Investigation of substitution effects and adoption patterns across hotel distribution channels: A multi-generation perspective

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Agenda

- Introduction
  - Today's context in hotel distribution
  - Goal of Study
- Past evolution of distribution channels (2002-2012)
- Simulation of future evolution
  - Generations of distribution channel (Kracht & Wang)
  - Multi-generation diffusion models (Meade & Islam)
  - Simulation results
- Discussion and conclusions

Hotels in a complex landscape of distribution (I)

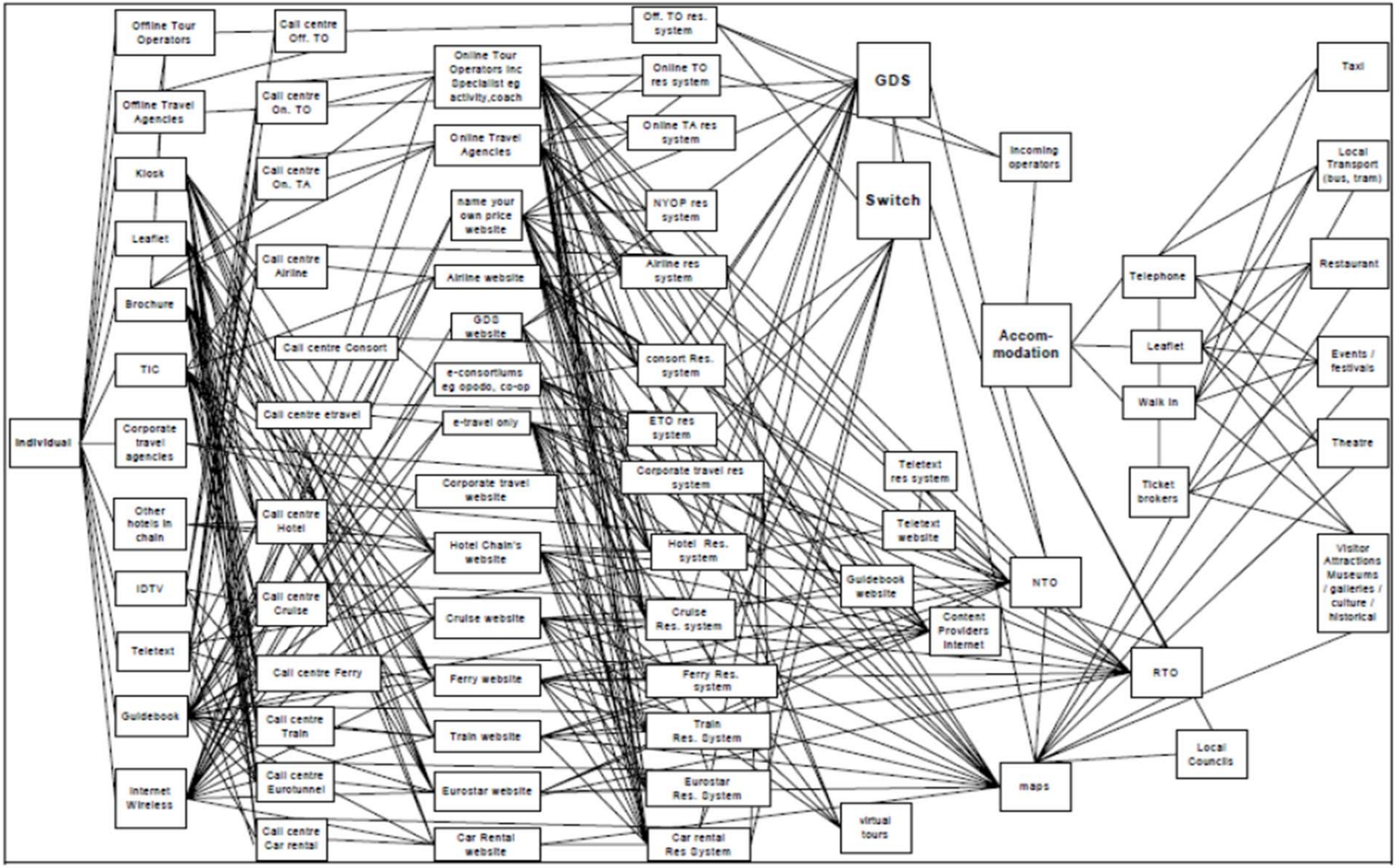
- Online intermediaries such as **OTAs play a major role** in the distribution of hotel rooms all over the world (Ku & Fan, 2009) (24*7*365)
- Many hotels still do **not fully exploit their own website** (c.f. Schegg, Scaglione, Liebrich, & Murphy, 2007) as a tool for selling hotel rooms and as a way to gain a competitive advantage
- **Hotels have underestimated** in the past the importance of an effective online marketing strategy whereas OTAs have invested with success in **online marketing** and a**ggressive conversion techniques** (Egger & Buhalis, 2008).

Hotels in a complex landscape of distribution (II)

The advances of ICT have “not reduced the number of intermediaries in the distribution channel, but rather resulted in an increasingly complex array of intermediaries.”

Kracht and Wang (2010, p. 736)

« Explosion » of interconnectivity in tourism



Source: Buhalis, D., and O'Connor, P., 2005, Information Communication Technology - Revolutionising Tourism, Tourism Recreation Research, Vol. 30(3), pp.7-16

Hard fights and concentration processes in the travel distribution market

- 2012: Priceline buys Kayak for 1.7 billion $
- Expedia pays $632 million for majority stake in Trivago
- Expedia partners with HomeAway
- Booking.com partners with Interhome

- Google hotel finder launched
- TripAdvisor's TripConnect
- Apple's Passbook app and iTravel
- Priceline cooperates with Chevrolet (mobile booking)
- etc.

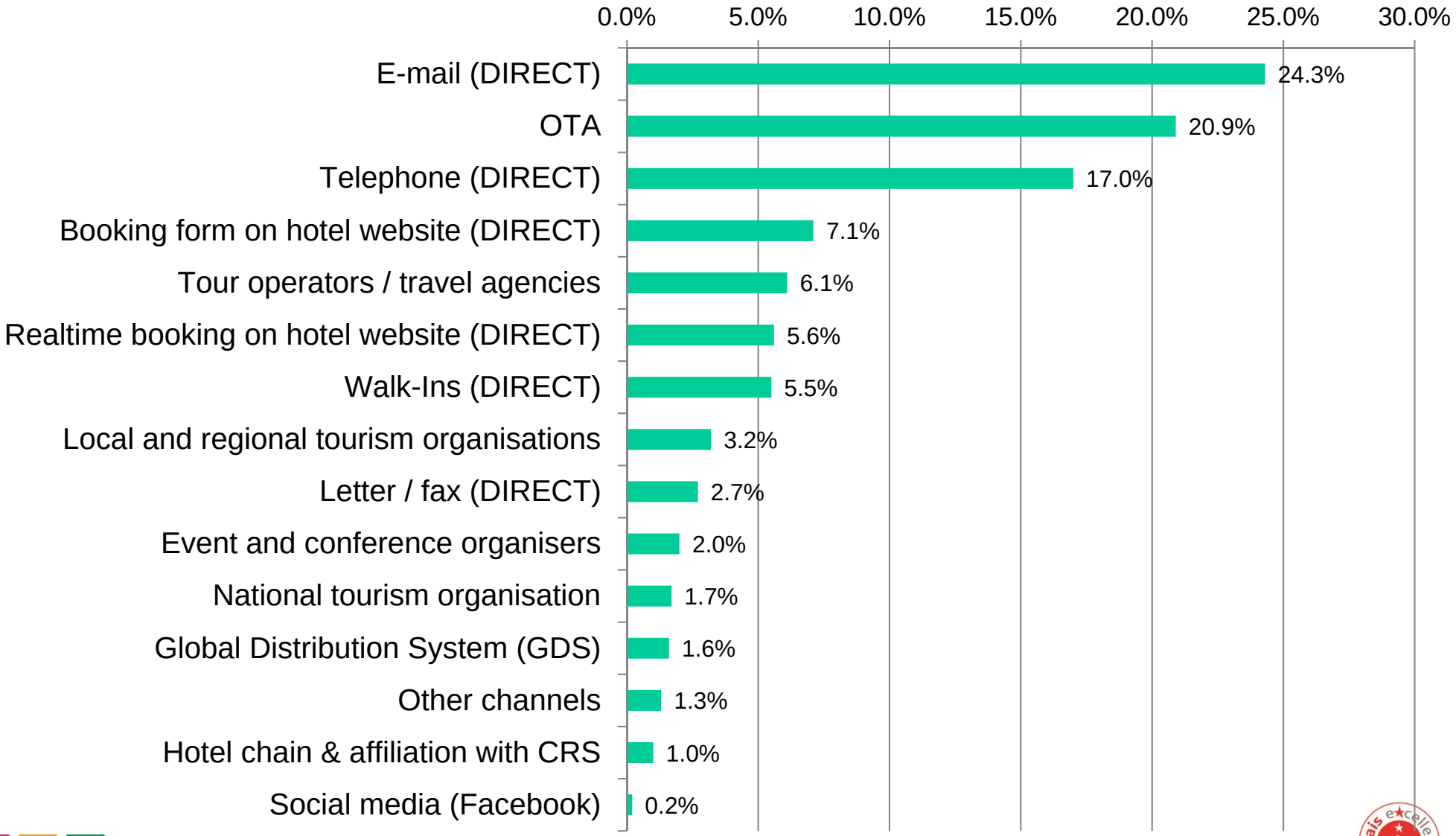
Overall goal of study

- This research investigates how the Swiss hospitality sector has embraced the new world of (online) distribution and analyses the evolution of distribution channels.
- As there is still little research, we want to look at the **future evolution** of distribution channels.
- By modeling the **substitution effects** across different **clusters of distribution channels** in the Swiss hotel sector, we try to understand the **dynamics of competing sales funnels** through time.

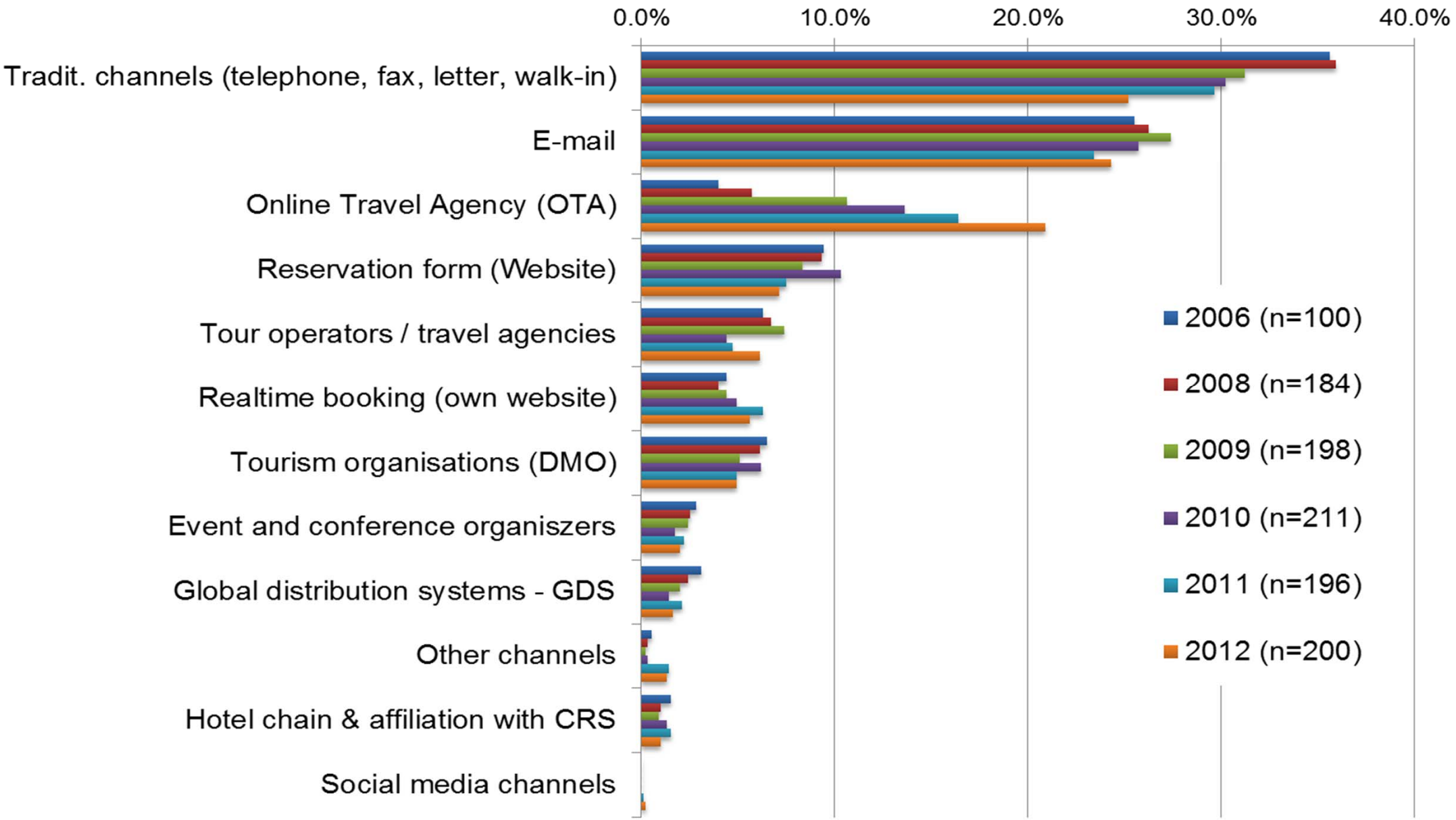
Data on the evolution of distribution channels in Swiss hotels

- **Since 2003, regular surveys** have been carried out among the over 2000 members of *hotelleriesuisse*.
  - There are «snapshots» for the reference years: 2002, 2005, 2006, 2008, 2009, 2010, 2011, 2012
- The **online questionnaire** monitored how bookings are distributed among available direct (telephone, fax, walk-in, etc.) and indirect (tour operator, tourism office, GDS, OTA etc.) distribution channels.

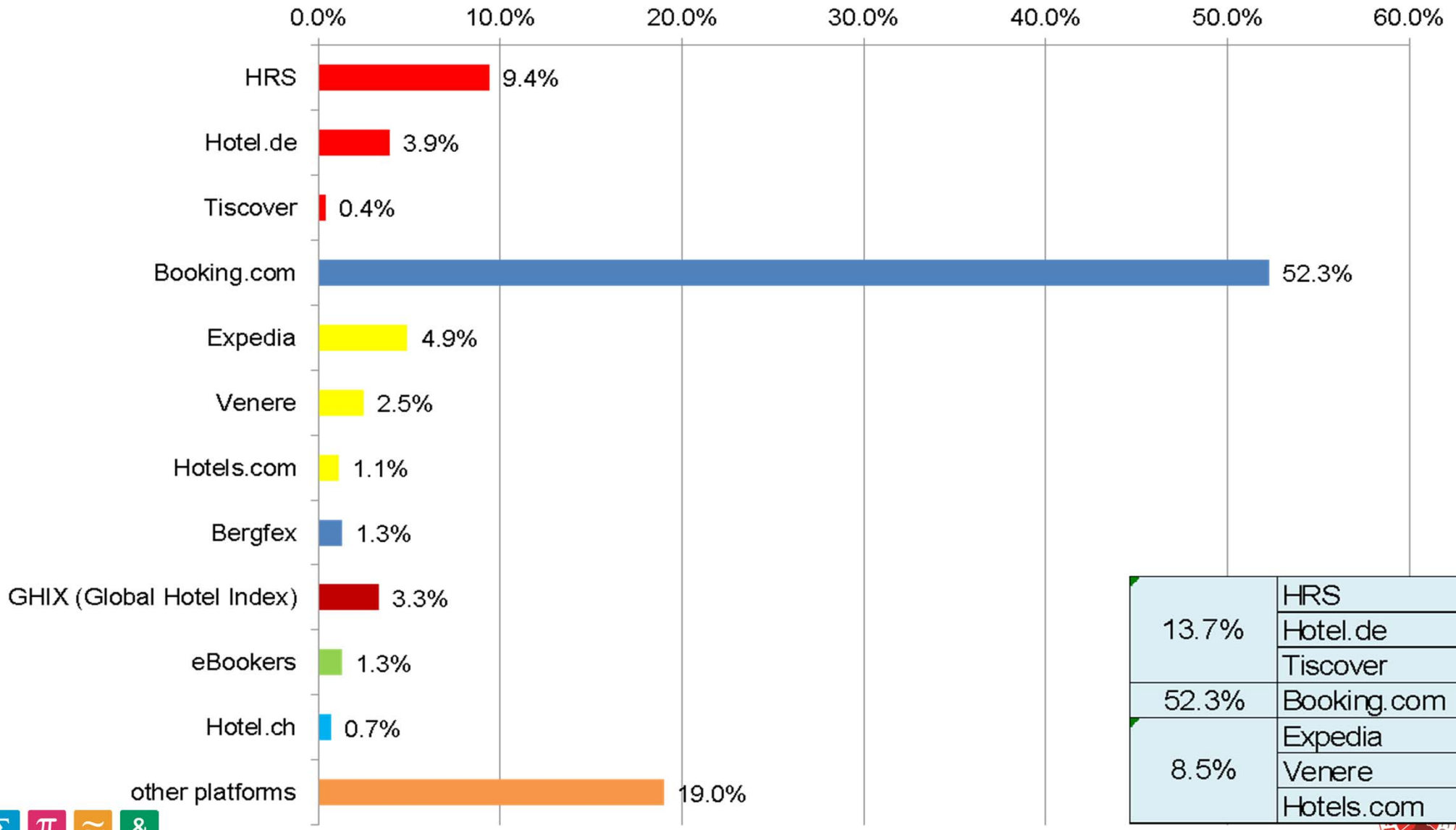
Booking channels in Swiss hotels 2012 (latest data)



Trends in Booking Channels in Swiss Hotels 2006-2012 (I)

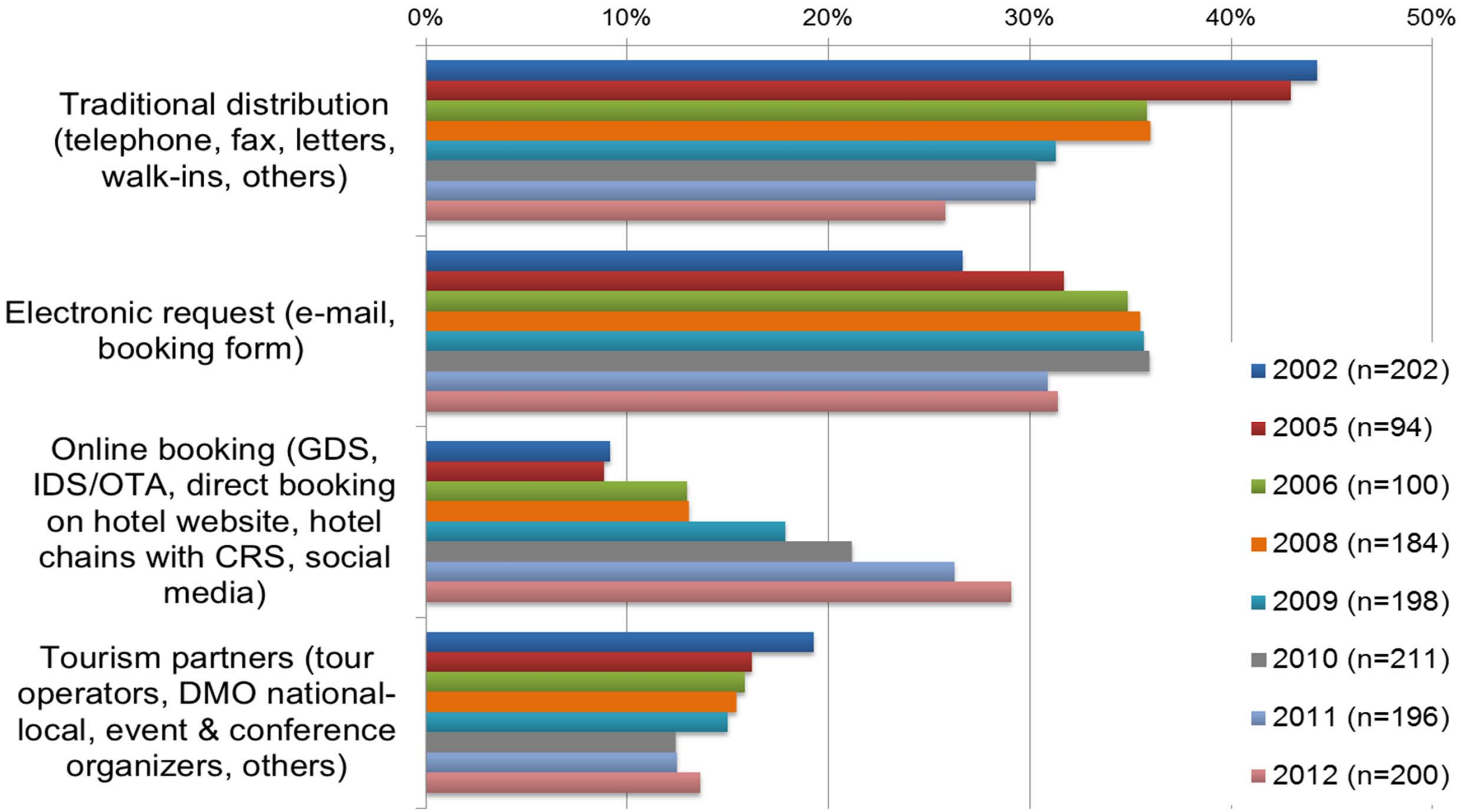


Relative OTA market shares in Switzerland 2012



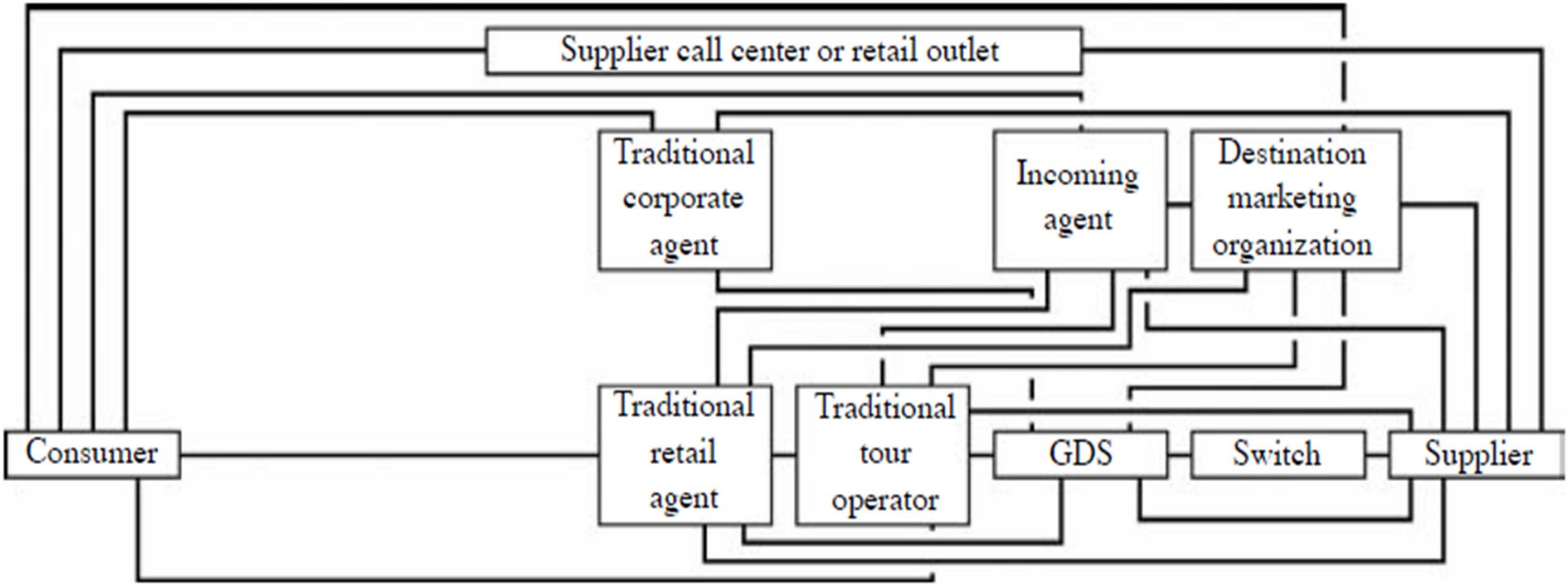
13.7%	HRS
	Hotel.de
	Tiscover
52.3%	Booking.com
8.5%	Expedia
	Venere
	Hotels.com

Trends in Booking Channels in Swiss Hotels 2006-2012 (II)



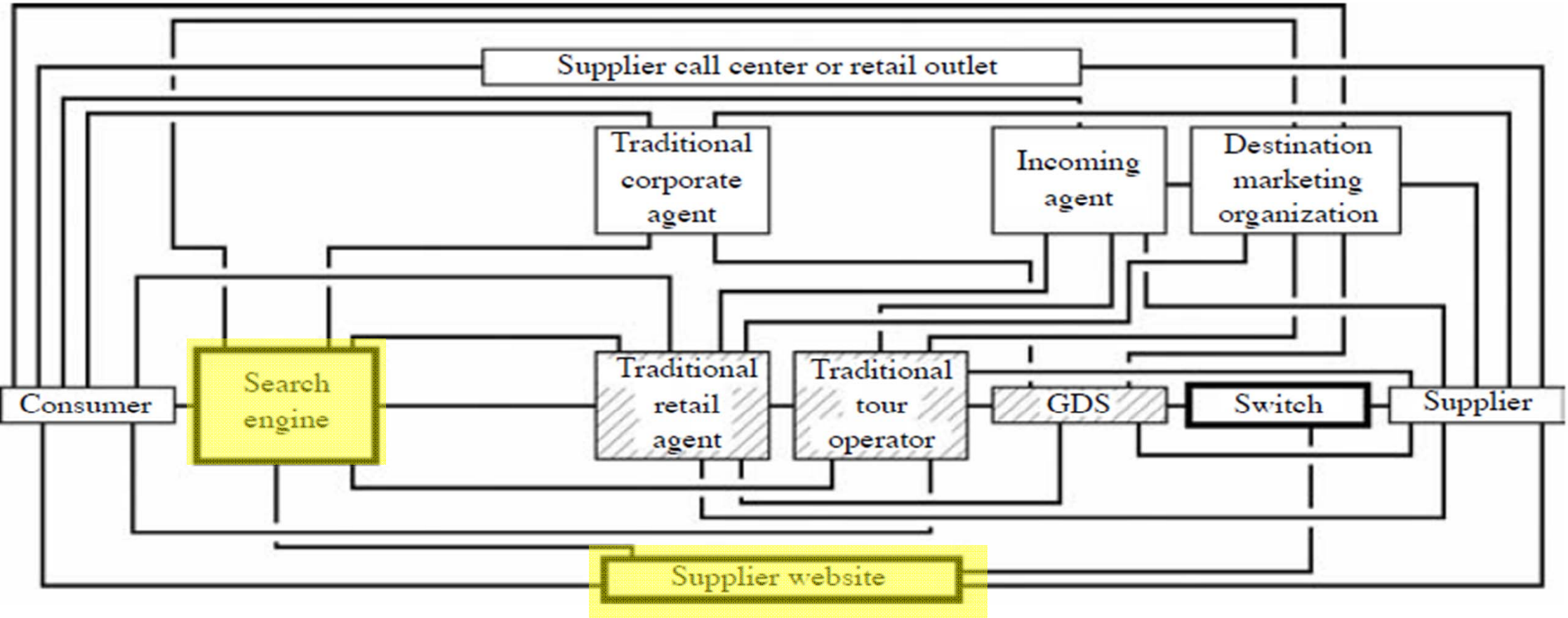
Kracht & Wang (2010) Model for Evolution of Distribution Channels (I)

- The **first generation** channels emerged in the **pre-World-Wide-Web era, before 1993** and are composed of traditional retail and traditional TA/TO, GDS, incoming travel agents, switches, destination marketing and DMOs and suppliers



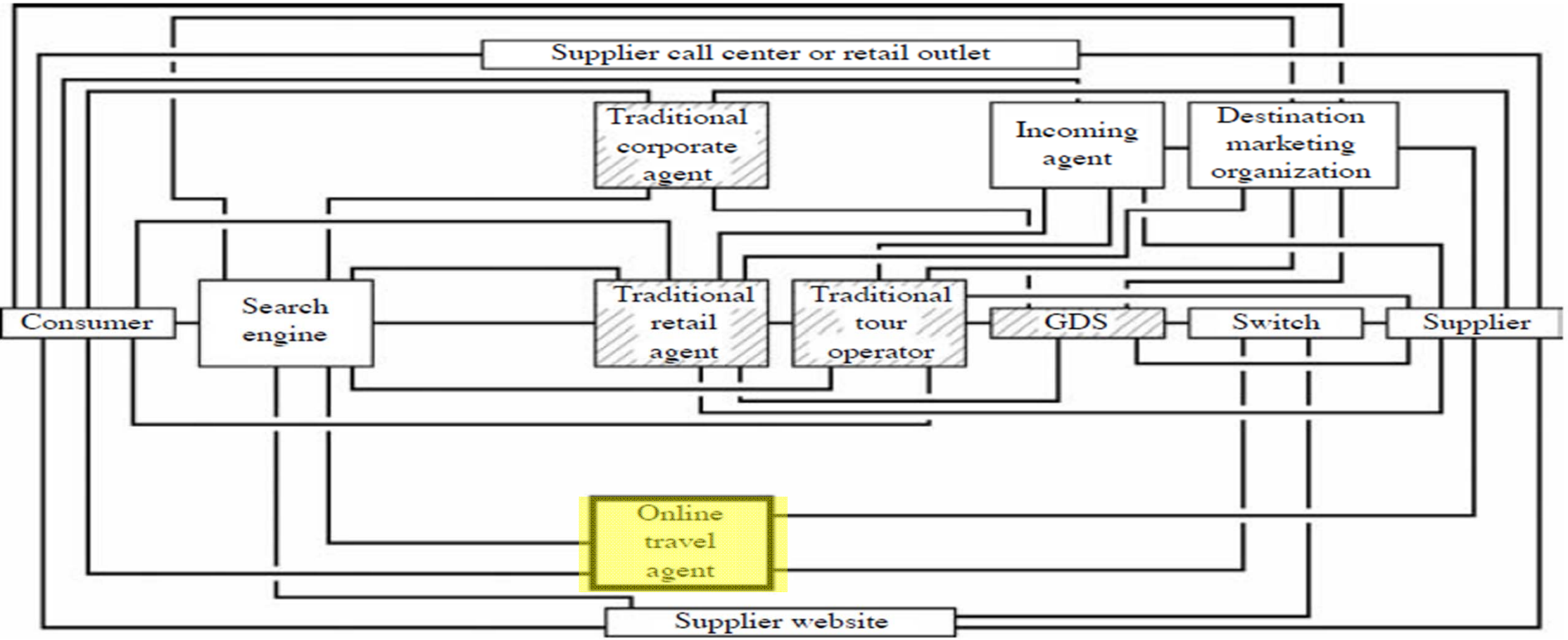
Kracht & Wang (2010) Model (II)

- The **2. generation** channels developed after WWW had been made freely available in 1993. Suppliers began to connect directly with customers through web-mediated channels and thus began the **disintermediation of traditional intermediaries**. -> the importance of **new direct channels** such as e-mail etc.



Kracht & Wang (2010) Model (III)

- The **third generation** channels: **slightly after the time that suppliers started disintermediating traditional intermediaries**, another layer of **intermediation** began to develop based on the growing importance of internet search engines such as Google -> **Online Travel Agencies (OTAs)**



Multi-generation diffusion models (I)

- Aim is **to model diffusion/substitution effects across several generations of technologies** -> successive generations of mobile bands (Meade & Islam, 2006, 2008), replacement of cash payment by electronic means in European countries (Snellman, Vesala, & Humphrey, 2001)
- **Substitution effects** show the evolution of the share of each generation when it is replaced by a new one (Meade & Islam, 2006)

Multi-generation diffusion models (II)

There are two important effects to consider in multi-generation models: diffusion and substitution effects.

1. Diffusion effects allow understanding the rationale of behaviour across adopters by showing the degree of imitation and innovation in diffusion processes following the traditional Bass diffusion model interpretation (Bass, 1969; Mahajan, Muller, & Bass, 1995).
2. Substitution effects show the evolution of the share of each generation when it is replaced by a new one (Meade & Islam, 2006)

Methodological approach

Based on the **distribution channel typology** of Kracht & Wang (2010), we have aggregated the individual channels in the following way in order to **analyse the evolution of market shares of successive distribution channel generations**:

- **G1 - Generation 1 (traditional channels)**: Telephone, fax, letter, travel agency, tour operator, DMO (local, regional or Swiss Tourism), conference organizers, CRS of hotel chain or franchisee, GDS, others.
- **G2 - Generation 2 (online direct channels)** : E-mail, reservation form on website, real-time booking on the property website.
- **G3 - Generation 3 (new online intermediaries)** : OTA, social media channel.

Data for simulation

year (n=number of hotels participating in survey)	G1	G2	G3	total
2002 (n=202)	0.68	0.29	0.02	0.99
2003	.	.	.	.
2004	.	.	.	.
2005 (n=94)	0.62	0.34	0.03	1.00
2006 (n=100)	0.56	0.39	0.04	1.00
2007	.	.	.	.
2008 (n=184)	0.55	0.40	0.06	1.00
2009 (n=198)	0.49	0.40	0.11	1.00
2010 (n=211)	0.46	0.41	0.14	1.00
2011 (n=196)	0.46	0.37	0.17	1.00
2012 (n=200)	0.42	0.37	0.21	1.00

Proc model of SAS Institute V9.3.

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Substitution effects modelling

Fisher & Pry (F-P) model

- Fisher & Pry (1971) is pioneering work of models of substitution based on the market share of various product generations.
- The F-P model follows an S-shaped curve for each generation

$$f = (1/2)[1 + \tanh \alpha (t - t_0)]$$

f is the fraction substituted

α is half the annual fractional growth

t_0 is the time at which the share of the generation is 50%

Simulation Results

Nonlinear 3SLS Estimates						
Model	Term	Estimate	Approx Std Err	t Value	Approx Pr > |t|	Estimate year f=0.5
G1	2α	-0.107	0.003	-32.76	<.0001	2009
	t_0	8.144	0.180	45.28	<.0001	
G2	2α	0.041	0.008	5.16	0.0004	2021
	t_0	19.991	2.870	6.96	<.0001	
G3	2α	0.275	0.011	25.08	<.0001	2017
	t_0	15.862	0.331	47.87	<.0001	

Note : annual fractional growth for the third generation is more than 6 times greater than the second (0.27/0.04).

Goodness of fit

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Nonlinear FIML Summary of Residual Errors

Equation	SSE	MSE	R-Square	Adj R-Sq
G1	0.00182	0.00018	0.0135	0.9759
G2	0.00737	0.00074	0.0272	0.4163
G1+G2	0.000998	0.0001	0.00999	0.9767
G3	0.00077	0.00008	0.00874	0.9822

Heteroscedasticity Test (White's Test)

Equation	Statistic	DF	Pr > ChiSq
G1	7.03	5	0.2184
G2	6.79	4	0.1476
G1+G2	8.25	5	0.1429
G3	3.79	5	0.5795

Normality Test (Shapiro-Wilk W)

Equation	Value	Prob
G1	0.93	0.3606
G2	0.93	0.3939
G1+G2	0.91	0.2357
G3	0.92	0.3307

Results (Complements)

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Nonlinear 3SLS Estimates						
Model	Term	Estimate	Approx Std Err	t Value	Approx Pr > |t|	Estimate year f=0.5
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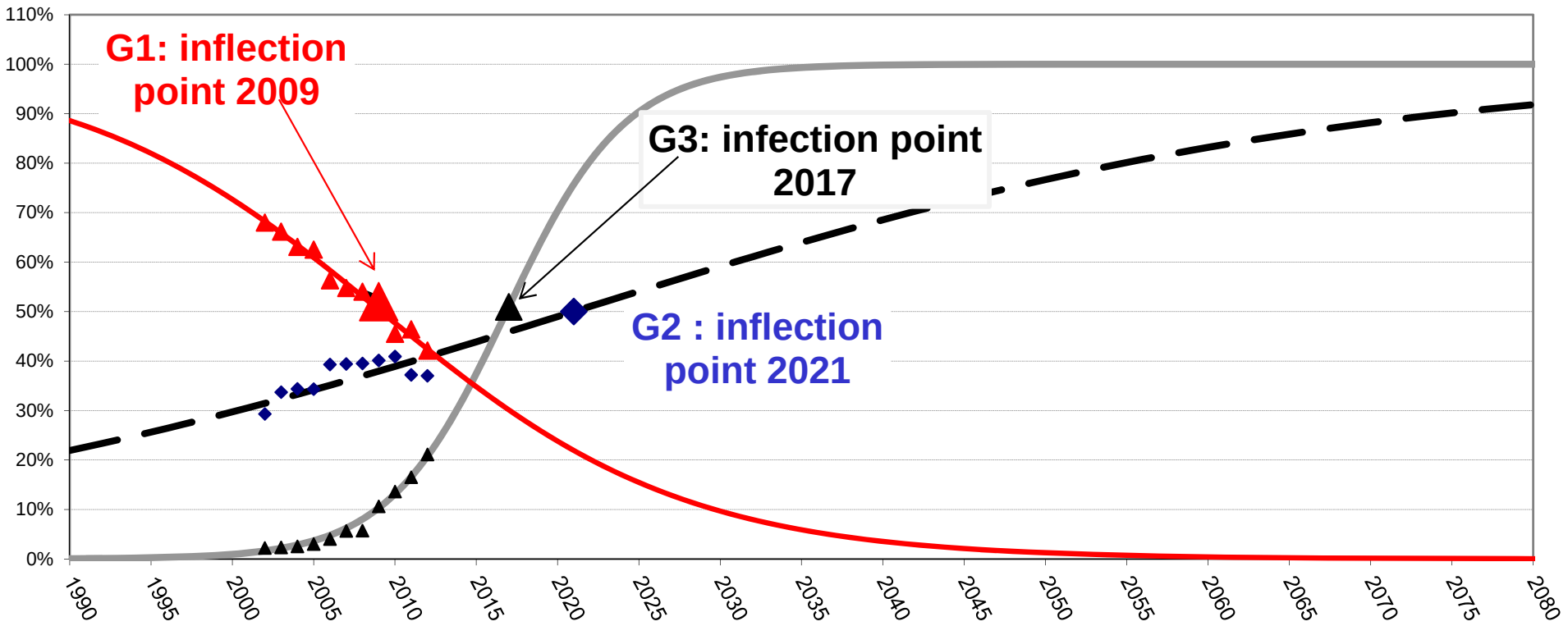
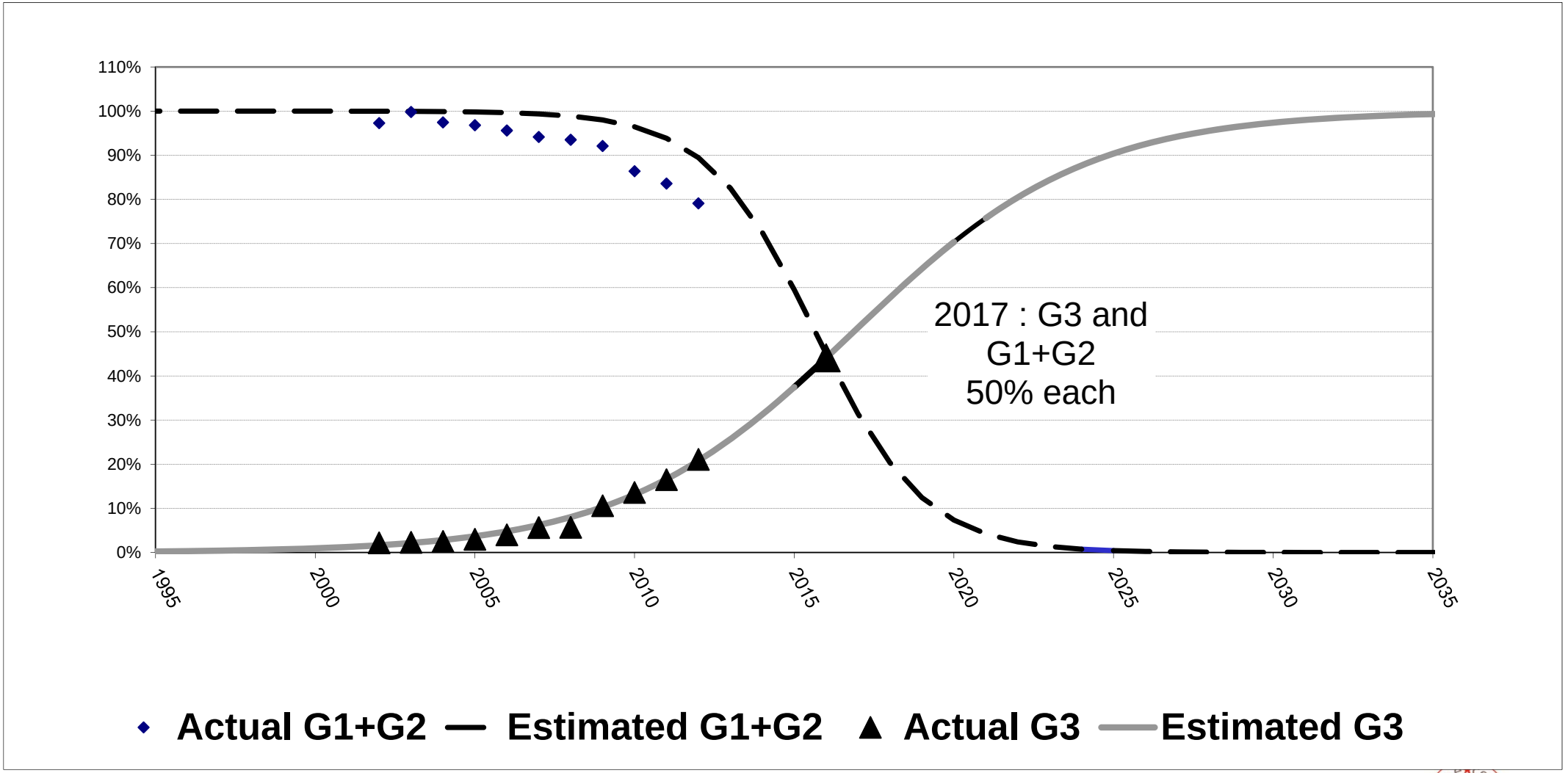
Nonlinear 3SLS Estimates						
Model	Term	Estimate	Approx Std Err	t Value	Approx Pr > |t|	Estimate year f=0.5
G1+G2	2α	-0.146	0.013	-11.26	<.0001	2017
	to	15.661	0.574	27.31	<.0001	
G3	2α	0.275	0.011	25.08	<.0001	2017
	to	15.862	0.331	47.87	<.0001	

Forecast of Market Shares



Re-modelling F-P with G1+G2 as first generation



However (limitations!)

- *Ceteris paribus*, the third generation of channels will reach half of booking share by 2017 and in the long run dominate the booking channels.
- The **long- run forecast has to be taken with parsimony**, as this is just a theoretical trend, which does not take into account the rise of possible forthcoming generations of distribution channels.
- It does, however, give some **evidence of the domination of the last generation** over the two previous ones.

Diffusion models
Bass Norton

Routine Proc model, SAS Institute V9.3, estimation method “full information maximum likelihood” (FIML)

Norton & Bass (1987,1992)

Single generation diffusion model Bass(1966)

$$X(t) = mF(t)$$

$$F(t) = \frac{1-\exp(-(p+q)t)}{1+(q/p)\exp(-(p+q)t)}$$

$X(t)$ is number of adopters at time t

M is potential number of adopters

$F(t)$ is cumulative proportion of adopter time t

Norton & Bass model of successive generations (3 in this application)

$$X_i(t) = m_i F_i(t)$$

$X_i(t)$ is number of adopters of the generation i at time t

M_i is potential number of adopters for the generation i

$F_i(t)$ is cumulative proportion of adopters of the generation i time t; generaration i introduced at time τ_i

$F_i(t-\tau_i) = 0$ for $t < \tau_i$

$$X_1(t) = F_1(t)M_1[1-F_2(t-\tau_2)]$$

$$X_2(t) = F_2(t-\tau_2)[M_2 + F_1(t)M_1][1-F_3(t-\tau_3)]$$

$$X_3(t) = F_3(t-\tau_3)\{M_3 + F_2(t-\tau_2)[M_2 + F_1(t)M_1]\}$$

Norton & Bass (cont')

Norton & Bass model of successive generations (3 in this application, cont')

$$F_i(t) = \frac{1-\exp(-a_i t)}{1+(b_i)\exp(-a_i t)}, \text{ where } a_i = p_i + q_i \text{ and } b_i = \frac{q_i}{p_i}$$

Restricted Norton & Bass Strong assumption	Unrestricted Norton & Bass
$p = p_i \ , q_i = q \ \forall i$	$\exists i \ \exists j : p_i \neq p_j \text{ or } q_i \neq q_j$
Assumption: adopters' behavior does not change across generation. Total number of parm. to be estimated= 3(#gen.)+2 (p&q)=5	Assumption: adopters' behavior change across generation. Total number of parm. to be estimated= 3(#gen.)*2(p&q)+3(#gen)=9

Estimation results (I)

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Nonlinear FIML Summary of Residual Errors

Equation	DF Model	DF Error	SSE	MSE	Root MSE	R-Square	Adj R-Sq
G1	0.889	10.11	0.01	0.00066	0.0258	0.911	0.912
G2	1.222	9.778	0	0.0003	0.0173	0.768	0.763
G3	1.889	9.111	0	0.00028	0.0167	0.941	0.935

Nonlinear FIML Parameter Estimates

Parameter	Estimate	Approx Std Err	t Value	Approx Pr > |t|	Label
a	0.068258	0.5812	0.12	0.9088	
b	0.072477	0.0249	2.91	0.0155	
M1	1.195458	0.0851	14.1	<.0001	
M2	0.162767	0.053	3.07	0.0134	
M3	-0.35822	0.0363	-9.88	<.0001	
Restrict0	89.70813	12.6758	7.08	<.0001	M1+M2+M3<=1

Estimation results (II)

Nonlinear FIML Estimates

Term	Estimate	Approx Std Err	t Value	Approx Pr > |t|	Label
p	0.067846	0.0137	4.94	0.0008	b/(a+1)
q	0.004631	0.0385	0.12	0.9069	b*a/(a+1)

Parameter Wald 95% Confidence Intervals

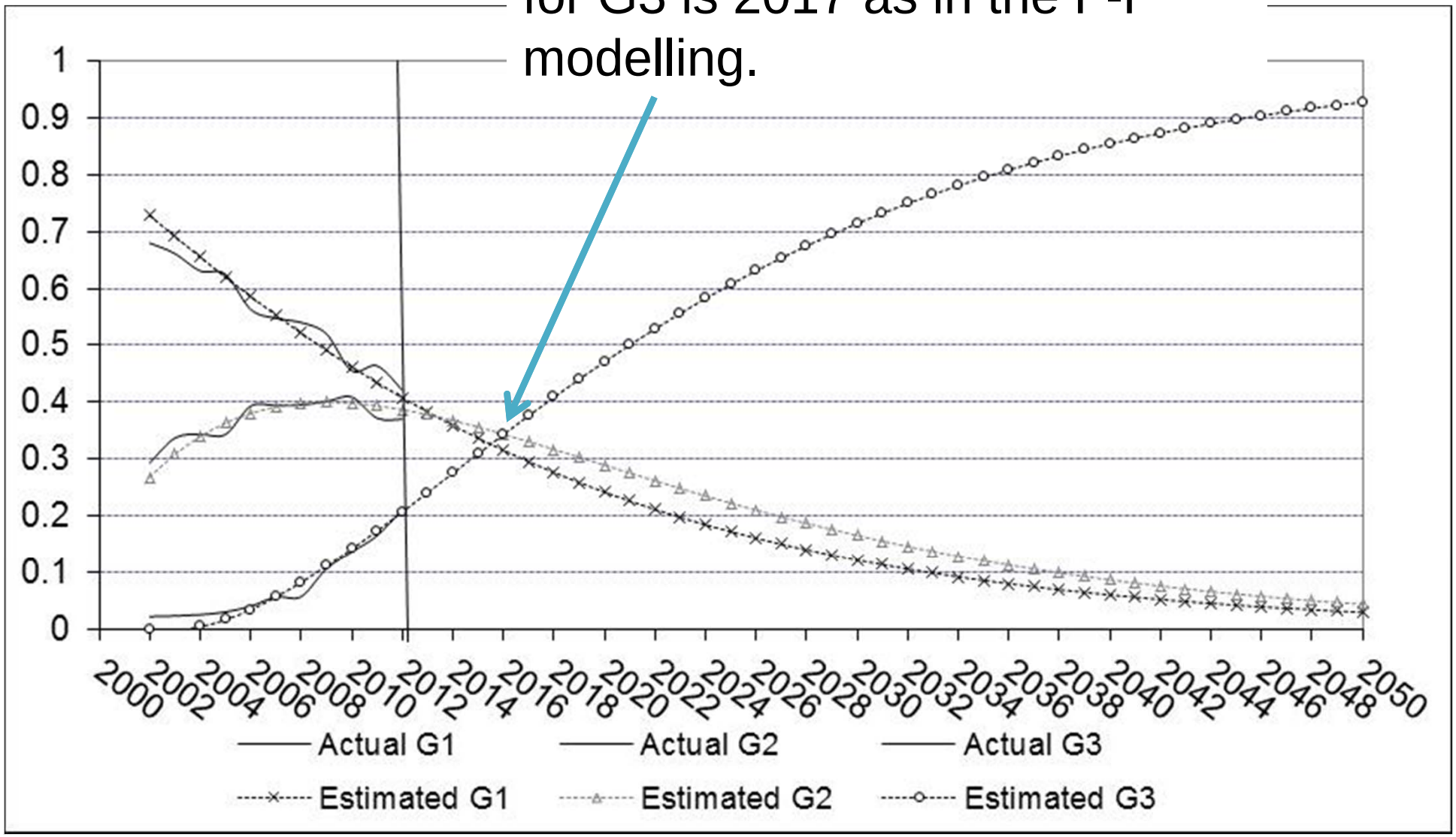
Parameter	Value	Lower	Upper
a	0.0683	0	1.21
b	0.0725	0.0237	0.12
M1	1.1955	1.0287	1.31
M2	0.1628	0.0588	0.23
M3	-0.3582	-0.4293	-0.31

The estimation of imitation parameter (***q***) fails to be significantly different of zero.

This suggests that the diffusion of successive channels of distribution are mainly driven by innovation.

Bass Norton estimation

The point of 50% penetration for G3 is 2017 as in the F-P modelling.



Conclusions

- The foreseen very high market share of OTAs is a serious threat for the Swiss lodging sector.
- Online intermediaries have become increasingly powerful in recent years and this development puts hotels in a difficult position of having to sell steadily growing portions of their inventory at (often) discounted rates and with high commission rates through third party intermediaries (Carroll & Siguaw, 2003).

Implications for hotels

- Promote direct bookings (better websites and online marketing, good web-booking engines)
- Value the customer IN the hotel (back to the roots of hospitality)

A leaf out of Accor's book: how to drive direct bookings to €2 billion

May 16, 2013

French hotel group Accor is aggressively aiming to increase its digital turnover by 45% within the next three years. It is also pushing for two-thirds of sales to come from the direct channel. That seems a big ask so EyeforTravel's Ritesh Gupta talks to Rémy Merckx, VP e-commerce sales and distribution, Accor about what's in store

ACCOR

Hotel Distribution in 2014: The Battle for Direct Sales

Future Research
Supply side

Moreover, the growing power of OTA/ IDS and the possible **dependency** of hotels is a recurrent topic in the industry and raises fundamental questions which could be addressed by academia:

- Can or should the (fragmented) hotel sector fight against an oligopoly of global booking portals?
- How to compete with the innovation pace of the big players which develop and optimise distribution in an industrial way?

Future Research
Demand side

- The Bass – Norton suggests that the adoption of new distribution channels by tourists is mainly driven by external effects (innovation) and not imitation.
- The “assured” best rates offered by OTA could be one of those external factor driving their success if it is not the main one. Further research should be in order to confirmer this fact.

Questions?