AGENCY FIXED RATE PREPAYMENT MODEL UPDATE

Modeling capacity constraints

We are releasing an update to the agency prepayment model at the close of business on Friday, October 19, 2012 (Beta Ver. 1.23) and plan to roll this version of the model to production in mid-November.

Since our prior model update, the GSEs have increased their guarantee fee (g-fee) and the FHA has released detailed pool level information on mortgage insurance premiums (MIP). Moreover, the recent rally in rates, combined with the sharp increase in prepayments on pre-HARP originations, has made origination capacity a major constraint on prepayments. In this update, we incorporate the changes in GSE g-fees and the new data disclosures by FHA on MIP distribution within a pool. In addition, we incorporate observed changes in prepayment behavior that can be attributed to origination capacity constraints. The key changes in this model update are:

- We have updated the primary-secondary spread model to incorporate the 10bp increase in g-fee for loans delivered on or after December 1, 2012.
- We have incorporated the effect of origination capacity constraints by decreasing peak prepayment speeds for deep-in-the-money cohorts; increasing the effect of loan size, particularly between 175K and 300K; and decreasing the effect of historic low mortgages rates on prepayment performance.
- We have extended the refinancing aging ramp for retail originations by 6 months.
- We have increased speeds on pre-HARP high LTV cohorts by decreasing the cumulative burn-out experienced by high LTV pools prior to the introduction of HARP 2.0.
- We have introduced a new model for pools with original LTV over 125. These were recently issued because changes to HARP now allow for LTVs in excess of 125.
- We now use the actual MIP paid by borrowers in GNMA pools as disclosed by the FHA. The current production model estimates the MIP paid by borrowers based on a pool's origination date.
- We have also made changes to the prepayment and default models of FHA collateral originated before May 2009, ie, pools that are eligible for decreased MIP under the FHA streamline refinancing program. These changes more closely reflect recent prepayment performance.

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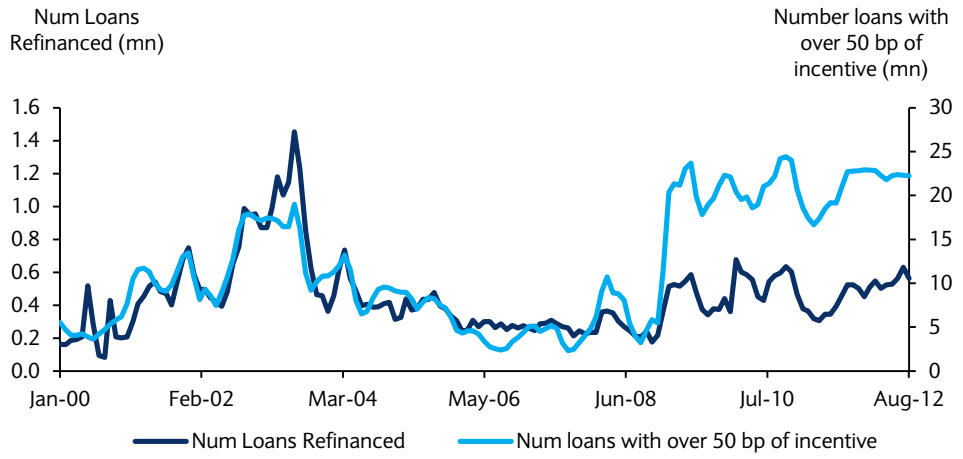
Conventional model changes

Aggregate prepayment volumes remain substantially below historical norms. Figure 1 shows the number of GSE loans refinanced in a month relative to the number of loans with at least 50bp of incentive to refinance. At the peak of the 2003 refinance episode, the mortgage industry managed to refinance over 1.4mn loans in a single month. In contrast, over the past few years, monthly refinancing volume has been 500-600k, despite the introduction of the HARP program, subsequent adjustments to the program to make it more effective, and repeated sharp rallies in mortgage rates. The reasons for this muted prepayment response can be attributed to increased refinancing frictions, limited origination capacity, and lower borrower demand.

Figure 1: Overall, the prepayment environment remains benign



Source: Fannie Mae, Freddie Mac, Barclays Research

Prepayment performance of HARP-eligible borrowers

When HARP was introduced, it was designed to help borrowers whose mark-to-market LTV had increased to above 80 because of home price depreciation. However, in the immediate aftermath of the credit crisis, originators who that were skittish about put-back risk significantly tightened their underwriting standards for GSE originations. Consequently, the average FICO score of GSE originations increased from 720 to 760, greatly decreasing the effectiveness of HARP and keeping refinancing volume low. Since then, the FHFA has addressed many of the concerns that originators had by eliminating most of the put-back risk due to appraisals and/or underwriting. These policy changes (commonly referred to as HARP 2.0) have substantially increased prepayment rates on pools with high mark-to-market LTV originated before the HARP cut-off date.

In our prior model update, we incorporated most of the prepayment effect of these policy changes (for details, refer to *Agency Fixed Rate Prepayment Model Update: Adjustments for HARP and TPO*, October 28, 2011). One of the key changes to the model was to increase refinancing efficiency and prepayments on HARP-eligible high LTV borrowers. We are now further increasing speeds on pools backed by high LTV loans by decreasing the cumulative burnout these borrowers experienced before HARP 2.0 was introduced. Between 2008 and 2011, they had significant incentive to refinance but limited opportunity to do so. In this model update, we account for this.

The success of HARP still depends on individual servicers adopting the program enthusiastically, mostly because the rules for cross-servicer refinancing of pre-HARP borrowers are more constrained than those for same-servicer refinancing. The FHFA is focused on addressing this issue. Consequently, when calibrating the model, we still assume some increase in pre-HARP prepayments before they start declining because of burnout.

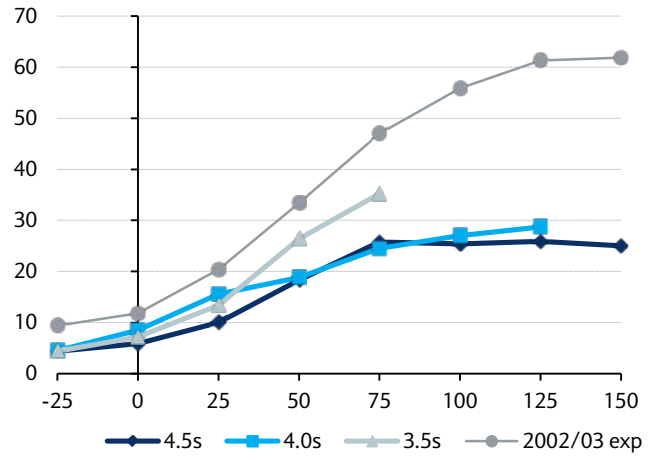
Prepayment performance of post-HARP originations

Post-HARP originations face significant refinancing constraints, many of which are exacerbated by limited origination capacity. These borrowers do not qualify for any streamline refinancing program and, thus, have to be fully underwritten. Roughly 35% of 30y post-HARP originations came through the HARP program. While a majority of those borrowers (~60%) have mark-to-market LTV below 80, they have never been qualified under the much tighter post-crises underwriting regime. The remaining 40% have LTV in excess of 80 and no mortgage insurance, leaving them few options to refinance. Moreover, originators have little to no rep and warranty risk on their HARP originations, and refinancing these loans would open them to put-back risk.

The limited origination capacity in the system forces originators to optimize the amount of time they spend per dollar of originations. This has manifested itself in two ways: the effect of loan size has significantly increased and borrowers with less than pristine credit who need to be more carefully underwritten are exhibiting slower prepayments. Loan size has always been a significant driver of a borrower's propensity to prepay. Historically, however, the increase in prepayments in response to increases in loan size had been fairly muted for loan sizes in excess of 200k. Over the past few quarters, the difference in prepayment response rate for borrowers at 200-300K has increased. In this update to the model, we adjust the loan size function to reflect this.

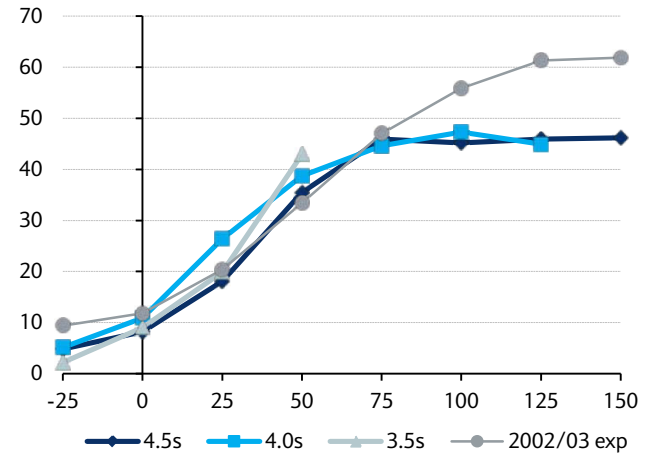
Since the onset of the credit crisis, borrowers with less than pristine credit quality as measured by FICO score and/or SATO have been prepaying materially slower. This trend continues and is generally in line with model expectations. Given these hurdles, the refinancing curve is substantially flatter than it was in 2002-03 (Figure 2).

Figure 2: Refinancing curves on post-HARP originations relative to 2002-03



Note: 12-30 WALA, Post Jun 2009 Originations.
Source: Freddie Mac, Barclays Research

Figure 3: Refinancing curves on pristine quality post-HARP originations relative to 2002-03 experience



Source: Freddie Mac, Barclays Research

However, even if we control for all of these factors, the refinancing curve is still materially different for deep-in-the-money coupons. In Figure 3, we compare the aggregate prepayment performance of 12-30 WALA pools in 2002-03 to that of similarly seasoned pristine loans in 2010-12. For the sake of this analysis, we define pristine loans as having less than 70 LTV, more than 750 FICO, TPO originations (since the majority of HARP originations come through the retail channel), and a greater than 200K loan balance (this is to adjust for the steeper than historical loan size function).

This carefully constructed and highly refi-sensitive set of loans has an S-curve roughly similar to that of 2002-03 for the first 75bp of economic incentive. However, as the economic incentive increases above 75bp, the refinancing function seems to flatten out rather sharply relative to 2002-03. While there can be many explanations for this,[1] we believe that it is at least partially driven by the lack of sufficient origination capacity. As the 4.5 coupon gets over 75bp in the money, the 4.0 coupon starts to move into the refinancing window. Historically, this would have created a surge in borrower demand, leading to a surge in prepayment volume (as observed in 2002-03, Figure 1). But with no streamline refinancing, origination capacity increases are only marginal. Thus, any increase in prepayment volume on the 4 coupon limits further increases in the 4.5 coupon. Similarly, as the 4.0 coupon gets over 75bp in the money, the 3.5 coupon starts to move into the refinancing window.

Whatever the reason, the data clearly show a flattening of the S-curve for even pristine collateral once it is fully in the money. To account for this, we have decreased the peak speed for deep-in-the-money coupons by flattening the model S-curve past 75bp of incentive. Unlike the empirical data, where the flattening is quite dramatic, the model S-curve continues to be upward sloping, but much less than it used to be.

Borrower demand

Historically, the refinancing curve steepens when rates hit new lows. This is driven by increased media focus on the low rates and perceived risk by borrowers that they might miss the chance of a lifetime to lock in low rates. Recently, however it has paid to wait. There has been a new generational low in mortgage rates in each of the past three years, and Fed policymakers have made it clear that they intend to keep rates low for the next several years. Combined with the capacity constraints in the system, this suggests that the prepayment effect of new historic lows is more muted than in the past. This has two effects: it decreases peak speeds while ensuring that speeds for deep-in-the-money cohorts do not decline as rapidly as they did in the past when rates back up a little. In the model, this is incorporated as a refi function multiplier that increases/decreases as mortgage rates become more/less attractive relative to the past. In this update, we have reduced the range of this multiplier about 15%.

Guarantee fee changes

In September, the FHFA announced that the average g-fee charged by the GSEs will increase about 10bp for loans delivered on or after December 1, 2012. Since then, the GSEs have communicated to originators the exact nature of the change. Unfortunately, this is confidential information that originators do not share with us. There is also no reason to believe that the changes are uniform across products and/or originators. However, as we have done in the past, we have recalibrated our primary-secondary spread model to the

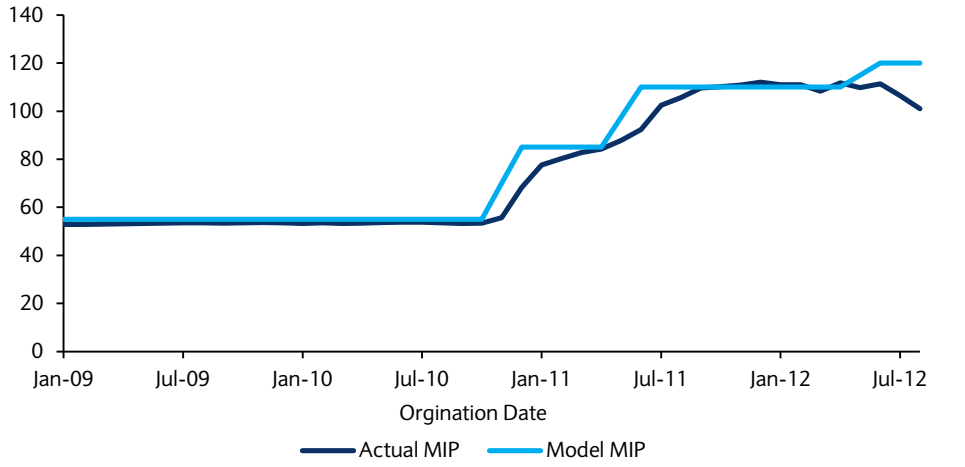
[1] SATO is slightly higher for larger incentives, and there is some drift in other collateral attributes, but, in our opinion, that alone does not explain all of the flattening in the refinancing curve.

zero point survey rates from HSH.[2] This results in a 10bp increase in the conventional 30y mortgage rate used in our model, while leaving 15y mortgage rates unchanged. We would not conclude from this that the g-fee on 15y mortgages has not changed. Recently, there has been significant volatility in par coupon calculations and primary-secondary spread.

GNMA model changes

Recently, the FHA started providing details on the actual MIP paid by borrowers backing individual pools. The MIP is a key driver of their economic incentive to refinance. Before these data were released, the model made assumptions on the MIP in a pool based on its origination date. On average, it estimated MIP at a few basis points higher than the reported MIP (Figure 4). This is particularly true for pools originated right around the cut-off date. With this update, we switch to using the actual data now available. Since the model generally assumed higher MIP, model-projected speeds should decline across most pools originated after October 2010. In addition, we have flattened out the VA and FHA S-curves for deep-in-the-money mortgages, similar to the adjustments we made for the convention mortgages.

Figure 4: Model-estimated MIP is slightly higher than the reported MIP



Source: GNMA, Barclays Research

A note on the daily par-coupon calculation

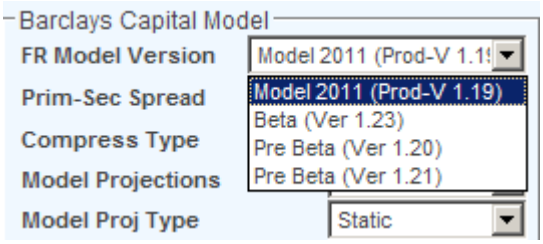
Over the past few months, the daily par-coupon calculation based on TBA prices has been challenging, to say the least. FN 3s have been for some time the lowest coupon actively traded in the TBA market, but the price on this coupon is well above par (it increased from close to par in April to almost $106 by late September and is currently about $104.5). Consequently, to calculate a daily par-coupon, which is an important input to our mortgage rate process and a significant driver of model valuations, we have been using trader estimated prices on the FN 3 and FN 2.5 fly. This worked well until the announcement of QE3, after which FN 3s (the coupon the Fed was most likely to purchase) tightened significantly more than FN 3.5s. Using the fly methodology in place at the time, this outperformance was extrapolated down to the par coupon. As a result, our calculated par-coupon was very volatile and on average 6-7bp lower than it should have been between September 24 and October 3. In response, we changed our par coupon methodology on October 3 to approximate FN 2.5 and FN 2 prices by using duration estimates relative to FN

[2] This rate is materially similar to the Freddie Mac Survey rate for 30y conventional.

3s. This has eliminated much of the excess volatility in our daily par coupon calculations. We regret any inconvenience the change in methodology might have caused.

How to access the Updated Beta Model?

The Updated Beta Model can be accessed from the preference page on SSA by choosing "Beta (Ver 1.23)" from the pull-down menu for "FR Model Version." This is the first input field in the right-hand corner of the preference screen. Users will also continue to have access to the previous pre-beta model. V 1.23 will be rolled to production on November 9, 2012. Please feel free to contact us if you have trouble accessing the model or with any feedback on the model changes.



The V 1.23 version of the conventional 30y model is materially similar to the Pre-Beta (V1.21) model that was released on October 2, 2012. Most of the new changes are to the GNMA and conventional 15y sectors.

Valuation effect of the model changes

The combination of a10bp increase in g-fee and a flatter refinancing curve pushed OAS wider on most post-HARP cohorts. This was somewhat offset on lower coupons because of the steeper loan size function. In general, speeds on pre-HARP cohorts increased, tightening OAS.

Figure 5: Effect of model change on Fannie Mae TBA and cohort (Online Model - V 1.19 vs. Beta V 1.23)

			Online Model (V 1.19)							Beta (V1.23)							OAS Change
Coupon	Vintage	Price	Yield	ZV	OAD	OAS	1-Yr	3-Yr	Life	Yield	ZV	OAD	OAS	1-Yr	3-Yr	Life	
3.0	TBA	104-07	2.07	47	5.5	-6	13.8	15.5	15.5	2.12	44	5.7	-3	11.2	13.7	14.6	4
	2012	104-07	2.07	46	5.6	-6	13.8	15.8	15.4	2.08	45	5.7	-4	12.7	15.1	15.4	2
	2011	104-07	2.06	43	5.4	-3	16.7	16.6	15.4	2.10	40	5.6	0	15.1	15.6	14.7	4
3.5	TBA	105-31+	2.19	47	5.0	16	15.9	16.5	15.4	2.29	42	5.6	24	13.0	14.5	13.8	7
	2012	105-31+	2.10	47	4.9	12	20.2	18.7	16.7	2.14	44	5.3	16	18.1	18.0	16.1	5
	2011	105-31+	1.85	52	3.8	-4	27.1	23.3	20.2	1.91	48	4.3	3	24.4	22.3	19.3	6
	2010	105-31+	1.81	51	3.7	-3	26.7	23.8	20.5	1.83	48	3.9	-1	26.2	23.8	20.3	2
4.0	TBA	106-28	1.76	52	2.4	6	34.5	27.3	24.2	1.98	46	3.8	24	28.5	24.6	21.6	17
	2011	106-29+	2.08	47	3.5	28	27.7	23.2	20.1	2.30	41	4.5	43	22.5	20.1	17.4	15
	2010	106-28+	2.04	47	3.2	26	28.3	23.8	20.7	2.17	42	4.0	35	25.8	22.2	19.0	9
4.5	TBA	107-25+	1.25	42	2.0	9	40.4	33.1	31.2	1.72	40	2.9	35	34.3	28.6	26.4	26
	2011	108-02+	2.08	41	3.4	50	29.0	24.7	22.1	2.44	37	4.4	72	22.6	20.2	18.2	22
	2010	107-29+	2.03	40	3.2	49	30.5	25.5	22.9	2.32	37	3.9	66	25.7	22.2	19.8	16
	2009	107-25+	1.46	40	2.1	18	40.1	31.9	29.1	1.95	38	3.0	46	32.8	27.0	24.0	28
5.0	TBA	108-30	0.99	26	1.7	3	41.2	35.8	33.7	0.98	27	1.5	-1	42.0	36.3	33.8	-4
	2010	109-22	2.38	32	3.9	83	22.8	21.4	19.6	2.61	30	4.4	98	19.6	18.9	17.4	15
	2009	109-05	2.30	32	3.6	82	26.1	23.7	21.4	2.59	30	4.1	100	22.0	20.6	18.7	18
5.5	TBA	109-18+	1.37	20	2.2	39	38.5	34.1	32.3	1.17	18	1.8	23	41.1	36.1	33.8	-16
	2008	109-19	1.63	21	2.4	55	36.7	32.3	30.1	1.48	21	2.1	43	39.0	34.0	31.3	-12
	2007	109-19	1.72	20	2.5	62	35.5	31.3	29.3	1.62	19	2.2	51	38.1	32.8	30.1	-10
	2006	109-19	1.75	20	2.5	65	35.2	31.0	28.9	1.69	19	2.2	57	37.4	32.2	29.3	-8
6.0	TBA	110-23	1.89	17	2.6	79	33.8	30.3	28.7	1.64	16	2.2	59	36.8	32.8	30.4	-20
	2008	110-24	2.30	17	3.0	107	30.7	27.3	25.4	2.11	17	2.7	91	33.5	29.5	26.8	-16
	2007	110-24	2.27	16	3.0	105	30.8	27.5	25.5	2.14	16	2.7	93	33.4	29.2	26.4	-12
	2006	110-24	2.31	16	3.0	109	30.3	27.0	25.0	2.21	15	2.7	99	32.7	28.6	25.7	-10
6.5	TBA	112-21	2.18	14	2.9	101	29.6	26.9	25.3	2.06	13	2.6	89	31.7	28.6	26.0	-12
	2007	112-22	2.66	12	3.4	134	26.4	23.7	21.9	2.57	11	3.2	125	28.1	25.0	22.5	-9
	2006	112-22	2.70	12	3.4	138	25.7	23.2	21.4	2.61	11	3.2	130	27.4	24.5	22.0	-9

Note: Pricing date Oct 18-2012
Source: Barclays;

Figure 6: Effect of model change on GNMA II TBA and cohort (Online Model - V 1.19 vs. Beta V 1.23)

			Online Model (V 1.19)							Beta (V1.23)							OAS Change
Coupon	Vintage	Price	Yield	ZV	OAD	OAS	1-Yr	3-Yr	Life	Yield	ZV	OAD	OAS	1-Yr	3-Yr	Life	
3.0	TBA	105-25	2.03	38	5.8	-16	7.9	11.1	10.9	2.10	32	6.4	-10	6.7	9.6	9.7	6
3.5	TBA	107-29	1.68	55	3.0	-25	15.8	18.9	16.8	1.99	44	4.5	-7	11.4	14.1	13.1	18
	2012	107-29	1.73	53	3.3	-22	15.5	18.2	16.2	2.04	42	4.7	-4	11.2	13.5	12.5	18
4.0	TBA	108-25	1.02	48	1.9	-33	33.4	30.3	25.9	1.63	46	2.8	-4	25.7	24.0	20.0	29
	2011	108-25	1.23	48	2.1	-25	31.4	28.5	23.9	1.71	45	3.0	-1	24.9	23.2	19.2	24
	2010	109-03	1.98	40	3.6	9	21.3	19.1	15.6	2.19	34	4.5	25	17.4	16.2	13.4	15
5.0	TBA	110-12	1.07	19	2.5	-10	36.9	32.2	28.7	1.29	21	2.6	5	35.0	30.6	27.0	15
	2010	111-02	1.72	35	2.4	32	28.9	26.4	22.0	2.16	34	3.0	57	24.1	22.4	18.5	25
5.5	TBA	110-12+	1.93	17	3.0	66	30.6	28.2	25.4	1.79	18	2.7	56	31.9	29.3	26.5	-9
6.0	TBA	113-11	2.03	12	3.4	68	26.2	24.6	22.0	1.94	14	3.2	62	26.9	25.2	22.6	-6
6.5	TBA	115-18	2.25	9	3.6	84	23.8	22.4	20.0	2.20	11	3.5	81	24.0	22.7	20.3	-3

Note: Pricing date Oct 18-2012
Source: Barclays

Figure 7: Effect of model change on IOS (Online Model - V 1.19 vs. Beta V 1.23)

			Online Model (V 1.19)							Beta (V1.23)							OAS Change
Security	Cpn	Price	Yield	ZV	OAD	OAS	1-Yr	3-Yr	Life	Yield	ZV	OAD	OAS	1-Yr	3-Yr	Life	
IFN-33510 IO	3.5	12-12	1.83	48	-31.2	644	27.7	24.4	21.1	1.95	28	-28.8	666	27.7	24.5	21.0	22
IFN-34011 IO	4.0	14-15+	1.31	1	-29.2	514	29.9	24.5	21.3	4.54	-30	-19.2	747	24.4	21.2	18.3	233
IFN-34010 IO	4.0	13-30+	2.12	3	-28.7	583	29.2	24.4	21.2	3.88	-29	-21.5	700	27.0	22.8	19.6	117
IFN-34009 IO	4.0	11-24	-1.93	-55	-41.0	374	42.8	33.2	29.3	1.93	-69	-30.3	653	37.2	29.6	25.3	279
IFN-34511 IO	4.5	17-01+	-1.25	-53	-23.1	324	30.4	25.5	22.8	3.17	-48	-15.4	616	23.8	20.9	18.7	293
IFN-34510 IO	4.5	15-16+	0.00	-62	-22.7	468	31.7	26.3	23.6	3.38	-57	-16.9	687	27.0	22.9	20.4	219
IFN-34509 IO	4.5	13-09+	-2.56	-102	-30.4	376	41.5	32.6	29.8	2.85	-83	-21.5	745	34.2	27.6	24.4	369
IFN-35010 IO	5.0	19-06+	1.52	-71	-13.4	452	23.4	21.7	19.9	4.09	-63	-10.0	628	20.2	19.2	17.7	177
IFN-35009 IO	5.0	17-03+	2.06	-90	-15.0	552	26.8	24.2	21.9	5.33	-73	-11.1	784	22.8	21.0	19.0	233
IFN-35008 IO	5.0	11-12+	0.38	-235	-20.8	655	41.7	36.1	34.0	-0.31	-221	-22.6	559	43.6	37.0	34.7	-96
IFN-35005 IO	5.0	14-08	0.16	-138	-17.6	423	35.3	30.2	27.5	0.53	-129	-17.9	448	35.2	30.1	27.1	25
IFN-35508 IO	5.5	12-08+	5.11	-213	-13.0	964	37.6	33.0	30.9	3.08	-214	-16.0	780	40.5	35.0	32.4	-184
IFN-35505 IO	5.5	15-28	5.00	-99	-10.4	741	29.1	25.6	23.0	4.68	-94	-11.7	706	30.2	26.2	23.2	-35
IFN-36008 IO	6.0	14-08	9.30	-138	-6.7	1157	31.3	27.9	25.8	6.81	-148	-9.1	936	34.7	30.3	27.5	-221
IFN-36567 IO	6.5	17-23	9.01	-77	-2.9	984	26.5	23.8	22.0	7.81	-81	-4.1	871	28.6	25.3	22.7	-112
IG2-34010 IO	4.0	18-00+	2.99	82	-18.3	409	20.7	18.3	14.9	5.13	68	-13.0	590	17.1	15.7	13.0	181
IG2-34510 IO	4.5	18-06	1.00	103	-29.0	366	25.1	23.0	19.1	5.12	78	-20.0	618	19.6	18.2	15.3	252
IG2-35010 IO	5.0	19-14	-1.28	-11	-24.2	244	29.2	26.8	22.4	2.35	14	-20.1	498	24.4	22.7	18.7	254

Note: Pricing date Oct 18-2012; Source: Barclays

Analyst Certification
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