

Special Comment

Moody's Credit Policy

June 2008

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Moody's Credit Transition Model: A Summary of the Watchlist/Outlook Extension

Summary

In virtually all cases, rated corporate entities carry a Moody's Outlook. This Outlook – which is usually *Stable* but may be *Negative* or *Positive* – represents the analyst's view as to the likely future prospects of the issuer's credit condition. In some cases, when Moody's believes that a rating change is likely, an issuer will be placed on a Watchlist for either an *Upgrade* or a *Downgrade*. Table I reports the current distribution of global corporate ratings and associated Outlook-Watchlist assignments.

Moody's Credit Transition Model is an issuer-level tool to forecast all rating transitions, not only from one rating to another but also to the absorbing states of *Default* and *Withdrawal*¹. Making use of an issuer's Outlook-Watchlist assignment would certainly be useful in predicting such transitions, but incorporating this information into the Credit Transition Model represents significant technical challenges. This Special Comment describes those challenges and Moody's approach to solving them.

Extending the Credit Transition Model to condition on issuers' Outlook-Watchlist assignments has, as expected, significantly enhanced the model's ability to identify which issuers are likely to upgrade, downgrade and, by extension, ultimately default.² Interestingly, this extension has also increased the model's ability to identify which issuer ratings are more likely to withdraw.³

¹ A more general description of the Credit Transition Model may be found in "Introducing Moody's Credit Transition Model," Moody's Special Comment, August 2007. For a technical treatment, please see "A Cyclical Model of Multiple-Horizon Credit Rating Transitions and Default," Moody's Special Comment, August 2007.

² For a discussion of the model's cross-sectional predictive power, please see "Testing the Cross-Sectional Power of the Credit Transition Model," Moody's Special Comment, June 2007.

³ One reason why Watchlist status might help predict rating withdrawals is that Moody's often places the debt of an issuer targeted for acquisition on review for upgrade or downgrade, depending in part on whether the acquirer is rated higher or lower than the target. When acquired, the target's ratings are often withdrawn if the acquirer assumes or pays off the target's debt.



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Table 1: Distribution of Outlook/Watchlist Assignments by Rating

	Downgrade	Negative	Stable	Positive	Upgrade
Aaa	3%	4%	93%	0%	0%
Aa	2%	12%	85%	2%	0%
A	3%	6%	86%	3%	2%
Baa	5%	12%	74%	7%	3%
Ba	4%	13%	69%	10%	4%
B	7%	15%	68%	8%	2%
Caa-C	6%	30%	60%	4%	0%
All Ratings	4%	11%	78%	5%	2%

Defining the Problem

The Credit Transition Model (CTM) conditions on a set of issuer-specific credit facts and macroeconomic drivers. As a general statement, all of the information the model conditions on must be forecasted into the future. In the case of the macroeconomic drivers (the U.S. unemployment rate and high yield spread), this requires a separate forecasting tool exogenous to CTM. In the case of most of the issuer-specific information, CTM itself forecasts that information (e.g., rating, elapsed time in rating, whether upgraded or downgraded into that rating, and trivially the elapsed time since the issuer was first rated). The only exception – that is, issuer-specific information which CTM does not directly forecast – is the issuer's Watchlist or Outlook assignment.

It is the need to forecast future Watchlist-Outlook assignments which is the complicating factor. Estimating a model which conditions on these assignments is straightforward: we simply define indicators for *Watchlist for a Downgrade*, *Negative Outlook*, *Stable Outlook*, *Positive Outlook* and *Watchlist for an Upgrade* and include these in the time-varying covariates in the Cox hazard-type regressions that are the basis of CTM. But as we allow the Watchlist-Outlook assignment to contemporaneously scale the different transition intensities, we need, in a forecasting application, to predict what those assignments will be in the future.

While in principle one could build a model which forecasts future Watchlist-Outlook assignments, there are a number of challenges which must be overcome, not the least of which is that these future assignments must reconcile with the future rating transitions.⁴ Instead, CTM has adopted a novel approach which avoids generating forecasts of future assignments. While this technique is currently applied only to Watchlist-Outlook assignments, it could be applied to any other issuer-specific conditioning information which is difficult (or impossible) to forecast, such as the issuer's current bond spreads, or EDF, or any other relevant factor.

Describing the Solution

Put simply, the Credit Transition Model chains together 5 separate models of rating transitions which are formally identical. The first model, call it M1, conditions on the usual information and on the issuer's current Watchlist-Outlook assignment. This model is used to generate rating transition predictions over the first quarter. The second model, call it M2, conditions on the usual information and on the issuer's Watchlist-Outlook assignment of one quarter ago. This model is used to generate model predictions from the first to the second quarter in the future. Similarly, models M3 and M4 condition on the usual information and the issuer's Watchlist-Outlook assignment of two and three quarters ago, respectively. Finally, model M0 does not condition on Watchlist-Outlook assignments at all.

These models are used sequentially as follows. Imagine that today, say q_0 , we know the issuer's Watchlist-Outlook assignment. We use M1 to predict its distribution of rating states one quarter from now (q_1)

⁴ For example, an issuer which is downgraded is far more likely to downgrade again, and far less likely to upgrade, than otherwise. It follows that such an issuer would be more likely to carry a Negative Outlook or be on Watch for a Downgrade than otherwise.

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conditional on that (and other) information. The future rating states will include new ratings as well as the *default* and *withdrawal* states. It will also include the possibility that the issuer's rating remains unchanged. Often this is the single most likely event.

While the model M1 predicts new ratings for the issuer in q1, it does not predict new Watchlist-Outlook assignments associated with those ratings, and we make no attempt to do so. Considering all further rating transitions for those states, we apply the model M0 which does not condition on such information. However, M1 will also predict that, with some (often large) probability, the issuer's rating does not change. In this case, while we do not know what its Watchlist-Outlook assignment will be on q1, we do know what it is on q0 – in other words, from the point of view of q1, we know what the assignment was one quarter ago. From this single (but often most likely) state of the world on q1, we can apply the model M2 which conditions on the one-quarter-lagged Watchlist/Outlook assignment, which of course is the assignment on q0 which we observe. For the "new" rating states on q1, all future transitions are predicted by model M0. But for the "stable" rating state on q1, the next set of transitions (from q1 to q2) will be predicted by the model M2. These predicted states on q2 will include new ratings, which will then be governed by M0, but, again, it will also include the possibility that the rating did not change. Transitions from that state will be governed by M3. And so on.

Example

It is perhaps easiest to demonstrate with an example. Suppose there are only three rating states A, B and C. We will ignore *default* and *withdrawal*. Consider an issuer which is rated B on q0 and has a Stable Outlook. We would apply M1 and obtain the following:

q0		q1	
Rating	Model	Rating	Probability
B	M1	A	10%
		B*	80%
		C	10%

For the rating states A and C, we do not know the Outlook-Watchlist assignment. Further transitions from those states will be controlled by M0. For the case where the rating doesn't change, B*, we know what the assignment was one quarter ago. Further transitions will be controlled by M2.

q1		q2	
Rating	Model	Rating	Probability
A	M0	A	85%
		B	10%
		C	5%
B*	M2	A	10%
		B*	80%
		C	10%
C	M0	A	5%
		B	10%
		C	85%

From rating states A and C, there is some chance the rating would transition in q2 to B. But this is not the same as the rating's never having changed, B*. Future transitions from these new B states will also be controlled by M0. From B*, we will use the model M3 which conditions on the Watchlist-Outlook assignment from two quarters ago (q0).

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q2		q3	
Rating	Model	Rating	Probability
A	M0	A	85%
		B	10%
		C	5%
B	M0	A	10%
		B	80%
		C	10%
B*	M3	A	10%
		B*	80%
		C	10%
C	M0	A	5%
		B	10%
		C	85%

Again, we distinguish the new states B from the original state B*. Notice that the probability of being in B* on q3 is $0.8 \times 0.8 \times 0.8 = 51.2\%$. Further transitions are governed by our last model to condition on Watchlist/Outlook assignments, M4, which references the assignment three quarters in the past (q0).

q3		q4	
Rating	Model	Rating	Probability
A	M0	A	85%
		B	10%
		C	5%
B	M0	A	10%
		B	80%
		C	10%
B*	M4	A	10%
		B	80%
		C	10%
C	M0	A	5%
		B	10%
		C	85%

Beginning in q4, we no longer condition on the issuer's assignment that obtained on q0. All transitions are controlled by model M0. In effect, beginning one year from now, we ignore the issuer's current Watchlist-Outlook assignment.

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q4		q5	
Rating	Model	Rating	Probability
A	MO	A	85%
		B	10%
		C	5%
B	MO	A	10%
		B	80%
		C	10%
C	MO	A	5%
		B	10%
		C	85%

The Impact on Individual Issuers

An issuer's Watchlist-Outlook assignment has a significant impact on the model's forecasts of future rating transitions. In Figure I below we compare the 20 quarter cumulative default forecast for a hypothetical new B2 issuer given different assignments.⁵ Four quarters into the future, an issuer on Watch for a Downgrade has an expected default rate of 4.3%, 2.4 times that of the same issuer with a Stable Outlook (1.8%) and 8.6 times that of the same issuer on Watch for an Upgrade (0.5%). Considering the five year cumulative default rate, there is a 1,000 bps spread between this issuer on Watch for a Downgrade or for an Upgrade.

Figure I:

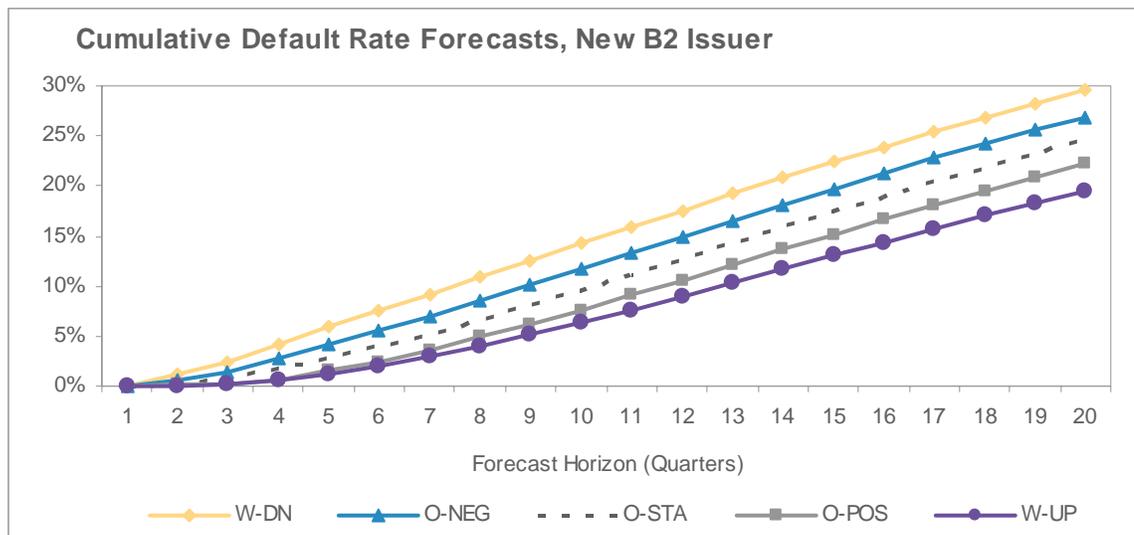


Figure II is an analogous plot of the cumulative downgrade probabilities for this issuer by various Watchlist-Outlook assignments. We continue to see the expected monotonic impact of those assignments – namely, that downgrade probabilities are highest for an issuer on Watch for a Downgrade, followed by an issuer with a Negative Outlook, a Stable Outlook, a Positive Outlook and finally by an issuer on Watch for an Upgrade.

In this case, the effect is particularly pronounced over shorter horizons. Considering the one year horizon, this issuer on Watch for a Downgrade has a downgrade probability of 18.4%, 1,130 bps greater than a Stable

⁵ All forecasts are adjusted for withdrawal. For details, please see "Comparing Withdrawal Adjustment Methods: An Application of Moody's Credit Transition Model," Moody's Special Comment, March 2008.

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Outlook and 1,500 bps greater than this issuer on Watch for an Upgrade. The dispersion narrows at longer horizons, with only 440 bps separating the highest from the lowest at 20 quarters.

Finally, Figure III compares the upgrade probabilities for this hypothetical issuer. The effects are quite similar to the preceding (though, as expected, the orders are perfectly reversed). At the one year horizon, an issuer on Watch for an upgrade has an Upgrade probability of 28.4%, 2,630 bps greater than an issuer on Watch for a Downgrade.

Figure II:

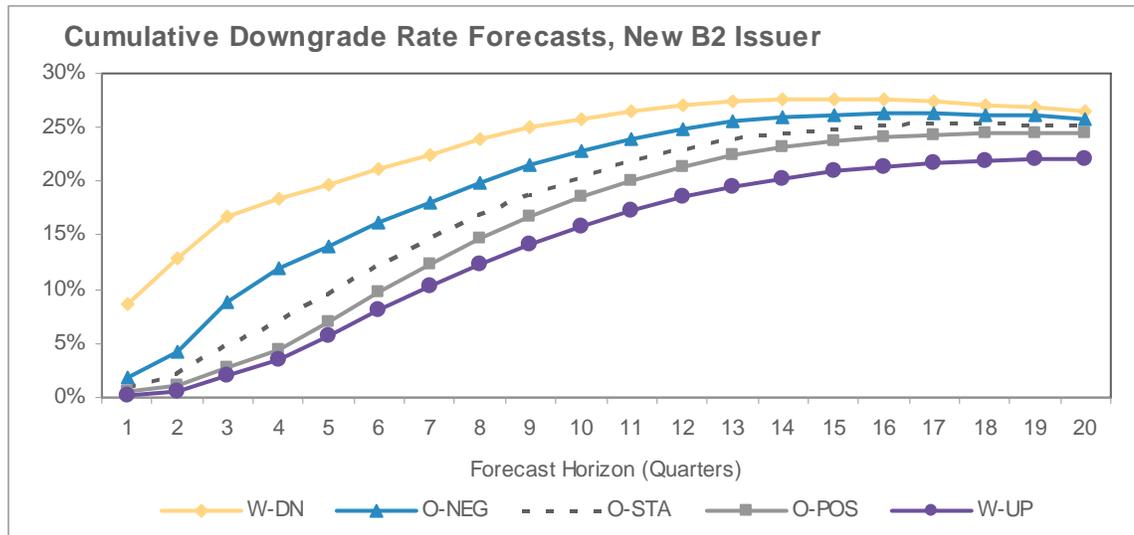
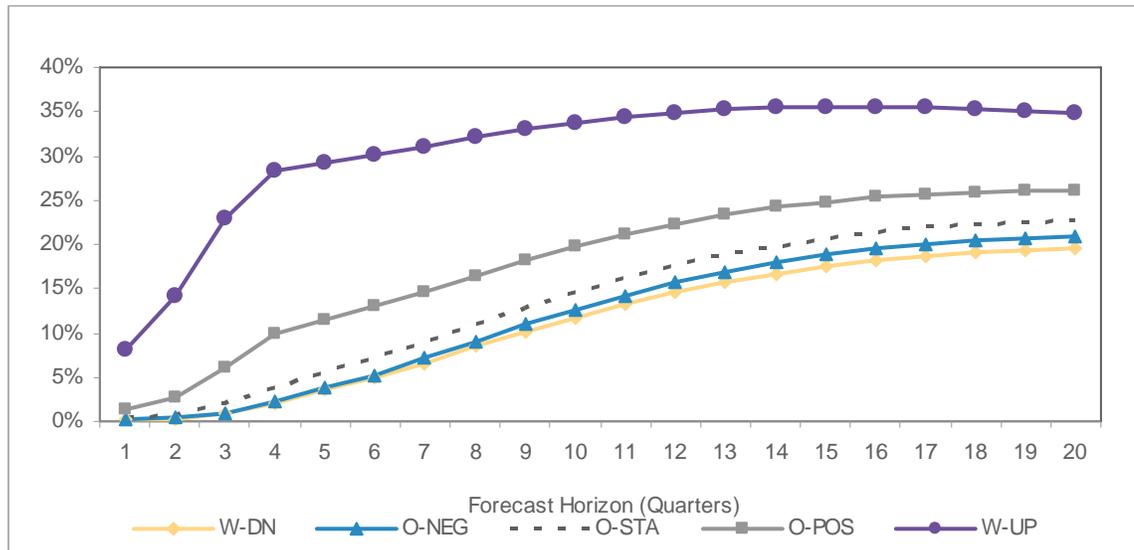


Figure III:



The Impact on Aggregate Model Performance

As shown above, conditioning on Watchlist-Outlook assignments can significantly impact the results for a single issuer. It is natural to think that it would therefore impact the aggregate performance of the model.

Model performance can be evaluated along two dimensions: its *time-series* ability to predict how an aggregate rate, such as the default rate, changes over time with the business cycle, and its *cross-sectional* ability to distinguish at a point in time those issuers more at risk default (or upgrade, or downgrade, or any other rating

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transition) from those less at risk.⁶ Somewhat surprisingly, conditioning on Watchlist-Outlook assignments does not materially change the time-series forecasts of the model.⁷ This would suggest that the distribution of assignments is itself not a significant predictor of time-series performance, just as the distribution of ratings is, by design, not predictive of aggregate risk.

However, conditioning on these assignments does improve the cross-sectional power of the Credit Transition Model. To provide just one example, we compare in Table II the accuracy ratios for different transition risks for the model with and without the Watchlist-Outlook extension.⁸ These results are for the January, 2003 cohort of North American issuers. For the default transition, we also include the accuracy ratio implied by the credit ratings alone to compare them against the model. We see material improvement, especially in the early horizons, for all rating transition risks in the Watchlist-Outlook model.

Table II: The Effect of Watchlist-Outlook Assignments on Model Accuracy

Quarter	Ratings	Default		Withdrawal		Downgrade		Upgrade	
		Basic	W-O Extension	Basic	W-O Extension	Basic	W-O Extension	Basic	W-O Extension
1	84%	90%	92%	35%	36%	25%	67%	52%	66%
2	87%	90%	91%	25%	27%	22%	51%	42%	54%
3	83%	86%	87%	23%	24%	21%	45%	39%	47%
4	82%	85%	85%	22%	24%	17%	38%	40%	51%
5	82%	85%	84%	19%	20%	18%	36%	38%	50%
6	82%	84%	84%	19%	21%	16%	32%	35%	45%
7	80%	82%	82%	20%	21%	17%	32%	35%	43%
8	80%	81%	82%	20%	21%	18%	30%	33%	39%
9	79%	80%	81%	19%	20%	17%	28%	33%	38%
10	79%	79%	80%	21%	22%	18%	28%	33%	37%
11	77%	78%	78%	22%	22%	19%	27%	33%	37%
12	74%	75%	76%	21%	22%	21%	27%	32%	35%
13	73%	74%	75%	20%	21%	22%	27%	29%	33%
14	73%	74%	74%	20%	20%	24%	28%	30%	33%
15	73%	74%	74%	20%	20%	25%	29%	27%	31%
16	73%	73%	73%	20%	20%	25%	28%	28%	31%
17	73%	73%	74%	20%	20%	26%	30%	28%	32%
18	72%	72%	73%	19%	20%	28%	31%	28%	32%
19	72%	72%	73%	19%	20%	29%	32%	27%	32%
20	72%	72%	72%	19%	20%	30%	32%	27%	32%

Conclusion

Watchlist and Outlook assignments are powerful leading indicators of future rating transitions. They are, of course, designed to be such. By extension, they help identify issuers that are more likely to default. Somewhat surprisingly, they also help identify issuers that are more likely to have their ratings withdrawn.

Extending Moody's Credit Transition Model to incorporate this issuer-specific information is an important enhancement which significantly improves the cross-sectional power of the model, but this extension is more

⁶ For a thorough exploration of the Credit Transition Model's cross-sectional power, please see "Testing the Cross-Sectional Power of the Credit Transition Model," *Moody's Special Comment*, June 2008.

⁷ There is a significant improvement for upgrade and downgrade rate forecasts over horizons of less than a year, but no change in the longer horizon forecasts.

⁸ For a definition of the accuracy ratio, please see "Measuring the Performance of Corporate Bond Ratings," *Moody's Special Comment*, April 2003.

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complicated than it may first appear. The complicating factor is that, in the most natural specification of the model, any forecasting application would require us to forecast future Watchlist-Outlook assignments.

Instead, Moody's chains together a series of models which condition on increasing lags of the Watchlist-Outlook assignments, thus obviating the need to forecast future assignments. Of course at some point the lagged assignments no longer convey useful information about future rating transitions, so at some point a forecasting application will switch to a model which does not condition on these assignments. Our research indicates that a Watchlist-Outlook assignment today will continue to inform rating transitions up to 4 quarters in the future.

It is worth noting that this method of linking models of increasing lag structure could be used to condition on other issuer-specific information which is difficult or impossible to reliably forecast. Such information might include bond or CDS spreads, EDF's, or financial ratios. Research into such models is continuing.

References

Special Comments

- "A Cyclical Model of Multiple-Horizon Credit Rating Transitions and Default," Moody's, August 2007 (103869)
- Introducing Moody's Credit Transition Model, August 2007 (104290)
- Testing the Cross-Sectional Power of the Credit Transition Model, June 2008
- Comparing Withdrawal Adjustment Methods: An Application of Moody's Credit Transition Model, March 2008 (108085)

Related Research

Special Comments

- Rating Transitions and Defaults Conditional on Watchlist, Outlook and Rating History, February 2004 (81068)
- Rating Transitions and Defaults Conditional on rating Outlooks Revisited: 1995-2005," December 2005 (95748)
- An Historical Analysis of Moody's Watchlist, October 1998 (38755)
- Measuring the Performance of Corporate Bond Ratings, April 2003 (77916)

To access any of these reports, click on the entry above. Note that these references are current as of the date of publication of this report and that more recent reports may be available. All research may not be available to all clients.

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