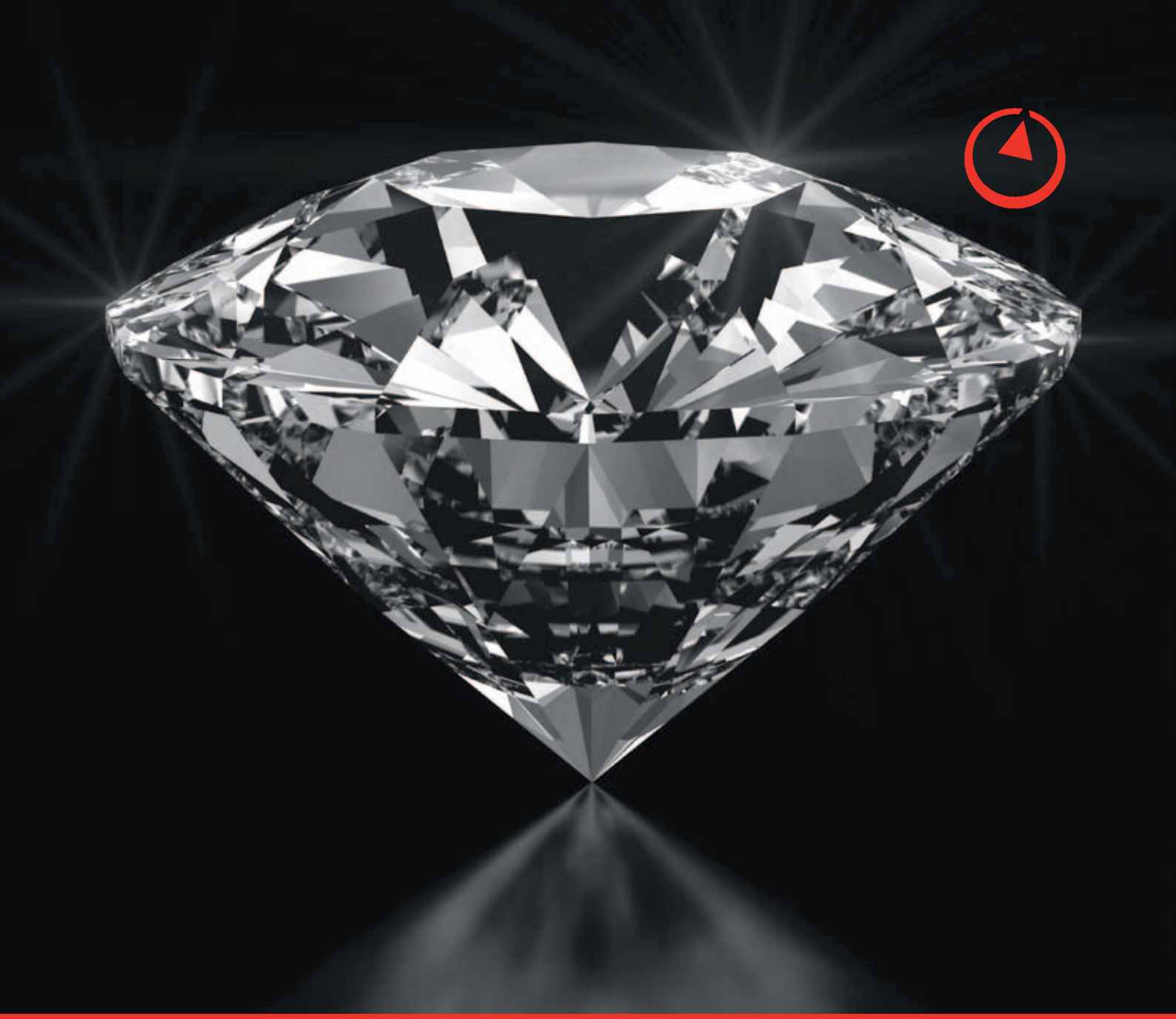


THE GLOBAL DIAMOND INDUSTRY

Lifting the Veil of Mystery

BAIN & COMPANY

AWDC
ANTWERP WORLD DIAMOND CENTRE

Contents

Note to readers

Diamonds are one of the world's major resources—and historically one of the least understood. For many years observers and even many participants have considered the diamond industry to be complex and difficult to comprehend, even impenetrable. This report is the first step in the process to shed light on the multibillion-dollar industry, which spans the globe and involves a wide spectrum of players, from mining to retail.

Major changes over the past 50 years have transformed the diamond industry. New diamond supplies have emerged, and mining and production have expanded beyond southern Africa to Russia, Australia and Canada. Structural changes introduced by De Beers and its Central Selling Organization (CSO), which once led the industry, have opened up the field to more competition.

In this report we trace these developments, explain the mechanics of mining, and explore the two main uses of diamonds: in jewelry and for industrial applications. We touch on the structure of the value chain, from the financial risk involved in early exploration to the economics of the retail trade. We devote one chapter to the potential impact of synthetic diamonds on the jewelry sector.

We also explore potential future scenarios through a supply-demand forecast. With the prospects for demand rising in key consuming countries, demand for rough diamonds is set to outpace supply over the coming decade.

We have conducted numerous interviews with players in all segments of the value chain and gathered a consensus opinion wherever possible. Other sources of information were the latest public announcements, presentations and annual reports of diamond companies.

For readers who want a quick overview of the report's findings, each chapter ends with key takeaways that summarize the chapter contents.

Given Antwerp's leading role in the diamond industry, it is fitting that AWDC sponsored this report. Over hundreds of years, Antwerp has created a robust diamond cluster that includes a multitude of specialized players, including producers, sightholders, high-end cutters and polishers, and specialized financial and educational institutions. The dynamics of competition and cooperation ensure that the city remains at the heart of the international diamond trade.

We hope you find the insights in the report useful, and we welcome further conversations on the subject.

Bain & Company **Antwerp World Diamond Centre (AWDC)**

Chapter 1: Introduction to diamonds

Among all the major natural resources on earth, diamonds have often been considered the most mysterious. For centuries they have been prized for their extraordinary brilliance and hardness. Battles have been fought over diamonds, fortunes have been won and lost and lovers around the world have prized the stone as a token of their deepest affections.

What is a diamond? Super hard and luminescent

For centuries diamonds have been associated with supernatural qualities, including the power to protect their wearer and confer good health. Some people swallowed diamonds in hopes of recovering from sickness. Ancient Hindus believed diamonds gave off silent vibrations that could heal the human brain and heart. Some believed diamonds could reconcile a quarreling husband and wife—hence the reference to the diamond as the "reconciliation stone."

The word *diamond* comes from the Greek word *adámas*, meaning adamant or unbreakable, and indeed hardness is one of the qualities that has always made diamonds so valuable. Measured on the Moos hardness scale, diamonds score a 10, the highest possible rating. Diamonds are also extremely high in luminescence, the ability to catch the light and sparkle with different colors. Cut and polished to show off their brilliance, diamonds have a visual appeal like no other stone.

Certain diamonds have become famous through association with rulers and adventurers. The violet-colored, 112-carat Hope diamond was supposedly plucked from the eye of an Indian god and linked to a malevolent curse. The Koh-I-Noor diamond, discovered in India before the thirteenth century, changed hands time and again as warring rulers seized it among the spoils of war. It now sits among the British crown jewels on display at the Tower of London. Another famous diamond, the Orlov, once belonged to the Romanov family and is now set in a scepter and kept at the Kremlin.

Origins: deep within the earth

Diamond crystals form deep within the mantle of the earth when carbon is exposed to extreme pressure and very high temperatures. Volcanic rock formations such as kimberlite or lamproite pipes serve as pathways that convey the fragments of rocks and crystals from the mantle to the surface (see Figure 1). The diamonds, along with vast quantities of magma, are blasted upward in the course of violent eruptions.

Kimberlite pipes, the richest source of mined diamonds, are usually shaped like a carrot and can extend as deep as 1 to 2 kilometers underground. Lamproite pipes are shallower, up to 0.5 kilometer in depth, and typically have a broader, martini-glass shape.

Diamond-rich lamproite pipes are extremely rare. To date the only economically viable diamond-bearing lamproites have been discovered in western Australia. Kimberlites are more common and are found in southern Africa, Russia and Canada. Kimberlite and lamproite pipes are known as primary diamond sources.

Figure 1: Kimberlite pipes are the main source of diamonds in the world

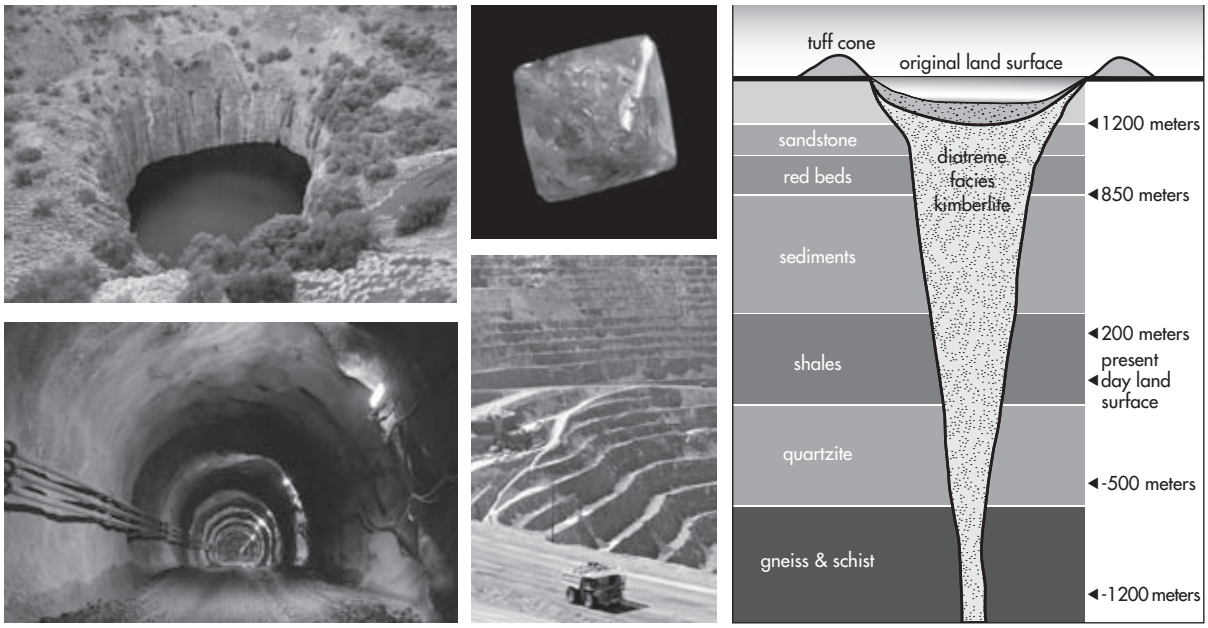
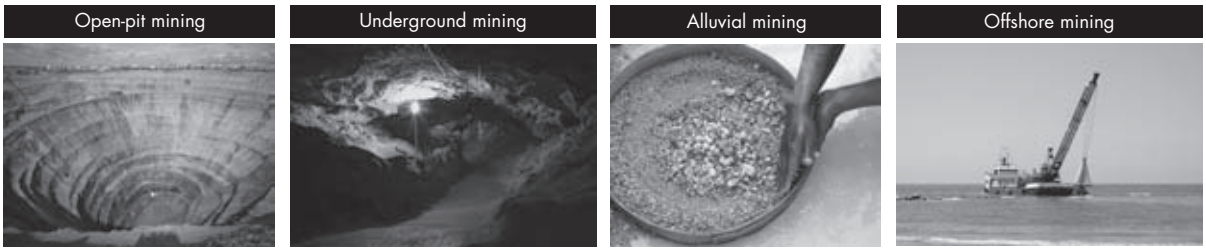


Figure 2: Diamonds can be mined four ways



Secondary diamond sources are deposits that have been removed from the primary source (a kimberlite or lamproite pipe) by natural erosion and eventually deposited in riverbeds, along shorelines, in glaciers and on the ocean floor. They are also known as alluvial deposits. Although alluvial deposits account for only 10-15 percent of the world's diamonds, they are generally higher-quality stones given that they retain more volume after polishing; they therefore command a higher price.

The location of the diamond deposits determines the mining method that producers use (see Figure 2). Diamonds found deep in the earth are extracted through open-pit and underground methods. Alluvial mining methods are employed to extract diamonds from deposits of sand, gravel and clay. Diamonds located in the seabed are mined through marine mining techniques.

Uses of diamonds: jewels and industrial tools

Diamonds serve two main functions today: jewelry and industrial uses. Slightly more than 50 percent of the volume of diamonds extracted becomes gemstones for jewelry, yet they account for more than 95 percent of the total value.

Polished diamonds have always been considered among the world's most precious gemstones. They account for about 40 percent of all jewelry manufacturing; engagement rings are the largest category of diamond jewelry. Jewelers usually set the diamonds in precious metals such as gold or platinum to emphasize the sparkle of the stones.

Stones not suited for jewelry, called "bort," are used for industrial purposes. Key characteristics that make them valuable for industrial uses include the following:

Hardness. As the hardest natural substance, diamonds can work with other materials without breaking.

Thermal conductivity. Diamonds are among the best conductors of heat and have a melting point of 6,420 degrees Fahrenheit.

Optical dispersion. Diamonds have great capacity to refract light, with a refraction index of 2.42; in comparison the refraction index of glass is 1.52.

Given their hardness and conductivity, diamonds suit a number of industries. They serve as drill bits for machinery and as abrasive slurries to cut and polish other materials (see Figure 3). They are also used in

Figure 3: Diamonds have a variety of industrial applications

the production of microchips and computer processors, and they serve as components in lasers. Today more than 95 percent of industrial diamonds are synthetic—that is, they are mostly produced using high-pressure, high-temperature synthetic processes that mimic conditions deep within the earth's mantle.

Key takeaways

- Natural diamonds form deep in the earth and can be found in two types of geological formations: kimberlite or lamproite pipes that transport the diamonds to the earth's surface.
- Kimberlite and lamproite pipes are known as primary sources. They account for 85-90 percent of the world's diamond deposits. Secondary diamond sources are known as alluvial deposits—they have been transported from their original location by erosion to settle in riverbeds, along shorelines, in glaciers and on the ocean floor.
- Diamonds can be mined using four different methods: open pit, underground, alluvial or marine mining.
- Diamonds are unique because of their physical properties of hardness, thermal conductivity and brilliance through optical dispersion, which make them popular as gemstones and industrial tools.
- The two main uses for natural diamonds are in fine jewelry and industrial applications, but jewelry-grade diamonds account for 95 percent of the total value of natural diamonds.
- More than 95 percent of all industrial diamonds are synthetic.

Chapter 2: Historical transformation of the diamond industry

Early history: how it all started

Legend has it that the first diamonds were found in India 8,000 years ago along the Penner, Krishna and Godavari rivers. Prized for their physical qualities, diamonds were used to decorate religious icons and as engraving and polishing tools. From early on, they were associated with wealth, status and well-being.

Historians believe the international diamond trade began about 1,000 years ago when traders began transporting rough stones from India across Arabia. The stones were cut and polished before being sold on the European continent to royalty and aristocrats. Trade centers emerged in cities such as Venice and Bruges.

By the sixteenth century the business had shifted to Amsterdam and Antwerp, which offered better facilities to conduct trade and had already developed cutting and polishing techniques.

India's diamond supply was largely exhausted by the early eighteenth century, and the diamond trade moved to Brazil, then later to southern Africa. At the same time, London emerged as the world's diamond sorting center, and Amsterdam and Antwerp became influential trade centers as well. Diamonds became an even more popular fashion item, worn by royalty and wealthy women at significant social occasions.

The 1870 discovery of massive diamond deposits near the confluence of the Vaal and Orange rivers in South Africa was a watershed moment, igniting a diamond rush. British-born politician and businessman Cecil Rhodes began buying up the claims of small mining operations, including the farm of two brothers, Diederik and Johannes de Beer.

Rhodes founded the De Beers commercial mining company, which eventually consolidated all the South African mines after it bought out Barnato Diamond Mining, the company owned by his main rival, Barney Barnato, in 1888. By the time Rhodes died, in 1902, De Beers accounted for 90 percent of the world's rough-diamond production and distribution (see Figure 4).

Another key figure in the history of the diamond trade was German-born businessman and financier Ernest Oppenheimer. After he established the Anglo American Corporation, he bought De Beers shares whenever they came up for sale. By 1927 he was one of the most significant shareholders of the company; he was later named chairman. Under his leadership De Beers evolved into a global diamond empire. Led by Oppenheimer and his descendants, an interrelated group of companies emerged that dominated the mining, trading, marketing and industrial manufacturing sectors of the diamond business for the majority of the twentieth century and remains a leader today. In late 2011, however, the Oppenheimer family announced its intention to sell its stake in De Beers to Anglo American, which if completed would bring to an end its historic involvement in the diamond industry.

Figure 4: Cecil Rhodes and Ernest Oppenheimer played an important role in the diamond industry in the beginning of the twentieth century

Cecil Rhodes

Ernest Oppenheimer

Creation of demand through marketing: "A diamond is forever"

Thanks to a long, successful marketing campaign by De Beers, diamonds became strongly associated with romantic love, first in the United States and then globally (see Figure 5). In the 1940s the company launched a long-running and renowned campaign around the theme "A diamond is forever." Over many decades, hundreds of millions of dollars were spent to market the notion that diamonds signify romance and love. That campaign benefited the entire diamond industry.

As a result of extensive marketing efforts the demand for diamond engagement rings has grown steadily since the 1940s (see Figure 6). As the world's largest jewelry market, the United States has seen the share of brides receiving diamond engagement rings grow from 10 percent in 1939 to 80 percent by the end of the twentieth century. Marketing activity in Japan helped replicate that pattern, and the share of brides in that country with diamond engagement rings grew from 6 percent in the 1960s to nearly 80 percent by the beginning of the 1990s.

Diversification of diamond supply: expansion across four continents

Commercial production of diamonds started in South Africa in 1870 and had expanded to four continents by the early 2000s, with 133 million carats produced in 2010 (see Figure 7). Today most commercially viable deposits are found in Australia, Botswana, Canada, Russia and South Africa. Russia produces nearly one-quarter of global diamond output by volume, followed closely by Botswana.

Figure 5: Successful marketing campaign linked diamonds with love

1940

- Paintings of Dali, Picasso and other famous artists are used in diamond advertisement
- Strong publicity is given to Queen Elizabeth's visit to South Africa, where she is presented with De Beers diamond

1950-1990

- Studies show that people buy diamonds not for fashion but rather because diamonds are viewed as a symbol of love
- N.W.Sayers advertising agency invents "A Diamond is Forever." slogan in 1947
- De Beers sponsors scriptwriting and production of Hollywood movies encouraging jewelers to promote diamond jewels to Hollywood celebrities

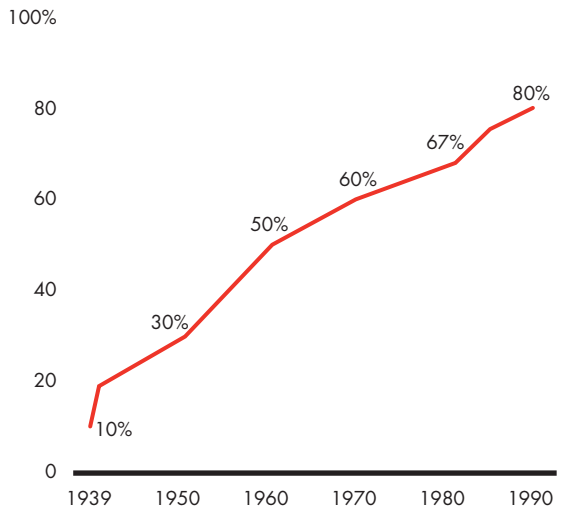
1990-2000

- DTC launches a three-diamond anniversary ring with the slogan "For your past, present and future"
- "Celebrate her" campaign targets men who choose gifts for women
- A new target segment is created by a campaign that encourages women to buy diamonds for themselves
- Continued product placement of diamonds – Hollywood celebrities wear diamonds at the Oscar ceremonies, fashion weeks, Grand-Prix races, etc.

Figure 6: Demand for diamond engagement rings enjoyed strong growth through successful marketing campaigns

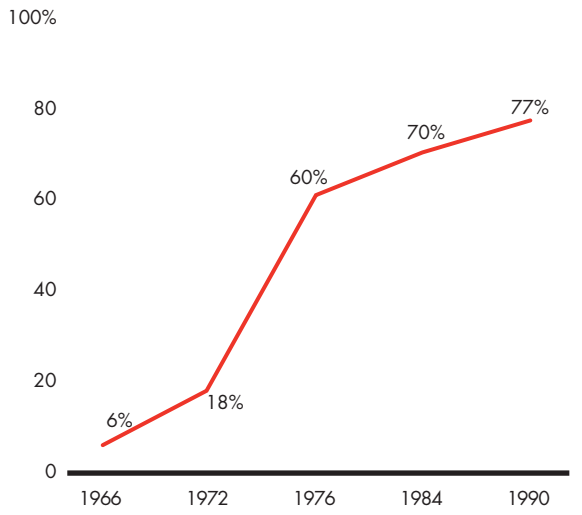
Strong growth in the United States …

Share of brides receiving diamond engagement rings in the U.S.



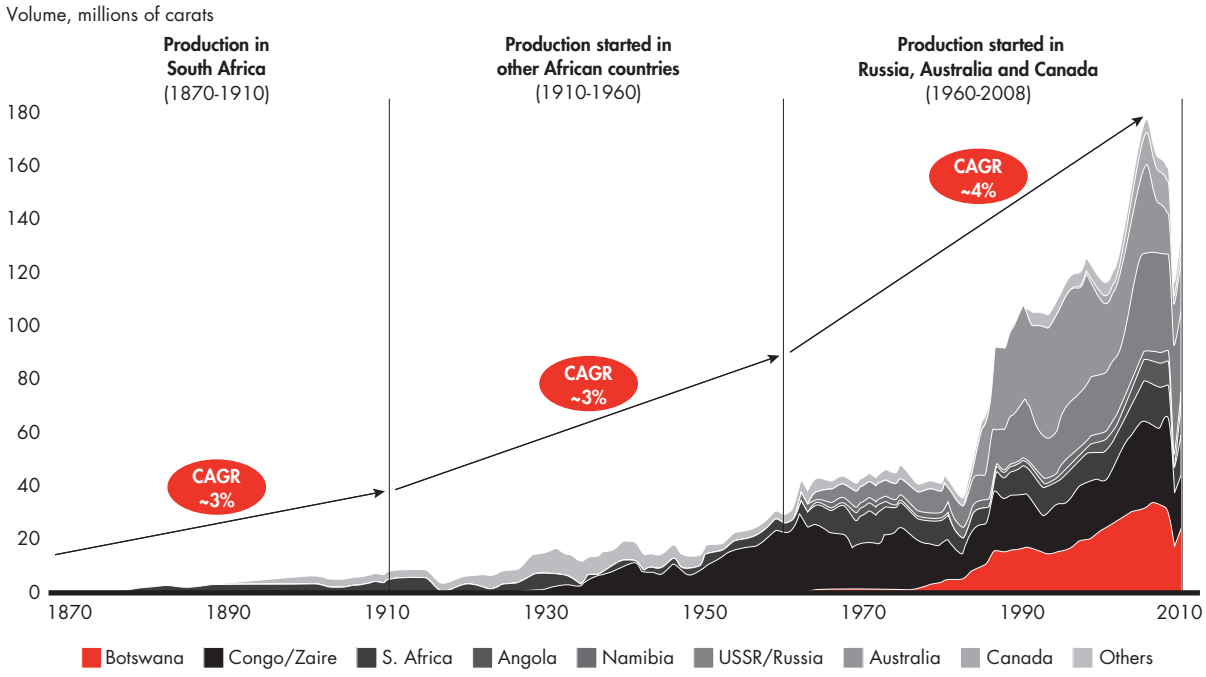
… was replicated later in Japan

Share of brides receiving diamond engagement rings in Japan



Source: Bain analysis

Figure 7: Since the 1960s, significant production started in Russia, Australia and Canada



Source: Kimberley Process; *Gems & Gemology*, autumn 2005; *Gems & Gemology*, summer 2007; U.S. Geological Survey; Bain analysis

One of the greatest diamond exploration success stories of the twentieth century was that of Russia. In the 1930s Russian explorers recognized geological similarities between the ancient bedrock in Siberia and some diamond-rich parts of southern Africa. They began prospecting in the Sakha region and in 1954 discovered the first kimberlite pipe in the region, called Zarnitsa (Dawn); more than 500 additional kimberlites were discovered during the next two years. Mines were gradually developed, and by the 1970s Russia had become the world's third largest diamond producer by volume, following Congo and South Africa. This major discovery increased the overall supply of rough diamonds on the market. At the same time, the Soviet Union made a deal with De Beers to sell its rough diamonds through the single channel of the CSO in order to better respond to global supply fluctuations.

Botswana has some of the largest and most valuable diamond mines in the world, such as Jwaneng and Orapa, both of which started production in the early 1970s. The Botswana government has a 50 percent share of each mine. Diamond mining has given Botswana a tremendous boost. One of the poorest countries in the world when it gained independence, in 1966, Botswana today is among the richest in Africa, with diamond-related activities accounting for nearly one-third of the country's gross domestic product (GDP).

Another interesting story lies in Australia. In 1979 geologists discovered the largest diamond deposit in the world by volume, the Argyle pipe, in western Australia. This marked the world's first discovery of economically viable lamproite deposits. In 1994, its peak production year, the Argyle mine produced 43 million carats of diamonds, which at the time represented 40 percent of world production.

Canada has become the most recent major region of new diamond discoveries. Significant deposits were found in 1992 at Point Lake in the Northwest Territories. Several major Canadian mines have since opened, among them Ekati and Diavik.

Expansion of rough-diamond sales channels

Another important change can be traced to the 1960s and 1970s, when some producers and dealers began testing the possibility of selling rough diamonds through alternative channels instead of the traditional practice of selling through the unified sales channel of De Beers' CSO (see Figure 8).

In the 1990s major producers began breaking away from the CSO (later transformed into the Diamond Trading Company, or DTC) to start selling their diamonds independently on the global market. At the same time producers began to channel an increasing amount of rough diamonds through auctions and spot sales that entail immediate payment and delivery.

The latest development occurred in the early 2000s, when, following a three-year antitrust investigation, the European Commission accepted a commitment by De Beers to gradually reduce and eventually end its purchase of rough diamonds from ALROSA, Russia's largest diamond company. Those sales began to slow in 2006 and stopped completely after 2008.

Figure 8: Since the 1970s diamond companies have been testing alternative sales channels

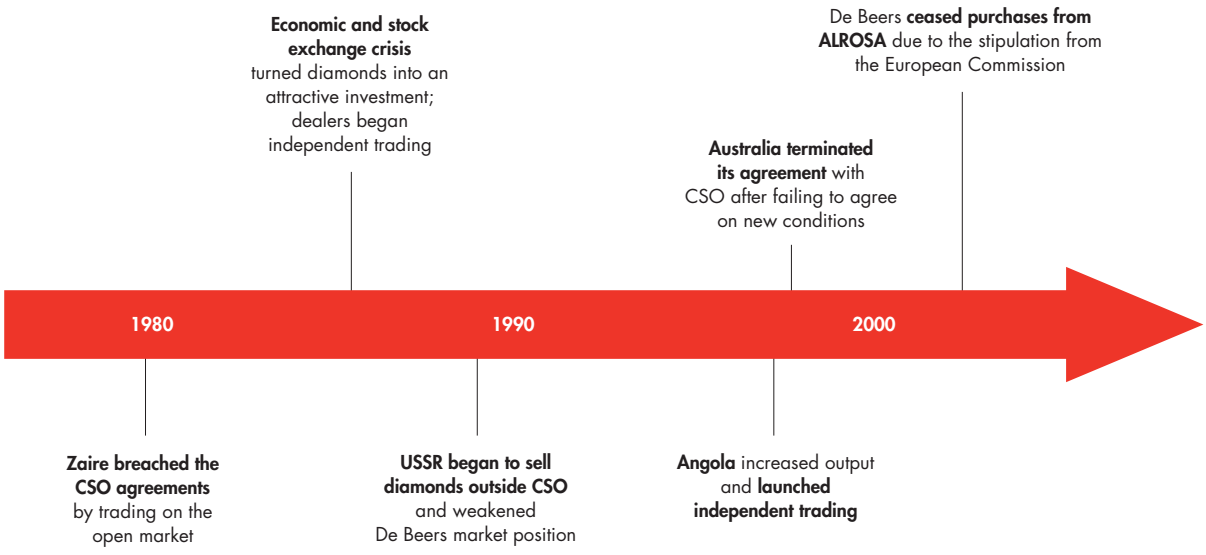
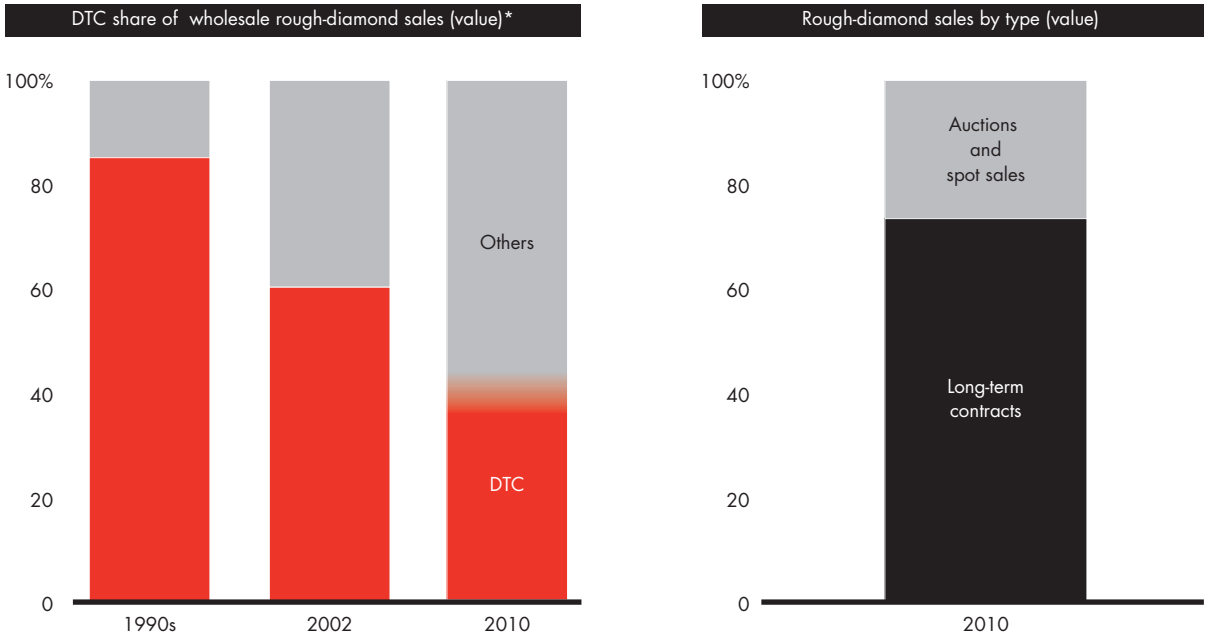


Figure 9: Even though the share of sales through CSO/DTC has been falling, long-term contracts still constitute the largest sales channel of rough diamonds



*2010 market share includes an estimate of small artisanal and illicit trade
Source: IDEX; interviews with sightholders; interviews with producers; company reports

Given that ALROSA is now one of the largest diamond producers in the world, the transition away from DTC signified an important industry shift (see Figure 9). No longer was a single player channeling the majority of rough diamond sales to the market. Global market dynamics had changed.

Impact of the De Beers transformation on the industry

The shifting market trends posed a significant challenge to De Beers' preeminent position. Throughout the 1990s, the company's inventories increased while its sales remained flat.

To address this issue De Beers chose a transformational strategy: instead of maintaining its long-standing role as steward of the entire industry, it would become a leader in driving consumer demand.

One of the key elements of that transformation was a program called Supplier of Choice. Launched in 2003, the program aimed to shift some of the responsibility for marketing to other players in the industry. De Beers would continue to promote the image and prestige of diamonds as a stable and secure asset, but by focusing on its own brand, it would no longer function as a category marketer for all diamonds. At the same time De Beers would move away from its longtime role, through the DTC, of buying and stockpiling the world's rough-diamond supply.

Supplier of Choice had a profound impact on the industry. The program focused on three elements:

Value addition. Sightholders – clients of the major diamond producers – began expanding beyond their role as dealers and adding value along other parts of the value chain: cutting and polishing, jewelry manufacturing, and promoting and marketing their own brands (see Figure 10). Those companies that expanded their reach in this way were admitted into the Supplier of Choice program, which gave them access to De Beers' rough-diamond supply. In some cases companies that had developed their expertise in jewelry manufacturing and retail joined the ranks of sightholders in order to gain access to the De Beers supply—one example is Tiffany & Co.

Marketing and branding. All players that wanted to ensure stable access to a supply of diamonds were encouraged to promote their own diamonds, while De Beers concentrated on its own Forevermark brand.

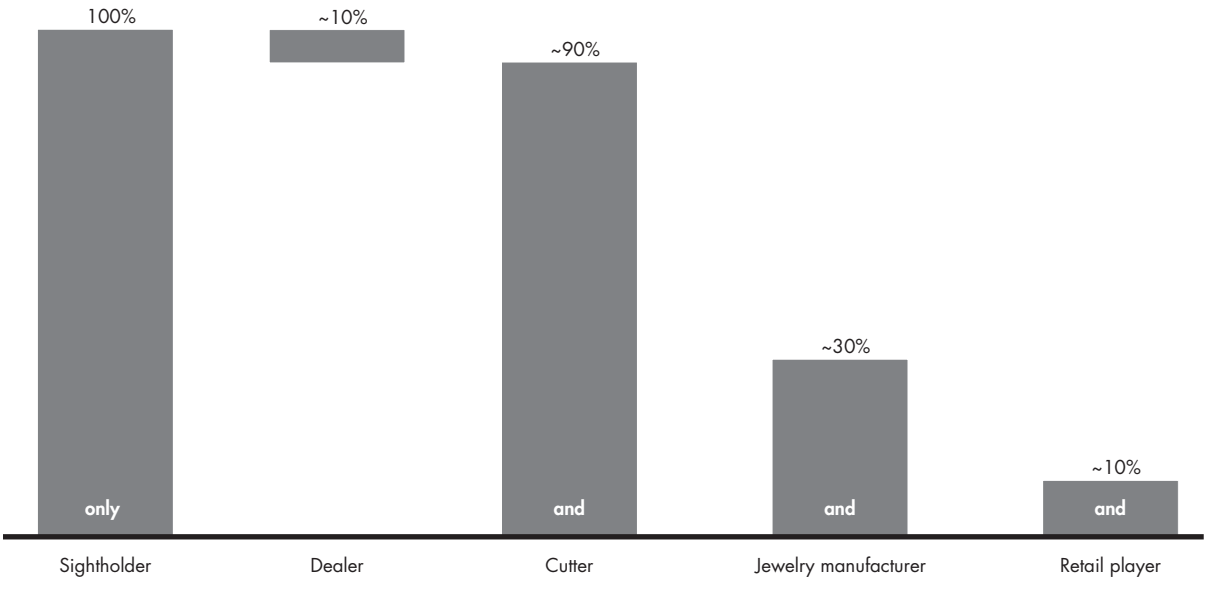
Consumer confidence and trust. Sightholders were expected to adhere to specific ethical business standards, which elevated the image and reputation of the entire industry.

In 2001 De Beers entered the retail sector in a joint venture with French luxury goods company Louis Vuitton Moët Hennessy (LVMH) to create the independently managed De Beers Diamond Jewelers. The first De Beers retail store opened in London, selling high-end jewelry and competing with the likes of Tiffany and Cartier. In 2011 there are 39 De Beers stores in the United States, Asia, Europe and the Middle East (see Figure 11).

De Beers' shift away from category marketing marked a significant break with the past.

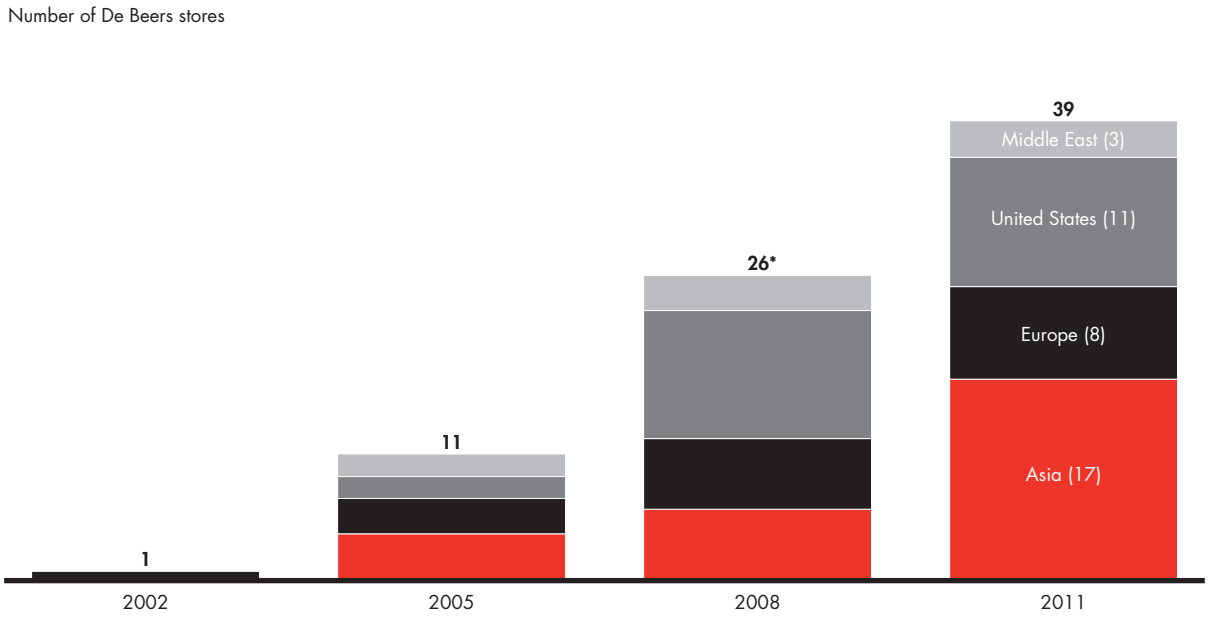
Figure 10: Sightholders play many roles

Share of sightholders working in various steps of value chain, 2010



Note: Excluding affiliated companies
Source: De Beers and Rio Tinto reports; expert interviews; Bain analysis

Figure 11: Number of De Beers stores grew over time



*Bain estimate of number of stores in 2008 based on publication analysis
Source: De Beers Group; Bain analysis

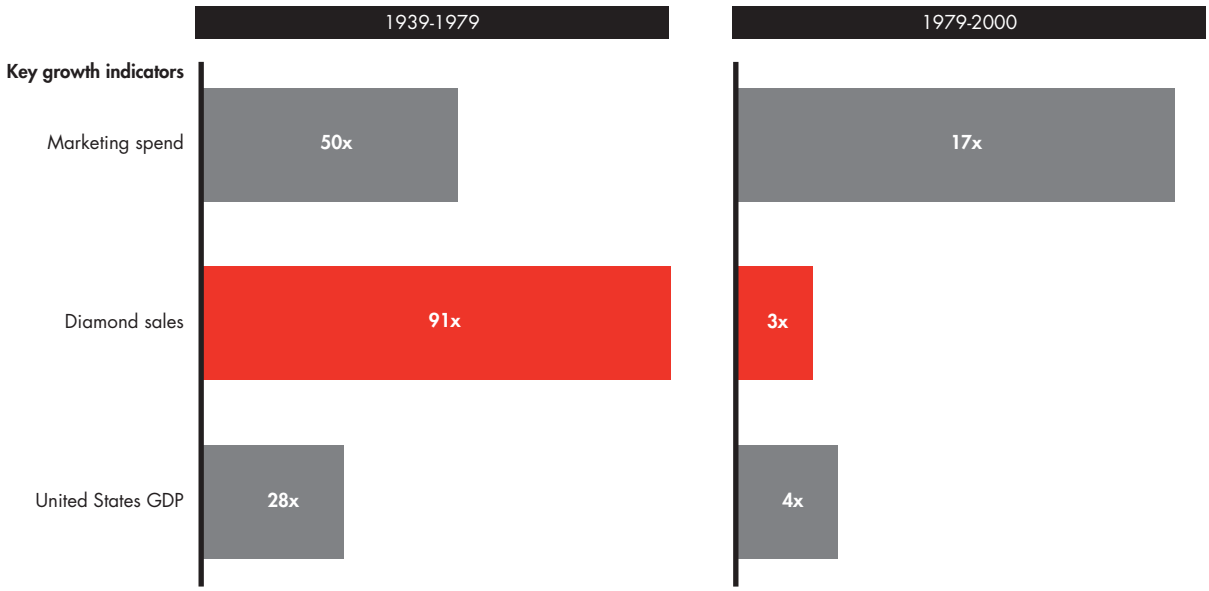
In all likelihood two developments drove the change. First, category marketing made sense for De Beers when the company was able to channel the vast majority of rough-diamond sales to the market. But when the company relinquished that role, generic marketing that benefited the entire industry became harder to justify to shareholders. Second, the returns on category marketing became harder to quantify. While diamond sales were exploding in the mid-twentieth century, far outpacing GDP growth, the "A Diamond is Forever" campaign was considered a huge success. But from 1979 to 2000, even as industry marketing spend significantly increased, overall diamond sales grew much more slowly, barely keeping pace with GDP (see Figure 12).

In De Beers' absence retailers and jewelry manufacturers are now stepping up their efforts to boost consumer demand. Major players such as Tiffany and Cartier each spend about $50 million a year marketing their own brands of jewelry, an effort that partly compensates for the absence of a generic marketing campaign.

The sightholders have also made considerable investments in marketing, in line with their participation in Supplier of Choice or other similar programs from producers.

So far no other diamond-producing player has stepped in to drive a generic marketing program, however. The jury is still out on how this absence will affect consumer demand, especially in fast-growth markets with relatively low per capita diamond penetration such as India and China.

Figure 12: Following explosive growth in sales in the middle part of the century, generic marketing was much less effective in later years



Source: De Beers annual reports; Bain analysis

Kimberley Process: a solution for conflict diamonds

In the 1990s the industry faced a controversy over "conflict diamonds" (see Figure 13). In various politically unstable African countries, paramilitary or rebel groups had taken control of the diamond mines and were using the proceeds from diamond sales to finance their operations. Although these diamonds ended up in legitimate channels, they were either directly or indirectly funding violent conflict. Not surprisingly the Western media's widespread coverage of the atrocities in these conflict zones—Angola, Sierra Leone, Liberia, the Democratic Republic of the Congo—began to damage the reputation of the diamond industry.

In response the Kimberley Process was established in 2002 (see Figure 14). An international process that came about under the auspices of the United Nations, it requires certification of all rough diamonds to guarantee that their trade does not finance rebel activities.

The Kimberley Process Certification Scheme (KPCS) outlines the set of rules each participating country must meet. These rules include an agreement to restrict trade to participants, to refrain from assisting others in trading conflict diamonds and to provide auditable statistical data on mining, exports and imports of diamonds. Exporting authorities of the trading partners require a certificate to ensure that the exporter meets all KPCS requirements.

Figure 13: Demand for diamonds was threatened by media coverage of "conflict diamonds" in Africa

Source countries of conflict diamonds

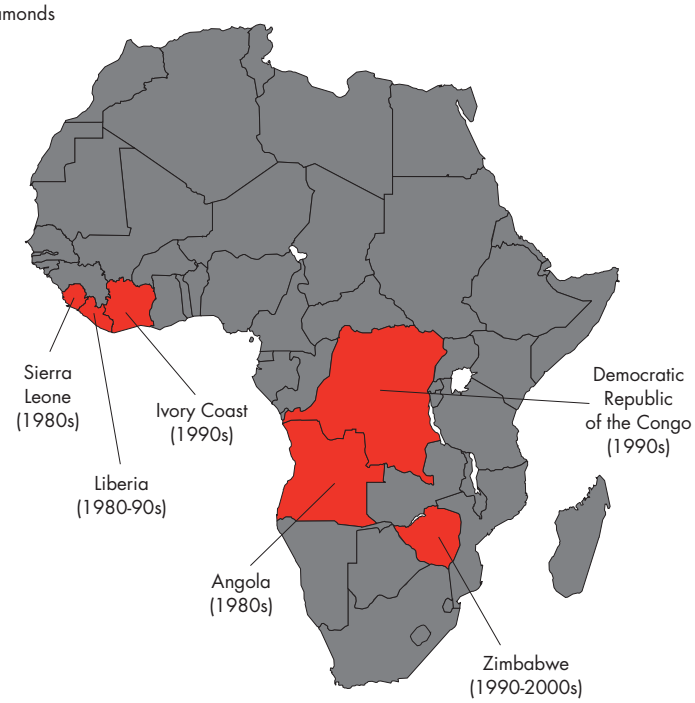
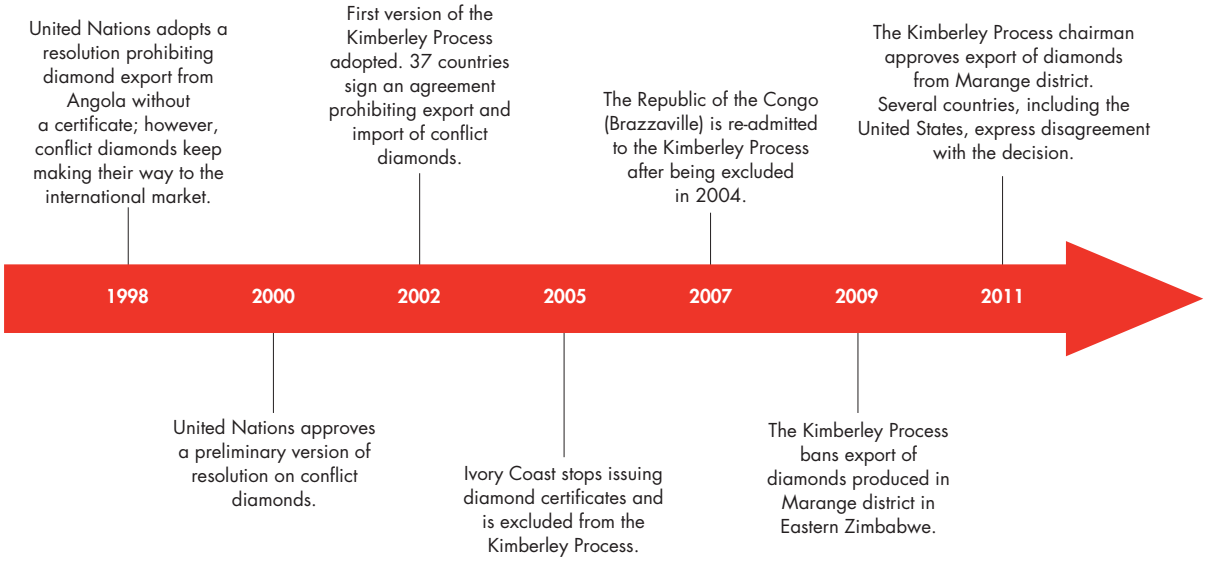


Figure 14: History of the Kimberley Process dates back to 1998



The 49 current participants in the Kimberley Process represent 75 countries and control 99.8 percent of the total diamond supply. Responsibility for supervising the Kimberley Process lies with a chairperson, who is elected annually during a plenary meeting, and by the Working Group on Monitoring, which ensures that participants adhere to the rules.

The Kimberley Process was the first example of an industry collectively collaborating with governments and international institutions to address a human rights problem. Experts suggest that after the introduction of the KPCS, the share of conflict diamonds fell from approximately 4 percent to less than 1 percent of global trade.

Key takeaways

- International diamond trade is believed to have started in India about 1,000 years ago, after which it gradually shifted to Brazil and southern Africa. Meanwhile London, Amsterdam and Antwerp established themselves as trade and cutting centers.
- By the beginning of the twentieth century De Beers had emerged as the diamond powerhouse, accounting for approximately 90 percent of the world's rough-diamond production and distribution.
- Extensive generic marketing throughout the century ensured significant growth in demand for polished diamonds.
- Over the past 20 years the diamond industry has experienced significant structural changes in all segments of the value chain.
- In the past 50 years production diversified into Russia, Australia and Canada, in addition to the African continent, with 133 million carats produced worldwide in 2010.
- Responding to flat sales and rising diamond supplies De Beers undertook a transformational strategy by relinquishing its role as steward of the industry and instead focusing on generating consumer demand through its own brand. The strategy resulted in the Supplier of Choice program and a partnership with LVMH to open retail stores.
- As a result additional competition was introduced on the supply side as new competitors began to sell rough diamonds.
- In response to the damaging controversy over "conflict diamonds" in the 1990s the Kimberley Process was established in 2002 to ensure that only conflict-free diamonds could be traded on the market.

Chapter 3: The diamond industry value chain

A diamond value chain overview: a journey "from mine to finger"

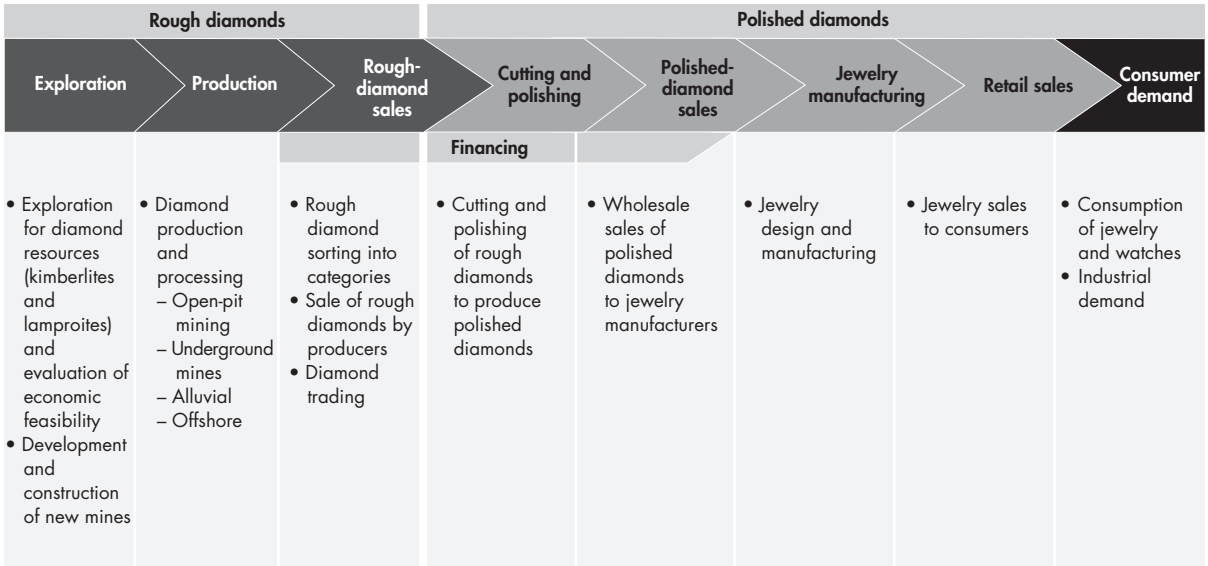
Eight stages define the value chain in the diamond industry, beginning with the exploration of a potential diamond deposit and ending with the demand for diamonds by millions of consumers around the world (see Figure 15). Along the way many different players—miners, dealers, craftspeople, jewelers—face distinct market dynamics and economic challenges.

Exploration. In this stage producers seek commercially viable diamond resources, usually by finding and evaluating kimberlite and lamproite pipes that might contain diamond ore. When a promising site is located the producers develop and construct new mines.

Production. Getting the diamondiferous ore out of the ground usually occurs through open-pit or underground mining. Alluvial and marine mining are two other methods of diamond production. Once mined, the diamond ore passes through various processing stages to extract rough diamonds from it.

Rough-diamond sales. Next producers inspect, classify and prepare the diamonds for rough-diamond sales. London, Moscow and Antwerp are the main centers for the purchase and trade of rough diamonds. These primary sales most often take place within the sightholder system, a system specific to the diamond industry

Figure 15: Eight stages from "mine to finger": the world of rough and polished diamonds



Source: Bain analysis

in which a select group of verified buyers are allowed to purchase rough product. Other sales channels include auctions and spot sales.

Cutting and polishing. This stage, in which diamonds are transformed from rough stones into finished gems, comprises five steps: determining the optimal cut, cleaving or sawing to break the rough diamond into pieces, bruiting to give the diamond the desired shape, polishing to cut the facets and final inspection to ensure quality. Diamond cutting requires specialized knowledge, tools and equipment. Thousands of small players populate this segment of the industry, mostly in India and elsewhere in Asia. Governments are increasingly requiring diamond producers to keep some profits closer to home by developing a local infrastructure and talent, with the result that countries including Botswana are emerging as cutting and polishing centers.

Polished-diamond sales. Polished diamonds get sold to manufacturers for jewelry manufacturing. The sales are transacted either directly by cutters and polishers or through dealers. Antwerp is the key polished diamond sales center, and all major diamond players maintain a presence there. Most of the polished gem sales also take place in Antwerp, but recently the site of sale is shifting closer to jewelry manufacturers in India and China, with many companies opening regional offices.

Jewelry manufacturing. Manufacturers use both in-house and outside designers to create their product, and the sector is quite fragmented. Thousands of players ranging from individual shops to large companies such as Tiffany, Cartier and Chow Tai Fook are integrated into different steps of the value chain, from rough-diamond sales to jewelry design and manufacturing to retail. A large share of the mid- to low-range jewelry manufacturing takes place in China and India.

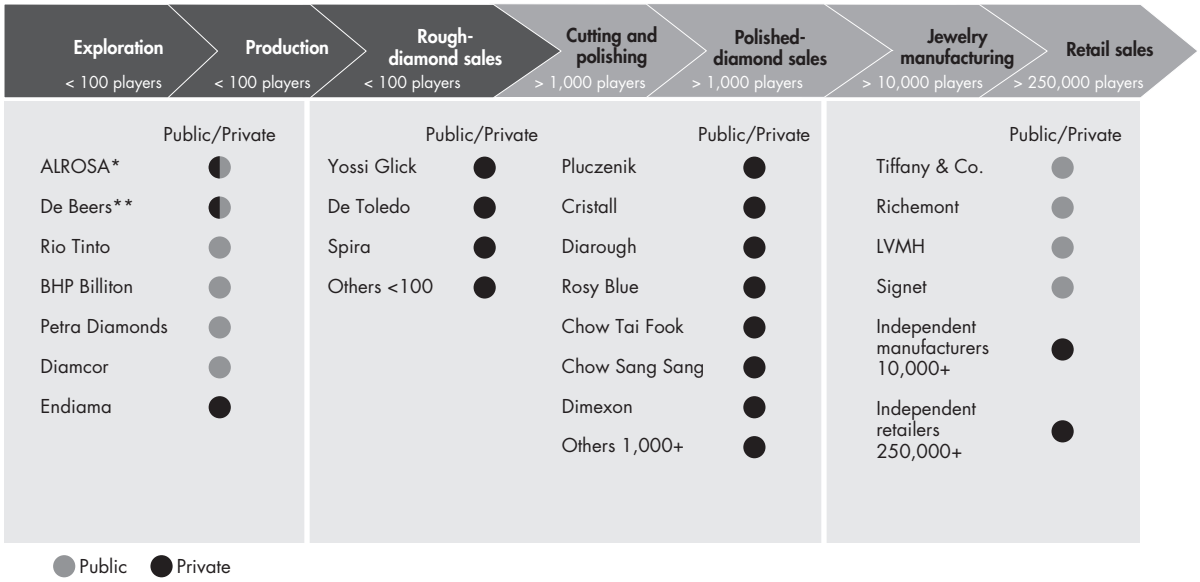
Retail sales. More than a quarter million retailers sell jewelry to consumers around the world. Retail channels include independent stores, mass-market chains such as Wal-Mart for low-end jewelry and high-end specialty chains such as Harry Winston.

Consumer demand. Demand is driven by the millions of people around the world who want to own diamond jewelry.

At either end of the value chain a handful of well-known public companies operate and earn the industry's highest profits. In the middle of the chain diamonds pass through a complex and fragmented distribution system in which many thousands of individuals and small businesses, almost all privately owned, are bound together in an intricate web of relationships (see Figures 16 and 17). These cutters, polishers and manufacturers engage in a significant amount of back-and-forth trading.

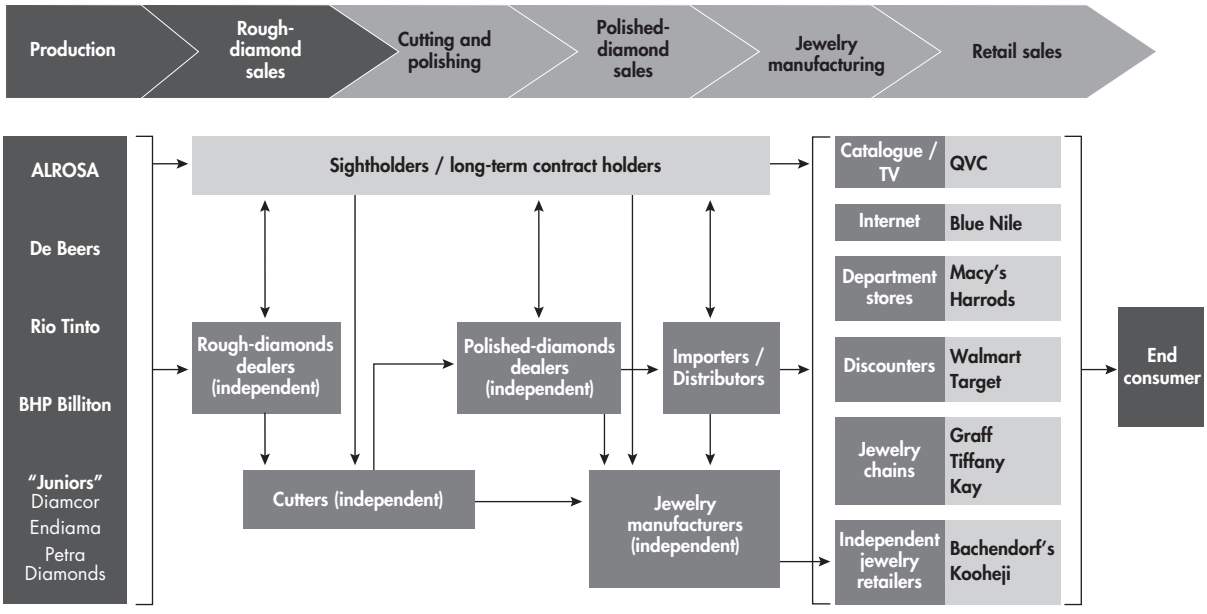
Outsiders who voice concern about the lack of transparency in the diamond industry point specifically to the accuracy of stock-level estimates and to the setting of prices. A comparison with other commodities and precious minerals, however, shows that the diamond industry is not unique. A similar level of uncertainty also surrounds stock levels at key stages of the value chain in the markets for precious metals such as gold, platinum and palladium.

Figure 16: The diamond industry is dominated by private, often family-owned businesses



*ALROSA is registered in Russia as an Open Joint Stock Company; **De Beers is part of Anglo American, which is a publicly listed company
Source: Bain analysis

Figure 17: Rough and polished diamonds pass through complex distribution systems



Source: Company reports; expert interviews; Bain analysis

Value chain economics

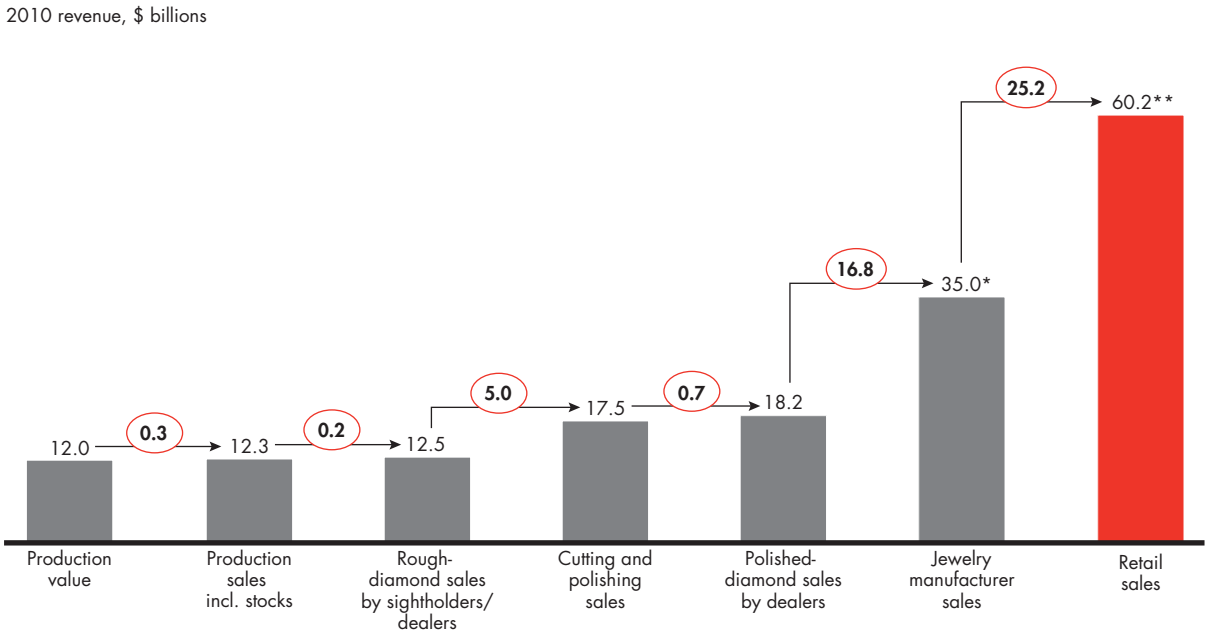
As the diamonds pass through each stage of the chain, their value grows in relatively small increments until they reach manufacturing and retail. The highest portion of revenues is generated at the retail stage, with revenues in 2010 slightly exceeding $60 billion worldwide (see Figure 18).

The highest profit margins are realized in the production and retail segments at either end of the chain (see Figure 19). In 2010 players in rough production achieved operating margins of 22 to 26 percent, the highest in the industry. Next highest were the 5 to 10 percent margins achieved by retailers. But the range in this segment is wide, since it includes not just the largest players in the industry, but also small independent retailers whose margins can be quite thin. Margins and revenues are lowest in the middle segments of the value chain. The total industry profit pool was approximately $11 billion in 2010.

Exploration: long times, great uncertainty

The exploration of a potential diamond site is a complex process that takes many years and considerable financial investment, with no guarantee of ultimate payback. From the moment that prospecting gets under way until the point where commercial production can commence, six to ten years can elapse (see Figure 20), and the odds of success are extremely low. For example, at the greenfield exploration stage, the probability that a producer will find a deposit that both contains diamonds and can be commercially developed into a diamond mine is only about 1 to 3 percent. The probability of successful commercial development at the feasibility assessment stage jumps to 25 percent, although significant uncertainty remains.

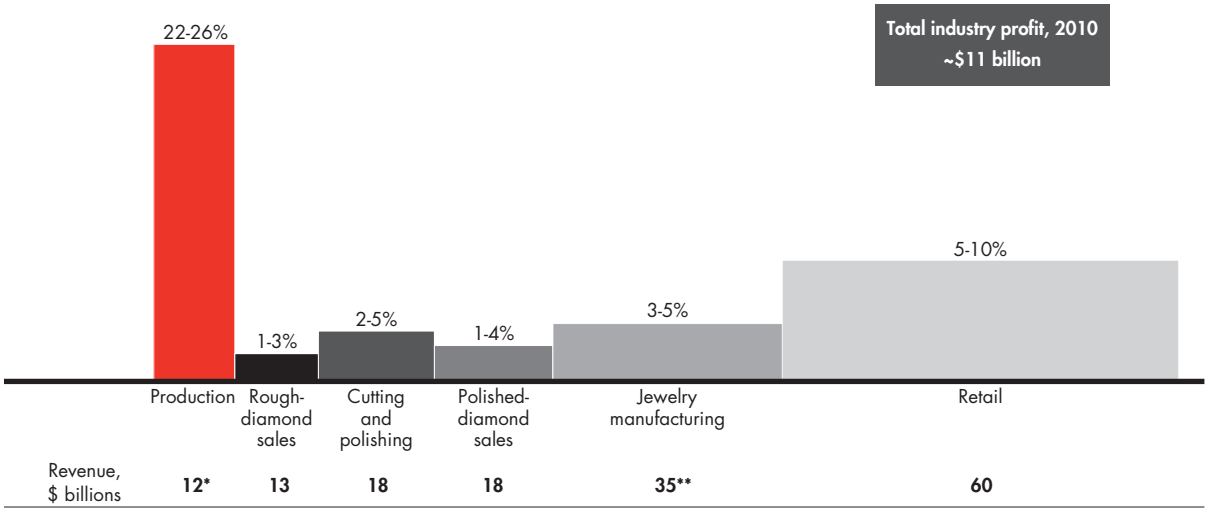
Figure 18: The largest added value is created in retail



*Bain estimate; **Total diamond jewelry retail sales
Source: IDEX; Tacy Ltd. and Chaim Even-Zohar; Diamond Value Chain 2010

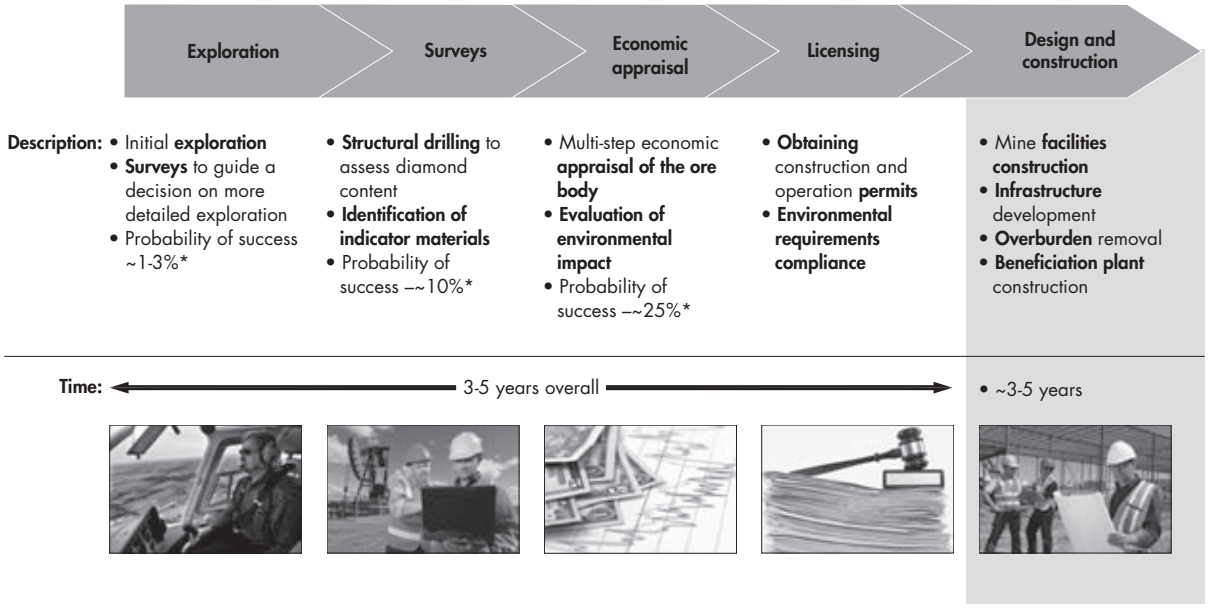
Figure 19: The highest margins are achieved in production and jewelry retail sales

2010 operating margin



*Includes stock sales; **Bain estimates; Revenues and margins indicated reflect only diamond-related business
Source: IDEX; Tacy Ltd. and Chaim Even-Zohar; Diamond Value Chain 2010; company reports; expert interviews; Bain analysis

Figure 20: Field development cycle: 6-10 years



*Probability that the discovered deposit will go on to become a world-class operating mine
Source: Expert interviews; *Diamonds: the Diamond Exploration Cycle* – Kaiser Research Online (2002)

Many production companies spend years and make significant investments without finding a commercially viable deposit. Four distinct phases make up the field development cycle:

Exploration involves getting an exploration license and then conducting initial geophysical and surveying work, with the aim of spotting indicator minerals that would point to a diamond-bearing kimberlite or lamproite pipe.

Prospecting and surveying includes multiple stages such as target drilling, micro diamond testing and mini-bulk and bulk sampling to estimate the grade and value of the identified deposit.

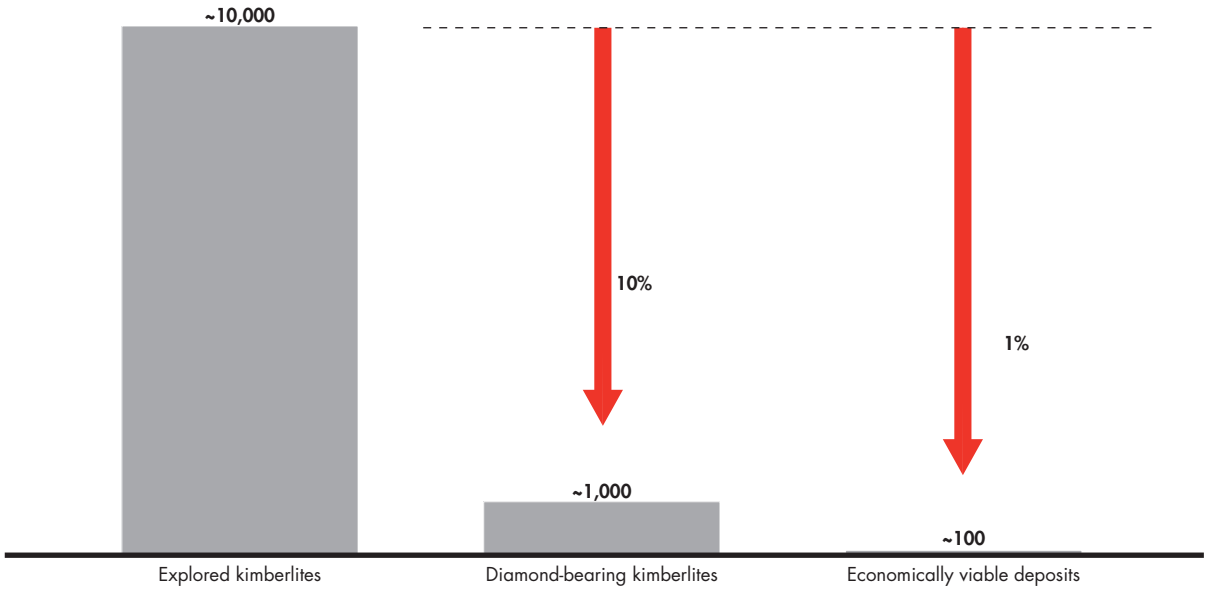
Next comes **economic appraisal**, the more detailed assessment of the value of a diamond deposit, the costs associated with construction and operation of the mine and the potential environmental impact of production.

Last is **licensing**, when the producer obtains the appropriate production licenses and meets any necessary environmental requirements.

Assuming the four phases of field development show promise, the next major step is **design and construction**, when producers construct the mine and its infrastructure (for example, road access, energy supplies and processing plants) and begin stripping away the overburden of earth and rocks that cover the ore.

Throughout this process there is still no certainty that the mine will be profitable. Of approximately 10,000 kimberlite pipes discovered around the world to date, only about 1,000 have proved to be diamondiferous, and only about one hundred were economically viable to develop (see Figure 21).

Figure 21: Only 1% of discovered kimberlites are economically viable



Source: Expert interviews

In the decade leading up to the economic crisis that began in 2008, producers around the world tended to increase their overall spend on exploration in line with rising demand and rough-diamond prices. From 2001 to 2008 exploration expenditure in the industry grew by 26 percent annually (see Figure 22), driven by declining reserves in existing mines and the need to locate new diamond sources. In the second half of 2008, however, the economic crisis caused a break in the investment pattern, and in 2009 spending on exploration fell by 64 percent.

From 2006 to 2010 the world's top four top production players – ALROSA, De Beers, BHP Billiton and Rio Tinto—spent 1 to 3.5 percent of their total revenues on exploration.

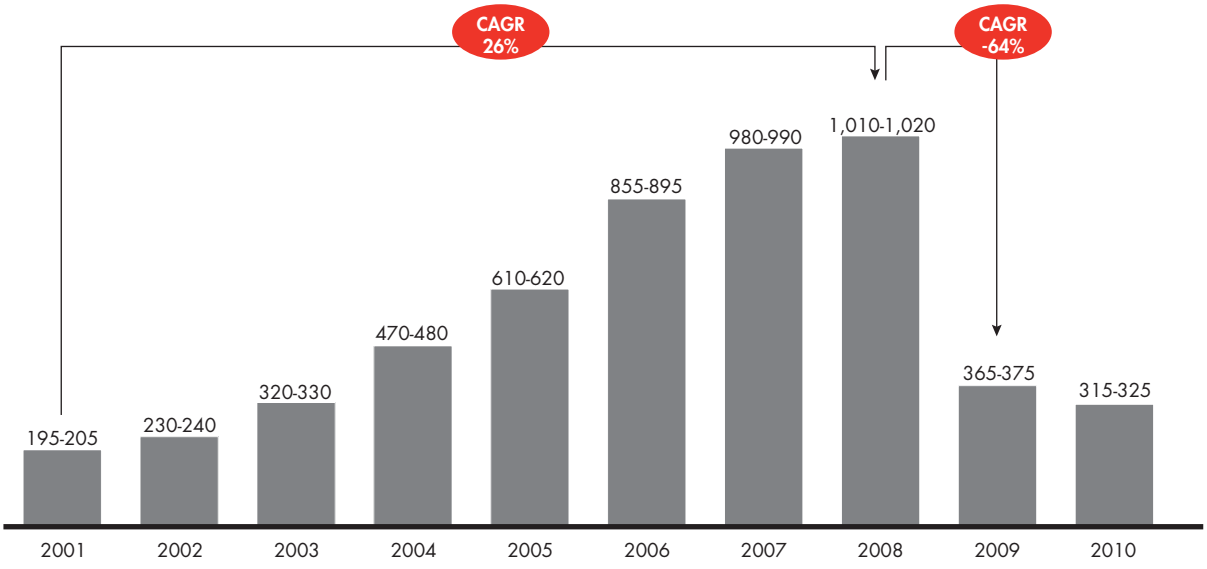
Three of the top four players (ALROSA, De Beers, Rio Tinto) reduced their exploration spend in 2009 and 2010 because of the crisis, as the focus shifted from exploration to optimization of existing sources. By contrast, BHP Billiton's increased overall exploration expenditure reflects the company's multiyear commitment to its petroleum exploration drilling program.

ALROSA stands out as the leader in historical levels of exploration expenditure, having spent a higher proportion of its revenues on exploration (up to 3.5 percent in 2008) than its major competitors. ALROSA has good reason to devote so much to exploration. First, as a state-owned entity, it has access to vast territories across Russia and still has a large amount of potential diamond-bearing territory to explore. Moreover ALROSA is the only company in Russia with the necessary expertise to conduct diamond exploration activities.

As larger companies have been pulling back from early-stage exploration, they are making room for small producers and focused diamond exploration players that are more nimble and willing to take on greater initial risk.

Figure 22: Reserve depletion has boosted exploration over the last 10 years; exploration spend dropped sharply after the economic crisis

World diamond exploration spend, $ millions



Source: NBF Research; Metals Economics Group

These smaller players carry out early exploration in the hope that if they succeed, the larger players will step in and buy them out. This represents a major shift in the dynamics of diamond exploration: smaller players are finding a potentially rewarding niche.

Among the majors ALROSA, which retains complete ownership rights to all its projects at every stage of development, is the exception. Because of the classification of diamonds as a strategic national resource, any diamond-producing company operating in Russia must by law be majority Russian-owned, which makes it difficult for international exploration players to conduct business there.

Smaller players that have taken an active role in exploration include the following:

Firestone Diamonds is a mining and development company with assets in Botswana and Lesotho and projects in development in the Orapa, Jwaneng and Tsabong areas, where De Beers has successfully operated. To date 20 kimberlite deposits have been discovered in Orapa, Botswana, of which seven are diamond bearing. At Tsabong, also in Botswana, 84 kimberlite deposits have been discovered, of which 20 are diamond bearing.

Gem Diamonds, a diamond mining and exploration company with a focus on high-value diamonds, owns five projects located mostly in Africa and Australia. It is developing the Gope deposit in Botswana. Commercial operations at the Ghaghoo diamond mine (part of the Gope deposit) are expected to start by 2013, with production potential of up to 0.7 million carats per year.

Mountain Province, a Canadian diamond mining and exploration company, has a 49 percent share in its primary asset, the Gahcho Kue mine in Canada. Gahcho Kue is expected to be one of the largest mines to start production within the next five years, yielding an estimated six million carats a year at peak production.

Peregrine Diamonds is a Canadian company focused on exploration and production across Canada, including Baffin Island, East Arctic, Lac de Gras and Manitoba. Peregrine spent $6.7 million on exploration in 2010. The company owns a 49 percent stake in the Chidliak exploration program on Baffin Island, for which the 2011 program budget is $17.7 million.

Shore Gold, a Canadian natural resources company, focuses its exploration and development on the diamond resources in the Fort à la Corne area of Saskatchewan, where more than 70 percent of kimberlites have so far been diamond bearing. Shore Gold's most prominent project is the Star Orion South diamond mine in Saskatchewan, expected to begin operations by 2016 and produce about 2 million carats annually.

Stellar Diamonds is a diamond mining and exploration company focused on West Africa. The company has exploration projects in Sierra Leone and is running operations in Guinea. Stellar owns licenses to develop diamonds in Sierra Leone, as well as kimberlites in Guinea's Bouro and Droujba pipes.

Stornoway Diamond, a Canadian production and development company, has an interest in ten Canadian projects that are still in early phases. Among the mining projects in development are Qilalugaq, Timiskaming, Aviat and Churchill. Commercial operations at Renard are expected to start in 2013, with production reaching about 1.5 million carats per year.

Given the widespread depletion of active mines, where will future diamonds be found?

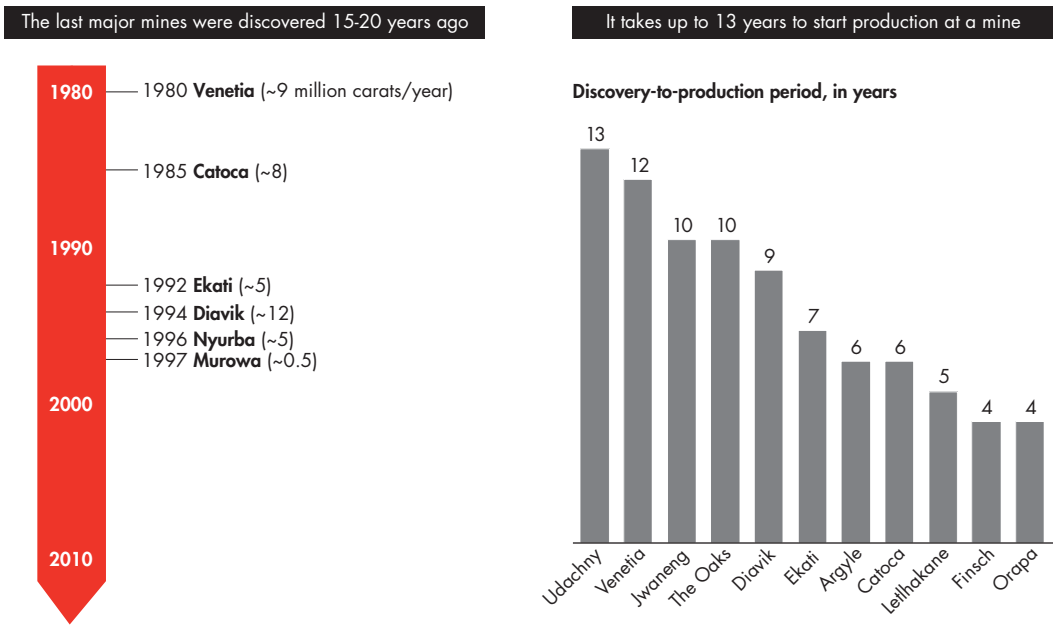
The most likely scenario for the next decade is that new supplies will mainly come from existing mines and previously explored diamond deposits. With industry projections of worldwide demand outpacing supply, producers are reevaluating known sources. In some cases, sites that can now be mined more profitably are being reopened, and production is resuming. In others, tailings can be reprocessed using newer, more efficient technologies that extract previously unrecovered stones.

Producers can also invest in both greenfields and brownfields exploration. Greenfields exploration entails searching for kimberlite and lamproite deposits in untapped areas. This type of exploration is associated with high risk and high return. Although the probability of finding a significant diamond deposit is low, such a discovery would likely be of high value. Brownfields exploration, on the other hand, takes place around the areas that lie close to known diamond deposits, where the geology is better understood. This type of exploration is associated with low risk and low to moderate return.

If recent trends continue, however, the prospects of a major new diamond deposit being discovered and commercially developed in the next decade are slim. The last major find was the Murowa deposit in Zimbabwe in 1997. Even if a producer does make a major new discovery, the chances of production getting under way soon are remote. Based on recent experience, it takes from four to 13 years after discovery to begin commercial production (see Figure 23).

The Lighobong and Kao mines in Lesotho and the AK6 in Botswana are expected to start production by late 2011. About 13 additional new mines under development in Canada, India, Russia and southern Africa are scheduled to come online by 2020. Altogether, these new mines should produce about 23 million carats a year.

Figure 23: It is unlikely that a significant new deposit will be discovered and commercially developed in the next ten years



Note: Peak production levels shown
Source: Deutsche Bank; *Gems and Gemology*; company data

These projections, however, are not easily verifiable since they are based on the public declarations of the mining companies involved in the projects. Moreover, they are subject to market conditions, which can fluctuate.

Production: mining mechanics, leaders and profitability

The mining process consists of three stages: ore excavation, processing and extraction.

Ore excavation involves drilling and blasting the overburden and hauling it away—an extremely costly process. Next is the excavation of the diamond-bearing ore. One of the key determinants of a viable project is the stripping ratio: how many tons of waste rock material must be removed in order to excavate one ton of diamond-bearing ore.

For kimberlite or lamproite deposits near the surface, producers use the open-pit mining technique. After the overburden is removed the ore is excavated using large hydraulic excavators and trucks. Producers employ a tier technique that carves away ever-narrowing concentric layers to avoid a mine collapse.

When the open-pit mines reach their physical limits miners employ underground or "hard-rock" techniques in which they tunnel underground and create rooms or "stopes" supported by timber or rock to extract ore and diamonds that can no longer be removed through open-pit mining.

Underground mining can significantly extend the economic life of a mine after open-pit mining is no longer feasible. But the process requires considerably more complex management and machinery than an open-pit mine.

Once ore is removed it is transported to on-site processing plants where the second mining stage, **processing**, begins. The stage consists of multistep crushing of the extracted ore. Its purpose is to reduce the ore to a manageable size for further processing.

In the third stage, **extraction**, producers sort the ore mechanically, then use various methods such as gravity and dense media separation to cull diamonds from the waste material. Miners today make use of as much automation as possible to minimize labor costs and theft risk.

The main producers of rough diamonds today follow (in alphabetical order):

ALROSA. The predecessor of Russia's largest diamond company was founded in 1957 in the Union of Soviet Socialist Republics (USSR). In 1992 it was transformed into the joint stock company ALROSA. Key shareholders are the Russian Federation government with 51 percent, the state government of the Yakutia Republic (32 percent) and local municipalities (8 percent). The company's core business is the production of rough diamonds in Russia and Angola. ALROSA production in 2010 exceeded 34 million carats.

BHP Billiton. A global diversified natural resources company, BHP Billiton was founded in 1885. The company owns 80 percent of the Ekati mine in Canada; in 2010, its share of diamond production from that mine totaled three million carats. Diamond sales constituted 2.4 percent of total company revenues in 2010.

De Beers. Founded in 1888, De Beers grew into a family of interrelated companies in diamond mining, trading and industrial diamond manufacturing. Key shareholders are Anglo American, the Oppenheimer family, and the government of Botswana. Rough-diamond production in South Africa, Namibia, Botswana and Canada makes up the core business. De Beers' production in 2010 was 33 million carats.

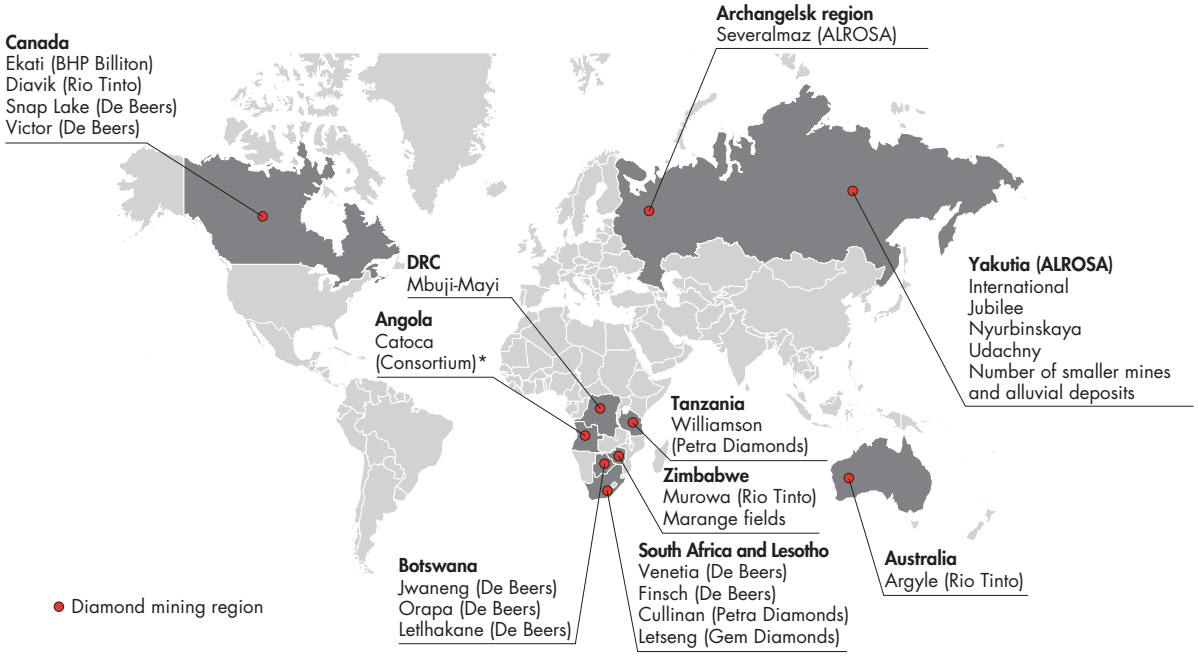
Harry Winston Diamond Corporation. Founded in 1994 with the discovery of its first and only asset in the mining segment, the Diavik diamond mine in Canada (Harry Winston owns a 40 percent share; 60 percent is owned by Rio Tinto). Harry Winston is also integrated into the premium retailing segment of the diamond industry via its subsidiary, Harry Winston Inc. In 2010 Harry Winston's share of production from the Diavik mine was 2.2 million carats.

Petra Diamonds. An AIM exchange-quoted independent diamond company, Petra Diamonds entered an accelerated growth stage when it merged with Crown Diamonds in 2005, introducing production to the group. Involved in both production and exploration, Petra Diamonds aims to optimize operations at assets acquired from the largest players, especially across Africa. Petra Diamonds' production in 2010 was 1.2 million carats.

Rio Tinto. Founded in 1873, Rio Tinto is a diversified UK–Australian mining and resources group with headquarters in London and Melbourne. The company produces diamonds in Australia, Canada and Zimbabwe. In 2010 Rio Tinto's share of diamond production was 13.8 million carats. Diamond sales constituted 1.2 percent of total revenues for the company in 2010.

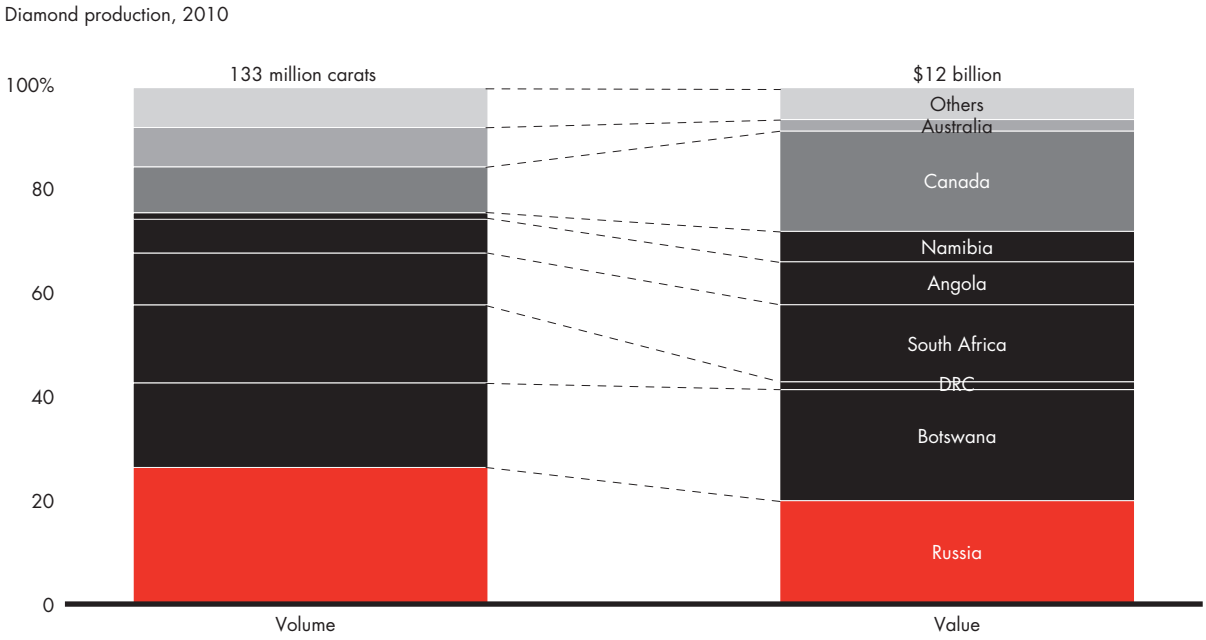
Today, diamonds are produced at about 20 major mines around the world (see Figure 24).

Figure 24: Currently rough diamonds are produced at about 20 major mines



*Consortium made up of ALROSA (32.8%), Endiama (32.8%) and others (34.4%)
Note: Map indicates the largest deposits only; Majority shareholders shown
Source: Company reports; BoA Merrill Lynch Alrosa initiating coverage (07/04/2011); Metals Economics Group

Figure 25: Botswana and Russia top the list of world diamond producers



Source: Kimberley Process; Bain analysis

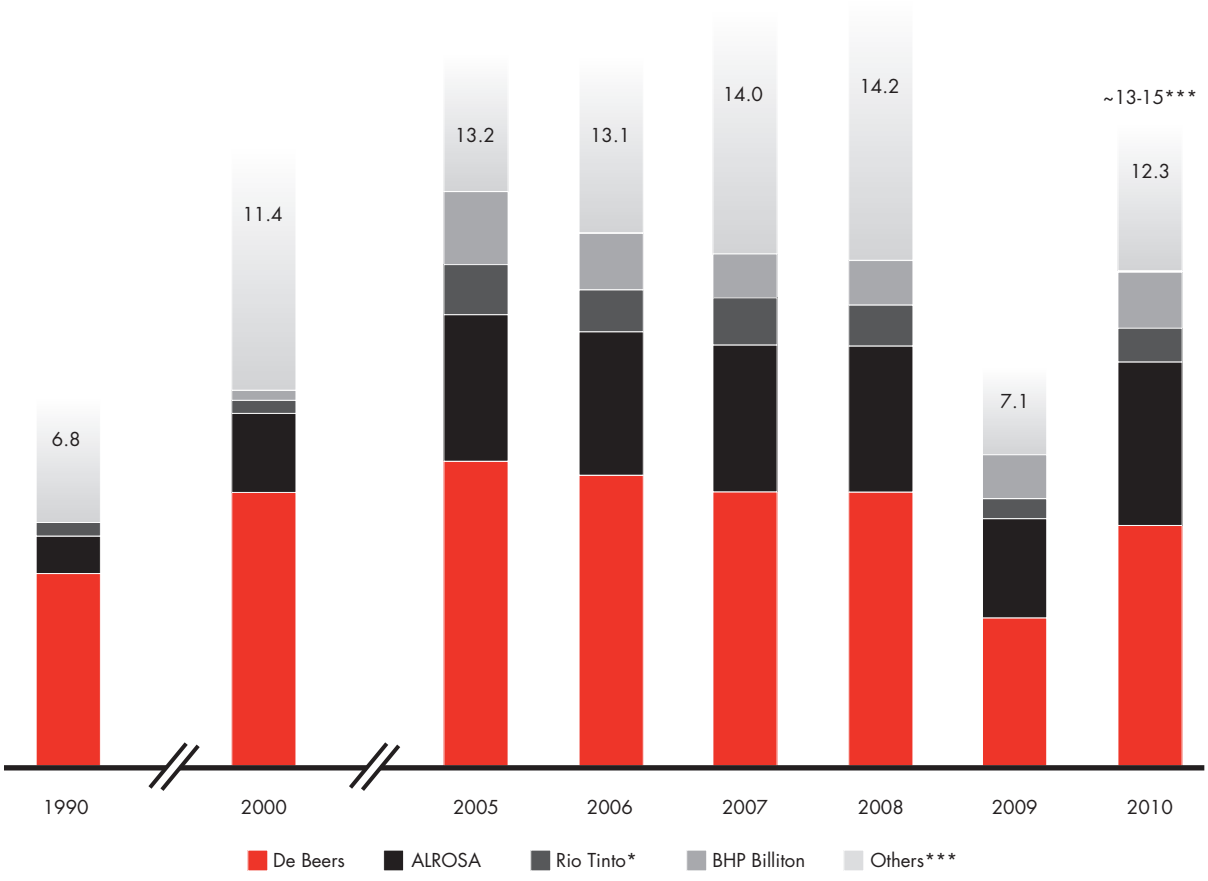
In terms of geographical diversification of the resources, the diamond industry is highly concentrated in a few locations, with about 70 percent of the world's diamonds located in Africa and Russia (see Figure 25). The other main producing regions are Canada and Australia, both relatively recent entrants.

ALROSA's mining activities are mostly focused on Siberia, with some smaller activity in the Archangelsk region of Russia and Angola. De Beers operates mostly in Africa, particularly South Africa and Botswana. Rio Tinto's operations are in Australia, Canada and Zimbabwe.

The diamond industry is also highly concentrated in terms of market participants. The two largest players in the industry, De Beers and ALROSA, together account for close to 70 percent of the world's annual production of rough diamonds, which, according to reports from the International Diamond Exchange (IDEX) and the Kimberley Process, totals $12.3 billion in sales (see Figure 26). However, some industry sources estimate the 2010 total value of production to be anywhere from $13 billion to $15 billion, but that figure includes smaller players whose production figures are not easily quantified, such as the informal and artisanal producers that operate throughout Africa. Taking the larger figure, the combined share of De Beers and ALROSA in value would be 56 to 65 percent.

Figure 26: De Beers holds leadership position in value terms

Estimated world rough-diamond sales (including sale of stocks), $ billions

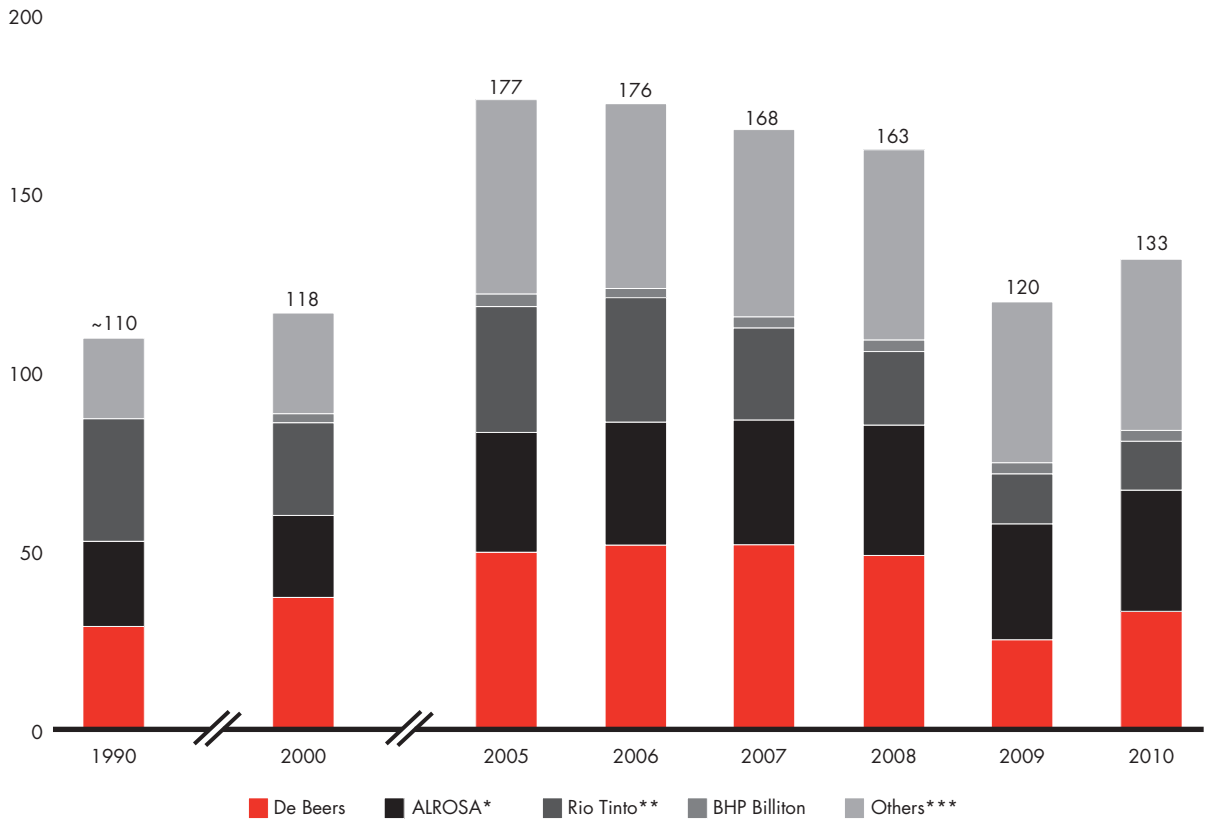


Global rough-diamond sales (including sale of stocks), $ billions								
Producer	1990	2000	2005	2006	2007	2008	2009	2010
De Beers	4.1	5.9	6.5	6.2	5.9	5.9	3.2	5.1
ALROSA	0.8	1.7	3.1	3.1	3.1	3.1	2.1	3.3
Rio Tinto*	0.3	0.2	1.1	0.8	1.0	0.8	0.5	0.7
BHP Billiton**		0.3	1.5	1.3	0.9	1.0	0.9	1.3

*Rio Tinto revenues include Australian production in 1990 & 2000; **Diamonds & Specialty products revenues shown; ***Industry sources estimate total sales could be larger than reported by IDEX; Tacy Ltd. and Chaim Even-Zohar by as much as $1-3 billion in 2010 due to additional sales from smaller artisanal and illicit activities
Note: Indicated totals are reported by IDEX; Tacy Ltd. and Chaim Even-Zohar and do not include sales to Gokhran and sales from artisanal and illicit production
Source: Company reports

Figure 27: Production industry is transforming as ALROSA takes a leadership position by volume in 2009-2010

Annual production, millions of carats



Production by volume (millions of carats)								
Producer	**1990**	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
De Beers	28	37	49	51	51	48	25	33
ALROSA*	24	23	34	35	35	37	33	34
Rio Tinto**	35	26	36	35	26	21	14	14
BHP Billiton	0	3	4	3	3	3	3	3
Others***	23	30	55	52	53	54	46	49
Total	**110**	**118**	**177**	**176**	**168**	**163**	**120**	**133**

*ALROSA data for 2000 calculated as total production from Russia; ALROSA data for 1990 estimated as difference of estimates for overall production and known production for all other countries; **Rio Tinto includes all Australian production for 1990 and 2000; Argyle production is decreasing over time; ***Others include Democratic Republic of the Congo, Angola, Brazil and other countries
Source: Company reports; Bain analysis; Kimberley Process Statistics; U.S. Geological Survey; O.P. Vecherina, "World Diamond Production," Moscow, 2001; A.D. Kirrilin, "World diamond market," Moscow, 1999

The next largest players, Rio Tinto and BHP Billiton, jointly produce about 15 percent. Other players, which include Petra Diamonds, Harry Winston and a score of smaller (including artisanal) miners in Africa, contribute the remaining approximately 15 percent of production in value terms.

Currently De Beers leads in overall rough-diamond sales and ALROSA in production.

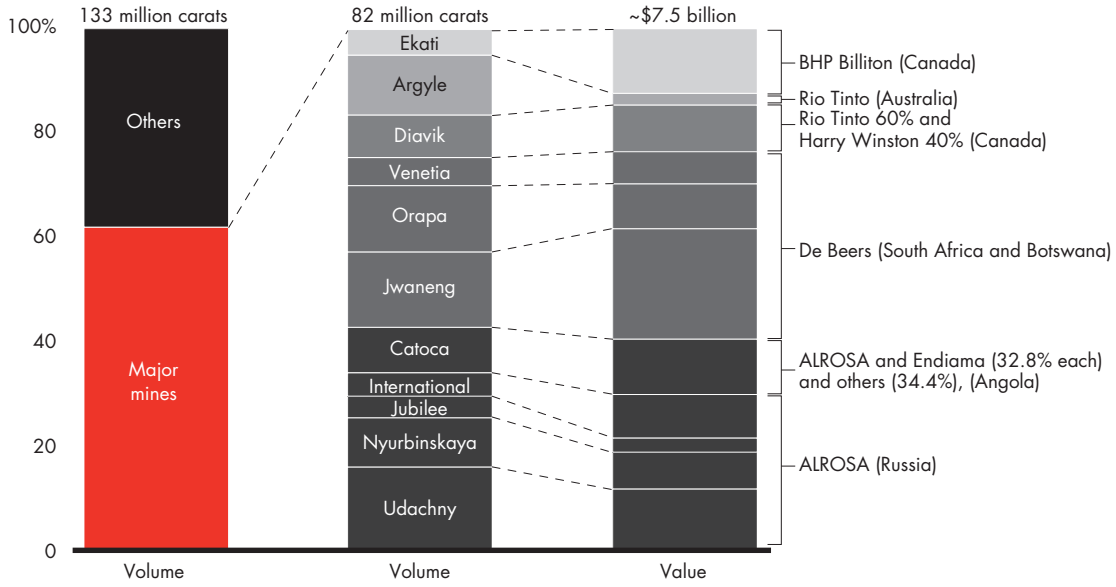
De Beers had overall rough-diamond sales of $5.1 billion in 2010. That constitutes a near 60 percent increase in sales for the company compared with the previous year, when De Beers' sales dropped by nearly 40 percent in response to the economic downturn.

ALROSA's emerged as an industry leader relatively recently. With the fall of the Soviet Union in 1991, ALROSA became an independent commercial player in the global market. Because the company did not reduce output during the economic crisis as significantly as other players, it assumed a volume leadership position in 2009, which it sustained into 2010 with the production of 34.3 million carats (see Figure 27). De Beers increased production by 35 percent to 33 million carats in 2010, after significantly cutting back during the crisis. Rio Tinto and BHP Billiton saw a slight decline in production relative to 2009, producing 13.8 and 3.0 million carats, respectively, in 2010.

The world's supply of diamonds comes from relatively few sources—only 11 deposits account for about 62 percent of world production (see Figure 28). The Argyle mine in Australia, the Jwaneng and Orapa mines in Botswana, as well as pipes at the Udachny deposit in Russia are among the largest operating mines by volume. By value, the single biggest mine is Jwaneng, followed by Udachny and Ekati in Canada.

Figure 28: The world's largest mines account for 62% of production by volume

Diamond production, 2010



Source: Kimberley Process; company data; Cormark Securities (2009); Gems and Gemology (2007); Mining Journal special publication – Diamonds (June 2011); Metals Economics Group; IDEX; Tacy Ltd. and Chaim Even-Zohar. Bain analysis

In terms of size large diamonds account for a very large proportion of the market by value but a small portion by volume (see Figure 29). The underlying reason is the relative scarcity of large diamonds, which lends them novelty and value and accounts for their greater expense relative to small stones. In 2011, according to IDEX, a four-carat diamond of the highest quality sold for an average $500,000, compared with $25,000 for a one-carat stone.

Among all producers, operating margins remain in the range of 25 to 50 percent (see Figure 30). Based on public information De Beers and ALROSA are the major producers that make the most money, with EBITDA margins of 24 percent and 31 percent, respectively. On average, smaller players tend to have comparable or even higher operating margins, such as the 43 percent margin of Petra Diamonds. BHP Billiton's exceptionally high margin of 51 percent is due to the highly profitable Ekati mine in Canada, the company's only diamond asset (80 percent ownership).

A number of key factors determine profitability (see Figures 31 and 32). On the revenue side, the significant factors are the average price of diamonds in the market, the amount of diamond content in the ore extracted and the amount of ore produced.

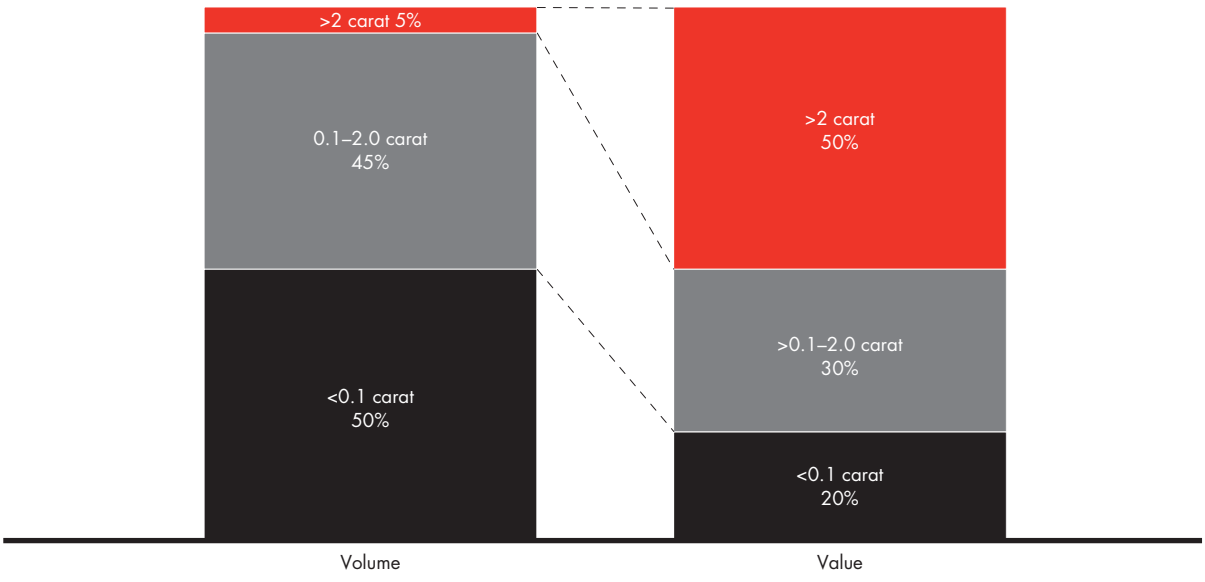
On the cost side are fixed overheads such as labor and security costs, the annual cost of production and processing, and design and construction expenses.

Producers make significant capital expenditures during the design and construction stages of production as well as during the operating phase of the mine.

Capital costs during the design and construction phase are typically split equally between direct and indirect costs. Within direct costs, the single largest outlay goes to sampling the ore to evaluate diamond grade and size.

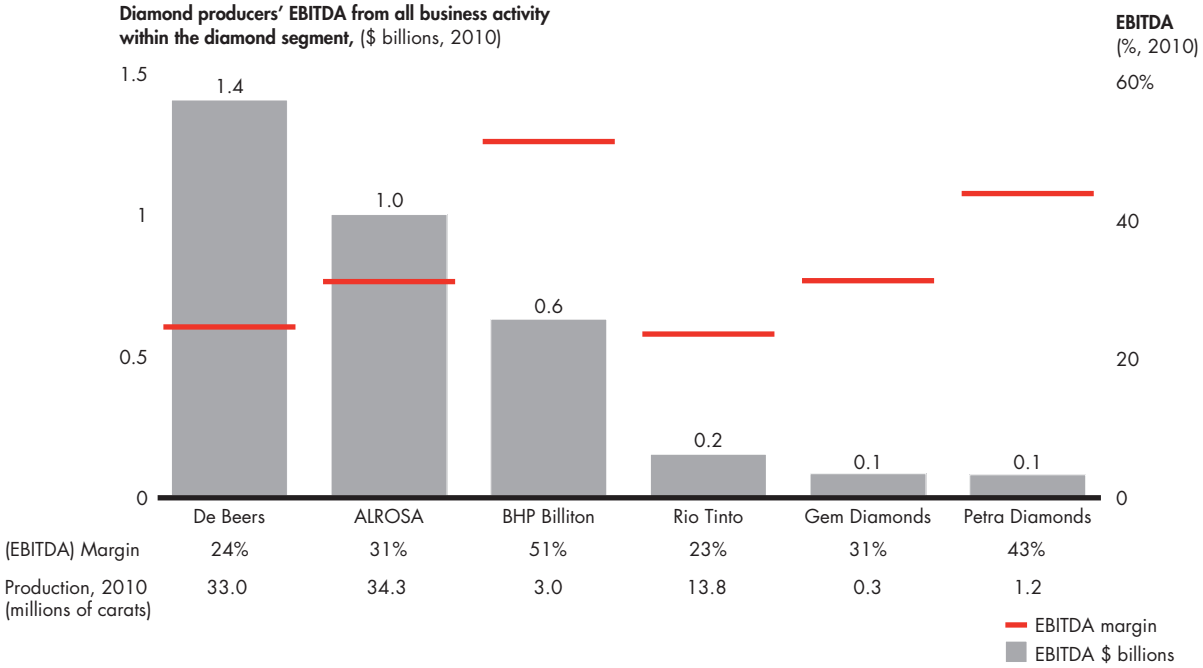
Figure 29: Large diamonds account for less than 5 percent of volume but 50 percent of value of the total diamond market

Structure of diamond production at a typical mine, in volume and value terms



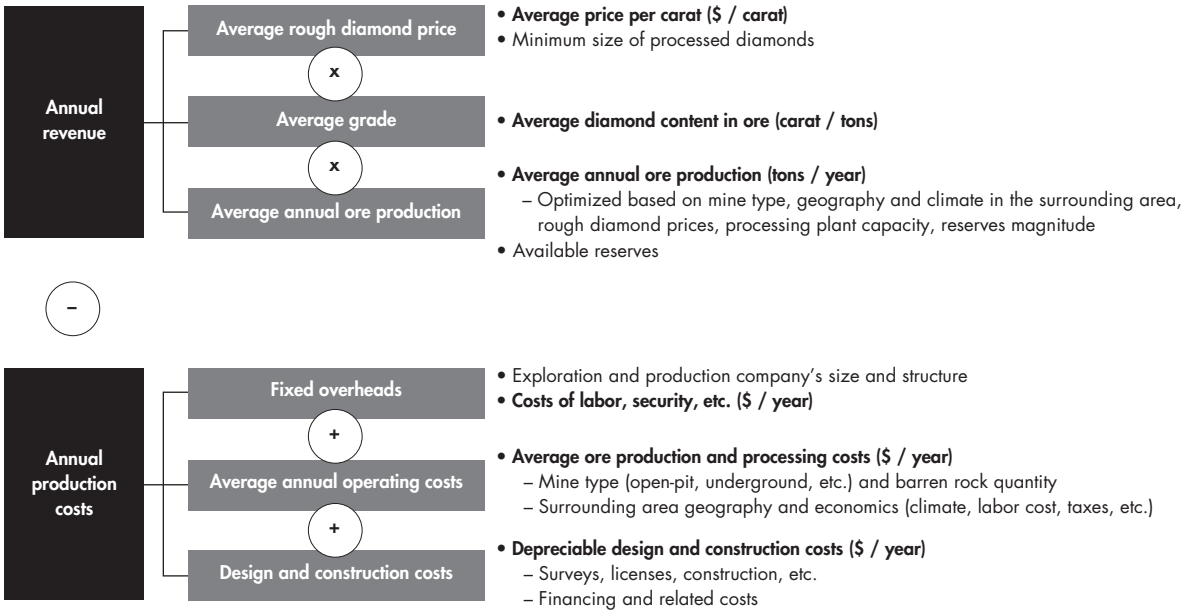
Source: Cormark Securities "Diamond Market Overview," 2009

Figure 30: Production economics vary, with margins of 25-70 percent



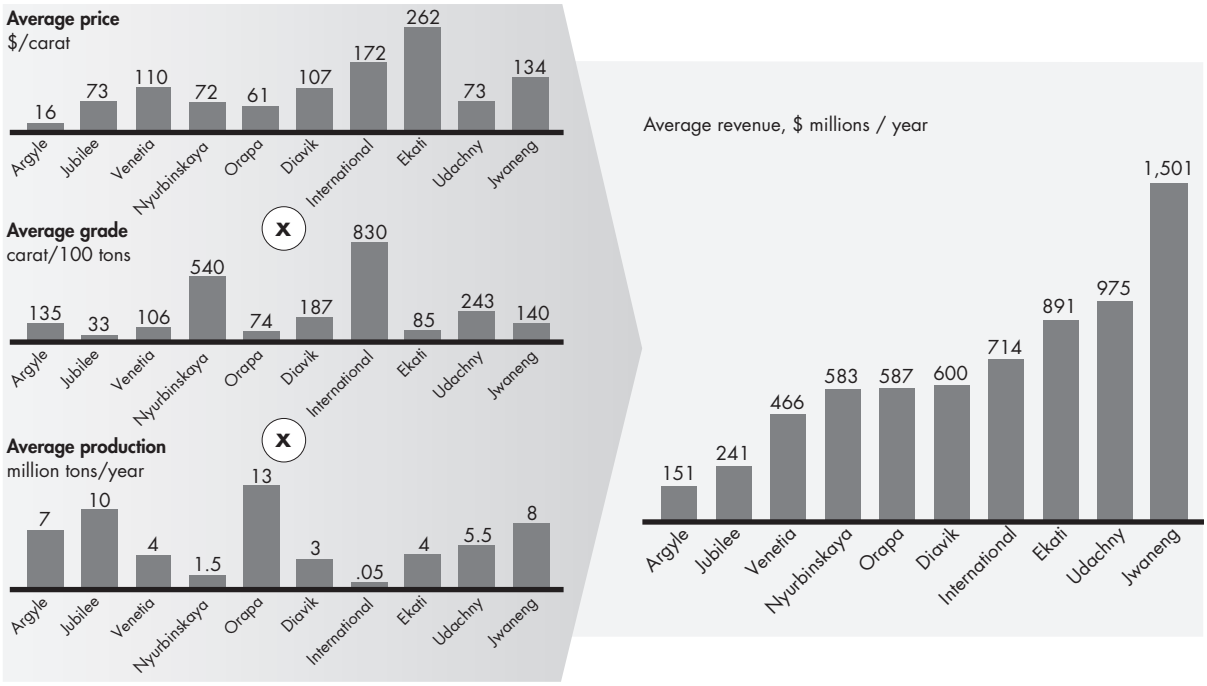
Note: BHP Billiton's financials shown for the Diamonds and Specialty Products division; Indicated overall company EBITDA from all business activity within the diamond segment
Source: Company reports

Figure 31: Production profitability is defined by several factors



Source: Bain analysis

Figure 32: Annual revenue is defined by ore production as well as diamond content and average price



Note: 2010 production data
Source: Company data; Cormark Securities (2009); *Gems & Gemology* (2007); *Mining Journal*; Metals Economics Group; Bain analysis

Indirect costs include commissioning of processing plants and other infrastructure necessities such as wastewater, waste removal facilities and construction-site management (see Figure 33).

Capital expenses (CAPEX) incurred during the operating phase of a mine include mine expansion, expenses related to any errors or miscalculations made during the design and construction of the mine and upgrades to the facilities and equipment.

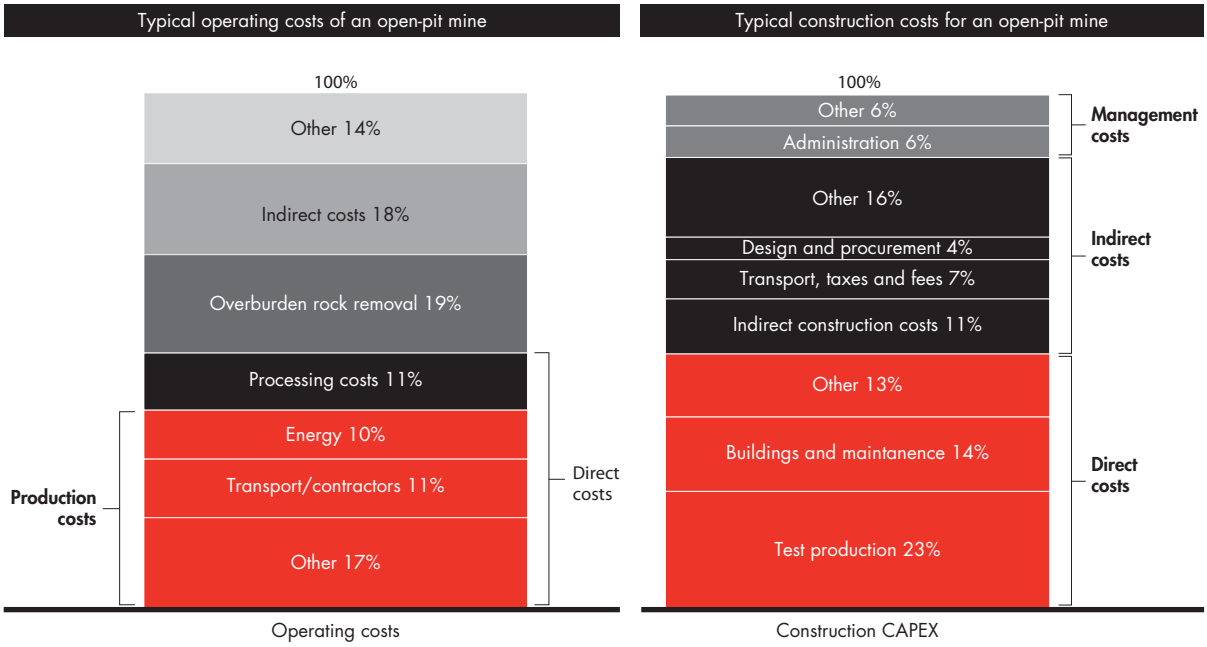
Besides the CAPEX required to start and maintain production, significant operating costs are associated with ensuring continued operations at a mine. In a typical South African open-pit mine, production accounts for the largest single cost component, or nearly 40 percent of overall operating costs (see Figure 33). Payments to staff and contractors and expenditures for energy, equipment purchase and maintenance are examples of the costs that make up the production expenses. Indirect costs, which typically make up 20 percent of total costs, include spending on administration and security to ensure undisrupted operation.

Key cost drivers of a typical open-pit operation include the depth of the pit; the amount of overburden to be removed; the geography and climate; the cost of labor, energy and electricity; and the political and economic conditions in the host country.

Mining can be more expensive in regions with harsh or remote conditions because of the extra cost of developing basic infrastructure such as roads or electricity generators. The cost of labor also varies significantly, as do tax levels and beneficiation laws that require hiring a quota of local residents.

In terms of average operating costs per carat (see Figure 34), De Beers and Rio Tinto lead the major producers

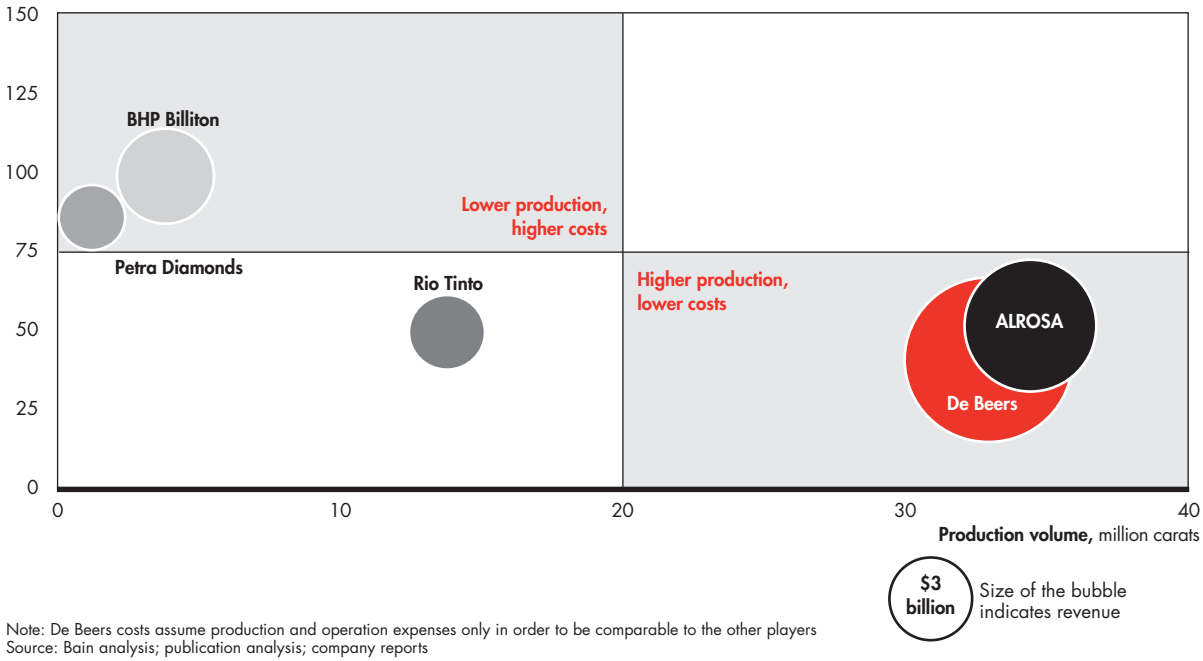
Figure 33: Production constitutes the main part of OPEX



Source: Expert interviews; Diavik Feasibility Study (2000); Metals Economics Group

Figure 34: OPEX per carat vs. production volume for five key players

Average operating costs per company vs. production volume, 2010



Note: De Beers costs assume production and operation expenses only in order to be comparable to the other players
Source: Bain analysis; publication analysis; company reports

but these numbers indicate only the operating efficiency, not the overall cost base, which is also heavily affected by taxes, government revenue-sharing agreements and beneficiation investments.

Sorting rough diamonds into categories for valuation

After extracting the rough diamonds, producers inspect, classify and prepare them for sale. The next stage is sorting. Each diamond is sorted according to four basic parameters widely known in the industry as "the 4 Cs": cut, clarity, color and carat. Each of the four parameters has myriad gradations, and by the time the diamonds reach the final stage, they have been sorted into 12,000 to 16,000 different categories. Even though the appraisers use predefined guidelines to evaluate the stones, a certain amount of subjectivity is inevitable.

The physical characteristics taken into consideration include weight, clarity, color, luminescence, proportion, finished cut and dimension. At the end of the sorting process is the control and audit stage.

Although gold and diamonds appear together often in jewelry, their valuations behave differently in the market. Unlike gold and other precious metals, diamonds are notoriously difficult to value (see Figure 35).

Consider these differences: gold is a homogeneous substance objectively valued as a commodity in the marketplace. But no equivalent market exists for diamonds because each stone is unique. As a result diamond appraisals can vary by as much as 30 percent, particularly for larger stones.

Figure 35: Diamonds are relatively complex to value

	Specific features	Gold	Diamonds
Valuation	Homogeneous quality	YES	NO
	Value is preserved when dividing or reshaping	YES	NO
	Objective and direct valuation	YES	NO
Financial characteristics	Easy transportation and convenient storage	YES	YES
	Volume sufficient for use as currency	YES	NO
	Relatively high liquidity	YES	NO
	Limited reserves	YES	YES
Other	Infeasible to economically mass produce	YES	NO
	Aesthetic value	YES	YES

Source: Bain analysis

Further complicating diamond valuation is the unique set of conditions and considerations that determine price. For example, the price of a stone does not necessarily correspond to its size. A one-carat diamond could be worth anywhere from $200 to $25,000, depending on characteristics other than size (cut, clarity and color).

Whereas the price of gold is available to anyone, no equivalent spot market for rough or polished diamonds exists; at any given time polished-diamond prices are known only to those involved in the transaction. Despite the rise of tenders, auctions and spot sales, the majority of sales still take place through private contracts. Producers do not disclose price tables for the different categories, nor do dealers, manufacturers or other players reveal their prices. As a result, it is very difficult to obtain an accurate, industry-wide pricing picture for rough and polished diamonds.

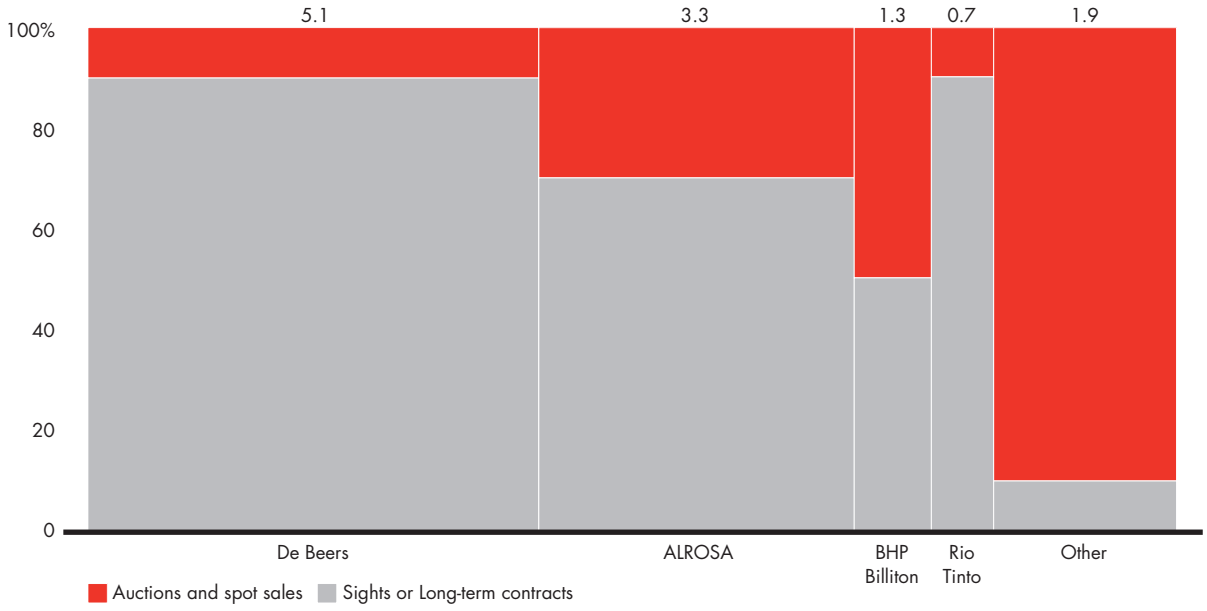
Rough-diamond sales: three ways to sell rough

Gaining access to rough stones is critical to the business of cutters and polishers, and the sale of rough diamonds occupies one of the key junctures on the value chain. There are three types of rough-diamond sales: long-term contracts, tenders and spot sales (see Figure 36).

In **long-term contracts and the sightholder system**, producers sell rough diamonds on a regular basis to the holders of long-term contracts, or sightholders. Under the system originally established by De Beers, sightholders were a small group of buyers who came to a location called a "sight" to inspect the diamonds for sale.

Figure 36: Three are several ways to market rough diamonds

Share of diamond value at wholesale, 2010



Note: Does not include all sales from artisinal and illicit production
Source: IDEX; expert interviews; company reports; Bain analysis

Later the sales themselves came to be known as "sights." As the market has opened up in recent years each major producer has developed its own version of the sightholder system.

Typically sights range in frequency from every month to every six weeks. Prices are set at regular intervals that are determined by each individual producer. The quantity and quality of diamonds sold in each box is set in advance, as is the price for the entire box. Producers try to match their customers with an assortment of diamonds that suits their needs, and the diamantaires—diamond experts who often function as dealers—are allowed to accept or reject the whole box; they cannot influence what is in the box. Some producers do, however, allow the diamantaires to negotiate for only part of a box.

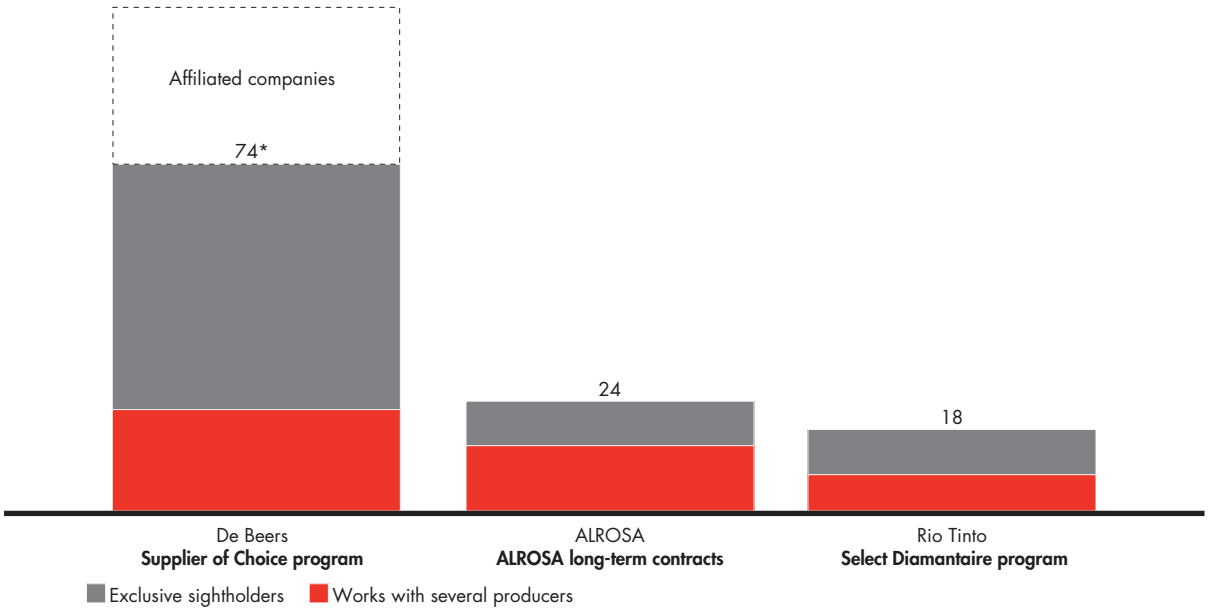
Long-term contracts offer many advantages. The original De Beers sightholder system fostered long-standing relationships rooted in trust. Much the same is true today. With long-term contracts, producers get to know the business practices, financial capabilities and reputations of potential buyers. Transparency therefore exists and is a major benefit.

Being a sightholder remains a highly advantageous position; fewer than 100 independent sightholders work with the largest producers and buy more than 70 percent of all diamonds produced in the world (see Figure 37). Of that total, only 10 to 15 sightholders can afford to buy a truly significant amount of diamonds—for example, $50 million to $100 million worth at a single sighting.

Auctions, which ten years ago were held only for large stones, now account for as much as 30 percent of overall rough-diamond sales. The stones are typically sold in boxes with a certain assortment, similar to those used at sights.

Figure 37: Fewer than 100 independent sightholders exist worldwide

Number of sightholders for each diamond producer, 2011



*Independent sightholders — total of 107 of "Supplier of Choice" sightholders include affiliated companies
Source: Company reports; Bain analysis

Auctions allow buyers to make purchases without a long-term commitment, so they can take advantage of changing market circumstances. They allow producers to maximize their profits in periods when diamonds are selling high, but they are also more vulnerable to major price drops as well. Typically auctions help identify the maximum price the market will bear at any given time.

A diamond auction may be open only to select buyers or to the public. Companies either run auctions on their own or through specialists that take a small commission. Because auctions are less expensive than operating a long-term contract system, small and midsize producers, known as "juniors," prefer them. BHP Billiton is unusual in that although it is a large producer, it sells half its rough diamonds through auctions. The majority of the smaller producers use auctions as the preferred method of selling their supply.

In **spot sales**, producers sell a range of rough diamonds based on one-time contracts.

Each type of sale has advantages. Long-term contracts guarantee supply and a measure of stability. Auctions are relatively inexpensive to administer, and under certain macroeconomic conditions allow sellers to maximize the price for their rough diamonds. Spot sales are often conducted with nonexclusive buyers and allow for price testing of particular types of stones.

The Antwerp connection

A special note must be made about the unusual role that the city of Antwerp plays in the international diamond trade. What New York City is to the global financial markets, Antwerp is to the diamond industry.

With more than 500 years of history as a center for diamond cutting, polishing and trading, Antwerp today remains the world's major global diamond hub. It is the key destination for the secondary, or open, rough-diamond market. Indeed, more than 80 percent of the world's rough-diamond volume is traded in Antwerp. Once diamonds are sorted in Antwerp, they are shipped for cutting and polishing to manufacturing facilities around the world. Many of them come back to Antwerp to be sold to jewelry manufacturers. More than 50 percent of the world's polished diamonds are traded in Antwerp through three of the four diamond exchanges. In addition to gem-quality diamonds, Antwerp is also the center of a vibrant trade in industrial diamonds. About 40 percent of the world's natural industrial diamonds pass through the city.

Within an area known as the Square Mile are four diamond bourses, five diamond banks and more than 1,850 companies that conduct diamond business and provide services to the industry, including rough-diamond producers, rough-diamond dealers, manufacturers, polished-diamond dealers, insurance brokers, security firms and shipping and logistics companies. Even the major players that are not based in Antwerp generally have representatives there.

Given the globalization of the economy and transformation of the diamond trade, Antwerp must constantly reinvent itself by offering new services and support infrastructure to ensure it stays at the heart of the business.

Rough-diamond pricing: supply and level of dealer speculation are key drivers

Unlike with precious metals such as gold, silver or platinum or base metals like zinc or copper, no globally set prices for rough diamonds exist. Their prices are nontransparent and are set by major producers via sights and determined by tenders.

Rough-diamond prices have been showing a steady growth trend of about 3 percent per year (see Figure 38).

Two factors have tended to affect rough-diamond price performance over the years: major macroeconomic trends and internal industry dynamics.

The major economic crises of the early 1980s and 2000s and the recent financial crisis have brought down prices, reflecting uncertainty about consumer demand, difficulties with access to financing for players in the middle of the value chain, and oversupply of inventories in the overall pipeline. Historically, prices have recovered relatively quickly and returned to typical growth trends after each of these macroeconomic crises, even the most recent one (see Figure 39).

During the recent financial crisis uncertainty about consumer demand for diamonds forced major diamond producers to take drastic steps to prevent an excess supply of rough diamonds from flooding the market. De Beers cut its production in half, going from a peak of 51 million carats in 2006 to 25 million carats in 2009. ALROSA was able to take a different approach by selling excess supply worth around $1 billion to Gokhran, the Russian Federation's precious metals and gemstone repository, in 2008 and 2009. The rest of the industry followed the lead by De Beers, and overall industry production volume fell to 120 million carats from a peak of more than 175 million carats in 2006.

Industry dynamics can also have a big impact on pricing and can cause volatility. One instance occurred in the mid-1980s when several large mines in Russia and Australia commenced production, which led to a sudden increase in supply and a drop in prices.

Historically De Beers used its diamond stockpiles to curtail price volatility—increasing supply in times of shortage and building stockpiles in times of weak demand. Following its change in strategic direction, however, De Beers sold off most of its inventory from 2002 to 2007 and no longer has the ability to play that role.

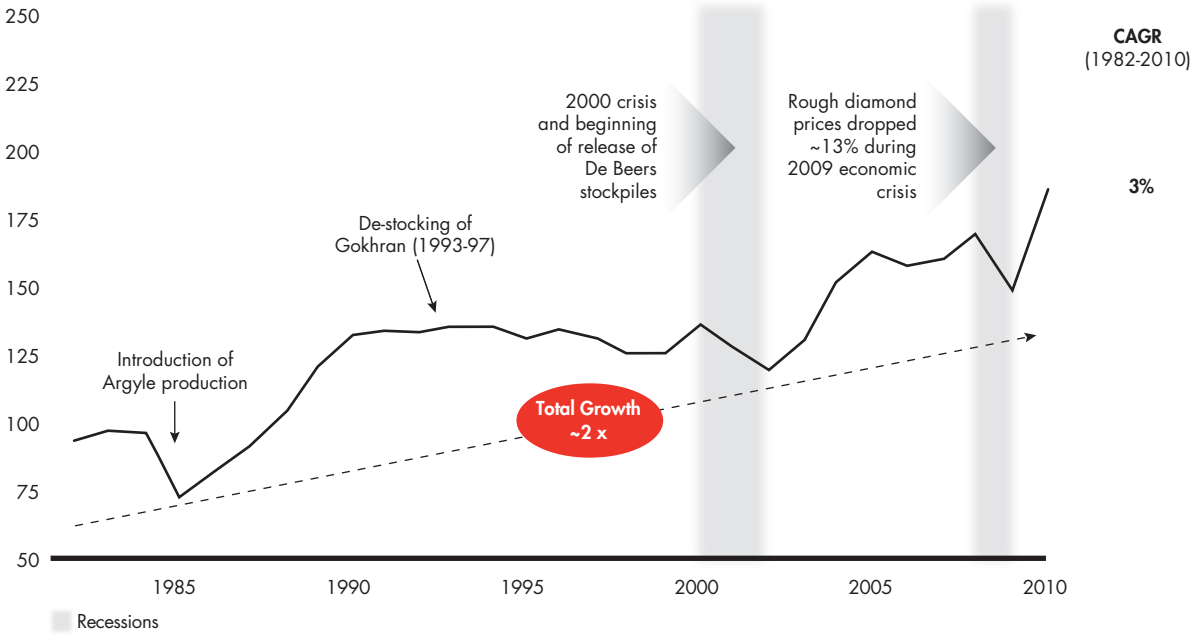
Today the Russian state agency Gokhran is the world's largest holder of diamond stock inventories. Although the agency has the opportunity to significantly influence the market, much as De Beers once did, it has publicly stated that it does not intend to sell off its inventory in the immediate future.

Cutting and polishing: the shift to Asia

In the cutting and polishing stage, skilled craftspeople called lapidaries transform rough stone into finished gems. They aim to create the largest gem possible given the physical properties of the stone. During the cutting and polishing process, most diamonds lose 50 to 60 percent of their weight because material inevitably is cut or polished away.

Figure 38: Historical rough-diamond pricing

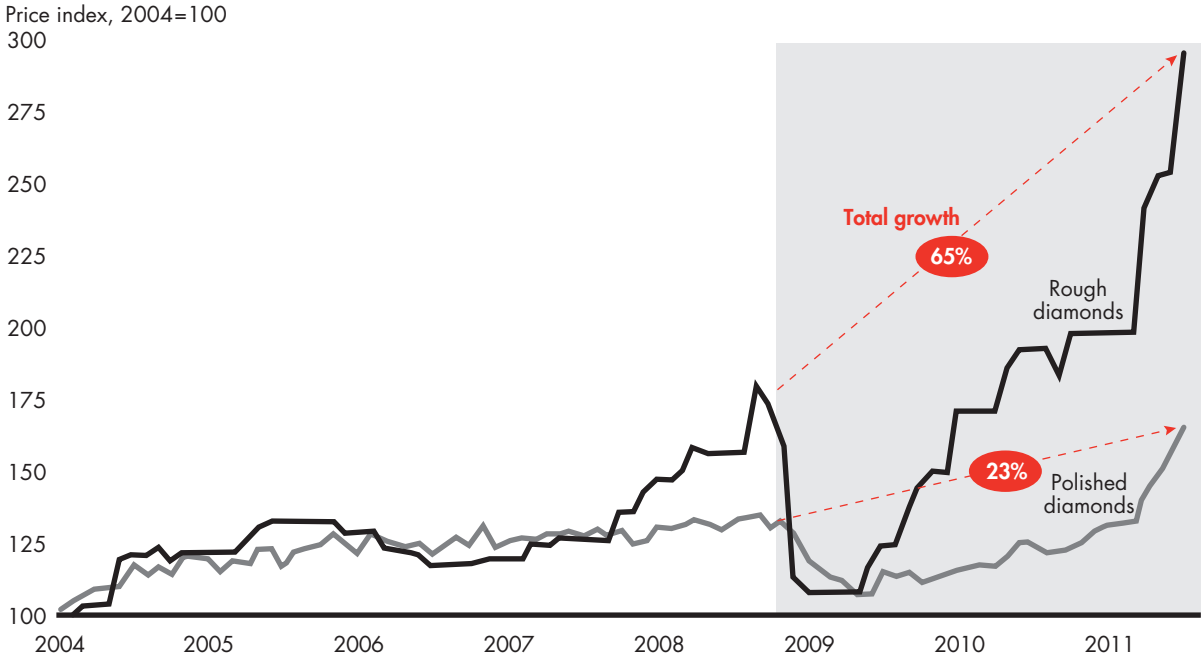
DTC Rough Price Index, 1982=100



Source: DTC Rough Price Index; Bain analysis

Figure 39: Rough-diamond prices showed a strong recovery after the economic crisis

Price index, 2004=100



Note: Growth indicated is overall growth, not compounded annual growth rate
Source: PolishedPrices.com; Diamond Prices Overall Index; PolishedPrices.com; Composite Rough Diamond Index

Lapidaries have developed a number of diamond cuts to take advantage of the various stone properties and achieve different effects. A round, or ideal, cut, has 58 facets and maximizes a diamond's brilliance. Fantasy cuts can have a variety of shapes: oval, heart, square, pear or other.

Before cutting, a lapidary will carefully study the stone to determine the optimal way to maximize its value. Diamond cutters are making increasing use of three-dimensional technologies to choose the cut. The process of cutting a stone can take anywhere from a couple of hours to several months. One famous cutter, Joseph Asscher, studied the Cullinan diamond for six months before making his first cut. After successfully cleaving the stone, he reportedly fainted from stress.

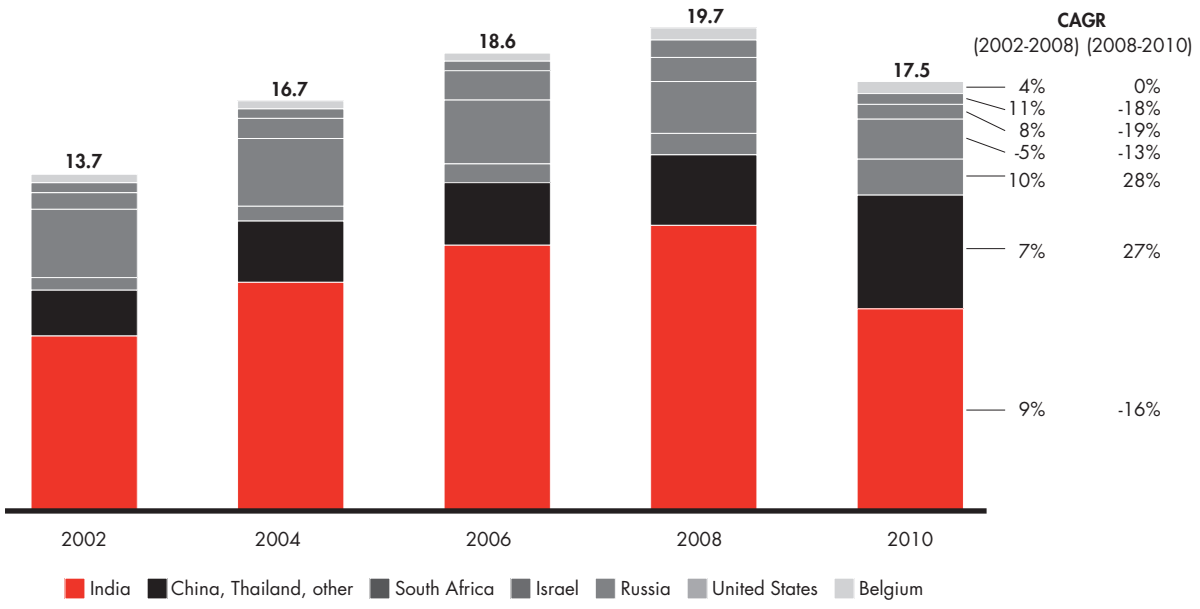
After a century of dominance in cutting and polishing, centers including Belgium, Israel, the United States and Russia are continuing to lose ground to Asia. Only several thousand cutters remain in the traditional strongholds, and they mostly work with larger stones. Among those, there are 1,000 high-end cutters remaining in Antwerp (see Figure 40).

Spurring the shift to Asia has been the availability of low-cost labor, a key advantage in low-margin parts of the value chain. After the cost of buying the raw materials, labor constitutes the largest expenditure. In the United States, it costs more than $100 per carat to cut a diamond, compared with just $10 in India (see Figure 41).

India is the world's largest diamond-cutting center. Its role emerged in the 1970s, when Indian companies began cutting very small diamonds for export. In fact the country is often credited with creating a market for smaller polished diamonds. But India's share has been growing steadily and is no longer confined to smaller stones. Factories in India employ modern technology and can capably handle larger and more complex stones as well.

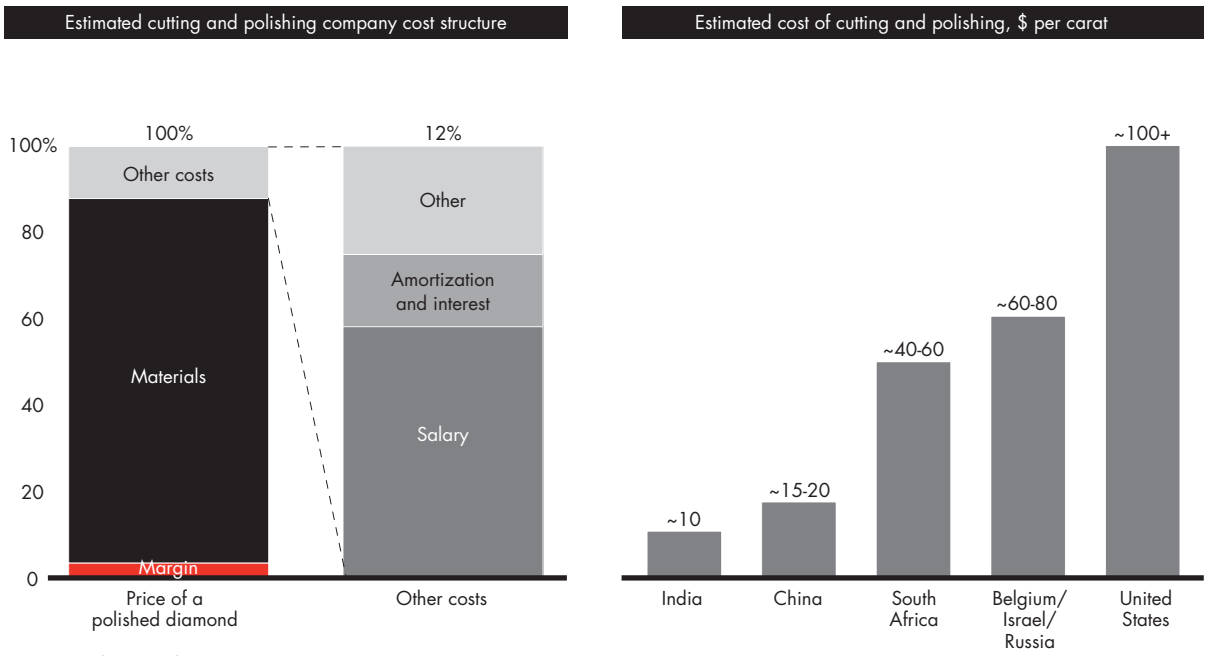
Figure 40: Asia and Africa are gaining share in cutting and polishing

Global sales of polished diamonds by cutters and polishers, $ millions



Source: IDEX; Tacy Ltd. and Chaim Even-Zohar

Figure 41: Availability of low-cost labor is one of the key advantages in the cutting and polishing industry



Source: Dogrib Diamond Report; expert interviews

Currently 700,000 to 800,000 diamond cutters work in India, bolstered in part by government subsidies. Before the recent recession, Indian craftspeople cut 14 out of 15 diamonds worldwide, mostly in the states of Maharashtra and Gujarat. About 30,000 to 50,000 cutters operate in China and Thailand, and the numbers there are rising. Guangzhou in China is now one of the world's largest global cutting centers. Sri Lanka is also making significant inroads.

As some governments have passed beneficiation laws mandating that a certain percentage of the cutting and polishing jobs be taken by local residents, the cutting and polishing industry in Africa has also grown significantly. In the past two years alone, sales of polished diamonds from African countries have grown 28 percent, even as the overall market has declined. De Beers and some of the largest DTC sightholders (examples include Suashish Diamonds and Pluczenik Diamond Company in Botswana) are supporters of beneficiation activities on the African continent.

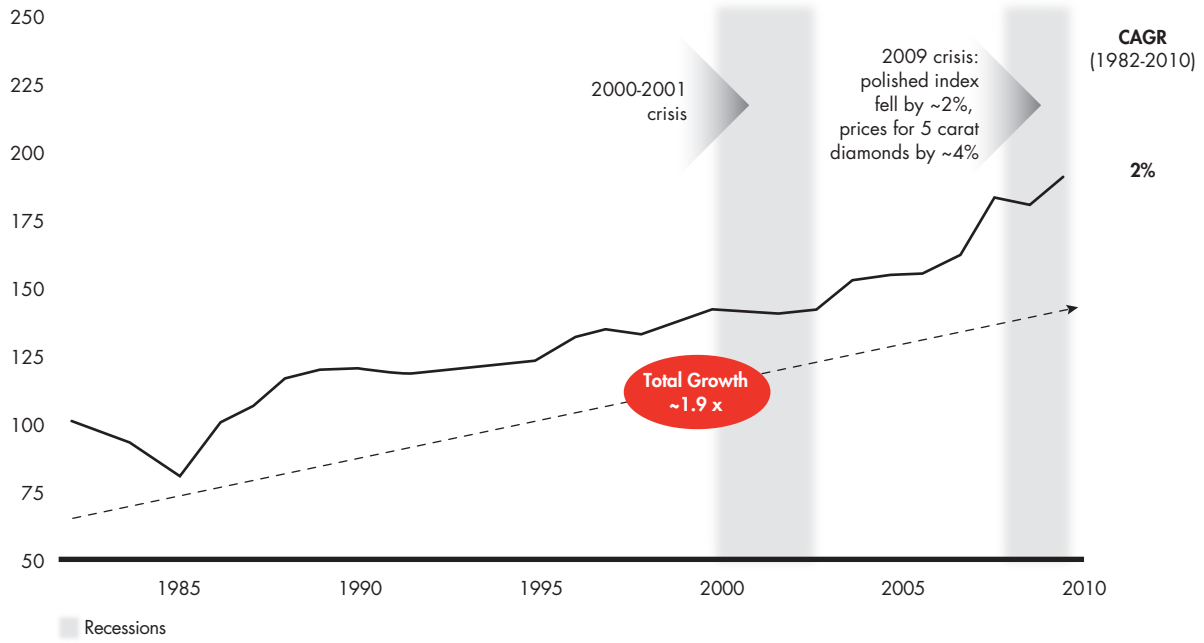
Polished-diamond pricing: consumer demand is the key driver

Compared with the ups and downs of rough-diamond prices, polished diamonds show a much smoother historical dynamic (see Figure 42).

Although changes that take place all along the diamond pipeline—whether it be jumps in the price of rough diamonds or a new discovery that increases supply—do tend to affect polished-diamond prices, some of those fluctuations are absorbed by players in the middle of the value chain, where pricing competition is intense. As a result, prices for the end product, polished diamonds, generally do not fluctuate as much as rough diamond prices.

Figure 42: Historical polished-diamond pricing

Rapaport Diamond Index, 1982 = 100



Source: Rapaport Diamond Index (Jan 2011); Bain analysis

The single most important factor affecting polished diamond pricing is consumer demand.

Historically demand has been driven by macroeconomic factors such as total private consumption and the size of the middle class in different countries. As the world economy has grown over the past century, so has the demand for polished diamonds.

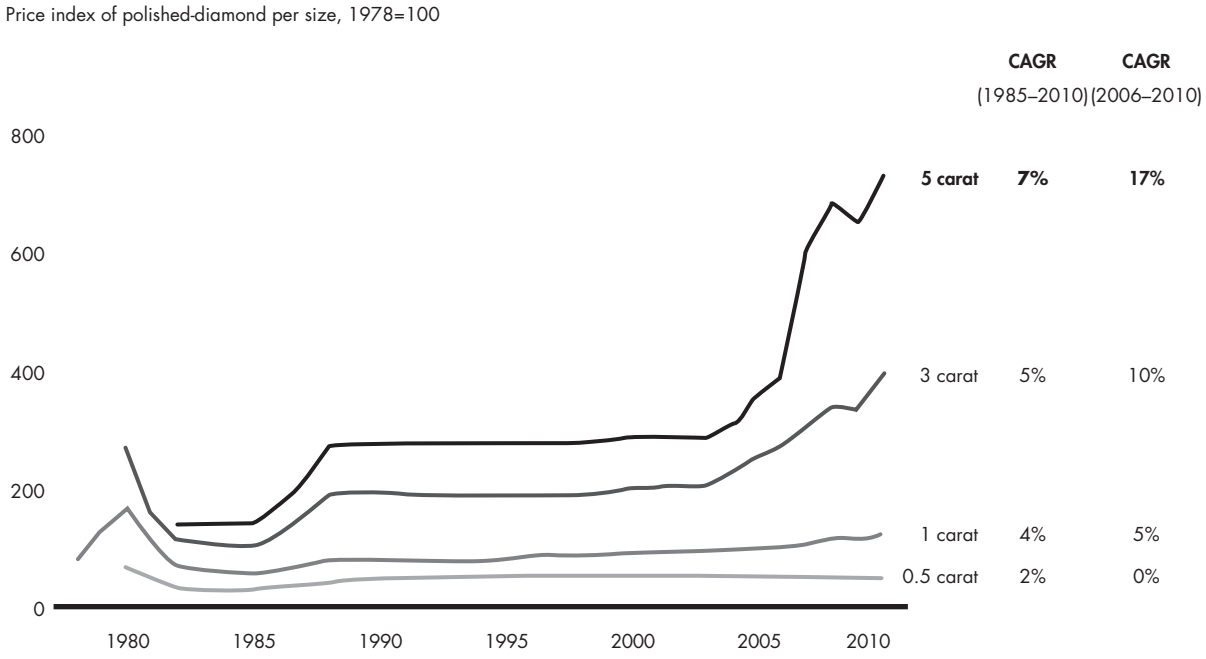
One interesting factor is the relationship between diamond quality and price evolution. Large stones are much rarer than smaller stones, and during periods of price growth they tend to increase in value much faster than small ones (see Figure 43). Therefore the supply and demand imbalance for stones larger than one carat has caused their prices to increase faster than those for smaller diamonds.

Inventories play a less significant role in regulating the prices of polished diamonds than the prices of rough diamonds. One reason is that the industry has become so fragmented that any given company does not hold sufficient stockpiles to affect global prices. Second, cutters and manufacturers want to turn over their inventories as quickly as possible in order to free up cash for the business.

Polished-diamond sales

Once diamonds are cut and polished, how do they get into the hands of jewelry manufacturers? For centuries Antwerp was the undisputed center of polished-diamond sales. While that city remains the leading destination for the diamond trade, the market has dispersed. More than half of sales today take place in the central and regional offices of diamond cutters and polishers (see Figure 44). Buyers can also go to India, Hong Kong, New York and other places. In some cases, sellers will even travel to meet the buyers.

Figure 43: Evolution of polished-diamond price depends on size of the stone



Source: Rapaport Diamond Price Statistics 2010

Figure 44: Sales of polished diamonds occur at large exhibitions or under direct contracts

Source: Sightholder interviews

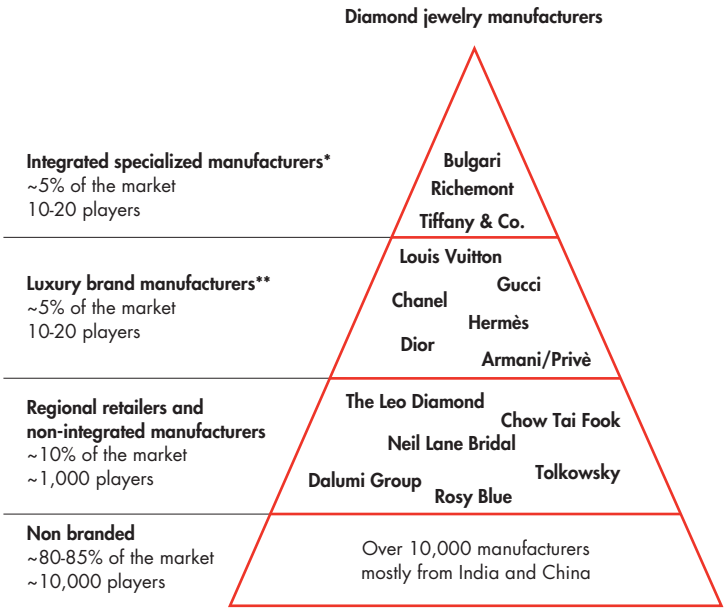
Some 30 to 40 percent of polished-diamond sales take place at industry exhibitions. Hong Kong holds the largest gathering, followed by Las Vegas. Many who attend those events also buy directly from cutters and polishers. The exhibition in Basel, Switzerland, is much smaller and draws mostly watch manufacturers.

Jewelry manufacturing and retail: a fragmented landscape

Jewelry manufacturing is characterized by extreme fragmentation, with more than 10,000 manufacturers around the world (see Figure 45). Roughly 80 percent are based in India and China because of the relatively low cost of labor in those countries. From 2000 to 2010, India and China's share in jewelry manufacturing grew from 27 percent to 55 percent (see Figure 46). For the most part, Asian manufacturers do not brand their businesses, and the work they do is at the low end of the market. At the top end of the manufacturing market, Tiffany is a large player, and other luxury brands such as Richemont and Bulgari also have a sizable share. Chow Tai Fook and Rosy Blue are notable in the regional manufacturing markets.

As with other jewelry manufacturing, diamond jewelry falls into two major categories: branded (or luxury) and unbranded. Because they can command higher prices, larger players with strong brands operate in the branded luxury segment. A diamond engagement ring by Cartier may enjoy up to a 40 percent premium over an unbranded ring with a stone of identical size and quality. Another key element of jewelry manufacturing is design. Jewelry that is well designed and distinctive will help set a manufacturer apart from the crowd.

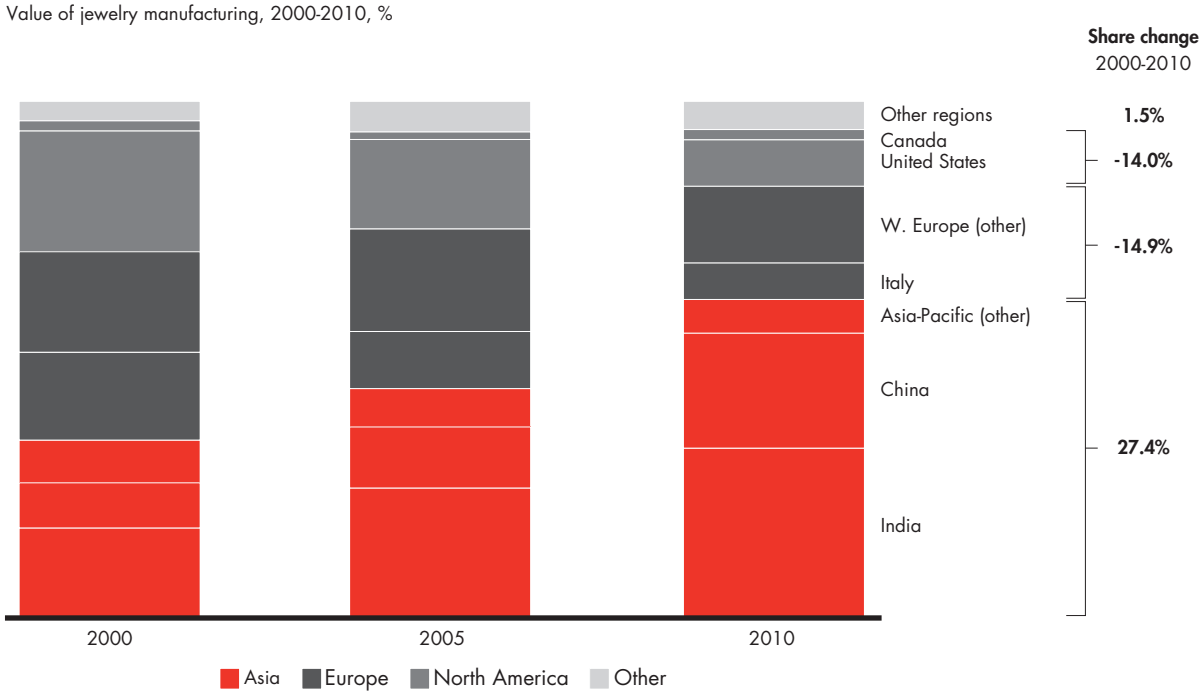
Figure 45: Jewelry manufacturing is highly fragmented



*Specialized global jewelry manufacturers with annual sales above €100 million integrated into retail
**Branded manufacturers of luxury goods with jewelry not being core commodity group
Source: BerenbergBank; company reports; Bain analysis

Figure 46: During the past decade India and China became the largest jewelry manufacturers

Value of jewelry manufacturing, 2000-2010, %



Volume of jewelry manufacturing, $ billions											
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
India	7.2	7.4	7.9	9.5	11.8	13.8	16.3	20.8	22.3	22.9	28.0
China (incl. HK)	3.6	3.7	3.8	3.9	5.0	6.7	8.3	11.8	16.1	17.4	19.4
Asia-Pacific (other)	3.3	3.1	3.2	3.5	3.9	4.2	4.3	4.8	5.3	5.2	5.8
Italy	7.2	5.8	6.4	6.1	6.2	6.3	6.5	7.4	7.3	6.3	6.0
Western Europe	8.1	8.1	8.1	8.8	10.3	10.9	12.1	15.3	16.4	13.1	12.9
United States	9.6	8.5	8.9	9.0	9.3	9.7	9.5	9.8	9.5	8.5	7.8
Canada	.79	.76	.75	.82	.86	1.0	1.1	1.3	1.5	1.3	1.7
Others	1.8	1.9	2.1	2.4	2.7	3.4	3.8	4.9	6.2	4.7	5.0

Source: Euromonitor; Bain analysis

The United States remains the largest market for diamond jewelry sales, but most new growth worldwide comes from China, India and the Persian Gulf states (see Figure 47).

Industry experts see huge potential demand among the emerging middle classes in India and China. Some experts believe that Asian markets hold the key to future growth in the global jewelry manufacturing business.

Retail sales is the next stage of the value chain, in which more than a quarter-million retailers sell jewelry to consumers around the world. The fragmentation that exists in the retail segment in the United States is indicative of that segment elsewhere, as numerous players fight for market share, putting upward pressure on prices by competing for polished stones (see Figure 48).

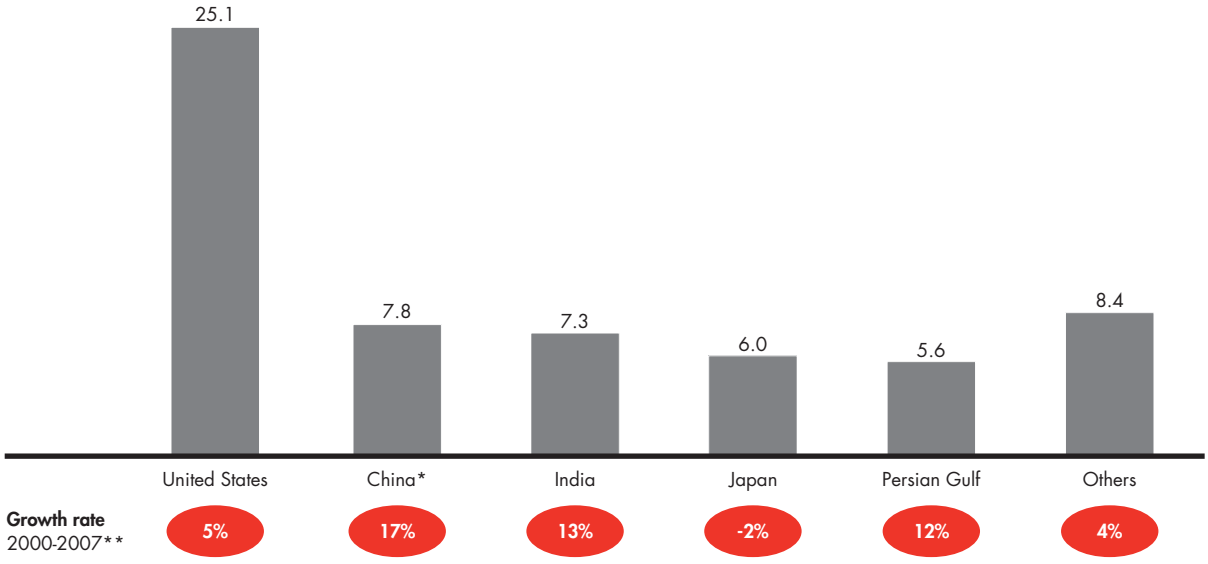
Along with the Internet has come change in the retail landscape (see Figure 49). Global retail chains have grown, especially in Asia. Local chains continue to have strong positions in China, but independent retail stores' share of global sales is nevertheless declining. For example, the number of independent jewelry stores declined on average 1.6 percent per year between 2000 and 2010, and this trend likely will continue over the medium term.

Retailers enjoy some of the highest markups in the industry due to their ability to leverage two key factors: the powerful association of diamonds with love and romance in the eye of the consumer, and the relative obscurity of diamond pricing. In recent years, however, the profitability of retail players has come under pressure as a consequence of the economic downturn and the emergence of online players such as Blue Nile.

So far the share of online sales is relatively small, but the Internet has brought significant disruption to the industry by introducing greater price transparency. Consumers today typically arm themselves with much more information before they visit a traditional retailer to negotiate a price on an engagement ring, for instance.

Figure 47: The United States dominates consumption of diamond jewelry, but Asia has been growing fast

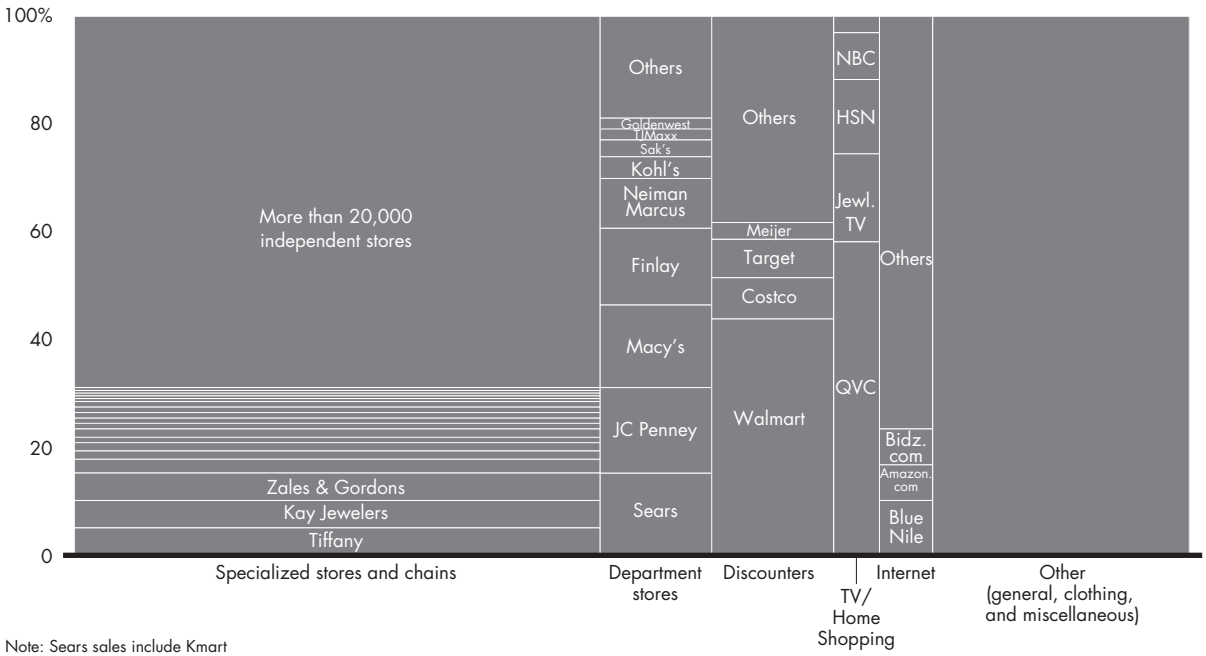
Demand for diamond jewelry in major markets, 2010, $ billions



*China includes Hong Kong; **Polished-diamond market growth rates are shown for China, India and Persian Gulf; "Others" include Europe and the remaining geographies. Others' growth rates were estimated by Bain. Growth rates in 2002–2007 show long-term trends and exlcude the impact of the economic crisis
Source: IDEX; Tacy Ltd. and Chaim Even-Zohar; Bain analysis

Figure 48: The U.S. jewelry retail market is highly fragmented

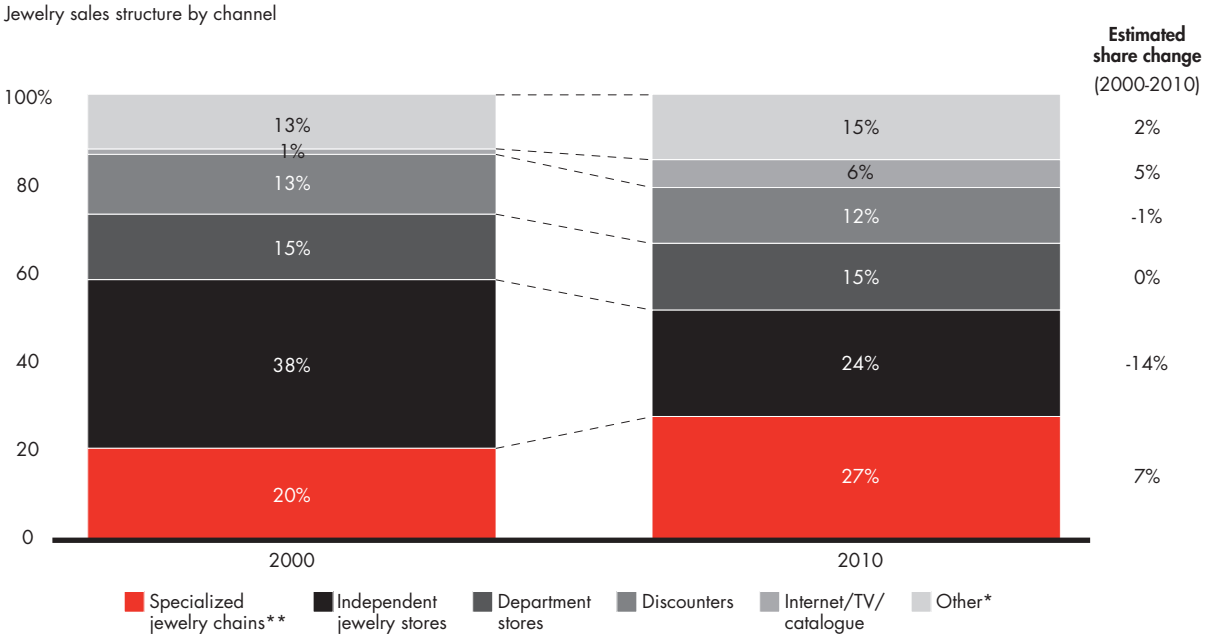
Jewelry retail market structure in the United States, 2008



Note: Sears sales include Kmart
Source: Company reports; Bureau of Economic Analysis (USA); publication analysis; Bain analysis

Figure 49: Independent jewelry retailers are losing share to specialized chains and Internet outlets

Jewelry sales structure by channel



*"Others" include unorganized trade and other store categories (clothes stores, electronics stores, etc.); **Specialized jewelry chains include single-brand and multi-brand chains
Note: Estimates based on analysis of trends in the United States, Japan, Europe and China
Source: Euromonitor; expert interviews; Bain analysis

The result has been some consolidation among smaller players and also the expansion of some larger retail chains into high-growth developing markets in order to diversify their exposure.

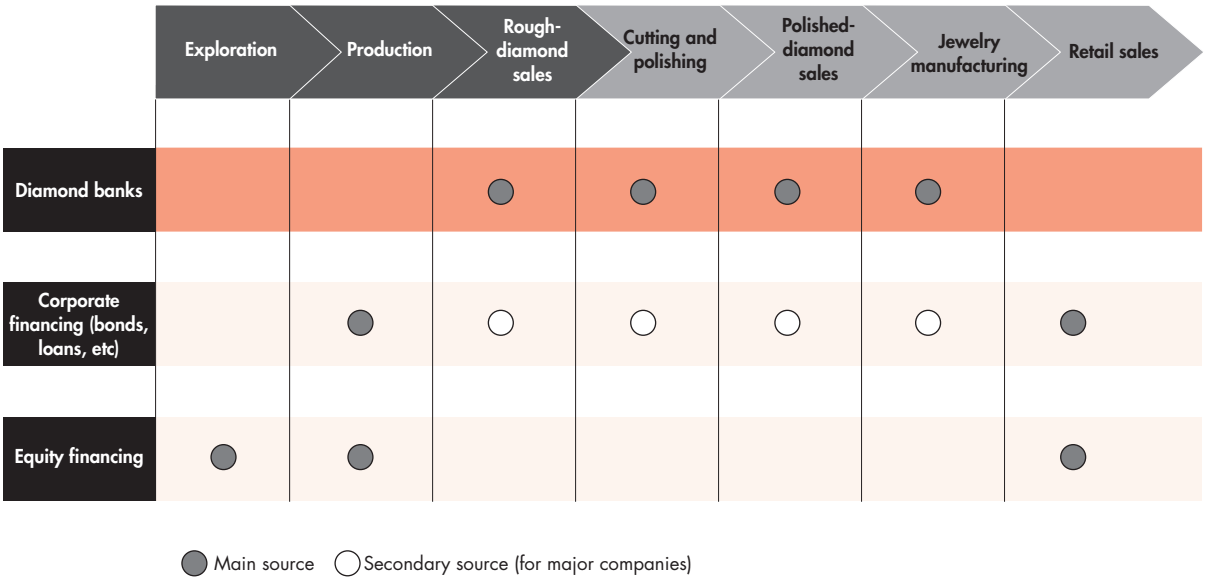
Diamond industry financing

Diamond production and manufacturing are capital-intensive segments of the value chain that require significant funding, particularly for the smaller players. At either end of the chain—producing and retailing—players can generally gain access to financing without difficulty. They can obtain loans, issue equity or even tap government sources (see Figure 50).

Players in the middle of the chain, however, have a much harder time. Access to working capital is essential to keeping their businesses going, but these small enterprises typically have no assets to use as collateral, so traditional finance approaches will not work. This is where the "diamond banks" step in.

Diamond banks provide two main types of working capital financing: accounts receivable and loans. Two banks stand out in this arena: ABN AMRO, a Dutch bank that focuses on large companies, and the Belgian bank ADB (Antwerp Diamond Bank), which specializes in midsize companies. Each controls a significant share of the market. Other players include the nearly 60 Indian banks that serve the growing market in that country. The Indian government gives these banks preferential interest rates and subsidies in order to promote the diamond industry (see Figure 51).

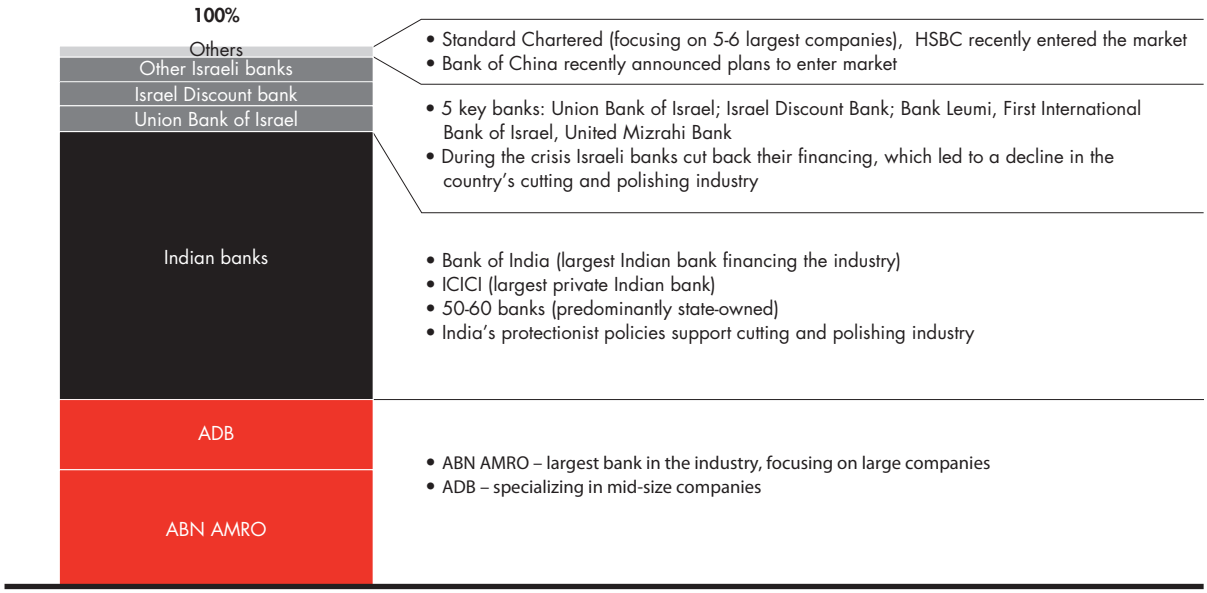
Figure 50: Industry players use various sources of financing



Source: Expert interviews

Figure 51: Because of industry complexity, few banks provide financing

Estimated share of diamond banks, 2009



Note: "Others" includes diamond-financing activity of large banks
Source: Diamonds.net: "Credit Oxygen to the Industry"; expert interviews

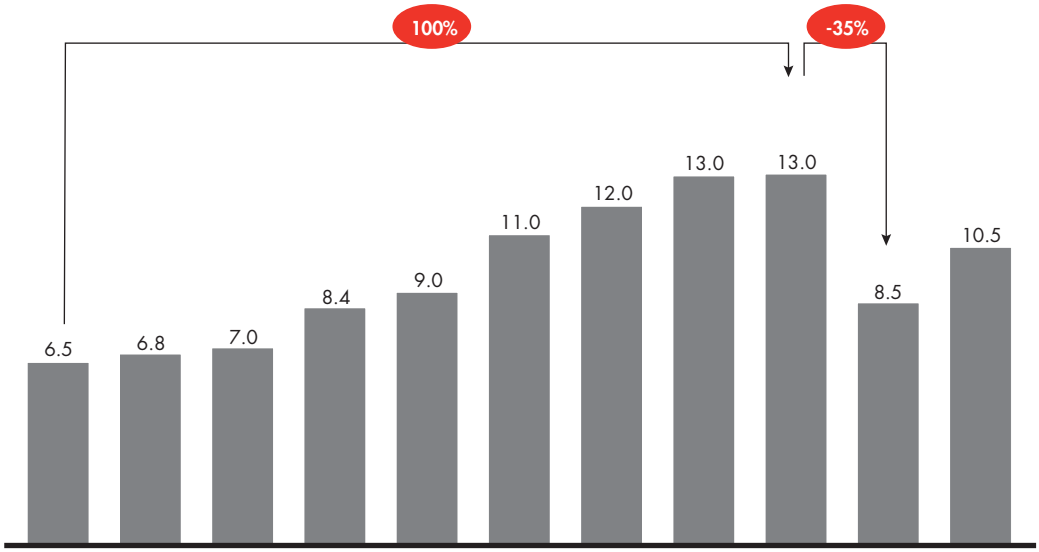
When credit availability came under intense pressure during the recent economic crisis, some observers questioned whether the diamond industry would become too highly leveraged. During the crisis, the leverage ratio did rise sharply. Much of the debt burden was carried by players in the middle of the chain, including the small-scale cutters and polishers that are required to pay cash for rough diamonds, sometimes even before they take delivery. These cutters and polishers in turn provide credit lines to jewelry manufacturers and retailers, which often do not pay it back until the diamonds are sold. During the economic crisis, many of these cutters and polishers found themselves squeezed from both sides and unable to pay off their debt.

As a result of the squeeze, many of the players in the middle trimmed their inventory and tightened their credit requirements. In some cases private families, especially in India, injected their own capital into their businesses.

Overall the crisis had a beneficial impact in that the industry became more prudent in its use of financing. The leverage ratios have returned to pre-crisis levels, and a consensus has emerged that debt levels in the industry have returned to historical levels (see Figure 52). Demand for jewelry continues to rebound, prompting many observers to conclude that the industry has weathered the crisis well.

Figure 52: During the crisis, the overall debt level in the diamond industry decreased

Global diamond industry debt levels, $ billions



Source: AllanHochreiter, Botswana Resource Conference, 2011; IDEX; Tacy Ltd. and Chaim Even-Zohar; expert interviews

Key takeaways

- The diamond industry value chain consists of eight stages, with the highest revenues realized at either end of the value chain—at the beginning in diamond mining and production, and at the end in retail. These segments also show the highest profitability, with diamond producers leading the charge with healthy 22 to 26 percent operating margins.

- The field exploration cycle is a lengthy and risky process. If exploration is successful, it may take up to 13 years to begin commercial production. Only about 1 percent of the kimberlite pipes discovered to date have proven to be economically viable.

- Rough-diamond production is highly concentrated among a handful of players operating in relatively few places around the world—in Africa, Russia, Australia and Canada.

- Extracted rough diamonds are evaluated on "the 4 Cs" criteria and are predominantly sold through sights, or long-term contracts. However, auctions and spot sales are slowly gaining ground as sales channels.

- Two segments in the middle of the value chain are cutters and polishers, then jewelry manufacturers. These segments are highly fragmented and often privately owned. Low profit margins characterize these segments.

- Access to the rough-diamond supply is one of the key competitive advantages in the industry.

- Small players in the middle of the value chain in particular have trouble accessing financing owing to a lack of available collateral, which is why traditional financing approaches do not work. This gap is filled by specialized "diamond banks."

Chapter 4: Demand for diamonds in the global economy

Key sources of diamond demand: jewelry and industrial applications

Two main constituencies drive the demand for diamonds in the global marketplace: the fine jewelry/watch market and the industrial goods market. An additional potential source exists in the investment community, but to date demand for diamonds as an investment vehicle has been small.

Gem-quality-diamond demand: a tight link to luxury goods and jewelry markets

Although natural diamonds are mined much like other commodities such as gold, copper or tin, they are actually not a commodity but a luxury good. People buy natural diamonds for their aesthetic, symbolic and status value, for emotional and subjective reasons.

In the context of luxury goods diamonds fit into a broader product pool that includes other jewelry and watches, high-end apparel, fragrances and cosmetics, and accessories such as leather bags, shoes and designer eyewear. Consumers worldwide spend about $227 billion per year on luxury goods.

Generally these goods sell as premium-priced products through a variety of retail channels. Most are associated with high-end branded stores and labels that cultivate a sense of exclusivity. Luxury goods compete for consumer discretionary spending with non-luxury items such as cars, clothing, travel and electronic devices.

Fine jewelry, which contains precious metals and either precious or semiprecious gemstones, is estimated to be worth about $160 billion in annual retail sales, or $80 billion wholesale. Sales in the top 16 markets account for more than 80 percent of global jewelry sales.

Market dynamics of luxury goods

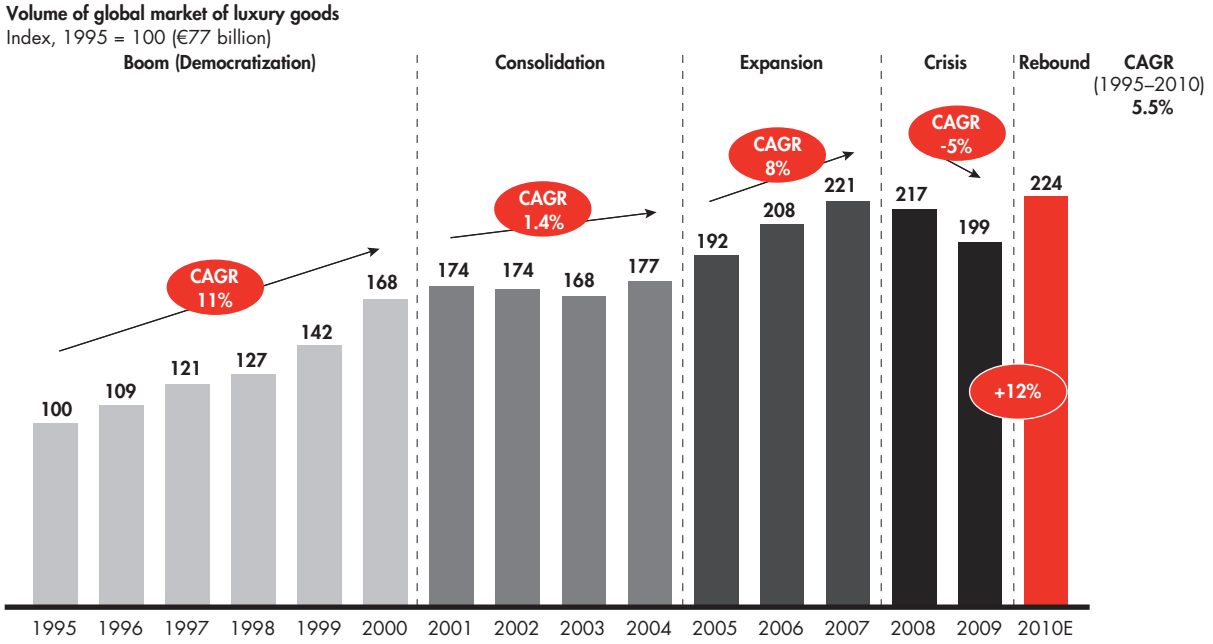
Demand for diamond gemstones, like the broader market for luxury goods, tracks overall economic performance. Over the past decade sales of luxury goods have passed through five stages (see Figure 53):

Boom or democratization. From 1995 through 2000, the industry experienced a period of strong growth at approximately 11 percent per annum. An emerging international trend helped boost demand: the democratization of luxury brands, in which high-end items became prized not just by the wealthy but also by middle-class customers. The result was robust global growth in the luxury goods market.

Consolidation. From 2001 through 2004, sales in the luxury goods market remained fairly constant.

Expansion. From 2005 through 2007, strong GDP growth around the world, especially in Asia, fueled demand for global luxury goods.

Figure 53: Luxury goods worldwide have enjoyed long-term growth and recently recovered to near pre-crisis levels



Note: 2010 estimated based on available data
Source: Bain "Luxury Goods Worldwide Market Study"

Crisis. After the economic crisis of 2008, consumer austerity caused a decline in luxury goods sales that was much steeper than the drop in the overall economy.

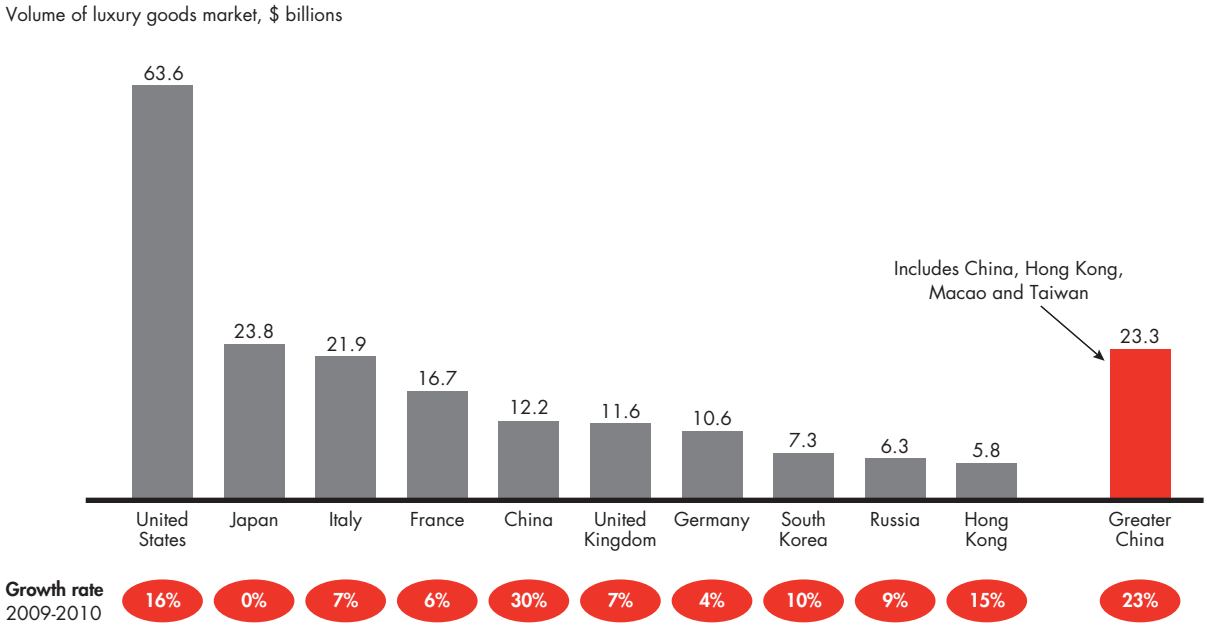
Recovery. Post-crisis in 2010, the luxury market is rebounding at a robust rate (approximately 12 percent).

In the global luxury goods market the United States is the undisputed leader and will likely remain so for the foreseeable future—a fact that tends to be overlooked in light of the remarkable growth of luxury goods in Asia in recent years (see Figure 54). In 2010 US consumers accounted for more than one-quarter of global luxury goods sales.

Europe and North America together claim about a 70 percent share of the luxury market, down slightly in recent years. Japan ranks second but is losing share, down from 15 percent in 2002 to 11 percent in 2010. In addition some observers predict that the Japanese market for luxury goods will be adversely affected by the recent tsunami and Fukushima nuclear plant disaster.

In recent years the most striking phenomenon relating to the demand for luxury goods has been the growth in Asia, particularly throughout what is known as "greater China" – which includes China itself, Hong Kong, Macao and Taiwan. Sales of luxury goods in this region have been growing fast, now account for 10% of the market. In the near future it could overtake Japan in luxury goods consumption.

Figure 54: The United States is the leading luxury goods market



Note: Original 2010 data in Euros converted to USD using average yearly exchange rate of 1.32; growth rate shown for market sizes in Euros
Source: Bain "Luxury Goods Worldwide Market Study"

Jewelry market dynamics

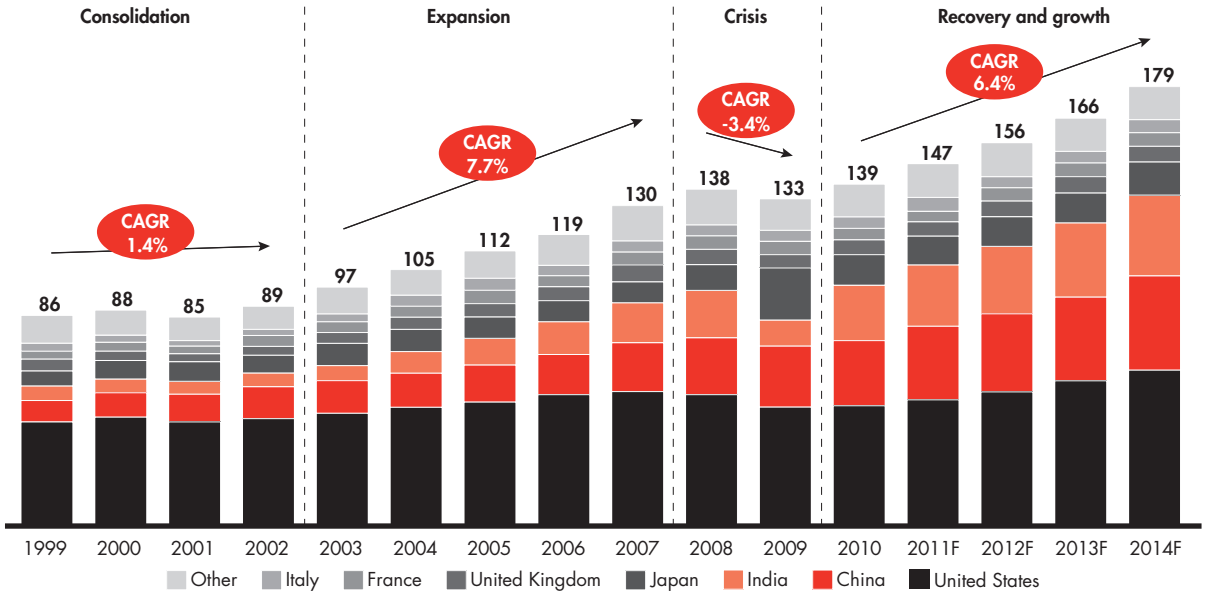
Looking at the overall jewelry segment, worldwide consumption in the fine jewelry sector followed a trajectory similar to that seen in the luxury goods market overall, beginning with expansion from 2002 through 2008 based on strong economic growth, especially in India and China, two nations whose share in the overall market increased significantly. Then came the economic crisis and a sharp setback (see Figure 55).

But the crisis influenced individual markets in different ways. In India and China, the decline was not significant. From 2007 through 2009, these two markets increased their share of the global market from 28 percent to 35 percent. In the United States, however, the economic downturn had a far more dramatic effect, and sales of jewelry, by value, were severely impacted. The jewelry sector suffered significant drops in store traffic, average sales, net sales and operating profits. At the same time, costume jewelry emerged as a viable alternative to fine jewelry and captured share.

Another question often raised in the media is whether other luxury or high-end goods, such as Prada handbags or iPads, are replacing jewelry as gifts of choice, especially among the new generation of consumers. U.S. data indicate that both the desire for jewelry and the level of actual purchases have remained relatively stable over the past few years (see Figure 56). No firm evidence attests that other luxury goods or electronics are being substituted for diamond jewelry.

Figure 55: The jewelry market, driven by China and India, is predicted to grow by 6% annually through 2014

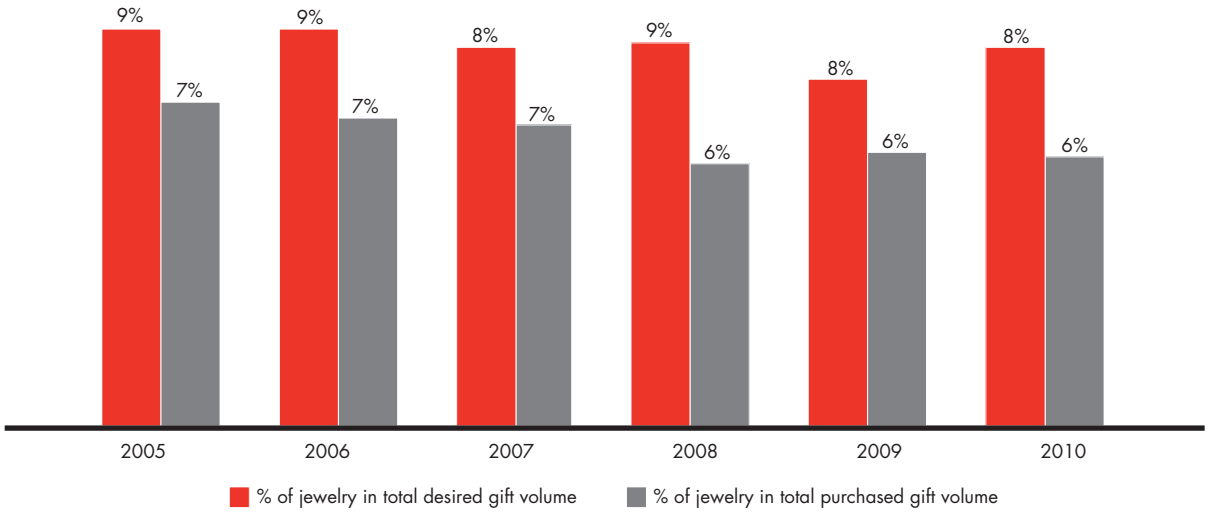
Demand for jewelry items of the largest markets*, $ billions (nominal price)



*Includes 16 largest jewelry markets; "Other" composed of Germany, Brazil, Netherlands, Spain, Mexico, Australia, Belgium, Sweden & South Africa
Note: Jewelry market includes costume jewelry
Source: Euromonitor; Bain analysis

Figure 56: Jewelry's share of holiday gift categories remains relatively stable

Percentage of jewelry in the total volume of desired and purchased Christmas presents, United States



Source: NRF Holiday Survey

Diamond jewelry and gem-quality-diamond dynamics

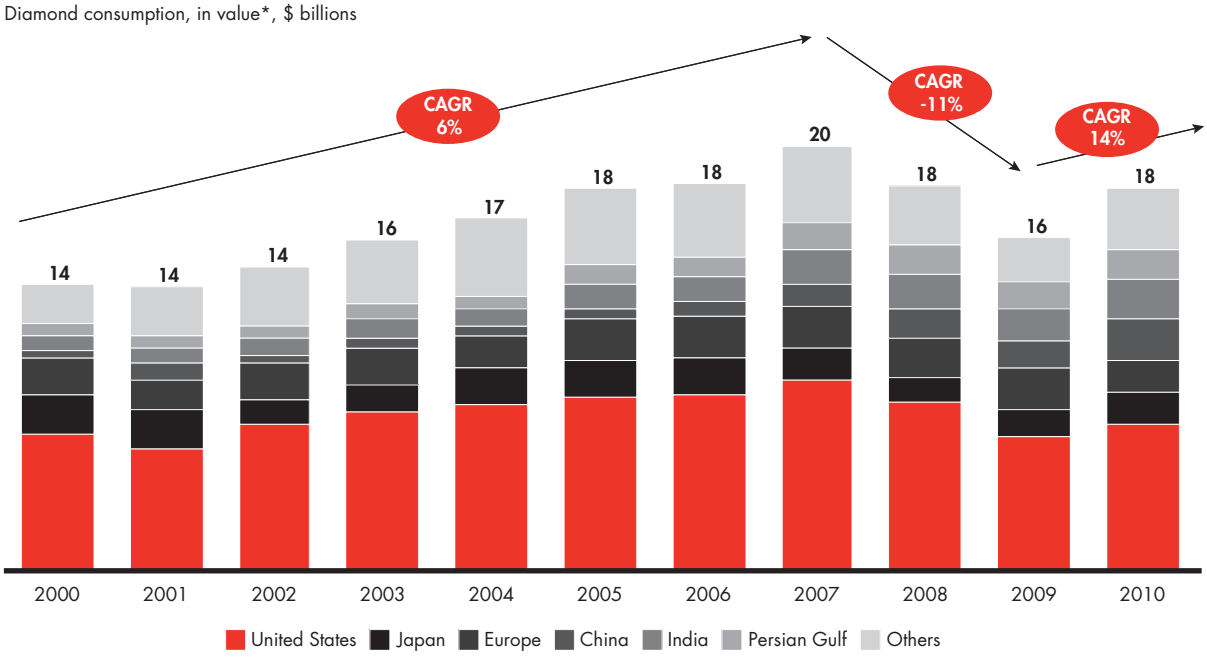
Turning to demand for gem-quality diamonds, the data indicate that although diamond sales overall were hit hard by the economic crisis, the market returned to near pre-crisis levels with remarkable speed (see Figure 57). At present, the outlook is positive, with robust 6 percent growth anticipated each year through 2014. China and India will likely continue to serve as big engines of demand.

In the global jewelry market structure the key categories are gold jewelry, diamond jewelry and jewelry made with other precious and semiprecious stones and metals. Gold jewelry constitutes the largest category in value terms. However, surges in the price of gold, rather than growth in sales volume, account for the gold jewelry share of the market.

Diamonds rank second in terms of value. The retail value of diamond jewelry today amounts to about $60 billion. Diamond demand continues to be boosted by sales of engagement rings in the United States, Western Europe and Japan. As Chinese and Indian consumers continue to adopt certain Western traditions diamond sales are growing in those regions as well.

Patterns of jewelry and diamond consumption vary widely from country to country due to historical and cultural differences (see Figure 58).

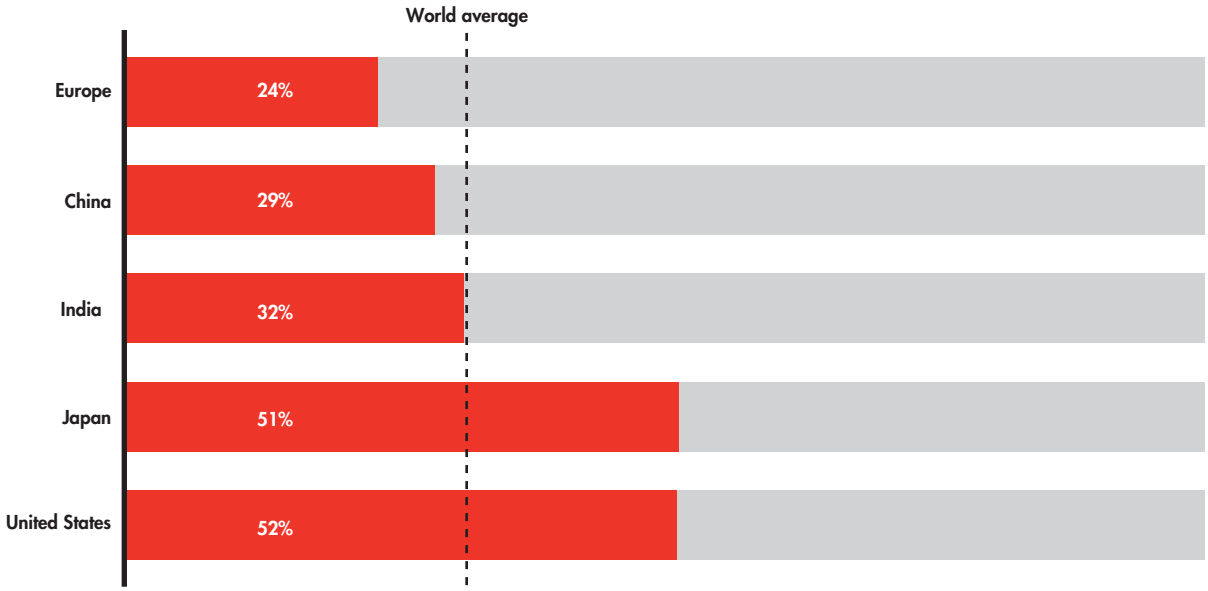
Figure 57: Developing markets are growing their share of overall consumption of gem-quality diamonds



*Wholesale value of polished diamonds used in diamond jewelry; Includes sale of stocks; wholesale value of diamonds; China includes Hong Kong
Source: IDEX; Tacy Ltd. and Chaim Even-Zohar; Bain analysis

Figure 58: Diamond content in jewelry depends on regional cultural specifics

Share of diamond jewelry in the structure of jewelry market by country, %, 2010



Note: China includes Hong Kong; jewelry market includes costume jewelry
Source: IDEX; Tacy Ltd. and Chaim Even-Zohar; Euromonitor; Bain analysis

Industrial-diamond demand: cutting faster, lasting longer

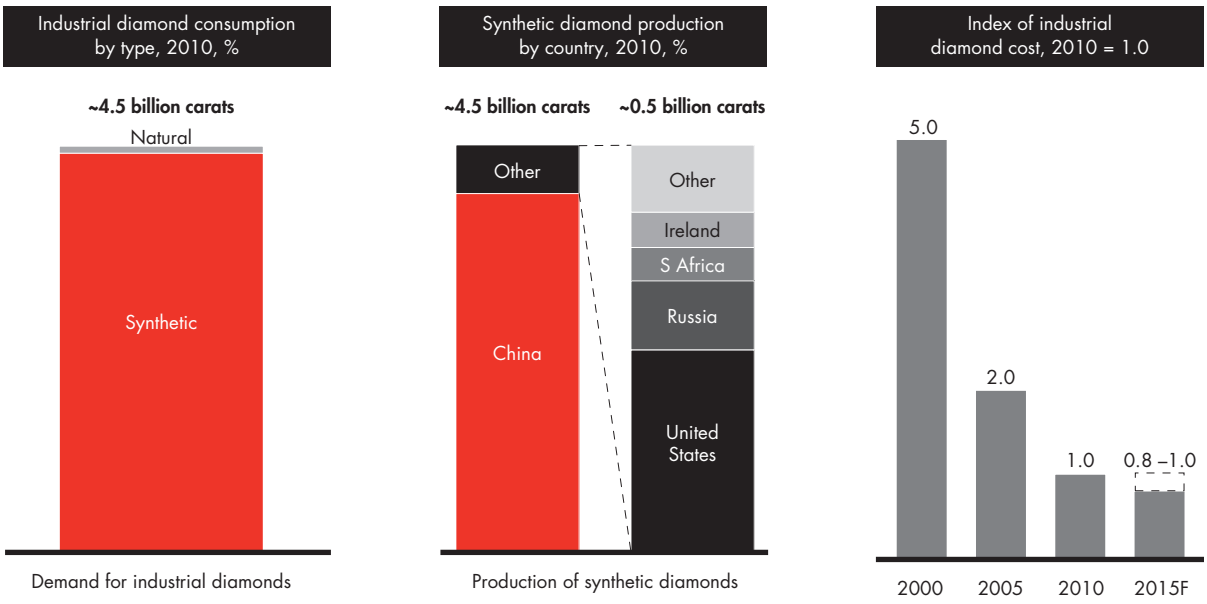
The second source of demand for diamonds comes from the industrial sector, where diamonds have numerous uses. In many industries they serve as an abrasive in cutting, drilling, grinding and polishing. They also play an important role in the production of construction and mining equipment, in auto manufacturing and in the aerospace industry. Even though they have a higher unit cost than other abrasives diamonds are more cost-effective overall because they cut faster and last longer than the alternatives.

Demand for industrial diamonds is huge and vastly outpaces demand in the jewelry sector. Within the overall industrial diamond market, less than 5 percent are natural; the rest are synthetically made (see Figure 59). But those natural industrial diamonds account for about half of all mined diamonds, and they are mostly the smallest and lowest-value stones among natural diamonds. The larger natural stones end up in the jewelry market because larger stones have a much higher per carat price.

In industrial uses synthetic stones function just as well as natural ones and even have some advantages. They can be manufactured according to highly specific needs and applications, for example, and they can be produced inexpensively in large quantities.

Although total demand for synthetic diamonds is extremely large, their value is much smaller than that of mined diamonds, and the price of manufacturing synthetic diamonds has recently dropped because of improvements in technology. Barring a technological breakthrough, however, no major price declines are expected in the near future.

Figure 59: Virtually all industrial diamonds are synthetic, produced mainly in China



Source: U.S. Geological Survey; Merchant Research and Consulting "Ind. Diamond Market Review"; expert interviews; Bain analysis

Diamonds as investment: no meaningful success to date

The third source of demand for diamonds comes from investors. Yet even though diamonds may seem like an attractive investment, much like gold or silver, the difficulties with valuation, the absence of a spot market and the lack of liquidity make them largely unsuitable as a financial investment at this time.

Nevertheless some groups and individuals keep trying to create diamond investment instruments (see Figure 60). Diamond Circle Capital, for example, launched a closed-end diamond fund on the London Stock Exchange in 2007, with a portfolio of high-quality cut diamonds worth more than $1 million per stone. The fund promised investors long-term deposit growth. Diamond Circle hoped to attract $400 million but raised only $74 million. The portfolio has produced negative returns each year since the launch, and its long-term outcome remains uncertain.

Other recent entrants include the KPR Capital Diamond Fund and the Diamond Asset Advisors. So far none has succeeded in a meaningful way. Going forward there is no reason to anticipate that investment demand will become a significant part of the diamond demand pool in the near future.

Figure 60: Several players operate in the investment market for diamonds

Player	Year	Business model	Target	Results
KPR Capital Diamond Fund	2009	Direct purchase of large high-quality diamonds (5 to 10 carats)	Investment tool not correlating with conventional tools and inflation hedging	Preliminary launch date was postponed because of **low investor interest**. Operation results are not evident yet
Diamond Circle Capital	2007	Portfolio of high-quality polished diamonds worth over $1million per stone	Long-term deposit growth for investors	**Negative indicators** each year since the launch
Diamond Asset Advisors	2011	Handling customers wanting to invest in polished diamonds. Relations with players such as Harry Winston	Advise customer on several topics related to polished-diamond investment (market review, financing)	Harry Winston announced intention to work with the company on launch of the new fund
DODAQ	2009	Exchange for polished-diamond trade. Stones are stored in special repository along with all certification documents	For repository services DODAQ charges up to 1.5% of each transaction	**Low activity** since August 2010. Website indicates new trading site is being developed

Source: Expert interviews; Bain analysis; publication analysis

Key takeaways

- Diamond demand is driven by two main categories: fine jewelry and industrial applications.
- Because diamond gemstones are a luxury good and not a commodity, the global diamond jewelry market moves in parallel with the broader market for luxury goods and jewelry.
- Despite suggestions that diamonds may be replaced by other luxury or high-end goods, diamond jewelry for now remains a relevant and desired gift option among consumers.
- The United States remains the undisputed leader in consumption within the global luxury goods market, even though Asia's share of consumption is growing fast.
- Industrial diamond demand far outpaces demand in the diamond jewelry sector by volume. However, it is predominantly met by synthetic diamonds, most of which are produced in China. Only about 2 percent of all industrial diamonds are natural.
- A handful of players operate in the investment diamond market that is attempting to generate investment demand for diamonds. So far there has been no notable success.

Chapter 5: Ten-year demand-supply balance: an attractive outlook for rough-diamond producers

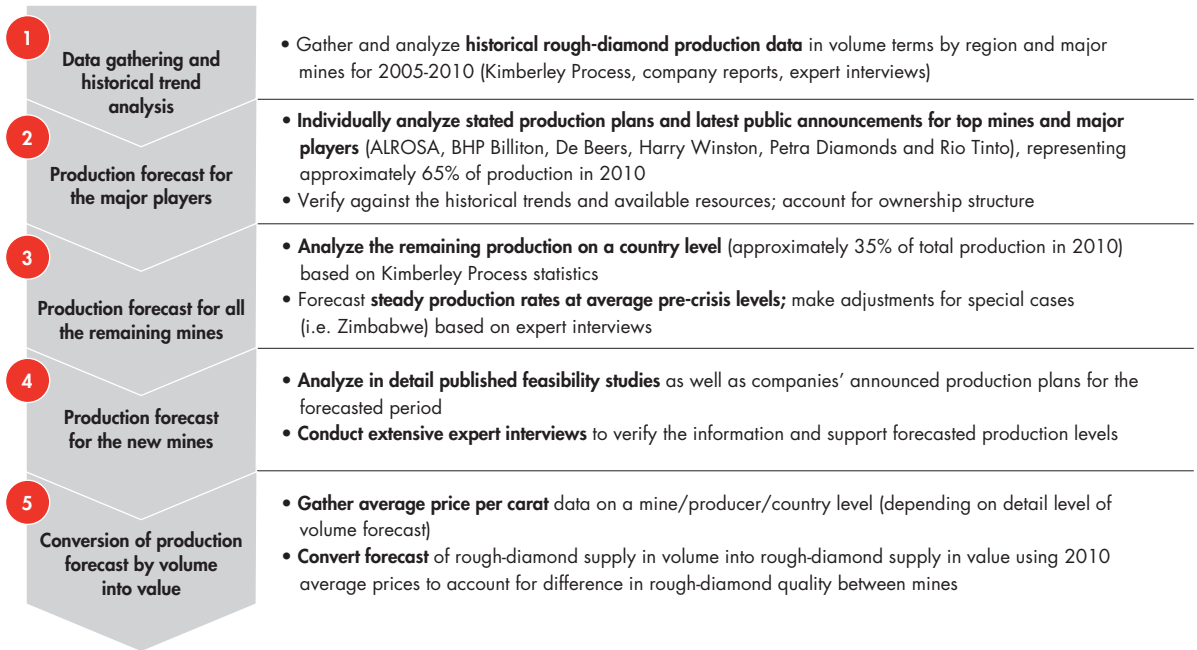
In the next decade, given the scenarios considered in this current study, demand for rough diamonds is expected to outpace supply, indicating a positive outlook for rough-diamond producers and supporting a potential for a long-term price increase.

Global rough-diamond supply forecast: methodology

Our base forecast for the global supply of rough diamonds is drawn from an analysis of current and historical production levels at existing mines, together with publicly announced plans and anticipated production at all new mines expected to come online in the forecast period, 2011 – 2020. Detailed methodology is shown in Figure 61.

For each of the major mines and producers (accounting for 60 percent of production in 2010), we looked at individual production plans as stated by the operating companies. We analyzed the remaining production on a country level (accounting for 40 percent of production in 2010), assuming steady production rates at average pre-crisis levels. Finally, for the new mines, we considered publicly stated feasibility studies and production targets. It is important to note that for the base forecast we relied on the published plans of the diamond producers without questioning the validity of those plans. However in two additional global rough-diamond supply scenarios presented in this chapter, we do consider potential variations in expected future production based on market research and expert opinion.

Figure 61: Methodology of global rough-diamond supply forecast 2011-2020



Global rough-diamond supply forecast: base case scenario

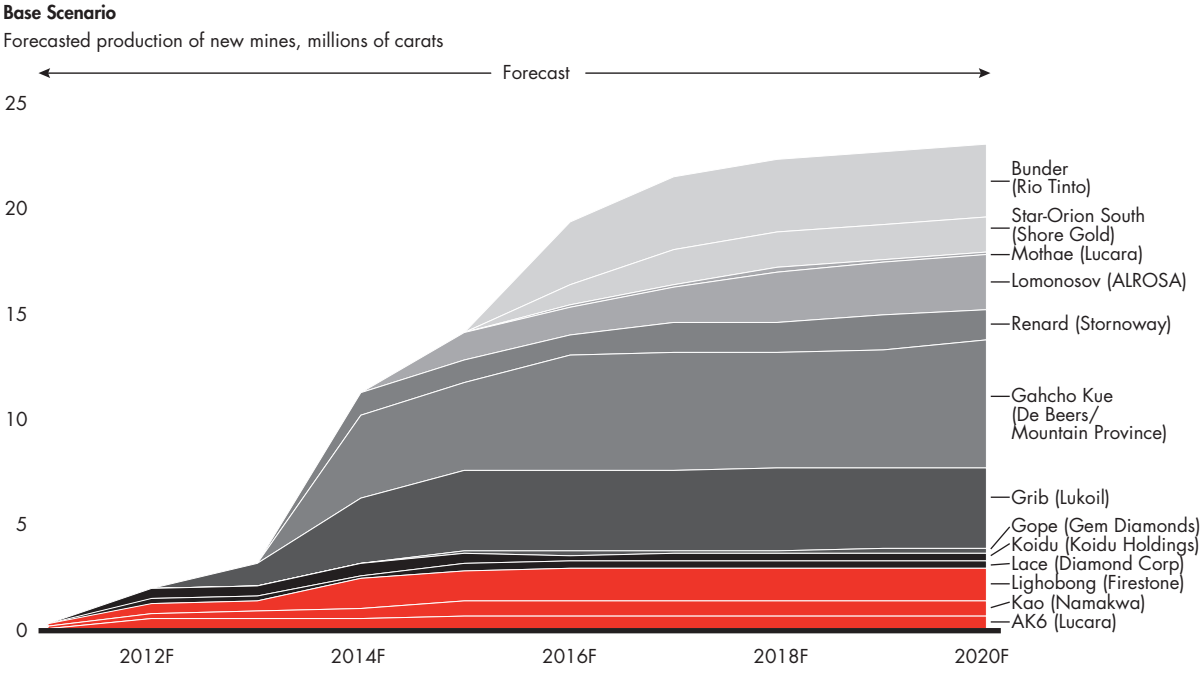
In the base case scenario, moderate supply growth is expected based on the planned addition of 23 million carats from new mines now being developed, slight depletion of existing diamond resources and a lack of any significant new discoveries in recent years. Rough-diamond supply is set to reach pre-crisis levels in volume terms by 2017 and stay relatively flat thereafter, assuming no unforeseen changes in the production landscape.

We assume a return to pre-crisis levels for De Beers, which owns all or part of the Venetia, Orapa and Jwaneng mines and which significantly slowed production during the economic crisis. De Beers has stated that it is targeting a return to a set level of production in the next several years and then remaining at that steady level through 2020.

ALROSA did not slow production during the crisis because it was able to sell excess supply to Gokhran, the Russian state agency tasked with holding a strategic reserve of precious minerals. Given that the majority of ALROSA's mines are in their mid-life stage and undergoing a number of improvement projects, our base scenario assumes slight growth in ALROSA's production levels.

Rio Tinto has announced plans to continue increasing production at the Argyle mine in western Australia to 20 million carats toward the end of the decade. Some projections indicate the potential for a production slowdown after 2020, but that is beyond the scope of this study.

Figure 62: New mines may add up to 23 million carats by the end of the decade



Source: Bain analysis

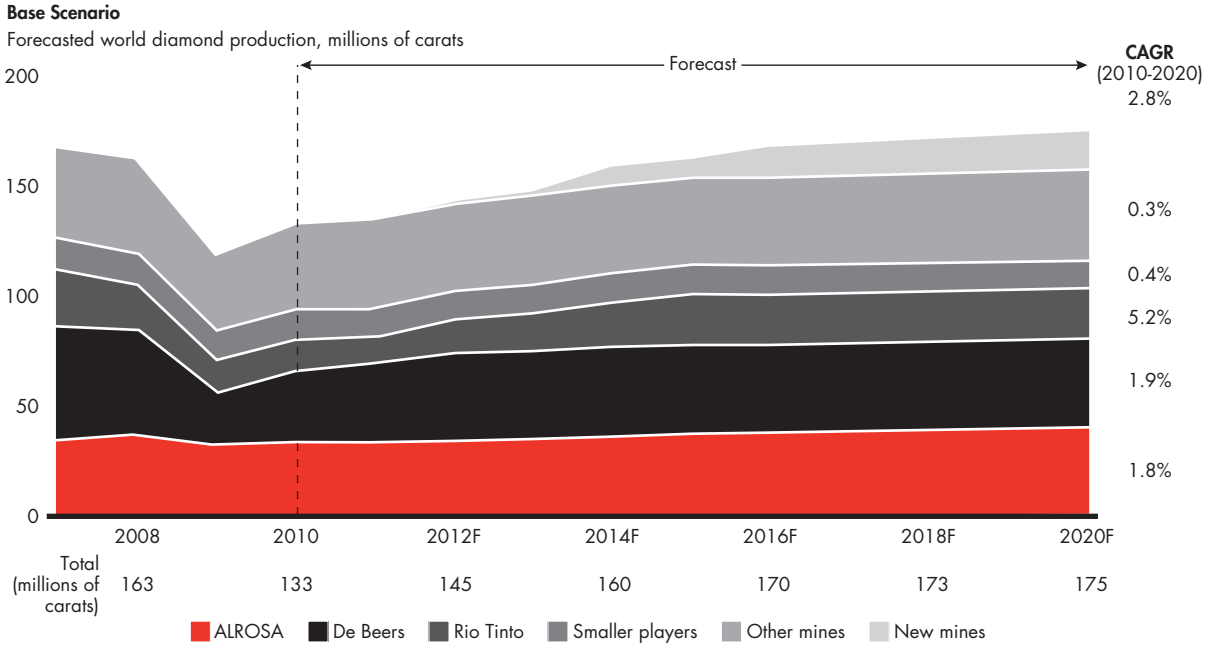
BHP Billiton, the last of the major players, has only one mine, Ekati, but that mine has been highly profitable. However, production at Ekati is expected to decline over the forecast period. Introduction of a new pipe (the Misery pipe) is planned but will likely only extend the life of the mine rather than generate a significant production increase.

In addition to the existing mines, between 2011 and 2020, 13 new mines are expected to begin production, with the first output due as early as the end of 2011 (see Figure 62).

The largest mine expected to come online is Gahcho Kue in Canada's Northwest Territories. Gahcho Kue is projected to produce up to six million carats annually by 2020. It is being developed by Mountain Province. ALROSA's development of the Karpinskij pipe at the Lomonosov diamond field is expected to yield around 2.5 million carats annually. Rio Tinto is also developing a sizeable project—the Bunder mine in central India—that when fully operational is forecast to produce approximately 3.5 million carats annually. Taken altogether, however, the aggregate 23 million carats of new production that the 13 new mines could generate by the end of the decade represent a relatively modest amount compared with current global diamond production. Even if another major new deposit were discovered in the near term, there would not likely be enough time to bring it to full production within the next decade.

To summarize, in the base case scenario, shown in Figure 63, global production is expected to grow by an average annual rate of 2.8 percent starting in 2011 to nearly 175 million carats in 2020, slightly above the peak 2007 pre-crisis production levels of approximately 170 million carats. The expected growth is driven by new mines coming online as well as the slight increase in production of leading players.

Figure 63: Total supply is forecast to reach 170-175 million carats



Note: Smaller players include Catoca mine, BHP Billiton, Petra Diamonds and Harry Winston; other mines include all the remaining production in Angola, Australia, Canada, Democratic Republic of the Congo, Russia, South Africa, Zimbabwe and other minor producing countries
Source: Company plans; Kimberley Process; Bain analysis

Global rough-diamond supply forecast: two additional scenarios

We considered two additional scenarios: one featuring a lower supply level and the other a higher supply level relative to the base case (see Figure 64).

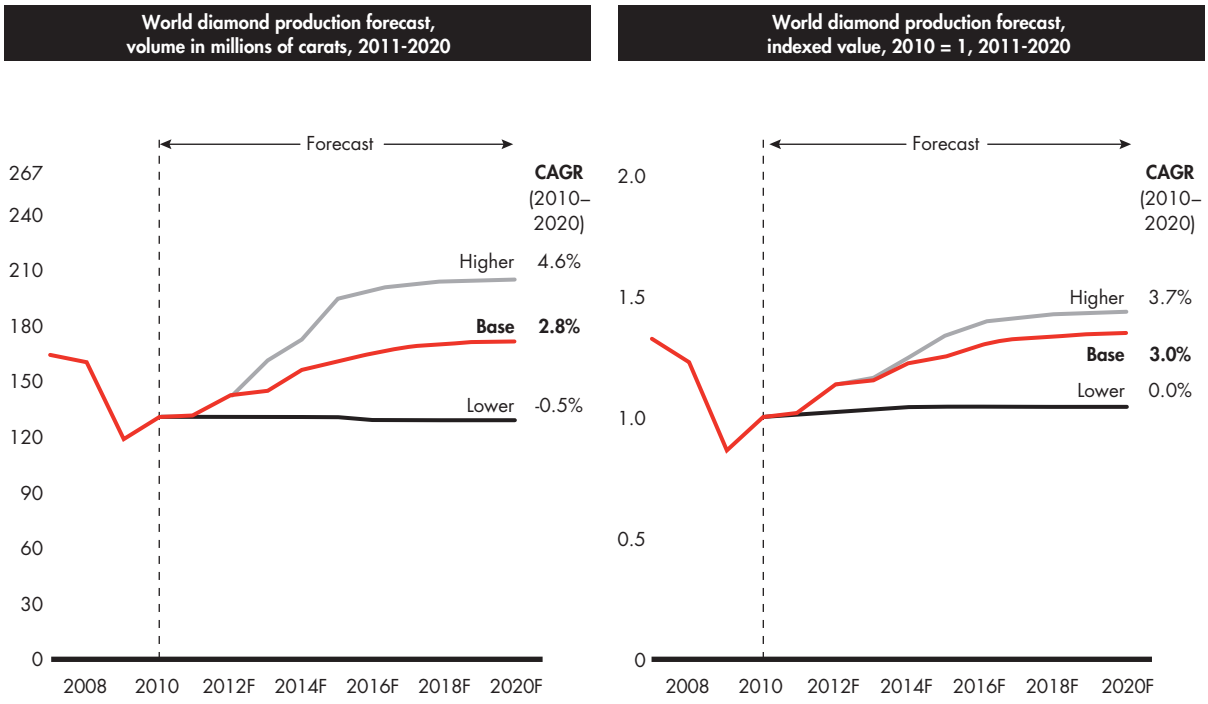
These additional scenarios consider alternative assumptions about the feasibility of additional supply in some of the African countries as well as the potential for the largest mines and producers to fall short of their stated production targets. One scenario envisions additional production increases, and the other sees production remaining essentially flat. Both scenarios factor in potential developments within the industry as well as external, geopolitical factors that could affect producers.

The first scenario projects increased production based on heightened activity in the diamond regions of Zimbabwe and the Democratic Republic of Congo. Although the full extent of their resources is not fully known, these regions do have the potential for significant new production. However, a production increase would require stabilization of the political situation in both countries, as well as a high level of management and organization on the part of the producers to allow for full production.

As previously noted, not all diamond carats are equal. Diamonds from Zimbabwe and the Democratic Republic of Congo tend to be of a relatively lower quality than diamonds from other regions. To account for the variability in diamond quality, this study uses the average price per carat per mine in 2010 to project future supply in dollar terms.

The second scenario takes a more conservative view, in which some of the major mines are slow to reach their full potential—this scenario supposes, for example, that the Jwaneng and Argyle mines do not reach their full potential plans, that ALROSA production remains stable at its current levels and that new mines do not come online as anticipated. Salient factors for this scenario include a weak economic environment and technical complications that would cause mines to produce less than their projected capacity. In this scenario, production is expected to decline very slightly in volume terms and remain stable in value terms.

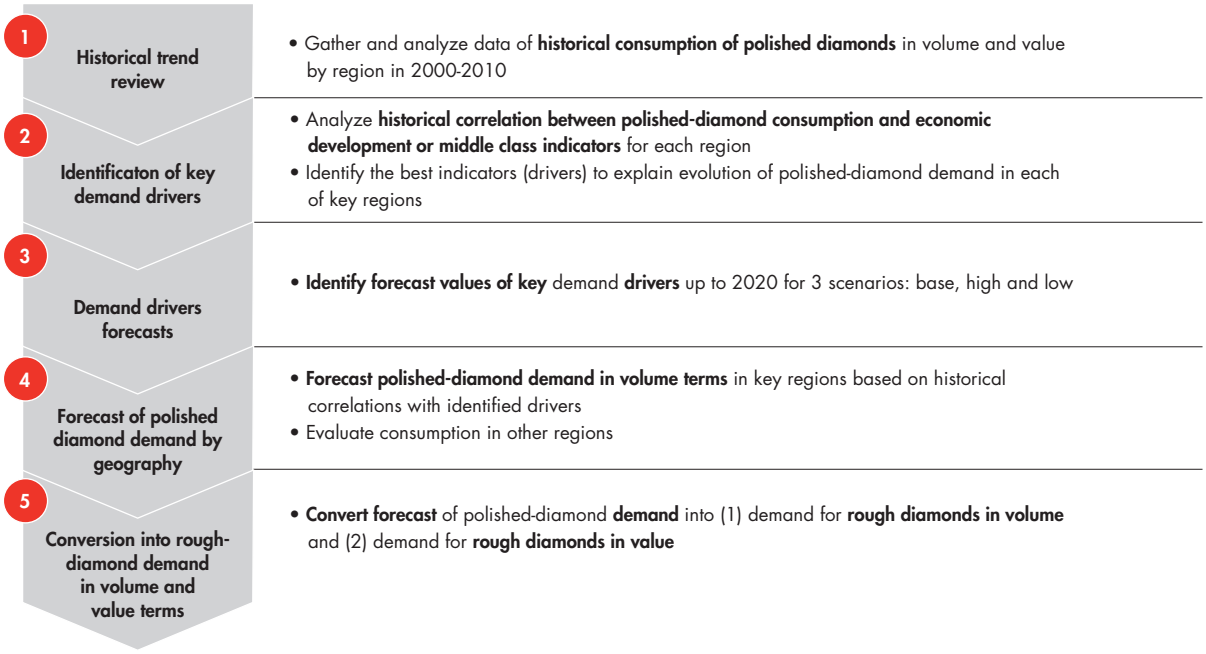
Figure 64: Global rough-diamond supply forecast 2011-2020



	World diamond production forecast, volume (M carats)						World diamond production forecast, indexed value in 2010 prices, 2010 = 1.0					
Scenario	**2010**	**2012F**	**2014F**	**2016F**	**2018F**	**2020F**	**2010**	**2012F**	**2014F**	**2016F**	**2018F**	**2020F**
Higher	133	145	176	204	207	209	1.00	1.13	1.25	1.39	1.42	1.44
Base	**133**	**145**	**160**	**170**	**173**	**175**	**1.00**	**1.13**	**1.22**	**1.30**	**1.34**	**1.35**
Lower	133	134	131	129	128	127	1.00	1.03	1.03	1.02	1.01	1.00

Source: Bain analysis

Figure 65: Methodology of global rough-diamond demand forecast 2011-2020



Global rough-diamond demand forecast: methodology

Consumer demand in key regions of the world drives the rough-diamond demand forecast. To anticipate consumer demand, this study incorporates historical macroeconomic drivers in each of the key regions and projects future demand based on those drivers, taking into account the effects of the 2008 financial crisis.

The methodology we used to produce our global rough-diamond demand forecast is detailed in Figure 65.

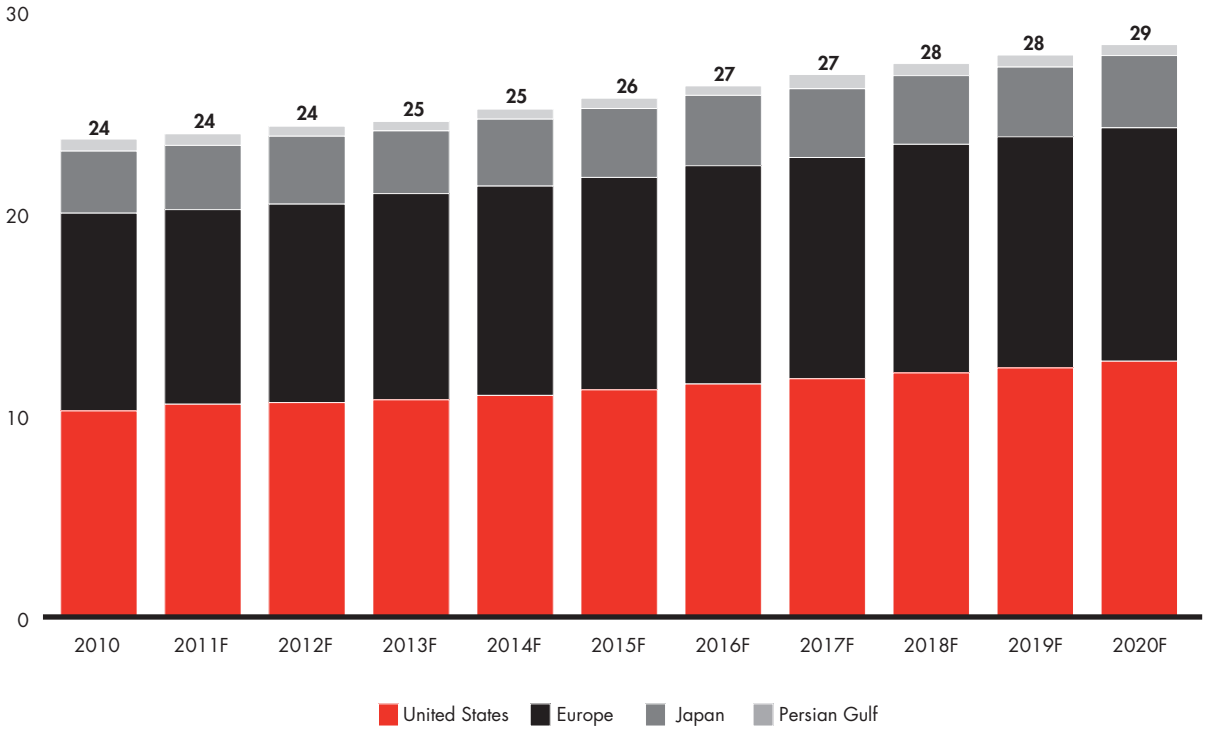
In developed regions such as the United States, Europe and Japan as well as in the growth area of the Persian Gulf, a key driver of diamond consumption will be total private consumption. To forecast diamond demand in these countries this study relies on a total private consumption projection for each region from IHS Global Insight (see Figure 66).

In China and India, where demographics are changing quickly, two related trends have an impact on our forecast: growing urbanization and the rise of the middle class. Historical analysis shows that the size of the middle class, as defined by the Organisation for Economic Co-Operation and Development (OECD), correlates closely with diamond consumption in China and India. As this class expands (see Figure 67) the retail landscape will adapt by adding stores and online channels that require inventory.

Figure 66: Total private consumption forecast 2011-2020 for developed countries

Base Scenario

Total private consumption by region,
$ trillions (real 2010)



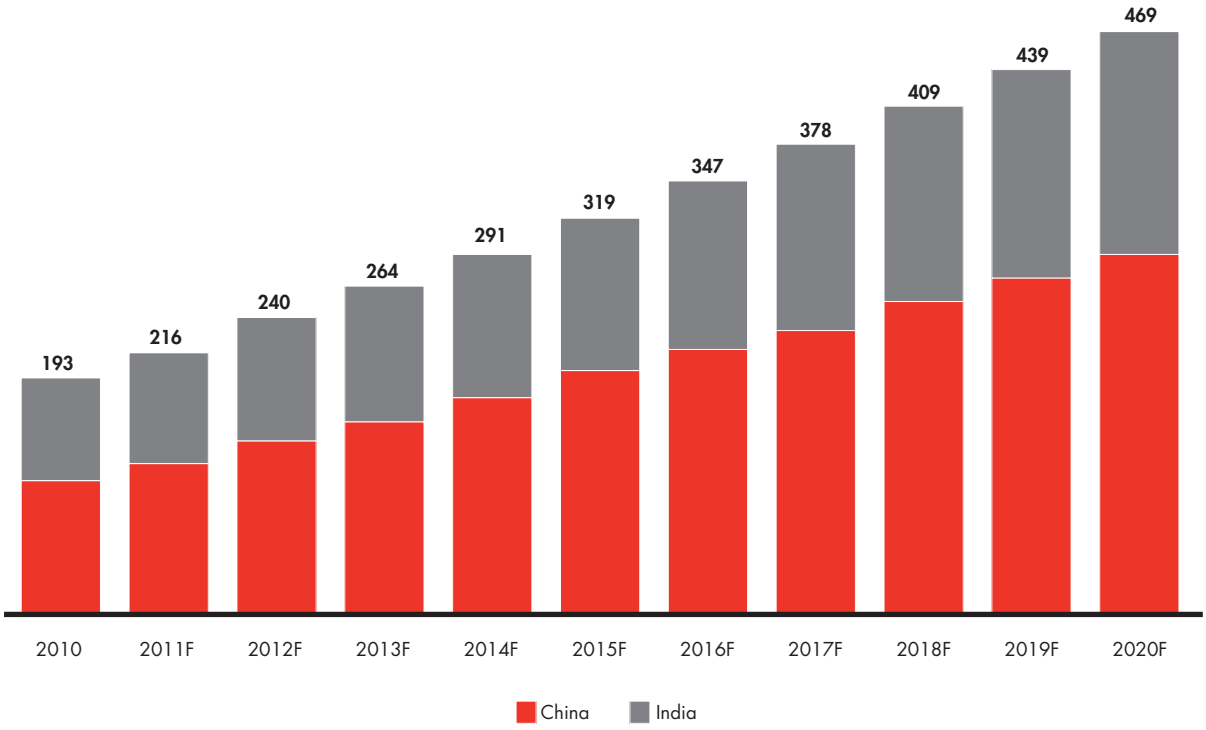
Total private consumption by region, $ trillions (real 2010)												
Region	**2010**	**2011F**	**2012F**	**2013F**	**2014F**	**2015F**	**2016F**	**2017F**	**2018F**	**2019F**	**2020F**	**CAGR** (2010-2020)
United States	10.4	10.6	10.7	10.8	11.1	11.4	11.6	11.9	12.2	12.5	12.7	**2%**
Europe	9.8	9.9	10.0	10.2	10.4	10.7	10.9	11.1	11.3	11.5	11.7	**2%**
Japan	3.2	3.2	3.2	3.3	3.3	3.4	3.4	3.4	3.5	3.5	3.5	**1%**
Persian Gulf	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	**5%**

Source: Global Insight; Bain analysis

Figure 67: Forecasted size of middle class in China and India

Base Scenario

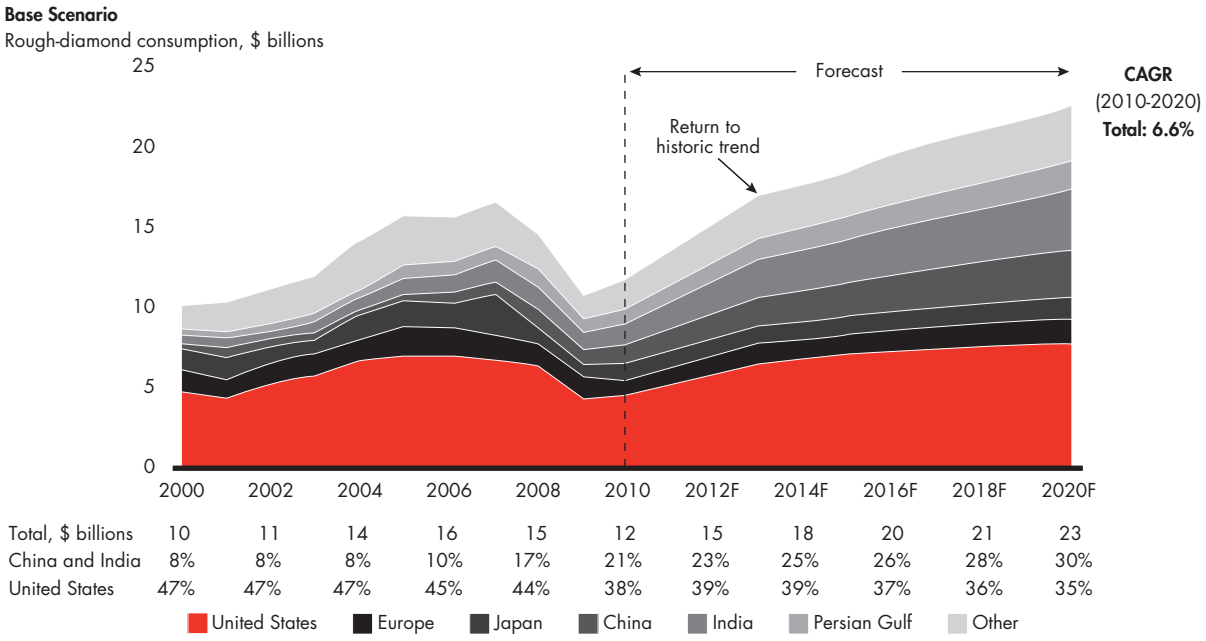
Middle class, millions of households



Region	2010	2011F	2012F	2013F	2014F	2015F	2016F	2017F	2018F	2019F	2020F	CAGR (2010-2020)
China	108	123	139	155	174	193	211	231	251	270	288	**10%**
India	85	93	101	109	117	126	136	147	158	169	181	**8%**

Note: Middle class is defined as a number of households with disposable annual income above $15,000 based on purchasing power parity
Source: Euromonitor; OECD; Global Insight; Bain analysis

Figure 68: Rough diamond demand is forecast to grow at 6.6% per year in value terms



Note: The calculation uses equal conversion factors and real production prices from the base scenario, which reflect changes in the quality of rough diamonds; an increase in stock is taken into account; historical data converted to 2010 dollars
Source: Bain analysis

Global rough-diamond demand forecast: base case scenario

The overall demand for rough diamonds over the next decade is projected to grow generally in line with the historical trends. Polished-diamond demand should be driven by an expected recovery from the economic crisis, by the expanding middle class in China and India and by the increase in total private consumption levels in developed countries.

In the base case, incorporating forecasts for all key regions, world rough-diamond demand is expected to grow at an average annual rate of 6.6 percent to nearly 23 billion dollars by 2020 (see Figure 68). Starting in 2013, demand will likely return to its pre-crisis historical trajectory and then continue to grow steadily.

Global rough-diamond demand forecast: two additional scenarios

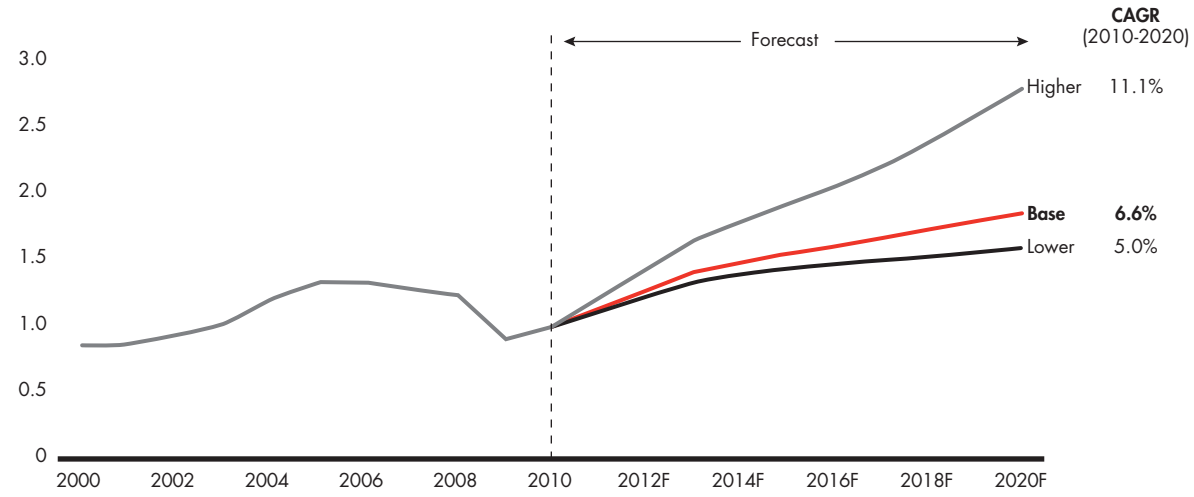
Two additional scenarios consider projections of higher and lower demand (see Figure 69).

Higher demand incorporates an optimistic global GDP growth rate forecast (an average of 3.9 percent per year) that in turn would drive higher levels of total private consumption in developed countries. In the case of China and India this scenario projects higher rates of growth in the number of middle class families, assuming a continuation of historical year-over-year growth rates for the forecast period.

By contrast the lower-growth scenario considers the potential for a second global recession, with global GDP growing at an annual average of 2.5 percent. This would lead to stagnation in developed countries and slower growth rates in China and India (although still higher than in the developed countries). Some experts are projecting that growth rates in China and India could slow by the end of the decade, irrespective of a possible recession.

Figure 69: Global rough-diamond demand forecast

Rough-diamond demand, indexed value in 2010 prices; 2010 = 1.0 ($12 billion)



	2000	2002	2004	2006	2008	2010	2012F	2014F	2016F	2018F	2020F
Higher	0.85	0.94	1.20	1.32	1.22	1.00	1.49	1.81	2.10	2.45	2.86
Base	**0.85**	**0.94**	**1.20**	**1.32**	**1.22**	**1.00**	**1.32**	**1.50**	**1.64**	**1.77**	**1.90**
Lower	0.85	0.94	1.20	1.32	1.22	1.00	1.27	1.40	1.49	1.56	1.63

Notes: In the estimates, the same conversion ratios and real production prices under the base-case scenario were used reflecting changes in the quality of feedstock; stock increase impact is also taken into account. Data for 2000-2010 are in 2010 dollars
Source: Bain analysis

As with the three supply scenarios, we used stable diamond prices to account for the different quality of diamonds and determine the demand forecast in terms of value.

Global rough-diamond supply-demand balance 2011-2020

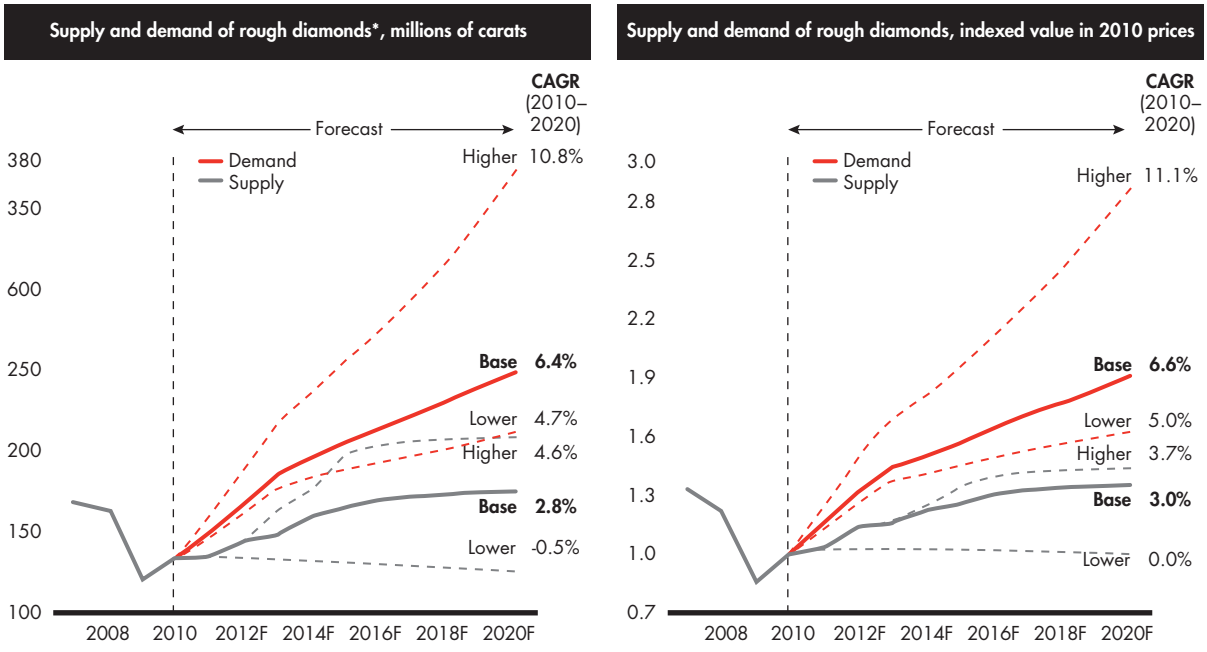
The forecast finds a likely global deficit in the supply-demand balance for rough diamonds over the next decade (see Figure 70). Under all potential scenarios that we considered as part of this research, demand in value terms is poised to outpace supply. In the base scenario, demand is projected to grow at 6.6 percent per year in value terms between 2011 and 2020, while supply is expected to grow at 3 percent per year. Historically such supply-demand imbalances have provided the foundation for firm prices in the industry.

Risks and disruptive factors

Several potentially disruptive factors could influence the supply-demand balance over the next decade. Although different experts in the industry have varied estimates of the likelihood of the factors' occurrence, industry players and potential investors should seriously consider these risks in their analyses and plans.

Potential change in macroeconomic outlook. Because macroeconomic factors play a significant role in this forecast, especially relative to demand, they have been taken into account in the various scenarios. A severe double-dip recession, however, could potentially cause a significant slowdown of demand growth for diamonds beyond what is projected in the lower-demand scenario. Particularly troubling and difficult to predict is the potential fallout from the European debt crisis and the continued unclear economic outlook in the United States at the time of the writing of this report.

Figure 70: Global rough-diamond supply-demand balance 2011-2020



	Supply and demand of rough diamonds, volume (M carats)						Supply and demand of rough diamonds, indexed value in 2010 prices, 2010 = 1.0					
Scenario	**2010**	**2012F**	**2014F**	**2016F**	**2018F**	**2020F**	**2010**	**2012F**	**2014F**	**2016F**	**2018F**	**2020F**
Supply: Higher	133	145	176	204	207	209	1.00	1.13	1.25	1.39	1.42	1.44
Supply: Base	**133**	**145**	**160**	**170**	**173**	**175**	**1.00**	**1.13**	**1.22**	**1.30**	**1.34**	**1.35**
Supply: Lower	133	134	131	129	128	127	1.00	1.03	1.03	1.02	1.01	1.00
Demand: Higher	133	190	236	273	317	371	1.00	1.49	1.81	2.10	2.45	2.86
Demand: Base	**133**	**168**	**196**	**213**	**230**	**247**	**1.00**	**1.32**	**1.50**	**1.64**	**1.77**	**1.90**
Demand: Lower	133	162	183	194	202	211	1.00	1.27	1.40	1.49	1.56	1.63

*Projected demand for polished diamonds is converted into demand for rough diamonds using the historic ratio as of 2005-2010; cutters' stock increase impact is also taken into account; real prices from the base-case production scenario are used; historic values are presented in 2010 dollars
Source: Bain analysis

Development of investment demand for diamonds. Another potentially disruptive factor would be the development of a significant investment market for diamonds. This could lead to a possible increase in demand, which in turn could drive prices higher and create an even stronger outlook for producers. Feasibly, the potential case for diamonds as an investment could come from markets where consumers are worried about inflation of the local currency and lack access to financial instruments that would allow them to hedge against inflation. One such country could be China. In such a case diamonds could become very attractive to consumers, which could lead to significant gains in consumption.

Improved perception and acceptance of synthetic gem-quality diamonds. Consumer acceptance of synthetic gem-quality diamonds could negatively affect the market for natural stones. But for that to happen the price of synthetic diamonds would have to drop considerably, which would be feasible if a technological breakthrough permitted lower manufacturing costs. Although such a possibility exists, it is not likely to present a significant threat to the diamond industry in the next decade, as discussed in detail in the next chapter.

Additional supply increase. Another potential factor that could substantially alter the forecast is the discovery and rapid development of a major new source of natural diamonds. The prospects of this happening are low given that no major discoveries have taken place in the past 20 years. Even if one or more significant deposits were discovered in the near term, achieving full production within the next decade is unlikely given the time it generally takes to make a mine fully operational. Even so, the possibility does exist. No one anticipated that Canada or Australia would become sources of major new diamond supplies before they emerged in the late 1980s and early 1990s.

Political instability, the rise of protectionist policies in diamond-producing countries and the ongoing effects of the decline in generic diamond marketing. All of these are factors that could have a negative impact on supply or demand. The risk of any of these potential developments, however, remains low.

Key takeaways

- The global rough-diamond supply forecast is based on the publicly announced production plans of the producing companies.
- Future supply is expected to be driven by production recovery to pre-crisis levels at existing mines as well as by up to 23 million carats in aggregate expected from the 13 new mines by 2020.
- The global rough-diamond demand forecast is driven by public macroeconomic forecasts for total private consumption for developed countries and the size of the middle class in the developing economies of China and India.
- An expanding middle class in China and India, together with the recovery of private consumption levels in developed countries, should generate robust demand.
- In the next decade, demand for rough diamonds is set to outpace supply under all considered scenarios, indicating a strong positive outlook for the industry.
- Several disruptive factors could negatively impact the diamond supply-demand balance, but all of these factors are unlikely to manifest.

Chapter 6: Synthetic diamonds overview

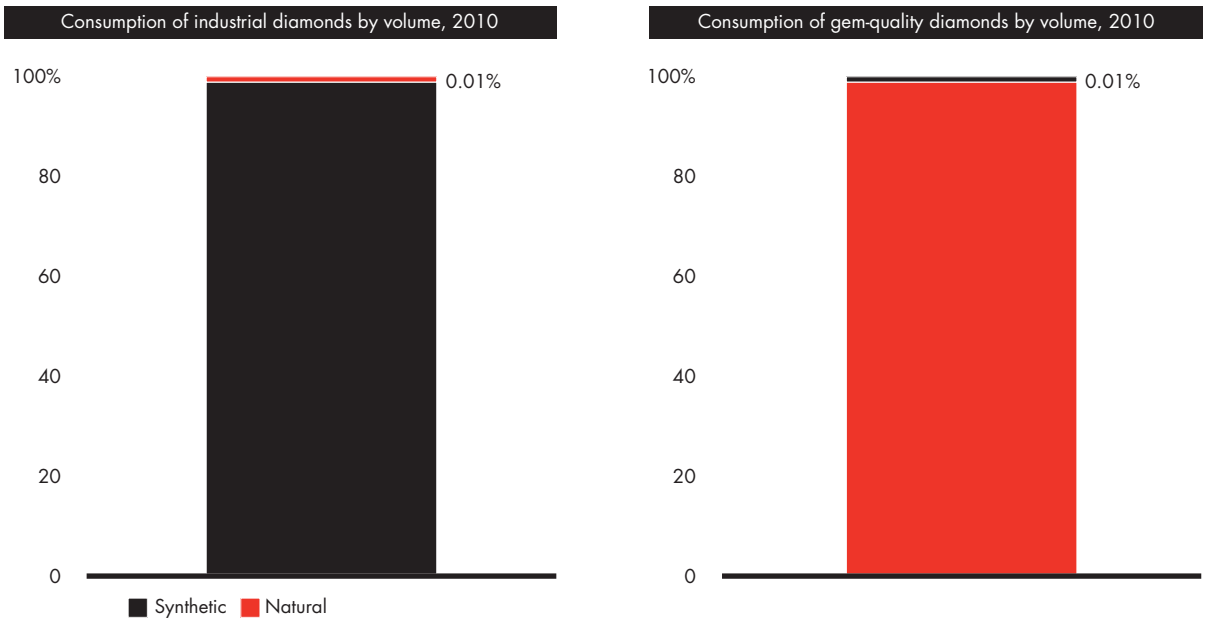
Synthetic diamonds: definition and production methods

Synthetic diamonds are created by a technological process that takes place in a laboratory, in contrast to natural diamonds that are created through a geological process that takes place deep within the earth. Synthetic diamonds have been around since the 1950s. About five billion carats of synthetic diamonds are manufactured and used for industrial purposes, a sector in which they dominate the total volume of diamonds used (see Figure 71).

In the world of jewelry the only inexpensive alternatives to natural diamonds until synthetic alternatives emerged were cubic zirconium and moissanite, which bear some visual resemblance to diamonds. But these stones have a molecular structure completely different from that of diamonds, and the visual differences between the two types are easily detected. Only in the past decade has technology allowed the manufacturing of synthetic diamonds of high quality. Today it is possible to make colorless synthetic gemstones that, on a molecular level, are identical to natural stones and so visually similar that only a gemologist with special equipment can tell the difference.

Given the high and rising prices of mined diamonds some manufacturers of gem-quality synthetic stones hope that consumers will turn to the synthetics as a lower-cost alternative. So far the predictions of massive

Figure 71: Industrial-grade diamonds dominate synthetic manufacturing



Note: The share of industrial-grade diamonds estimated as the average for 2004-2009
Source: U.S. Geological Survey; Kimberley Process; Bain estimates

growth and takeover of the natural market by synthetic stones have not materialized, and synthetic diamonds remain a sliver of the gem-quality market. Still the question remains: how big a threat are the synthetics?

The market for synthetic gemstone diamonds is new – so new that a battle is still brewing over what to call them. Manufacturers do not want to call them "synthetic" because of that word's connotation of falsity. Some prefer to call them "cultured," following the success of the pearl industry in creating a thriving market for artificially cultivated pearls. But some natural-diamond producers are pushing for "synthetic," "artificial" or even "laboratory-grown" to ensure full disclosure to consumers and to enhance the distinction of their mined product.

De Beers recently shifted its marketing strategy subtly to reflect this debate. After years of placing the slogan "A Diamond is Forever" at the center of its advertising campaigns, the company has begun incorporating the terms "purity" and "naturally created beauty" in its marketing language. In addition De Beers wants to make sure that people can differentiate between natural and synthetic stones. To that end the company has developed a spectroscopic instrument called the DiamondView that it is distributing through the Gemological Institute of America (GIA) to researchers, gemologists and retailers worldwide.

Two methods are used to produce synthetic diamonds. Diamonds produced through either method can be cut into gemstones suitable for the jewelry market.

The high-pressure, high-temperature (HPHT) method is the older approach. General Electric used HPHT to achieve its breakthrough 1954 commercial production of industrial diamonds at the company's research facility in Schenectady, New York. HPHT replicates the natural geologic process. Small seed diamonds are placed into a machine, covered with a mixture of catalyst metal and graphite powders and subjected to temperatures up to 2,500 degrees centigrade and pressure up to 60,000 atmospheres.

HPHT remains the major method for producing diamonds suitable for industrial purposes. The downside of HPHT is that most of the diamonds emerge in shades of yellow and brown because of the presence of nitrogen in the manufacturing process. Manufacturers can produce diamonds of other colors as well by introducing various gases into the reactor chamber. In fact, production of multicolored diamonds is the niche that diamond manufacturer Gemesis chose in recognition of the rarity and expense of naturally colored diamonds. It is also possible to introduce chemicals that will produce the highly desirable colorless diamonds, but the cost of doing so is far greater.

In the second method, chemical vapor deposition (CVD), manufacturers create diamond crystals in a low-pressure environment using carbon-bearing gases. The process involves depositing a carbon vapor onto a substrate to grow the stones. Manufacturers can precisely control the diamond composition and create either a single crystal or a polycrystalline form. The ability to do so has wide potential for industrial uses. Using the CVD method manufacturers can produce colorless gem-quality diamonds up to two carats in size more economically than with the HPHT method.

Overall the HPHT method is better suited than the CVD method for industrial diamond production, because HPHT has the advantage of using fewer ingredients and producing more diamonds more quickly. CVD is more suitable for manufacturing stones of higher quality because this process permits growth of diamonds over larger areas and on various substrates and more-refined control over the chemical properties.

Industrial-grade synthetic diamonds

Synthetic diamonds are ideally suited to industrial needs, which explains their dominance in this market. Their key advantage over natural diamonds is that manufacturers can control the properties of hardness, thermal conductivity and electron mobility and thereby tailor the product to specific uses.

Industrial diamonds are used in two broad application categories.

Industrial: machine and cutting tools. Small synthetic diamonds, usually no larger than one carat, of any color or quality (even finely ground into powder), make excellent cutting, sawing, polishing, drilling and grinding tools. Of the total synthetic diamond production, about 95 percent goes to these industrial uses.

Optics and high-tech. High thermal conductivity makes diamonds ideal for a range of high-tech applications including transmitting infrared and microwave radiation; as semiconductors in electronics; and for use in X-ray machines, heat sinks in electronic devices, laser windows, high-sensitivity sensors and acoustic systems. Although the optics and high-tech segments are much smaller than the machine and cutting tools segments, the margins are estimated to be significantly higher. Most of the current research in synthetic diamonds manufacturing is focused on this area.

Most manufacturers of industrial diamonds are in China, with a handful in other places (see Figure 72). Element Six (part of the De Beers Group) is a leader in synthetic manufacturing and has manufacturing facilities on three continents. Other notable producers include Sumimoto Electric in Japan and Henan Huanghe Whirlwind and Zhengzhou Sino-Crystal Diamond in China. Apollo Diamonds, based in the United States, is among the few companies today that actively participate in both the industrial and gem-quality market segments.

Figure 72: Synthetic manufacturers are concentrated in China

Company	Manufacturing facilities	Method	Industrial production	High-tech production
Element Six	China, Europe, South Africa	CVD, HPHT	YES	YES
Sumitomo Electric	Japan	CVD, HPHT	YES	YES
Henan Huanghe Whirlwind Co	China	CVD, HPHT	YES	NO
Zhengzhou Sino-Crystal Diamond	China	HPHT	YES	NO
Henan Sifang Super Hard Material Co., Ltd.	China	HPHT	YES	NO
Diamond Innovations	United States, Ireland	CVD	YES	NO
Apollo	United States	CVD	NO	YES

HPHT = High Pressure, High Temperature CVD = Chemical Vapor Deposition

Note: Only largest manufacturers of industrial-grade synthetic diamonds are shown
Source: Company websites; Bain analysis

Gem-quality synthetic diamonds

An entirely different set of companies takes part in the gem-quality manufacturing sector. To date, few manufacturers of synthetic diamonds have shown interest in the gem-quality market. Experts give a number of possible explanations.

First, the process is complex and requires a substantial investment in technology; most manufacturers would have to convert their existing equipment into gemstone reactors. Moreover, switching to gemstones would almost certainly mean a decrease in production volumes due to longer production processes.

Furthermore the demand for synthetic gems remains relatively low, with sales and distribution channels still limited. In addition the margins for industrial and high-tech production remain robust—nearly as high as in the jewelry sector—so manufacturers have little incentive to switch.

Most of the companies that operate in the gem-quality synthetic production market deploy the HPHT method and focus on the production of colored stones (see Figure 73). Only Apollo employs a CVD method and claims to be able to mass-produce colorless gems. In general, little information is publicly available on this sector because the companies in it regard their approaches as proprietary.

Currently manufacturers sell synthetic gemstone diamonds in the United States and Canada through two distribution channels: manufacturer's websites and jewelry shops that partner with manufacturers to offer synthetic gem-quality jewelry as well as loose stones.

Figure 73: Among companies currently operating in the jewelry market, Apollo is theonly one with the stated technology for mass production of colorless stones

Company	Production method	Colored diamonds	Colorless diamonds
D. Nea Diamonds (United States)	HPHT	●	◉
Gemesis (United States)	HPHT	●	◉
Apollo (United States)	**CVD**	●	●
Chatham Created Gems (United States)	HPHT	●	○
Life Gem (United States)	HPHT	●	○
New Age Diamonds (Russia)	HPHT	●	○

HPHT = High Pressure, High Temperature
CVD = Chemical Vapor Deposition

● Mass production
◉ Limited production
○ None

Note: Element Six also claims to have the technology and the patents, but does not participate in this segment
Source: *The Wall Street Journal*; Merchant Research & Consulting; D. Nea Diamonds

At present, partnerships between manufacturers and jewelry stores exist only in the United States and Canada. Typically these are smaller chains or individual stores, including Joseph Schubach Jewelers in Arizona, Murphys Jewelers in Pennsylvania, and Created-diamonds.com and Marshall's of Milford, in Massachusetts.

Because the technology is relatively new and expensive, the cost of creating a diamond in the laboratory significantly exceeds the cost of a mined diamond—as much as 50 times more (see Figure 74). Per carat, the cost of mining a natural colorless diamond runs about $40 to $60, and the cost to produce a synthetic, gem-quality colorless diamond is about $2,500.

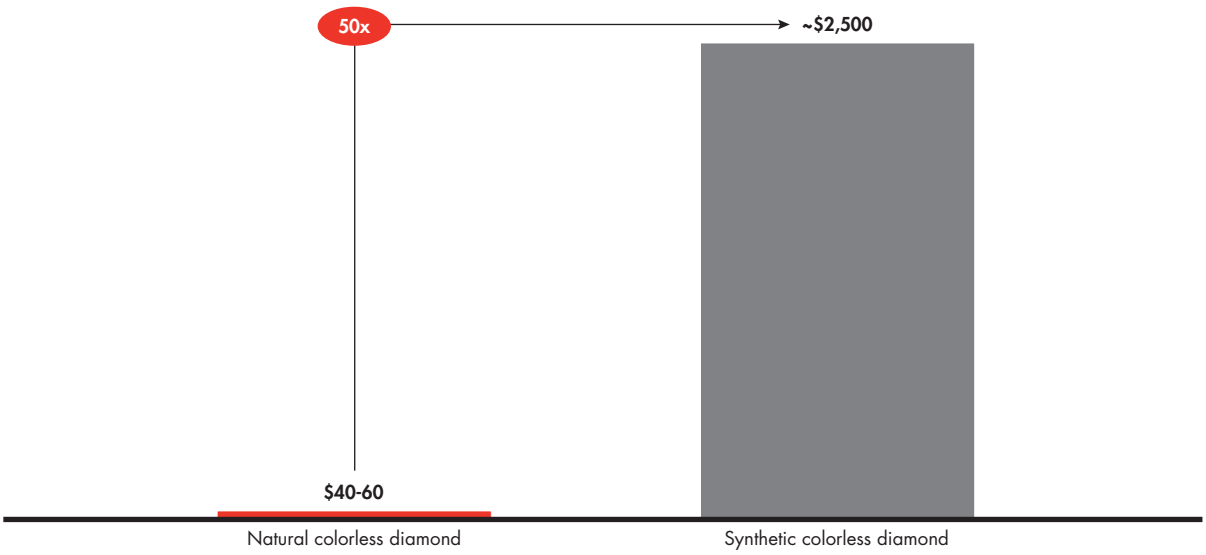
To be accepted in the market, synthetic gemstone diamonds would need to be significantly less expensive than natural stones. But that will probably not happen until the price comes down, which is unlikely given the current state of technology. Given current technology, heavy discounting of synthetic gemstone diamonds would render them commercially unviable. For the production of colorless synthetic stones to reach the breakeven point, the diamonds would have to be sold at no lower than a 50 to 55 percent discount to natural stones. For producers to do better than breakeven, they would have to charge higher prices, but whether consumers would be willing to pay that much is not clear (see Figure 75).

Implications of synthetic diamond availability for the natural diamond industry

We believe the potential for significant market penetration by synthetic diamonds remains low for the time being because of several limiting factors.

Figure 74: The manufacturing cost of a 1-carat synthetic colorless diamond substantially exceeds the production cost of a natural diamond

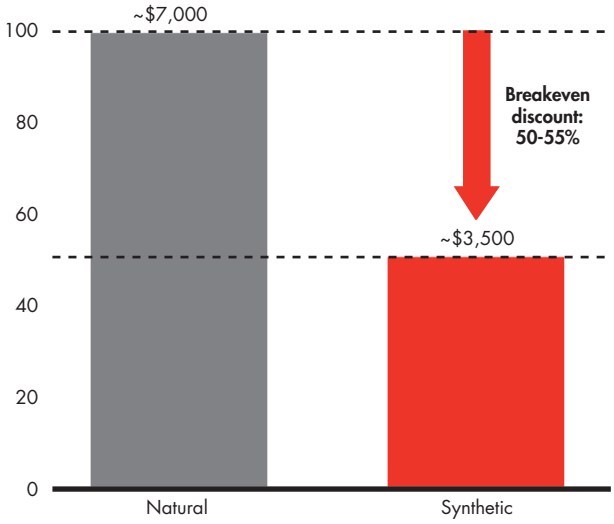
Manufacturing and production cost, $ per carat, 2010



Source: Expert interviews; Bain analysis

Figure 75: Synthetic diamonds cannot be offered at more than a 50-55% discount to natural stones to stay economically profitable

Wholesale price of a 1 carat diamond (round cut, G color, VVS2 clarity)



Colorless diamonds synthesis facility: key indicators

• Reactors	10
• CAPEX	$3 million
• Production volume	1,000 carats/year
• Operation costs*	$2.8 million
• SG&A costs	$0.7 million
• Total costs	**$3.5 million/year**
• Revenue based on 50% price discount for synthetic stone	**$3.5 million/year**

*Operation costs include cutting & polishing and all direct costs
Source: AWDC synthetic diamond factory model; Idex; Bain analysis

On the demand side most consumers are not yet willing to buy synthetic gemstone diamonds, especially not for engagement rings. A relatively small percentage of mostly lower-income customers do show a willingness, as long as the synthetic stones are significantly less expensive than the natural ones. Various industry studies estimate the percentage of consumers willing to make such purchases to be between 10 and 25 percent. The demand for synthetic diamonds could increase over time as consumers grow to accept the product or as a new category of price-conscious consumers emerges. An aggressive and far-reaching marketing campaign could transform the situation, but almost no significant marketing of synthetic diamonds is taking place at this time.

On the supply side the complexity of the manufacturing process and capacity restrictions present another limitation. Initial investment requires significant capital expenditure, and so far the only company that offers gem-quality synthetic diamonds and has a stated capacity to mass-produce them is Apollo. (Element Six also has all the necessary patents and resources but chooses not to participate in this market.) Moreover, there are currently no companies that can commercially mass produce the reactors needed to manufacture the colorless diamonds. If consumers do begin to accept lower-priced synthetic diamonds in jewelry and manufacturers decide to enter the market, the initial investment required to build enough reactors to produce even 10 percent of the market demand would be in the area of half a billion to a billion dollars.

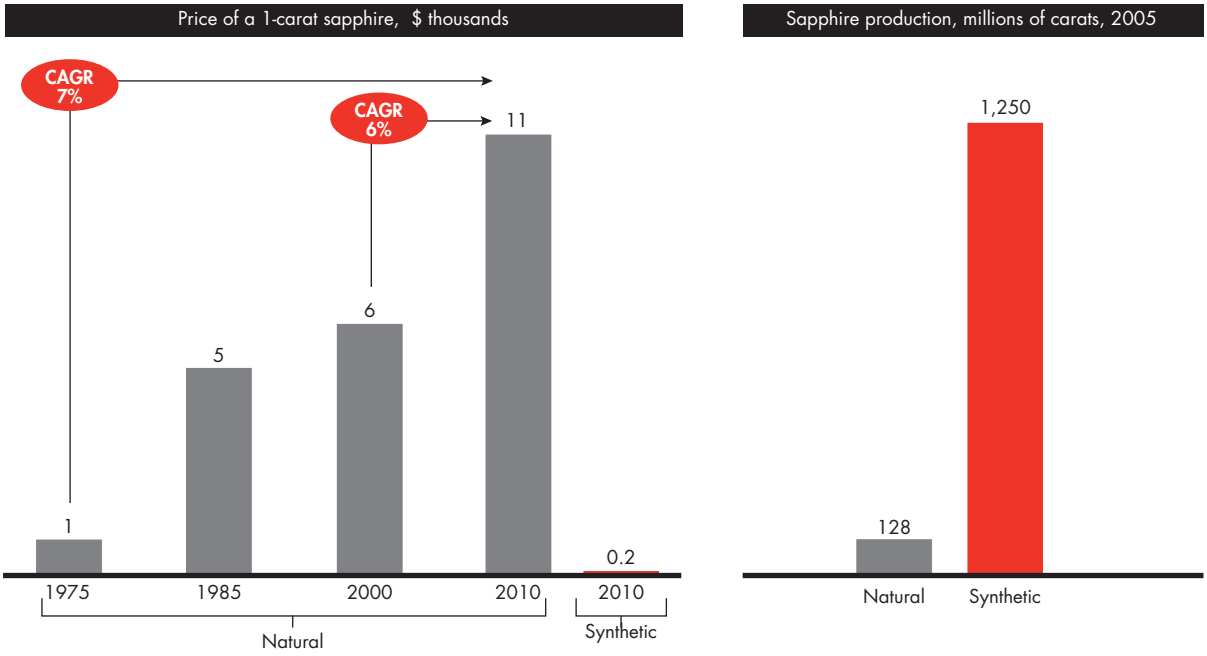
Yet it is worth considering the experience of the sapphire, a gemstone also highly prized but less valuable than the diamond (see Figures 76 and 77). The technology to produce synthetic sapphires that are nearly indistinguishable from natural sapphires emerged in the early twentieth century.

Figure 76: The experience of sapphires shows that synthetic production development does not have to adversely affect the market for natural stones

Characteristics	Sapphires	Diamonds
Stones production 2005, millions of carats	128	177
Synthetic stones 2005, millions of carats	1,250	4,350
Start of mass use of synthetic stones in jewelry	**1910**	**No**
Start of mass use of synthetic stones in industry	1910	1956
Difficulty of distinguishing a synthetic stone from a natural one	Medium	Difficult**
Price of one-carat stone of the highest quality*, 2010, $	11,000	25,000

*Rough diamond of the highest grade: clarity - IF, calor - D, cut – round; Sapphire of the highest grade : clarity - LI, color - 3.5/75 (blue), rough
**Require special equipment such as DiamondSure™ and DiamondView™
Source: Kimberley Process Statistics; Preciousgemstones.com; U.S. Geological Survey; expert interviews

Figure 77: Prices for natural sapphires are growing despite the wide availability and low price of synthetic stones



Source: Preciousgemstones.com; U.S. Geological Survey

Synthetic sapphires have been produced artificially for a century, but their availability has not dampened the demand for natural sapphires, which are still mined in about the same quantity as diamonds. The price of a one-carat natural sapphire has been growing at about 7 percent per year for the past 35 years.

Despite the emergence of synthetic diamonds no substantial changes in the supply or demand for natural diamonds are expected in the next decade. It would take substantial shifts in manufacturing, the supply chain, marketing campaigns and consumer attitudes for synthetic diamonds to pose a threat to naturally mined diamonds.

Key takeaways

- Most synthetic diamonds are created in laboratories using a method that replicates the geologic process by which diamonds are created naturally inside the earth.
- Synthetic diamonds have the same chemical composition as natural diamonds and are so visually similar that only experts using special equipment can tell the difference.
- The overwhelming majority of synthetic diamonds are used in industry for a wide variety of applications, with only a small proportion used as gemstones.
- Several factors keep synthetic gem-quality diamonds from cannibalizing the market for naturally created diamonds. The most important is consumer resistance and the lack of available technology to profitably produce colorless diamonds and considerably expand production levels.
- The experience of sapphires shows that even with the availability of low-cost synthetic gemstones, natural stones can maintain their prices and increase their volume.
- Over the next decade synthetic gemstone diamonds are not expected to threaten consumer demand for natural diamonds; at most they will create a niche to satisfy demand from low-income consumers.

Chapter 7: Future evolution of the industry

Diamond mining: much in common with other mined materials

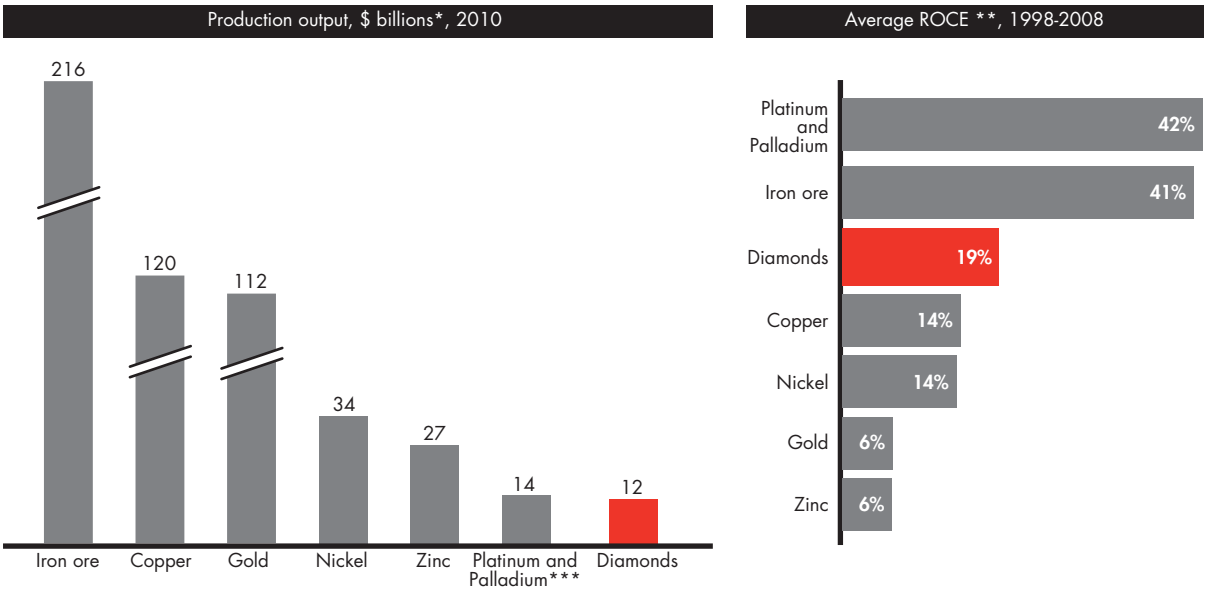
As a natural resource and investment asset, diamonds are not unique. The diamond-mining industry is part of the global mining sector and subject to the same business and market dynamics as other extractive industries. The diamond industry is not as idiosyncratic as outsiders have generally thought.

For example, it is true that diamonds lack homogeneity in their raw form, but so do iron ore and thermal, or steam-generating, coal. Speculative demand in the form of a futures and forwards market for raw diamonds is very small, but the same holds true for copper, nickel, zinc, iron ore and coal. Diamonds produce almost no recycled product and lack a secondary market product, just like iron ore and coal. And diamonds are not the only mined product for which tight relationships between producers and buyers govern the distribution channels; the same is true of iron ore and coal. In all these respects diamond mining shares attributes with many other mined commodities.

While diamond production is relatively small compared with other mining segments, it is profitable based on some commonly accepted industry criteria, including return on capital employed, or ROCE (see Figure 78).

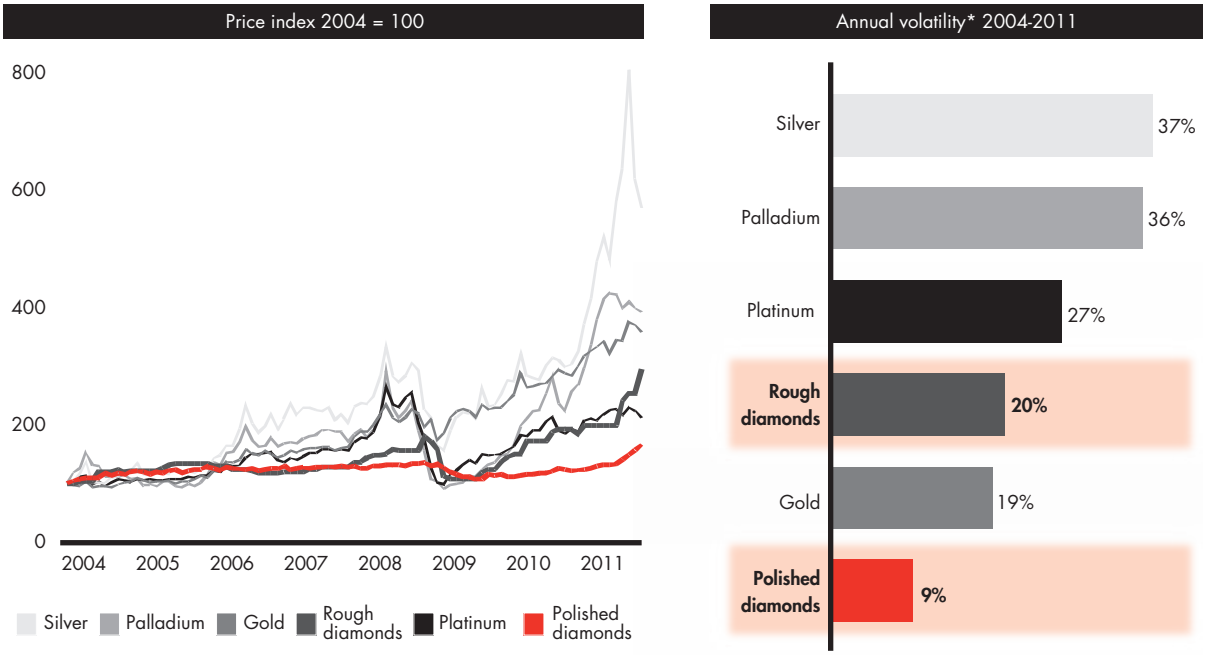
Considering the price volatility of both rough and polished diamonds, we can see that pricing in the diamond industry is relatively stable compared with the other major commodities (see Figure 79).

Figure 78: Production volume and ROCE by mining segment



*Value of annual production output calculated by multiplying physical volume of annual output by average annual price; **ROCE = EBIT/(total assets – current liabilities) calculated based on financials of leading companies in the industries; ***Platinum and palladium belong to one (platinum) group of metals
Source: Johnson Matthey; U.S. Geological Survey; IDEX

Figure 79: Price volatility of various minerals and metals



*Volatility calculated based on standard realized volatility methodology
Source: PolishedPrices.com Diamond Prices Overall Index; PolishedPrices.com; Composite Rough Diamond Index; Bloomberg; Bain analysis

A virtuous cycle

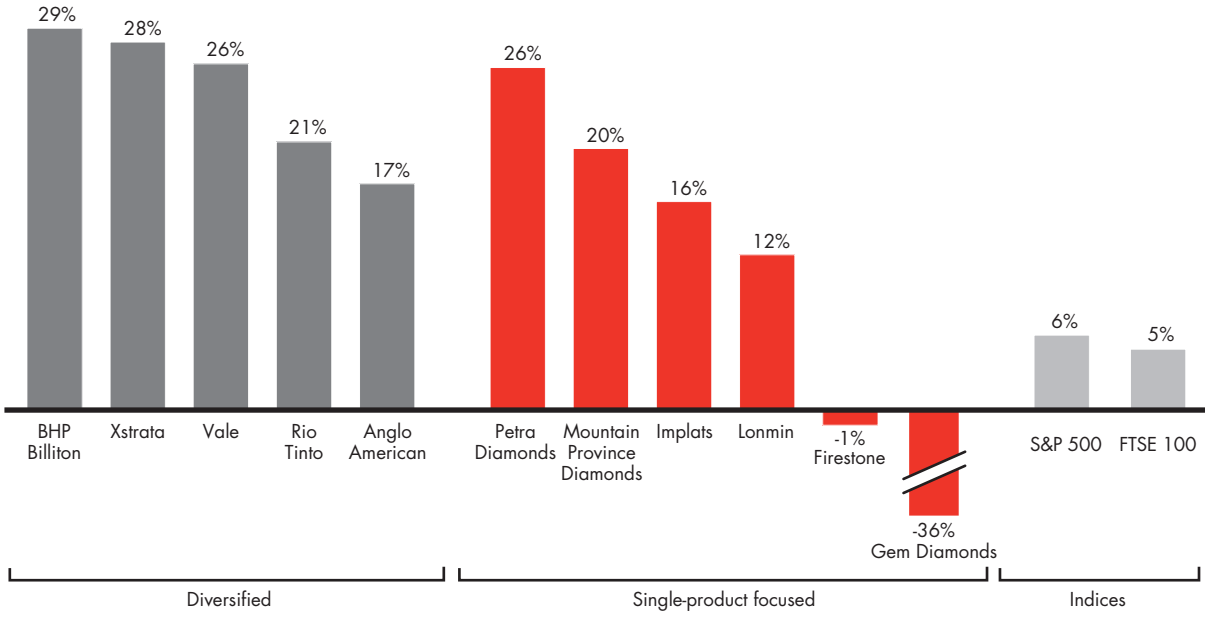
Successful mining companies distinguish themselves by making optimal use of four key advantages: consistent access to high-quality ore reserves at low cost, scale, diversification and a disciplined management approach that generates returns sufficient to replenish the producing assets. When all four elements are working in concert the result is a virtuous business cycle that sustains continuous high performance.

By definition, mining assets constitute a depleting resource that constantly needs to be renewed as reserves are mined. To grow, companies must replace their resources in excess of the depletion rate. This requirement presents a considerable challenge given that in recent years diamond assets around the world have become harder to find and, when found, tend to be located in remote, inhospitable places that are costly to develop.

Some mining companies have mastered the virtuous cycle and delivered a healthy stock market return, especially relative to the major indices (see Figure 80). Their strategies differ in significant ways and offer possible models for the future, as we discuss in the next section.

Figure 80: Stock growth of select mining companies vs. major indices

Average annual stock price change, 2002-2010



Source: Bloomberg

Diamond industry business models evolution

In the global mining industry four types of businesses are emerging as dominant organizational models for the future.

First are the **global diversified natural resource conglomerates**, which typically operate in more than three regions of the world and with presence in more than five commodities. They have succeeded in recent years by exploiting their scale, an approach that allows them to take on larger, riskier and more expensive projects in multiple commodities and to pursue those projects simultaneously without facing financial difficulties. Companies without scale are not able to extend themselves to that extent without confronting trouble when their projects are delayed or saddled with large cost overruns.

In recent years the diversified majors have expanded their influence by buying up the smaller, subscale mining companies. One example is BHP Billiton's acquisition of WMC Resources.

Diversified conglomerates clearly lead the industry in stock performance, but single product companies can also perform extremely well. A number of them, including Petra Diamonds, Implats, Mountain Province and Lonmin, have achieved robust stock growth relative to the major stock indices and even to some of the diversified majors.

These **single-product focused majors** constitute the second business model. They concentrate on a single commodity and benefit from a strategically focused approach. The two main examples in the diamond industry are ALROSA and De Beers, which are focused on diamond mining. Barrick, Norilsk Nickel, Alcoa and Goldcorp are examples of product majors that focus on a single raw material in other industries.

The third business model consists of **juniors**, which focus on high-risk, early-stage exploration and development. When they discover a valuable deposit, they are likely to sell their assets to a larger player. Typically the juniors rely on shareholder equity to fund exploration. Examples among the diamond producers are Firestone Diamonds, Endiama, Stornoway and Hecla. Richemont and UraMin are among the junior producers in other raw-material industries.

The fourth group consists of **optimizers**—companies that look for market opportunities that others may have missed. Frequently they turn to the majors for assets that may be diminishing in production but still have viability. The optimizers purchase the assets, strengthen the business processes, make production enhancements and turn a profit. Some examples are Diamcor Mining and Petra Diamonds, which focus on diamonds, and HudBay Minerals and ARM (African Rainbow Minerals), which produce other minerals and materials.

Access to quality resources is extremely important

The single most important driver in diamond mining is access to top-quality resources—in other words, large deposits of valuable stones. If the volume and quality of a producer's resources are comparatively high as measured in price per carat, then the producer will occupy a leadership position.

In a bid to increase market transparency ALROSA recently disclosed the size of its resources and reserves to be 1.3 billion carats. It is probable that De Beers is not far behind in the size of its reserves, but the company does not publicly disclose those figures. Rio Tinto and BHP Billiton lag significantly, with the estimated size of their reserves and resources at approximately 400 and 115 million carats, respectively.

In this capital-intensive industry, scale is another key success factor. Both De Beers and ALROSA have the resources and capacity to ensure their leadership positions. Both invest significant capital expenditure into development, facility construction, replacement projects and asset improvement—an amount that in both cases is considerably higher than their annual pretax profits. They are not likely to find themselves in an over-extended position.

By contrast the smaller players cannot afford to spend as much on expansion projects, so they are far less likely to attain a leadership position in the foreseeable future.

Little change in business models

Given recognized success factors and established industry leadership, experts consider the diamond mining industry highly stable and anticipate no near-term change in existing business models.

Going forward we anticipate future trends for each of the four models:

The **product majors**, who focus on mining only one type of product, will continue to lead the industry, and their projected growth will remain steady. The two players in this category, De Beers and ALROSA, are expected to maintain their leadership by focusing on high-quality assets, operating efficiencies and a disciplined approach to optimizing their portfolio of assets.

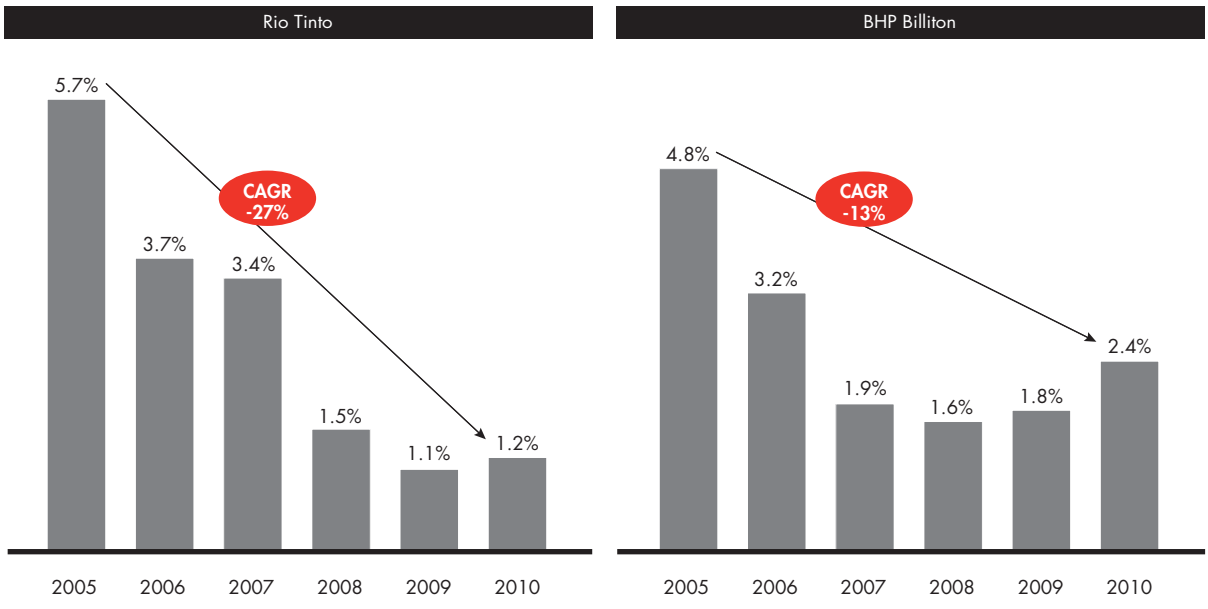
Both De Beers and ALROSA are continually focused on increasing profitability levels. Thus in recent years De Beers has been selling off noncore or unprofitable assets and concentrating on the most profitable mines. Examples include the closing of the Kimberley mine in 2005 and the sale of seven other mines from 2008 to 2011. In addition De Beers is pulling back on early exploration activities and letting others incur much of the development risks. From 2001 to 2009 the company's share of exploration costs in the diamond mining industry dropped from more than 60 percent to less than 25 percent.

So far, for reasons previously stated, ALROSA has not pulled back from exploration; in fact it is investing more. However, in order to focus on its main diamond activities, ALROSA has been spinning off its noncore assets.

Given the low probability of discovering significant, commercially viable diamond assets, the **diversified global conglomerates** are not significantly expanding their diamond production business, and their diamond portfolios will likely decline relative to the rest of their business over time. This trend has already started (see Figure 81). From 2005 through 2010, Rio Tinto's diamond revenues dropped 27 percent annually and BHP Billiton's revenues fell by 13 percent annually. As the assets of companies in this group deplete (for example, the Ekati mine for BHP Billiton), company market share is likely to decline.

Figure 81: The share of diamond revenues at conglomerates has been falling

Diamond revenue as a share of total revenue



Source: Company reports

Niche operators, both **juniors** and **optimizers**, will likely pursue the same strategies in the future as they do today. The juniors will keep focusing on exploration and turn to external financing to support their operations. The optimizers will continue to step in as opportunities present themselves and as the majors sell off their assets. For both groups top-line growth will likely increase. The rapid growth of the new players in the diamond industry over the last 20 years creates the potential for the larger ones to acquire significant diamond businesses, if the diversified majors were to decide that diamond mining had become a negligible part of their overall business and choose to get out. However the diversified majors have not publicly indicated they intend to do that.

One more group is worth noting—the small, artisanal surface miners that operate independently in many parts of Africa. Mostly using crude equipment, and sometimes only their bare hands, they collect diamonds that are found on the ground or in riverbeds. As long as political instability undermines the ability of companies or governments to organize into effective mining entities, this small segment will continue to exist.

Key takeaways

- Diamond mining is not unique; in many respects it resembles other parts of the global mining industry.
- A comparison of return on capital in diamond mining with that in other mining segments shows that diamond mining remains relatively profitable.
- The players in the diamond-mining industry are the global diversified conglomerates, the majors that specialize in one product and the second-tier juniors and optimizers that take advantage of opportunities in the evolving market.
- Those players that succeed in the mining sector have mastered the virtuous cycle, in which high-quality, large-scale assets, operational excellence, and a strong balance sheet allow them not only to continuously replenish their depleting resource base but to grow beyond that.
- Access to high-quality, low-cost quality resources and scale are the two key factors for success in diamond mining.
- Without new high-quality assets coming to market, the diamond-mining industry will likely be relatively stable for the foreseeable future, with no major changes in the types of players or their business models.

Conclusion

This report aims to start stripping away some of the mystery surrounding the global diamond industry by explaining the significant historical developments and illuminating the major trends shaping the economic outlook. Although some parts of the industry—pricing, in particular—remain obscure, the report provides macroeconomic and industry-specific data to support an economic forecast of the supply and demand for the coming decade. As long as major global financial turmoil over an extended period does not force consumers to significantly change their purchasing habits, global demand is set to outstrip supply in the long run, and the future of the diamond business looks bright.

Glossary

- **4Cs**—the four main diamond characteristics that define the quality of a stone: carat, color, cut and clarity
- **Added value**—the portion of revenues/profits captured by a specific segment in the industry value chain
- **Beneficiation**—the process by which producing governments seek to extract more value from their natural resources by developing downstream industries in their own countries. Typically it involves commitments by producer companies to set up local cutting centers and hire local workers.
- **CAGR**—compound annual growth rate, a year-on-year growth rate over a specified period of time
- **Conflict diamonds**—diamonds used to sponsor rebel and revolutionary activities against legitimate and internationally recognized governments
- **Carat**—one of the four main diamond characteristics, the others being color, cut and clarity; 1 carat = 250 mg
- **CSO**—refer to DTC
- **CVD**—chemical vapor deposition, a high-temperature but normal-pressure process to grow diamonds
- **DRC**—Democratic Republic of Congo
- **DTC**—Diamond Trading Company (formerly the central selling organization, or CSO), selling and marketing arm of De Beers
- **Gem-quality diamonds**—diamonds used for jewelry manufacturing
- **Generic marketing**—marketing a whole product category as opposed to marketing a specific brand
- **Global conglomerates**—diversified mining industry leaders operating along various geographical regions and group of products
- **Grade**—diamond concentration in the ore body. Typically measured in carats per ton of ore.
- **HPHT**—high-pressure, high-temperature; a process using large presses to grow synthetic diamonds
- **IDEX**—International Diamond Exchange, one of the major diamond research and publishing agencies; based in Israel
- **Industrial diamonds**—diamonds used for non-jewelry purposes in manufacturing processes across various industries (construction, high-tech, etc.)
- **Juniors**—smaller scale mining companies focused primarily on exploration

- **Kimberlite pipe**—volcanic rock structure that sometimes contains diamonds because it acts as a carrier of these diamonds from the mantle to the earth's surface, along with other minerals. Typically carrot-shaped.
- **Kimberley Process**—certification scheme aimed at prevention of conflict diamond sales
- **Lamproite pipe**—volcanic rock structure similar to kimberlite that can also contain diamonds, albeit with lower likelihood. Typically martini-glass-shaped.
- **Natural diamonds**—diamonds mined from the ground
- **Operating profit**—profit from main operations before interest and tax
- **Opportunists**—niche diamond-mining companies acquiring assets from majors and turning them around
- **Primary deposits**—kimberlite or lamproite pipes. Account for approximately 85 percent to 90 percent of the world's diamond deposits.
- **Product majors**—industry leaders specializing in one type of product
- **Product placement**—advertising techniques aimed at demonstrating specific products in movies
- **R2**—coefficient indicating level of interrelationships of data series
- **Reserves**—diamond deposits that can be economically extracted currently
- **Resources**—diamond deposits that have been found to be valuable and that could potentially be economically extracted at a later point in time
- **ROCE**—return on capital employed, a measure of how effectively a company is using its capital
- **Secondary (alluvial) deposits**—deposits moved from the primary source by natural erosion and deposited in riverbeds, along shorelines, in glaciers and on the ocean floor. Account for about 15 percent of the world's diamond deposits.
- **Sightholders**—designated group of diamond dealers that have direct contracts with major diamond producers (De Beers, ALROSA, etc.)
- **Spot market**—a market where daily prices are set at the level of the supply-demand equilibrium
- **Supplier of Choice**—a new strategy adopted by De Beers in the early 2000s implementing new requirements for sightholders, including commitments to certain amounts of investment in diamond marketing
- **Synthetic diamonds**—diamonds produced in laboratories using HPHT or CVD methods

Key contacts for the report

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