2012. 5.31

#### Virtual Asset in the Virtual World, "Intangible" in the **Real World : Korean Case**

#### **CHANG**, Woohyun



### CONTENTS

- I. About Virtual World & Virtual Asset
- II. Virtual Asset Trading in Korea
- III. Demand Estimation of Virtual World industry with Virtual Asset

#### About Virtual World & Virtual Asset

### Virtual World : Definition

- Virtual World : A network space where users set up their own avatars to interact with others by sending/receiving digital information under the rule of a specific social model electronically programmed by the service provider
- Type of Virtual World
  - SNS Services : *Facebook, Cyworld*
  - "Virtual Worlds" : Second Life
  - Online Games : World of Warcraft, Lineage

#### Virtual Asset : Definition

- Virtual Asset : Objectives defined over a Virtual World, which have the following properties :
  - 1) Objectives are durable
  - 2) Property right of the objective is assigned to a specific person (avatar) in the virtual world
  - 3) It is possible to transfer the property right to another person (avatar) by the rule of the virtual world
  - 4) There is at least a person who has a positive amount of willingness-to-pay for holding the property right of the objective

### **Virtual Asset : Classification**





# **Online Game : Definition**

 Online game is defined as a game played over computer networks, now typically on the internet : A Virtual World

If game players need internet connection to play a game, the game can be viewed as an online game

#### **Game Industry Overview**

#### World Game Industry

- Total Revenue of \$116 billon (2009)

#### - Genre

- Arcade games
- Personal Computer games (Offline)
- Video games
- Online games
- Mobile games
- Online game (World) : Virtual World
  - Revenue of \$12.6 billion (2009)
  - The fastest growing genre with the growth rate of 21.9% (2009)

Source: DFC Intelligence

# Industry Overview: Online games (World)

#### \* Million dollars

		2007	2008	2009	2010 (E)	2011(P)	2012(P)
U.S/Canada	Revenue	1,488	1,717	1,780	2,150	2,509	2,885
	Growth rate	26.8%	15.4%	3.7%	20.80%	16.7%	15.0%
Europe	Revenue	1,599	1,973	2,039	2,522	2,937	3,333
	Growth rate	37.7%	23.4%	3.3%	23.7%	16.5%	13.5%
Asia	Revenue	5,413	6,632	8,762	10,631	12,486	14,899
	Growth rate	31.4%	22.5%	32.1%	21.30%	17.5%	19.3%
Total	Revenue	8,501	10,322	12,581	15,303	17.932	21,117
	Growth rate	32.0%	21.4%	21.9%	21.6%	17.2%	17.8%
Source: DFC Intelligence, Esterbrain 2010, iResearch 2010. JOGA 2009, PWC 2010							

Game Industry Overview (Korea)	<b>KDI</b>
Korean Game Industry (Source: 2010 White Paper on Korean	n Games)
<ul> <li>Total annual revenue (2009): \$3.9 billion</li> <li>Revenue from Online Games (2009): \$3.16 billion</li> </ul>	
<ul> <li>Online games became dominant</li> <li>About 81.1% of total market share</li> </ul>	

#### **Game Industry Overview (Korea)**

Total Sales Ratio by Platform in Korea (2001~2009)



# **Online Game Overview (Korea)**

#### Estimated number of Online game users

- Population (2008) : 48,600,700
- Estimated on-line game users (2008) : 20 million
  - Cf) U.S : 68 Million Online game users (2009: including 3.1 million "hardcore" gamers)
- Growth rate is still over 37.8% in 2009 (Source: 2010 White Paper on Korean Games)

#### "Korean Wave": K-Pop? K-Movie?





سيو غيون. عضو فرقة حقيرلز جيئيرينلس، الغذائية الكورية، كما بيت في ممورة تتكارية ورعتها لها أمس أدابة جماح منطنة الأمير الشعدة في مغرض يووسو، الثقام في كوريا الجنوبية، وذلك في اعقاب مسفورة النيات الجسنية، لمناح النشبة الدولية في المرض عن مذا الشبهر تحت العنوان البيش الشعير قعت العنوان البيش الشعيط السي والشاطئ الجي دارا بدأ ا



ملايين سانيج الى كوريا من كافية النحاء المالم للاطلاع على للواقئ والقصور والأماكن الطبيعية التبي جرت فيغا أحداث قصة جوهرة القصر

ان عمالا تلفزيونيا يظفر بهذا الثراء في الديكور والاكسوارات ولللابس

واعداد المثلين للشاركين والواقئ الكثيرة التبي تم التصوير بها لا بعدان تكون

تكلفة انتاجة أكبر حتى من توقعاتنا.

#### بمش تعليقات المحافة العائية ومواقع الانترنت على المعل

جون غوم .. فلاذ طيبة طموحة.. الظروف القاسية التبي عاشتها اضطت عليما حرزنا دائما .. ولكن الأمل في مستقبل الضل طل براودها .. ويدفعها الى الصبر على كل لثحن واجعت الكثير من للومرات وللضايقات والسعن والذشي .. وكتمت حيما متطلعة إلى تعقيق ذائها - وسائطا عات الغوز في التهاية ولا شك ن للمثلة في يونغ في استطاعت ان تشقمص شخصية جون غوم في جميرة مراحل حياتها على غير وجه فقد كانت قسمات وجمها تحسل اسدن تعبير في ساعات الحزن والفرح ... والمشة والانكسان... والعذب والعتاد ... والالم والصابر - المعق أن شمس عن يوقع الا العلقيمة كما سميت جون قوم العاليمة:

ستطاع الكاتب كيم بولغ هنون أن يروشق بالدرما الجميئة حقبة ممعة من تاريخ الشرق الأقصر ... وأن يجدد الشاهدين من جميع الطبقات الى متابعة حتبة تاريغية ماينة دالاحداث . كما ستطاع الحرع الس بيونغ هون ان بوطلف كاهة عثاصر الانشاح توطيفا ممثازاهي سبيل الوسول مغنا العمل الدرمن الميزالي القملا

تتحصت (mbr-Kenon) في جذب الذياء النامي من جميع أتَّجاء العالم الن كوريا الكان وكوريا التاريخ واحضارا المتناظر المقيعية المكادسة والولقخ الأشريبة والتصور الشديمة شكات عناصر جذب للسائحين من جميع افعاء العالم كماان لشاهدين تضذا للببلسل منل جديني للحاء العناليم اسبيح لديهم فكرذ عن عمل شارة في ملاد خللت مجمولة لزمن طويل



#### Export comparison, K-waves (2011)



# A Quick view of Development/Publishing



### Digression : Are Games played by children only? [KDI



### Digression : Are Games played by children only? [KDI



#### Virtual Asset Trading in Korea

### Virtual Asset Trading Brokerage Services

	Virtual Asset		
Seller		Buyer	
	Money		
Seller	Virtual Asset	Buyer	
<u> </u>		$\nearrow$	
Money		Money	
(	Brokerage Firm		

### Virtual Asset Trading Volume of the Two Major Firms : About \$1 billion, Annually



#### **Monthly Trading Volume**





#### Purchase/Sales Ratio, conditional on gender



#### Virtual Asset Trading Ratio, by categories



#### Virtual Asset Trading Ratio, by categories

Dec-10

16.30%

Jan-09 20.90% 9.80% 66.50% 2.80% Feb-09 9.40% 67.50% 20.50% 2.60% Mar-09 18.30% 7.30% 71.80% 2.60% Apr-09 7.20% 72.40% 17.70% 2.70% May-09 17.80% 7.90% 71.30% 3.00% Jun-09 8.10% 71.10% 2.90% 18.00% Jul-09 17.70% 7.80% 71.70% 2.80% Aug-09 18.00% 7.40% 71.80% 2.80% 71.60% Sep-09 18.80% 7.00% 2.60% Oct-09 17.30% 7.40% 72.70% 2.50% Nov-09 7.10% 73.90% 2.50% 16.40% Dec-09 16.40% 6.70% 74.40% 2.60% Jan-10 16.30% 6.90% 73.70% 3.10% Feb-10 17.70% 7.80% 71.70% 2.70% Mar-10 17.40% 6.90% 73.00% 2.70% 6.10% Apr-10 16.40% 74.80% 2.60% May-10 15.50% 6.00% 76.00% 2.50% 6.20% 76.10% Jun-10 15.10% 2.60% Jul-10 16.10% 6.10% 75.50% 2.40% Aug-10 16.10% 5.70% 75.90% 2.30% Sep-10 16.50% 5.60% 75.50% 2.30% Oct-10 1.10% 77.50% 17.10% 4.20% Nov-10 16.60% 0.00% 78.80% 4.60%

0.00%

79.00%

4.70%

#### **Two Types: Buyers and Sellers**





### Virtual Asset Trading in China = About 4.3 billion Annually



#### Demand Estimation of Virtual World Industry

with Virtual Asset

### **Dataset for the estimation**

#### Market:

- Region-Time pairs: 16 regions, 24 months (384 markets)
- Number of Games: 34~40 per market
- Quantity: Playtime and average playtime
  - Gametrics Database, Region-Month pairs
- Price : Monthly Game Price, Internet Usage Fee
  - Monthly, by games

### Dataset for the estimation

#### Internet Café Sampling for the price, by Region

Province	#	Sample size		
FIOVINCE	2009	2010	2011	Sample Size
Seoul	4,917	5,007	4,305	290
Gyeonggi	4,863	4,636	3,018	199
Incheon	1,168	1,121	712	47
Daejeon	614	635	411	27
Chungbuk	646	654	416	27
Chungnam	814	855	549	36
Gangwon	746	754	556	36
Gyeonbuk	1,171	960	698	46
Gyeongnam	1,316	1,311	1,005	66
Daegu	765	887	523	34
Busan	1,359	1,433	871	57
Ulsan	440	523	325	21
Cheonbuk	798	911	535	35
Cheonnam	698	768	491	32
Gwangju	831	751	524	34
Jeju	350	341	201	13
Total	21,496	21,547	15,140	1,000

### Demand Estimation : Discrete Choice Modekoi

#### Choice Sets

 Assumption: "Average playing time and Average Revenue for items" of each game in the market makes a discrete choice option for consumers



### Choice Sets – How good is the assumption?KDI

- Logical Justification: Consumers enjoy the socialization activity as an indivisible discrete unit
  - Ex) Dancing, Sudoku, Crosswords, Minesweeper: If you stop when you are on the half way of completing the mission or quest to show off, the utility can even be negative.

# Choice Sets – Do buyers choose only one game in one market?

- It is true that players may play multiple games in reality. However, it is not a bad approximation of the reality in a sense that the data set is composed of monthly panel, and according to a survey, the average number of games the players play is around 2.5, and in general players have their "main" game to play for a period of time even though they play multiple games (Source: 2008 White Paper on Korean Games)
- Also, according to a survey, the average rate for a consumer to switch to another game in a month is around 15%



### **Summary of Instruments**



Endogenous Variables	Instruments
Price: Monthly Game Price	Lagged Variables
and Internet Café Usage Fee	
Virtual Asset Trading Volume	1. Lagged Variables
	2. Policy Variable (Prohibition of Youth Trading)
Size of Network	Lagged Variables
Within Nest Market Share	Characteristics of other firm's product (nest)

#### **Demand System Estimation : Nested Logit**





The Criterion Function and Moment conditions

$$\hat{\theta} = \arg\min m' \Phi^{-1} m$$

$$m = \begin{bmatrix} Z' & \xi \end{bmatrix}$$

$$\int \prod_{\text{Variables}} \prod_{Variables} \prod_{V$$

#### **Estimation Result**

Variables	Model I	Significance	Model II	Significance	Model III	Significance
IV	Х		0		0	
Virtual Asset	х		х		0	
Constant	-4.977018	**	-5.080568	**	-5.609492	**
	0.0483589		0.1325843		0.2622165	
Price	0.00000244	**	0.00000515	**	-0.0000227	**
	0.00000014		0.0000025		0.0000058	
log(Group Share)	0.7799663	**	0.5958106	**	0.2647813	**
	0.0040072		0.013625		0.0816698	
VA Trading					5.07E-10	**
					1.24E-10	
Network	0.00000124	**	0.0000018	**	0.00000627	*
	2.02E-08		4.73E-08		0.00000324	
Min OS	-0.0477032	**	-0.068679	**	-0.440428	**
	0.0058515		0.0096078		0.0980786	
Max OS	0.0475858	**	0.0680611	**	0.4400395	**
	0.0058433		0.0095957		0.0981286	
Min CPU	-0.0006229	**	-0.0011486	**	-0.0010161	**
	0.0000995		0.0001661		0.0002974	

\* Significant at 5%, \*\* Significant at 1%

#### **Estimation Result : Continued**

Variable	Model I	Significance	Model II	Significance	Model III	Significance
MAX CPU	0.0003205	**	0.0001308	**	-0.002247	**
	0.0000658		0.0001092		0.0006408	
MIN RAM	0.0045709	**	0.0078406	**	-0.0115513	**
	0.0002283		0.0003754		0.0050013	
MAX RAM	-0.0022814	**	-0.0035419	**	0.0068612	**
	0.0001128		0.0001829		0.0026654	
MIN Graphics	0.0014762	**	0.0026557	**	-0.0160339	**
	0.0002622		0.0004214		0.0046058	
MAX Graphics	-0.0000931		0.0000034		0.0350355	**
	0.0002145		0.0003597		0.0085878	
MIN HDD	-0.2464565	**	-0.4817247	**	1.409871	**
	0.0093552		0.0178586		0.4711092	
MAX HDD	0.2596112	**	0.5031724	**	-1.727507	**
	0.0095454		0.0182243		0.5541793	
Time Trend	0.011049	**	-0.0037644		0.0323029	**
	0.0020609		0.0058426		0.0132451	

#### **Estimation Result : Elasticity**

- Own Price Elasticity, product j
- Cross-Price Elasticity, product j,k
  - Within Nest

$$\epsilon_{jk} = -\alpha p_k \left( \frac{\sigma s_{k|g}}{1-\sigma} + s_k \right)$$

 $\epsilon_{jj} = \left| \alpha p_j \left( \frac{1 - \sigma s_{j|g}}{1 - \sigma} - s_j \right) \right|$ 

Cross-Price Elasticity, product j,k



$$\epsilon_{ik} = -\alpha p_k s_k$$

#### **Estimation Result : Elasticity**

- For an Average Product, Own price elasticity = 2.67
  - For 1% price increase, the demand will go down by 2.67%
- For an Average Product, Trading Volume Elasticity of Demand = 1.283
  - For 1% increase in the Monthly Trading Volume of Virtual Asset, the demand for the Virtual World will go up by <u>1.283%</u>
- For an Average Product, Network size Elatsticity of Demand = 0.164
  - For 1% increase in the size of the Virtual World users, the demand for the Virtual World will go up by 0.16413%

# KDIKDIKDIKDI KDIKThankYouDIKDI KDIKDIKDIKDI

