

Deriving NPV and IRR	Discount Rate					
	MMDCL			DYOD		
	7.7%	8.4%	9.0%	7.7%	8.4%	9.0%
NPV	3.3	-131.6	-241.6	-2796.9	-2969.2	-3108.7
IRR	7.72%	7.72%	7.72%	0.06%	0.06%	0.06%
Terminal Value with perpetual growth rate 2.5%	16919.4	14912.0	13535.6	28458.9	25082.4	22767.1
NPV with terminal value	8061.3	6524.9	5476.0	10756.9	8227.1	6508.4
IRR with terminal value	24.35%	23.25%	22.44%	19.73%	18.52%	17.63%

Table 1: NPV & IRR with and without terminal value

The table above includes NPV and IRR calculations with and without using a terminal value with perpetual growth rate. Initial inspection shows a minor loss in short term for the Match My Doll Clothing Line project, and a rather large loss in short term for the Design Your Own Doll project.

To supply our suggestions with concrete rationales, we first look into the projection exhibits, from which we derive the NPV and IRR above, to justify each project's risk level.

¹Both projects are predicted to grow more quickly than the growth rate of the doll industry. MMDCL is expected to eventually have a stable grow rate of 8%, nearly thrice the industry average of 3%, while DYOD is expected to grow twice as quickly as the industry's. This might be reasonable considering the low revenue of each project compared to the market size overall (<\$10M each compared to the total market size of \$3.1B). However, this signifies that if we extend the NPV and IRR calculation to perpetuity, we might want to pick a much lower growth rate to comply with the low industry growth rate.

A closer inspection into **MMDCL**'s profit projection shows a much higher operating margin (12%-15%) than that of New Heritage's accessory product line (3.6%)². However, the NOPAT margin³ is still rather low considering the recent publicity. Providing the positive reception from celebrities, New Heritage might want to increase the price for the MMDCL product line to target the higher-end segment, where profit margin is 10%-14% (Chron, 2018). The FCF growth pattern seems unusual: it takes a dip during 2014-2015, while revenue keeps increasing. The reason for this dip could possibly be a drastic increase in capital expenditure (almost twice from \$152,000 in 2013 to \$334,000 in 2014), coupled with only a modest increase in revenue. There is no clear explanation, but it could be guessed that this change is associated with an aggressive move to scale up, after three years of prototyping strategies in production and

¹ The next three paragraphs answer question 1.

² Refer to the case study

³ Refer to [this spreadsheet](#) for my calculations.

marketing. Given its popularity and potential of expansion, as well as its capability to quickly obtain cash (demonstrated by its relatively low projected account receivable - approximately \$1M-2M per year), it is reasonable of Harris to classify MMDCL as a moderate risk project. The project might not be suitable to be classified as low risk, as is the whole industry, because its products are not quite staple, and fashion trend could reverse. Thus, the sales may drop drastically in the case of macroeconomic recession.

FCF by Year - MMDCL (2011 - 2020)

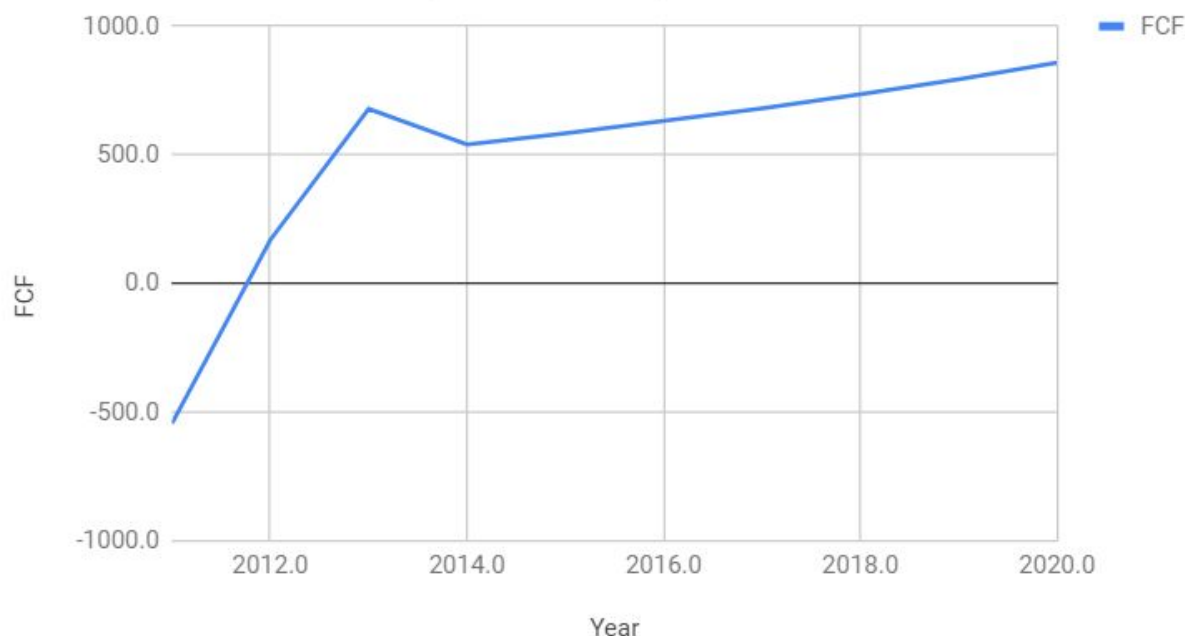


Fig 1: FCF by Year of MMDCL, from 2011 to 2020. We see a slight dip in 2014.

On the other hand, the upfront marketing cost for **DYOD** is questionable, given that the project depends on “near-flawless operation of new customer-facing software and user interfaces”. The new technologies would require considerable efforts to prove the market their reliability. The upfront spending does not do this obstacle justice. An investment of only \$360,000 on marketing and \$435,000 for a team of three developers is unrealistic. This project also showcases an unusual FCF pattern, with an enormous pike in capital expenditure in 2014 (\$2M), causing a large drop in FCF, with no proper explanation. The project is untested, and if it fails, it could greatly damage the relationship of the company with some of its frequent customers. It also has higher account receivable (amounting up to \$3M-4M per year), thus signifying potential difficulties in collecting cash. Furthermore, as it does not add to the breadth of the product mix of the company, but merely serves as a premium alternative to New Heritage’s current products, the sales of DYOD could actually damage the sales of other types of dolls the company offers. For these reasons, DYOD would be appropriately classified as a high-risk project.⁴

⁴ #critique: thoroughly critique a financial spreadsheet with evidence-based arguments.

FCF By Year - DYOD (2011 - 2020)

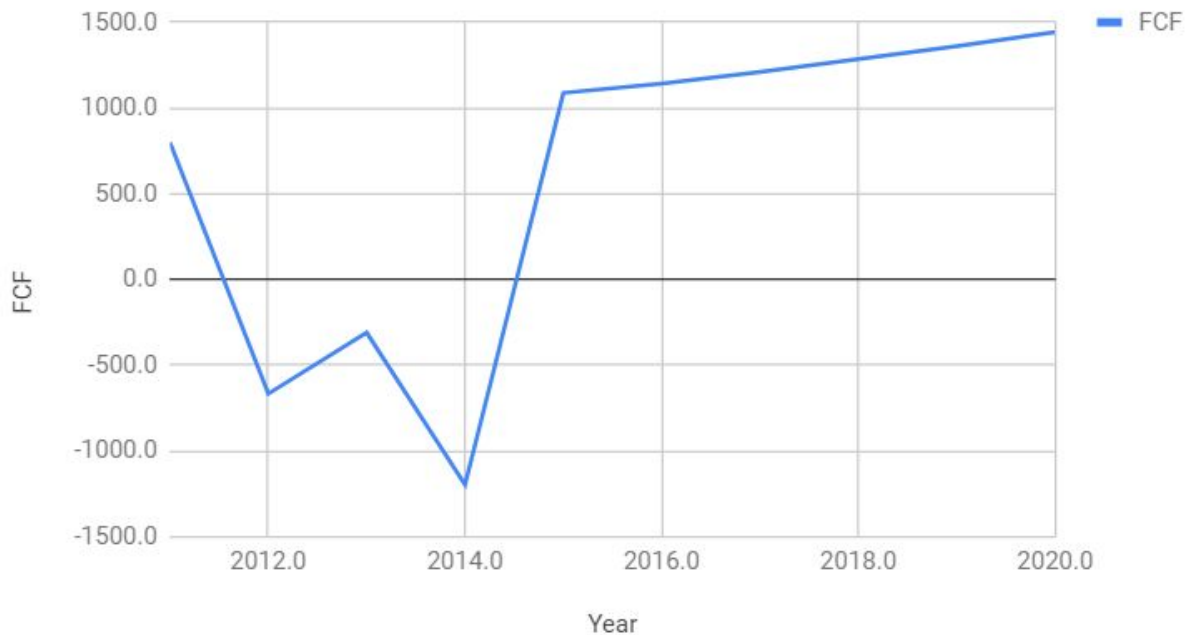


Fig 2: FCF By Year of DYOD, from 2011 to 2020. The FCF fluctuates wildly in the first few years.⁵

⁶Both projects have potentials to become permanent product lines of New Heritage, thus we are motivated to use terminal value in calculating our NPV and IRR. Given the average growth rate of the industry is projected to be 3% per year, we conduct a sensitivity analysis with a conservative range of perceptual growth rate, from 2%-3% per year in perpetuity, taking into account adverse macroeconomic trends against the industries that may occur in the future (such as recessions, during which non-staple goods such as dolls would certainly experience drastic drops in sales).

WACC\ PGR	2%	2.50%	3%
7.70%	15360.0	16919.4	18810.7
8.40%	13680.0	14912.0	16372.3
9.00%	12507.4	13535.6	14735.0

WACC\ PGR	2%	2.50%	3%
7.70%	25835.8	28458.9	31640.0

⁵ #dataviz: identify interesting trends in the data and produce plots to describe them.

⁶ The next two paragraphs (and the table in the beginning of the paper) answer question 2

8.40%	23010.0	25082.4	27538.5
9.00%	21037.8	22767.1	24784.7

Table 2: Sensitivity Analysis of MMDCL (upper table) and DYOD (lower table).

A quick glance through the two tables above shows that the terminal value of DYOD is much higher than that of MMDCL. This is because the much higher revenue, thus FCF, that DYOD brings to the business, which makes sense providing that DYOD offers a premium product line. We could also observe the diminishing return effect of risk on terminal value. Take the DYOD sensitivity table for example. While the low-risk discount rate (7.7%) is associated with a wide range of terminal value depending on the growth rate (from \$25.8M at the growth rate of 2% to \$31.6M at the growth rate of 3%), the high-risk discount rate demonstrates a much smaller range of value regardless of the growth rate (\$21.0M at 2% growth rate to \$24.8M at 3% growth rate). This indicates that the terminal value is very much susceptible to changes in the discount rate, which means the perceived level of risk of each project would have a great impact on our NPV calculations. This insight would later on guide our recommended strategy.

Discount Rate		
7.7%	8.4%	9.0%
10	11	11

Discount Rate		
7.7%	8.4%	9.0%
15	16	17 ⁷

Table 3: Break even analysis of MMDCL (upper table) and DYOD (lower table). Perpetual growth rate is selected to be 2.5%. Break even is calculated by year instead of sales volume due to the lack of data.

⁸Comparing the two projects, we could see that MMDCL takes shorter time to break even. The project returns its investment after 10 years (when discount rate is 7.7%) or 11 years (when discount rate is 8.4%), while the high-risk DYOD would only break even after 17 years (with a discount rate of 9% and terminal growth rate of 2.5%). NPV's with and without terminal value are approximately equal between the two projects (see table 1 - with terminal value, the NPV's of both MMDCL and DYOD are both \$6.5M). However, as the upfront investment for DYOD is much higher than that of MMDCL (~\$7M for DYOD, twice as much as MMDCL's ~\$3M), the

⁷ Method to calculate break even by year: select a perpetual growth rate. Calculate the NPV using the FCF given the perpetual growth rate. At the year during which the NPV reaches 0 is the breakeven year of the respective project.

⁸ The next two paragraphs answer question 3.

profitability index of MMDCL is higher (1.8 for MMDCL compared to DYOD's 0.9), making it a more appealing investment. Thus, MMDCL is an obviously better choice in the short term.

The choice of one project to invest in depends largely on the current stage and the long-term vision of the company. Being a small company that is establishing itself and is trying to expand its market share, New Heritage should take on the MMDC project, given its lower risk, capability of quick liquidity of cash, tried-and-true style that receives positive feedback, and high profitability index. This does not mean that DYOD is completely rejected. The project has many merits and should be considered at some point in the future. One, DYOD consolidates and reflects New Heritage's identity. That is, creating realistic dolls with nuanced backgrounds. Such a product could potentially be instrumental in strengthening the relationship between the company and the customers. Two, while doll-based clothes is not quite new to the market, DYOD is a unique offer that would appeal to customers' value of heirloom, hence rendering itself a desirable choice in the long run. The product could potentially be a huge long lasting success that redefines the image of the company. MMDCL depends very much on designers' creativity robustness, as the fashion trend could quickly reverse and MMDCL loses popularity. DYOD, on the other hand, could remain a permanent addition to the company's product offerings. The only problem with DYOD is that the project entails high risk level due to various uncertainties. Committing too early to an untested project could potentially lead the company into financial troubles. Hence, I suggest that MMDCL's profit is partly directed to research and development for DYOD. By the time the technology is tested and feedbacks are received, the company would have had replenished its capital and obtained enough concrete proofs to reassess the project's risk. This strategy has limited downside, according to Porter's five forces. As many other dolls companies do not survive long enough for projects as intricate as DYOD, the risk of new market entry is low. In fact, most doll lines wane a few years after launching. New Heritage's giant competitor, Barbie dolls, has a completely different design style, which is less realistic. Thus, it is likely that Barbie would not want to pursue a project involving realistic depictions such as DYOD. At the same time, given the speed of technological innovation, potential contractors could arise soon in the future to provide New Heritage with complementary technological products (such as 3D face scan technology, or specialized customizable doll-producing machineries). This might reduce the fixed cost of the product, thus reducing the risk of the plan.⁹

Bibliography:

Chron. (2018). Profit Margin of Retail Clothes. Retrieved from:
<https://smallbusiness.chron.com/profit-margin-retail-clothes-25123.html>

⁹ #broadframing: Think about the two projects in a big picture. Craft a strategy that takes into account both short term and long term benefits of the company.