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Article

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Real options valuation of franchise territorial exclusivity

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Abstract: With the maturity of the franchise system, franchisors have to look for new markets to capitalize constantly. This continuing expansion comes at the expense of the existing franchise establishments, as it could lead to territorial encroachment. One possible solution to mitigate this problem is by offering territorial exclusivity rights (TER) of new potential location to the existing franchisee. Yet, pricing the value of TER is not simple due to contingent claim nature of this rights. Hence, the goal of this paper is to model the TER using real options approach, a financial options valuation method that applies in real business. The real options will be built using Datar–Mathews method and then simulated using hypothetical case data. Results and implications are also discussed.

Subjects: Corporate Finance; Investment & Securities; Small Business Management

Keywords: franchise; real options; territorial encroachment; territorial exclusivity; Datar–Matthews

1. Introduction

After business functions of the franchise system are proven and ready to be duplicated, franchisor's main job is to monetize it by adding as high as possible number of outlets. However, due to limited available space, this expansion is prone to become a conflict as opening of a new outlet could cannibalize the market of existing franchisees. This phenomenon, referred as territorial encroachment, happens if the new establishment of a franchise approved by a franchisor is relatively close to the existing franchise outlet, which leads customers in the intersection area to be taken away by new franchise establishment (Vincent, 1998).

Lukito Adi Nugroho

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PUBLIC INTEREST STATEMENT

The real options is a renewed approach of capital budgeting process that upgrades most widely used method; the net present value. By incorporating uncertainty, real options improves the managerial flexibility in executing the investment appraisal. Unfortunately, due to complexity of mathematical background, this method having difficulties migrating from academic papers to real management practice. My aim in this paper is to apply real options method using Datar–Mathews model, a simulation and spreadsheet-based valuation model that more accessible to managers due to its simplicity. The case that will be investigated is territorial exclusivity rights in business format franchising. Thus, using real options, we can value the contingent claim inherent in this rights.

In order to reduce the impact of territorial encroachment, franchisors commonly include exclusive territory in the franchise agreement. This exclusivity can be in the form of geographic boundary, certain distance, or minimum population (Zeller, Achabal, & Brown, 1980). However, this exclusive territory will not guarantee that existing franchisees would not lose their costumers, as the economic distance between franchises will vary, while the legal distance set by franchisor is fixed.

Using two periods simple model, Nair, Tikoo, and Liu (2009) propose the idea of transferring territorial exclusivity as a solution to mitigate a territorial encroachment issue. The franchise rights of a certain location can be offered to the existing franchisee that would be impacted if the new outlet opens. This territorial exclusivity rights (TER) could be a win-win solution for both parties, as long as it can compensate the franchisor's foregone income and franchisee's revenue reduction if the new franchise outlet opens. Owning a TER for a location means that franchisee has a right, but not obligation to open a franchise outlet of that particular location.

This paper will extend the analysis of TER using real options analysis. Introduced by Myers (1977), real options has been perceived as an improved net present value (NPV) method in capital budgeting process. Real options incorporates uncertainty into the NPV method, which a remedy to a rigid cash flow estimation that is difficult to justify in real business case (Abdel Sabour & Poulin, 2006). Utilizing the real option, managers have flexibilities in managing uncertainties through the structure for an analysis of strategic investments. This is done through the identification of the flexibilities available to the management that consider various situations (Dixit & Pindyck, 1994). This allows the decision-makers to keep the options of investment open in times of uncertainty while considering different options after the uncertainty is dealt with Trigeorgis (1995).

Despite above aforementioned merit, many managers still encounter difficulties in implementing real options in a real business case due to mathematical complexity in pricing the options value. This is due to the nature of the contingent claim that inherent in the future uncertainty which needs to be derived with the stochastic model. Different option valuation methods have been developed in last decades. The most celebrated analytical model of options valuation is Black–Scholes PDE of Merton (1973). This model, even though can provide closed-form solution to options pricing, it is not preferable in real options pricing due to its assumptions that mainly referring to financial market.

Hence the numerical method such as Cox–Ross–Rubinstein binomial method (Cox, Ross, & Rubinstein, 1979) and Monte Carlo method of Boyle (1977) are preferable to many real options cases. From these numerical method, binomial model is still the frequently used valuation model due to its simple procedure while keeping the result reasonably accurate (Cerrato & Cheung, 2007). However, due to its curse of dimensionality (Barraquand & Martineau, 1995) and easier access to high-speed computer, many recent researches developed Monte Carlo-based options valuation. Some notable paper are LSM method (Longstaff & Schwartz, 2001) which priced American options and Datar–Matthews model (Datar & Mathews, 2004) which build a spreadsheet-based real options model.

The aim of this paper is to create a simple analytical framework for pricing TER in the case of franchise territorial encroachment. It is an extension of the model developed by Nair et al. (2009), as in this paper, TER value will be calculated using Datar–Matthews Real Options Model (DM-ROM). The DM-ROM was chosen because it is intuitive and transparent, thus, can be easily applied to the strategic managerial decision-making. It helps managers to apply real options which commonly used advanced mathematical approach into a spreadsheet model that can be accessed from any modern computer (Mathews, 2009).

The remainder of this paper is as follows: in the next section, the model will be constructed, as well as the assumptions behind it. Then, the model will be simulated using hypothetical data and results will be discussed. Finally, the conclusion will be presented in the last part.

2. Model

2.1. Model structure and assumptions

In this section, the model of franchise location development conflict originally proposed by Nair et al. (2009) will be developed. As shown in Figure 1, there are two locations that have an intersection area, eligible for franchise outlet. Outlet *A*, with territorial exclusivity in area *A* currently is resided by franchisee *A* (*Fsee*^{A}), while outlet *B* in area *B* is a potential location for future expansion.

As long as outlet *B* is not open, *Fsee*^{A} will enjoy revenue from area *A*. However, if outlet *B* opens, some customers in the intersection area, *A*∩*B*, will be drawn away to outlet *B*, so it would reduce *Fsee*^{A} revenue. While the franchisor (*Fsor*) expects outlets in both locations to operate, as *Fsor* income is only the fees taken from all franchisees.

As it is common in franchise arrangements, franchisor's operating income would be in the form of the franchise fee and royalty fee. As these fees are interchangeable (Vázquez, 2005), this paper assumes that franchise fee is zero. So that *Fsor* income only from royalty fee, a percentage of franchisees' revenue. On the other hand, franchisee income is revenue minus all operating costs and fees paid to the franchisor. For simplicity, operating costs will be assumed to be zero, so *Fsee*^{A} operating profit is simplified to revenue minus royalty fee payment to *Fsor*.

Thus, *Fsor* offers TER of outlet *B* to *Fsee*^{A}. In other words, *Fsor* is selling the exclusivity rights of outlet *B* for a certain period. This TER is contingent in nature, so *Fsee*^{A} has rights, but not obligation to open the outlet *B* at the predetermined exercise date.

Based on the structure of the problem and assumptions described above, the Present Value (PV) of *Fsor* and *Fsee*^{A} operating profit in one period of franchise contract can be formulated as:

$$\text{PV of } F_{\text{sor}} \text{ operating profit} = \sum_{n=1}^{T} \frac{\delta S_n^A}{(1+R)^n} + \sum_{n=t+1}^{T} \frac{\delta\left(S_n^B - S_n^{A\cap B}\right)}{(1+R)^n} \tag{1}$$

and

$$\text{PV of } F_{\text{see}^A} \text{ operating profit} = \sum_{n=1}^{T} \frac{(1-\delta)S_n^A}{(1+R)^n} - \sum_{n=t+1}^{T} \frac{(1-\delta)\gamma S_n^{A\cap B}}{(1+R)^n} \tag{2}$$

where

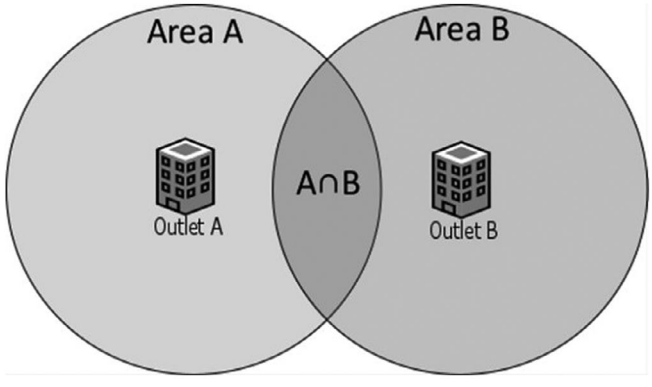


Figure 1. Illustration of locational conflict between outlet *A* and outlet *B*.

S_n^A = Revenue of outlet *A* at time *n*

S_n^B = Revenue of outlet *B* at time *n*

$S_n^{A \cap B}$ = Revenue in the intersection area $A \cap B$ at time *n*

δ = Royalty fee

γ = Percentage of customers lost in the intersection area

T = Contract period of franchise

t = Time when franchisee *B* opens

R = Discount rate for franchise investment

The last summation notions in Equations (1) and (2) are the impact if outlet *B* is open at time *t*. $Fsee^A$ will lose γ, partial customers in the intersection area $A \cap B$, while *Fsor* will get extra royalty fee, δ from area *B* less intersection area $A \cap B$. Therefore, the $Fsee^A$ wants to postpone the outlet *B* opening for as long as possible, while *Fsor* expects the other way around. This conflict of interest is the main problem of territorial encroachment that is attempted to be mitigated by TER, which will be modeled in the next subsection.

2.2. Pricing the exclusivity: The real options approach

Taken from the concept of financial options, the real options method offers a new perspective in the capital budgeting process. The contingent claim feature inherent in financial options can be applied to the real investment process as a right to commit an investment in predetermined future. With real options, the investor can postpone an investment decision while waiting for uncertainty to be resolved. This approach was a breakthrough in the capital budgeting process, which relies on static discounted cash flow valuation that undermines stochastic future opportunity of an investment.

However, until the DM-ROM was introduced (Datar & Mathews, 2004), real options were commonly inaccessible to managers due to mathematical complexity behind it. The DM-ROM achievement is to translate the Black–Scholes model of options pricing to the simulation-based spreadsheet model, which increases the usability of the real options method for managers. The DM-ROM formulation for real options is (Mathews, 2009):

$$\text{Real options value} = \text{Average}\left[\text{MAX}(\overline{\text{operating profit}} - \text{launch cost}, 0)\right] \tag{3}$$

According to the Equation (3), the real options value is average operating profit minus launch cost with a threshold of zero. The operating profit will be simulated using Monte Carlo simulation that produces a range of possible present values of the project's cash flow, while the launch cost is investment outlay that occurred at the beginning of the project. This cost is irreversible, so once the investor commits to the project, it will be bound by the return and risks of the project.

Translating Equation (3) for territorial exclusivity in the franchise case, we formulate TER as;

$$\text{TER} = \text{Average}\left[\text{MAX}(\overline{\text{franchisee'operating profit}} - K, 0)\right] \tag{4}$$

In the Equation (4), the operating profit is the present value of franchisee's operating profit during one period contract of franchising. For the launch cost, it will be proxy by the capital investment, *K*. The *K* here assumed as a necessary investment to be made by the franchisee is at the beginning of contract related to the specific asset of the franchise. In this paper, it is also assumed that this investment is irreversible and the value is depreciated to zero at the end of the franchise contract.

If $Fsee^A$ decided to buy TER from *Fsor*, $Fsee^A$ has the rights at predetermined exercise date to become the franchisee in outlet *B*. However, if $Fsee^A$ decided not to exercise the TER at exercise date, *Fsor* is allowed to sell the rights on outlet *B* to another investor. This feature is mimicking the European financial call options, where the options buyer has the rights, but not the obligation to buy shares at predetermined exercise date. We discuss further the *Fsor* and $Fsee^A$ decision regarding the transaction of TER in Section 4.

3. Hypothetical case

In this section, we will test the previous formulation in a hypothetical case. For simplicity, the current time ($n = 0$) set that TER is offered by *Fsor* in the same time when $Fsee^A$ franchise contract is over and needs to be extended. The contract period of the franchise, *T* is five years and period of TER, *t* is three years. Accordingly, the NPV of franchisee in outlet *B* ($Fsee^B$) payoff is formulated as:

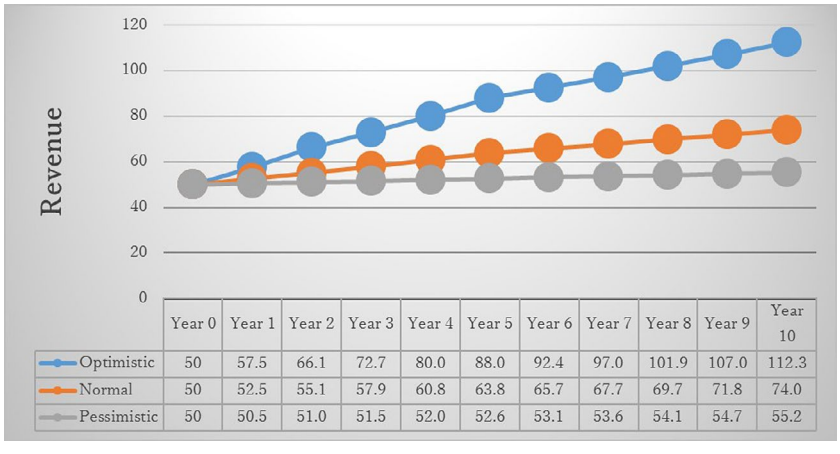
$$\text{NPV of } F_{see^B} \text{ payoff} = \sum_{n=t+1}^{t+5} \frac{(1-\delta)S_n^B}{(1+R)^n} - \frac{K}{(1+r)^t} \tag{5}$$

As seen in Equation (5), there are two kinds of discount rates, *r* and *R*. *r* refers to investment rate for postponing investing capital to the franchise, while *R* represents a franchise discount rate, which is referring to the rate that the investor requires in investing in the franchise as a risk premium. For $A \cap B$ is set to 20% of area *B* (or area *A*) and γB accounts of 50% of $A \cap B$. All the base case variables are shown in Table 1.

Following the Datar–Matthews model (Mathews, 2009), revenue projection is split into three scenarios: pessimistic, normal, and optimistic. The value of each scenario will be the corner of triangular probability distributions, which represents the future uncertainty of the revenues. The total revenue projection for 10 years is illustrated in Figure 2.

Table 1. The base case for numerical simulation

Variable	Value
Investment rate (*r*)	5%
Franchise risk rate (*R*)	8%
Capital investment (*K*)	230
Royalty (δ)	5%
$A \cap B$	20%
γB	50%
t	3 years
T	5 years



	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Optimistic	50	57.5	66.1	72.7	80.0	88.0	92.4	97.0	101.9	107.0	112.3
Normal	50	52.5	55.1	57.9	60.8	63.8	65.7	67.7	69.7	71.8	74.0
Pessimistic	50	50.5	51.0	51.5	52.0	52.6	53.1	53.6	54.1	54.7	55.2

Figure 2. Annual revenue projection for outlet *B* with three scenarios.

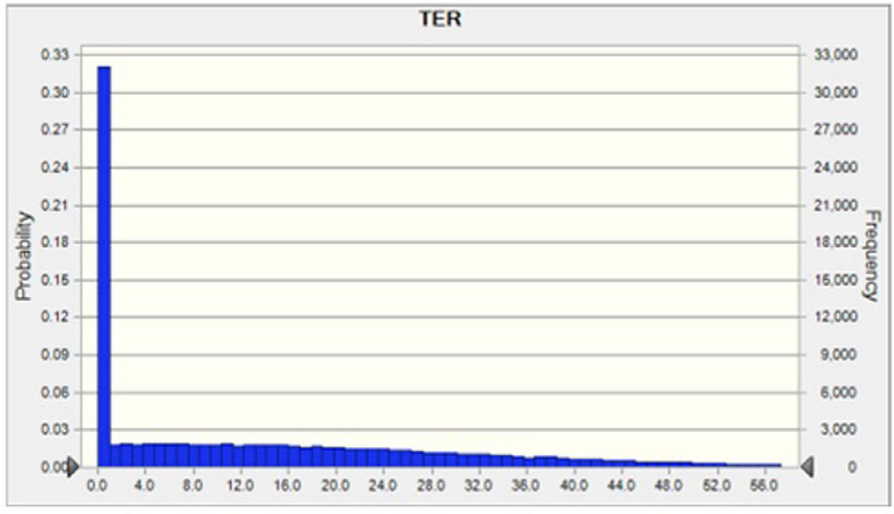
Based on data on Table 1 and Figure 2, we calculate the TER price. In this paper, we use the Oracle's Crystal Ball™ as a Monte Carlo simulator with 100.000 trials and correlation set to 70% from year to year. The result for TER price simulation is seen in Figure 3, where the price of TER for this setting is the mean of the simulation, which is 14.4.

The TER price will definitely vary depending on variables set in Table 1 and revenue projection in Figure 2. Consequently, it will also impact the *Fsor* and *Fsee*^{A} decision framework to transact the TER. This point is discussed more in detail in the next section.

Figure 3. TER simulation result for hypothetical case using Crystal Ball™.

Forecast: TER **Cell:**

Summary:
Entire range is from 0.0 to 72.9
Base case is 0.0
After 100,000 trials, the std. error of the mean is 0.0



Statistics:	Forecast values
Trials	100,000.00
Base Case	0.00
Mean	14.44
Median	10.04
Mode	0.00
Standard Deviation	15.33
Variance	234.88
Skewness	0.95
Kurtosis	3.04
Coeff. of Variation	1.06
Minimum	0.00
Maximum	72.87
Range Width	72.87
Mean Std. Error	0.05

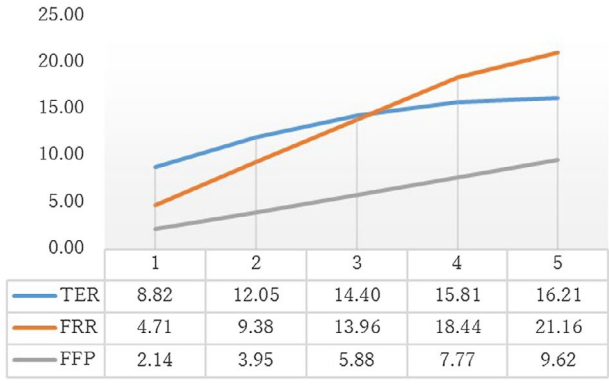


Figure 4. Value of TER, FRR and FFP with varying t = {1, 2, 3, 4, 5}.

4. Discussion

Solely, pricing the TER is not going to solve *Fsee*^{A} and *Fsor* problem. The *Fsor* has to choose whether selling the TER to *Fsee*^{A} is more profitable than foregoing profit if outlet *B* opens. Meanwhile, *Fsee*^{A} concern is to compare the TER price to the amount of revenue reduction in outlet *A* if outlet *B* opens. These conditions are formulated in Equation (6):

$$\sum_{n=1}^{t} \frac{\delta\left(S_n^B - S_n^{A\cap B}\right)}{(1+R)^n} < TER < \sum_{n=1}^{t} \frac{(1-\delta)\gamma S_n^{A\cap B}}{(1+R)^n} \tag{6}$$

In the left hand side of Equation (6), it is referred as *Fsor* Foregone Profit (FFP) for postponing to open outlet *B* to *t*, whereas in the right hand side it is referred as the *Fsee*^{A} Revenue Reduction (FRR), a revenue loss if outlet *B* opens. Therefore, the decision to transact the TER will also influenced by FFP and FRR. To give more insight about this issue, we simulated the TER, FFP, and FRR with varying *t* for one to five years. The result is shown in Figure 4.

As seen in Figure 4, the TER will not be transacted only in the $t = 4$ and $t = 5$. *Fsor* will prefer the TER at any *t*, since it is more profitable from him, while *Fsee*^{A} will not transact the TER if it is more expensive than FRR. Note that even though there is a significant gap between the TER price and FFP, *Fsor* would not sell TER below the calculated price as is fairly priced based on revenue projection of outlet B. So, *Fsor* can sell it to another investor, besides *Fsee*^{A} that is willing to own the TER of outlet B. Figures 5–7 pictured the change value of the TER, FRR, and FPP with other varying other variables at −40%, −20, 20, and 40% from the base case.

Hypothetical case presented in this paper is a simplification of the real case. In the real case, one of the most difficult parts of pricing the TER is creating an acceptable financial projection that can satisfy both the franchisor and the franchisee. Unlike financial options that have been standardized, it can accommodate both a seller and a buyer. In this case, both parties can have their own perspective of the franchise ongoing concern. This discrepancy will create different price of the TER, as

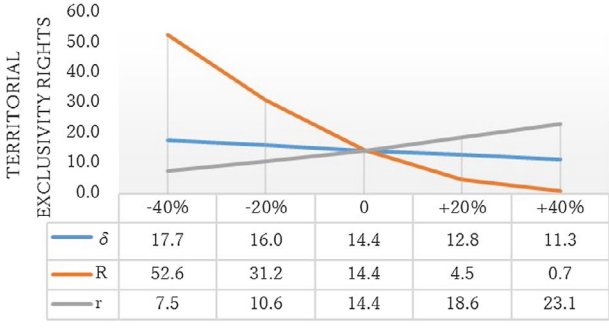
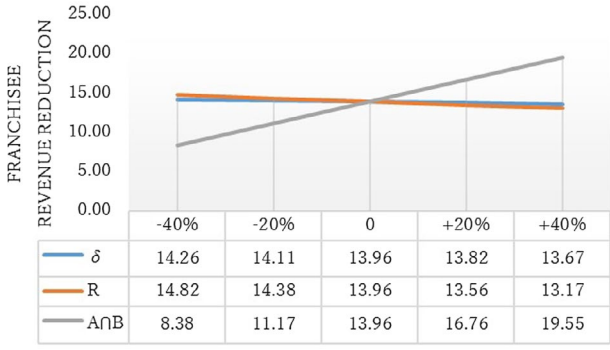


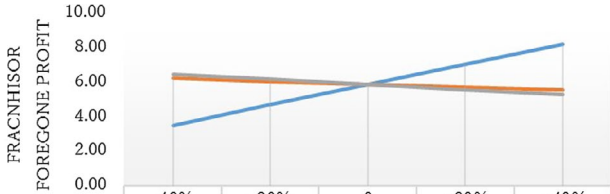
Figure 5. TER value sensitivity with varying Royalty fee (δ), Franchise risk rate (R) and Investment rate (r).

Figure 6. FRR value sensitivity with varying Royalty fee (δ), Franchise risk rate (R), and Intersection area ($A \cap B$).



	-40%	-20%	0	+20%	+40%
δ	14.26	14.11	13.96	13.82	13.67
R	14.82	14.38	13.96	13.56	13.17
A∩B	8.38	11.17	13.96	16.76	19.55

Figure 7. FFP value sensitivity with varying Royalty fee (δ), Franchise risk rate (R), and Intersection area ($A \cap B$).



	-40%	-20%	0	+20%	+40%
δ	3.53	4.70	5.88	7.06	8.23
R	6.24	6.06	5.88	5.71	5.55
A∩B	6.47	6.18	5.88	5.59	5.29

commonly the franchisor is more optimistic about the future projection of the franchise. Thus, he tends to create higher price for the TER, whereas the franchisee is skeptical and prefers lower price of the TER.

5. Conclusion and future research direction

Inspired by the idea of transferring exclusivity rights as a mitigation of territorial encroachment proposed by Nair et al. (2009), this paper utilized Datar–Mathews real options model to price TER. Yet, the decision of transacting TER was not only influenced by the price of the rights itself, but also by the franchisor's foregone income and franchisee's revenue reduction if the new outlet opens. In addition to that, different perspectives of both parties in calculating those conditions will also impact the franchisee's and franchisor's decision to transact the rights.

The model in this paper can be improved by incorporating perspective discrepancy between the franchisor and the franchisee as a game theory, thus the model becomes real options game. Another direction to tackle the territorial encroachment issue is by offering the existing franchisee a cash settlement if the newly opened outlet indeed reduces the existing franchisee's revenue, as in the case of Burger King (Emerson, 2010). The real options will be mimicking financial put options and similar to revenue guarantee model (Nugroho, 2015), where the franchisor will compensate the revenue that falls below a predetermined level.

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