first two are difficult to accept for the economist:

(i) Gambling is often assessed morally as a *vice* (like liquor, tobacco and cars) that deserves especially high *taxes*. The moral assessment is often religiously based, and regulation goes back to the Middle Ages. (ii) Due to the long history, regulation has a strong path dependency – and it has created *stakeholders*. If for some reason regulation had to start all over, it would probably be done differently. (iii) The rational reason for the special treatment of gambling is that it creates the *gambling problem* of addiction for a small fraction of the population. The problem is an *externality*, which should be regulated.

Externalities are often difficult to assess empirically, and policy decisions on regulation need macro estimates, so the first half of the paper develop a method to assess the aggregate social costs of gambling for a country and actually assess the numbers for one country (Denmark). This is done in sufficient detail so as to allow others to use the model with data from their own country.

The analysis consequently distinguishes between normal (recreational) and problem gambling, and assumes that the regulation on the gambling market today has two purposes: collect taxes and reduce the externality of the gambling problem. The two purposes are at odds: If gambling is reduced, so is the revenue and vice versa. The outcome observed is a compromise that has been shaped by the political and economic forces operating in the field.

The political economy starts from the *weak victim observation* that the victims of the gambling problem are few and prefer to hide. This makes them unorganized, largely invisible and hence politically weak. On the other hand the political decision makers need taxes for many purposes, and the stakeholders, who use the tax revenue, tend to be powerful. Public choice theory consequently predicts that the tax purpose will capture the instrument. Clearly, it is a field where the ideal of welfare maximization and political realities may generate different outcomes.

The externality is complex, and so is the regulation as it uses a mixture of three instruments: Gambling is taxed, and it is subjected to administrative regulation. In addition some or the entire range of gambling products are normally reserved to a GSOE (i.e.

2. The term gambling is used to cover all sorts of commercial betting and lotteries.

Gambling State Owned Enterprise). The GSOE share on the gambling market differs widely across countries, due to both history and choice: Some countries have a dominating GSOE, and others have privatized (most of) the sector.

Regulation attempts to reduce the gambling problem by restricting the range of available gambling product to relatively benign ones and by making marketing of gambling products less aggressive. This may – together with high taxes – *prevent* gambling and hereby reduce the gambling problem. The alternative to prevention is *treatment*. As the gambling problem only affects a small fraction of the population, treatment may be more effective. This is a field where a major cost benefit study appears to be missing.

Both as regards tax collection and gambling problem reduction, the regulation becomes *softer and more informal* when it is done through a GSOE than though a set of market firms. The GSOE is a monopoly that generates rent, and as the state is the owner, it is also the residual claimant, receiving the rent as tax revenue. Also, regulation of the GSOE may be done through its charter or by direct orders from the political decision-makers representing the owners.

It is a tradition – going back to the start of regulation – to earmark the rents generated by the GSOE to a G-fund. That is, the rents are not paid into general revenue, but reserved to some special purpose outside the normal spending programs. Most activities financed by the G-fund might have been financed anyhow, but the special rules for G-funds must generate a switching effect,[3] which creates the *stakeholders* of the GSOE. Even if the switching is weak, the recipients will suspect that they may at most get the same under an alternative regime. Also, the ability to switch expenditures gives power to some decision-makers. So, two groups of stakeholders are created. Below we only consider the first group of stakeholders: the beneficiaries of the G-fund.

Section 2 discusses the microeconomics of the demand for gambling by normal and problem gamblers. The article turns to the macro level in order to discuss policy. To keep track of the effects, Section 3 presents a macro model – it is made to handle the data for any country. Section 4 gives a brief quantitative description of the Danish gambling sector, and show how the data found can be can be used by the model of Section 3 to assess the costs of gambling for one country. Section 5 discusses the political economy of GSOEs, and finally Section 6 summarizes the results.

3. It is defined as the difference between the spending patterns in two cases: (i) The gambling rent is paid into the general revenue, and (ii) the rent is distributed by the G-board.

2. Micro: The gambling demand of a normal and an addicted gambler

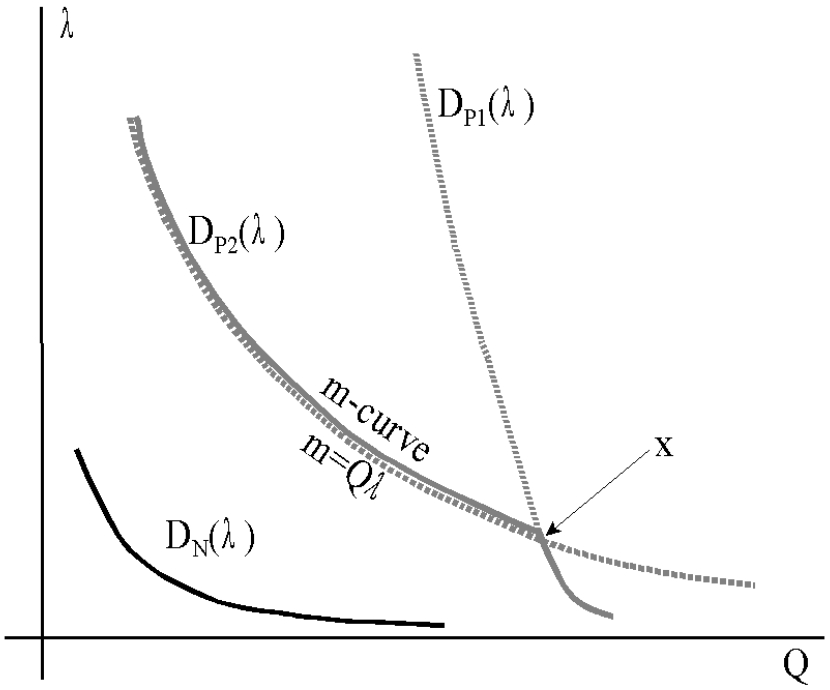
The micro analysis considers the demand for gambling for each of the two types of gamblers. Addiction is an irrationality, which is difficult to deal with in economics. Sections 2.1 to 2.3 rationalize the irrationality by assuming that the addicted gambler has a large and inelastic demand. Sections 2.4 and 2.5 sketch a more complex trigger/spree mechanism.

2.1 Two demand curves

Figure 1 shows the two demand curves, $Q = D_N(\lambda)$ and $Q = D_P(\lambda)$, for a normal and a problem gambler. The D_N-curve is a normal looking demand curve that gives a modest budget share for gambling, well within the means of the gambler. The evidence is that it has a price elasticity of about –2 (see Farrell, 2007).

The problem gambler has the demand curve, D_P, which is much higher and steeper than D_N. The price elasticity is smaller (numerically). Perhaps it is –½, or even closer to zero. However, much of that curve is unobservable (the dotted part), as it quickly hits some x, where it crosses a gambling budget constraint, *the m-curve*, and becomes irrelevant.

Figure 1. Demand for gambling by a normal and an addicted gambler



That is, the m-curve is where the product of the gambling price λ and quantity Q is equal to the most the gambler can afford, m. Thus the m-curve is:

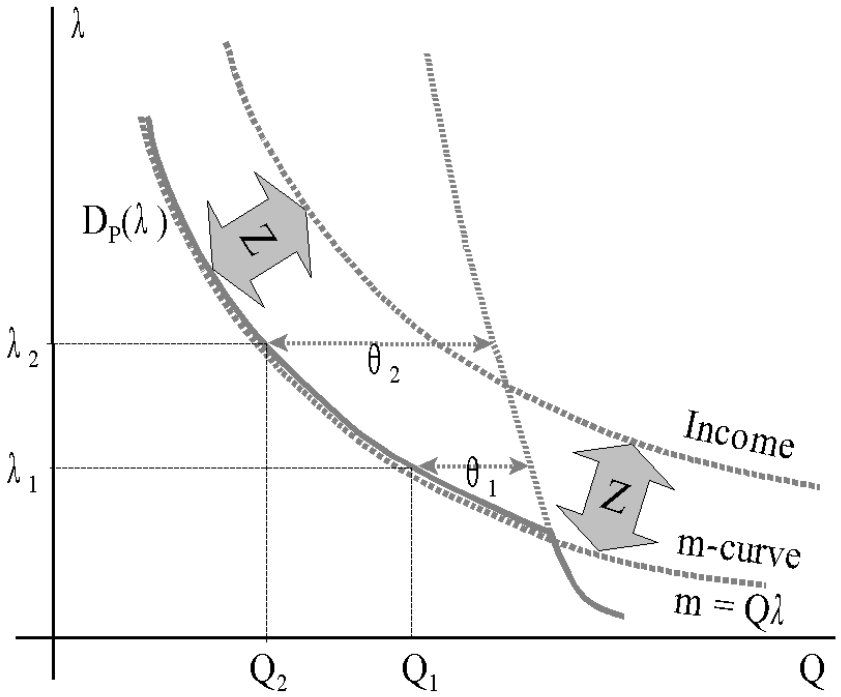
(1) $\lambda Q = m,$ or $Q = m/\lambda$, which is a rectangular hyperbola.

From point x, the demand comes to follow the max budget share upwards. This part of the demand curve is termed D_{P2}. The demand curve, D_P, thus has a kink in x, and becomes a constrained behavior when prices are above x. Here the demand curve turns into a gambling constraint with the price elasticity of –1.[4]

2.2 The gambling constraint: The m-curve and its relation to income[5]

Figure 2 develops Figure 1, but it only looks at the compulsive gambler. Now we try to explain the m-curve. The essential point is that the *m*-curve is substantial relative to the income of the gambler. The distance is *Z*. It is the necessary expenditures – for the gambler and those dependent upon him – to everything else than gambling.

Figure 2. Demand for gambling by addicted gambler



4. If $\lambda Q = m$, then $Q = Q(\lambda) = m/\lambda$. And the price elasticity is $\frac{\partial Q}{\partial \lambda}\frac{\lambda}{Q} = \frac{\partial (m/\lambda)}{\partial \lambda}\frac{\lambda}{m/\lambda} = -\frac{m}{\lambda^2}\frac{\lambda^2}{m} = -1.$

5. Here income is taken to be net of income taxes.

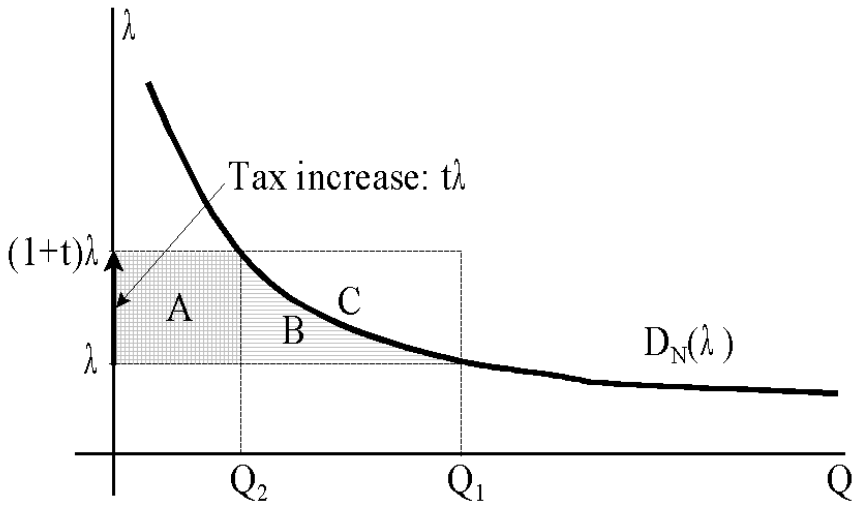
The gambler is constrained by her income. She really wants to gamble more. If the price is λ_1 the gambler can "afford" to buy the quantity of gambling Q_1, but she wants to buy the quantity $Q_1 + \theta_1$ as shown. This puts pressure on reducing *Z*. In the same way is the price is λ_2. Here the gambler wants to buy the quantity $Q_2 + \theta_2$ that is higher than her income.

Thus θ may be termed the *tension* variable. It is likely that $Z = Z(\theta)$, so that the higher θ is the more *Z* is reduced. And, of course, the more Z is squeezed the more the family and friends of the gambler are tempted to turn away from the addict.

2.3 The effect of increasing the tax on gambling

Assume that the rate of revenue collection goes up either by increasing the monopoly power of the GSOE or the tax on the private enterprises goes up, corresponding to an increase in the cost of gambling from λ to $(1+t)\lambda$, so that the tax increase is $t\lambda$.

Figure 3. The effect on normal gamblers of a tax increase



The revenue of the tax increase on normal gamblers gives the typical welfare calculations like the calculations for any other good – see Figure 3. As the good has a relatively elastic demand it causes a large fall in consumption and thus a fall in the consumer surplus, *A* + *B*. It gives the revenue *A*, which is redistributed to some other purpose, which for simplicity we assume has the same utility. The revenue is:

(2) $A = t\lambda Q_2$

The loss of welfare is B, which is roughly half of the square *C*, so we get:

$$(3) \qquad B \approx \frac{C}{2} = \frac{t\lambda}{2}(Q_1 - Q_2)$$

For the non-constrained part of the demand curve for the addicted gambler the story is the same except that the area B now becomes much smaller. Money is taken from the gambler and redistributed to some other purpose.

Another story occurs for the constrained part of the demand curve for the addicted gambler. Now Q = m/λ. This allows us to calculate everything;[6] but we only show the results corresponding to (2) and (3):

$$(2b) \qquad A = t\lambda Q_2 = \frac{t\lambda}{(1+t)\lambda} m = \frac{t}{1+t} m$$

$$(3b)^7 \qquad B \approx \frac{t\lambda}{2}(Q_1 - Q_2) = \left(\frac{t\lambda}{\lambda} - \frac{t\lambda}{(1+t)\lambda} \right) \frac{m}{2} = \frac{t^2}{t+1} \frac{m}{2} = A \frac{t}{2}$$

Imagine that the tax increase is 10%, so that $t = 0.1$. Then B is only 5% of A. Thus we still have that money is redistributed from the addicted gambler to everybody else with a small loss of consumer surplus.

These results therefore show that an increase in the taxation on gambling causes a large loss of welfare for the normal gamblers and a small one for the addicted gamblers, who still use all they can on gambling. Thus the gambling externality is not reduced. This is probably not what the political decision-makers imagine.

2.4 Irrationality of addiction: The trigger/spree-mechanism

Compulsive gambling is often described in fiction, with Dostoyevsky (1866) as the most famous gambling novel. It is known as an accurate description of the author's own addiction.[8]

Also, psychologists like Jørsel (2003) have given illuminating case studies suggesting that addicted gamblers at some stage in their addiction lose interest in and the ability to perform normal work. Part of the process is that addicted gamblers borrow money from everybody they know, and by not repaying turn friends and colleagues into enemies. This may lead to loss of job and a general social deroute. That is, excessive gamblers first run down

6. A note is available from the author with the complete calculations.

7. This formula is an approximation. The exact formula is: $CS = (\ln(1+t) - t/(1+t))m$. The approximation is very good for small *t*'s, as the fault stays below 1% of CS till the tax rate reaches 40%.

8. A biography of Dostoyevsky that covers the amazingly strong relation between his life and work is Kjetsaa (1987). Dostoyevsky's gambling addiction was so strong that his economy was always on the brink of collapse.

their social capital, and then they start borrowing on the gray market, soon getting into a real economic mess. Also, the need for extra income generated by the addiction may be directed toward anti-social behavior. This is modeled as the *DWL* on Figures 4 and 5 below.

Addiction is an irrationality corresponding to an extreme behavior. Figure 2 gives a rational economic interpretation of addiction as a steep demand curve turning into a constrained one. This is probably realistic for the average of all addicted gamblers, but it is not a realistic description of each individual one.

From the case description referred to it would perhaps be more accurate to imagine that the demand for gambling by the addict is highly irregular, like the one for alcohol by the alcoholic. Often, the addict refrains from indulging in his obsession for some time, but then something triggers the addiction, and once started, things get out of hand.

Thus, the demand curve may shift between horizontal and vertical due to a trigger mechanism, which is difficult to generalize. The addict is unable to bet only a little, like normal people. This may be modeled, but the model is likely to be complex. Using the analogy of alcohol and drugs, we say that the addicted gambler does not gamble when she is sober, but once something triggers the mechanism of addiction, she goes on a gambling spree.

2.5 Controlling the gambling problem by reducing the number of triggers

One way to reduce the gambling problem is thus to identify and reduce the number of triggers. The main problem is that this is a field where knowledge is sporadic, and the triggering may have a large random element. However, 3 factors may be generalized:

(*r*) Some gambling products are stronger triggers than others.

(*a*) Advertisement may trigger sprees.

(λ) It is likely that one person's addiction may be triggered by other people gambling, and thus be a function of the amount of normal gambling, that depends on the price λ.

(*S*) Treatment may reduce the number of problem gamblers.

Section 3.1 argues that the number of problem gamblers, N_P, may change as a function of theses factors – this will be discussed as a macro effect:

(4) $\Delta N_P = q(r, a, NG_N(\lambda), S)$, the partial derivatives are $q_r > 0$, $q_a > 0$, $q_\lambda < 0$ and $q_S < 0$

While the signs on the effects (the partial derivatives) are probably not controversial, the sizes of the effects are largely unknown.

Griffiths (2007) argues that the effect, q_r, of regulation the range, r, of gambling products is substantial, especially if the most trigger-prone products are singled our. Also, it appears likely that there a sizable effect, q_S, of treatment, S.

The other two effects are more speculative, and I have found no numbers to allow even tentative quantitative assessments. While a tax increase have no effect on $NG_P = m$, it may reduce the gambling problem by reducing normal gambling and hereby triggering fewer new problem gamblers as modeled in (4). This is probably not a strong effect.

The argument for a GSOE is that it may provide fewer triggers by behaving more responsibly and less efficiently. Also, it is closer to the politicians, who have people's welfare in mind. But then, politicians are also susceptible to stakeholders, and they want tax revenue.

3. Macro: The gambling problem

The present section presents a simple macro model of the gambling problem by use of a graph with a basic macro model. It uses the concepts of a *dead weight loss*, *DWL*, and *excess gambling expenditures*, NG_P, to model the problem. The two key explanatory variables in the discussion below are *the price of gambling*, λ, and the GSOE *share* of the industry, μ. Things will be explained as we go along, but Table 1 may be useful to keep track of the variables.

Table 1. The variables and the main bookkeeping relations

a, r	Advertisement, and product range in the gambling sector
C	Value added of gambling industry. Second part of gambling costs
D	Demand for gambling, by a normal and an problem gambler: D_N and $D_P = m$
DWL	Production loss due to problem gambling: $DWL = \beta\, NG_P$, where β is a parameter
G	Gross gambling expenditure: $G = G_N + G_P = W + R + C = W + NG$
Γ	Total costs of the gambling problem, estimated as: $\Gamma = DWL + NG_P$
λ	Price of gambling: $\lambda = \lambda_R + \lambda_C = T/G + C/G = NG/G$
N	Population, divided into normal and problem gamblers: $N = N_N + N_P$
NG	Net gambling expenditure: $NG = NG_N + NG_P = G - W = R + C$, the cost to the gambler
NG_N	Normal gambling: $NG_N = NG - NG_P = (1-\alpha)NG$
NG_P	Net spending on problem gambling: $NG_P = \alpha NG$, where α is a parameter
μ	The share of the GSOE in production, $0 \le \mu \le 1$
q	ΔN_P, increase in the number of problem gamblers
S	Budget for problem treatment: $q_s = \partial q / \partial S$ is treatment effectiveness
T	Revenue to public sector, where $T = T_M + T_P$. Main part of gambling costs
T_M	Monopoly rent of GSOE (Gambling State Owned Enterprise). Paid as tax
T_P	Gambling tax paid by market firms, over and above other taxes
W	Winnings returned to gamblers

3.1 From the micro level of Section 2 to the macro level

The population, N, consists of $N = N_N + N_P$, i.e., normal and problem gamblers. In the static calculation the gross movements between the groups even out.

From Section 2 we know that the average normal gambler spends $Avr(D_N(\lambda, a, r))$. The aggregate normal net gambling is: $NG_N = N_N Avr(D_N(\lambda, ...))$. Section 3.2 replaces the average with a NG-curve that gives the "normal" gambling expenditure of all gamblers.

In the same way we get that the average problem gambler spend m on her addiction. Thus the aggregate net gambling of the addicted is $NG_P = N_P m$. Section 3.2 replaces the average with a triangle between the NG-curve, and NG_N-curve as will be explained.

This gives the aggregate net gambling expenditures based on averages:

$$(5) \qquad NG = NG_N + NG_P = N_N Avr(D_N(\lambda,...)) + N_P m$$

We have data for NG, and from sociological studies we may have measures of the two *N*'s, so with data for either $Avr(D_N)$ or *m* everything can be estimated/assessed.

However, there is the problem that the two groups may not be permanent. Section 2.5 argued that various factors, such as, *r, a* and $NG_N(\lambda)$ may trigger dormant addictions. Thus there may be a net movement of people to the problem group as modeled in equation (4) $\Delta N_P = q(r, a, NG_N(\lambda), S)$.

The group-shift variable, *q*, turns the calculations dynamic. If the 5 variables in (5) can be calculated from more years it is possible to calculate *q* and to estimate the effects on *q* of the other variables. This is certainly not possible for the Danish data we consider.

3.2 The core of a model – explaining Figure 4

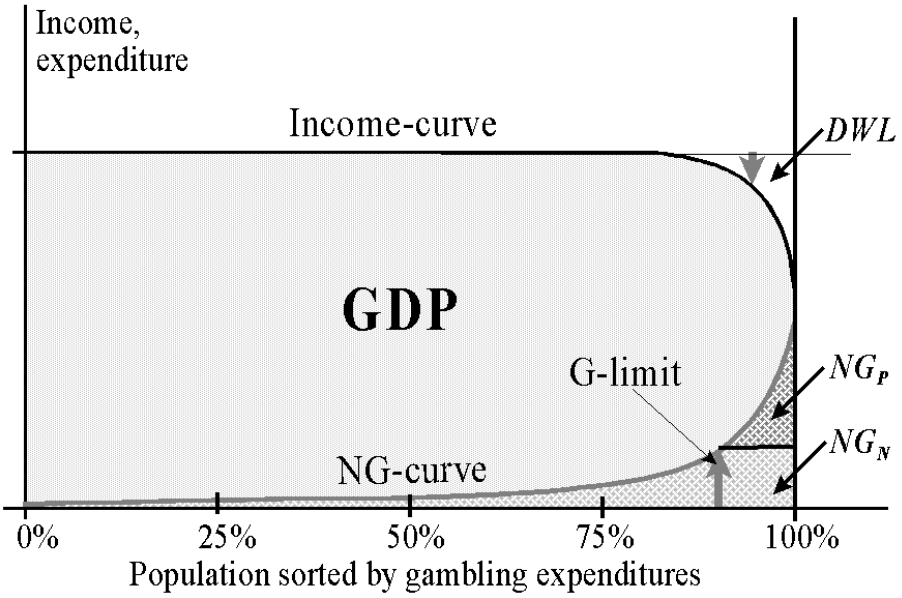
Figure 4 is a macro model of the gambling problem. It considers a rectangle giving GDP measured as income: GDP is the number of people times their income. The figure depicts two key curves: The income-curve and the NG-curve. The trick that generates the figure is that people are sorted by the net amount used for gambling, *NG*.

The income curve: Figure 4 assumes that gambling is randomly distributed in the population, so that there is no relation between the amount of gambling and income. This makes the income-curve horizontal, except the downward bend to the extreme right that will be discussed. This assumption will be relaxed in Section 3.4.

The NG-curve: By the sorting the NG-curve must slope upward. NG is the "wattled" area below the upward sloping NG-curve. The gambling problem only occurs for gamblers spending more than a certain amount (the G-limit) on gambling. Thus, the bold gray arrow of the G-limit divides the NG-area into normal gambling, NG_N, and problem gambling, NG_P.

NG redistributes income (and hereby consumption) from the gamblers to the gambling industry, *C*, and the state, *T*. Here, the assumption of full employment (or steady state growth) is essential. We assume that instead of producing the service of gambling, the labor force would in its absence have produced the goods the gamblers would otherwise have consumed. For normal gambling one may assume that gambling replaces other recreational goods.

Figure 4. A stylized theory of the gambling problem



Note: The text concentrates on three areas: *DWL* and the two parts of *NG:* $NG_P + NG_N$. They are drawn so that the *NG*-area is approx. 5% of GDP. The *DWL* and NG_P both amount to approx. 2% of GDP. This is exaggerated to make the areas visible. In fact, the full *NG* is only about 1.2% of GDP in Denmark, or one third of the areas shown. About the same reduction is likely to apply to *DWL* and NG_P.

As discussed in Section 2.4 addiction causes problems to the gambler himself in the form of a social deroute. This is likely to lead to a loss of career and even job, so the income curve will eventually turn down, as shown. This is termed a Dead Weight Loss, *DWL*, as it is a potential production that is lost due to gambling. It is shown on the upper right hand side of the graph. The upper bold gray arrow shows where the *DWL* turns visible. It gives an alternative measurement of the G-limit, where the problem begins.[9]

For the addicted gambler the excess gambling causes problems, both to himself, as caught by the *DWL*, and to others, mostly as a family externality. It is proportional to NG_P, and we may simply use NG_P as the measure. Both *DWL* and NG_P are measured (or at least measurable) in simple economic terms.

3.3 The two problem areas DWL and NG_P

My intuition is that the form of the two problem areas, *DWL* and NG_P, are roughly similar. They certainly follow from each other. The *DWL* occurs due to excess gambling, and once the

9. It is interesting to read the questionnaires used to identify problem gamblers. Most items actually try to catch one of the two G-limits shown on Figure 4.

social deroute of the gambler starts, gambling becomes more and more excessive. So I shall simply assume that *DWL* and NG_P are proportional. Consequently we have two losses:

DWL, dead weight loss, not measured, but guesstimated to be $DWL = \beta NG_P$.
NG_P, excessive net loss of family income $NG_P = \alpha NG$, which is assessed using relation (5)

The size of the gambling problem, Γ, thus becomes:

(6a) $$\Gamma = DWL + NB_P = (1+\beta)NB_B = (1+\beta)\alpha NB.$$

As everything is kept simple, it allows a basic assessment of the size of the gambling problem from *NG* and estimates of the two parameters α and β.

Here α can be calculated from the variables of relation (5). It is not accurate, but the order of magnitudes is reasonably easy to assess. However, the evidence on the size of the *DWL* is weak. For Denmark Bonke (2007) and anecdotal evidence suggest it is small. I shall use the *guess* that $\beta \approx 0.5$, which is probably too high, so that *DWL* is half NG_P:

(6b) $$\Gamma \approx 1.5NB_P = 1.5\alpha NB.$$

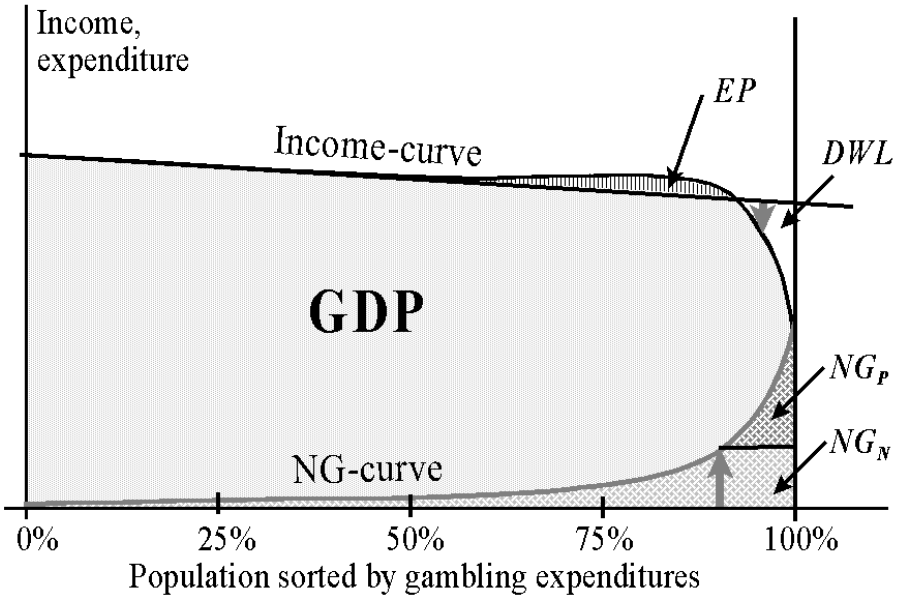
3.4 Two complications: Income dependency and excess production

The income-curve on Figure 4 is horizontal, assuming that gambling is independent of income. This is in accordance with Bonke and Borregaard (2006); but Smith (2007) provides evidence that NG is falling relatively as income rises. This can be depicted as a downward sloping income line as drawn on Figure 5.

Another possible complication is that the demand for income of the addicted gambler is such that it generates an excess production, *EP*, as drawn on Figure 2. Maybe the gambler does not want her family to suffer, and thus works extra hard to make money. This is actually what many of the respondents claim in Bonke (2007). Also, the addiction of Fyodor Dostoyevsky, often caused his household to be close to economic ruin. It appears that he wrote particularly fast when bankruptcy was close.

If there is an *EP*-area, it offsets some of the *DWL*. This is another reason not to take the *DWL* to be as large as the NG_P-area. However, the assessment of the *EP* and the *DWL*-areas are based on little evidence.

Figure 5. Adding the possibility of excess production



The model shown on Figures 4 and 5 can thus be amended to deal with several complications that appear in reality. Also, since it is a macro relation a lot of the more random micro problems, such as the trigger/spree mechanism, are likely to aggregate out.

Table 1 defined the cost of gambling as the ratio between net and gross gambling:

(7) $$\lambda = NG/G = (G-W)/G = (T+C)/G = \lambda_R + \lambda_C$$

We assume that the price influences demand in the usual way $\partial B/\partial\lambda < 0,$ with the price elasticity, see Section 2. This gives the same expression for the effect of taxes and other costs.

It appears that gambling addiction in many cases can be cured like alcoholism, once the addict recognizes the problem and makes an effort not to bet on anything, see Jørsel (2003) and the references in Bonke (2007). Also it appears that a medical treatment may work. Hence, it is clear that $q_S > 0,$ and it is even likely that q_S is substantial.

4. Macro: A case study of the Danish case

The model just presented should allow the reader to estimate the costs for society of gambling. The data from Denmark will be used to show how it is done in practice. If the reader believes the data, he may just look at Table 2 and then jump to the conclusion in Section 4.4, where the total costs of gambling is calculated for Denmark.

Table 2. Names in Danish and our translation

Unit	Danish name	Ownership
Gambling Authority	Spillemyndigheden	Legal control – unit of Tax Ministry
Danish State Lottery, Ltd	Det Danske Klasselotteri A/S	100% state owned
Danish Gambling, Ltd. Owns (1) – (3)	Danske Spil, A/S	State owns 80% of shares[a)]
(1) Danish Pool Betting, Ltd	Dansk Tipstjeneste A/S	Old name kept for main company
Has subsidiaries for Lotto, etc		
(2) Danish Totalizator, Ltd	Dantoto A/S	
(3) Danish Slot Machines, Ltd	Dansk Automatspil A/S	Operates 3,000 slot machines [b)]
Private slot machine operators	Taxed, but easy to get permit	Operates 22,000 slot machines [b)]
Six casinos, in major hotels		Permitted in 1991

Notes: a. The remaining 20% of the shares are owned by sports organizations, which are NGOs.
b. The Danish population is 5,300,000 so there are 5,300,000/25,000 = 210 Danes per machine.

4.1 The gambling sector

A recent study on privatization and public ownership in the (old) EU countries (Köthenburger et al, 2006) shows that Denmark as a country with few SOEs (State Owned Enterprises). Virtually all are in the network industries where natural monopolies have to be regulated anyhow. The Danish GSOEs is thus an anomaly,[10] but a large liberalization was implemented in the early 1990s, and the GSOEs now only produce about 40% of the gambling.

The two GSOE firms have an old history. The oldest is the State Lottery started by King Frederik V's government to finance the main public orphanage in 1753. Now the surplus is paid into the general revenue as an ordinary tax. It has an annual turnover of about € ½ bill. The fraction of GDP for this lottery has been slowly falling, and it projects a somewhat "grandmotherly" image.

10. Countries use different combinations of regulatory instruments and institutions, partly due to history, but also because solutions follow traditions used for other addictive goods. Alcohol is heavily taxed in all Nordic countries (lowest in Denmark). Only Denmark does not combine the tax with an SOE liquor retail monopoly.

The second is *Danish Gambling*. It was started as a soccer pool to finance soccer in 1948 and has gradually grown and sprouted new branches. It increasingly competes with new/foreign gambling products. One division runs approx. 12% of the Danish slot machines in pubs and game parlors. The total turnover is about € 1¼ bill. A little more than half is the monopoly rent, of which most goes into a special G-fund (Tipsfonden), which supports sports and other good causes.

The private gambling sector runs 22,000 slot machines of which many are in gambling arcades. Also, there are 6 "high end" casinos, with roulettes, card games and dress code. Also some private clubs and NGOs are allowed to rum bingo and various lotteries.

Finally, illegal gambling should be mentioned. It has two parts: The illegal gray/black sub-sector has been (almost) wiped out by the liberalization and will be disregarded.[11] Gambling abroad using the *internet* appears to be increasing fast, but it is still a minor part of gambling. Approx. 85% of all Danes have internet access from their homes. Thus, it is easy to bet abroad, and nobody has yet been punished for doing it.[12]

4.2 A study of problem gambling

The Danish Institute of Social Research has recently completed a study of the prevalence of compulsive gambling; see Bonke and Borregaard (2006) and Bonke (2007). It is made as similar recent studies in Norway and Sweden. That is, they use the standard U.S. questionnaire which has been translated and adjusted to fit in a Scandinavian setting.[13]

Table 3. Categories and main results of Danish gambling dependency study

	Category	Definition	Fraction
(1)	Compulsive gamblers	Life dominated by gambling	0.1%
(2)	Problem gamblers	Major factor in part of life	1.5%
(3)	Others	Gambling is no problem	98.4%

Source: Bonke and Borregaard (2006).

11. The largest attempt to measure the gray sector in Denmark is from the Rockwool Foundation (see e.g. Mogensen, 1994), which concentrates on the effort to escape taxation. Gray is thus as a normal activity, which is hidden, so that it leaves no paper trail for the tax man to follow. The estimates are at about 3-5% of GDP. Gambling is not singled out and only poorly covered.

12. If the computer on which the gambling program runs is placed in a location, where it is legal, there is little the (Danish) authorities can do. It is even legal (in Denmark) to advertise gambling abroad. Likewise, cruise trips on boats with casinos and journeys to tourist resorts with casinos cannot be forbidden. Thus there are complex issues involved in drawing a line and making some sorts of gambling abroad illegal.

13. The definition of compulsive gambling is from the DSM IV of the American Psychiatric Association.

It operates with three categories: Compulsive gamblers, problem gamblers and others. The study is based on interviews with a representative sample of 8,000 respondents. The main results are given in Table 3. As is obvious from the numbers, compulsive gambling is a small problem in Denmark. The category (1) is only 0.1% of the population,[14] and category (2) applies to only one part of life so it is much less at any one time.

This allows us to asses the fraction of the population having the problem at any time. The average Dane lives 78 years. Imagine that he has a gambling problem for 5 of these years. That amounts to about 6% of his life, and as the population pyramid to almost rectangular also to 6% of the problem gamblers: This is $0.06 \cdot 1.5\% \approx 0.1\%$ that should be added the 0.1% having a permanent problem. Thus, at any time the problem afflicts 0.2% of the population.

The study also contains summaries of detailed interviews with 453 persons, where half are problem gamblers (from the first study) and the other half are a control group with the same socio-economic characteristics. It appears that the social deroute due to excessive gambling comes fairly late, and that many people with a problem still manage to live an almost normal life. For example the data show that the divorce rate for problem gamblers is only marginally higher that for the control group.

4.3 The price and the treatment observation, and a look at the other Nordic countries

Bonke (2007; p 52) gives the estimates in Table 4 of the prices (defined as in Table 1) of various gambling products in Denmark:

Table 4. Gambling prices for various products in Denmark

Products of the GSOE			Products of the private companies		
Public revenue mainly administrated via G-fund			Tax revenue paid to general tax revenue		
Product	Price, λ	Problem [a)]	Product	Price, λ	Problem [a)]
Football betting, Lotto	55%	Small / weekly	Slot machines	18%	High
Scratch card games	30-50%	Small / small size	High end casinos	2-10%	High
Kendo, Oddsett	30-40%	Medium	Internet poker	2-5%	High

Note: (a) The assessments are based on Griffiths (2007). The price structure is fairly unchanged the last 20 years, thus it is nor a reaction to the starting international competition in the sector.

14. The estimate of compulsive gamblers is based on 0.1% of 8,000 respondents, i.e. 8 persons. This is a small number and likely to be Poisson distributed. Thus, it cannot be a precise estimate. However, the 1.5% of problem gamblers are 120 persons. In the detailed re-interviews twice as many are covered, so the study (Bonke 2007) covers people with a small gambling problem only.

When these prices are compared with the potential of the various products for triggering the gambling problem (according to Griffith, 2007), it appears that they have a negative correlation – products with the highest triggering potential has the lowest tax. This is termed the *price observation*.

One group of NGOs (partly) financed by the G-fund is the (handful of) institutions treating problem gamblers. While about € 1 bill is collected in taxes from gambling, only about € 4-5 mill is used to treat the addicted. This is termed the *treatment observation*.

Both the price and the treatment observation suggest that the *pious* purpose of reducing the gambling problem is secondary to the purpose of tax collection. The political economy of the explanation of these priorities will be discussed in Section 5.

The estimated fraction of the gambling problem is only between 50% and 70% of the corresponding numbers from Norway and Sweden, even though the turnover in the gambling industry is relatively high in Denmark. Interestingly, the pattern of consumption corresponds to that of alcohol consumption. Danes drink more than other Scandinavians, but Denmark has a lower incidence of alcoholics (and alcohol-related diseases) than Norway and Sweden. The beverage sector is fully privatized in Denmark, and the alcohol tax has been lowered almost to the EU-level. It is sometimes argued that Denmark is a marginally more laid back society than its neighbors – at least this is what many Danes think.

4.4 The calculation: The cost of gambling in Denmark

In 2005/06 the turnover of the GSOE was about € 1.75 bill., at a time when GDP is about € 200 bill., so GSOE gambling is a little less than 1% of GDP. When the market sector is added, we reach about B = € 4 bill or 2% of GDP. Net gambling NG = € 2½ bill or 1.2% of GDP.

If we assume that the income line is horizontal as on Figure 4 we get a crude estimate of the two *NG*-areas. Section 4.2 estimated that $N = N_N + N_P$ = 99.8% + 0.2% respectively. If the average compulsive gambler uses m = 50% of her (net of tax) income equation (5) gives:

(5b) $100\% = 99.8 \cdot x + 0.2 \cdot 50\%$, so that $x \approx 90\%$. It means that $\alpha = 0.1$

Thus, about 10% of the net gambling expenditure *NG* is in the problem area NG_P. This is not, of course, a precise estimate, but it gives an order of magnitude. Problem gambling thus accounts for 10% $\pm$ 5% of the gambling. Using 10% as the estimate, relation (6b) gives:

(6c) $\Gamma \approx 1.5NB_p = 1.5 \cdot 0.1NB = 0.15 \cdot 1.2 = 0.18$, in % of GDP.

As some of the quantities are in the high end we conclude:

(8) $\Gamma = 0.15 \pm 0.05\,\%$ of GDP or € 300 mill

This means that the *DWL* and the *NG* triangles on Figure 4 are drawn far too big (for visibility as explained in the note to the figure). The *NG* triangle should only constitute 1.2% of GDP. Hence, both the *DWL* and the NG_P areas are far too big as well.

Expressed in % of GDP, we are dealing with a small problem, and it is small e.g. compared to the costs of alcohol. However, there are other ways to look at the size of the problem: 0.2% of the population is 10,000 people, so at any one moment, about 10,000 Danes are afflicted by compulsive gambling. For them it is surely a large problem,[15] which should be treated.

15. This gives an average gambling problem of € 30,000 per addict. It includes DWL of € 10,000, which is not produced. The net DWL problem is hence € 1,670 per month. This only applies in the worst cases.

5. Political economy: The gambling monopoly as an SOE

No study has compared the cost structure in the GSOEs with the cost structure of comparable market companies. However, a large literature studies the relation between costs in SOEs and market firms in other fields – it is both based on theory and many empirical studies. Consequently, we know what to expect in the GSOE sector. That is what we have to believe in the absence of detailed studies of the sector.

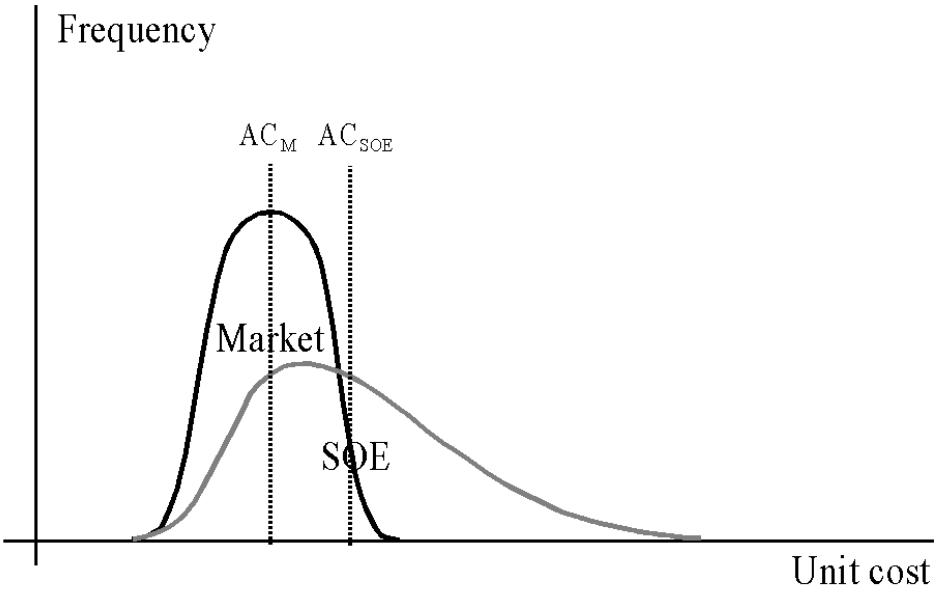
5.1 The market vs the SOE, the literature in a nutshell[16]

All organizations have the "internal" goal of *cost maximization*. That is, the employees want higher salaries, better fringe benefits, and organizational growth. A market firm is forced to turn cost maximization into minimization by two mechanisms:

(F1) Competition punishes inefficiency.

(F2) The owner is the residual claimant and the ultimate decision-maker. He thus has both a strong interest in and the means to enforce cost minimization.

Figure 6. The distributions of unit costs for the typical market firm and SOE



16. See here World Bank (1996), the surveys by Megginson and Netter (2001, 2003), Parker and Saal (2003), Köthenburger et al (2006) and Christoffersen et al (2007). A few studies, notably Willner (2003, 2006) find no efficiency difference between SOEs and comparable private firms.

It is much more uncertain and debatable what SOEs maximize. SOEs always have some degree of monopoly, and cannot go bankrupt as easily as market firms – so (F1) is weak. The owners are people at large, as represented by the politicians. They are not the residual claimants, so also (F2) is weak. Thus the standard result when comparable private and public firms are compared is that the average cost difference is in the order of 20-30% in developed countries. However, there is a fairly large variation in the costs, notably in the SOEs.

The cost distributions found in studies with many cases are shown on Figure 6. The market enforces a fairly narrow (and symmetrical) distribution of the costs of the private firms, where the standard deviation of the distribution is often even smaller than the average. Variations in the market structure matters a great deal to the distribution. However, for the SOEs the distribution is asymmetrical with a long upward tail. Thus, the medians of the two distributions are not as different as the average.

Though the political decision-makers – who represent the owners – are not the residual claimants, they have other, namely political goals. So basically, the SOEs have to observe these goals. One way the goals are presented to the SOEs is through their charter. However, there is also a board with representatives for the political interests, and a top management, which typically consists of (senior) ex-civil servants, who are well trained in the complex game of combining loyalty and politics. Finally, there is the threat of liberalization and privatization that some governments and the EU try to push.[17]

In the absence of studies of the sector we have to believe that the usual result applies: BSOEs are a bit less efficient than the market firms would be if the sector was privatized. However, due to the externality (of the gambling problem) efficiency is not the only goal.

5.2 Which goal wins? The case of the GSOE

The GSOE has the contradictory goals of problem prevention and tax collection. Compromises have to be made, and different owner representatives may differ on which part of the compromise should take first priority. In addition to the ideal of maximizing social welfare, there is the pressure from the groups with the two interests: When the relative power of the groups is assessed, the tax goal is likely to win for two reasons:

The first reason works even if there is no switching.[18] It starts from the *weak victim observation*: The victims of the problem are few, they tend not to advertise their problem, and

17. The push from the EU to liberalize has already generated amazing results – in Scandinavia the most visible is that it has forced the public airline, SAS, to cut costs to half, over a period of less than 5 years.
18. That is even if the all public revenue collected from gambling is paid into the general tax fund.

as they do not suffer from visible disabilities, it is relatively easy for them to hide. They are certainly not organized and hence constitute a politically weak group. On the other hand there is daily pressure on the political decision-makers to increase public expenditures and therefore they need taxes.

The second reason operates if the tax revenue is administrated via a special fund, as it normally is for GSOEs. This creates switching and stakeholder interests: In most countries the stakeholders are organized sport and culture. In some countries it is also the social NGOs, which are often associated with the churches. Due to switching, the tax goal is supported by large and well organized – and hence powerful – pressure groups.

Consider organized sport, which has the support of millions of fans, and culture which is always well connected to the press and the upper crust of society. It seems obvious that only the toughest and most idealistic policy-maker has any choice but to bow to the big guns. The collection of revenue must win and make the prevention of the G-problems becomes a weak second.

This is well in accordance with both the price and the treatment observation in Section 4.3. Also, it appears to be a general result.

5.3 SOEs as tax instrument: A general rule?

The literature on SOEs as tax instruments probably only amounts to hundred papers looking at special cases: An important case is natural resources, where economic theory suggests that the *resource rent* is the ideal tax subject as tax prevents the rent from being wasted in excess costs expended to capture the rents.[19] As regards exhaustible resources, such as oil, some countries have chosen to keep the national wealth under public ownership (e.g. Mexico and Norway); while others (e.g. the USA and Denmark) prefer private operators, which are then taxed. However, it appears that the tax authorities are quite successful in extracting the rent regardless of the institutions used.

Another much studied case is marketing boards in LDCs, where the classical study is Bates (1981, 2005). It shows how an institution set up by colonial administrations to protect poor farmers in the LDC world from the monopsony forces (typically multinational firms) in the market normally turns into tax instruments as the boards are taken over by the new national governments after independence. For long, the study did not receive much attention,

19. For renewable resources, such as fish, all countries keep the enterprises private, and then tax or regulate use. The choice is rarely in accordance with the recommendations of economists, but appears to be heavily influenced by a mixture of path dependency and politics.

but from approx. 1990 it led to a set of studies of the dynamics of SOEs, which are used as tax instruments when possible.

Consequently, we know that the story of the BSEOs is rather typical. Once the SOE has tax collection as one of its goals it tends to be the cuckoo chick in nest.[20]

5.4 The symbiotic relation of the GSOEs, stakeholders and politicians

What makes the GSOEs a special case is that their history has generated a political consensus agreement between the GSOEs, stakeholders and politicians. In Denmark it goes so far that the main stakeholders – the sports organizations – have been given 20% of the shares of the GSOE to cement the consensus on the policies of the GSOE.

Other institutional arrangements exist in other countries, but switching arrangements are common and they have provided the GSOEs with politically strong stakeholders. This, of course, somewhat constrains the behavior of the GSOEs, but it does provide them with a pressure group that gives some protection against liberalization threats.

Political decision-makers are experts at balancing interests. It is the key to the art of politics. Obviously there are a number of interests to be balanced in this case: powerful stakeholders, normal recreational gamblers, and victims of the gambling problem. These interests are clearly contradictory, so compromises have to be made. One part of many good compromises is to keep things somewhat unclear. As argued in the introduction, the GSOE is an instrument that allows both taxation and regulation to be softer and more informal. Thus, compromises are easier in this case.

The complex political games surrounding the GSOEs give them an image problem. Are they an almost market firm with profits and efficiency as the goal, or are they almost a social institution devoted to the dual purpose of taking the sin out of a morally dubious type of entertainment and at the same time financing good deeds?

The home page and advertisements of the Danish GSOE mentions both good roles, but it puts more emphasis on looking as a successful business. [21] Certainly, in Denmark the GSOE tries hard to project the image that it is a modern firm behaving like any other firm. This is well in line with the demand for public efficiency pushed by the Ministry of Finance.

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20. Tax capture often happens even of instruments that are not used through a SOE. An example is *green taxes* introduced for the pious primary purpose of protecting the environment, and with a secondary purpose of tax collecting. It appears that after some time the second purpose normally wins (see Daugbjerg and Svendsen, 2001, for a survey of the evidence).

21 One is reminded of the Danish cigarette industry, which is an efficient export industry, paying a high tax, publishing a warning on each package and giving half its surplus to foundations financing art and science.

5.5 The effect of market form

So far the argument has assumed that the market solution is in perfect competition. In standard economic theory this is the ideal that gives the highest short-run efficiency, if externalities are regulated. This is a somewhat unfair comparison, as it compares an SOE in a highly politicized environment with an economic ideal. Let us imagine that gambling in the EU is liberalized and eventually privatized.

As shown by Viren (2007) the enterprises in the gambling sector have rather marked economics of scale. Especially as regards lotteries it is easy to understand. The graphs looks rather like the similar graphs one can make for the companies in the medical drugs market and in fact for most sectors with modern mass production. Hence, it is fairly safe to predict that if the sector is privatized the firm structure will converge a situation where a handful of multinationals dominate and are engaged in (fierce) monopolistic competition.

Some theory sees this firm structure as optimal for innovation and technical progress, and thus as preferable in a long-run perspective.[22] Consequently, it is not clear that economics of scale is a problem in a longer-run perspective.

However, if the firm structure converges to full private monopoly it is surely an inferior solution that has to be regulated by the EU competition authority.

22. This is the prevailing view in the theory of endogenous growth, notably in the research started by Romer (1986). It also plays a prominent part in modern trade theory, see Ch. 5 and 10 in Feenstra (2004).

6. Conclusion: What have we found?

We can now summarize the analysis of the trade-offs in this difficult case. The article has data from Denmark to give orders of magnitudes. I hope it is sufficiently clearly explained how the calculations are made so that readers with a different national background, more knowledge, or different priors than the author, can amend the numbers.

The basis for the analysis is a simple graphical model of the gambling problem. It is reached by sorting the population by gambling expenditure. This allows us to draw GDP as a rectangle. The top line is an income curve, and near the bottom is an upward bending net gambling expenditure curve. At the right side of the rectangle the loss for society appears as two triangles.

One is the top of the gambling expenditure curve that is a peak of excessive gambling due to compulsive gambling. It gives a welfare loss that is mainly a family externality. The other is the dead weight loss due to the downward bend in the income curve as addiction causes people drop out of normal work. My intuition is that the two triangles are mirror images of each other. The (weak) evidence suggests that the dead weight loss triangle should be scaled down relative to the excess gambling triangle.

The paper makes an effort to describe how the two triangles can be assessed, and to do so using data from Denmark. Here the analysis is perhaps a bit too pedestrian, but it should allow the reader to repeat the exercise for another country, and to improve the estimate if more information becomes available.

This gives the size of the gambling problem of 0.2 ± 0.05 in % of the GDP. Consequently the problem is small. At any point in time it affects about 0.2% of the population or about 10,000 people in Denmark. However about 1.5% of the population experiences the problem during a period of their life. It is certainly an externality that should be reduced.

For most people, gambling is thus innocent entertainment. Some do not gamble at all, but most do so to add a little spice to the enjoyment of spectator sports. The utility it produces (the consumer surplus) is considerable, and it is inconceivable that it is not larger than the costs borne by the minority. So the solution to reducing gambling in general to reduce the gambling problem does not increase welfare in society.

This proposes that other regulation should be made to reduce the problem. This can be done either by regulating the product mix and the marketing methods of either the private business or through regulating the Gambling State Owned Enterprises – the GSOEs – that

exist in most countries. The GSOEs are a product of history. When tax collection was much harder than now, many countries created gambling monopolies earmarked to finance specific expenditures.

This has reduced many problems in the past, but it has also generated stakeholders who are often well organized and powerful groups, while the victims of the gambling problem are few and unorganized and thus politically weak. This has caused the goal of tax collection to dominate the goal of controlling the problem.

It thus appears that it would be better for both the welfare in general and the reduction of the problem if taxes on gambling were fully paid into the general revenue. That would allow the restrictions on gambling to be more focused on prevention and treatment of the gambling problem than on tax collection.

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