Price-fixing in the lab diamond market

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Abstract
The mined diamond cartel, known for its price-fixing tactics, has been challenged in recent years with the emergence of lab-grown diamonds in the market. Surprisingly, the lab-grown diamond industry, initially seen as a force for healthy competition and fair pricing, is now facing its own price-fixing issues. These lab-grown diamonds are being sold at significantly inflated prices compared to their estimated production cost. However, unlike the mined diamond market, this price inflation is not a result of lab diamond farms forming cartels and restricting supply. Instead, the inflated prices of mined diamonds play a crucial role. The exorbitant pricing of mined diamonds creates a formidable entry barrier for diamond jewelers. Consequently, established diamond jewelers can engage in price-fixing of lab-grown diamonds without fearing much competition. This observation suggests that the price-fixing of a product can extend to its substitutes by creating a high barrier to entry for downstream industry participants.

Keywords
antitrust, price-fixing, lab-grown diamond, diamond

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Introduction

The mined diamond cartel established by De Beers[1] is known for its antitrust practices[2], and the diamond price today remains to be unrepresentative of its true value and rarity.[3] In recent years, lab diamond entered the diamond jewellery market. Lab diamond has existed for over sixty years with negligible impact on the mined diamond cartel due to the high costs associated with older production methods. However, recent technological advancements, particularly the development of the Chemical Vapor Deposition (CVD) methodology, have revolutionized lab-grown diamond production. This breakthrough has allowed companies to produce lab diamonds at a significantly lower cost, with products that are visually indistinguishable from natural diamonds; notably, the production cost of lab diamonds was around $300-$500 per carat in 2018, a significant drop from the $4,000 per carat cost in 2008.[4]

Yet as of November 2022, the competitive pricing of a retail 1-carat lab diamond is $1,890[5], a few times higher than its estimated product cost. This paper aims to investigate the reasons behind the exorbitant price markup of lab-grown diamond jewelry by delving into the dynamics of its antitrust market. We examine both the upstream participants, the lab diamond producers, and the downstream participants, the diamond jewelers, to shed light on the factors contributing to this pricing discrepancy.

Relevant market for lab diamond jewelry

To assess competition, economists and antitrust practitioners typically start by defining the relevant antitrust market. An antitrust market serves the purpose of identifying market power and is characterized as a market encompassing a group of products and a region where a hypothetical monopolist could potentially impose a "small but significant and non-transitory increase in price" (SSNIP). The relevant antitrust market for a specific product is defined as the smallest market that includes that product.[6] In this paper, as no evidence of regional differences in lab diamond pricing was found, a specific region for the market will not be specified.

To define the antitrust market for lab diamond jewelry, it is crucial to differentiate between melee diamonds and larger diamonds. Melee diamonds, categorized by GIA

[1] Multiple antitrust litigations were bought against De Beers, such as *Hopkins v. De Beers Centenary AG*, No. CGC-04-432954, 2005 WL 1020868 (Cal. Sup. Ct., Apr. 15, 2005) and *Sullivan v. DB Invs., Inc.*, 2008 U.S. Dist. LEXIS 81146 (D.N.J., May 22, 2008).

[2] A. A. Foer. An essay on diamonds, trust, and antitrust, inspired by barak d. richman's stateless commerce. *The Antitrust Bulletin*, 64(1):105–114, 2019. doi: 10.1177/0003603X18822578. URL https://doi.org/10.1177/0003603X18822578

[3] D. J. Bergenstock and J. M. Maskulka. The de beers story: are diamonds forever? *Business Horizons*, 44(3):37–44, 2001. ISSN 0007-6813. doi: https://doi.org/10.1016/S0007-6813(01)80033-1. URL https://www.sciencedirect.com/science/article/pii/S0007681301800331

[4] O. Linde, O. Geyler, and A. Epstein. The Global Diamond Industry 2018: A Resilient Industry Shines Through. https://www.bain.com/insights/global-diamond-industry-report-2018, 2018. [Accessed 15-08-2023]

[5] Lab Diamond Prices. https://www.creditdonkey.com/lab-diamond-prices.html, 2022. [Accessed 15-08-2023]

[6] G. J. Werden. The 1982 merger guidelines and the ascent of the hypothetical monopolist paradigm. *Antitrust LJ*, 71:253, 2003.

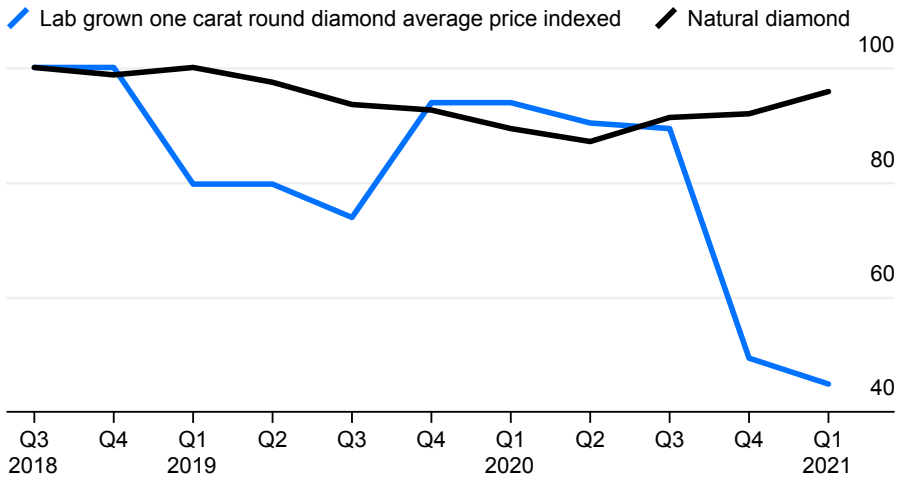

Figure 1. There is minimal correlation in price movement between one-carat round lab-grown diamond and one-carat round natural diamond. Changes in the price of a one-carat round lab-grown diamond typically do not result in a corresponding price change for a one-carat round natural diamond, and vice versa.
Source. Edahn Golan Diamond Research & Data.

as those below 0.2 carats, are small and lack significant polish.[7] They typically serve as supplementary accents in jewelry and do not carry the same social prestige as larger diamonds. Due to limited data availability on the pricing of melee diamonds, this paper will concentrate on non-melee diamonds instead.

In the realm of larger diamonds, lab-grown diamonds and natural diamonds exhibit limited product interchangeability and show little correlation in pricing (Figure 1). In an effort to stifle the lab-grown diamond firms, in 2018 De Beers made a foray into the lab diamond industry by introducing lab diamond products priced at an astonishingly low rate of $800 per carat. This price was significantly lower than the prevailing price of $6000 per carat for natural diamonds and $4200 per carat for lab-grown diamonds at that time.[8] De Beers' aggressive undercutting strategy resulted in an up to sixty percent decrease in the wholesale price of lab-grown diamonds.[9] However, despite this drastic price drop for wholesale lab-grown diamonds, the price of wholesale natural

[7] GIA. Melee Diamonds: Tiny Diamonds, Big Impact. https://4cs.gia.edu/en-us/blog/melee-diamonds-tiny-diamonds-big-impact/. [Accessed 16-08-2023]
[8] E. Onstad and B. Lewis. Lab-grown diamond prices slide as De Beers fights back. https://www.reuters.com/article/us-diamonds-debeers-synthetic-analysis-idUSKCN1OK0MQ, 2018. [Accessed 16-08-2023]
[9] B. Lewis. De Beers says lab-grown diamond wholesale prices fall by up to 60 percent. https://www.reuters.com/article/anglo-results-de-beers-idINKCN1QA2D1, 2019. [Accessed 16-08-2023]

diamonds only experienced a minor decline, and natural diamond producers did not suffer a significant blow to their revenue.[10]

Participants in the lab diamond jewelry industry

Diamond jewelry offerings are highly standardized, making it easy for customers to compare prices.[11] However, this standardization can also enable industry participants to effectively engage in collusion. In our examination, we analyze both the upstream participants, which are the lab diamond producers, and the downstream participants, which are the diamond jewelers. Our aim is to uncover the factors that contribute to the significant markup observed in lab diamond jewelry.

Lab diamond producers

It is unlikely that the high markup in price is the result of price collusion between lab diamond firms, as any collusion would have been unsustainable due to the low barrier of entry into the lab diamond production business; ornamental lab diamond production primarily relies on the Chemical Vapor Decomposition (CVD) methodology.[12] The main startup cost in establishing lab diamond production would involve acquiring CVD machines, which are relatively inexpensive. In fact, an automated CVD diamond making machine listed on the e-commerce website Alibaba can have a price as low as $1280.[13]

The producers of lab-grown diamonds are also unlikely to incur significant research and development costs, if any at all. The products manufactured by lab diamond firms are nearly identical, adhering to the strict gem-quality standards set by GIA. Notably, most lab-grown diamond firms highlight the environmental friendliness of their diamonds[14] rather than promoting any distinctiveness in their product or production process. Moreover, among the numerous lab diamond firms we examined, only two had patented their specific lab diamond production procedures.

Diamond jewelers

The absence of proportional reductions in the retail price, despite significant drops in lab-grown diamond wholesale prices from 2017 to 2021 (Figure 2), serves as the most

[10] See https://www.bloomberg.com/news/articles/2019-11-04/de-beers-cuts-diamond-prices-by-about-5-as-crisis-deepens, accessed 2 August 2023. After its undercutting of lab-grown diamonds in 2018, De Beers experienced a slight drop in its mined diamond sales in 2019.

[11] Retail diamond jewelry is standardized for sale using the GIA Diamond Grading Scales, which provide a universal framework for evaluating diamonds based on their cut, color, clarity, and carat weight. (https://4cs.gia.edu/en-us/how-to-buy-a-diamond/, accessed 3 August 2023)

[12] A. Butcher. Lab-Grown Diamond Production Methods - International Gem Society. https://www.gemsociety.org/article/lab-grown-diamond-production-methods/. [Accessed 16-08-2023]

[13] See https://www.alibaba.com/product-detail/1200c-Lab-Heat-Treatment-Mini-CVD_1600791478690.html, accessed 3 August 2023.

[14] For instance, Lightbox highlights that their diamonds are grown with renewable energy. (https://lightboxjewelry.com/pages/lightbox-lab, accessed 3 August 2023)

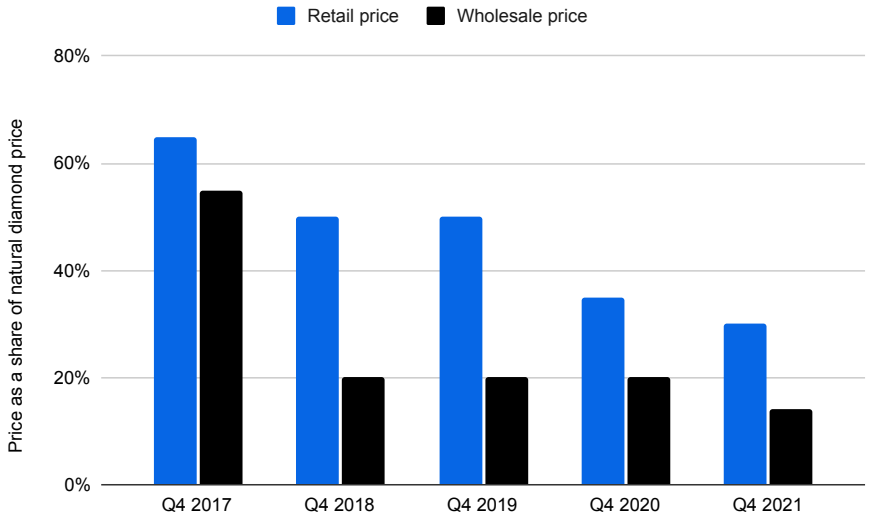

Figure 2. Price of polished lab-grown diamond as a percentage of polished natural diamond (1 carat G VS polished)
Source. Bain & Company, The Global Diamond Industry 2020-21, Figure 43 (https://www.bain.com/globalassets/noindex/2021/bain_report_diamond_report-2020-21.pdf) and Bain & Company, The Global Diamond Industry 2021-22 (https://www.bain.com/globalassets/noindex/2022/bain_report_diamond_report-2021-22.pdf).

convincing evidence that the price markup predominantly originates from retailers of lab-grown diamond jewelry. Industry insider Rapaport also made a similar observation in 2022 that the price of retail lab diamond jewelry remains at the same rate despite a drop in its wholesale price.[15] This suggests a scarcity of price competition among lab-grown diamond retailers.

The lack of price competition is also evident in the substantial profit margins generated from the sale of lab-grown diamond jewelry compared to its mined counterpart. In 2020, jewelers reported 16% to over 40% higher profit margins on selling lab diamonds compared to mined ones.[16] In December 2022, despite the

[15] "Even in the lab-grown ranges with falling prices, consumers are not getting the discounts. Retailers have continued to sell at the same rates, enabling them to expand their profit margins, Hurwitz says." J. Freedman. The Economics of Lab-Grown. https://www.diamonds.net/Magazine/Article.aspx?ArticleID=68735&RDRIssueID=226&ArticleTitle=The+Economics+of+Lab-Grown, June 2022. [Accessed 16-08-2023]

[16] "...with retailers in the survey reporting LGD margins run 16% to 40%+ higher than mined diamonds." P. N. Danziger. Lab-Grown Diamonds Need To Be On Every Jewelry Store's Shopping List. https://www.forbes.com/sites/pamdanziger/2020/10/30/lab-grown-diamonds-need-to-be-on-every-jewelry-stores-shopping-list/?sh=ff5103721cd3, October 2020. [Accessed 16-08-2023]

price drop in lab diamonds, jewelers are still able to obtain a 54% profit margin on lab diamond retail sales, compared to 36% for its mined counterpart.[17] In addition, anecdotal evidence indicates that for retail jewelers selling both lab-grown and mined diamonds, lab-grown ones are considerably easier to sell in comparison to their mined counterparts.[18]

The persistently high price markup in lab diamond jewelry sales can be primarily attributed to the formidable barrier of entry faced by diamond jewelers. Apart from the already steep costs associated with acquiring mined diamonds, newly established diamond jewelers encounter the additional challenge of gaining trust from customers. This hurdle becomes apparent when considering that established diamond jewelry brands such as Tiffany, Cartier, and Harry Winston can overcharge by as much as 330% for identical diamonds sold in Costco.[19] Moreover, many established diamond jewelers refrain from offering lab-grown diamonds due to concerns over potential repercussions from natural diamond suppliers and industry peers, further reducing market competition.[20]

Discussion and Conclusion

The presence of the mined diamond cartel has led to price inefficiencies in both the upstream wholesale of mined diamonds and the downstream retail of mined diamond jewelry. Moreover, this inefficiency extends to the retail market of its substitute lab diamonds as well. Though regulating the cartel itself may pose challenges[21], implementing effective regulations on the diamond jewelry retail market, encompassing both mined and lab-created diamonds, could offer a potential solution to alleviate the impact of the cartel's practices.

[17] "Jewelry stores hold loose diamonds on hand and the margins on loose natural diamonds is around 36%, while the margin for LGD was 54% at the end of December." P. N. Danziger. Industry-Insider Rapaport Lashes Out Against Lab-Grown Diamonds To No Avail. https://www.forbes.com/sites/pamdanziger/2023/02/08/industry-insider-rapaport-lashes-out-against-lab-grown-diamonds-to-no-avail/, 2023. [Accessed 16-08-2023]

[18] "The first is a revelation that Helzberg Diamonds CEO...The US retailer sold 50 times more 2-carat lab-grown diamonds than naturals of the same size in 2021, she told the audience." J. Freedman. The Economics of Lab-Grown. https://www.diamonds.net/Magazine/Article.aspx?ArticleID=68735&RDRIssueID=226&ArticleTitle=The+Economics+of+Lab-Grown, June 2022. [Accessed 16-08-2023]

[19] H. Parry. Jewelry expert's undercover to show Tiffany overcharges for diamonds. https://www.dailymail.co.uk/news/article-4358094/Jewelry-expert-goes-undercover-Tiffany-overcharges.html, 2017. [Accessed 16-08-2023]

[20] L. Meirovich. Is Lab-Grown Still a Dirty Word in the Industry? https://rapaport.com/analysis/is-lab-grown-still-a-dirty-word-in-the-industry/, 2023. [Accessed 16-08-2023]

[21] Diamond mining companies like De Beers can sidestep regional antitrust regulations via indirect market participation, such as selling through diamond dealers (https://www.nytimes.com/2004/07/10/business/de-beers-agrees-to-guilty-plea-to-re-enter-the-us-market.html). However, this form of evasion is not viable for retailers of diamond jewelry.