

## Equities

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# Precious Metals Outlook

## The Platinum-Palladium Dichotomy

- **PGM basket price upgrade on bullish outlook for palladium** — We have upgraded our medium-term PGM basket price by 1-11%, due mainly to a significantly more bullish view on palladium. We expect the palladium market to move into a rising deficit from 2011 onwards. In contrast, we do not see significant upside in the platinum price from current levels and expect a medium-term surplus market. This is as new mine supply and rising auto catalyst recycling are likely to exceed growth in demand.
- **We considered the impact of three macroeconomic scenarios** — We have developed and tested the impact of three macroeconomic scenarios on the supply-demand fundamentals of platinum and palladium. Our CIRA house view of ‘protracted growth’ formed our base case scenario. We also tested the impact of a ‘double-dip’ (worst case scenario) and ‘sustained-growth’ (best case scenario) on our supply-demand outlook for both metals.
- **Stars aligning for palladium** — We view a rising deficit market in palladium as likely in the medium term. This is due mainly to our view of strong growth in light vehicle (LV) production in gasoline-based markets (US and China), and a likely depletion of above-ground stock. As a result, we have a bullish outlook on the medium-term price of palladium.
- **Limited upside for platinum** — Even though EU incentive schemes and rising investment demand in 2009/10 are likely to drive the platinum market into deficit in 2010, we expect this to be short-lived. This is as we expect a decrease in Western European LV production in 2011, together with rising mine supply and recycling, to drive the market into surplus from 2011 onwards. We view a range-bound platinum price as likely in the medium term, as its precious metal attribute is likely to keep it correlated to our muted gold-price outlook.

### ■ Industry Overview

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*With thanks to*

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**Figure 1. Summary changes to CIRA's precious metals price expectations**

	2009	2010F	2011F	2012F	2013F	2014F	LT real
R/USD exchange rate	8.37	7.37	7.49	8.23	8.91	9.40	10.00
Platinum price - new (USD/ounce)	1,173	1,585	1,625	1,600	1,500	1,500	1,500
Platinum price - old (USD/ounce)	1,173	1,548	1,600	1,500	1,400	1,400	1,500
% change	0%	2%	2%	7%	7%	7%	0%
Palladium price - new (USD/ounce)	246	492	575	650	550	500	450
Palladium price - old (USD/ounce)	246	447	450	400	400	400	400
% change	0%	10%	28%	63%	38%	25%	13%

Source: Citi Investment Research and Analysis

**See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.**

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# Platinum supply-demand outlook

Figure 2. Platinum supply-demand outlook

	2005	2006	2007	2008	2009	2010F	2011F	2012F	2013F	2014F	2015F
<b>Demand</b>											
<b>Auto catalysts</b>											
Europe	1960	2060	2055	1970	970	1515	1484	1521	1649	1717	1739
North America	820	705	850	505	370	566	634	690	723	734	735
China	120	155	175	145	130	217	254	296	324	349	362
Japan	600	605	610	610	395	545	592	605	607	611	617
Rest of the world	295	380	455	420	365	458	481	516	539	562	580
<b>Total</b>	<b>3795</b>	<b>3905</b>	<b>4145</b>	<b>3650</b>	<b>2230</b>	<b>3302</b>	<b>3445</b>	<b>3628</b>	<b>3842</b>	<b>3973</b>	<b>4034</b>
<b>Jewellery</b>											
Europe	195	200	200	205	185	197	199	196	193	193	196
North America	285	270	225	200	135	182	192	198	204	210	216
China	1205	1060	1070	1060	2080	1456	1412	1483	1557	1604	1652
Japan	670	585	540	530	535	589	619	560	504	504	558
Rest of the world	110	80	75	65	75	81	82	81	79	79	81
Jewellery recycled	500	555	655	695	565	650	666	656	615	615	615
<b>Net jewellery demand</b>	<b>1965</b>	<b>1640</b>	<b>1455</b>	<b>1365</b>	<b>2445</b>	<b>1856</b>	<b>1838</b>	<b>1861</b>	<b>1921</b>	<b>1974</b>	<b>2088</b>
<b>Investment</b>											
Europe	0	0	195	105	385	250	150	101	50	50	50
North America	25	20	30	60	105	299	174	151	79	39	39
Japan	-15	-65	-60	385	160	181	71	29	29	29	29
Rest of the world	5	5	5	5	10	25	55	6	6	6	6
<b>Total</b>	<b>15</b>	<b>-40</b>	<b>170</b>	<b>555</b>	<b>660</b>	<b>755</b>	<b>449</b>	<b>286</b>	<b>163</b>	<b>124</b>	<b>124</b>
<b>Industrial</b>											
Europe	340	330	350	335	290	257	270	283	294	304	314
North America	455	445	420	380	250	291	306	321	333	344	356
China	120	180	295	205	0	157	165	173	180	186	192
Japan	260	250	225	210	160	161	169	177	184	190	197
Rest of the world	515	625	555	595	440	456	479	503	521	539	558
<b>Total</b>	<b>1690</b>	<b>1830</b>	<b>1845</b>	<b>1725</b>	<b>1140</b>	<b>1322</b>	<b>1389</b>	<b>1458</b>	<b>1512</b>	<b>1563</b>	<b>1616</b>
<b>Total platinum demand</b>	<b>7465</b>	<b>7335</b>	<b>7615</b>	<b>7295</b>	<b>6475</b>	<b>7235</b>	<b>7121</b>	<b>7233</b>	<b>7439</b>	<b>7635</b>	<b>7862</b>
<b>Supply</b>											
<b>Mine supply</b>											
Southern Africa	5273	5462	5240	4686	4693	4715	4938	5088	5283	5539	5677
Russia	890	920	915	805	785	810	815	799	783	767	752
North America	365	345	325	325	260	340	372	386	381	376	371
Rest of world	112	103	120	124	178	178	180	180	180	180	180
<b>Total</b>	<b>6640</b>	<b>6830</b>	<b>6600</b>	<b>5940</b>	<b>5916</b>	<b>6043</b>	<b>6305</b>	<b>6453</b>	<b>6627</b>	<b>6862</b>	<b>6980</b>
<b>Auto catalyst recycling</b>											
Europe	170	190	215	385	299	353	374	396	412	428	446
North America	505	575	605	630	421	505	556	578	601	625	650
China	0	0	10	15	23	34	51	76	91	109	126
Japan	35	35	35	60	54	59	65	72	78	84	91
Rest of the world	60	60	70	45	44	53	63	73	79	85	92
<b>Total</b>	<b>770</b>	<b>860</b>	<b>935</b>	<b>1135</b>	<b>840</b>	<b>1004</b>	<b>1109</b>	<b>1195</b>	<b>1260</b>	<b>1332</b>	<b>1404</b>
<b>Total platinum supply</b>	<b>7410</b>	<b>7690</b>	<b>7535</b>	<b>7075</b>	<b>6756</b>	<b>7047</b>	<b>7414</b>	<b>7648</b>	<b>7887</b>	<b>8193</b>	<b>8383</b>
<b>Supply-demand surplus/(deficit)</b>	<b>-55</b>	<b>355</b>	<b>-80</b>	<b>-220</b>	<b>281</b>	<b>-188</b>	<b>293</b>	<b>415</b>	<b>448</b>	<b>559</b>	<b>521</b>

Source: Johnson Matthey, CIRA estimates

## Palladium supply-demand outlook

Figure 3. Palladium supply-demand outlook

	2005	2006	2007	2008	2009	2010F	2011F	2012F	2013F	2014F	2015F
<b>Demand</b>											
<b>Auto catalysts</b>											
Europe	975	890	920	1005	995	1022	1049	1147	1330	1476	1590
North America	1430	1415	1695	1290	1020	790	1484	1623	1708	1808	1841
China	170	220	325	390	685	1154	1068	1244	1461	1626	1720
Japan	660	795	820	885	590	626	848	849	852	845	849
Rest of the world	630	695	785	895	760	1189	980	1083	1153	1210	1253
<b>Total</b>	<b>3865</b>	<b>4015</b>	<b>4545</b>	<b>4465</b>	<b>4050</b>	<b>4781</b>	<b>5428</b>	<b>5946</b>	<b>6505</b>	<b>6965</b>	<b>7254</b>
<b>Jewellery</b>											
Europe	35	40	40	45	50	53	54	53	52	52	53
North America	20	40	55	60	60	81	85	88	90	93	96
China	1250	890	705	740	560	392	380	399	419	432	445
Japan	155	145	125	115	120	132	139	126	113	113	125
Rest of the world	30	25	25	25	25	27	27	27	26	26	27
Jewellery recycled	60	135	235	130	130	70	70	63	63	63	63
<b>Net jewellery demand</b>	<b>1430</b>	<b>1005</b>	<b>715</b>	<b>855</b>	<b>685</b>	<b>616</b>	<b>615</b>	<b>630</b>	<b>639</b>	<b>654</b>	<b>683</b>
<b>Investment</b>											
Europe	0	0	280	370	525	341	205	137	69	69	69
North America	220	50	-20	50	95	271	157	137	71	36	36
Japan	0	0	0	0	0	0	0	0	0	0	0
Rest of the world	0	0	0	0	5	13	28	3	3	3	3
<b>Total</b>	<b>220</b>	<b>50</b>	<b>260</b>	<b>420</b>	<b>625</b>	<b>625</b>	<b>389</b>	<b>277</b>	<b>142</b>	<b>107</b>	<b>107</b>
<b>Industrial</b>											
Europe	445	485	465	375	345	395	415	436	452	467	483
North America	795	610	565	515	480	543	570	598	620	642	663
China	350	410	435	320	320	337	354	372	386	399	412
Japan	835	635	635	625	610	659	692	726	753	779	805
Rest of the world	345	500	540	585	525	616	647	680	705	729	754
<b>Total</b>	<b>2465</b>	<b>2350</b>	<b>2325</b>	<b>2075</b>	<b>1885</b>	<b>2187</b>	<b>2296</b>	<b>2411</b>	<b>2500</b>	<b>2585</b>	<b>2673</b>
<b>Total palladium demand</b>	<b>7980</b>	<b>7420</b>	<b>7845</b>	<b>7815</b>	<b>7245</b>	<b>8208</b>	<b>8728</b>	<b>9264</b>	<b>9785</b>	<b>10311</b>	<b>10717</b>
<b>Supply</b>											
<b>Mine supply</b>											
Southern Africa	2730	2910	2900	2570	2550	2631	2917	3209	3345	3589	3716
Russia	4620	3920	4540	3660	3635	3558	3610	3600	3580	3580	3580
North America	910	985	990	910	755	975	1050	1066	1060	1053	1053
Rest of world	145	135	150	170	160	160	180	180	180	180	180
<b>Total</b>	<b>8405</b>	<b>7950</b>	<b>8580</b>	<b>7310</b>	<b>7100</b>	<b>7324</b>	<b>7757</b>	<b>8055</b>	<b>8165</b>	<b>8403</b>	<b>8530</b>
<b>Auto catalyst recycling</b>											
Europe	165	225	300	310	330	389	413	438	455	473	492
North America	30	30	35	75	55	61	67	73	79	85	92
China	390	500	590	660	480	576	634	659	685	713	741
Japan	0	0	20	30	35	53	79	118	142	170	196
Rest of the world	40	50	70	65	65	78	94	108	116	126	136
<b>Total</b>	<b>625</b>	<b>805</b>	<b>1015</b>	<b>1140</b>	<b>965</b>	<b>1156</b>	<b>1285</b>	<b>1395</b>	<b>1477</b>	<b>1567</b>	<b>1657</b>
<b>Total palladium supply</b>	<b>9030</b>	<b>8755</b>	<b>9595</b>	<b>8450</b>	<b>8065</b>	<b>8480</b>	<b>9043</b>	<b>9450</b>	<b>9643</b>	<b>9970</b>	<b>10186</b>
<b>Supply-demand surplus/(deficit)</b>	<b>1050</b>	<b>1335</b>	<b>1750</b>	<b>635</b>	<b>820</b>	<b>273</b>	<b>314</b>	<b>187</b>	<b>-143</b>	<b>-341</b>	<b>-531</b>

Source: Johnson Matthey, CIRA estimates

## Summary

In light of the new supply-demand analysis in this note, we have revised our PGM price forecasts. Upgrades to our medium-term PGM price forecasts are driven mainly by a more bullish outlook for palladium, while we expect platinum to remain range-bound at current levels.

## The platinum-palladium dichotomy

### We considered the impact of three macroeconomic scenarios

We developed and tested the impact of three macroeconomic scenarios on the supply-demand fundamentals of platinum and palladium. Our CIRA house view of 'protracted growth' formed our base case scenario. We also tested the impact of a 'double-dip' (worst case scenario) and 'sustained-growth' (best case scenario) on our supply-demand outlook for both metals.

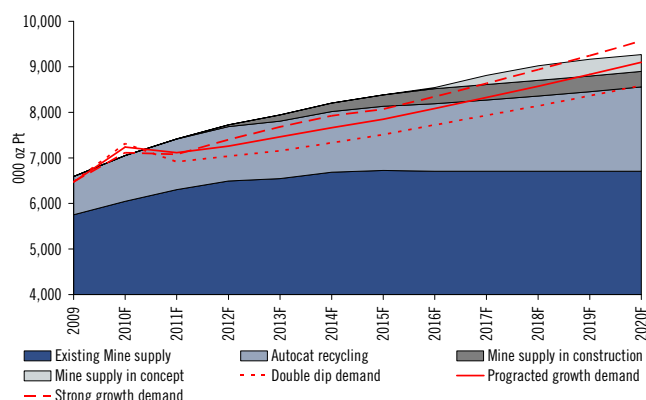
### All scenarios point to a likely surplus market for platinum

Even though a 2010 deficit market is likely for platinum, all scenarios point to a surplus market from 2011 onwards as rising mine supply and growing auto catalyst recycling are likely to outstrip growth in demand.

### And a growing deficit market in palladium

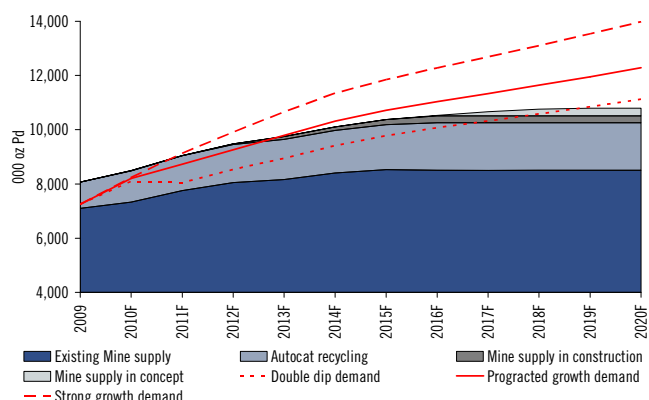
In contrast, we view a growing deficit market in palladium as likely from 2011/12 onwards, unless a double-dip scenario materializes. This is mainly as we expect strong growth in LV production in gasoline-based markets (near term in the US, and near to long term in China), and a likely depletion in Russian stockpiles over the next 12-24 months.

Figure 4. Platinum supply-demand profile



Source: Johnson Matthey, CIRA estimates

Figure 5. Palladium supply-demand profile



Source: Johnson Matthey, CIRA estimates

### PGM basket price upgrades driven mainly by bullish palladium outlook

As a result, we expect platinum to remain range-bound at current levels and have made only minor upgrades to our medium-term assumptions (2-7%). We have upgraded our palladium price expectations by c.20-60% in the medium term and 13% long-term based on the results from our new supply-demand analysis. We have made no changes to our rhodium price assumptions.

Figure 6. Changes to CIRA's precious metals price expectations

	2009	2010F	2011F	2012F	2013F	2014F	Long-term real	Long-term nominal
<b>ZAR/USD</b>								
CIRA ZAR/USD - New	8.37	7.37	7.49	8.23	8.91	9.40	10.00	10.00
CIRA ZAR/USD - Old	8.37	7.61	8.15	8.81	9.30	9.60	10.00	10.00
% change	0%	-3%	-8%	-7%	-4%	-2%	0%	0%
<b>Platinum</b>								
Platinum price - New (USD/ounce)	1,173	1,585	1,625	1,600	1,500	1,500	1,500	1,722
Platinum price - Old (USD/ounce)	1,173	1,548	1,600	1,500	1,400	1,400	1,500	1,722
% change	0%	2%	2%	7%	7%	7%	0%	0%
Platinum price - New (ZAR/kilogram)	315,692	375,437	391,097	423,573	429,743	453,376	482,315	553,728
Platinum price - Old (ZAR/kilogram)	315,692	378,787	419,293	424,920	418,650	432,154	482,315	553,698
% change	0%	-1%	-7%	0%	3%	5%	0%	0%
<b>Palladium</b>								
Palladium price - New (USD/ounce)	246	492	575	650	550	500	450	517
Palladium price - Old (USD/ounce)	246	447	450	400	400	400	400	459
% change	0%	10%	28%	63%	38%	25%	13%	13%
Palladium price - New (ZAR/kilogram)	66,206	116,514	138,388	172,076	157,572	151,125	144,695	166,118
Palladium price - Old (ZAR/kilogram)	66,206	109,378	117,926	113,312	119,614	123,473	128,617	147,588
% change	0%	7%	17%	52%	32%	22%	13%	13%
<b>Rhodium</b>								
Rhodium price - New (USD/ounce)	1,444	2,678	2,500	3,000	3,000	3,500	3,000	3,444
Rhodium price - Old (USD/ounce)	1,444	2,678	2,500	3,000	3,000	3,500	3,000	3,444
% change	0%	0%	0%	0%	0%	0%	0%	0%
Rhodium price - New (ZAR/kilogram)	388,626	634,077	601,688	794,199	859,486	1,057,878	964,630	1,107,456
Rhodium price - Old (ZAR/kilogram)	388,626	655,170	655,145	849,839	897,106	1,080,386	964,630	1,107,395
% change	0%	-3%	-8%	-7%	-4%	-2%	0%	0%
<b>3PGM basket price*</b>								
3PGM price - New (USD/ounce)	914	1,334	1,371	1,413	1,320	1,340	1,290	1,481
3PGM price - Old (USD/ounce)	914	1,297	1,318	1,275	1,212	1,247	1,275	1,464
% change	0%	3%	4%	11%	9%	7%	1%	1%
3PGM price - New (ZAR/kilogram)	245,952	315,865	330,026	374,068	378,174	405,016	414,791	476,206
3PGM price - Old (ZAR/kilogram)	245,952	317,311	345,392	361,182	362,431	384,926	409,968	470,740
% change	0%	0%	-4%	4%	4%	5%	1%	1%

\*Based on 63% platinum, 30% palladium and 7% rhodium Source: Johnson Matthey, CIRA estimates

## Macroeconomic scenarios

We have developed three macroeconomic scenarios and tested the likely impact of each on our platinum and palladium supply-demand outlook.

### We have developed three macroeconomic scenarios...

We have developed and tested three macroeconomic scenarios and their likely impact on each of the PGM demand drivers, and our supply-demand outlook. A description of each of the three scenarios is summarized below:

- **Double-dip (worst case):** Growth moderation in 2H10 is worse than expected and undermines the current investor and business confidence. Corporate credit spreads widen and the cost of capital increases. As a result, corporate investment decreases and unemployment rises further. Consumer spending deteriorates again and corporate profits falter. Given the high government debt levels, there is no room for further fiscal stimulus.
- **Protracted growth (Citi House view and base case):** 1H10 recovery in growth cannot be sustained and growth in 2H10 and 2011 is sluggish. Corporate investment is slow to pick up as businesses prefer to reduce debt. Unemployment remains high, decreasing only slowly. Consumer spending remains hesitant as the impact of earlier fiscal stimulus fades. Absence of strong final demand recovery limits upside for earnings growth.
- **Sustained growth (best case):** Current slowdown fears prove excessive and growth quickly recovers to 1H10 pace. Corporate investment picks up as business confidence is restored. Unemployment decreases; consumer confidence and spending rise. Corporate earnings surprise to the upside, boosting equities and lowering credit spreads. Debt-to-income ratios decrease.

Figure 7 summarizes our regional GDP growth assumptions under each scenario. The protracted growth scenario is our Citigroup Global Markets house view and forms the base case scenario for our analysis.

Figure 7. GDP growth rates at difference macroeconomic scenarios (%)
















	Double-dip					Protracted growth (Citi House view)					Sustained growth				
	2009	2010F	2011F	2012F	2013F	2009	2010F	2011F	2012F	2013F	2009	2010F	2011F	2012F	2013F
<b>Regional</b>															
Global	-1.9%	3.4%	1.5%	3.1%	3.6%	-1.9%	3.6%	3.2%	3.4%	3.5%	-1.9%	3.8%	4.3%	3.6%	3.6%
Industrialized	-3.5%	2.0%	0.5%	1.9%	2.5%	-3.5%	2.2%	1.9%	2.4%	2.5%	-3.5%	2.4%	3.2%	2.5%	2.5%
Emerging market	1.4%	6.3%	3.9%	5.9%	6.0%	1.4%	6.7%	5.9%	5.7%	5.7%	1.4%	7.0%	7.0%	6.0%	6.0%
<b>Country-specific</b>															
US	-2.6%	2.1%	0.6%	2.2%	2.8%	-2.6%	2.5%	2.2%	2.7%	2.8%	-2.6%	2.7%	3.6%	2.8%	2.8%
Europe	-4.1%	1.2%	0.3%	1.2%	1.6%	-4.1%	1.4%	1.2%	1.5%	1.6%	-4.1%	1.5%	2.0%	1.6%	1.6%
Japan	-5.2%	2.0%	0.7%	2.5%	3.3%	-5.2%	2.9%	2.5%	3.2%	3.3%	-5.2%	3.3%	4.2%	3.3%	3.3%
China	9.1%	8.8%	8.6%	8.8%	9.0%	9.1%	9.5%	8.8%	9.0%	9.0%	9.1%	10.0%	9.5%	9.0%	9.0%

Source: Citi Investment Research and Analysis

## ...and tested their likely impacts on PGM demand

We tested the likely impact of each of these scenarios on platinum and palladium demand, by application. Our perspective is summarized in Figure 8 below:

Figure 8. Likely impact of different macroeconomic scenarios on platinum and palladium demand (relative to 1H10 demand)

Demand driver	Impact	Double dip Description	Impact	Protracted growth Description	Impact	Sustained growth Description
Autocatalysts		Global LV production decreases into 2011E, driven mainly by a sharp fall in demand from industrialised economies. Chinese LV demand stagnates at current levels		Global LV production increases slowly into 2011E, driven mainly by strong growth in China and a recovery in demand in the US. The 2H09 and 1H10 demand in Europe is not sustained into 2H10E and 2011E		Strong 1H10 growth in LV production is sustained into 2011E, driven by continued growth in demand from industrialised economies and China
Jewellery		A likely decrease in PGM prices stimulates an increase in jewellery demand, especially in China		With the Chinese jewellery restocking in 2009 and with PGM prices likely to remain range-bound at current levels, net jewellery demand is likely to decrease slightly from 2009 levels		A sharp recovery in global auto demand and a likely rise in PGM prices result in a decrease in net jewellery demand, especially in price-sensitive regions such as China
Industrial		In line with a slowdown in global growth, industrial demand for PGMs is likely to decrease as consumer spending falters, but not as sharply as global auto demand		Given the low 2009 and 2010 base, protracted growth is likely to result in marginally positive growth in industrial demand for PGMs		Given the low 2009 and 2010 base, strong global GDP growth and increasing consumer spending is likely to result in strong growth in industrial demand for PGMs
Investment		Falling equity markets and rising levels of volatility and risk are likely to result in a continuation of the sharp rise in demand for safe-haven investments, like precious metals		Given the current infancy stage of the PGM ETF market, current PGM ETF holdings are unlikely to be liquidated in a protracted growth scenario. We still expect net ETF inflows, but at a slower pace than that achieved in 2008-10		Buoyant equity markets, decreasing levels of risk and rising PGM prices are likely to result in a net sell-off in PGM ETFs
Autocat recycling		Autocatalyst recycling falls from 1H10 levels closer to 2009 levels as falling consumer confidence and spending leads to consumers hanging onto their existing cars. Low PGM prices de-incentivise refineries to recover and recycle		With stimulus packages coming to an end, autocatalyst recycling is likely to stabilise in 2H10E and 2011E as new vehicle sales seeing flat to moderate growth		Improved consumer confidence and spending result in a continuation in growth in vehicle sales. More old vehicles are traded in and scrapped. Rising PGM prices also incentivise refineries to recover and recycle more

Source: Citi Investment Research and Analysis

The net result from our analysis is a likely 5% decrease in **platinum** demand in our double dip scenario in 2011E, a 2% decrease in demand in our protracted growth scenario and flat demand in our sustained growth scenario (all relative to 1H10 levels).

In terms of **palladium**, our analysis indicates a likely 0.5% decrease in demand in our double dip scenario in 2011E, 6% growth in demand in our protracted growth scenario and 10% growth in demand in our sustained growth scenario (all relative to 1H10 levels).



# Platinum outlook

## Medium-term surplus likely

### EU incentive schemes to keep 2010 in deficit

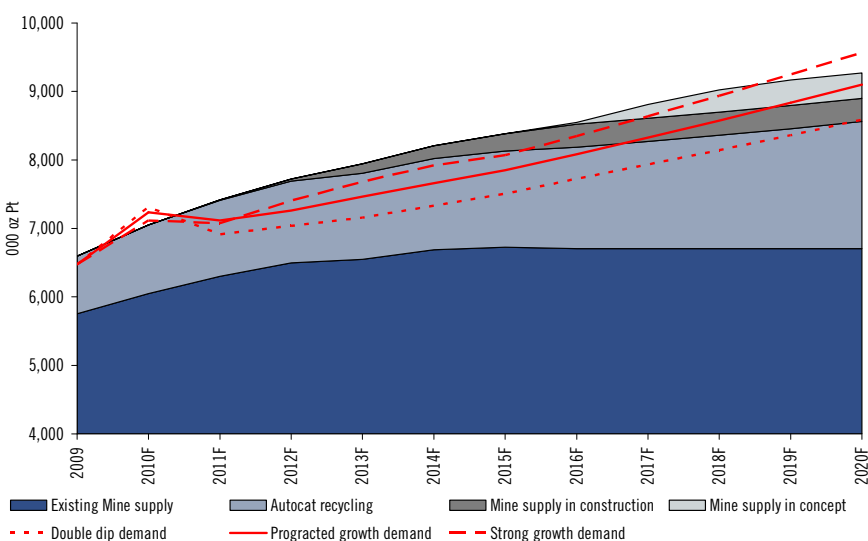
In the very near term (2010), all three of our scenarios point to a deficit market of between 45k and 315k ounces. This is as both the precious metal attribute (rising investment demand) and industrial attribute (recovering auto production through stimulus packages and continued strength in jewellery sales) of platinum are likely to align in 2010E.

### Rising mine supply and auto catalyst recycling to push medium term into surplus

However, we caution that this deficit market may be short-lived and expect medium-term (2011-17E) supply surpluses in all three of the macroeconomic scenarios considered (*Figure 9*). This is as growth in mine supply (from existing mines and mines currently in construction, refer *Figure 53* in Appendix 1) and rising auto catalyst recycling are likely to more than offset the growth in demand for platinum.

Both our worst case and base case scenarios indicate a surplus market up to 2020E, while our best case scenario points to a surplus market up to 2016E. This is unless production from existing mines can be trimmed, or mines currently in construction can be delayed.

**Figure 9. Platinum supply-demand outlook (000 oz)**



Source: Johnson Matthey, CIRA estimates

A key upside risk to our view is a further rise in investment demand should new PGM ETFs be launched. We are aware of two potential new ETFs, both in the US. According to Johnson Matthey, proposals for the White Metals Basket Trust and Precious Metals Basket Trust are currently under review by the Securities and Exchange Commission. Though no decision has yet been reached, we think one could reasonably expect a decision later in 2010.

## Double-dip scenario

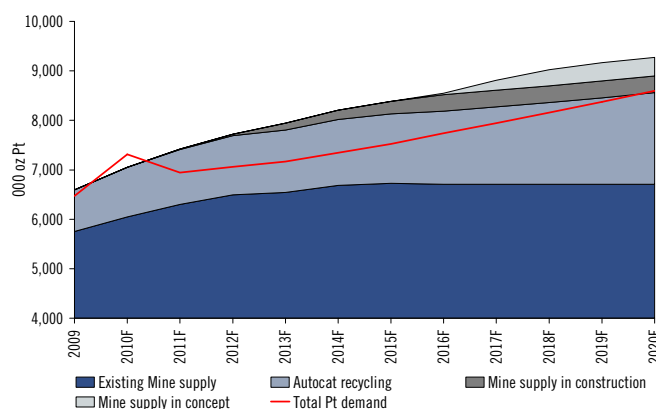
### Significant cut-back in mine-supply would be required

Under our double-dip scenario, we expect the market to be in deficit of 315k ounces in 2010 as global stimulus packages resulted in a bounce in global auto production in 1H10 and as global economic uncertainty is likely to support further net investment inflows into platinum ETFs (880k ounces in 2010E and 520k ounces in 2011E).

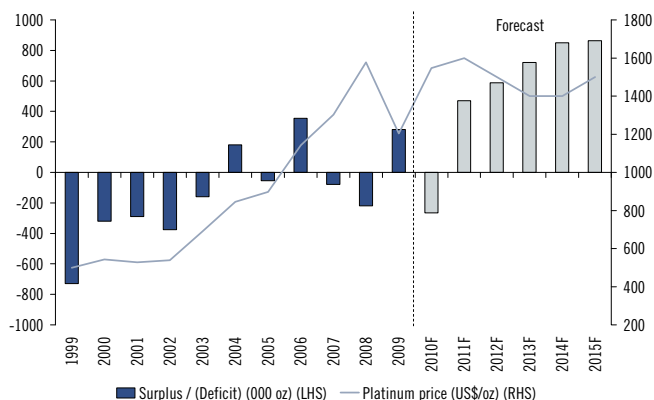
However, with global growth moderation being worse than expected in 2H10E and 2011E, global light vehicle production stagnates in 2011E. This is driven mainly by a sharp fall in demand from industrialized economies, while demand from China stagnates at current levels. The effect of falling light vehicle production is, however, somewhat offset by 1) rising jewellery sales as prices fall, 2) strong net investment inflows as economic uncertainty returns and 3) reduced auto catalyst recycling as falling consumer confidence and spending result in consumers holding onto their existing vehicles.

Unless mine production can be significantly reduced, the platinum price will likely move back towards the low \$1000/oz level.

Figure 10. Platinum supply-demand outlook in a double dip scenario (000 oz) Figure 11. Platinum supply-demand balance (000 oz)

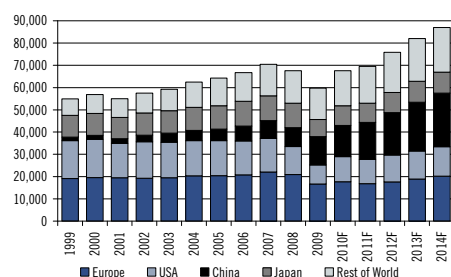


Source: Johnson Matthey, CIRA estimates



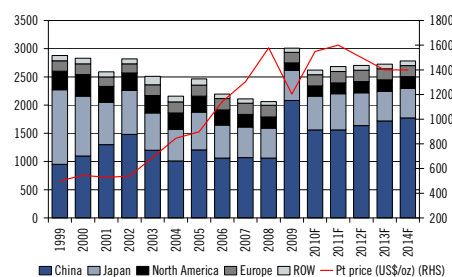
Source: Johnson Matthey, CIRA estimates

Figure 12. Global LV production (000 units)



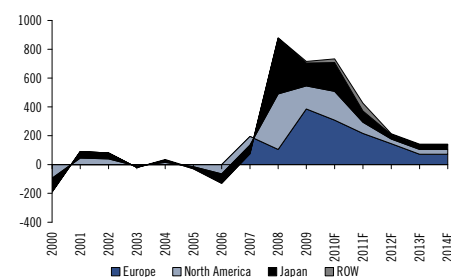
Source: JD Power, CIRA estimates

Figure 13. Net platinum jewellery demand (000 oz)



Source: Johnson Matthey, CIRA estimates

Figure 14. Net platinum ETF flows (000 oz)



Source: Johnson Matthey, CIRA estimates

## Protracted growth scenario

### 300k ounce surplus in 2011E, stabilizing thereafter

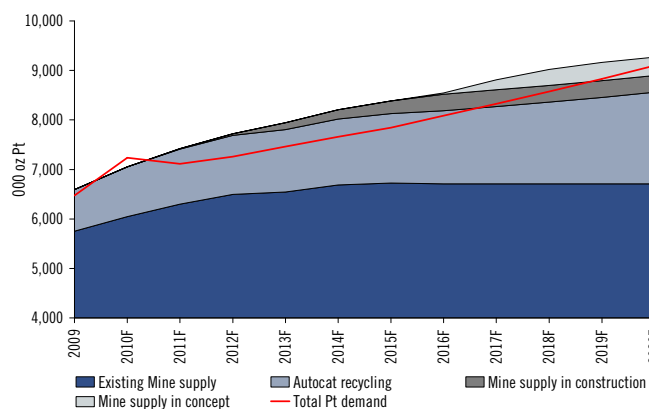
Under our protracted growth scenario, we expect the market to be in deficit of 188k ounces in 2010, less than the 315k ounce deficit under our double-dip scenario, due mainly to lower investment and jewellery demand as economic uncertainty is less and as jewellery demand reduces at current price levels.

However, with consumers remaining hesitant to spend as the impact of earlier fiscal stimulus fades, global light vehicle production grows at only a slow pace yoy into 2011E, driven mainly by growing in demand from China and a recovery in demand from the US, while 2H09 and 1H10 growth in Europe is not sustained.

Net jewellery demand is likely to decrease slightly from 2010E levels following the restocking in China and with PGM prices remaining range-bound at current levels. With confidence in corporate earnings and the equity markets still lagging, net investment inflows into PGM ETFs remain strong in 2011E at 450k ounces.

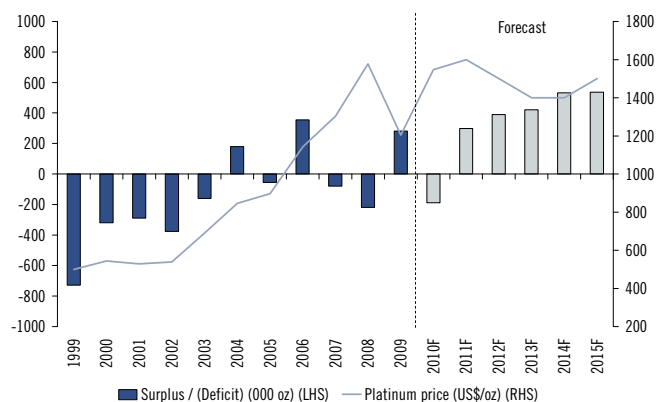
With stimulus packages coming to an end, autocatalyst recycling increases slowly to 1.1m ounces, compared with 1.0m ounces in 2010E, in line with the slow growth in vehicle sales.

Figure 15. Platinum supply-demand outlook in a protracted growth scenario (000 oz)



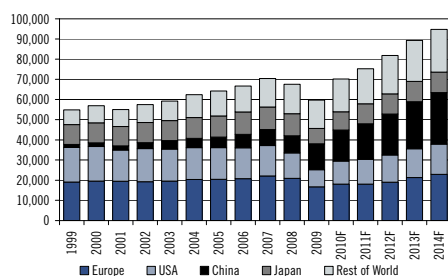
Source: Johnson Matthey, CIRA estimates

Figure 16. Platinum supply-demand balance (000 oz)



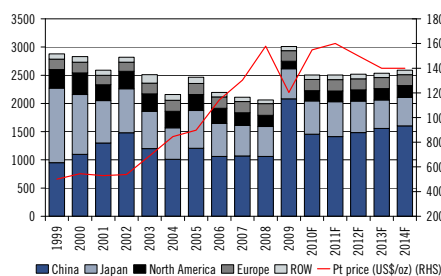
Source: Johnson Matthey, CIRA estimates

Figure 17. Global LV production (000 units)



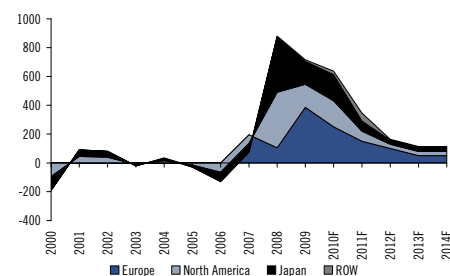
Source: JD Power, CIRA estimates

Figure 18. Net platinum jewellery demand (000 oz)



Source: Johnson Matthey, CIRA estimates

Figure 19. Net platinum ETF flows (000 oz)



Source: Johnson Matthey, CIRA estimates

## Sustained growth scenario

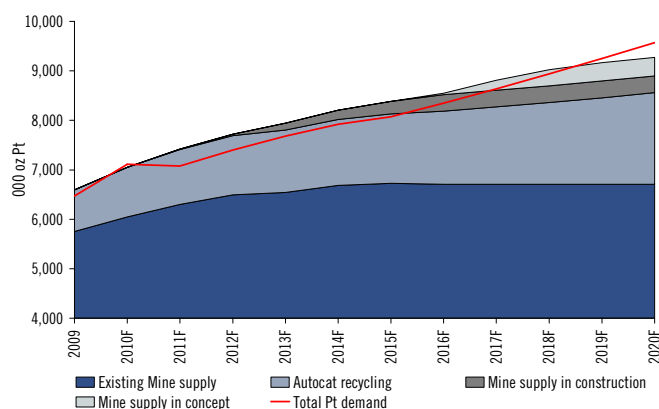
### Hardly enough demand for new mine supply

Under our sustained growth scenario, we expect the market to be in a small deficit of 45k ounces in 2010, less than the 315k and 188k ounce deficits under our double-dip and protracted growth scenarios, respectively, due mainly to sharply lower jewellery demand, slowing inflows into ETFs and a pick-up in autocatalyst recycling. The market remains in surplus from 2011E onwards as growth in European LV production lags that of the US and China.

The recovery in global LV production and a likely rise in PGM prices result in a sharp decrease in net jewellery demand, especially in price-sensitive regions such as China. Buoyant equity markets, decreasing levels of risk and rising PGM prices are likely to result in net ETF inflows decreasing to 400k ounces in 2011E.

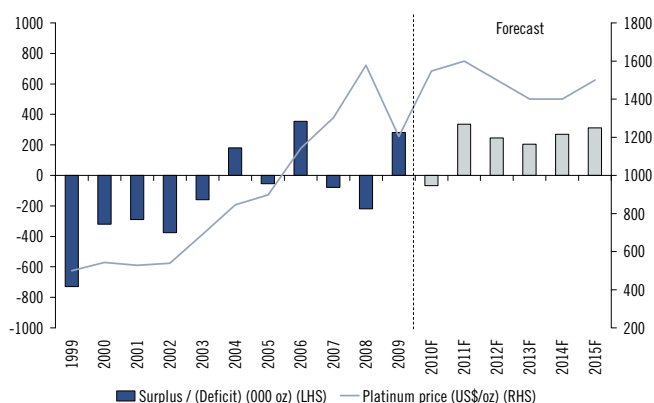
Autocatalyst recycling increases sharply to 1.2m ounces in 2011E. This is as improved consumer confidence and increasing LV sales result in more old vehicles being traded in and scrapped. Rising PGM prices also incentivize refineries to recover and recycle more PGMs.

Figure 20. Platinum supply-demand outlook in a sustained growth scenario (000 oz)



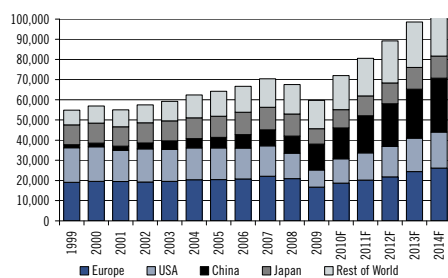
Source: Johnson Matthey, CIRA estimates

Figure 21. Platinum supply-demand balance (000 oz)



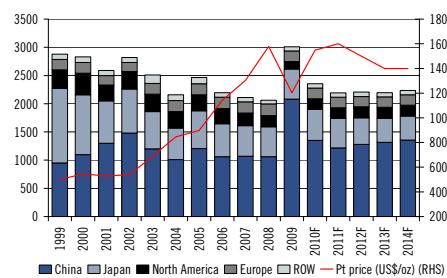
Source: Johnson Matthey, CIRA estimates

Figure 22. Global LV production (000 units)



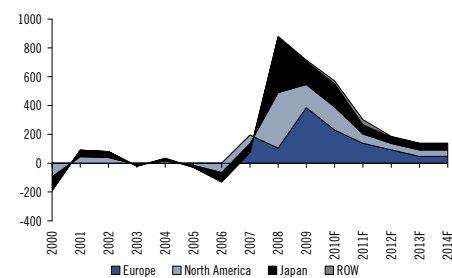
Source: JD Power, CIRA estimates

Figure 23. Net platinum jewellery demand (000 oz)



Source: Johnson Matthey, CIRA estimates

Figure 24. Net platinum ETF flows (000 oz)



Source: Johnson Matthey, CIRA estimates

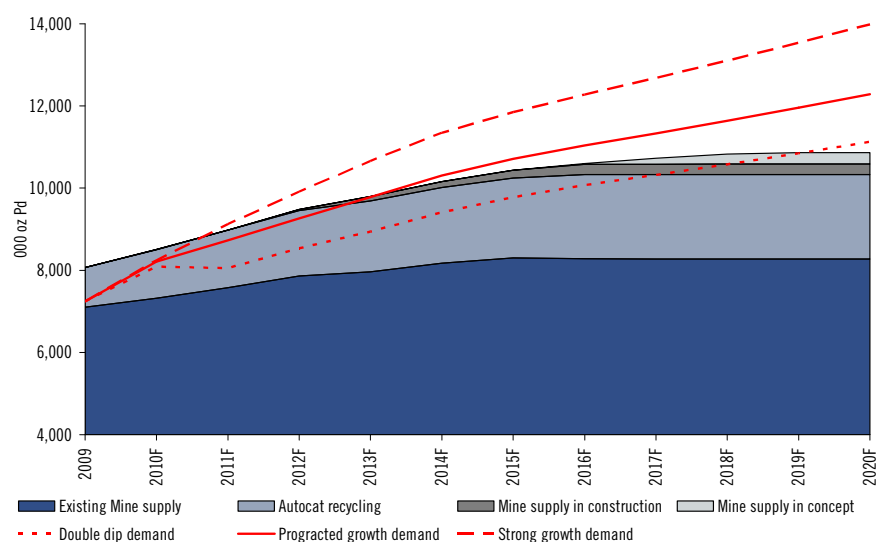
# Palladium outlook

## Gather the bulls

### Near-term surplus to prevail

Even though supply surpluses are likely to prevail in the near-term (FY10/11E) as the global economy recovers from its 2009 lows, we believe that a deficit market is likely for palladium in the medium term (FY12E onwards), except in the case of a double-dip scenario.

Figure 25. Palladium supply-demand outlook (000 oz)



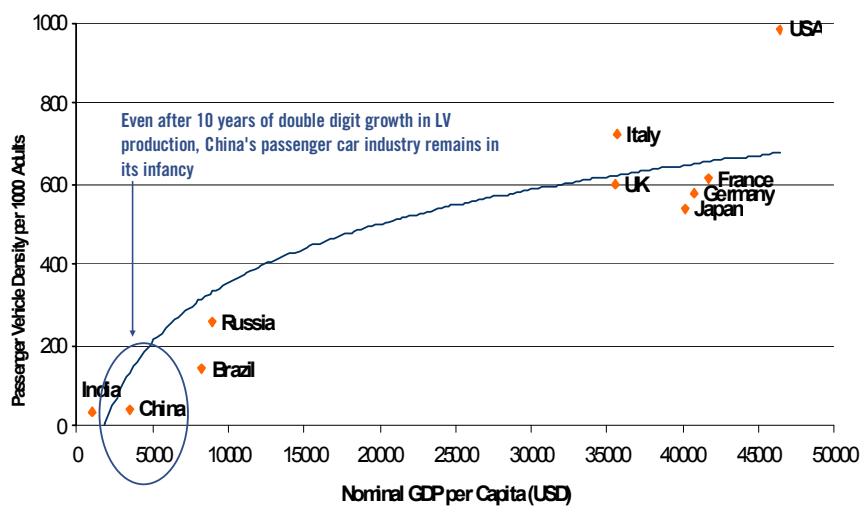
Source: Citi Investment Research and Analysis

### However, strong growth in gasoline-powered LV production to drive rising medium-term deficit

Our bullish stance is based on our view of: 1) sustained growth in auto demand from China, 2) a recovery in US auto production, and 3) limited additional supply from depleted (or nearly depleted) Russian stockpiles.

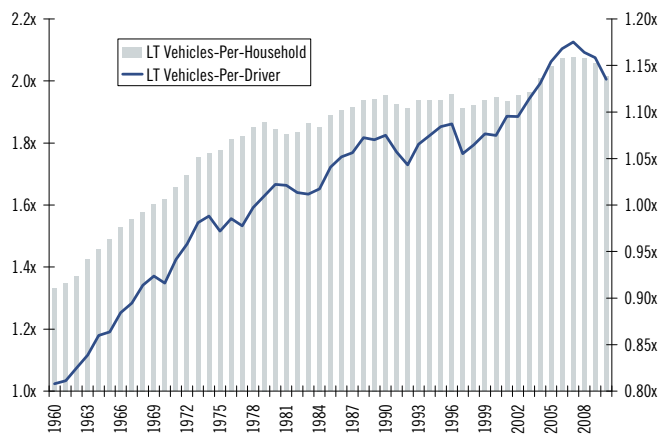
- **Sustained growth in auto demand from China:** We believe growth in Chinese auto demand over the next decade will be driven by: 1) sustained growth in GDP/capita and 2) increasing light-vehicle density. Given the relative preference for smaller gasoline engines, we believe this growth will be a strong demand driver for palladium (*Figure 26*).
- **US recovery from a low base:** Even though US vehicle density shows noticeable weakness, we believe this to be cyclical rather than structural. As a result, US auto production may be leveraged to any macro-economic upside, even under our protracted growth scenario (*Figures 27 and 28*).
- **Depletion of Russian stockpiles:** We believe Russian stockpiles are likely to be depleted over the next 12-24 months.

Figure 26. Global passenger car intensity curve



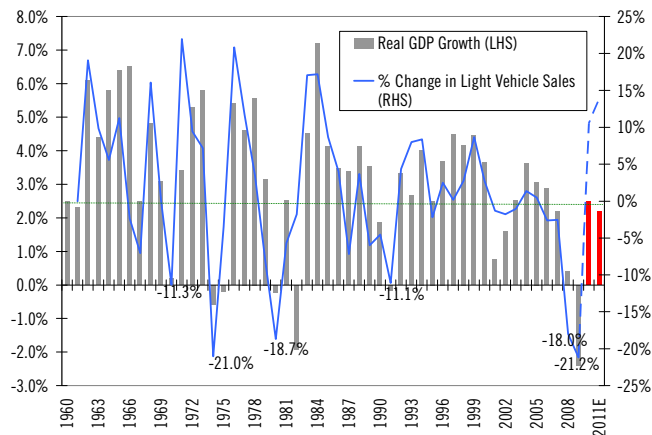
Source: JD Power, Ward's, FHWA, CSM, company reports and CIRA estimates

Figure 27. US vehicle saturation



Source: JD Power, Ward's, FHWA, CSM, company reports and CIRA estimates

Figure 28. Correlation between change in LV sales and US real GDP growth



Source: JD Power, Ward's, FHWA, CSM, company reports and CIRA estimates

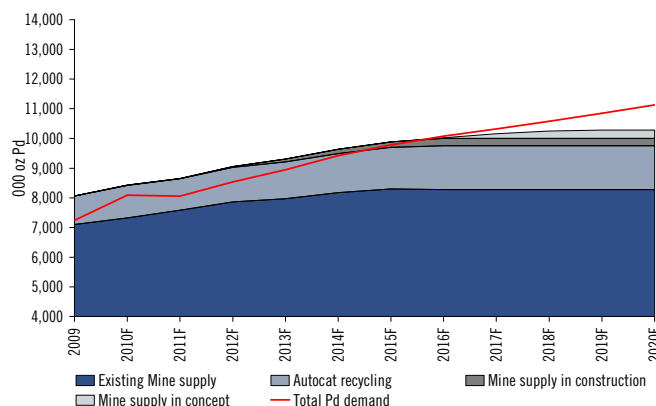
## Double-dip scenario

### Sustained surplus market up to 2015E

Under our double-dip scenario, we expect the palladium market to remain in surplus up to 2015E. This is as global growth moderation is worse than expected in 2H10E and 2011E, US vehicle production fails to recover from its current depressed levels and China only shows moderate growth.

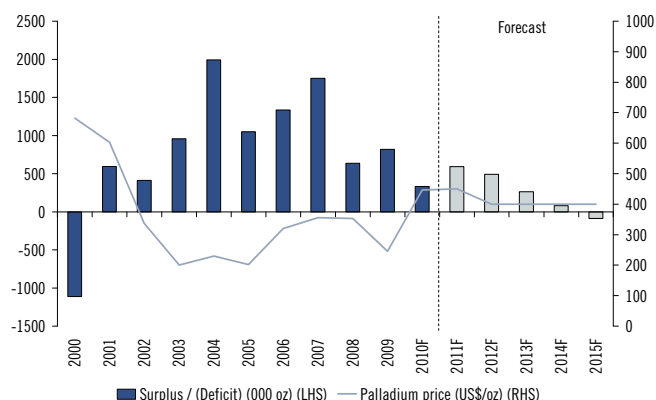
The effect of falling light vehicle production is, however, somewhat offset by: 1) rising jewellery sales as prices fall, 2) strong net investment inflows as economic uncertainty returns and 3) lower auto catalyst recycling as falling consumer confidence and spending result in consumers holding onto their existing vehicles.

**Figure 29. Palladium supply-demand outlook in a double-dip scenario (000 oz)**



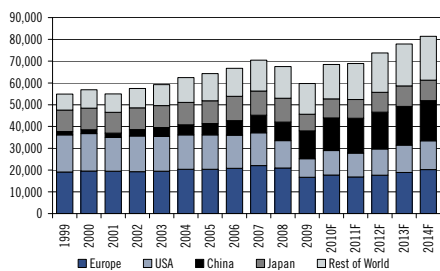
Source: Johnson Matthey, CIRA estimates

**Figure 30. Palladium supply-demand balance (000 oz)**



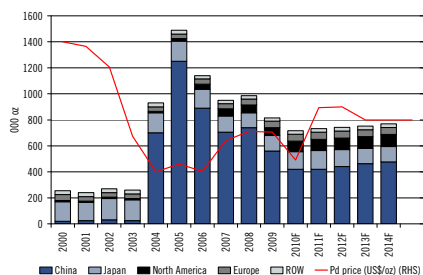
Source: Johnson Matthey, CIRA estimates

**Figure 31. Global LV production (000 units)**



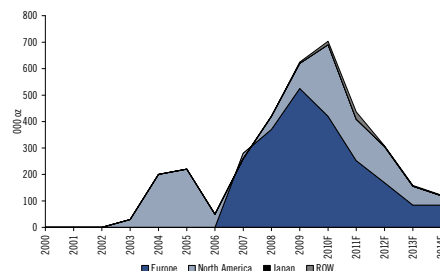
Source: JD Power, CIRA estimates

**Figure 32. Net palladium jewellery demand (000 oz)**



Source: Johnson Matthey, CIRA estimates

**Figure 33. Net palladium ETF flows (000 oz)**



Source: Johnson Matthey, CIRA estimates

## Protracted growth scenario

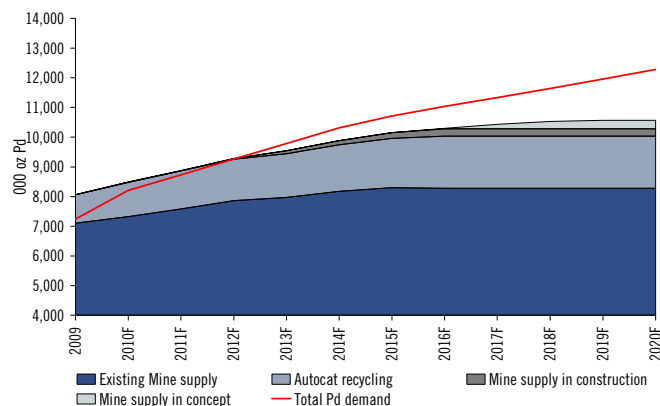
### Balanced market in 2012E, deficit thereafter

Under our protracted growth scenario, we expect the market to be in surplus of 315k ounces in 2011, less than the 770k ounce surplus under our double-dip scenario. This is as consumers remain hesitant to spend as the impact of earlier fiscal stimulus fades and global light vehicle production grows at only a slow pace yoy into 2011E. However, importantly for palladium demand, most of growth in global light vehicle production will come from strong growth in demand from China and a recovery in demand from the US, while 2H09 and 1H10 growth in Europe is not sustained. As a result, we view a balanced-to-deficit market from 2012 onwards as highly likely.

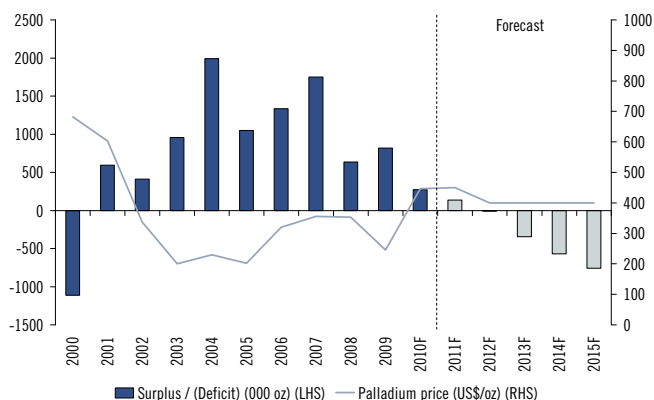
Net jewellery demand is likely to decrease slightly from 2010E levels on the back of rising palladium prices. With confidence in corporate earnings and the equity markets still lagging, we expect net investment inflows into palladium ETFs to remain strong in 2011E at 390k ounces.

With an increase in demand for new vehicles in the US and China, autocatalyst recycling increases slowly to 1.28m ounces, compared with 1.15m ounces in 2010E, in line with the slow growth in vehicle sales.

**Figure 34. Palladium supply-demand outlook in a protracted growth scenario (000 oz)** **Figure 35. Palladium supply-demand balance (000 oz)**

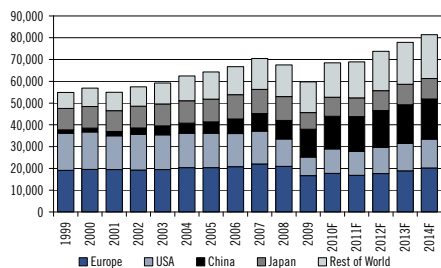


Source: Johnson Matthey, CIRA estimates



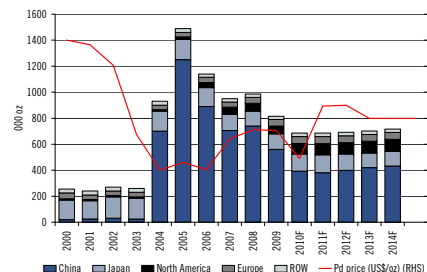
Source: Johnson Matthey, CIRA estimates

**Figure 36. Global LV production (000 units)**



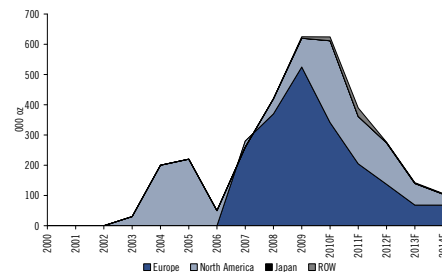
Source: JD Power, CIRA estimates

**Figure 37. Net palladium jewellery demand (000 oz)**



Source: Johnson Matthey, CIRA estimates

**Figure 38. Net palladium ETF flows (000 oz)**



Source: Johnson Matthey, CIRA estimates



## Sustained growth scenario

### Growing deficit

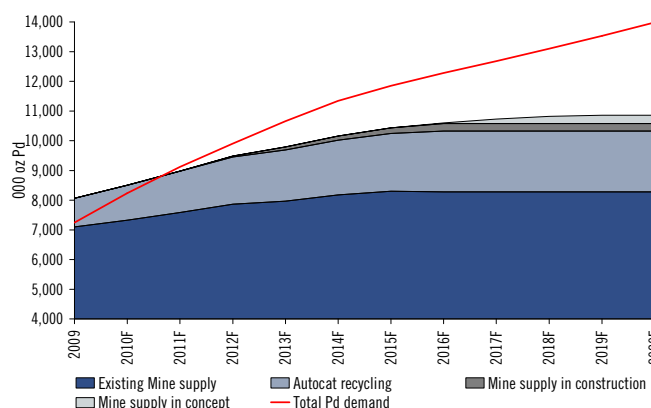
Under our sustained growth scenario, we expect the market to be in a growing deficit from 2011E onwards. This is due mainly to our view of a sharp recovery in US auto production and sustained strong (15-20%) medium-term growth in Chinese LV demand. The positive effect is likely to be somewhat offset by lower jewellery demand, slowing inflows into ETFs and a pick-up in autocatalyst recycling.

The recovery in global LV production and a likely rise in PGM prices are likely to result in a decrease in net jewellery demand, especially in price-sensitive regions such as China.

Buoyant equity markets, decreasing levels of risk and rising PGM prices are likely to result in net ETF inflows slowing significantly from the highs achieved during the GEC.

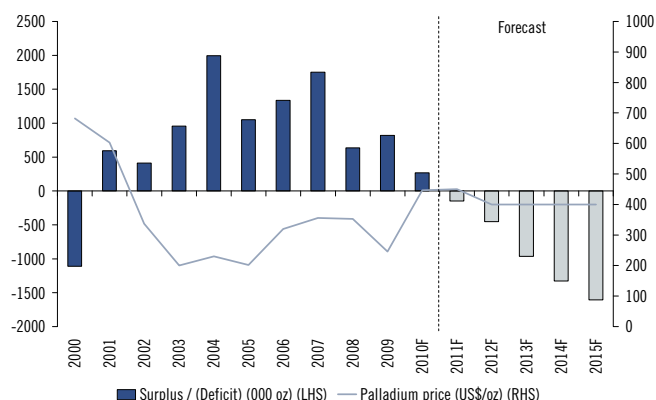
Autocatalyst recycling increases sharply to 1.4m ounces in 2011E. This is as improved consumer confidence and increasing LV sales result in more old vehicles being traded in and scrapped. Rising PGM prices also incentivize refineries to recover and recycle more PGMs.

**Figure 39. Palladium supply-demand outlook in a sustained growth scenario (000 oz)**



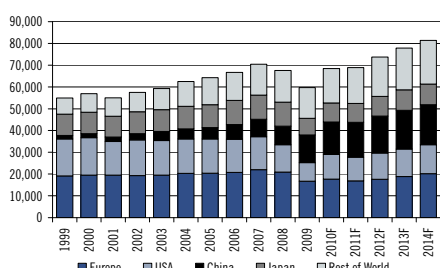
Source: Johnson Matthey, CIRA estimates

**Figure 40. Palladium supply-demand balance (000 oz)**



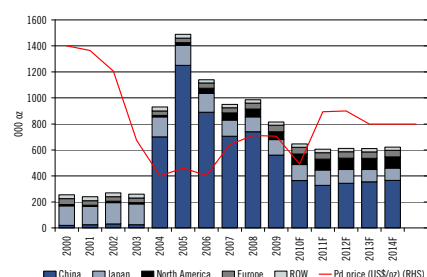
Source: Johnson Matthey, CIRA estimates

**Figure 41. Global LV production (000 units)**



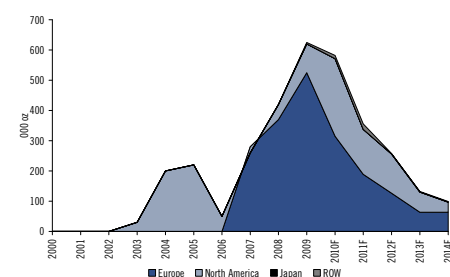
Source: JD Power, CIRA estimates

**Figure 42. Net palladium jewellery demand (000 oz)**



Source: Johnson Matthey, CIRA estimates

**Figure 43. Net palladium ETF flows (000 oz)**



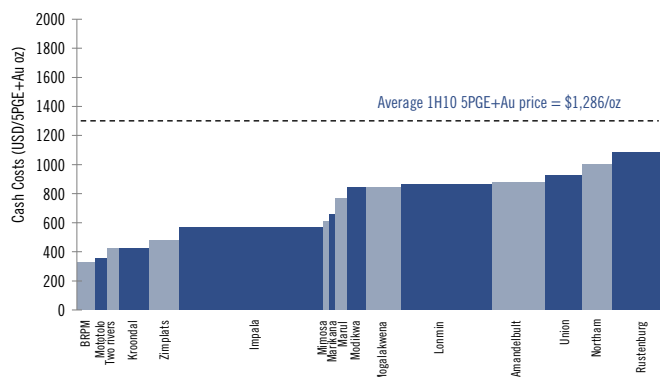
Source: Johnson Matthey, CIRA estimates

## Price outlook

### Muted basket price outlook

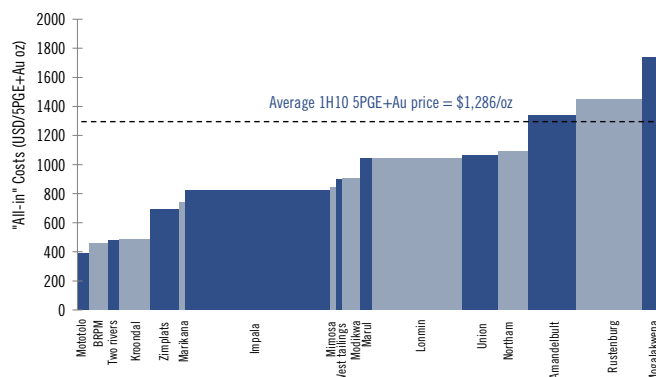
Given our view of a medium-term surplus market in platinum, somewhat offset by a likely deficit market in palladium, we do not expect full-cost curve incentive pricing to prevail in the PGM sector in the medium term. Rather, we expect the PGM basket price to be set by the 80-90<sup>th</sup> percentile, implying a basket price of between US\$1,300-1,400/ounce.

Figure 44. 1H10 5PGE+Au cash cost curve (US\$/oz)



Source: Company data, Citi Investment Research and Analysis

Figure 45. 1H10 5PGE+Au 'All-in' cost curve (US\$/oz)



Source: Company data, Citi Investment Research and Analysis

As a result, our medium-term PGM pricing outlook remains fairly muted. We expect the platinum price to peak at US\$1,625/ounce in 2011, declining to our long-term real price assumption of US\$1,500/ounce (nominal US\$1,722/ounce). (See *Long Term Prices*, 5 July 2010, Alan Heap).

Our view of a deficit market makes us more optimistic about the palladium price, with a peak price forecast of US\$650/ounce in 2012 and a long-term real price assumption of US\$450/ounce (nominal US\$517).

Figure 46. Input price assumptions

December year end	FY08	FY09	FY10F	FY11F	FY12F	FY13F	FY14F	LT real	LT Nominal
<b>US\$/oz</b>									
Platinum price	1,577	1,173	1,585	1,625	1,600	1,500	1,500	1,500	1722
Palladium price	353	246	492	575	650	550	500	450	517
Rhodium price	6,599	1,444	2,678	2,500	3,000	3,000	3,500	3,000	3444
Gold price	873	960	1,222	1,228	1,121	1,009	907	850	976
3PGE+Au basket price	1,540	907	1,323	1,359	1,399	1,305	1,322	1,271	1459
<b>ZAR/USD exchange rate</b>									
	8.26	8.37	7.37	7.49	8.23	8.91	9.40	10.00	10.00
<b>R/oz</b>									
Platinum price	13,031	9,812	11,676	12,163	13,173	13,365	14,100	15,000	17,220
Palladium price	2,918	2,054	3,624	4,304	5,352	4,901	4,700	4,500	5,170
Rhodium price	54,537	12,077	19,720	18,713	24,700	26,730	32,900	30,000	34,440
Gold price	7,212	8,028	8,996	9,189	9,233	8,991	8,522	8,500	9,759
3PGE+Au basket price	12,728	7,589	9,743	10,175	11,515	11,630	12,429	12,705	14,587

Source: Johnson Matthey, CIRA estimates

## Appendix 1 – PGM supply-demand tables

### Platinum: Double-dip scenario

Figure 47. Platinum supply-demand outlook under a 'double dip' scenario

	2005	2006	2007	2008	2009	2010F	2011F	2012F	2013F	2014F	2015F
<b>Demand</b>											
<b>Auto catalysts</b>											
Europe	1960	2060	2055	1970	970	1493	1385	1416	1465	1519	1535
North America	820	705	850	505	370	556	579	629	656	664	665
China	120	155	175	145	130	203	242	282	308	331	343
Japan	600	605	610	610	395	529	528	561	574	578	584
Rest of the world	295	380	455	420	365	449	464	494	517	539	557
<b>Total</b>	<b>3795</b>	<b>3905</b>	<b>4145</b>	<b>3650</b>	<b>2230</b>	<b>3231</b>	<b>3198</b>	<b>3382</b>	<b>3520</b>	<b>3632</b>	<b>3684</b>
<b>Jewellery</b>											
Europe	195	200	200	205	185	198	202	199	196	196	199
North America	285	270	225	200	135	182	193	199	205	211	217
China	1205	1060	1070	1060	2080	1560	1560	1638	1720	1771	1825
Japan	670	585	540	530	535	599	641	581	522	522	578
Rest of the world	110	80	75	65	75	83	87	85	83	83	85
Jewellery recycled	500	555	655	695	565	650	666	656	615	615	615
<b>Net jewellery demand</b>	<b>1965</b>	<b>1640</b>	<b>1455</b>	<b>1365</b>	<b>2445</b>	<b>1972</b>	<b>2017</b>	<b>2045</b>	<b>2111</b>	<b>2169</b>	<b>2290</b>
<b>Investment</b>											
Europe	0	0	195	105	385	308	216	144	72	72	72
North America	25	20	30	60	105	299	174	151	79	39	39
Japan	-15	-65	-60	385	160	200	78	32	32	32	32
Rest of the world	5	5	5	5	10	25	55	6	6	6	6
<b>Total</b>	<b>15</b>	<b>-40</b>	<b>170</b>	<b>555</b>	<b>660</b>	<b>832</b>	<b>522</b>	<b>333</b>	<b>188</b>	<b>149</b>	<b>149</b>
<b>Industrial</b>											
Europe	340	330	350	335	290	248	236	247	256	265	274
North America	455	445	420	380	250	281	267	281	291	301	311
China	120	180	295	205	0	152	144	151	157	162	168
Japan	260	250	225	210	160	155	148	155	161	166	172
Rest of the world	515	625	555	595	440	440	418	439	456	471	487
<b>Total</b>	<b>1690</b>	<b>1830</b>	<b>1845</b>	<b>1725</b>	<b>1140</b>	<b>1277</b>	<b>1213</b>	<b>1274</b>	<b>1321</b>	<b>1366</b>	<b>1412</b>
<b>Total platinum demand</b>	<b>7465</b>	<b>7335</b>	<b>7615</b>	<b>7295</b>	<b>6475</b>	<b>7312</b>	<b>6950</b>	<b>7034</b>	<b>7140</b>	<b>7316</b>	<b>7535</b>
<b>Supply</b>											
<b>Mine supply</b>											
Southern Africa	5273	5462	5240	4686	4693	4715	4938	5088	5283	5539	5677
Russia	890	920	915	805	785	810	815	799	783	767	752
North America	365	345	325	325	260	340	372	386	381	376	371
Rest of world	112	103	120	124	178	178	180	180	180	180	180
<b>Total</b>	<b>6640</b>	<b>6830</b>	<b>6600</b>	<b>5940</b>	<b>5916</b>	<b>6043</b>	<b>6305</b>	<b>6453</b>	<b>6627</b>	<b>6862</b>	<b>6980</b>
<b>Auto catalyst recycling</b>											
Europe	170	190	215	385	299	344	326	352	374	389	404
North America	505	575	605	630	421	463	435	461	480	499	519
China	0	0	10	15	23	34	44	61	74	88	102
Japan	35	35	35	60	54	59	58	63	68	73	79
Rest of the world	60	60	70	45	44	53	54	63	68	73	79
<b>Total</b>	<b>770</b>	<b>860</b>	<b>935</b>	<b>1135</b>	<b>840</b>	<b>953</b>	<b>918</b>	<b>1001</b>	<b>1063</b>	<b>1122</b>	<b>1183</b>
<b>Total platinum supply</b>	<b>7410</b>	<b>7690</b>	<b>7535</b>	<b>7075</b>	<b>6756</b>	<b>6996</b>	<b>7223</b>	<b>7454</b>	<b>7689</b>	<b>7984</b>	<b>8162</b>
<b>Supply-demand surplus/(deficit)</b>	<b>-55</b>	<b>355</b>	<b>-80</b>	<b>-220</b>	<b>281</b>	<b>-316</b>	<b>273</b>	<b>420</b>	<b>550</b>	<b>668</b>	<b>627</b>

Source: Johnson Matthey, CIRA estimates

## Platinum: Protracted growth scenario

Figure 48. Platinum supply-demand outlook under a 'protracted growth' scenario

	2005	2006	2007	2008	2009	2010F	2011F	2012F	2013F	2014F	2015F
<b>Demand</b>											
<b>Auto catalysts</b>											
Europe	1960	2060	2055	1970	970	1515	1484	1521	1649	1717	1739
North America	820	705	850	505	370	566	634	690	723	734	735
China	120	155	175	145	130	217	254	296	324	349	362
Japan	600	605	610	610	395	545	592	605	607	611	617
Rest of the world	295	380	455	420	365	458	481	516	539	562	580
<b>Total</b>	<b>3795</b>	<b>3905</b>	<b>4145</b>	<b>3650</b>	<b>2230</b>	<b>3302</b>	<b>3445</b>	<b>3628</b>	<b>3842</b>	<b>3973</b>	<b>4034</b>
<b>Jewellery</b>											
Europe	195	200	200	205	185	197	199	196	193	193	196
North America	285	270	225	200	135	182	192	198	204	210	216
China	1205	1060	1070	1060	2080	1456	1412	1483	1557	1604	1652
Japan	670	585	540	530	535	589	619	560	504	504	558
Rest of the world	110	80	75	65	75	81	82	81	79	79	81
Jewellery recycled	500	555	655	695	565	650	666	656	615	615	615
<b>Net jewellery demand</b>	<b>1965</b>	<b>1640</b>	<b>1455</b>	<b>1365</b>	<b>2445</b>	<b>1856</b>	<b>1838</b>	<b>1861</b>	<b>1921</b>	<b>1974</b>	<b>2088</b>
<b>Investment</b>											
Europe	0	0	195	105	385	250	150	101	50	50	50
North America	25	20	30	60	105	299	174	151	79	39	39
Japan	-15	-65	-60	385	160	181	71	29	29	29	29
Rest of the world	5	5	5	5	10	25	55	6	6	6	6
<b>Total</b>	<b>15</b>	<b>-40</b>	<b>170</b>	<b>555</b>	<b>660</b>	<b>755</b>	<b>449</b>	<b>286</b>	<b>163</b>	<b>124</b>	<b>124</b>
<b>Industrial</b>											
Europe	340	330	350	335	290	257	270	283	294	304	314
North America	455	445	420	380	250	291	306	321	333	344	356
China	120	180	295	205	0	157	165	173	180	186	192
Japan	260	250	225	210	160	161	169	177	184	190	197
Rest of the world	515	625	555	595	440	456	479	503	521	539	558
<b>Total</b>	<b>1690</b>	<b>1830</b>	<b>1845</b>	<b>1725</b>	<b>1140</b>	<b>1322</b>	<b>1389</b>	<b>1458</b>	<b>1512</b>	<b>1563</b>	<b>1616</b>
<b>Total platinum demand</b>	<b>7465</b>	<b>7335</b>	<b>7615</b>	<b>7295</b>	<b>6475</b>	<b>7235</b>	<b>7121</b>	<b>7233</b>	<b>7439</b>	<b>7635</b>	<b>7862</b>
<b>Supply</b>											
<b>Mine supply</b>											
Southern Africa	5273	5462	5240	4686	4693	4715	4938	5088	5283	5539	5677
Russia	890	920	915	805	785	810	815	799	783	767	752
North America	365	345	325	325	260	340	372	386	381	376	371
Rest of world	112	103	120	124	178	178	180	180	180	180	180
<b>Total</b>	<b>6640</b>	<b>6830</b>	<b>6600</b>	<b>5940</b>	<b>5916</b>	<b>6043</b>	<b>6305</b>	<b>6453</b>	<b>6627</b>	<b>6862</b>	<b>6980</b>
<b>Auto catalyst recycling</b>											
Europe	170	190	215	385	299	353	374	396	412	428	446
North America	505	575	605	630	421	505	556	578	601	625	650
China	0	0	10	15	23	34	51	76	91	109	126
Japan	35	35	35	60	54	59	65	72	78	84	91
Rest of the world	60	60	70	45	44	53	63	73	79	85	92
<b>Total</b>	<b>770</b>	<b>860</b>	<b>935</b>	<b>1135</b>	<b>840</b>	<b>1004</b>	<b>1109</b>	<b>1195</b>	<b>1260</b>	<b>1332</b>	<b>1404</b>
<b>Total platinum supply</b>	<b>7410</b>	<b>7690</b>	<b>7535</b>	<b>7075</b>	<b>6756</b>	<b>7047</b>	<b>7414</b>	<b>7648</b>	<b>7887</b>	<b>8193</b>	<b>8383</b>
<b>Supply-demand surplus/(deficit)</b>	<b>-55</b>	<b>355</b>	<b>-80</b>	<b>-220</b>	<b>281</b>	<b>-188</b>	<b>293</b>	<b>415</b>	<b>448</b>	<b>559</b>	<b>521</b>

Source: Johnson Matthey, CIRA estimates

## Platinum: Sustained growth scenario

Figure 49. Platinum supply-demand outlook under a 'sustained growth' scenario

	2005	2006	2007	2008	2009	2010F	2011F	2012F	2013F	2014F	2015F
<b>Demand</b>											
<b>Auto catalysts</b>											
Europe	1960	2060	2055	1970	970	1570	1656	1741	1885	1956	1976
North America	820	705	850	505	370	588	683	751	812	848	875
China	120	155	175	145	130	217	263	306	335	361	374
Japan	600	605	610	610	395	545	592	623	641	656	668
Rest of the world	295	380	455	420	365	472	506	550	582	608	625
<b>Total</b>	<b>3795</b>	<b>3905</b>	<b>4145</b>	<b>3650</b>	<b>2230</b>	<b>3393</b>	<b>3699</b>	<b>3971</b>	<b>4256</b>	<b>4429</b>	<b>4518</b>
<b>Jewellery</b>											
Europe	195	200	200	205	185	191	187	184	184	184	184
North America	285	270	225	200	135	182	188	193	193	193	193
China	1205	1060	1070	1060	2080	1352	1217	1278	1316	1355	1396
Japan	670	585	540	530	535	551	523	474	426	426	426
Rest of the world	110	80	75	65	75	79	80	78	76	76	78
Jewellery recycled	500	555	655	695	565	650	666	656	615	615	615
<b>Net jewellery demand</b>	<b>1965</b>	<b>1640</b>	<b>1455</b>	<b>1365</b>	<b>2445</b>	<b>1705</b>	<b>1528</b>	<b>1551</b>	<b>1581</b>	<b>1620</b>	<b>1663</b>
<b>Investment</b>											
Europe	0	0	195	105	385	231	139	93	46	46	46
North America	25	20	30	60	105	284	164	143	74	37	37
Japan	-15	-65	-60	385	160	160	64	45	45	45	45
Rest of the world	5	5	5	5	10	21	36	4	4	4	4
<b>Total</b>	<b>15</b>	<b>-40</b>	<b>170</b>	<b>555</b>	<b>660</b>	<b>696</b>	<b>403</b>	<b>284</b>	<b>169</b>	<b>132</b>	<b>132</b>
<b>Industrial</b>											
Europe	340	330	350	335	290	257	282	305	320	333	344
North America	455	445	420	380	250	291	320	346	363	378	391
China	120	180	295	205	0	157	173	187	196	204	211
Japan	260	250	225	210	160	161	177	191	201	209	216
Rest of the world	515	625	555	595	440	456	502	542	569	592	612
<b>Total</b>	<b>1690</b>	<b>1830</b>	<b>1845</b>	<b>1725</b>	<b>1140</b>	<b>1322</b>	<b>1455</b>	<b>1571</b>	<b>1650</b>	<b>1716</b>	<b>1774</b>
<b>Total platinum demand</b>	<b>7465</b>	<b>7335</b>	<b>7615</b>	<b>7295</b>	<b>6475</b>	<b>7115</b>	<b>7084</b>	<b>7378</b>	<b>7656</b>	<b>7896</b>	<b>8087</b>
<b>Supply</b>											
<b>Mine supply</b>											
Southern Africa	5273	5462	5240	4686	4693	4715	4938	5088	5283	5539	5677
Russia	890	920	915	805	785	810	815	799	783	767	752
North America	365	345	325	325	260	340	372	386	381	376	371
Rest of world	112	103	120	124	178	178	180	180	180	180	180
<b>Total</b>	<b>6640</b>	<b>6830</b>	<b>6600</b>	<b>5940</b>	<b>5916</b>	<b>6043</b>	<b>6305</b>	<b>6453</b>	<b>6627</b>	<b>6862</b>	<b>6980</b>
<b>Auto catalyst recycling</b>											
Europe	170	190	215	385	299	373	448	515	567	595	619
North America	505	575	605	630	421	505	581	639	671	705	733
China	0	0	10	15	23	34	51	76	91	109	126
Japan	35	35	35	60	54	59	65	72	78	84	91
Rest of the world	60	60	70	45	44	53	63	73	79	85	92
<b>Total</b>	<b>770</b>	<b>860</b>	<b>935</b>	<b>1135</b>	<b>840</b>	<b>1025</b>	<b>1208</b>	<b>1375</b>	<b>1485</b>	<b>1578</b>	<b>1660</b>
<b>Total platinum supply</b>	<b>7410</b>	<b>7690</b>	<b>7535</b>	<b>7075</b>	<b>6756</b>	<b>7068</b>	<b>7513</b>	<b>7828</b>	<b>8112</b>	<b>8439</b>	<b>8639</b>
<b>Supply-demand surplus/(deficit)</b>	<b>-55</b>	<b>355</b>	<b>-80</b>	<b>-220</b>	<b>281</b>	<b>-47</b>	<b>429</b>	<b>451</b>	<b>456</b>	<b>543</b>	<b>553</b>

Source: Johnson Matthey, CIRA estimates

## Palladium: Double-dip scenario

Figure 50. Palladium supply-demand outlook under a 'double dip' scenario

	2005	2006	2007	2008	2009	2010F	2011F	2012F	2013F	2014F	2015F
<b>Demand</b>											
<b>Auto catalysts</b>											
Europe	975	890	920	1005	995	1007	981	1071	1187	1312	1411
North America	1430	1415	1695	1290	1020	775	1309	1425	1488	1577	1606
China	170	220	325	390	685	1078	998	1163	1366	1520	1608
Japan	660	795	820	885	590	607	731	769	789	782	786
Rest of the world	630	695	785	895	760	1161	929	1017	1083	1137	1178
<b>Total</b>	<b>3865</b>	<b>4015</b>	<b>4545</b>	<b>4465</b>	<b>4050</b>	<b>4628</b>	<b>4948</b>	<b>5444</b>	<b>5914</b>	<b>6329</b>	<b>6589</b>
<b>Jewellery</b>											
Europe	35	40	40	45	50	54	55	54	53	53	54
North America	20	40	55	60	60	81	86	88	91	94	97
China	1250	890	705	740	560	420	420	441	463	477	491
Japan	155	145	125	115	120	134	144	130	117	117	130
Rest of the world	30	25	25	25	25	28	29	28	28	28	28
Jewellery recycled	60	135	235	130	130	70	70	63	63	63	63
<b>Net jewellery demand</b>	<b>1430</b>	<b>1005</b>	<b>715</b>	<b>855</b>	<b>685</b>	<b>646</b>	<b>663</b>	<b>679</b>	<b>689</b>	<b>706</b>	<b>737</b>
<b>Investment</b>											
Europe	0	0	280	370	525	420	252	169	84	84	84
North America	220	50	-20	50	95	271	157	137	71	36	36
Japan	0	0	0	0	0	0	0	0	0	0	0
Rest of the world	0	0	0	0	5	13	28	3	3	3	3
<b>Total</b>	<b>220</b>	<b>50</b>	<b>260</b>	<b>420</b>	<b>625</b>	<b>703</b>	<b>437</b>	<b>308</b>	<b>158</b>	<b>123</b>	<b>123</b>
<b>Industrial</b>											
Europe	445	485	465	375	345	382	362	381	395	408	422
North America	795	610	565	515	480	524	498	523	542	560	579
China	350	410	435	320	320	326	309	325	337	348	360
Japan	835	635	635	625	610	636	604	634	658	680	703
Rest of the world	345	500	540	585	525	595	565	594	616	637	658
<b>Total</b>	<b>2465</b>	<b>2350</b>	<b>2325</b>	<b>2075</b>	<b>1885</b>	<b>2111</b>	<b>2006</b>	<b>2106</b>	<b>2184</b>	<b>2258</b>	<b>2335</b>
<b>Total palladium demand</b>	<b>7980</b>	<b>7420</b>	<b>7845</b>	<b>7815</b>	<b>7245</b>	<b>8089</b>	<b>8053</b>	<b>8537</b>	<b>8945</b>	<b>9415</b>	<b>9784</b>
<b>Supply</b>											
<b>Mine supply</b>											
Southern Africa	2730	2910	2900	2570	2550	2631	2917	3209	3345	3589	3716
Russia	4620	3920	4540	3660	3635	3558	3610	3600	3580	3580	3580
North America	910	985	990	910	755	975	1050	1066	1060	1053	1053
Rest of world	145	135	150	170	160	160	180	180	180	180	180
<b>Total</b>	<b>8405</b>	<b>7950</b>	<b>8580</b>	<b>7310</b>	<b>7100</b>	<b>7324</b>	<b>7757</b>	<b>8055</b>	<b>8165</b>	<b>8403</b>	<b>8530</b>
<b>Auto catalyst recycling</b>											
Europe	165	225	300	310	330	380	361	389	413	429	446
North America	30	30	35	75	55	61	59	64	69	75	81
China	390	500	590	660	480	528	496	526	547	569	592
Japan	0	0	20	30	35	53	68	96	115	138	158
Rest of the world	40	50	70	65	65	78	80	92	100	108	116
<b>Total</b>	<b>625</b>	<b>805</b>	<b>1015</b>	<b>1140</b>	<b>965</b>	<b>1099</b>	<b>1065</b>	<b>1167</b>	<b>1243</b>	<b>1318</b>	<b>1393</b>
<b>Total palladium supply</b>	<b>9030</b>	<b>8755</b>	<b>9595</b>	<b>8450</b>	<b>8065</b>	<b>8423</b>	<b>8822</b>	<b>9222</b>	<b>9409</b>	<b>9721</b>	<b>9923</b>
<b>Supply-demand surplus/(deficit)</b>	<b>1050</b>	<b>1335</b>	<b>1750</b>	<b>635</b>	<b>820</b>	<b>334</b>	<b>770</b>	<b>685</b>	<b>463</b>	<b>305</b>	<b>140</b>

Source: Johnson Matthey, CIRA estimates

## Palladium: Protracted growth scenario

Figure 51. Palladium supply-demand outlook under a 'protracted growth' scenario

	2005	2006	2007	2008	2009	2010F	2011F	2012F	2013F	2014F	2015F
<b>Demand</b>											
<b>Auto catalysts</b>											
Europe	975	890	920	1005	995	1022	1049	1147	1330	1476	1590
North America	1430	1415	1695	1290	1020	790	1484	1623	1708	1808	1841
China	170	220	325	390	685	1154	1068	1244	1461	1626	1720
Japan	660	795	820	885	590	626	848	849	852	845	849
Rest of the world	630	695	785	895	760	1189	980	1083	1153	1210	1253
<b>Total</b>	<b>3865</b>	<b>4015</b>	<b>4545</b>	<b>4465</b>	<b>4050</b>	<b>4781</b>	<b>5428</b>	<b>5946</b>	<b>6505</b>	<b>6965</b>	<b>7254</b>
<b>Jewellery</b>											
Europe	35	40	40	45	50	53	54	53	52	52	53
North America	20	40	55	60	60	81	85	88	90	93	96
China	1250	890	705	740	560	392	380	399	419	432	445
Japan	155	145	125	115	120	132	139	126	113	113	125
Rest of the world	30	25	25	25	25	27	27	27	26	26	27
Jewellery recycled	60	135	235	130	130	70	70	63	63	63	63
<b>Net jewellery demand</b>	<b>1430</b>	<b>1005</b>	<b>715</b>	<b>855</b>	<b>685</b>	<b>616</b>	<b>615</b>	<b>630</b>	<b>639</b>	<b>654</b>	<b>683</b>
<b>Investment</b>											
Europe	0	0	280	370	525	341	205	137	69	69	69
North America	220	50	-20	50	95	271	157	137	71	36	36
Japan	0	0	0	0	0	0	0	0	0	0	0
Rest of the world	0	0	0	0	5	13	28	3	3	3	3
<b>Total</b>	<b>220</b>	<b>50</b>	<b>260</b>	<b>420</b>	<b>625</b>	<b>625</b>	<b>389</b>	<b>277</b>	<b>142</b>	<b>107</b>	<b>107</b>
<b>Industrial</b>											
Europe	445	485	465	375	345	395	415	436	452	467	483
North America	795	610	565	515	480	543	570	598	620	642	663
China	350	410	435	320	320	337	354	372	386	399	412
Japan	835	635	635	625	610	659	692	726	753	779	805
Rest of the world	345	500	540	585	525	616	647	680	705	729	754
<b>Total</b>	<b>2465</b>	<b>2350</b>	<b>2325</b>	<b>2075</b>	<b>1885</b>	<b>2187</b>	<b>2296</b>	<b>2411</b>	<b>2500</b>	<b>2585</b>	<b>2673</b>
<b>Total palladium demand</b>	<b>7980</b>	<b>7420</b>	<b>7845</b>	<b>7815</b>	<b>7245</b>	<b>8208</b>	<b>8728</b>	<b>9264</b>	<b>9785</b>	<b>10311</b>	<b>10717</b>
<b>Supply</b>											
<b>Mine supply</b>											
Southern Africa	2730	2910	2900	2570	2550	2631	2917	3209	3345	3589	3716
Russia	4620	3920	4540	3660	3635	3558	3610	3600	3580	3580	3580
North America	910	985	990	910	755	975	1050	1066	1060	1053	1053
Rest of world	145	135	150	170	160	160	180	180	180	180	180
<b>Total</b>	<b>8405</b>	<b>7950</b>	<b>8580</b>	<b>7310</b>	<b>7100</b>	<b>7324</b>	<b>7757</b>	<b>8055</b>	<b>8165</b>	<b>8403</b>	<b>8530</b>
<b>Auto catalyst recycling</b>											
Europe	165	225	300	310	330	389	413	438	455	473	492
North America	30	30	35	75	55	61	67	73	79	85	92
China	390	500	590	660	480	576	634	659	685	713	741
Japan	0	0	20	30	35	53	79	118	142	170	196
Rest of the world	40	50	70	65	65	78	94	108	116	126	136
<b>Total</b>	<b>625</b>	<b>805</b>	<b>1015</b>	<b>1140</b>	<b>965</b>	<b>1156</b>	<b>1285</b>	<b>1395</b>	<b>1477</b>	<b>1567</b>	<b>1657</b>
<b>Total palladium supply</b>	<b>9030</b>	<b>8755</b>	<b>9595</b>	<b>8450</b>	<b>8065</b>	<b>8480</b>	<b>9043</b>	<b>9450</b>	<b>9643</b>	<b>9970</b>	<b>10186</b>
<b>Supply-demand surplus/(deficit)</b>	<b>1050</b>	<b>1335</b>	<b>1750</b>	<b>635</b>	<b>820</b>	<b>273</b>	<b>314</b>	<b>187</b>	<b>-143</b>	<b>-341</b>	<b>-531</b>

Source: Johnson Matthey, CIRA estimates

## Palladium: Sustained growth scenario

Figure 52. Palladium supply-demand outlook under a 'sustained growth' scenario

	2005	2006	2007	2008	2009	2010F	2011F	2012F	2013F	2014F	2015F
<b>Demand</b>											
<b>Auto catalysts</b>											
Europe	975	890	920	1005	995	1058	1166	1307	1514	1673	1799
North America	1430	1415	1695	1290	1020	823	1639	1820	2000	2187	2304
China	170	220	325	390	685	1154	1118	1303	1530	1702	1800
Japan	660	795	820	885	590	626	848	884	917	932	948
Rest of the world	630	695	785	895	760	1230	1056	1191	1290	1357	1399
<b>Total</b>	<b>3865</b>	<b>4015</b>	<b>4545</b>	<b>4465</b>	<b>4050</b>	<b>4891</b>	<b>5828</b>	<b>6505</b>	<b>7251</b>	<b>7851</b>	<b>8250</b>
<b>Jewellery</b>											
Europe	35	40	40	45	50	52	50	50	50	50	50
North America	20	40	55	60	60	81	83	86	86	86	86
China	1250	890	705	740	560	364	328	344	354	365	376
Japan	155	145	125	115	120	124	117	106	96	96	96
Rest of the world	30	25	25	25	25	26	27	26	25	25	26
Jewellery recycled	60	135	235	130	130	70	70	63	63	63	63
<b>Net jewellery demand</b>	<b>1430</b>	<b>1005</b>	<b>715</b>	<b>855</b>	<b>685</b>	<b>576</b>	<b>535</b>	<b>549</b>	<b>548</b>	<b>559</b>	<b>571</b>
<b>Investment</b>											
Europe	0	0	280	370	525	315	189	127	63	63	63
North America	220	50	-20	50	95	257	149	129	67	34	34
Japan	0	0	0	0	0	0	0	0	0	0	0
Rest of the world	0	0	0	0	5	11	18	2	2	2	2
<b>Total</b>	<b>220</b>	<b>50</b>	<b>260</b>	<b>420</b>	<b>625</b>	<b>582</b>	<b>356</b>	<b>258</b>	<b>132</b>	<b>99</b>	<b>99</b>
<b>Industrial</b>											
Europe	445	485	465	375	345	395	435	469	493	513	530
North America	795	610	565	515	480	543	597	645	677	704	728
China	350	410	435	320	320	337	371	401	421	437	452
Japan	835	635	635	625	610	659	724	782	822	854	883
Rest of the world	345	500	540	585	525	616	678	732	769	800	827
<b>Total</b>	<b>2465</b>	<b>2350</b>	<b>2325</b>	<b>2075</b>	<b>1885</b>	<b>2187</b>	<b>2405</b>	<b>2598</b>	<b>2728</b>	<b>2837</b>	<b>2933</b>
<b>Total palladium demand</b>	<b>7980</b>	<b>7420</b>	<b>7845</b>	<b>7815</b>	<b>7245</b>	<b>8236</b>	<b>9124</b>	<b>9909</b>	<b>10660</b>	<b>11345</b>	<b>11852</b>
<b>Supply</b>											
<b>Mine supply</b>											
Southern Africa	2730	2910	2900	2570	2550	2631	2917	3209	3345	3589	3716
Russia	4620	3920	4540	3660	3635	3558	3610	3600	3580	3580	3580
North America	910	985	990	910	755	975	1050	1066	1060	1053	1053
Rest of world	145	135	150	170	160	160	180	180	180	180	180
<b>Total</b>	<b>8405</b>	<b>7950</b>	<b>8580</b>	<b>7310</b>	<b>7100</b>	<b>7324</b>	<b>7757</b>	<b>8055</b>	<b>8165</b>	<b>8403</b>	<b>8530</b>
<b>Auto catalyst recycling</b>											
Europe	165	225	300	310	330	413	495	569	626	657	684
North America	30	30	35	75	55	61	67	73	79	85	92
China	390	500	590	660	480	576	662	729	765	803	835
Japan	0	0	20	30	35	53	79	118	142	170	196
Rest of the world	40	50	70	65	65	78	94	108	116	126	136
<b>Total</b>	<b>625</b>	<b>805</b>	<b>1015</b>	<b>1140</b>	<b>965</b>	<b>1180</b>	<b>1396</b>	<b>1597</b>	<b>1728</b>	<b>1842</b>	<b>1943</b>
<b>Total palladium supply</b>	<b>9030</b>	<b>8755</b>	<b>9595</b>	<b>8450</b>	<b>8065</b>	<b>8504</b>	<b>9154</b>	<b>9652</b>	<b>9894</b>	<b>10244</b>	<b>10472</b>
<b>Supply-demand surplus/(deficit)</b>	<b>1050</b>	<b>1335</b>	<b>1750</b>	<b>635</b>	<b>820</b>	<b>268</b>	<b>30</b>	<b>-258</b>	<b>-766</b>	<b>-1101</b>	<b>-1380</b>

Source: Johnson Matthey, CIRA estimates



## Platinum: Supply assumptions

Figure 53. Platinum supply assumptions

	2010F	2011F	2012F	2013F	2014F	2015F	2016F	2017F	2018F	2019F	2020F
<b>Current mine supply</b>											
Anglo Platinum	2400	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
Implats	1217	1288	1305	1328	1460	1513	1513	1513	1513	1513	1513
Lonmin	668	714	809	833	859	866	866	866	866	866	866
Aquarius	47	96	181	206	210	210	210	210	210	210	210
Northam	389	337	335	335	335	335	335	335	335	335	335
Russia	810	815	799	783	767	752	737	737	737	737	737
USA	340	372	386	381	376	371	366	366	366	366	366
Other	178	180	180	180	180	180	180	180	180	180	180
<b>Total current mine supply</b>	<b>6049</b>	<b>6302</b>	<b>6495</b>	<b>6546</b>	<b>6687</b>	<b>6727</b>	<b>6707</b>	<b>6707</b>	<b>6707</b>	<b>6707</b>	<b>6707</b>
<b>Additional mine supply in construction</b>											
Anglo Platinum	0	0	0	0	0	0	0	0	0	0	0
Implats	0	0	0	41	68	90	90	90	90	90	90
Lonmin	0	0	0	0	0	0	0	0	0	0	0
Aquarius	0	0	0	0	0	0	0	0	0	0	0
Northam	0	8	33	97	119	163	244	249	249	249	249
Russia	0	0	0	0	0	0	0	0	0	0	0
USA	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0
<b>Total additional supply in construction</b>	<b>0</b>	<b>7</b>	<b>34</b>	<b>137</b>	<b>187</b>	<b>253</b>	<b>334</b>	<b>339</b>	<b>339</b>	<b>339</b>	<b>339</b>
<b>Additional mine supply in feasibility</b>											
Anglo Platinum	0	0	0	0	0	0	0	0	0	0	0
Implats	0	0	0	0	0	0	0	100	200	245	245
Lonmin	0	0	0	0	0	0	0	0	0	0	0
Aquarius	0	0	0	0	0	0	0	0	0	0	0
Northam	0	0	0	0	0	0	25	100	125	125	125
Russia	0	0	0	0	0	0	0	0	0	0	0
USA	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0
<b>Total additional supply in feasibility</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>25</b>	<b>200</b>	<b>325</b>	<b>370</b>	<b>370</b>
<b>Autocat recycling</b>	<b>1004</b>	<b>1109</b>	<b>1195</b>	<b>1260</b>	<b>1332</b>	<b>1404</b>	<b>1481</b>	<b>1564</b>	<b>1653</b>	<b>1750</b>	<b>1854</b>
<b>Total platinum supply</b>	<b>7047</b>	<b>7414</b>	<b>7648</b>	<b>7887</b>	<b>8193</b>	<b>8383</b>	<b>8547</b>	<b>8810</b>	<b>9025</b>	<b>9166</b>	<b>9270</b>

Source: Citi Investment Research and Analysis

## Palladium: Supply assumptions

Figure 54. Palladium supply assumptions

	2010F	2011F	2012F	2013F	2014F	2015F	2016F	2017F	2018F	2019F	2020F
<b>Current mine supply</b>											
Anglo Platinum	1287	1458	1659	1713	1854	1906	1868	1868	1868	1868	1868
Implats	830	879	888	936	1016	1087	1087	1059	1059	1059	1059
Lonmin	324	346	389	400	413	416	416	416	416	416	416
Aquarius	28	78	107	112	114	114	114	114	114	114	114
Northam	116	103	111	130	137	137	151	177	178	178	178
Russia	3558	3610	3600	3580	3580	3580	3580	3580	3580	3580	3580
USA	975	1050	1066	1060	1053	1053	1053	1053	1053	1053	1053
Other	160	180	180	180	180	180	180	180	180	180	180
<b>Total current mine supply</b>	<b>7324</b>	<b>7757</b>	<b>8055</b>	<b>8165</b>	<b>8403</b>	<b>8530</b>	<b>8505</b>	<b>8502</b>	<b>8504</b>	<b>8504</b>	<b>8504</b>
<b>Additional mine supply in construction</b>											
Anglo Platinum	0	0	0	0	0	0	0	0	0	0	0
Implats	0	0	0	30	51	68	68	68	68	68	68
Lonmin	0	0	0	0	0	0	0	0	0	0	0
Aquarius	0	0	0	0	0	0	0	0	0	0	0
Northam	0	6	25	72	89	122	183	187	187	187	187
Russia	1	0	0	0	0	0	0	0	0	0	0
USA	2	0	0	0	0	0	0	0	0	0	0
Other	3	0	0	0	0	0	0	0	0	0	0
<b>Total additional supply in construction</b>	<b>6</b>	<b>6</b>	<b>25</b>	<b>103</b>	<b>140</b>	<b>190</b>	<b>251</b>	<b>255</b>	<b>255</b>	<b>255</b>	<b>255</b>
<b>Additional mine supply in feasibility</b>											
Anglo Platinum	0	0	0	0	0	0	0	0	0	0	0
Implats	0	0	0	0	0	0	0	75	150	184	184
Lonmin	0	0	0	0	0	0	0	0	0	0	0
Aquarius	0	0	0	0	0	0	0	0	0	0	0
Northam	0	0	0	0	0	0	19	75	94	94	94
Russia	0	0	0	0	0	0	0	0	0	0	0
USA	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0
<b>Total additional supply in feasibility</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>19</b>	<b>150</b>	<b>244</b>	<b>278</b>	<b>278</b>
Autocat recycling	1156	1285	1395	1477	1567	1657	1754	1754	1754	1754	1754
<b>Total palladium supply</b>	<b>8480</b>	<b>9043</b>	<b>9450</b>	<b>9643</b>	<b>9970</b>	<b>10186</b>	<b>10529</b>	<b>10661</b>	<b>10756</b>	<b>10790</b>	<b>10790</b>

Source: Citi Investment Research and Analysis

Prices for stocks mentioned: Anglo Platinum (AMSJ.J; R689.99; 2M); Aquarius Platinum Ltd (AQP.AX; A\$6.08; 1H); Aquarius Platinum Ltd (AQP.L; £3.80; 1H); Impala Platinum (IMPJ.J; R195.80; 1M); Lonmin PLC (LMI.L; £18.35; 2M); Northam Platinum (NHMJ.J; R46.71; 2M)

**Notes**

## Notes

# Appendix A-1

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