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**To:** "Jim Pierson" <JPierson@ci.fremont.ca.us>  
**Date:** 3/27/2008 2:11 PM  
**Subject:** A's Ballpark trip model  
**Attachments:** Table 1.pdf; Figure 1 - 4.pdf

**CC:** "Kunle Odumade" <KOdumade@ci.fremont.ca.us>, "Shannon Allen" <Shannon.Al...>  
Hello Jim,

Per your request, below is a brief description of the trip distribution method Hexagon developed for the A's Ballpark study.

Hexagon developed a formula that predicts the likelihood that the residents of a particular City within about 60 miles of the A's ballpark would purchase tickets to a ballgame. The formula is based on the ticket purchasing habits of the A's existing fan base per the A's credit card receipt data. The formula correlates the distance from the existing stadium, the number of households in each City (per ABAG), the purchasing power per household (derived per ABAG mean income), and apparent biases in the A's fan base given the proximity of the SF Giants. The data are summarized on Table 1. The findings were as follows:

1) Figure 1 shows the correlation between distance to the stadium and the number of households per City (each data point represents the characteristics for a City). As shown, the best fit curve has a  $R^2$  correlation of only 0.22, which means that although distance and number of households appear to be an important factor, other factors clearly are important.

2) Figure 2 shows the correlation between distance and the purchasing power of each City. Purchasing power reflects both the number of households per City AND the income per household. Purchasing power was defined as median income of each household minus \$45,000. The data show a clearer correlation between distance, number of households, and purchasing power. The  $R^2$  correlation improved to 0.52.

3) Figure 3 shows a correlation that was shown to be statistically relevant due to geographic preferences of the A's fan base. We called this the Giants bias. Given income and population, many peninsula Cities are much less likely to purchase tickets to an A's game than they should (probably because this is Giants territory). In contrast, many Cities in the tri valley area were much more likely to purchase tickets to an A's game (this appears to be predominately A's territory). When the territory biases are factored in, the resulting  $R^2$  correlation improves to 0.64.

We acknowledge that any attempt to predict a behavior as complex ticket purchasing has limitations. The current method does not account for:

1) distance is not a perfect proxy for travel time to the stadium (influence of BART/transit); 2) mean household income is not a perfect proxy for disposable income (which could vary by household wealth); 3) demographic, cultural differences, and recreational preferences in areas; 4) limitations inherent in the ticket data, 5) household location is not a perfect proxy for trip end locations (some people may be driving from work); and 6) effects of marketing efforts. Without

extensive surveys of A's and Giants patrons, we do not believe we can be more accurate than the 0.64 R<sup>2</sup> correlation achieved. However, despite the limitations, the formula appears to provide a reasonable estimate of ticket purchases by City. And, when the data are aggregated to formulate general approach and departure, the error is reduced (for instance, people who live south of the ballpark are also most likely to work south of the ballpark). Because this method is objective, reproducible, and statistically relevant, we believe it represents the best possible estimate of trip making activities to/from A's games.

When the formula is applied to the Alameda County TDF model for the new ballpark location in Fremont, the results show approximately (See Figure 4):

Coming from the north I-880: 30%  
Coming from the south I-880/I-680: 43%  
Coming from tri valley I-680: 21%  
Misc land uses in Fremont/Newark: 6%

F&P previous estimate was:

Coming from the north I-880: 40%  
Coming from the south I-880/I-680: 40%  
Coming from tri valley I-680: 15%  
Misc land uses in Fremont/Newark: 5%

The distributions developed by F&P and Hexagon are reasonably similar. However, Hexagon's distribution shows a slightly higher draw from the south and east. Per our meeting, we are moving forward with our distribution. If you have any questions, feel free to give me a call.

-Brett

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Table 1

City	Total Ticket Sales (Form A's Credit Card Info, 2007 season)	Households /	Mean Income Per Household /	Purchasing Power (Household Income - \$45,000)	Tickets/ Household	Miles between City Center and Ballpark (Miles) /	County	TERRITORY BIAS CALCULATION			FORMULA PREDICTION			FORMULA PREDICTION WITH TERRITORY FACTOR			ERROR MEASUREMENTS						
								Predicted tickets / \$100k of purchasing power (From Raw Data)	Difference	% Reduction	Yearly Tickets Predicted	Yearly Tickets Normalized	Normalized County Ticket Predictions (No Territory Adjustment)	Adjustment for Season	Adjustment for Game	Final Ticket Sales for Sellout Game of 34,000 fans	Final Ticket Sales for Season	Difference of Predicted - Actual	Absolute % Error	Weighted Error	Absolute Value of Weighted Error		
Alameda	28,627	30,980	\$ 68,500.00	\$ 1,347,320,000.00	0.92	4.9	T	2.790940892	-8.666	-33%	0.5478	2,124,477.53	37,610	32,538	1,091	32,538	1,091	1,223	30,458	7,831	21%	7831/19%	7831/19%
Alamo	8,213	8,420	\$ 233,400.00	\$ 1,586,320,000.00	0.89	26.1		0.890331992				0.283514254	15,234	13,179	442	24,087	807	904	26,587	18,754	70%	1875385%	1875385%
Albany	3,934	7,130	\$ 77,800.00	\$ 234,577,000.00	0.55	14.7		1.677061283				1.677061283	3,728	2,223	108	3,223	108	120	3,612	3,612	-9%	-3223/1%	3223/1%
Anchich	10,540	33,090	\$ 83,300.00	\$ 1,287,347,000.00	0.32	42.3		0.431905013				0.831685875	5,474	4,735	159	4,735	159	178	5,004	5,234	-90%	-5234/13%	5234/13%
Balmain	1,197	10,740	\$ 127,400.00	\$ 884,876,000.00	0.11	25.8	P	0.972990156	-8.252	-73%	2.7285	0.388786128	8,610	7,440	250	2,732	92	103	3,000	3,000	61%	1854/21%	1854/21%
Berkeley	24,718	45,530	\$ 83,500.00	\$ 671,040,000.00	0.54	14.6		1.410116350				1.410116350	27,977	24,204	812	24,204	812	909	27,120	2,402	8%	2402/20%	2402/20%
Brentwood	7,789	14,400	\$ 91,600.00	\$ 970,548,000.00	0.15	27.1	P	0.201848182	-5.758	-65%	2.7285	0.915190288	1,807	1,586	53	1,586	53	60	1,772	1,772	-60%	-182/10%	182/10%
Burlingame	1,960	13,910	\$ 119,800.00	\$ 640,588,000.00	0.37	38.8		0.952250120				0.852250120	3,272	2,917	99	2,917	99	106	3,177	3,177	-12%	-121/60%	121/60%
Campbell	6,100	16,510	\$ 83,800.00	\$ 1,219,350,000.00	0.89	8.7		1.614056670				1.614056670	26,380	22,813	765	22,813	765	857	23,619	2,801	-87%	-2831/2%	2831/2%
Castro Valley	18,881	22,170	\$ 100,000.00	\$ 369,800,000.00	1.02	32.5		1.135708340				1.135708340	2,590	2,241	75	2,241	75	84	2,259	2,259	-87%	-2831/2%	2831/2%
Clayton	4,084	14,000	\$ 134,900.00	\$ 1,718,036,000.00	0.69	20.8		1.354914465				1.354914465	6,734	5,826	195	5,826	195	210	6,070	6,070	23%	5806/4%	5806/4%
Concord	31,831	46,130	\$ 92,200.00	\$ 1,578,024,000.00	0.18	42.5	T	0.815230014	-18.728	141%	0.5478	0.217170335	13,960	12,103	406	12,103	406	420	12,509	12,509	-23%	-3028/7%	3028/7%
Cupertino	3,427	19,530	\$ 125,800.00	\$ 1,952,188,000.00	2.13	27.9		0.887350952				0.887350952	17,322	15,627	1,519	15,627	1,519	168	15,818	15,818	-14%	-1445/7%	1445/7%
Danville	33,683	15,820	\$ 168,400.00	\$ 1,892,000,000.00	0.23	42.9	T	0.887350952	-18.707	108%	0.5478	0.945103010	17,322	15,627	1,519	15,627	1,519	168	15,818	15,818	-14%	-1445/7%	1445/7%
Dublin	14,089	13,440	\$ 111,500.00	\$ 893,760,000.00	1.05	18.6		1.578373971				1.578373971	11,896	10,232	345	10,232	345	320	10,578	10,578	-10%	-3028/7%	3028/7%
Emeryville	8,279	12,950	\$ 85,800.00	\$ 530,084,000.00	0.48	17.1		1.184573938				1.184573938	7,543	6,256	245	6,256	245	245	7,312	7,312	-10%	-3028/7%	3028/7%
El Cerrito	4,711	4,830	\$ 73,200.00	\$ 1,186,103,000.00	0.24	21.7	P	0.249784155	-8.838	-65%	2.7285	1.162394802	1,889	1,245	75	1,245	75	84	2,510	2,510	-67%	-2185/35%	2185/35%
Foster City	2,920	12,080	\$ 141,700.00	\$ 1,169,103,000.00	0.23	21.7		0.249784155				0.249784155	1,889	1,245	75	1,245	75	84	2,510	2,510	-67%	-2185/35%	2185/35%
Fremont	51,488	70,130	\$ 115,100.00	\$ 4,916,113,000.00	0.74	21.2		1.047314939				1.047314939	15,589	13,589	50,522	13,589	50,522	1,894	18,988	5,121	8%	5121/33%	5121/33%
Geary	4,281	15,940	\$ 76,800.00	\$ 506,892,000.00	0.27	66.3		0.840612991				0.840612991	-304	-263	-8	-263	-8	10	-254	-254			
Hayward	2,913	45,890	\$ 74,800.00	\$ 1,382,024,000.00	0.66	8.1		2.237587770				2.237587770	29,208	25,269	847	25,269	847	949	26,110	26,110	-9%	-261/108%	261/108%
Hercules	4,281	7,750	\$ 100,800.00	\$ 432,420,000.00	0.28	38.8		0.873693498				0.873693498	4,171	3,608	121	3,608	121	136	4,043	4,043	28%	112965%	112965%
Hillsborough	1,484	3,750	\$ 390,300.00	\$ 1,182,375,000.00	0.40	27.4	P	0.807141728	-7.795	-73%	2.7285	0.187930885	4,171	3,608	121	3,608	121	136	4,043	4,043	28%	112965%	112965%
Lafayette	1,484	9,840	\$ 165,600.00	\$ 1,180,556,000.00	1.38	18.9		1.127972106				1.127972106	1,889	1,527	118	1,527	118	128	1,613	1,613	-11%	-172092%	172092%
Livermore	28,352	28,550	\$ 107,800.00	\$ 1,795,795,000.00	0.99	27.9		1.578796362				1.578796362	15,635	13,788	462	13,788	462	484	14,729	11,729	-11%	-172092%	172092%
Los Altos	4,981	14,470	\$ 178,500.00	\$ 1,531,245,000.00	0.43	32.9		0.325290858				0.325290858	10,825	9,365	314	9,365	314	352	10,490	5,512	53%	5512/31%	5512/31%
Los Gatos	6,170	13,340	\$ 138,400.00	\$ 1,219,278,000.00	0.45	44.5		0.508036009				0.508036009	4,889	3,970	133	3,970	133	149	4,449	4,449			
Marina	11,151	16,980	\$ 89,500.00	\$ 755,810,000.00	0.66	34.3		1.475781305				1.475781305	8,959	8,529	286	8,529	286	204	8,440	4,857	77%	40555/6%	40555/6%
Menlo Park	3,676	14,180	\$ 162,700.00	\$ 1,888,088,000.00	0.28	27.4	P	0.907141728	-9.422	-62%	2.7285	0.605330200	15,140	13,068	684	13,068	684	162	14,844	-6,307	-130%	-6307/24%	6307/24%
Mill Valley	1,463	8,270	\$ 158,000.00	\$ 917,870,000.00	0.18	32.4		0.161552120				0.161552120	6,843	5,747	193	5,747	193	216	6,440	6,440			
Milpitas	6,805	17,860	\$ 97,700.00	\$ 876,585,000.00	0.38	29.4		0.695393237				0.695393237	8,122	7,027	238	7,027	238	204	7,727	1,069	14%	10684/4%	10684/4%
Morgan	7,160	5,730	\$ 153,300.00	\$ 620,558,000.00	1.25	25.1		1.163789430				1.163789430	7,733	6,890	224	6,890	224	251	7,490	336	4%	3360/4%	3360/4%
Morgan Hill	2,989	13,530	\$ 104,000.00	\$ 798,270,000.00	0.22	58.1		0.374434715				0.374434715	981	849	28	849	28	32	951	-2,038	-214%	-2038/1%	2038/1%
Mountain View	5,130	31,920	\$ 90,800.00	\$ 1,482,394,000.00	0.16	33.9		0.360794656				0.360794656	8,529	8,529	286	8,529	286	320	8,529	4,427	49%	4427/8%	4427/8%
Norwalk	8,757	13,250	\$ 95,400.00	\$ 667,600,000.00	0.88	18.2		1.311320755				1.311320755	6,047	7,827	262	7,827	262	294	7,827	13	0%	131/8%	131/8%
Novato	5,721	20,830	\$ 85,300.00	\$ 1,047,749,000.00	0.27	38.9		0.546027722				0.546027722	5,488	4,748	158	4,748	158	178	5,318	4,407	-6%	-4031/9%	4031/9%
Oakland	180,860	154,680	\$ 95,000.00	\$ 3,679,004,000.00	1.04	3		0.437237804				0.437237804	122,431	105,920	3,552	105,920	3,552	3,980	118,881	-42,179	-36%	-42179/33%	42179/33%
Oakley	3,146	8,730	\$ 83,000.00	\$ 369,740,000.00	0.32	49.3		0.858088176				0.858088176	877	778	28	778	28	32	847	-2,109	-232%	-2109/7%	2109/7%
Orinda	9,385	8,870	\$ 203,900.00	\$ 1,059,883,000.00	1.41	15.9		0.888435322				0.888435322	15,928	13,778	462	13,778	462	518	15,438	6,043	39%	6043/4%	6043/4%
Palo Alto	5,637	30,130	\$ 133,100.00	\$ 2,854,453,000.00	0.19	27.5	P	0.903164636	-14.903	-62%	2.7285	0.599551603	23,973	20,740	685	20,740	685	747	20,740	255	28%	255/12%	255/12%
Piedmont	2,702	10,720	\$ 245,700.00	\$ 784,897,000.00	1.55	10.6		0.771577693				0.771577693	14,883	12,876	432	12,876	432	484	14,827	5,527	59%	8527/31%	8527/31%
Pineville	6,518	25,910	\$ 80,200.00	\$ 827,022,000.00	0.25	38.6		1.081286101				1.081286101	3,834	3,217	111	3,217	111	125	3,710	1,014	27%	1014/7%	1014/7%
Pittsburg	11,132	16,910	\$ 90,500.00	\$ 789,405,000.00	0.88	25.9		1.448832262				1.448832262	3,338	2,898	97	2,898	97	102	3,234	-3,284	-102%	-3284/7%	3284/7%
Placer	50,447	25,280	\$ 138,900.00	\$ 2,371,914,000.00	2.01	22.5	T	1.122786845	27.608	104%	0.5478	1.168282778	26,831	23,039	773	23,039	773	4,203					

Figure 1

Ticket Sales vs. Distance - Existing 2007 A's Ticket Sales Data

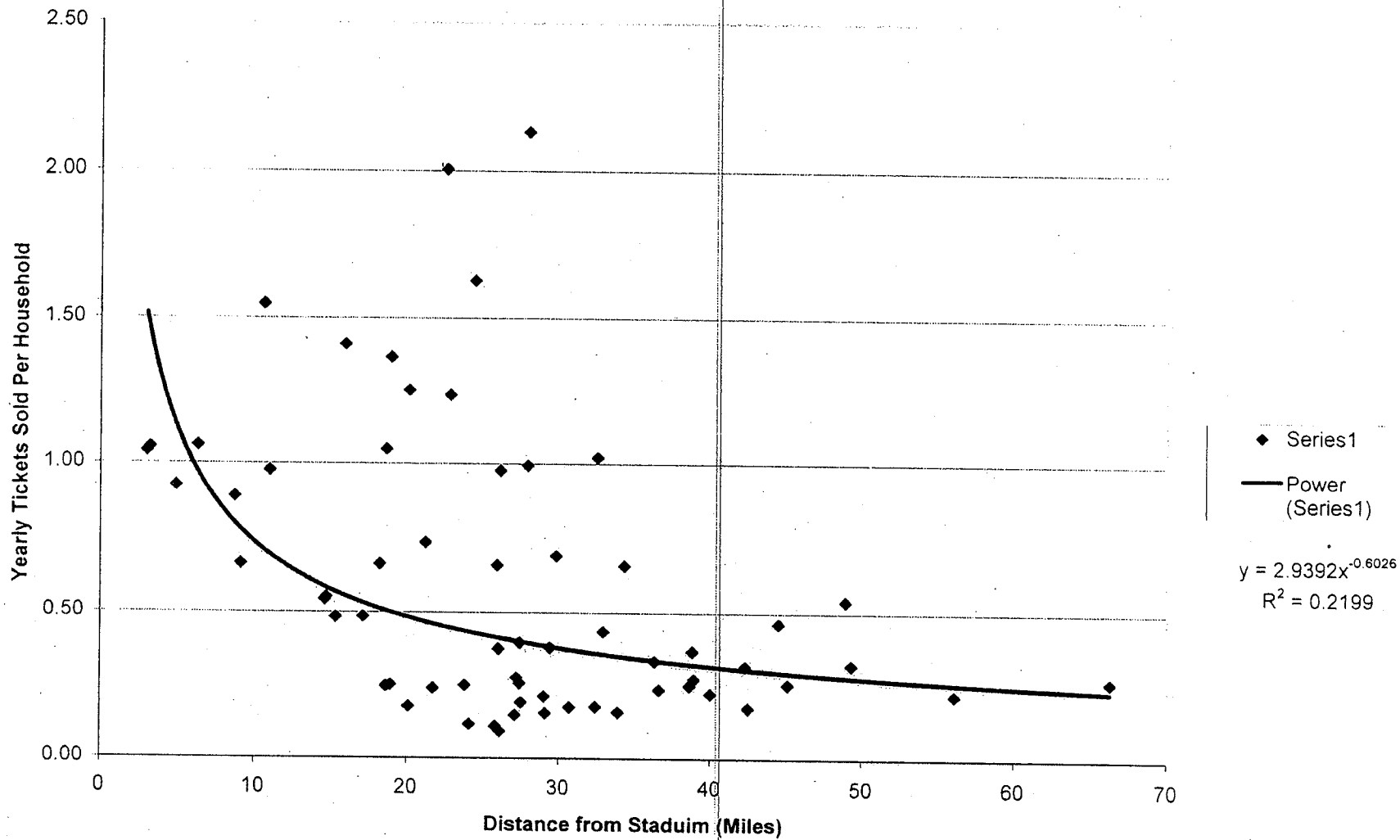
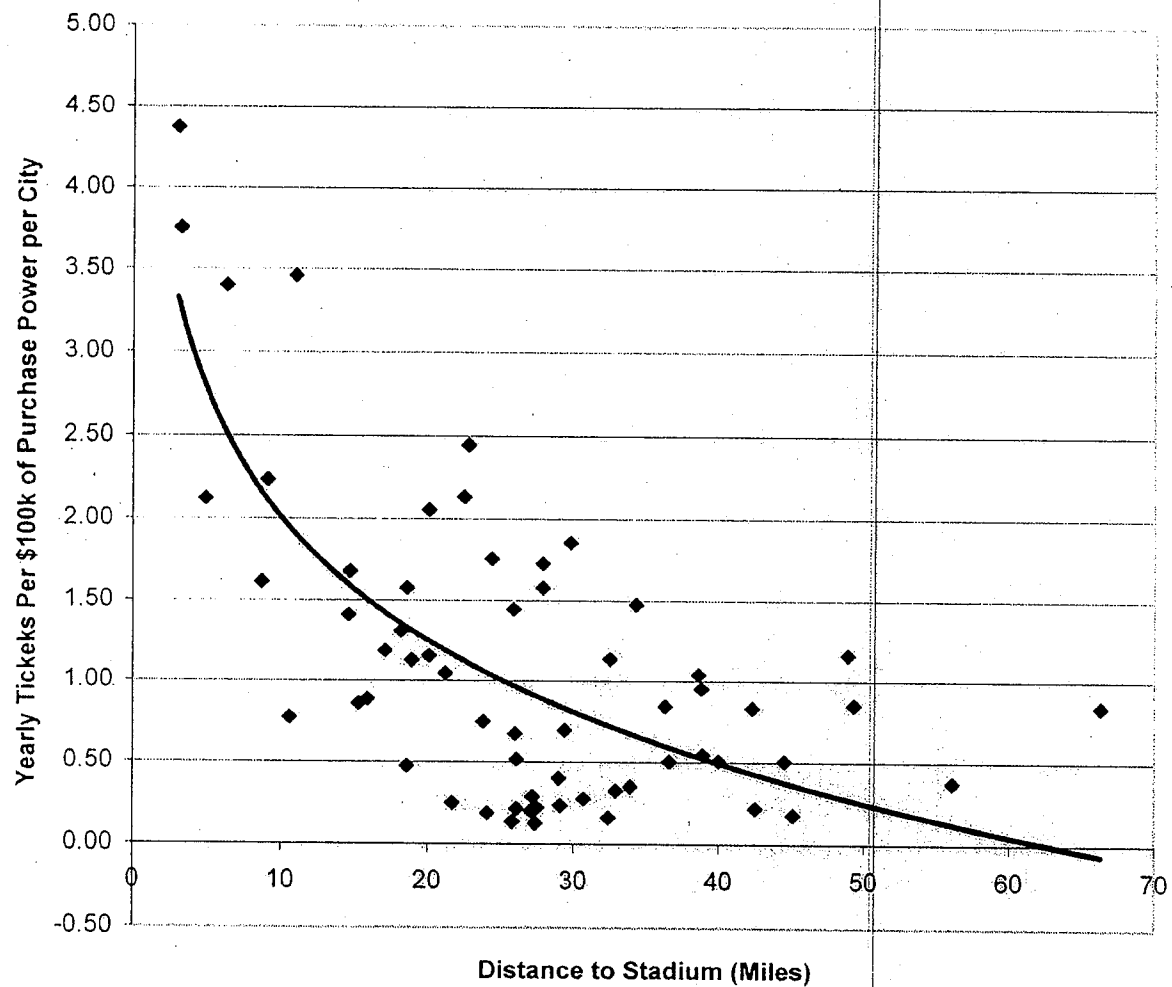


Figure 2

Existing A's Tickets/ \$100,000 of Purchasing Power



◆ Tickets/ \$100,000 of Purchasing Power  
— Log. (Tickets/ \$100,000 of Purchasing Power)

$$y = -1.0944\ln(x) + 4.5302$$
$$R^2 = 0.5248$$

Use this equation as the formula for predicting ticket demand.

Figure 3

Tickets/ Purchasing Power - Existing 2007 A's Ticket Sales Data w/ Territory Correction

