# Managing Warranty Goodwill

*"It takes 20 years to build a reputation and five minutes to ruin it."*
—Warren Buffett

REPUTATION IS EVERYTHING in the business world, for individuals and companies alike. The most successful companies in American history have been those with the strongest reputations and brands.

With the recent economic downturn, many companies tightened their belts in an attempt to survive and reposition themselves to come out of the recession stronger. Expenses deemed "customer indulgences" were placed squarely in the cross hairs of corporate budget-slashers. One of these "indulgences," warranty goodwill, often has been one of the first sent to the chopping block in an attempt to maintain bottom lines during tough economic times. While this may satisfy management's short-term needs, it could have a significant impact on reputation and future earnings.

This raises the question: How much warranty goodwill should be paid? Described below is a model aimed at providing an answer. The model seeks to determine the amount of warranty goodwill that maximizes firm value.


## Defining Warranty Goodwill

Warranty goodwill is the repair or replacement of a product outside of the formal warranty coverage. It's provided for a number of reasons: customer retention, branding, cross-product marketing, and reputation. The basic idea is that warranty repair outside of the warranty coverage is likely to improve the chances that a customer would buy from the company again.

The decision to provide warranty goodwill is analogous to the decision to recall a product. Case in point: Toyota recently faced a tough decision regarding a possible recall for a potential braking system defect. The cost to recall and repair the braking system paled in comparison to the reputational cost of not doing the recall. The auto industry is built on reputation and brand. In an effort to save its reputation, and future sales, Toyota went through with the recall. Management of warranty goodwill should be considered in the same way. How would a change in the amount of warranty goodwill that we pay now affect future sales?

A majority of the value of a company is represented by future business. In its most basic form, the value of a firm is the present value of current and future earnings.

The concept of franchise value was detailed in William H. Panning's 2006 working paper "Managing Interest Rate Risk: ALM, Franchise Value, and Strategy," in which he applied the concept to insurance renewals, defining franchise value as the value of the prospective renewals attached to the sale of an insurance policy. In this article, I am focusing on customer retention instead of insurance renewals. The franchise value, here, is the value of future product sales.

As Panning points out, franchise value typically isn't recognized by accounting rules—other than when a firm is sold for greater than its book value. As a result, this valuable asset often is ignored.

It's simple to see franchise value in the difference between the book and market values of a company. On Feb. 23, 2010, Dell had a $26 billion market cap and a $5 billion book value. It traded at roughly a market-to-book ratio of 5.2-to-1. The additional $21 billion (or 81 percent of its market value) assigned to the firm by investors is the franchise value, or value of future business.

The key to managing warranty goodwill lies in determining how much should be provided to maximize future earnings, or franchise value. Our model, albeit simplified for the sake of presentation, seeks to estimate the optimal amount of warranty goodwill that maximizes franchise and thus firm value.

EPPIX / ISTOCK, PETRA ROEDER / DREAMSTIME, BONOTOM STUDIO

**FIGURE 1:** Model Assumptions

| | |
|---|---|
| a | The company sells all of its widgets on Jan. 1. |
| b | All expenses are paid on Jan. 1. |
| c | The company provides a six-month warranty. |
| d | All customers buy a new product annually. |
| e | Uniform breakdown occurs over the yearlong useful life, which means that the incidents of breakdown are spread evenly throughout the year. |
| f | Warranty goodwill occurs only during the last six months of useful product life. |
| g | Obsolescence and depreciation are ignored. |
| h | No pipeline claims exist; that is, claims that have occurred but are not known at year-end. |
| i | Occurrence, report, and payments of in-warranty claims are on June 30 and on Dec. 31 for warranty goodwill claims. |
| j | The true value of in-warranty costs (labor + parts) is known on June 30 of each year, and all in-warranty costs are paid on June 30. |
| k | Expenses and expected losses are identical each year; i.e., inflation is ignored. |
| l | As in Panning's article (see Page 70), surplus is the same for all future years. All profits are immediately paid as dividends to its shareholders. If a loss is incurred for a given year, it immediately raises equity to restore its surplus to the initial amount. |
| m | Taxes are not considered. |
| n | Term structure of interest rates is flat; i.e., risk premiums are ignored. |
| o | Insolvency risk is ignored. |
| p | Outside effects on customer retention, other than goodwill and product price, are ignored. |
| q | Customer base change reacts to price change immediately at time zero. |
| r | Recoverables from salvaged parts are ignored. |
| s | Fixed costs are fixed into perpetuity. |

## The Model

Perhaps the simplest way to understand a new concept is through an example. Further detail is included in the appendix, including the relevant formulae.

Before going through the example, please keep in mind that, as with any other model, all assumptions of the model should be understood fully before considering its usefulness. Figure 1 details the assumptions of the model, as discussed in Panning's working paper. Not all these assumptions would hold in the real world and may need to be modified for practical use. With that out of the way, let's get to the good stuff.

In this example, we sell widgets on Jan. 1 of each year. Each year half of the products sold will fail—25 percent in warranty in the first six months of the year, and 25 percent out of warranty in the last six months. Each year, every consumer will buy a new widget. An exhibit in the appendix defines the other variables used in the model.

Keep in mind that the goal of the model is to determine what amount of goodwill will maximize firm value. To do this, we will estimate firm values for various amounts of goodwill per product. We then will select the amount of goodwill per product that provides the highest firm value.

The first step of the model is to set a price for the widget. The price is based on a required return on equity (ROE). (See Equation 2 in the Appendix.)

The price per product is dependent on the number of customers at a given price and also is dependent on the amount of warranty goodwill provided. To solve the equation we must perform an iterative procedure, shown in the Appendix.

The other inputs for our example, such as in-warranty and out-of-warranty losses, the cost of manufacturing the product, discount rate, equity, fixed costs, and the target return on equity, are shown in Figure 2.

The results are shown in Figure 3 (note that it wasn't possible to achieve the required ROE with warranty goodwill greater than $4 per product).

Figure 3 shows the amount that would need to be charged per product for various amounts of warranty goodwill. In other words, to achieve a 15 percent ROE for $1 of goodwill per product, we must charge $56.76 per product and sell 12,159 widgets per year. To provide $2 of goodwill per product, the price would need to be increased to $58.25 with sales of 11,164 widgets per year.

## Current Economic Value

Now that we have defined a price for each amount of warranty goodwill, we can begin to calculate the firm value. The first component of the total firm value is the current economic value (or book value), which is simply the value of current assets less current liabilities. (See Equation 3 in the Appendix.)

As you can see in Figure 4, the current economic value is constant, regardless of the amount of warranty goodwill provided, price, etc. This is proven in Equation 4 (see Appendix). If the first component of firm value is constant, we must maximize the second component.

## Franchise Value

The second component of firm value is franchise value. The franchise value is future assets less future liabilities (note the similarity in concept to the current economic value).

To calculate the franchise value, we

**FIGURE 2:** Input Constants in Model

*The following are the inputs for variables that do not vary by warranty goodwill*

| | | |
|---|---|---|
| Cost to manufacture product | M | $40 |
| In-warranty losses | L | $10 |
| Discount rate | y | 5% |
| Surplus (used interchangeably with equity) | S | $30,000 |
| Target return on surplus (or equity) | k | 15% |
| Fixed costs | FC | $60,000 |
| Variable expense | e | 8% |

**FIGURE 3:** Price per Product

| Warranty Goodwill (per Product) | $0 | $1 | $2 | $3 | $4 |
|---|---|---|---|---|---|
| Number of customers (per Year) | 13,094 | 12,159 | 11,164 | 10,066 | 8754 |
| Price (per Product) | $55.36 | $56.76 | $58.25 | $59.90 | $61.87 |

**FIGURE 4:** Current Economic Value

| Warranty Goodwill (per Product) | $0 | $1 | $2 | $3 | $4 |
|---|---|---|---|---|---|
| Current Economic Value | $32,857 | $32,857 | $32,857 | $32,857 | $32,857 |

**FIGURE 5:** Customer Retention and Growth Estimates

| Warranty Goodwill (per Product) | $0 | $1 | $2 | $3 | $4 |
|---|---|---|---|---|---|
| Price (per Product) | $55.36 | $56.76 | $58.25 | $59.90 | $61.87 |
| Customer Retention | 79.2% | 85.6% | 88.2% | 90.1% | 91.7% |
| Growth in New Customers | 20% | 15% | 12% | 10% | 8% |

**FIGURE 6:** Calculating Franchise Value

| Warranty Goodwill (per Product) | $0 | $1 | $2 | $3 | $4 |
|---|---|---|---|---|---|
| Franchise Value | –$129,626 | $247,371 | $108,056 | $85,054 | –$19,390 |
| Current Economic Value | $32,857 | $32,857 | $32,857 | $32,857 | $32,857 |
| Market Value | –$96,769 | $280,228 | $140,913 | $117,911 | $13,467 |
| Market-to-Book Ratio | –2.95 | 8.53 | 4.29 | 3.59 | 0.41 |

need to estimate our future customer base. We will need estimates of the retention of existing customers, and the prospective growth in new customers. These two factors drive the outcome of the model. Market research and a significant amount of judgment would be required to estimate these factors. Absent background on the widget market, the factors shown in Figure 5 were selected for illustrative purposes. The model continues into perpetuity and, like any model that does so, tends to be leveraged on its selected parameters. Franchise value is clearly sensitive to the customer retention of existing customers and projected growth in new customers. The modeler should take great care in estimating these parameters.

For $1 of warranty goodwill per product, which results in a price of $56.76 as shown in Figure 3, it is expected that 85.6 percent of current customers will purchase another widget from us next year and we will gain 15 percent in new customers. If we were to offer $2 of warranty goodwill per product at a price of $58.25, we would increase the number of returning customers (the warranty goodwill has improved brand reputation) but decrease the growth in new customers because of the higher price.

Using the inputs in Figure 5, we arrive at an estimate of franchise value for each value of warranty goodwill per product based on Equation 5 (see Appendix). The total firm value, or market value of the firm, is simply the sum of the two components—the current economic value and the franchise value.

The resulting estimates of the franchise value, market value, and market-to-book value by amount of warranty goodwill per product are summarized in Figure 6. In our example, no warranty goodwill actually results in a negative firm value. The model assumes the decision will be made at one point and continue into the future, when, in fact, if the firm starts experiencing negative earnings, it would revise its goodwill and pricing.

As is evident in Figure 6, warranty goodwill of $1 per product resulted in the highest firm value. *This is the optimal amount of warranty goodwill that maximizes firm value.*

To review, $1 of goodwill per product results in a price of $56.76 and an initial customer base of 12,159 per year. Based on this price and amount of warranty goodwill, it's expected that 85.6 percent of customers will return the next year and there will be 15 percent growth annually in new customers. This results in an estimated franchise

value of $247,371 for future earnings and a total market value of $280,228 including current earnings. If instead we had chosen to offer $2 of goodwill per product, our total market value would be only $140,913.

### An Important Framework

Factors other than goodwill, both tangible and intangible, can influence franchise value as well. These elements include the type of product, the competitiveness of the current market, the demographic that buys the firm's product (business, consumer, government), geography, and the current brand strength.

Further development of the model no doubt is needed. One such development would be the concept of marginal utility. The model in this article assumes an overall utility curve for customer retention, when in fact it is actually dynamic. As prices change, so do consumer expectations. Consumers derive utility from changes in wealth. The model could be used also for other purposes, including, as is mentioned in Panning's paper, asset liability management (ALM). The sensitivity of franchise value to changes in interest rate could be estimated.

**Factors other than goodwill can influence franchise value. These include type of product, competitiveness of the current market, the demographic that buys a firm's product, geography, and current brand strength.**

Despite the limitations of the model, it provides the framework for a more complex model. Through a numerical example using the model, we were able to understand the meaning of franchise value and the effect that warranty goodwill could have on it.

Maximizing franchise value by managing the amount of warranty goodwill should be an integral part of a firm's overall financial management. Changes in warranty goodwill can have a significant impact on future earnings. It should be viewed as a means to maintain and grow the business. After all, who could argue with Warren Buffett's success? Reputation really is everything. □

MICHAEL PACZOLT, a member of the Academy and a fellow of the Casualty Actuarial Society, is an actuary with Milliman in Chicago.

**Resource**

Panning, William H, "Managing interest rate risk: ALM, franchise value, and strategy," Willis Re Working Paper, July 2006, http://www.casact.org/library/studynotes/panning.pdf.

# APPENDIX

The return on equity (ROE) is equal to the expected net income (product revenue plus investment income less expenses):

**FIGURE 7:** Variables Definitions

| | |
|---|---|
| M | Cost to manufacture product per product (does not change) |
| E | Expense of administering warranty per product (expressed as percent of in-warranty plus warranty goodwill experience |
| L | Expected yearly in-warranty losses per product (does not change) |
| G | Expected yearly out-of-warranty losses per product (warranty goodwill) |
| y | Rate or return for discount (does not change) |
| S | Surplus (used interchangeably with equity; does not change) |
| k | Target return on surplus (or equity; does not change) |
| cr | Customer retention (percent of existing customers that purchase same product again next year) |
| FC | Fixed costs (does not change) |
| P | Price per product |
| n | Number of units sold |
| F | Franchise value (present value of future cash flows from future earnings) |
| C | Current economic value (value of current assets at the beginning of the year) |
| MV | Market value (or total economic value) of the firm |
| t | Growth rate |

***Equation 1:***

$$k\times S=\left(P-\frac{L}{(1+y)^{0.5}}-G-E-M\right)\times n-FC+(S-FC)\times y+(P-E-M)\times n\times y.$$

Based on this relationship, we can solve for the price necessary to achieve the required ROE:

***Equation 2:***

$$P=\frac{S\times\frac{k-y}{n}+L\times(1+y)^{0.5}+G}{1+y}+M+E+\frac{FC}{n}.$$

Expenses are assumed to be a variable percentage of in-warranty and warranty-goodwill costs:

$E = e\times(L + G)$.

We are trying to estimate the price per product, which is dependent on both the number of customers at a given price, $n$, and the amount of warranty goodwill provided, $G$.

An iterative procedure is used to solve an equation with two unknowns. An iterative procedure involves successive guesses of the value of the two unknowns until they provide the required ROE. The constraints on the iterative procedure would be that the number of customers, $n$, must lie on the demand curve and provide the required ROE.

The expected demand curve by price is shown in Figure 8.

Next, we can begin to derive various firm values, the first of which is $C$, the current economic value (or book value).

***Equation 3:***

$$C=S+\left(P-E-M-\frac{L}{(1+y)^{0.5}}-\frac{G}{1+y}\right)\times n-FC.$$

The current economic value is simply the value of current assets less current liabilities for products sold in the current year. By substituting Equation 2 for $P$, Equation 3 simplifies to:

***Equation 4:***

$$C=S\times\frac{1+k}{1+y}.$$

The current economic value is independent of all factors other than ROE and $y$, under the pricing assumption. In actuality, $y$, the rate of return for discount, and ROE would vary because of risk.

Finally, we derive the franchise value, which, again, represents future earnings. These future earnings are based on the future customer base, which is summarized as follows:

$$\frac{(1+t)-(1-cr)}{1+y}+\frac{[(1+t)-(1-cr)]^2}{(1+y)^2}+\dots$$

This simplifies to:

$$\frac{t+cr}{1+y}+\left(\frac{t+cr}{1+y}\right)^2+\dots;$$

which is an infinite geometric series and can be simplified to:

$$\frac{d}{1-d}$$

where

$$d=\frac{t+cr}{1+y}.$$

The franchise value can then be summarized as future earnings into perpetuity based on expected growth and customer retention less the fixed costs into perpetuity. (An adjustment to the model could be that fixed costs can change in future years. For example, if a company's sales go from $100 million annually to $10 million annually, it will most likely cut its overhead.)

***Equation 5:***

$$F=\left[P-E-M-\frac{L}{(1+y)^{0.5}}-\frac{G}{1+y}\right]\times\frac{d}{1-d}\times n-\frac{FC}{y}$$

To calculate the franchise value, we will need estimates of $cr$, customer retention on existing customers, and of $t$, the prospective growth in new customers based on the selected amount of warranty goodwill and price. I have assumed a logarithmic relationship between warranty goodwill and customer retention.

The market value ($MV$) is simply $C$, the current economic value, and $F$, the franchise value.

***Equation 6:***

$MV = C\ F.$

**FIGURE 8:** Expected Demand Curve