A diagnostic approach to corporate sustainability based on normalized net margins and extended present value

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Abstract

Relying on indices and ratios for rigorous deterministic valuations entirely, present analysis models often fail to clearly and logically represent diagnoses of companies and the outcomes of transactions conducted in risk capital markets, particularly banks and other credit entities.

Focusing on interactions between money, credit, production and income mechanisms, we propose alternate method for assessing businesses and determining their value at a certain time and the relative probability of insolvency.

Replacing the static measures under which companies are normally evaluated, the method we propose outlines mathematical measures that normalize expected flows, positioning them against 'extended present value' to deepen the significance of income aspects to financial assessments.

JEL Codes: G32; M21; O16.

Keywords: portfolio analysis, risk management, business crisis, products-markets matrix, strategic planning, present value.

Introduction

As strategic production, management and market choices are not directed at the aggregate level, the mainstream deterministic approach of bank risk management states that assessing company competitiveness at this level is economically and financially insufficient.

Where the unitary and global results of production are crucial to drawing conclusions about a company's competitiveness, a fuller survey of the company's economic lines will allow for a better understanding of the results that they produce. Current diagnostics must therefore be further segmented to account for the multiple dimensions of general production practices.[3] Setting single product line and related customer segment as the fundamental variables, this framework thus examines the potentials of different product-market combinations. Discounted performance will also be considered for the multifaceted nature of the analysis.

Aware of the transversality of its overall production, a company in good health should approach the market with a positioning strategy, based on production range and customer needs, that balances with its organizational procedures. In the event of a crisis, a targeted evaluation of this strategy should be conducted, with revisions to individual units made only after the impacts to other units are calculated. It is, however, unrealistic to assume perfectly homogenous customer behaviours and purchasing habits following internal adjustments. As such, product-market singularities, stochastic and otherwise, should be examined to determine product and market evaluations. Analysis depends on the identification of product-market combinations and the allocation of economic components (costs and revenues) to each.

The first phrase of this process is crucial as an investigation based on poorly defined market combinations would only obscure the strategic relationships most important to pulling a

[3] cf. Damodaran (2015).

company out of crisis. At their most basic, products can be classified by product line, raw materials, technological and production processes or the phases of their life cycles. Markets are also divided easily by their geographical location, distribution channel or customer base. After these lines are decided, the difficult but essential tasks of differentiating between nuanced sectors and synthesizing the company's entire product-market structure begin. Based on initial aggregate data, this process highlights key criteria and new relationships that should be analysed for the most sustainable crisis support plan. Since a more complex system is being created to achieve this, choose market combinations that can be easily computed and monitored and that follow the analytical logic of the economic results expected.

Rendered in a set of three increasingly complex products-market matrices for each singularity, the second phase itemizing the fixed and variable costs and recalculating economic values according to marginalist logic.[4] With revenues and industrial and commercial variable costs compared in the first matrix, industrial and commercial fixed costs are built into the second one, and characteristic and financial management components overlaid in the third.

[4] cf. Danovi and Quagli (2010).

Products-Markets Matrices

Presenting variable revenues and costs, the first matrix organizes market sectors by columns and product lines by rows.

Revenue figures can be extrapolated directly from general accounts by distributing total revenue across market combinations. More specific proportions can be derived from sales statistics based on various criteria. The company's quality of production is then identified by comparing its gross revenues, including adjustments and returns, to net volumes. Where minor subdivisions deemed inconsequential may be omitted from calculations for the matrix, slight variations between inputted values and their equivalents in the income statement may arise.

Within the matrix, the total revenues of various product-market combinations are displayed in each cell, alongside the totals of distinct market segments and product lines in their corresponding column or row of sum cells. These values also converge to reveal the overall combined revenue. Where this matrix assumes that no market receives products from more than one line, any correlations between specific products and markets are notable.

Emphasising industrial and commercial variable costs, this configuration is most useful to companies with proportionally lower fixed costs. This can be attributed to a small staff and low overhead compared to more variable output levels and production costs. Fixed costs are also less consequential to instrumental amortization as staff are less involved in production.

More heavily influenced by market conditions, the variable costs of each singularity in the matrix are assigned by market segment. This is because the macro-item of variable commercial costs depends on the market in which products are placed. The possible range of costs per unit also depends on the commercial policies of each market segment. Take, for instance, transport for commercial sales. From a purely geographic analysis, costs must factor in the expected

distance travelled across the market segment. Aside from some issues with indirect costs that may arise, allocating variable commercial costs to their related segments is not overly complex. However, if transport costs are to be calculated according to a divisional model only, the costs can only be approximately allocated based on methods of rational imputation.

By contrast, industrial variable costs including materials, labour and services are specific to production and isolated from the production sector in which the goods are placed. They are therefore assigned by product line in the matrix. Should a single product survey reveal variations in industrial variable costs across markets, productive customizations such as specific finishes may have been applied to goods allocated to certain markets. The product lines of companies that produce to order are key examples of this, requiring more detailed itemizations to account for the distinct industrial variable costs of each unit. As with revenue calculations, industrial variable costs that are of limited significance and incidence may be omitted.

From the total commercial variable costs and individual industrial variable costs in a given market segment, the company's margins of commercial and industrial contribution can be determined. Where the former discerns the degree to which each market segment can cover industrial costs and generate a residual surplus, the latter similarly identifies the capacity of each product line to supplement commercial costs and produce surplus profits. The margin of industrial contribution is particularly useful when evaluating companies with a reduced extension of the production cycle or a high incidence of material cost such as sub-supply companies or semi-finished products.

Summaries of the aggregate industrial contribution margins per product line and commercial contribution margins per market segment are thus given in the matrix. The total contribution

margin is also noted. Indicated by the difference between total revenues and total industrial and commercial variable costs, this third margin reflects a company's ability to cover fixed costs.

The total contribution margin can be further used to identify the company's operating lever, or operating contribution margin. For planning purposes, a variable unit cost can also be ascertained by comparing total variable costs to total quantity sold.

For a credible forecast of the income statement, historicized figures on cost to revenue incidence may also be computed in the matrix, especially where minimal changes to production processes or expected market prices exist[5].

Table I: products-markets matrix with variable revenues and costs[6]

		Revenues							*Costs*	
		MKT.1	*MKT.2*	*...*	*MKT.i*	*...*	*MKT.n.*	**TOT.MKT.**	*IVC*	***IVM***
Revenues	*PROD.A*									
	PROD.B									
	...									
	PROD.J									
	...									
	PROD.Z									
	TOT.PROD.							**TOT.REV.**		
Costs	*CVC*								**TOT.VC**	
	CCM									**TCM**

[5] cf. Danovi and Quagli (2010).

[6] MKT: Market; PROD: Product; IVC: Industrial Variable Costs; CVC: Commercial Variable Costs; ICM: Industrial Contribution Margin; CCM: Commercial Contribution Margin; Rev: Revenues; VC: Variable Costs; TCM: Total Contribution Margin.

Introducing industrial and commercial fixed costs, the second matrix addresses companies with proportionally more fixed costs, often in manufacturing and marketing. These fixed costs align respectively with product lines and market segments. Building on the previous diagnostic arrangement, the flexibility of this evaluation and control system allows customization on a case-by-case basis.

This second matrix is underwritten significantly by the class of special industrial fixed costs. Broadly, these special costs refer to the ceasing or differential costs incurred from tasks occurring in the technical and physical stages of production such as instrumental amortization, salary payment for non-operative personnel, use of third-party assets, maintenance services, design and assistance, which occur. These costs are then crucial for determining the outsourcing or elimination of various production lines. Decisions resulting in higher charges are exclusive to specific products or lines. Contrary to their fixed mandate, options are available for special fixed costs only due to their unique influence over the survival of a given product line; the clarity of their terms for cost allocation; and their relative ease with which administration and management can evaluate them.

As with variable costs, special industrial fixed costs are tied solely to individual product lines while special commercial fixed costs are affected only by market conditions. In the schematics of the matrix, these costs appear immediately adjacent to the industrial contribution and commercial contribution margins respectively.

The industrial operating margin is then calculated in the final column of the matrix by subtracting industrial fixed costs from the industrial contribution margin for each product line. The margin reflects the contribution that each product line makes toward residual operating costs of a company, which are primarily in production and marketing.

Likewise, the commercial operating margin is found in the last row, detailing the difference between commercial fixed costs and the commercial contribution margin, and how much each market segment covers remaining costs. The significance of commercial activity to a company's operations is indicated by the difference between this margin and net revenues.

The impact of characteristic operating functions on total revenues, or the total operating margin, is further indicated by the difference between total special industrial and commercial fixed costs and the total contribution margin. Net common industrial and commercial costs are not, however, accounted for in this margin.

Table II: products-markets matrix with variable and fixed revenues and costs[7]

		Revenues								*Costs*			
		MKT.1	*MKT.2*	*...*	*MKT.i*	*...*	*MKT.n.*	**TOT.MKT.**	*IVC*	***IVM***	*IFC*	***IOM***
Revenues	*PROD.A*											
	PROD.B											
	...											
	PROD.J											
	...											
	PROD.Z											
	TOT.PROD.							**TOT.REV.**				
Costs	*CVC*								**TOT.VC**			
	CCM									**TCM**		
	CFC										**TOT.FC**	
	COM											**TOM**

[7] IFC: Industrial Fixed Costs; CFC: Commercial Fixed Costs; IOM: Industrial Operating Margin; COM: Commercial Operating Margin; FC: Fixed Costs; TOM: Total Operating Margin.

For companies in crisis or pre-default standing especially, financial management must be assessed prior to or alongside the sustainability of product lines and business plans. In particular, the profitability of working capital investments including in commodities and trade receivables should be assessed.

This is because managerial steps to increase capital turnover and resource optimization as well as gradually reduce corporate finance demands are central indicators of recovery. Other situations such as the forced suspension of trade receivables by customers with high bargaining power due to granted extensions should also be considered. It is otherwise misleading to assume the health of a business without factoring in internal measures and external conditions.

Should analyses of working capital management identify declining investments and therefore financial needs in this area, the value, though indirect, created by loans and inventories that are crucial for operating working capital could be directed elsewhere. Indeed, a reduced investment intensity results in a proportionately elevated level of efficiency.

Where the matrix must therefore be adapted for an economic analysis that lends itself to financial management valuation, the third matrix incorporates those working capital investments that are deemed financial charges. The values can be found on those income statements discussing product lines and market segments.

However, cases where investments in stocks of raw materials cannot be attributed in their entirety to a single market segment,

$$[1] \quad \text{Product J} \rightarrow \text{Market i} = \text{FALSE}$$

complicates the process of determining which investments belong to which singularities. As such cases would require knowledge of varying customer purchasing habits across market segments to either calculate or estimate the average time that each product spends in stores, the investment is instead attributed entirely to a single product line. Alternately, weighting coefficients may be used to produce approximate distributions adequate for this analysis. Disregarding any specifics related to raw materials exclusive to given product lines, financial burdens from inventory investments are noted in a separate column of the matrix. If unlisted in the stock accounts, the financial burden can be extrapolated from investment reports—monthly, quarterly, and the like—adjusted by the average interest rate of loans received.

Where a broad range is given for industrial variable costs or special fixed costs prior to inventory valuation, the uncertainty of this range can be reduced, and a more specific estimate distilled through weighting calculations. Once isolated from any implicit interests arising from commercial liabilities, each loan must be treated with historical rates based on loan size and duration. Should accounting records point to further financial charges related to loan investments, they can be found in the general accounts which detail the credit transactions of each customer and their corresponding products.

Another row for total financial credits in each market can be added to the matrix for clarity. The industrial net margin is then reflected in the difference between the financial charges accrued due to inventory investments and the industrial operating margin. Similarly, the commercial net margin is defined by the difference between financial charges on receivables and the commercial operating margin.

Table III: products-markets matrix with figurative financial charges[8]

		Revenues								*Costs*					
		MKT.1	*MKT.2*	*...*	*MKT.i*	*...*	*MKT.n.*	**TOT.MKT.**	*IVC*	***IVM***	*IFC*	***IOM***	*FChI*	***INM***
Revenues	*PROD.A*													
	PROD.B													
	...													
	PROD.J													
	...													
	PROD.Z													
	TOT.PROD.							**TOT.REV.**						
Costs	*CVC*								**TOT.VC**					
	CCM									**TCM**				
	CFC										**TOT.FC**			
	COM											**TOM**		
	FChL												**TOT.FCh**	
	CNM													**ONM**

[8] FChI: Financial Charges on Inventories; FChL: Financial Charges on Loans; INM: Industrial Net Margin; CNM: Commercial Net Margin; FCh: Financial Charges; ONM: Operating Net Margin.

The Valuation of Business Branches with the Income Method

Operating alongside the product-market matrices, the income method provides structure for comprehensive performance evaluations that are customizable for individual business units.

Part of a general class of flow models that discounts financial and income flows, the income method valuates the economic capital of a company as the sum of all future flows, discounted at the time of calculation.

The theoretical contribution of the income method is given in the general formula:

$$[2] \quad W = \sum_{i=0}^{n} Fi \cdot vi$$

where:

W = the aggregate value of the broader product-market business segment in question, combining similar segments and rendering further separation unnecessary for analysis;

Fi = the flow, financial or income;

vi = the discount factor of each flow.

We now examine the use of income flows compared to financial flows based on the margins set out in the matrices for given segments.

From the established body of literature that discusses economic capital valuations and income streams, Gino Zappa (1946) stands out for noting that "capital is a single value, resulting from the capitalization of future income" (p. 76). In other words, as fluctuations in future income

and the discount rate applied affect the current state of capital directly, the value of capital thus stems from income, which is then the principal value.

Income flows, moreover, directly tie income to production outcomes, thereby expressing exact results. By contrast, cash flows reveal only apparent results, referring only to the liquidity released, which is not suitable for analysis when left untreated. This is especially the case in instances where accrual basis accounting is preferred over cash basis accounting, although the former is too nebulous for these scenarios.

Recognizing this, the general formula below is suitably adapted to factor in income flows:

$$[3] \quad W = Ra_{\bar{n}|i}$$

where:

W = the value of the business segment in question;

R = the average prospective income, or expected income of future years;

n = the number of future years;

i = the discount rate.

Assuming an infinite time horizon, the current value of income and therefore economic capital would extend into perpetuity. The prospective average income is then represented as:

$$[4] \quad W = R/i$$

This arrangement would require:

- determining the average prospective income by arranging previous financial statements in multi-year strategic programs;
- establishing a corresponding time horizon;
- applying a discount rate that responds to business risks and the economic environment;

and is relevant for:

- appraisals of the risk of default;
- cases requiring credible projections of future flows, where necessary data are available;
- businesses for which the assets are inconsequential;
- transfers or sales of business units;
- acquisitions and joint ventures.

Prospective Average Income

Prospective average income is then forecast according to the Integrated Economic Result (IER). This involves normalizing accounting values that were previously omitted from calculations in the matrices for margins, or partial aggregates of them, and perhaps new values as well. The resulting figure should then be adjusted for inflation, and the tax component of the tax base revaluated.

In revising these numbers, however, it is crucial that such factors as extraordinary income components and latent costs, distinct from daily operations or otherwise, are unaffected as they help to define the significance of the IER.

The full process is outlined below:

[5] ***ONM***

Normalization of extraordinary components

+ extraordinary charges

– extraordinary income

+/– average value of extraordinary components

Insert latent costs

– managerial remuneration

– figurative costs of renting

– computed interests

Other correctives for normalization

+/– normalization of income components out of management

+/– leasing fees

…

NGI - Normalized Gross Income

Tax correctives

NNI - Normalized Net Income

In the first entry, extraordinary income components can be broken down into three categories: extraordinary gains and losses such as from the sale of non-instrumental goods; extraordinary non-existences including claims, tax dispute penalties, and divestment due to third parties; and extraordinary contingencies, which may involve insurance reimbursements.

It should be clarified that to normalize these components means to replace them with more accurate historicized averages rather than dismiss their significance. This substitution helps to homogenize any excitations or depressions that may have been introduced during calculations.

If we aim to normalize income for year *n*, for instance, and the company in question reports extraordinary components for four years prior, then:

$$[6] \quad n-4=a; n-3=b; n-2=c; n-1=d; n=e$$

The extraordinary element e is then subtracted from the *ONM* of year n, and the arithmetic average

$$[7] \quad AV = (a + b + c + d + e)/5$$

is added.

For the second entry regarding latent costs of a business and its production site, specific factors are considered for their relevance to performance evaluations:

- the lower bound of remuneration given to the owner and/or those authorized to oversee standard payments;
- figurative rents for buildings used for ordinary management, or the estimated revenues receivable if properties were rented;
- the interest calculated for invested capital, deemed non-verified returns on capital for their irrelevance to financial investments otherwise.

By subtracting the latent costs listed above, income is disassociated from the non-management components peripheral to a company's regular operations. The resultant value is then normalized by substitution with average income flows under normal market conditions.

Although they appear less frequently since the adoption of IAS 17, leasing contracts assessed through the equity method require a further corrective and must be considered separately. Where this accounting style accumulates leasing fees in a single number on the income statement and in memorandum accounts in the balance sheet, income should be normalized with the financial method. Once the value of the leased asset is listed as a payable to the leasing company under

assets and liabilities in the payable, depreciation on the asset and the financial component of fees is calculable through the income statement.

The normalization process must be further altered to address the leasing fee and amortization that the leased asset would incur, which requires the verification of any additional elements such as write downs, provisions, and future charges included on the financial statements. Following this, an accurate projection of actual annual commitment, including net deferred tax assets and/or deferred taxes, is necessary to correct the value of the tax burden.

Before using the income method, a finite or infinite time horizon approach also needs to be established. Informed by the business continuity principle, which characterizes a company by an infinite lifetime, a preference for perpetual annuity and infinite time horizons is evident in both corporate literature and practice. The mathematical theory further indicates that, as the number of years n increases, the formulas involving finite and infinite time horizons will converge. Given an interest rate similar to the average Effective Global Rate when $n = 0$, the time until convergence will be significantly altered when $n \geq 30$.

In real terms of technological advancements and agreed upon product and project cycles, however, defining a period of no less than five years is likely necessary.

Once these adjustments are complete, the discount rate must be defined. This determination is complicated by the functions of the discount rate, which include:

- discounting forecasted financial flows. Since the current value of these flows falls as the discount rate rises, an increased rate would then account for the increasing uncertainty of the forecast, due, in part, to real time corrections;

- reflecting business risk, where cases with lower confidence that forecasted flows will be realized are given higher discount rates;
- summarizing market trends that influence the company or product-market segments in question according to the profitability indices of relevant product sectors;
- adjusting nominal values for inflation by correcting marked price fluctuations.

Where literature focuses on two methodologies to calculate discount rates, the criterion of the opportunity rate, or equivalent rate, provides more predictive and deterministic evaluations. This criterion is based on returns received from alternate investments within the same risk level; risk levels must therefore be standardized before proceeding with calculations[9].

The alternate option, the criterion of the cost of capital, logically produces a rate analogous to the cost of capital.

The literature further presents three components as fundamental to the equivalent rate:

$$[8] \quad i = i^* + r + l$$

where:

i = the discount rate for prospective average income, varied according to individual singularity;
i^* = the return rate of alternate investments assigned zero risk. Also, the Internal Rate of Return for loans guaranteed to be correctly recast such as the rate of return on government bonds within the timeframe under valuation;

[9] cf. Danovi and Quagli (2010).

r = the probability that a company will not achieve projected income flows. The most complex component to quantify, the risk faced must be considered alongside management variables including business relations with customers and suppliers under contract, the possibility of immediate insolvency, unfavourable and unforeseen legislative changes, negative economic conditions and a broader sector crisis. The valuation therefore relies on a carefully argued risk to valorise consequent *vulnera*;

l = the liquidity of investments in capital compared to the liquidity of alternate investments. Where alternatives such as public bonds, discussed and accounted for in the first component, liquidate almost immediately, the discount rate must be increased to accommodate the slower liquidation of capital.

Present Value and Extended Present Value

Allowing for comparisons between profits earned through existing operations and those derivable from temporary policies or following structural reorganization, the equivalent rate can be applied to determine the risk of default and any contingency plans to minimize losses in case of default.

Beginning with the Net Present Value (NPV) at the equivalent rate to valuate current earnings, the sum of elements included in the flows vector is divided by $(1 + i)$ to increase time:

$$[9] \quad NPV = \sum_{s=0}^{n} NNI_s \cdot (1 + i)^{-s}$$

With the same returns of (positive) NPVs, it will be necessary to make suitable arrangements to ensure higher values.

Before determining the potential worth after recovery, Strategic Business Areas (SBAs) must be explained to understand the relationship between NPV and Extended Present Value (EPV). SBAs refer to the competitive strategy implemented in situations where definitive or functional biunivocal relations exist between product-market segments of the matrices.

With this framework, a company nearing crisis can reorganize itself to dispose of non-strategic business areas and ensure a divisional system that supports efficient management by the new business cycle.

The company in question should then prioritize the valorisation of resources and investments as well as the restoration of financial circumstances to ensure that greater value will be generated.

This can be done by increasing normalized income flows, lowering risk levels to improve the discount rate, and reducing amounts owing and investments in capital.

The EPV method given evaluates the potential that a strategy has for effective recovery and should be considered in relation to the NPV[10]:

$$[10] \quad VR = \sum SBA + Po + Op + Iacc$$

where:

VR = the value of the company recovered through the given strategy;

$\sum SBA$ = the summated value of strategic business areas in a company;

Po = the value of the strategic portfolio, or the value generated or lost between SBAs;

Op = the value of real options introduced by reorganization;

Iacc = the value of accessory investments.

An extensive understanding of the company under valuation, its regular functions, and its product-market segments and SBAs in quantitative and qualitative terms is crucial for this method. Once flows are identified, the most suitable time horizon must be determined, and latent and expressed risks outlined. At each stage, relevant equivalent rates should be applied to all values considered. Following this, options beyond default including a recovery strategy, rent or sale, and settlement can be discerned and assessed, with settlement as a last resort that will invariably see SBAs, possibly the company, fold.

[10] cf. Yun (2011).

Assuming a maintained current value of the company, the estimated liquidation (*VL*) or cession (*VC*) value indicates that the company will consolidate if:

$$[11] \quad VR > VC \wedge VR > VL$$

Accounting for all this, the profitability and sustainability of a company will then be assessed first and foremost by its financial commitments. Reviewing future income streams will also allow the evaluator to anticipate possible uncertainties or terminations for product-market segments and subsequently mitigate insolvencies by establishing pre-default recovery strategies.[11]

[11] cf. Migliori (2013).

Bibliography

Beaver W.H., Correia M., MvNichols M.F. (2010). Financial Statement Analysis and the Prediction of Financial Distress. Foundations and Trends in Accounting, 5, 99-173.

Capinski M., Zastawniak T. (2003). Mathematics for Finance. Springer: London.

Damodaran A. (2015). Applied Corporate Finance. John Wiley & Sons: New York.

Danovi A., Quagli A. (2010). Crisi aziendali e processi di risanamento. Previsione e diagnosi, terapie, casi aziendali. Ipsoa – Gruppo Wolters Kluwer: Milano.

Desogus M., Casu E. (2018). Essays in innovative risk management methods based on deterministic, stochastic and quantum approaches. Anaphora Literary Press: Quanah (Texas).

Duffie D., Singleton K.J. (2003). Credit Risk: Pricing, Measurement, and Management. University Press: Princeton.

Migliori S. (2013). Crisi d'impresa e corporate governance. FrancoAngeli: Milano.

Yun J. (2011). A Present-Value Approach to Variable Selection. University of Chicago – Booth School of Business.

Zappa G. (1946). Il reddito di impresa: scritture doppie, conti e bilanci di aziende commerciali. Giuffrè: Milano.

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