

***Ambio***

Electronic Supplementary Material

This supplementary material has not been peer reviewed.

Title: Effects of scarcity, aesthetics and ecology on wildlife auction prices of large African mammals

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**Table S1.** Annual average auction prices in thousands ZAR for carnivore and ungulate species from 1991 to 2012. Number of auctions for each year and species is given in brackets.

**Table S2.** Predictor variables used in regression against average annual auction prices, including data sources.

**Table S3.** Data on biological characteristics for carnivore and ungulate species.

**Table S1.** Annual average auction prices in thousands ZAR for carnivore and ungulate species from 1991 to 2012. Number of auctions for each year and species is given in brackets.

Order	Species	Origin	Form	1991 (9)	1992 (15)	1993 (18)	1994 (20)	1995 (19)	1996 (20)	1997 (30)	1998 (38)	1999 (43)	2000 (48)	2001	2002	2003 (59)	2004 (47)	2005 (56)	2006 (46)	2007 (49)	2008 (46)	2009 (45)	2010 (56)	2011 (55)	2012 (55)
Carnivora	Panthera tigris	exotic	common																						35.00
Carnivora	Acinonyx jubatus	native	common														32.00	26.25		47.07	50.00	67.29	25.00		
Carnivora	Caracal caracal	native	common															3.50		1.60	2.38				1.20
Carnivora	Crocuta crocuta	native	common															0.50		5.60	5.60				
Carnivora	Lycaon pictus	native	common						3.00	15.50	4.25			7.33	8.00	9.50				2.00	1.01				
Carnivora	Panthera leo	native	common		8.67	7.00	7.83	4.08	14.75		25.43	18.17	8.20	15.00	36.40	22.99	6.31	21.83		7.43	97.50	28.47		64.03	46.00
Carnivora	Panthera pardus	native	common				2.25							2.25				32.67							
Artiodactyla	Dama dama	exotic	common	0.26	0.45	0.46	0.56	0.91	0.80		1.38	0.98	0.99	1.12									2.29	4.35	3.68
Artiodactyla	Kobus lechwe	exotic	common		4.25	2.30	1.80	1.97	2.62	3.50	4.43	3.93	5.75	7.28	11.23	15.49	14.01	10.98	9.73	11.35	9.95	10.18	10.37	8.63	8.53
Artiodactyla	Oryx dammah	exotic	common										7.17			14.75	14.33	17.00						7.55	
Artiodactyla	Aepyceros melampus	native	common	0.20	0.21	0.23	0.33	0.37	0.48	0.63	0.58	0.57	0.60	0.64	0.72	0.68	0.64	0.73	0.75	0.98	1.15	1.10	1.12	1.16	1.12
Artiodactyla	Aepyceros melampus	native	black													100.00	86.00	30.00	35.00	38.37	38.79	53.41	102.67	129.81	194.30
Artiodactyla	Aepyceros melampus	native	black back																					355.00	818.75
Artiodactyla	Aepyceros melampus	native	black back splits																						320.00
Artiodactyla	Aepyceros melampus	native	black faced											101.33		1.05	3.00		3.00			6.60			
Artiodactyla	Aepyceros melampus	native	black splits																					8.00	25.09
Artiodactyla	Aepyceros melampus	native	grey																						160.00
Artiodactyla	Aepyceros melampus	native	white																						260.00
Artiodactyla	Aepyceros melampus	native	white splits																						10.75
Artiodactyla	Alcelaphus buselaphus	native	common	1.15	0.91	1.01	1.02	1.68	1.96	2.49	2.75	2.72	2.96	3.19	4.33	3.48	3.34	3.12	3.31	3.86	4.14	4.41	3.97	4.31	3.83
Artiodactyla	Alcelaphus lichtensteini	native	common						25.75		30.00					75.00	70.00		95.71	90.00	100.00		140.00		
Artiodactyla	Antidorcas marsupialis	native	common	0.12	0.17	0.27	0.24	0.30	0.31	0.40	0.47	0.41	0.38	0.50	0.65	0.60	0.52	0.60	0.78	0.62	1.11	0.87	0.98	1.39	1.45
Artiodactyla	Antidorcas marsupialis	native	black	0.33	0.36	0.30	0.43	0.46	0.54	0.63	0.81	0.88	0.99	0.87		1.13	0.91	0.95	1.26	2.09	2.17	2.00	1.54	1.97	3.57
Artiodactyla	Antidorcas marsupialis	native	black heartwater																						45.24
Artiodactyla	Antidorcas marsupialis	native	heartwater	1.09	1.20	1.83	0.50	0.55	2.54	0.96	2.72	1.89		0.89		7.63	2.70	3.39	2.65	5.95	7.75	4.07	7.60	8.95	14.46
Artiodactyla	Antidorcas marsupialis	native	Kalahari											0.84		0.76	0.87	0.92	1.08	1.09	1.12	1.55		2.49	2.32
Artiodactyla	Antidorcas marsupialis	native	red										2.00				8.00	8.07	7.33	5.79	4.25	6.41	5.68	5.23	7.78

Artiodactyla	Antidorcas marsupialis	native	white				0.46	0.56	0.91	1.54	1.37	0.99	0.88	2.23	2.18		2.60	2.82	2.36	2.84	3.34	1.78	3.95	3.53	3.83	4.57
Artiodactyla	Cephalophus natalensis	native	common	2.13	1.73	1.45						0.18	2.00		2.60		4.80		4.50		3.00					
Artiodactyla	Connochaetes gnou	native	common	0.45	0.47	0.60	1.05	1.40	1.65	2.22	2.60	2.55	2.68	2.31	2.68	1.64	1.80	1.47	2.11	3.02	2.83	2.44	2.15	2.97	2.19	
Artiodactyla	Connochaetes taurinus	native	common	0.74	0.49	0.82	1.44	1.39	1.78	2.23	2.13	2.25	2.23	2.33	2.27	1.79	1.63	1.63	1.78	2.28	2.62	2.44	2.37	2.91	2.16	
Artiodactyla	Connochaetes taurinus	native	gold															80.00	112.50	170.00	171.67	197.15	265.31	459.42	514.16	
Artiodactyla	Connochaetes taurinus	native	king																							3350.00
Artiodactyla	Connochaetes taurinus	native	king splits																							81.55
Artiodactyla	Connochaetes taurinus	native	splits																							23.22 52.85
Artiodactyla	Damaliscus lunatus	native	common		3.06	2.98	2.74	2.45	3.42	4.71	5.91	6.37	9.50	15.29	17.11	16.74	19.12	15.32	10.18	12.69	12.32	11.28	12.13	11.83	14.32	
Artiodactyla	Damaliscus pygargus phillipsi	native	common	0.27	0.26	0.29	0.38	0.44	0.57	0.61	0.67	0.65	0.68	0.70	0.83	0.74	0.75	0.72	0.94	1.16	1.16	1.33	1.26	1.12	1.23	
Artiodactyla	Damaliscus pygargus phillipsi	native	copper																							177.67
Artiodactyla	Damaliscus pygargus phillipsi	native	red																							8.50
Artiodactyla	Damaliscus pygargus phillipsi	native	speckled																							7.00
Artiodactyla	Damaliscus pygargus phillipsi	native	white	0.70	0.30	0.43	0.71	0.66	0.82	0.79	1.03	0.87	0.70	0.99		1.25	1.12	1.06	1.36	1.80	1.74	1.79	1.62	1.29	2.22	
Artiodactyla	Damaliscus pygargus phillipsi	native	white splits																							2.40
Artiodactyla	Damaliscus pygargus phillipsi	native	yellow						0.90	1.56	1.09		1.30					2.60		4.10	3.42	9.50	8.67	47.38		
Artiodactyla	Damaliscus pygargus pygargus	native	common		1.00	1.00	2.00	2.60	2.40	2.45	2.50	2.73	3.16	3.16	5.68	8.52	9.30	9.49	6.25	6.63	6.99	5.50	4.00	3.58	9.81	
Artiodactyla	Giraffa camelopardalis	native	common	6.58	6.05	6.04	6.28	7.01	7.21	9.32	10.26	10.99	12.51	13.12	14.78	14.51	13.99	13.70	15.50	13.67	16.12	13.65	18.26	14.19	15.68	
Artiodactyla	Hippopotamus amphibius	native	common		5.20		15.00				18.25	23.50	25.30	27.00	44.11	40.00	31.63	28.17	15.50	25.03	41.00		43.14	48.13	34.50	
Artiodactyla	Hippotragus equinus	native	common	17.00	29.00		28.00	38.50	33.63	26.40	48.50	94.10	86.39	106.71	135.65	130.33	149.52	66.42	60.90	67.53	67.74	62.99	67.18	108.22	223.65	
Artiodactyla	Hippotragus niger	native	common	25.29	18.28	19.16	15.67	13.48	17.25	24.89	32.46	48.77	53.58	66.53	78.36	91.56	61.81	47.22	57.42	63.61	71.46	121.83	117.73	152.12	178.12	
Artiodactyla	Hippotragus niger	native	Zambian																						419.17 593.36	
Artiodactyla	Hippotragus niger	native	Zambian hybrid																						485.58	
Artiodactyla	Kobus ellipsiprymnus	native	common	2.10	1.79	1.54	1.90	2.19	2.61	3.36	3.56	3.54	4.83	5.06	6.66	5.56	4.99	4.79	5.40	6.10	6.20	6.01	6.27	5.13	4.31	
Artiodactyla	Neotragus moschatus	native	common		1.33	2.05	1.30			2.00						3.96					5.51					
Artiodactyla	Oreotragus oreotragus	native	common		2.30	2.40	2.46			4.36	5.05	5.99	5.60	4.92	5.56	4.73	3.83	4.90	3.15						10.00 10.00	
Artiodactyla	Oryx gazella	native	cardinal																						140.00	
Artiodactyla	Oryx gazella	native	common	1.25	1.04	1.14	1.41	1.88	1.98	2.64	2.95	3.15	3.30	3.39	3.75	3.76	3.52	3.44	4.09	4.01	4.31	4.76	4.76	4.93	4.86	



**Table S2.** Predictor variables used in regression against average annual auction prices, including data sources.

Variable	Hedonic class	Type	Levels or units	Reference level	Source	Comment
Origin	Rarity	Categorical	“Native”; “Exotic”	“Native”	1	
Form	Rarity	Categorical	“Common”; “Deviant”	“Common”	own data	Only for ungulates
IUCN class	Rarity	Categorical	“Least concerned”; “Near threatened”; “Vulnerable”; “Endangered”; “Critically endangered”; “Endangered in the wild”	“Least concerned”	1	
Horn or tusk length	Aesthetics	Categorical	mm		3,4	Only for ungulates
Colour pattern	Aesthetics	Categorical	“Plain”; “Spotted/Striped”	“Plain”	own data	
Body mass	Ecology	Continuous	kg		2	Average mass for adult males and females, panTHERIA code 5-1
Activity pattern	Ecology	Categorical	“Diurnal”; “Nocturnal”; “Both”	“Diurnal”	2,3	panTHERIA code 1-1
Group size	Ecology	Continuous	Number of animals		2,3,4,5	panTHERIA code 10-2
Density	Ecology	Continuous	animals/km <sup>2</sup>		1,2,6	panTHERIA code 21-1
Home range	Ecology	Categorical	km <sup>2</sup>		2,3,7,8,9,10	panTHERIA code 22-1
Diet breadth	Ecology	Categorical	Number of diet categories (“vertebrate”, “invertebrate”, “fruit”, “flowers/nectar/pollen”, “leaves/branches/bark”, “seeds”, “grass” and “roots/tubers”)		2	panTHERIA code 6-1
Litter size	Ecology	Continuous	Mean number of offspring per breeding event		2,3	panTHERIA code 15-1

## Data sources

1. IUCN redlist <http://www.redlist.org>
2. Jones et al. 2009 Ecology 90:2648
3. Skinner & Chimimba 2005 Mammals of the African subregion. Cambr. Univ. Press
4. Macdonald 2001 Encyclopedia of mammals. Oxford Univ. Press
5. Bigalke 1970 Zool. Afr. 5:59-70
6. East & Estes 1999 African antelope data base 1998. IUCN
7. Mason 1976 S. Afr. J. Wildl. Res. 6:33-39
8. Nowak 1999 Walkers mammals of the world. John Hopk. Univ. Press
9. Young 1972 Zool. Afr. 7:187-195
10. Tear et al. 1997 J. Wildl. Managem. 61:1142-1154

**Table S3.** Data on biological characteristics for carnivore and ungulate species.

Order	Species	Origin	Year	IUCN	Activity cycle	Mass	Diet breadth	Home range	Litter size	Density	Group size	Horn or tusk length
Carnivora	Acinonyx jubatus	Native	2004	VU	Diurnal	50.58	1	88.27	3.3	0.01	1	na
Carnivora	Acinonyx jubatus	Native	2006	VU	Diurnal	50.58	1	88.27	3.3	0.01	1	na
Carnivora	Acinonyx jubatus	Native	2008	VU	Diurnal	50.58	1	88.27	3.3	0.01	1	na
Carnivora	Acinonyx jubatus	Native	2009	VU	Diurnal	50.58	1	88.27	3.3	0.01	1	na
Carnivora	Acinonyx jubatus	Native	2010	VU	Diurnal	50.58	1	88.27	3.3	0.01	1	na
Carnivora	Acinonyx jubatus	Native	2011	VU	Diurnal	50.58	1	88.27	3.3	0.01	1	na
Carnivora	Caracal caracal	Native	2005	LC	Noct	11.96	1	293.94	2.3	0.10	1	na
Carnivora	Caracal caracal	Native	2008	LC	Noct	11.96	1	293.94	2.3	0.10	1	na
Carnivora	Caracal caracal	Native	2009	LC	Noct	11.96	1	293.94	2.3	0.10	1	na
Carnivora	Caracal caracal	Native	2012	LC	Noct	11.96	1	293.94	2.3	0.10	1	na
Carnivora	Crocuta crocuta	Native	2004	LC	Noct	63.37	1	21.93	1.9	0.12	15	na
Carnivora	Crocuta crocuta	Native	2008	LC	Noct	63.37	1	21.93	1.9	0.12	15	na
Carnivora	Crocuta crocuta	Native	2009	LC	Noct	63.37	1	21.93	1.9	0.12	15	na
Carnivora	Lycan pictus	Native	1996	EN	Diurnal	22.00	1	395.88	8.1	0.01	10	na
Carnivora	Lycan pictus	Native	1997	EN	Diurnal	22.00	1	395.88	8.1	0.01	10	na
Carnivora	Lycan pictus	Native	1998	EN	Diurnal	22.00	1	395.88	8.1	0.01	10	na
Carnivora	Lycan pictus	Native	2001	EN	Diurnal	22.00	1	395.88	8.1	0.01	10	na
Carnivora	Lycan pictus	Native	2002	EN	Diurnal	22.00	1	395.88	8.1	0.01	10	na
Carnivora	Lycan pictus	Native	2003	EN	Diurnal	22.00	1	395.88	8.1	0.01	10	na
Carnivora	Lycan pictus	Native	2008	EN	Diurnal	22.00	1	395.88	8.1	0.01	10	na
Carnivora	Lycan pictus	Native	2009	EN	Diurnal	22.00	1	395.88	8.1	0.01	10	na
Carnivora	Panthera leo	Native	1992	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	1993	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	1994	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	1995	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	1996	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	1998	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	1999	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	2000	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	2001	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	2002	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	2003	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	2004	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	2005	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	2007	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	2008	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	2009	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	2011	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera leo	Native	2012	VU	Noct	158.62	1	55.19	2.8	0.11	3	na
Carnivora	Panthera pardus	Native	1993	LC	Both	52.40	1	18.78	2.1	0.07	1	na
Carnivora	Panthera pardus	Native	2001	LC	Both	52.40	1	18.78	2.1	0.07	1	na
Carnivora	Panthera pardus	Native	2005	LC	Both	52.40	1	18.78	2.1	0.07	1	na
Carnivora	Panthera tigris	Exotic	2012	EN	Noct	161.91	1	64.89	2.6	0.03	1	na
Artiodactyla	Aepyceros melampus	Native	1991	LC	Diurnal	52.59	2	2.36	1.0	13.36	15.25	810
Artiodactyla	Aepyceros melampus	Native	1992	LC	Diurnal	52.59	2	2.36	1.0	13.36	15.25	810
Artiodactyla	Aepyceros melampus	Native	1993	LC	Diurnal	52.59	2	2.36	1.0	13.36	15.25	810
Artiodactyla	Aepyceros melampus	Native	1994	LC	Diurnal	52.59	2	2.36	1.0	13.36	15.25	810
Artiodactyla	Aepyceros melampus	Native	1995	LC	Diurnal	52.59	2	2.36	1.0	13.36	15.25	810
Artiodactyla	Aepyceros melampus	Native	1996	LC	Diurnal	52.59	2	2.36	1.0	13.36	15.25	810
Artiodactyla	Aepyceros melampus	Native	1997	LC	Diurnal	52.59	2	2.36	1.0	13.36	15.25	810
Artiodactyla	Aepyceros melampus	Native	1998	LC	Diurnal	52.59	2	2.36	1.0	13.36	15.25	810
Artiodactyla	Aepyceros melampus	Native	1999	LC	Diurnal	52.59	2	2.36	1.0	13.36	15.25	810
Artiodactyla	Aepyceros melampus	Native	2000	LC	Diurnal	52.59	2	2.36	1.0	13.36	15.25	810





























Artiodactyla	Kobus leche	Exotic	1993 VU	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	1994 VU	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	1995 VU	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	1996 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	1997 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	1998 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	1999 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2000 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2001 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2002 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2003 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2004 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2005 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2006 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2007 NT	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2008 LC	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2009 LC	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2010 LC	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2011 LC	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Kobus leche	Exotic	2012 LC	Both	88.65	2	0.05	1.0	31.00	20	889
Artiodactyla	Oryx dammah	Exotic	2000 EW	Both	199.80	5	200.00	1.0	1.50	30	1270
Artiodactyla	Oryx dammah	Exotic	2003 EW	Both	199.80	5	200.00	1.0	1.50	30	1270
Artiodactyla	Oryx dammah	Exotic	2004 EW	Both	199.80	5	200.00	1.0	1.50	30	1270
Artiodactyla	Oryx dammah	Exotic	2005 EW	Both	199.80	5	200.00	1.0	1.50	30	1270
Artiodactyla	Oryx dammah	Exotic	2011 EW	Both	199.80	5	200.00	1.0	1.50	30	1270