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## Elon Musk, Jeff Bezos licked by James Lick in space race

The list of [rich men obsessed with space exploration](#) is as long as an Apollo rocket. The sums spent are long, too. Musk has put up an estimated \$100M, Bezos is into the millions likely, [Paul Allen](#) spent \$100M. Robert Bigelow, a budget hotel-chain mogul, [built a life-size space station](#) in his well-guarded Bigelow Aerospace factory in Nevada.

But Musk and Bigelow look like pikers next to James Lick. The wealthiest man in California (150 years ago), Lick spent more on a single telescope (in today's dollars) than all of their investments combined. Lick made his fortune in real estate after the Gold Rush. He built most of downtown San Jose, Calif. and late in his life was moved to spend \$700,000 on the Lick Observatory, finished in 1876 in San Jose at a cost of what would now be the equivalent of \$1.2 *billion* (in 2008 dollars). The era of the tycoon-funded giant telescope lasted until the construction of the Palomar Observatory in 1928 with \$6.5M from the Rockefellers. That's \$972M in 2008 GDP equivalent dollars (see methodology below). Most of these big scopes were built with private money, and most were built purely for scientific purposes. Musk and Bigelow seem like they're in it for the money and the science. And why not go for-profit? The space industry is worth \$250B, with great potential for entrepreneurs to take share from lazy, shiftless government programs.

These money comparisons were drawn out in a recent paper by NASA research economist Alexander C. MacDonald (yes, NASA has economists), who is working on an economic history of space exploration for his doctoral dissertation. He says the rich have always been a huge factor in space work.



Photo by Andy Morris

“These [new] guys,” says MacDonald of Musk, Bigelow and Bezos, “already made their money so profit is not really their goal. They’re also doing it for personal reasons. They want to see space as an option for humanity. I mean, there are a lot of easier ways to make money than in the space industry.”

MacDonald’s paper is [here](#). His thesis also validates the [Obama administration’s agenda to encourage private space enterprise](#), which is smart because government efforts usually bloat up with taxpayer money that space bureaucrats merely had to ask for from Congress. While we don’t want to be dependent on billionaires for all our big-ticket science and engineering projects, we might as well reduce the barriers that hold back private efforts.

Here’s the table from MacDonald’s paper listing costs then and now of space exploration projects from 100 or more years ago. Many were larger in today’s dollars than today’s space investments. **Click on it to enlarge it.**

Project	Year	Cost	2008 GDP Equivalent Value	Ratio
University of North Carolina Observatory	1831	\$6,430 <sup>1</sup>	\$89,000,000	
Williams College Observatory	1836	\$6,100 <sup>2</sup>	\$60,000,000	
West Point Academy Observatory	1842	\$5,000 <sup>3</sup>	\$45,000,000	
U.S. Naval Observatory	1842	\$25,000 <sup>4</sup>	\$225,000,000	
Cincinnati Observatory	1843	\$16,000 <sup>5</sup>	\$149,000,000	
Harvard College Observatory	1843	\$25,000 <sup>6</sup>	\$233,000,000	
-Edward Phillips Endowment	1848	\$100,000 <sup>7</sup>	\$601,000,000	
Georgetown Observatory	1844	\$18,000 <sup>8</sup>	\$154,000,000	
Detroit Observatory	1852	\$17,000 <sup>9</sup>	\$81,000,000	
Shattuck Observatory	1852	\$11,000 <sup>10</sup>	\$52,000,000	
Hamilton College Observatory	1852	\$15,000 <sup>11</sup>	\$71,000,000	
Dudley Observatory	1852	\$119,000 <sup>12</sup>	\$566,000,000	
Dearborn Observatory	1865	\$25,000 <sup>13</sup>	\$37,000,000	
Transit of Venus Expedition	1872	\$177,000 <sup>14</sup>	\$310,000,000	
Lick Observatory	1876	\$700,000 <sup>15</sup>	\$1,220,000,000	
Warner Observatory	1880	\$100,000 <sup>16</sup>	\$139,000,000	
Transit of Venus Expedition	1882	\$85,000 <sup>17</sup>	\$101,000,000	
McCormick Observatory	1881	\$135,000 <sup>18</sup>	\$168,000,000	
Yerkes Observatory	1892	\$500,000 <sup>19</sup>	\$441,000,000	
Mt. Wilson Observatory	1910	\$945,000 <sup>20</sup>	\$408,000,000	
Mt. Palomar Observatory	1928	\$6,550,000 <sup>21</sup>	\$972,000,000	
McDonald Observatory	1939	\$840,000 <sup>22</sup>	\$132,000,000	

Space Exploration Projects in the 19<sup>th</sup> and early 20th Century

MacDonald ran his numbers using equivalent GDP ratio, which he says is a better method than inflation-adjusting when it comes to assessing relative historical impacts of megaprojects like telescopes or churches. MacDonald divided Lick’s \$700,000 telescope budget by the U.S. GDP in 1876 and multiplied that number by 2008 GDP. Voila: \$1.2 billion. NASA’s total annual space shuttle budget is \$4 billion.

Background on the money today: Dennis Tito spent \$20 million of his own money to become the world’s first space tourist in 2001. Microsoft cofounder [Paul Allen](#) spent \$25 million on SpaceShipOne. PayPal cofounder Elon Musk put a reported \$100 million of his own money into SpaceX, whose Falcon rockets are poised to take over cargo delivery duties from NASA to the International Space Station. Intel cofounder [Gordon Moore](#) has spent \$24 million and pledged another \$200 million through his foundation to build a [giant \\$1.4 billion telescope in Mauna Kea, Hawaii](#). It will be able to peer to the very edge of the observable universe. Amazon founder Jeffrey Bezos has bankrolled with undisclosed millions a project called Blue Origin that has already [received a separate \\$3.7 million in federal funds](#) to develop an astronaut escape system for its manned New Shepherd rocket. The final

frontier ain't cheap.

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