

Chapter 2

The Five Offshore Drilling Rig Markets

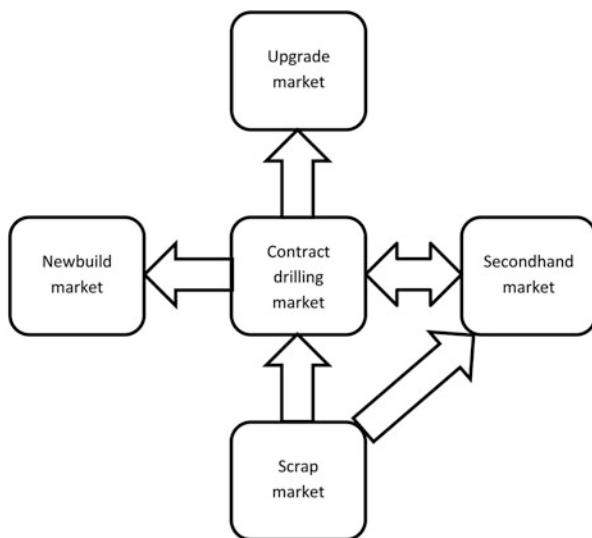
Abstract The offshore drilling industry is composed of five markets engaged in the trade of a unique service or good. Mobile offshore drilling units are owned and operated in the contract drilling services market, supplied by the newbuild and secondhand markets, maintained and enhanced in the upgrade market, and complete their lifecycle in the scrap market. The purpose of this chapter is to describe the players, prices, activity and cash flows in each of the five offshore rig markets circa 2010–2011. Contract drilling and newbuilding are large transparent markets and activity is closely followed throughout the industry. From 2005 to 2012, contract drilling and newbuilding generated between \$25–\$50 billion and \$10–\$20 billion in transactions per year, respectively. Maintenance and upgrade activities are performed by a number of shipyards throughout the world, but because of the sporadic nature of the activities and limited record keeping, the market is difficult to track. The secondhand and upgrade markets are estimated to be worth between \$2–\$10 billion and \$1–\$5 billion annually. The scrap market is the smallest of the five markets and is poorly documented and worth less than \$50 million during most years.

2.1 Offshore Rig Markets

The offshore rig industry is composed of five markets (Fig. 2.1). Cash enters the contract drilling services market when exploration and production (E&P) firms lease rigs from contractors. Contractors use this cash to operate their units, acquire new rigs, and upgrade and maintain their fleet. The newbuild and upgrade markets are the primary mechanisms by which capital leaves the service market.

In the contract drilling market, rigs owned and operated by contractors are leased to E&P firms on a dayrate basis to drill or service wells. The dayrate is the daily price to lease a rig and includes the use of the rig and its crew but does not include most of the other costs associated with drilling and completing a well (e.g., casing, drilling fluids, logistics, well evaluation, etc.). The drilling service industry is the largest and

Fig. 2.1 Direction of cash flow through offshore rig markets



most closely followed of the five markets and drives the activities of investors in the other markets.

The newbuild market uses shipyard labor and capital to convert steel and third party equipment into rigs. Drilling contractors enter into turnkey contracts with shipyards for the construction and delivery of one or more rigs, or yards may build on speculation. The newbuild market is primarily Asian with major shipyards in Singapore, South Korea, and China.

Rigs operate offshore in a corrosive and hostile environment, and steel and equipment needs to be replaced for safe and efficient operations. As a rig ages, its technology also becomes obsolete and upgrades are required to sustain competitiveness and market value. The upgrade market is a ship repair market which both upgrades and maintains rigs. Upgrades improve and modernize rig technology and represent significant capital expenditures.

In the secondhand market, rigs are sold among and between contractors and other market participants. Rigs may be sold for use in the service market, may be converted to another use by the buyer, or sold into the scrap market. Transactions include corporate mergers where all the assets of the firm are purchased, liquidations during bankruptcy where one or more units may be purchased, or conventional sales.

In the scrap market, shipbreaking firms buy rigs on the secondhand market, either directly from contractors or via brokers. Equipment is removed and reused or sold as market conditions and demand permit. Following sale, dismantling occurs and the steel is sold for scrap to steel mills. Rigs in the U.S. may be stored for years until the price of scrap steel is adequate to make dismantling economic, while in international yards, rigs are broken down quickly along with beached ships [14].

The financial value of individual sales in the scrap market is low, and companies do not frequently report income from scrap sales leading to the smallest and least transparent of the five markets.

2.2 Contract Drilling Market

2.2.1 Measures

The contract drilling service market is described by dayrates, utilization and fleet size. Dayrates behave according to demand and supply conditions, and as regional demand approaches available supply, dayrates generally rise. Demand for drilling is driven by the capital spending patterns of E&P companies, which in turn, is based on operator's expectations of future oil and gas prices, the availability of acreage, and many other factors [11, 15]. Dayrates are an indicator of market conditions and the same drivers that impact dayrates tend to influence the rest of the offshore service industry.

Utilization is a system measure defined by the proportion of rigs working at a point in time to the available fleet within a specific region. Industry capacity is not a fixed resource because companies can add rigs through newbuilding and relocation to respond to higher demand and stack rigs when demand declines. While adding new capacity takes several years, rigs have very long lives (25+ years), and when demand weakens, overcapacity in the market may lead to prolonged declines in utilization. Stacking units removes capacity from the market and can be performed relatively quickly to help support prices, but stacking, like newbuilding decisions, are firm specific and are not performed in unison. High utilization cause dayrates to rise and provide a signal to operators that additional capacity can be absorbed in the market [4].

Fleet size describes the total number of rigs of a given water depth or class. Fleet size is described by firm, and when reported regionally, is an indicator of the total capacity in the drilling market at a given point in time. The scale and quality of a contractor's asset base is correlated with its revenue base. A large asset base implies a platform for sustainable earnings and cash flows and is related to a company's market position, its ability to compete in terms of cost structure, and the ability to obtain financing for capital projects.

2.2.2 Players

The number of offshore drilling companies varies over time, and in 2012 there were approximately 100 offshore drilling contractors and the market was dominated by a small number of firms, including Transocean, Ensco, Diamond Offshore and Seadrill (Table 2.1). The top four firms owned 36 % of the 868 rigs in the world

Table 2.1 Distribution of rigs by class and operator circa 2Q2011

Company	Jackups	Semis	Drillships	Total	Ownership
Transocean	68	50	23	141	Public
Ensco	49	20	7	76	Public
Noble Drilling	45	14	13	72	Public
Hercules Offshore	53	0	0	53	Public
Diamond Offshore	13	32	3	48	Public
Seadrill	21	12	6	39	Public
COSL	27	6	0	33	State
Rowan	31	0	0	31	Public
Maersk Drilling	14	6	0	20	Subsidiary
Aban Offshore	15	0	3	18	Public
Saipem	7	7	2	16	Public
Nabors Offshore	16	0	0	16	Public
Atwood Oceanics	6	6	1	13	Public
National Drilling	13	0	0	13	State
ONGC	8	0	2	10	State
Petrobras	6	4	0	10	State
All others (87 firms)	147	66	46	259	
Top 4 firms	205	116	46	367	
Top 8 firms	337	134	52	523	
Total	539	223	106	868	

Source: Data from RigLogix [16]

Note: Count includes cold-stacked rigs and rigs under construction

fleet circa 2011 and the top eight firms owned over half of the marketable rigs. Fleet size changes over time with changing market conditions, but the changes are often slow and represent a small portion of the world's asset base. Asset transactions and additions are common but new firm entrants are infrequent. Most large firms are publicly owned and all but one of the major players in the market (National Drilling) are listed on stock exchanges. Contractors not listed in Table 2.1 own on average three rigs per firm.

2.2.3 Prices

Dayrates are the primary contract specification during the bidding process and are frequently announced by contractors and assembled by commercial data providers such as RigLogix, ODS-Petrodata, and RigData. Contract durations are often less than a year so there is a steady stream of new contracts that provide a large number of transparent and reliable data.

Jackup and floater dayrates were relatively stable from 2000 to 2005 in most regional markets before increasing sharply from 2005 to 2007 as oil prices rose (Fig. 2.2). Following the 2008 global recession, dayrates fell rapidly, especially in the over-supplied and volatile jackup market. Regional prices tend to move together and follow oil prices but not all markets respond in the same manner.

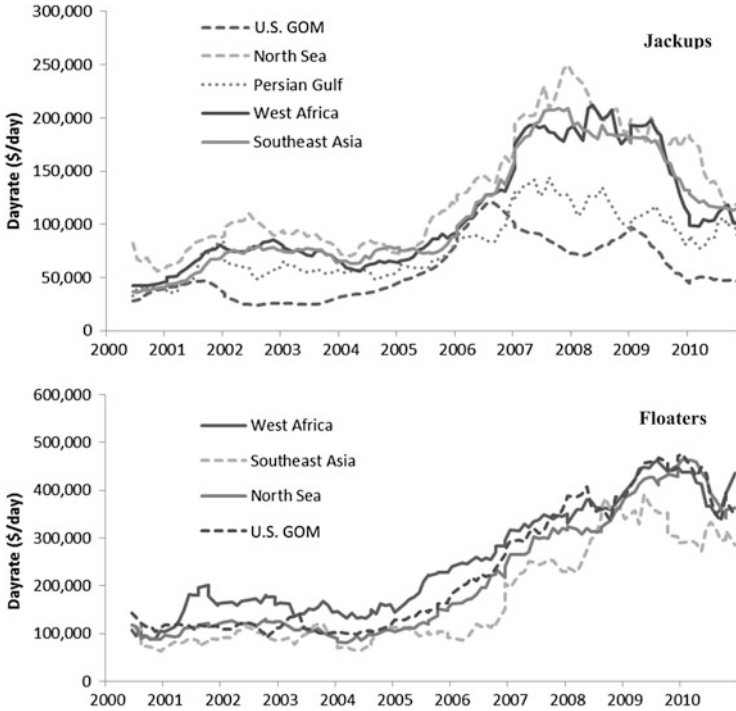


Fig. 2.2 Dayrates in the contract drilling market, 2000–2010 (Source: Data from RigLogix [16])

In the jackup market, there are significant price differences between regions, ranging from 50,000 to 100,000 \$/day in the U.S. GOM during 2009–2011 compared with 100,000–175,000 \$/day in the North Sea. In the floater market, there is less variation between regions due to patterns of supply and demand, technical requirements, and the greater similarity in deepwater rig specifications. In the 2009–2011 period, floater dayrates ranged between 300,000 and 500,000 \$/day with slightly lower dayrates in Southeast Asia than in the Atlantic basins.

2.2.4 Size

In 2011, approximately 85 % of the active fleet was operating in the Persian Gulf, U.S. GOM, Brazil, North Sea, Southeast Asia, West Africa, India and China (Table 2.2). Smaller markets include the Mexican GOM, Mediterranean, the Red Sea, Black Sea, Caspian Sea, the Caribbean and Australia. Frontier regions typically have less than five working rigs and include the Arctic Ocean, East Africa, Ghana, and the Philippines.

Table 2.2 Geographic distribution of active rigs by region in 2011

Region	Jackups	Semis	Drillships	Total
Persian Gulf	85	0	0	85
U.S. GOM	51	20	10	81
Brazil	3	52	15	70
North Sea	32	36	2	57
Southeast Asia	42	9	2	53
India	34	2	9	45
West Africa	17	13	9	39
China	28	4	0	32
Mexico	24	3	0	27
Egypt	20	2	2	24
All others	55	33	13	101
Top 4	171	108	27	306
Top 8	292	136	47	475
Total	394	175	57	626

Source: Data from RigLogix [16]

The number of offshore wells drilled since 1994 has ranged between 2,500 and 3,700 per year (Fig. 2.3). All exploratory wells are drilled using MODUs, but development drilling may occur from either MODUs or platform rigs, and in many instances, both mobile and platform rigs are responsible for well construction. Deepwater drilling activity has grown over the past 15 years and is the more lucrative business segment, but about 80 % of well construction still occurs in shallow water throughout the world. Asia has accounted for nearly half of drilling activity in recent years. North American activity is dominated by drilling in the U.S. GOM, but after the Macondo blowout on April 20, 2010 and subsequent drilling moratorium, activity levels remain depressed through 2012, before returning to historic levels.

2.2.5 Value

To estimate market value, the number of rigs of each class under contract in each month and region were counted and multiplied by the average regional dayrates. Over the past decade, the revenue in the contract drilling market ranged from \$21 billion in 2004 to over \$50 billion in 2009 (Fig. 2.4; Table 2.3). Although deepwater drilling makes up a relatively small proportion (about 20 %) of the number of wells drilled each year, the deepwater market accounted for approximately two-thirds of total revenue throughout the decade. In 2010, the North Sea and Brazil were the largest floater markets and the largest overall, while the Persian Gulf was the largest jackup market.

Market valuations are performed by a number of industry consultancies (e.g. Douglas-Westwood, GBI Research, IHS, R.S. Platou, Rystad Energy, Wood Mackenzie). Comparisons across firms depend on the assumptions and methods

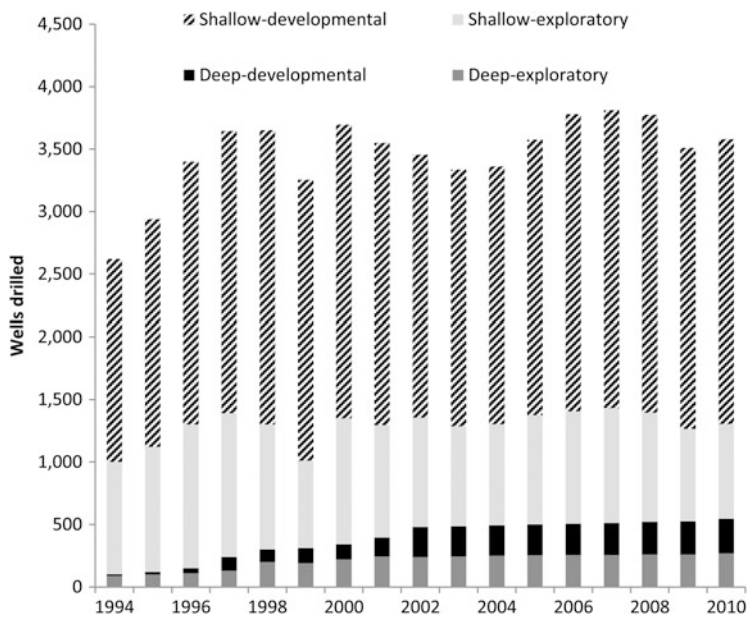


Fig. 2.3 Number of wells drilled per year, 1994–2010. Deepwater defined as greater than 400 m (Source: Data from Douglas-Westwood [5])

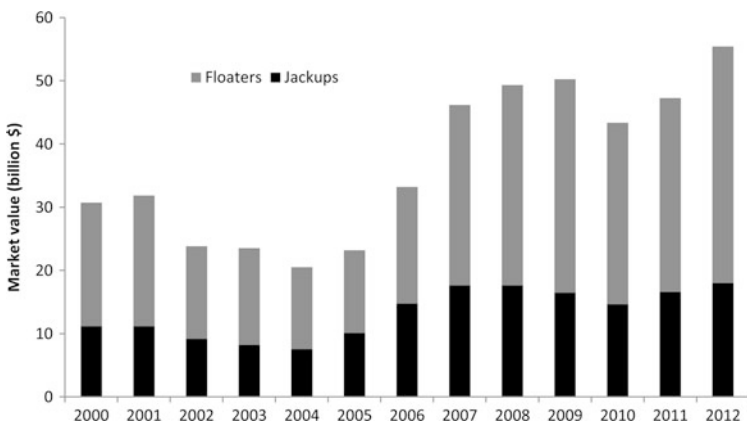


Fig. 2.4 Annual revenue of the offshore contract drilling market, 2000–2012 (Source: Data from RigLogix [16])

and the definition of the market employed [7, 18]. Large markets with a high degree of involvement by public E&P companies and drilling contractors are transparent and may be estimated with confidence. For small markets or those dominated by National Oil Companies and state-owned drilling contractors, more uncertainty

Table 2.3 Regional contract drilling markets in 2010

	Jackups (million \$)	Floater (million \$)	Total (million \$)
North Sea	1,865	6,436	8,302
Brazil	72	7,615	7,688
West Africa	994	4,314	5,307
U.S. GOM	983	3,781	4,765
Southeast Asia	1,931	2,092	4,023
Persian Gulf	3,253		3,253
India	1,263	1,369	2,632
China	1,377	526	1,903
Mediterranean	509	1,291	1,799
Mexico GOM	1,075	256	1,331
Australia	57	1,022	1,079
Venezuela & Caribbean	296	292	588
Red Sea	511		511
Total	14,187	28,588	42,775

Source: Data from RigLogix [16]; Authors calculations

arises in the valuation estimates. The Chinese market is particularly difficult to reliably estimate due to the large number of state-owned rigs.

2.3 Newbuild Market

2.3.1 Measures

The newbuild market is specified by deliveries and prices. The market is transparent because newbuilding is a significant capital expenditure for contractors and a significant source of revenue for rig-building shipyards. Prices are widely reported and tracked by the same firms that survey rig dayrates.

Drilling contractors order rigs when the expected rate of return from operating a new rig exceeds company investment criteria. The benefit of investment depends on dayrates and utilization over the life of the rig [2, 4], and since these are unknown and uncertain, management employ their own expectations relative to their business strategy [10]. The newbuild market is linked to conditions in the service market, and the cyclical nature of contract drilling causes similar cycles in the newbuild market.

Prices in the newbuild market are a function of demand and shipyard labor, equipment and steel costs. As shipyard demand increases, backlogs develop and yards are able to command higher prices for services. In addition, demand at rig-building shipyards is generally associated with demand across the drilling supply chain. Therefore, demand and prices for drilling equipment typically increase along with demand at shipyards, which leads to further price increases.

Table 2.4 Number of newbuild rigs on order by shipyard in 2011

Shipyard	Jackups	Semis	Drillships
Keppel FELS	17	4	1
Samsung		2	16
Daewoo		3	11
Jurong ^a	5	3	
Hyundai			6
PPL ^a	6		
COSCO		3	1
Dalian	4		
ABG	4		
Lamprell	4		

Source: Data from RigLogix [16]

^aPart of Sembcorp Marine**Table 2.5** Worldwide distribution of rig construction in 2011

Country	Jackups	Semis	Drillships	Total	Value (million \$)
South Korea	0	5	38	43	27,125
Singapore	33	7	2	42	13,402
China	9	6	3	18	6,979
Brazil	2	0	7	9	5,088
UAE	6	1	0	7	1,585
India	5	0	0	5	1,048
Norway	0	1	0	1	614
U.S.	2	0	0	2	375
Malaysia	1	0	0	1	227
Vietnam	1	0	0	1	180
Russia	1	0	0	1	100
Total	60	20	50	130	56,723

Source: Data from RigLogix [16]; Authors calculations

2.3.2 Players

In 2011, the jackup market was dominated by Keppel and its subsidiaries, while the drillship market was dominated by Daewoo and Samsung (Table 2.4). Keppel has shipyards located throughout the world, while the Daewoo and Samsung yards are located in Korea. Semi construction is spread across five Asian shipyards. There were 130 rigs under construction in 2011 worth an estimated \$57 billion (Table 2.5). Measured by capital flows, rig building in South Korea is about twice as large as the Singaporean industry, but this is due to the current boom in drillship construction which may not continue after the current round of drillships are delivered. Singapore is a major supplier of jackups to the world market while the U.S. plays a niche role in jackup supply to the GOM market.

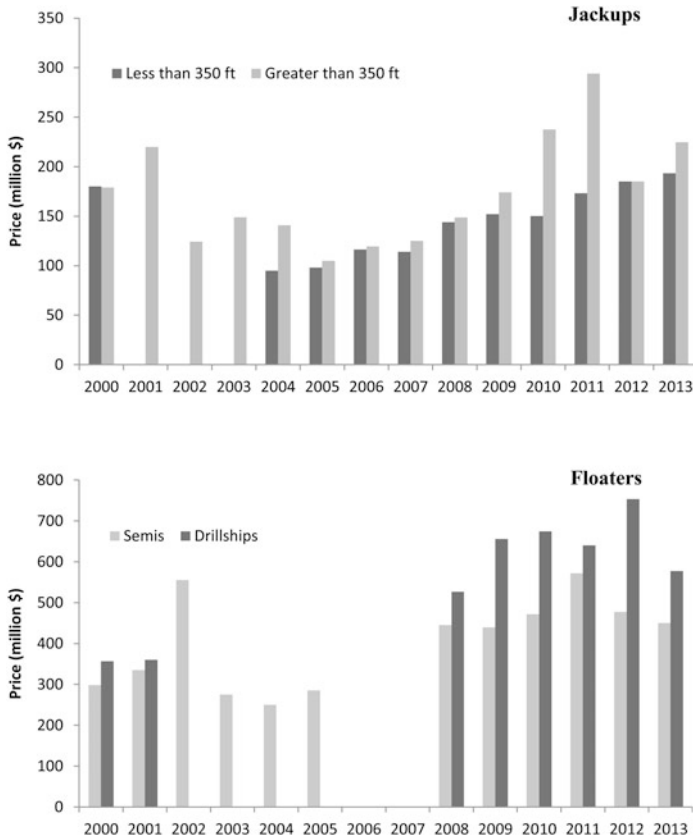


Fig. 2.5 Average cost of jackup and floater deliveries, 2000–2013 (Source: Data from RigLogix [16])

2.3.3 Prices

The average cost of jackup rigs increased from approximately \$100 million in 2004–2005 to approximately \$200 million for rigs delivered in 2012–2013 (Fig. 2.5). Price differences between high-spec (>350 ft) and standard (<350 ft) jackups varied only slightly over most of the cycle, except in 2010–2011 when several harsh environment high-spec units were delivered. Both ends of the jackup newbuild market respond to the same market stimuli due to similarities in the rigs and the firms engaged in construction.

Semis and floaters are two to three times more expensive than jackups and usually command dayrate premiums of similar magnitude. Drillships are more expensive to construct than semisubmersibles with average premiums ranging between \$70 to \$275 million.

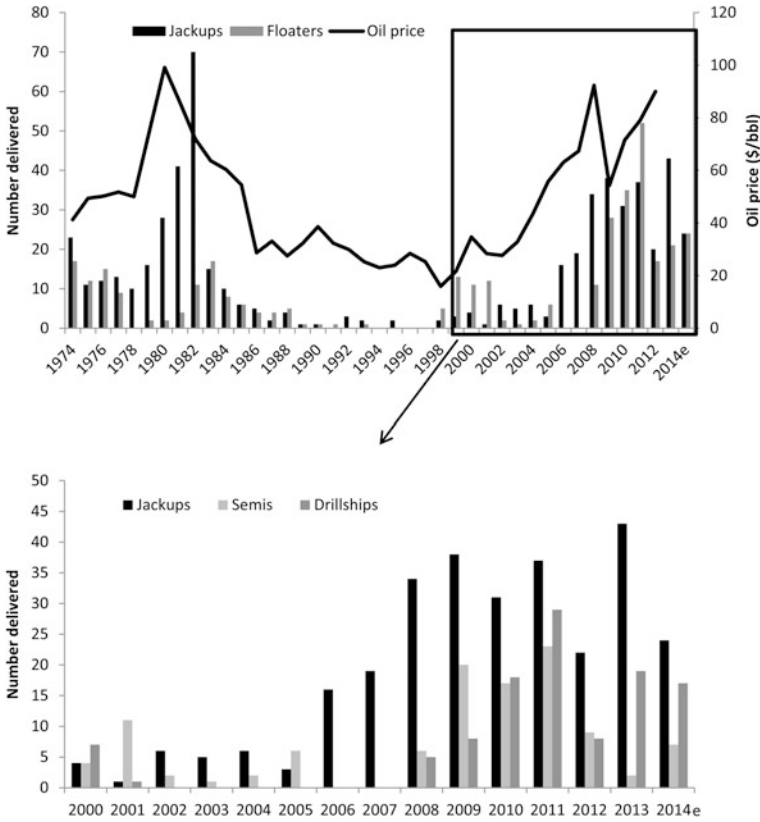


Fig. 2.6 Deliveries of newbuild rigs by class and oil prices, 1974–2014 (Source: Data from RigLogix [16])

2.3.4 Size

Newbuild deliveries have exhibited several cycles over the past half century (Fig. 2.6). The jackup industry began in the U.S. in the late 1950s and spread to Europe and Asia through the mid-1970s as exploration worldwide increased [1]. Prior to 1974, about 200 MODUs had been delivered. In the late 1970s and early 1980s, oil prices rose and the market grew rapidly, peaking in 1982 with 70 jackup and 11 floater deliveries.

Oil prices declined in the mid 1980s and demand collapsed, and during the decade 1986–1997, only 37 rigs were delivered. By the late 1990s, deepwater drilling technology had advanced, but few rigs were capable of drilling in water depths greater than 1,500 ft. Contractors responded by upgrading and ordering a small number of floaters. New jackup orders also began in this period due to concerns about the age of the fleet and operator interest in more challenging reservoirs and harsh environments.

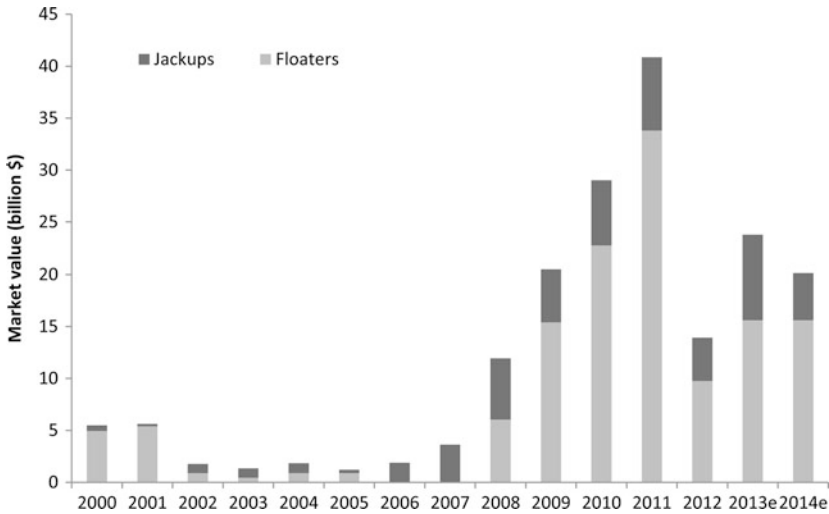


Fig. 2.7 Newbuild market size by delivery year, 2000–2014 (Source: Data from RigLogix [16])

During 2000–2005, about five jackups and five floaters were delivered each year. In 2005, the number of jackup orders increased dramatically followed by an increase in floater orders, due in large part to increasing oil and gas prices and contractors expectations of future demand. Jackup deliveries peaked in 2009 with 38 rigs delivered, and floater deliveries peaked in 2011 with 52 units. In every year since 2000, high-spec jackup deliveries have outnumbered standard jackups, and in 2011 only three standard jackups were delivered compared to 33 high-spec rigs.

2.3.5 Value

The value of the newbuild market is estimated¹ by tabulating the reported prices of rig deliveries. Market value peaked in 2010 at approximately \$18 billion, and in most years floaters made up the majority of the market value, while jackups made up the majority of deliveries (Fig. 2.7). Market revenue peaked in 2009–2011 due to high demand in the 2007–2009 period. Orders declined in 2009 and 2010 due to the recession, and as a result, market revenue in 2012 was low before subsequently rebounding.

¹ Cost information is not available for a small number of rigs built by state-owned shipyards for state-owned drilling contractors, and cost data may not be reported similarly in all cases, but these sources of bias are believed to be small both on an absolute and relative basis.

2.4 Upgrade Market

2.4.1 Measures

Rigs require routine maintenance and periodically undergo upgrades. Periodic maintenance occurs over a 3–10 year period and typically consists of painting, replacing corroded or worn components, upgrading living quarters, and changing out machinery and equipment. Maintenance is performed to repair defects, accommodate customer demands, and maintain the useful life and value of the rig.

In addition to periodic maintenance, rigs are generally upgraded and refurbished at least once over the course of their lifetime to improve technology and maintain competitiveness. Upgrades involve significant capital expenditures and often involve structural changes to the rig, such as adding dynamic positioning, increasing leg length, adding cantilever capability and increasing variable load [6, 21]. Installation of new drilling equipment is also common. Upgrades increase the value of the rig and its replacement cost and require several months to perform [17].

In some cases, E&P companies require modifications to a rig before commencement of a drilling program. These typically do not significantly alter rig specifications and are charged to the E&P company, either as a lump sum payment or amortized over the duration of the contract. Money spent to maintain a rig in an acceptable state are considered operating expenditures. Costs incurred to upgrade the specifications of the rig or extend its life are considered capital costs.

2.4.2 Players

For most repairs and maintenance, work can be performed at local ports without shipbuilding or drydocking facilities [23]. More intensive upgrades are conducted at specialized facilities. Lamprell and Keppel are dominant players most years and no other shipyard upgraded more than one rig during 2009–2010 (Table 2.6). Other firms active in the upgrade market include Signal International and Gulf Cooper in the U.S., Drydocks World in the U.A.E., Larsen and Toubro in Oman, Malaysia Marine and Heavy Engineering in Malaysia, Maua Shipyard in Brazil, PD&MS in the U.K., Rijeka Shipyard in Croatia, and Remontowa in Poland.

2.4.3 Prices

The scale of upgrades varies widely and only by reviewing the scope of work can the variation in cost be understood. Recent jackup upgrades have ranged between

Table 2.6 Major rig upgrades by shipyard, 2009–2010

Shipyard	Nation	2009	2010
Lamprel	UAE	3	8
Keppel	Singapore	2	2
Keppel	Brazil	3	
Keppel	Netherlands	1	2
Hindustan	India		1
Keppel	Philippines		1
L&T	Oman		1
Aker	Norway		1
Sembawang	Singapore	1	
Others		3	
Total		13	16

Source: Offshore Magazine [13]

Table 2.7 Jackup upgrade contracts

Customer	Shipyard	Year	Cost (million \$)	Scope
EnSCO	Lamprell	2008	14.8	Steel renewal, leg repairs, accommodation upgrade, piping renewal, painting
National Drilling	Drydocks	2010	20	Life extension
GSP	Lamprell	2010	12	Upgrade electrical, drilling equipment, accommodation refurbishment
Japan Drilling	Lamprell	2010	11.8	Refurbishment
Aban Offshore	ABG	2011	13.2	Steel renewal, replacement of equipment
Gulf Drilling	Keppel-Qatar	2011	16.2	Major upgrade
Millennium	Lamprell	2011	27.5	Conversion to accommodation unit

Source: Industry press

\$10 and \$30 million and include painting, drilling equipment change-outs, new accommodations, piping and electrical system replacement, and leg and spudcan repair work (Table 2.7). Upgrade costs can exceed \$50 million but at higher prices many firms choose to newbuild rather than upgrade [12].

Floater upgrades vary significantly in price depending on the type of upgrade (Tables 2.8 and 2.9). Complete rebuilds using the existing hull cost \$300–\$350 million and replace nearly all other components. Minor upgrades costing \$10–\$50 million include survey work, helideck addition, quarters replacement, piping installation, and structural modifications. At the mid-range, \$75–\$150 million will buy increased variable load, new accommodations and equipment. The 2010 upgrades of Noble’s drillships *Roger Eason* and *Leo Segerius* are representative. For \$152 million, new stern blocks were added to both vessels, over 85 % of the marine operating systems were replaced, derricks were refurbished, top drives and cranes were replaced, and the dynamic positioning system power was increased.

Table 2.8 Semisubmersible upgrade contracts

Customer	Shipyard	Year	Cost (million \$)	Scope
Diamond	Keppel	2008	310	Complete rebuild
Noble	Signal	2010	15	Addition of helideck, quarters upgrade
Awilco	Remontowa	2010	75	Increase variable load, quarters
Fred Olsen	Keppel	2010	160	Survey, renewal and upgrade
Awilco	Remontowa	2010	15	Survey
Transocean	Semco	2011	20	Piping installation
Diamond	Keppel	2012	300	Complete rebuild

Source: Industry press

Table 2.9 Drillship upgrade contracts

Customer	Shipyard	Year	Cost (million \$)	Scope
Neptune	Sembawang	2009	340	Increase water depth capacity, add dynamic positioning, upgrade drilling equipment
Transocean	Signal	2010	32.4	Living quarters upgrade, equipment replacement, painting, hull and tank repair
Noble	Keppel	2010	152	Replacement of accommodations and heliport modifications to stern

Source: Industry press

2.4.4 Size

A total of 287 rigs had major upgrades between 2001 and 2010 (Table 2.10). On average, 17 jackups and 13 floaters were upgraded each year, with peaks in 2004 and 2007 approximately coinciding with the timing of newbuild orders and suggesting that firms invest in upgrading under roughly the same conditions in which they invest in newbuilding. Upgrade activity is firm and rig specific and depends on factors such as the age of the fleet, the capital budgets of firms, and market demand.

2.4.5 Value

Estimating market revenue is complicated by the wide range of costs and the definition of what constitutes an upgrade. Shipyards generally do not breakout rig upgrade cost in their financial reports, and for private shipyards, no financial data is reported at all, therefore, a range of market values is provided by enumerating major upgrades and assuming a minimum and maximum upgrade cost per rig.

Table 2.10 Number of major upgrades and estimated market value, 2001–2010

	Jackups	Floaters	Total	Value (billion \$)
2001	8	7	15	0.6–1.9
2002	32	10	42	1.0–3.3
2003	15	12	27	1.0–3.3
2004	22	15	37	1.3–4.3
2005	9		9	0.1–0.2
2006	13	20	33	1.6–5.3
2007	36	29	65	2.5–8.1
2008	18	18	36	1.5–4.9
2009	9	4	13	0.4–1.2
2010	11	5	16	0.5–1.5
Total	172	115	287	10.1–34.3

Source: Offshore Magazine [13]; Authors calculations

Jackup upgrades are estimated to cost at least \$10 million and floater upgrades at least \$75 million; at a maximum, jackup and floater upgrade costs are estimated as \$25 and \$250 million. Upgrade costs for individual rigs may fall outside of this range. Under these assumptions, the upgrade market is estimated to have an average value between \$1 and \$3.4 billion per year.

2.5 Secondhand Market

2.5.1 Measures

The secondhand market is measured by the number, value and type of transactions that occur. Rigs sold on the secondhand market may be part of the legacy fleet or newbuilds; units may be sold through mergers, liquidations, or private transactions; rigs may be sold with or without an existing contract backlog; and buyers may continue to use the vessel as a rig or may convert it to another use.

Transactions are conducted for a wide variety of reasons. In some cases, firms sell rigs due to bankruptcy. For example, Hercules purchased 20 rigs from Seahawk in 2011 for \$105 million. Another example is Seadrill's purchase of a Petroprod rig from Sembcorp in 2010. In this case, Petroprod ordered a rig from Sembcorp, but entered bankruptcy before construction was finished. Sembcorp completed construction and sold the rig to Seadrill. In other cases, firms sell rigs to eliminate non-core assets which frequently involves a large drilling contractor selling older rigs to a low-spec specialist. For example, in September 2012, Transocean agreed to sell 38 shallow water rigs to Shelf Drilling International Holdings for \$1.05 billion as part of its strategy to focus on the high-end market.

Rigs may be obtained through merger activity such as Seadrill's purchase of Scorpion in 2010, Transocean's purchase of Aker Drilling in 2011, and Noble's purchase of Frontier in 2010. However, the distinction between a secondhand transaction and a merger is ambiguous. For example, Enasco's purchase of Pride

Table 2.11 Number of transactions in the secondhand market for select firms, 2005–2010

Firm	Buyer	Seller
Hercules	7	4
Seadrill	8	3
Transocean		10
Songa	4	4
Noble	6	
Ensco	1	4
Rowan	3	2
Diamond Offshore	1	4
Maersk	2	3
Aban	3	1
Saipem	4	

Source: Data from RigLogix [16]

Note: Transactions frequently involve multiple rigs of different quality and classes

in 2010 and Transocean's purchase of Global Santé Fe in 2007 are typically considered mergers by market tracking services and are not included in secondhand market data. Mergers of similarly sized companies are not considered secondhand transactions, while mergers between a larger and smaller firm are often considered secondhand transactions.

2.5.2 Players

Hercules and Seadrill have been the most frequent buyers in the secondhand market in recent years, while Transocean has been the most frequent seller (Table 2.11). Seadrill has targeted newbuild and high-spec rig purchases, while Hercules has focused on less expensive, low-spec units as an alternative to newbuilding. Transocean has been active in divesting older rigs, particularly jackups.

The newbuild market allows firms to add capacity, but the secondhand market is critical to matching fleets to business strategies. For firms focused on the high specification market, the secondhand market provides a means to divest older assets. For firms focused on lower specification rigs, the secondhand market is an economic way to increase fleet size and gain market share.

2.5.3 Prices

Secondhand prices range widely due to differences in rig age and factors related to the buyer and seller and market conditions at the time of sale (Table 2.12). The minimum value of a rig on the secondhand market is \$5 million which is approximately equal to the scrap value of a unit. Low-priced transactions are frequently scrap sales or conversions.

Table 2.12 Secondhand market prices by year, 2005–2010

Year	Jackups (million \$)	Floater (million \$)
2005	42 (22–60)	37 (13–60)
2006	67 (17–210)	102 (14–270)
2007	148 (26–212)	321 (211–675)
2008	106 (9–200)	294 (5–676)
2009	84 (5–199)	475 (460–490)
2010	188 (26–356)	288 (102–560)

Source: Data from RigLogix [16]

Note: Average price depicted. Price range shown in parentheses

Prices on the secondhand market are determined by market conditions and the net asset value (NAV) of the rig which is an estimate of its net revenue generation potential over its remaining life. Factors that influence NAV include rig design class, operational water depth, drilling depth and equipment specifications, age and condition, location, and participants expectations of future market conditions.

In the absence of market constraints the secondhand price should approximate the NAV, however, imperfect information, supply–demand imbalances, a limited number of players, and financial pressure (e.g. bankruptcy) may cause NAV and secondhand market prices to differ. For example, when Seahawk declared bankruptcy in 2011, it owned a fleet of 20 low specification jackup rigs valued at approximately \$397 million. Hercules was the only interested buyer and paid \$105 million to acquire the fleet.

The maximum price for a secondhand marine vessel can exceed the price of a newbuild if sold with a contract backlog, and this is particularly common in company acquisitions [22]. Sale with a contract backlog will increase the asset value. Secondhand rigs may also be more valuable because they are available immediately while rigs under construction may only be delivered after a multi-year delay. In recent years, secondhand prices for recently built rigs have been approximately equal to newbuild prices.

2.5.4 Size

From 2005 to 2010 about 20 rigs were sold each year with the majority being jackups (Table 2.13). Jackups transacted the most, followed by semis and drillships. Approximately 2–5 % of the global fleet is transferred each year.

2.5.5 Value

The secondhand market is valued on the order of \$2–\$4 billion per year. When cost data for a particular transaction was not available, the value of the transactions was

Table 2.13 Rigs sold and market valuation in the secondhand market, 2005–2010

Year	Jackups	Semis	Drillships	Total	Value (billion \$)
2005	9	5	1	15	0.5
2006	20	10	1	31	2.1
2007	13	6	3	22	3.7
2008	10	3	1	14	2.2
2009	10	3	0	13	2.0
2010	20	4	7	31	6.8
Total	82	31	13	126	17.3

Source: Data from RigLogix [16]; Authors calculations

estimated based on the age of the rig, its water depth capability, and the average cost of similar transactions during the year. High market value in 2010 was due to three transactions: the purchase of Skeie Drilling by Rowan, the purchase of Scorpion by Seadrill, and the purchase of Frontier by Noble. Each of these transactions exceeded \$1 billion.

2.6 Scrap Market

2.6.1 Measures

The scrap market is characterized by the annual number of transactions and their prices. Cold- and dead-stacked rigs are sold to specialized shipbreaking firms for dismantling and recycling [8]. Rigs may be scrapped after being damaged in a hurricane if toppled offshore, or may be economic to repair and re-enter the fleet (Fig. 2.8). When rigs are scrapped following damage, a marine salvage firm is contracted to remove the rig to the owner's shipyard.

2.6.2 Players

Rig scrapping is a small part of the larger ship breaking industry concentrated in India, Pakistan, China, Turkey and Bangladesh [14, 19]. Shipbreaking in the U.S. is primarily driven by disposal of U.S. Navy ships and other federal vessels and very little rig hull deconstruction occurs domestically [20]. The firms most likely to process scrapped rigs in the U.S. are located along the Brownsville, Texas ship channel: Esco Marine, International Shipbreaking, Marine Metals and All-Star Metals.

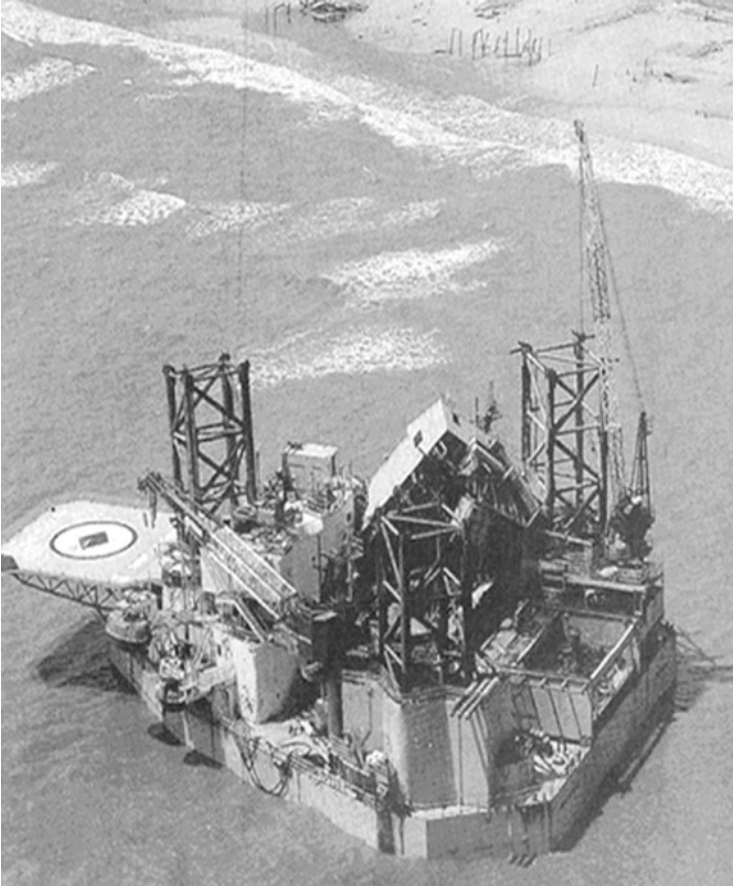


Fig. 2.8 The *Ocean Warwick* grounded near Dauphin Island, Alabama following Hurricane Katrina was repaired and re-entered the fleet (Source: Smit)

2.6.3 Prices

Vessels are sold to ship breaking firms directly or via brokers on a per ton basis and the value of a vessel will principally depend on its weight, the scrap metal price at the time of sale, the labor required to dismantle the unit, and the transport cost [9]. Most of the value in an obsolete rig lies in the drilling equipment which is removed and sold before the rig is scrapped [3].

In 2010 and 2011, Hercules sold five jackups for scrap ranging between \$1 and \$5 million with an average price of \$2.5 million, consistent with scrap steel prices in the range of \$300–\$550 per ton. In some cases, scrapping may result in a net cost for contractors. In 2008, for example, the Texas General Land Office contracted Cleveland Wrecking Company to remove the jackup rig *Zeus* in the Freeport Ship

Channel. The Cleveland Wrecking Company was paid \$1.75 million in addition to the value of the scrap steel.

2.6.4 Size

Rigs are removed from the fleet when converted to another use, when lost due to accidents or catastrophic events, or when sold into the scrap market. Conversion to another use is usually more profitable than scrapping, but the option may only be available sporadically. In addition, because storage costs are relatively low, there is little incentive for contractors to retire rigs from the fleet and a large number of dead-stacked rigs are in storage awaiting final disposition. As a result, rigs are rarely scrapped unless they have sustained significant damage from storms, blowouts or other accidents. Between 2005 and 2011, just seven rigs in the U.S. were sold for scrap [16].

2.6.5 Value

Given the small number of rigs scrapped each year and their low value, the size of the scrap market is for all practical purposes negligible relative to the other rig markets. In many years, no rigs are scrapped, and when rigs are scrapped the value of transactions are based on the rig weight and scrap metal price at the time of sale, rarely exceeding \$5 million per unit. The average size of the market is estimated to be less than \$50 million annually.

As the legacy fleet continues to age, scrapping activity will increase and the market may grow, and since many aging rigs are in the GOM, most of these rigs are likely to be processed by U.S. ship recyclers. While costs at U.S. ship recyclers are high relative to world costs, they will likely be sustained by the high costs to transport a rig from the GOM to Asia.

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