

The Gaming Addiction Problem and its Economic and Social Consequences: A Comprehensive, Dynamic Approach

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Abstract: We examine the economic and social implications of the gaming addiction problem, and in turn, its impact on the wellbeing of society. As many more younger males in any society increasingly spend more and more hours playing video games, they cannot acquire the skills and capabilities that schools and universities would have otherwise endowed them with, and which are necessary for employment in the modern workplace. Without the on-the-job training and re-skilling that serve to supplement and eventually supplant the skills acquired in academic settings, these unemployed or underemployed youth lose their ability to stay relevant over the remaining three or four decades of their careers for the demands of today's hypercompetitive, global marketplace. This inability to find or retain meaningful employment leads to a disproportionately larger number of males dropping out of the workforce, as evidenced by the precipitous drop in the male workforce participation rate since 2008. This, in turn, will very likely have a seriously adverse impact on GDP growth, birth rate, etc., currently as well as in the future, on an intergenerational basis. Without any regulation or policy intervention, the growth of internet gaming addiction will continue or even accelerate, with seriously negative consequences. Similarly, an active and proactive approach, rather than a passive and reactive one, is called for - otherwise it will be too little, too late to deal with what is a growing and increasingly serious socio-economic problem.

Keywords: Gaming addiction, economy, dynamics, consequences, problems, demographics

1 Introduction

More and more analysts and researchers have started focusing on the gaming addiction problem over the last decade or two, but it is only recently that the governments of several countries, such as South Korea and China, have begun to recognize officially that the gaming addiction problem is a serious one. With the Internet becoming much easier to access and more ubiquitously available over time, the number of gamers has increased significantly globally, and the number of gaming addicts has increased more than proportionately - this has now become a serious problem not only for gamers, but also for the addict's or would-be-addict's close circle of people (relatives, friends) and for society and the economy as a whole.

According to Hall and Parsons [1], Garrison and Long [2] and Goldberg [3] had presented the first definition for Internet-related disorders, Internet Addiction Disorder (IAD), as a "behavioral addiction that serves as a coping

mechanism and borrows from substance-dependence criteria from the DSM-IV" (DSM stands for the Diagnostic and Statistical Manual of Mental Disorder, a reference for diagnosing and classifying mental disorders). Griffiths [4] sought to expand this definition by including six "core components" of Internet addiction (salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse), and "hypothesized that the source of this addiction could stem from one or more aspects of Internet use such as the process of typing, the medium of communication, the lack of face-to-face contact, Internet content (e.g., pornography), or online social activities (chat rooms, MUDs, bulletin boards, computer games)."

Hall and Parsons [1] had cited Young [5] as having presented the second definition for Internet related disorders, Problematic Internet Use (PIU), another diagnostic term based on DSM-IV criteria associated with pathological gambling. This definition required

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”individuals to meet five of eight criteria for Internet addiction in order to qualify as an addict, viz.,

- 1.Preoccupation with Internet
- 2.Need for longer amounts of time online
- 3.Repeated attempts to reduce Internet use
- 4.Withdrawal when reducing Internet use
- 5.Time management issues
- 6.Environmental distress (family, school, work, friends)
- 7.Deception around time spent online
- 8.Mood modification through Internet use.”

According to Rasmussen [6], Internet addicts: (i) found it increasingly difficult to meet their major obligations at work, school, or home; (ii) used it longer, with less enjoyment; (iii) were restless, irritable, and anxious when not online; (iv) did not succeed in cutting down, controlling, or stopping use; and (v) experienced physical, psychological, and social problems due to their use, yet they persisted in their Internet behavior.

Hall and Parsons [1] had followed up by presenting a working definition for Internet Behavior Dependence (IBD), a form of Internet addiction, ”as a new disorder requiring informed response from addictions clinicians such as mental health counselors, and to provide an overview of the prevalence rates and demographic profiles of dependent users, and to review the assessment criteria and treatment for IBD.”

Since we have sought to focus more closely on gaming addiction, we build on the insights provided by Dr. Leigh Holman [7], President-Elect of the International Association of Addiction & Offender Counselors, into the addiction risks associated with different types of games in his presentation ”Internet Gaming Addiction.” These risk levels range from a low of 2 for Puzzle Games (which ”deal with logic, language, trivia, mindless repetition, and visual-spatial skills - no themes or characters”) to a high of 7 or 8 for ”Shoot’Em Up and Adventure Games” (FPS, or First-Person Shooter, Games, RTS, or Real-Time Strategy, Games, RPG, or Adventure and Role Playing, Games), with MMORPGs (or massively multiplayer online role playing games) such as World of Warcraft, taking the top spot with a 10 (since the first month for this game is offered free, it is easy to see how tens of millions of users can be hooked globally and be induced to pay, say, 13–15/month, to support their addiction).

Dr. Holman proposed the following criteria to determine whether a gaming addict suffers from the ”DSM 5 Section III: Internet Gaming Disorder”: ”Persistent and recurrent use of Internet to engage in games, often with other players, leading to clinically significant impairment or distress as indicated by 5 or more of the following in a 12 month period:

- 1.Preoccupation with Internet games.
- 2.Withdrawal symptoms when Internet gaming is taken away.
- 3.Tolerance: the need to spend increasing amounts of time engaged in Internet games.

- 4.Unsuccessful attempts to control the participation in Internet games.
- 5.Loss of interest in previous hobbies and entertainment as a result of, and with the exception of, Internet games.
- 6.Continued excessive use of Internet games despite knowledge of psychosocial problems.
- 7.Has deceived family members, therapists, or others regarding the amount of Internet gaming.
- 8.Use of Internet games to escape or relieve a negative mood.
- 9.Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of participation in Internet games.

While the first eight of these may present problems for the addict’s or would-be-addict’s close circle of people (relatives, friends), we believe that it is the last of these that has severely adverse implications for the economy and society as a whole, and in what follows, we examine these and related issues in greater depth.

In fact, when we link up the first, second and fifth of the criteria offered by Young [5] as listed above, with the first of the behaviors observed by Rasmussen [6] as listed above, we see that as Internet addicts (and their subset, gaming addicts) become increasingly preoccupied with Internet (games), they need to spend more and more time online (playing games), and hence we can expect them to have time management issues, and that they would find it increasingly difficult to meet their major obligations at work, school, or home. This in turn, would imply that their addiction to the Internet (or games) has jeopardized, or will end up jeopardizing, their lives and careers severely in that they have lost, or will stand to lose, significant relationship, job, or educational or career opportunities because of their participation in Internet games. More importantly, that this addiction may end up compromising their employability over the long haul, because they have not picked up and will not pick up (absent any corrective measures) the technical-, soft- and life-skills that would serve to essentially underpin their ability to find meaningful employment in the economy.

2 Modeling the Implications of Internet/Gaming Addiction for the Economy and for Society at large

In the current macroeconomic conditions, this would indeed be a cause of concern to parents, school teachers and university professors, politicians and policy makers, alike. Given the rather tepid economic recovery in the US and EU countries from the Great Recession (that was triggered by the bankruptcy of the investment bank Lehman Bros. on September 14th 2008 and which presented the global system with the greatest challenges since the Great Depression of the 1930’s), one cannot be blamed for believing that the worst is yet to come.

Fatas [8] suggests that if the US economic recovery is not as strong as previous ones, the stagnant employment to population ratio is the variable that "possibly best demonstrates the weakness of the recovery. This ratio summarizes two labor market variables: the unemployment rate and the participation rate." A declining ratio indicates that fewer resources are being used out of the available population, "either because workers cannot find jobs (high unemployment rate) or because they are giving up and leaving the labor force (low participation rate)." However, separating the effects of these forces by gender gives us deeper insights, as depicted in figure 1.

It is obvious from the rather precipitous drop in the employment to population ratio for males as compared with that for females, that males are missing from the workforce in increasingly larger numbers.

The critical question that one would have to ask and seek an answer for is: where are the missing working age males? If one were to divide working-age males into university-educated males and those with high school diplomas, or even high school dropouts, then one would realize that it is the relatively less-educated category of males that is suffering the most from the tepid recovery. This may well be attributable to the fact that the industries and sectors that these unskilled, less-educated males have traditionally worked in (e.g., construction, low-end services and manufacturing, etc.), have declined significantly, or even disappeared over time, with the increasing degree of globalization and the overhang of the housing crisis, which presaged and led to the global financial crisis of 2008.

Is it the case, then, that the unemployed males cannot find jobs (resulting in a higher unemployment rate) or are they giving up and leaving the labor force (which reduces the participation rate for males)? Have they become unemployable because their skills have atrophied from longer terms of their unemployment history, or because they have not obtained the skills necessary for obtaining meaningful employment in the first place? If the latter is the case, then has an addiction to the Internet and games been the factor which impeded them in their quest for the necessary skills and hence for meaningful employment?

While these plots are based on aggregate data for the 15-64 working age fraction of the population, we strongly suspect that sub-categorizing the male and female labor segments by age (into say, young, or 15-35; middle aged, or 35-55; and old, or 55-65) would throw the argument we seek to make into sharper relief. After all, given the more than 50 percent youth unemployment levels for young males in some developed economies, one can only conclude that this does not bode well for them as well as for the economy and society, in the future.

Consider the fact that some of the technical-, soft- and life-skills that are necessary but not sufficient for finding meaningful employment, are obtained in schools and universities, and the rest through on-the-job-training and re-skilling over the rest of their careers. The rapid rate of

obsolescence of knowledge acquired in academic settings would imply that much more emphasis ought to be placed on the latter, rather than on the former. In an increasingly dynamic and high-pressure workplace, professionals are discovering that they have to continuously learn and re-learn (and often unlearn what they have already learnt) on the "fly", in order to stay current and thus valuable, or even indispensable, to their employers. If young unemployed males have not been able to acquire the necessary skills and capabilities in the first place, how will they manage to find meaningful employment over the remaining three or four decades of their working lives? When you consider the case of young unemployed males who are also addicted to the Internet and games, the picture of long term employability becomes even bleaker, unfortunately.

To provide deeper insights into the impact of Internet addiction, and its subset, gaming addiction, on the macroeconomy, consider the numerous roles, as depicted in Figure 2, played by ordinary men and women (and their dependents, both children and retired parents, etc.) as:

- participants in the labor force: (i) who provide their labor inputs to: the private sector producers; the capitalists; the financial institutions; the government and public sector employers; as well as landlords; (ii) who, in return, get paid wages and salaries; (iii) who spend part of what they earn on goods and services provided by the other macroeconomic players; (iv) who pay direct and/or indirect taxes to, or are provided subsidies by, the government; (v) who save the remainder of their wages and salaries, which they could:

- deposit in their accounts with one or more of those financial institutions and get paid interest in return,
- invest in real estate (this could entail occupying a home they partly or wholly own, in which case they would save on the rent that they would otherwise have to pay to some landlord, or buying additional properties, which could elevate them to the rent-seeking landlord class),

- or invest in the stocks, shares and bonds issued by the private sector producers, the capitalists, the financial institutions and the partially privatized public sector entities, some or all of who pay dividends to their shareholders and interest to their bondholders; and

- (vi) who may borrow money over the short-, medium- and long-term from banks and other financial institutions to cover their credit card payments, their university tuition fees, their mortgage payments, and so on, and who would very likely pay the principal back and the interest due to their creditors over time;

- consumers of the various goods and services provided by the other players in the macroeconomy;

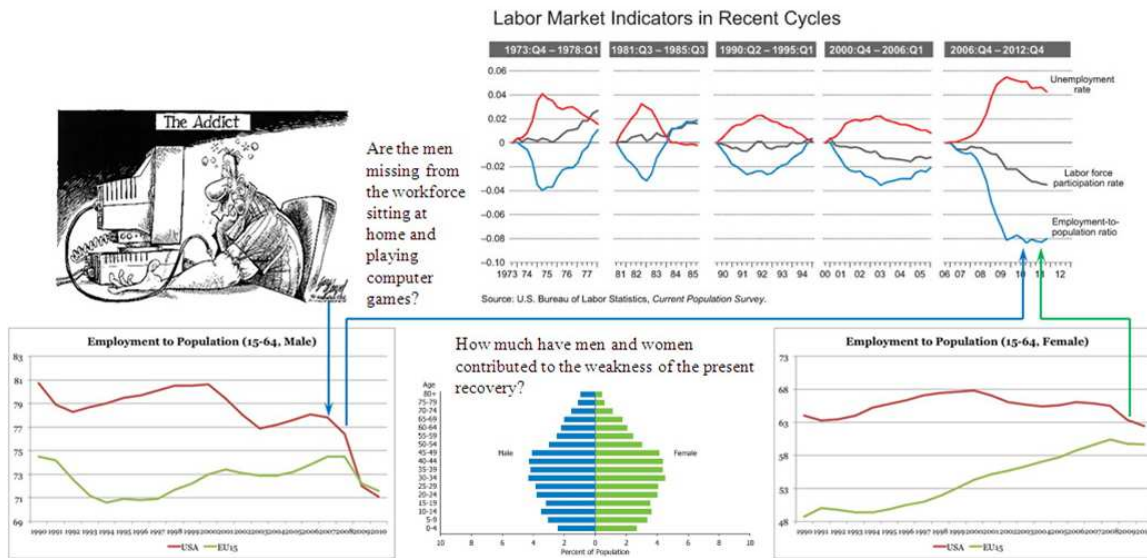


Fig. 1: A comparison of the current recovery with the recoveries from previous recessions, and the male and female employment to population ratios (adapted from Fatas [8], with the cartoon of the Internet addict borrowed from a Wordpress.com blog post by "katmil16" dated June 20, 2012 and entitled "Internet Addiction: Symptom or Cause?")

- tax-paying, voting citizens, members of various "publics" and as stakeholders as far as the government and the other players are concerned;
- rent-payers, savers, investors and borrowers as mentioned above; and
- perhaps, as members of the producers or capitalist class (if they launch and grow their own companies), or as rent-seeking landlords, if they have invested in real estate, or as elected or unelected members of the legislative/parliamentary bodies, government ministries and agencies, and so on.

In short, these are the functions and roles that we all have to play for a major part of our lives, if the economy is to grow sustainably and equitably, and if we are to attain what we all aspire for, i.e., a better life for ourselves and for our children, and so on.

Notice that as males drop out of the workforce (either because of longer term and hence skill-atrophying levels of unemployment or because they were too addicted to the Internet and games to acquire the skills in the first place), they are severely at a disadvantage relative to the employed males, vis--vis their ability to perform some or all of these functions and roles.

(While we have more or less resorted to stereotyping gaming addicts as young, unemployed and increasingly unemployable males, we should note, as warned by Hall and Parsons [1], that Internet addicts can no longer be "stereotyped as White, well-educated men with a thirst for knowledge (e.g. computer nerds). Current research indicates that Internet addicts can be of any race or gender. They will generally fall between the ages of 18 and 55, with an average of 15 years of education?As

technologies become increasingly accessible and diverse, age and education will no longer serve as useful guidelines for examining Internet addiction." Given Dr. Holman's assessment of addiction risks associated with different types of games that was alluded to earlier, we however, believe that younger males are more at risk in the current environment, and will continue our analysis based on this assumption.)

As we explain in Figure 3, as younger addicts grow older, they could become more addicted, more socially isolated, less employable (since they may lack the skills that their non-addicted cohort mates had picked up in schools and universities, while they, the addicts, were getting their online "fixes") and hence, or otherwise, less attractive to potential mates. If the younger unemployed and unemployable males (quite possibly because of their addiction to the Internet and games) cannot find spouses because they cannot support families in the first place, this will depress new household formation levels as well as new housing starts, which is one of the main drivers and leading indicators for GDP and GDP growth.

We can think of this as having a "triple or even quadruple whammy" negative impact on the economy over time (and we try to depict this in figure 4):

- the incomes that would have otherwise been earned by younger unemployed and unemployable men will be missing as far as GDP and GDP growth rates are concerned;
- the multiplier effects of the money they would have otherwise spent (if they had stable incomes), would be missing and this would depress most if not all of the goods and services markets over time.

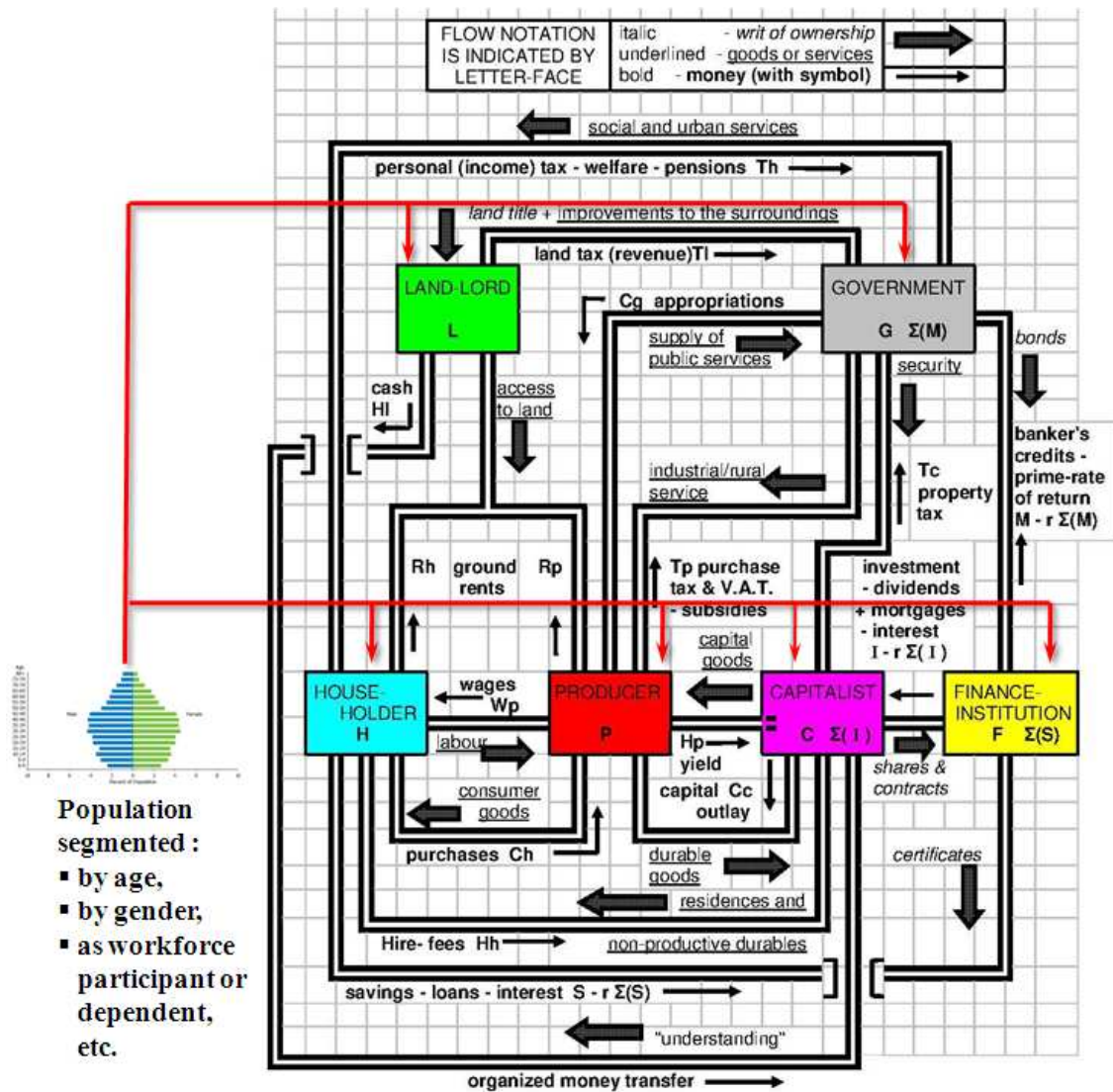


Fig. 2: The Role of Ordinary Male and Female Citizens and their Dependents in the Macro-Economy. (Adapted from the figure provided in the article Macroeconomic model from Wikipedia, the free encyclopedia)

–the inability to start and form stable households would translate either into a drop in birth rates over time (population growth is driven by the net accretion rate, or the birth rate minus the death rate - see [10] for more details), and this would have ripple effects over time, when the missing contribution of the unborn next generation to the GDP and GDP growth rates, two decades or more later, is taken into account, or worse (if, indeed, the transient or transactional relationships that the younger, unemployed and unemployable men can enter into do result in progeny, then such children, born perhaps out-of-wedlock, would be severely handicapped in a physical, psychological, social and economic sense, over the

rest of their lives because of absentee fathers, for instance); and

–the local, state and federal governments would have to ramp up their law and order and criminal system related expenditures quite heavily over time to tackle the concomitant in social problems, crime rates, and so on (as the old saying goes, “an idle mind is the devil’s workshop”).

While all of this has very significantly adverse social and economic implications for society and the nation as well, in the “here and now” sense, it could get a lot worse over time. Why? Because as we depict in Figure 3, the population of male and female gaming addicts can be expected to grow over time, in the absence of any policy initiatives by the government, since addicts in each

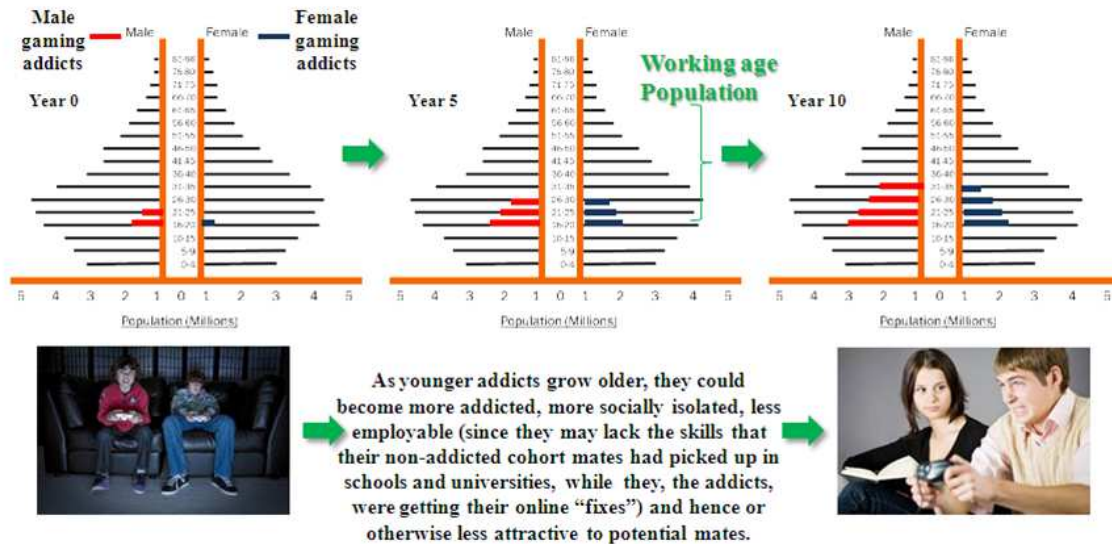


Fig. 3: In the absence of any policy initiatives by the government, the population of male and female gaming addicts will grow over time, as addicts in each cohort grow older and "infect" their peers in the same cohort, as well as their juniors (and perhaps their seniors, also). As recent studies show, approximately 50% of Internet users spend their money relying on recommendations made by others [9], which more than likely also applies to the expenditures on games.

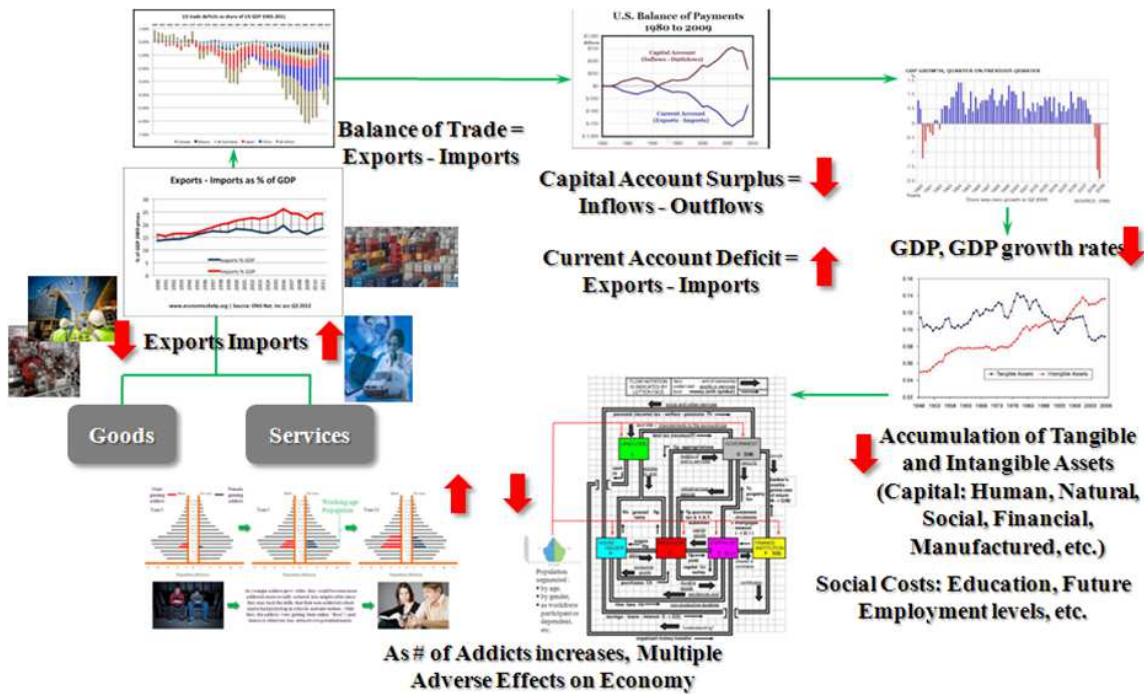


Fig. 4: As the population of gaming addicts grows over time, the Macro-Economy gets adversely impacted in numerous ways (adapted from a diagram available at Dr. John Homewood's 2010 Wordpress.com blog post entitled "Visualising Economic Entities").

cohort, as they grow older, will most likely "infect" more of their peers in the same cohort, as well as their juniors (and perhaps their seniors, also).

Inter-temporally speaking, as the population of gaming addicts grows over time, the macroeconomy gets adversely impacted in numerous ways, as depicted in Figure 4. In a direct sense, as explained above, the economy will suffer adverse consequences in three or four different ways as the population of addicts grows over time. Indirectly, there could be just as many and just as deleterious side-effects, namely:

- the balance of trade or the current account deficit (imports minus exports) will become increasingly adverse to the nation combating a serious and growing Internet and gaming addiction problem, because imports will increase since the providers of such products and services tend to be located primarily in developed countries or in the transition economies of the CIS, and at the same time exports could decrease as producers and exporters find it increasingly difficult to find adequately skilled and committed human resources to meet their commitments over time;
- the capital account deficit (capital outflows minus inflows) could also become increasingly adverse to the nation with an addiction problem, with FDI and FII (foreign direct and indirect investment, respectively) flows finding their way to other nations that can have adequate resources, including human resources, and which are therefore more growth oriented;
- the ensuing reduction in GDP growth rates, in turn, translates over time into lower investments in accumulated tangible and intangible capital stocks, or conversely increases in the tangible and intangible liabilities, for the future (this includes human capital, social capital, financial capital, manufactured capital, and even natural capital), and this could trigger off a vicious, rather than virtuous, cycle, with even more serious negative externality effects.

3 Discussion

If the future for any nation combating a serious and growing Internet and gaming addiction problem is going to be increasingly bleak, we believe that the only logical approach is a preventive or preemptive one: recognize the problem at its inception, and prevent it from becoming more serious over time, instead of a reactive one, which involves building costly addiction treatment centers and trying to prevent treated addicts from relapsing into old habits.

There are a few approaches that have been discussed in the literature: the fatigue system and tax and rebate policies, for instance, that are designed to tackle the addiction problem preemptively. In China, the government apparently uses a fatigue system approach to

online gaming. When gamers play over 3 hours in a row, they do not get compensated as much as they used to from playing, and if the gamer's playing time exceeds 5 hours, items and accumulated experience could be deleted with access to the online game being denied thereafter.

Park and Ahn [11] have argued quite persuasively for imposing a tax and rebate policy for addressing game addiction problem. They used a system dynamics approach to address such questions as: (i) The business as usual case, or what could happen in the online game industry if no action is taken by the government or game companies to tackle online game addiction?; (ii) What could happen if game providers make efforts to reduce game addiction voluntarily?, and (iii) What could happen if the government regulates game companies? They conclude from their analysis that a tax and rebate policy is better than the self regulation policy, and that "to reduce problems caused by online game addiction without compromising growth of game industry, the government would want to implement a tax and rebate policy and build a sufficient number of game addiction treatment centers for addicts to have an easy access."

The gaming and Internet addiction problem is a transnational one, in our opinion, and hence the global community of nations will have to act in concert if the problem is to be addressed satisfactorily. Just as tobacco-growing and exporting countries cannot afford to ignore the health issues and the potentially lethal consequences of their tobacco-related activities for tobacco-users everywhere on earth, the authorities of those nations (where producers of games and gaming-related paraphernalia and accessories are based) cannot afford to take the approach that the gaming and Internet addiction problem is not theirs to solve.

Given that tobacco use is still the number one preventable cause of death in much of the world, for instance, Luke and Stamatakis [12] view tobacco control, as the biggest challenge for public health and one of its biggest success stories at the same time. The approach that could be used for researching and analyzing gaming and Internet addiction can follow the one used by epidemiologists and clinical scientists to identify the links in the causal chain between tobacco use and death and disability (mainly via cancer and heart disease), even though the consequences of addiction are generally not as lethal. Just as in the case of tobacco-use and -addiction, there are: (i) a number of complex factors shaping the tendency of non-gamers to become casual gamers and gaming addicts over time, that need to be understood at the individual level as well as at the systemic level and incorporated into the analysis; and (ii) various organizational actors in the substance control and public health systems who interact with each other in complex ways that need to be understood and addressed by any modeling and analytical approach.

Drawing upon the causal map for a systems dynamic model for tobacco control that was part of NCI's Initiative on the Study and Implementation of Systems [13], Luke

Who are the Stakeholders in the Addiction Dynamics System?

- Game Addicts, Family and Friends (and School Teachers, Professors), etc.
- Employers, Business Leaders and Professional Bodies
- Civil Society and Publics (Church Leaders, Social Service Providers, Community Leaders, Media, etc.)
- Game Developers, Game and Gaming-Platform Providers, Console & Hardware Providers (e.g., Sony, Microsoft, Nintendo, Steam, etc.)
- Internet Service Providers
- Government Agencies
- Public Healthcare Providers, Addiction Treatment Centers

What can be Done Pro-Actively or Reactively to Address Game Addiction Problem?

- Leave it to Family and Friends (and School Teachers, Professors), etc., to Cope with or even Prevent Addiction to Games
- Increase Awareness of the Risks and Perils of Addiction among the Vulnerable Segments of the Population and their Families
- Build Addiction Therapy Centers (paid for by Taxes or by Game Providers)
- Pressure Game Developers and ISPs to Self-Regulate and Monitor Potential Addicts Online
- Legislation to Intrusively Regulate the Gaming Industry
- Devise Smart Tax and Rebate Policies

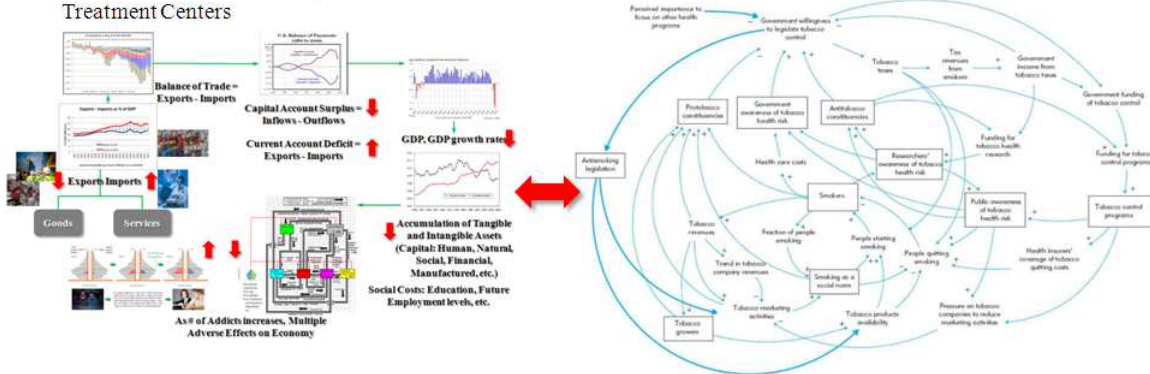


Fig. 5: The Gaming Industry as a Complex System with links to the rest of the Economy and Society (adapted from a diagram depicting a system dynamics model for tobacco control available at an undated Haiku Analytics blog post entitled "A practical systems dynamics approach to complex program logic," which is similar to the one provided in Luke and Stamatakis [12]).

and Stamatakis [12] see tobacco control science as "a classic example of a complex system," with interacting, heterogeneous actors and with the system as a whole adapting and changing over time. From the original model which had more than 1,900 complex feedback loops linking the various actors, including individual smokers, tobacco growers, government regulators, public health scientists, and the tobacco industry, they derived a simplified version, which we have used to base our own modeling and analysis approach in a very broad sense.

We base our conclusions on this complex and dynamic systems model of the gaming industry and the addiction problem and offer our board and general recommendations to deal with the gaming addiction problem that we feel is going to be an increasingly major headache for families, school teachers and administrators, university professors, business leaders, civil society, government agencies, and so on, in the future.

4 Conclusions

Given the large number of stakeholders in the addiction dynamics system, as depicted in Figure 5, viz (i) the game

addicts themselves as well as other potential addicts who are currently Internet users and casual gamers at worst; (ii) their family members and friends, school teachers, professors, etc.; (iii) their to-be or would-be employers, business leaders and professional bodies; along with (iv) civil society and publics (church leaders, social service providers, community leaders, media, etc.); (v) game developers, game and gaming-platform providers, console and hardware providers (e.g., Sony, Microsoft, Nintendo, Steam, etc.); (vi) ISPs or Internet service providers; (vii) government agencies; (viii) public healthcare providers, addiction treatment centers; and so on, it would be very difficult to offer recommendations that would prove to adequately address all of their concerns, and safeguard all of their interests.

If one were to ask "What can be done to address the game addiction problem?," we feel, firstly, that the approach ought to be proactive rather than reactive. Secondly, we will also have to accept that changes in the regulation and control of the Internet and gaming industry and any policy measures that could potentially be adopted, will not be easy to obtain and will likely have complicated and often unintended consequences in the larger information and communications technology,

entertainment, economic, political and health care spheres.

Leaving it to the addict's or the would-be-addict's family and friends (and school teachers, professors), etc., to cope with, or to even prevent addiction to games, would be both callous and disastrous, we feel, for all involved. Attempts to make the vulnerable segments of the population and their families increasingly aware of the risks and perils of addiction is needed but is too passive and just not enough to head off the major addiction crisis that we feel is looming on the horizon.

Governments may have to build and operate many more addiction therapy centers (paid for by taxes, i.e., with the increased healthcare costs being absorbed by state and local budgets, or by game providers, if they can be forced to do so), but like all reactive measures, this would be tantamount to "closing the barn door after the horse has bolted."

The stakeholders on the supply side can be expected to fight off any and all legislation to regulate the gaming industry irrespective of how intrusive or not-so-intrusive such legislation may well be. Can game developers and ISPs be pressured to self-regulate and monitor potential addicts online? Yes, but given the "golden-egg-laying-geese" that some of the games have turned out to be, would they, unless they were held thoroughly accountable for the aftereffects of their efforts to design, develop and deliver even more attractive and potentially addictive games over time?

Lastly, in addition to some of the above measures, we feel that, following Park and Ahn [11], smart fatigue approaches and/or tax and rebate policies would have to be devised and implemented, to address and tackle the game addiction problem. The time, however, to act, to come up with the right strategies and implement them is now - this cannot wait for the game addiction problem to become more serious over time, and for all the concomitant social and economic problems to raise their heads. That would be too late!

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