RESEARCH PAPER

Valuation Sensitivity Insights for a Licensing Deal with Imprecise Terms

Use Case: Olanzapine LAI, (TEV-749) licensing deal

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1 Executive Summary

This report presents an independent valuation review of a **licensing agreement**, illustrating how **imprecise economic disclosures**, such as broad royalty ranges, complicate the assessment of deal economics. As a representative use case, we analyze a typical licensing disclosure commonly found in public filings, where incomplete information requires analysts to make assumptions that meaningfully shape valuation outcomes.

In particular, **the combination of approximate royalty terms and back-loaded components** like sales milestones introduces significant variability in potential deal value. Even modest adjustments to these assumptions can shift valuation outputs materially, **highlighting the limitations of traditional single-point spreadsheet models** when applied to partially disclosed agreements.

To address this, we implemented an **Event-Tree scenario framework** that structures the key clinical and regulatory gating events and links them to commercial-stage revenues. **Triangular and other bounded probability distributions** are applied to both development outcomes, royalty cash flows and sales related milestones, enabling a **wider and more realistic range of potential licensing values**.

Key findings include:

- **Critical influence of back-end value**: Deals with substantial commercial-stage royalties are highly sensitive to binary regulatory outcomes. Depending on approval success, valuations can range from near zero to several hundred million dollars.
- **Royalty rate uncertainty**: Imprecisely disclosed royalty rates significantly increase reliance on valuation assumptions. While scenario modeling can partially capture this risk, the range of potential outcomes remains broad.
- **Sales milestone opacity**: As with royalties, limited transparency around large sales-based milestones materially impacts the estimated value of the licensing agreement.

In conclusion, beyond the well-understood impact of binary development events, this review highlights that approximate deal-term disclosure itself can meaningfully influence the valuation of licensing agreements, especially when much of the economic value is concentrated in commercial-stage performance.

2 Assumptions Driving Valuation Under Imprecise Deal Terms

The agreement examined in this use case relates to TEV-749, the subcutaneous long-acting formulation of olanzapine previously discussed in our Royalty Pharma white paper. Here, however, we focus specifically on the licensing agreement signed in 2013 between Teva and MedinCell for the use of MedinCell's long-acting injectable technology. As with many publicly disclosed deals, the economic terms were disclosed only in approximate or range-based form. While such limited precision is common and often justified by competitive considerations, it leaves analysts with meaningful uncertainty when estimating the value of the agreement.

2.1 Sales assumptions

Market consensus currently centers around approximately $1.6 billion in peak revenue for TEV-749, while company guidance suggests the potential for higher performance. To capture this divergence in expectations and reflect the inherent uncertainty at launch, we modeled a broad revenue range from $1 billion to $3 billion. The launch is expected toward the end of 2026, with potential slippage into 2027, and a loss of exclusivity in 2042/2043.

The table below summarizes the commercial base assumptions incorporated into the simulation framework.

	Base	**Low**	**High**	Launch base	LOE base
Peak Sales	1.6	1	3	End-2026	2042

Table 1: Commercial assumptions, Sales in $bn

2.2 Translating approximate Royalty Terms into a Valuation Model

The royalty schedule was disclosed only in approximate terms, described as ranging from mid–single-digit to high–single-digit rates. To translate this imprecise wording into a usable modeling structure, we applied a triangular distribution with a **4% minimum, 7% mode, and 9% maximum**, representing the full span of plausible royalty outcomes.

2.3 Modeling Milestone Triggers Under Probabilistic Ranges

TEV-749 is currently in Phase 3 development, with several steps remaining prior to commercial launch. Given that the technology has already been validated through the approval of a first compound in the same indication (Usedy), and that the active ingredient (olanzapine) has been on the market for many years, an **80%** base probability of positive Phase 3 results, followed by a **90%** probability of regulatory approval.

Event	**Milestone**	**Date**	**Probability**	**IC**	**Sales Threshold**
End_P3	5	2025-01-01	80%	10%	—
Approval	4	2026-09-01	90%	5%	—
Sales_Milestone	105	—	—	—	1000–2000

Table 2: Milestone and Sales Event Summary ($M), IC refer to confidence interval for probability calculation

Sales milestones represent one-time payments triggered when annual sales exceed an agreed-upon threshold. Because the specific sales level required to activate the payment was not disclosed, a sales window approach was applied. For each product indication, minimum ($1000 M) and

maximum ($2000 M) sales thresholds were established, and the milestone trigger was drawn probabilistically from a quintile-based uniform distribution spanning this range. The selected bounds are shown in the above table.

3 Valuation Results: Licensing Value Potential of Up to $300 Million

3.1 Mapping Valuation Outcomes Along the Development Path

The Event Tree chart provides an intuitive view of how the valuation of TEV-749 evolves as the product progresses through key development and regulatory milestones. By structuring outcomes as success or failure at each stage, it captures the inherently binary nature of pharmaceutical development. Each node represents the average valuation across all simulated scenarios at that point in the pathway, illustrating how milestone achievements increase expected value while setbacks reduce or eliminate the commercial component of the deal.

For each transition, the chart displays:

- The upcoming events and date
- the current valuation if all milestones (green boxes) are achieved, and the valuation at each step if the project does not reach the next event (pink boxes).
- the modal probability of success as well as the overall cumulative probability of reaching the final valuation with all milestones achieved.

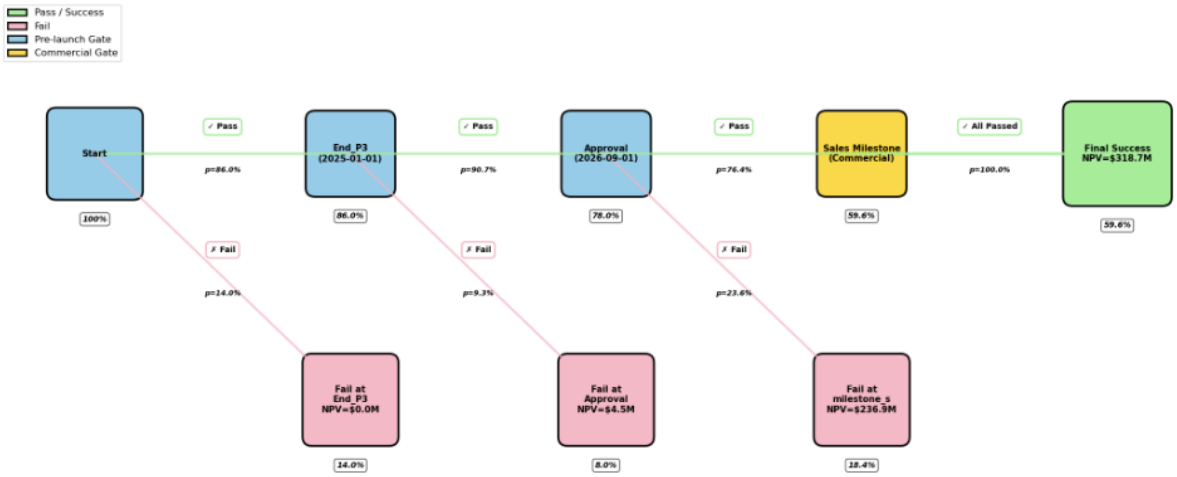

Figure. 1: Event Tree Valuation for TEV-749 license

Note: The Event Tree refers to valuation of the license deal for TEV-749 based on the scenario at different milestone. For example, if TEV suceeds in Phase 3 but is not approved its NPV is $4.5 million. If TEV-749 is commercialy launch but does not reach sales milestone level the valuation is $237 million.

When TEV-749 successfully clears all milestones in the development pathway, the valuation reaches approximately $320 million. However, the back-loaded nature of the deal means that failure at any stage leads to a substantial loss of value.

3.2 Valuation Sensitivity to Royalty Rate Uncertainty

Given the approximate disclosure of royalty rates and sales-milestone thresholds, the model applies probabilistic scenario averaging (*as detailed in the Methodology section*) to generate a continuous distribution of valuation outcomes within the defined bounds. Within this framework, the **royalty rate emerges as a primary valuation driver**.

To interpret the *"mid- to high-single-digit"* royalty guidance, the model applies a royalty rate ranging from 4% to 9% using a triangular distribution. The sales milestone triggers in a range between $1.0 billion and $2.0 billion in annual sales.

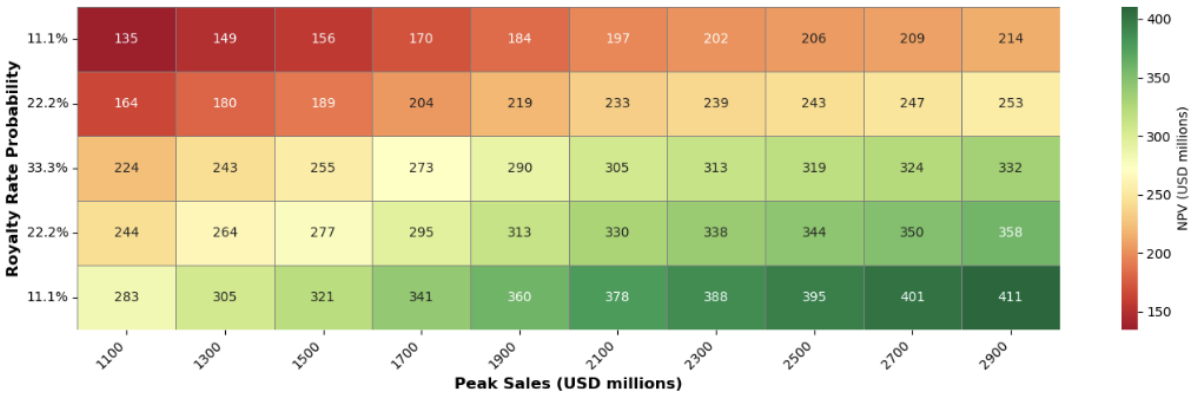

Figure. 2: Heatmap of TEV-749 license NPV

Note: This heatmap shows NPV sensitivity across sales and Royalty Rate. Vertical axis % represents the distribution applied.

Using these royalty rate assumptions together with consensus peak-sales estimates of around $1.6 billion and the modeled probabilities of reaching launch, the valuation converges toward an upper range of approximately $250–$300 million in full-success scenarios. This reflects the strong contribution of late-stage commercial cash flows to the overall deal value.

3.3 Valuation Sensitivity to Key Parameters

This section presents the sensitivity analysis of the deal valuation with respect to the principal modeling parameters, including launch probability, peak sales, royalty rate, sales-milestone, and the weighted average cost of capital (WACC). These analyses highlight how variations in core assumptions propagate through the scenario framework and influence the resulting NPV outcomes. This section is particularly important in the context of limited disclosure, as it illustrates the cumulative impact of assumption uncertainty on the valuation of the licensing agreement.

The tornado *(see next page)* chart highlights the parameters with the strongest influence on valuation relative to the **base scenario,** particularly those affected by limited disclosure.

The differences between the Tornado analysis and the Event Tree results arise from the underlying inputs: the tornado analysis is based on a base-case scenario describe in section 2, whereas the Event Tree reflects the average valuation across all simulated scenarios at each step of the development pathway.

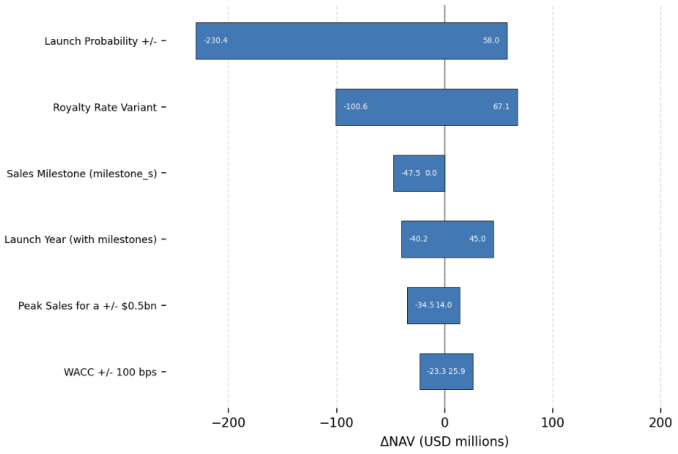

Figure. 3: Tornado Chart of TEV-749 valuation sensitivity

1. **Royalty Rate**: The royalty rate is a major valuation driver because it is disclosed only in approximate terms, described as mid to high single-digit. This ambiguity creates a broad range of plausible royalty outcomes, which in turn produces substantial dispersion in valuation results. The tornado analysis highlights this sensitivity, showing that shifts from the minimum to the mode, and from the maximum to the mode, are among the most influential factors affecting NPV.
2. **Sales milestone**: With a $105 million sales milestone—representing one to two years of royalty revenue, the undisclosed sales-level threshold becomes a major source of valuation risk. Without visibility into the actual trigger point, even minor variations in assumed sales trajectories can move the milestone from being highly probable to virtually unattainable, resulting in sharp differences in modeled deal value.

4 Methodology and Framework

4.1 Development risks assessment

Development risk was assessed using a Monte Carlo simulation that models the product's progression through key milestones including clinical trial success, regulatory filing, and approval.

The simulation framework applies a **gated progression system** in which each development stage is assigned a base probability of success. To capture uncertainty around these probabilities, a triangular distribution is used at each step. This approach enables a controlled yet realistic representation of **outcome variability** across the development pathway.

Milestone Timing achievement is modeled using a baseline (50%) complemented by potential delays of one (25%) or two years (25%). Slippage in any stage propagates through subsequent steps, thereby reflecting the cumulative impact of development delays on the overall timeline to approval.

Each successful milestone event triggers the corresponding contractual cash payment to the licensor, ensuring that both development uncertainty and financial flows are consistently integrated into the valuation model.

4.2 Sales Forecasting

Valuing royalty-bearing assets requires constructing long-term revenue projections for the underlying product, spanning its entire commercial life-cycle from initial launch through peak

penetration and ultimately into the post–loss-of-exclusivity phase.

For scenarios in which the product attains regulatory approval, sales forecasts are generated using Monte Carlo simulation applied to the key commercial value drivers:

- **Launch timing**: Derived from the development-risk algorithm described previously, incorporating potential delays propagated through the clinical and regulatory pathway.
- **Peak sales**: Modeled using a distribution that captures the full low-to-high range of expectations, informed by market consensus, therapeutic benchmarks, and company disclosures.
- **Loss of exclusivity (LOE)**: Represented as a windowed range reflecting the global nature of the program and related patent expiries.
- **Sales curve dynamics**: Lifecycle revenue curves calibrated to asset-specific characteristics, including modality (small molecule), therapeutic context (multiple incremental indications), and expected breadth of commercial deployment.

A uniform distribution was selected for peak-sales inputs due to the presence of two distinct indications, psychosis and bipolar disorder, each yielding materially different uptake and peak-revenue profiles. Under such conditions, a single-mode distribution (e.g., normal or triangular) would not appropriately reflect the multimodal nature of potential outcomes.

4.3 Royalty Forecasts Computation

Royalty rates were modeled directly from the information publicly disclosed in the licensing announcement.

Given the imprecise nature of the disclosure—described only as *"mid- to high–single-digit royalties"*, a probabilistic framework was applied to capture the range of plausible outcomes. A triangular distribution was selected, bounded by the extreme interpretations of the wording. While a tiered royalty structure could theoretically improve model precision, the absence of any disclosed tiering thresholds, combined with the relatively narrow range implied by the disclosure, supports the use of a single-tier triangular distribution as an appropriate and parsimonious modeling assumption.

This approach contributes to a comprehensive scenario grid of potential cashflow outcomes.

4.4 Tranche related Contingent Payments

Because the threshold required to trigger the sales-based milestone was not disclosed, a probabilistic approach was implemented to represent the full range of plausible trigger levels. A uniform distribution of annual sales values from a defined minimum to a high-end scenario was applied. This range was then segmented into quintiles, with each quintile representing a potential threshold at which the milestone payment could be activated.

This approach ensures that milestone-trigger uncertainty is explicitly incorporated into the valuation framework while remaining consistent with the limited precision of the publicly disclosed information.

4.5 Computation of NPV

The License valuation was determined by discounting the forecasted royalty flow and milestones payment scenarios using a weighted average cost of capital (WACC). The analysis applies a WACC of 12%, consistent with the average discount rate typically used for small-capitalization

companies. Additional project-specific and operational risks are captured separately through the Monte Carlo simulations rather than being embedded in the discount rate.

4.5.1 NPV Sensitivity

Sensitivity of the licensing valuation was assessed across the principal value drivers, including launch probability, peak sales, launch timing, royalty rate assumptions, loss-of-exclusivity timing, milestone payments, and the weighted average cost of capital (WACC). To quantify the effect of these parameters, 3 complementary approaches were applied:

- **A tornado analysis**, which measures the relative contribution of each variable to valuation variability. Although the underlying model is based on an event-tree of possible outcomes, a central scenario is retained as the primary disclosure basis in order to ensure clarity and comparability with standard analytical practice. Sensitivities (tornado charts) are presented relative to this central scenario, while the scenario analysis informs the selection and interpretation of the base case.
- **A heatmap visualization**, which capture interaction effects from the most influential drivers across the simulated scenario landscape.
- **An Event Tree analysis** to map the product's progression through key clinical, regulatory, and commercial inflection points. Each branch represents the achievement or failure of a milestone, with associated cash flows and net present values (NPVs) calculated for each resulting pathway. This structure highlights how uncertainty propagates through the development and commercial lifecycle and provides an intuitive representation of valuation outcomes under different milestone achievement.

4.6 Analytical Framework

A Python-based analytical framework was used to operationalize the valuation and scenario-modeling workflow. The platform enables systematic analysis of licensing transactions and ensures rigorous version control of all inputs, configurations, and outputs. For this engagement, the tool was improved from its existing form rather than developed de novo. (*Analysis conducted using Framework Version 1.2.2.*)

Compared with prior framework iterations, several methodological enhancements were incorporated:

1. **Pre-launch gating**: A Monte Carlo–based gating process was introduced to replace risk-adjusted NPV approach, allowing explicit simulation of stage-by-stage development uncertainty.
2. **Royalty-rate scenarios**: A new module was implemented to accommodate the imprecise royalty disclosures of this transaction, providing a more realistic range of rate assumptions than earlier versions of the model.
3. **Contingent payment modeling**: Probability structures and threshold logic for milestone-triggering events were added to more accurately represent contingent payment mechanics.
4. **Event Tree analysis**: A dedicated component was integrated to model milestone achievement pathways and their corresponding NPVs across the product lifecycle.

Limitations & Disclaimers

This analysis is based solely on information available as of January 2025. Future clinical, regulatory, competitive, or commercial developments may materially alter the outcomes presented in this report.

All assumptions, estimates, and projections used in this valuation are derived exclusively from publicly available information, which has not been independently verified. As a result, the conclusions herein are subject to the accuracy and completeness of the underlying data.

This report does not constitute an audit opinion, investment recommendation, or fairness opinion. All valuations are expressed in nominal USD and discounted to January 1st 2025 to incorporate the 2025 upcoming milestone events, unless otherwise specified.

Given the inherent uncertainties associated with early and mid stage pharmaceutical assets including clinical success rates, regulatory outcomes, competitive dynamics, and pricing—actual results may differ materially from the modeled scenarios.

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