Reducing income volatility through better resource-sharing policies:
The case of the investment banking industry

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Abstract

This paper is based on the hypothesis that income volatility is influenced by endogenous resource sharing policies. The effect of competition for internal resources on income volatility is examined using the example of the investment banking industry. After analyzing income volatilities of different industries, specific characteristics of investment banks are illustrated, using the service production theory as a frame of reference. After this, the income volatility of two product groups of investment banks is analyzed on an industry-wide level. To gain deeper insight into the competition for a shared resource, the two-shower model of Morecroft et al. is analyzed. By discussing the adaptations of an application of this model in an investment banking context, a stylized causal loop diagram is derived. In this last step, a product group is identified, and the real internal production data, which is broken down into primary and secondary business units, is analyzed. The results show first indications of competition from primary and secondary units for shared sales teams.

Key words: Shower model, resource-sharing, income volatility, multi-product company, investment bank, resource allocation, coupled loops

Introduction

The recent developments in financial markets and the world economy force corporations to rethink and to reorganize their business. Whole markets dried up, profits went down, and, in many cases, turned into bitter losses, which made the further existence of many companies uncertain. Basically, cyclical income is a phenomenon which nearly every industry has to cope with in different intensities. In the context of the contingency paradigm, a reaction to those environmental changes that best addresses the contingencies of the particular situation is the reallocation of internal resources (Kieser and Walgenbach, 2007). A corporation has to be attentive to those allocation decisions because they are the basis for future success or failure of the company (Rumelt, 1991; McGahan and Porter, 1997; Bowman and Helfat, 2001; Ruefli and Wiggins, 2003). Managers must allocate limited and non-exclusive resources to different organizational units. Internal capital markets are the predominant channel of the allocation in those modern industrial companies (Lamont, 1997). This process is characterized through an interaction of different hierarchy levels with the objective of investing capital in the most effective way (Harris and Ravis, 1996). This raises the question how much competition for internal resources is desirable for a company.

This paper aims to examine the effect of competition for internal resources on income volatility of investment banks. The research question is based on the hypothesis that income volatility is influenced by endogenous resource-sharing policies. It points at the desirability and possibility from a company-wide perspective to decrease income volatility, which is induced by internal competition for resources, and to maximize the returns on invested capital.

First, the relationship between competition for resources, environmental change, and income volatility is illustrated. Second, the operating income of different industries is analyzed. Furthermore, specific characteristics of investment banks are shown, using the service production theory as a frame of reference, and income volatilities of different product groups within this industry are analyzed. In a next step, the situation of competition for internal resources is investigated via the two-shower model of Morecroft et al.. Hence, the two-shower model is tested and analyzed in symmetric and asymmetric situations. Discussing the adaptations of an application of this model in an investment banking context, a stylized causal loop diagram is derived. Correspondingly, the case of an international investment bank is investigated. In the last step, a product group is identified, and the unique and proprietary data that is divided into primary and secondary business units is analyzed. The results show first indications of competition for shared sales teams within investment banks.

The relationship between competition for resources, environmental change, and income volatility

In resource based theory, organizations are defined as bundles of resources, which are characterized as all tangible and intangible assets that are combined in the firm in a relatively permanent fashion (Caves, 1980; Wernerfelt, 1984). There is a strong relationship between the creation and management of resources and the establishment of competitive advantages (Barney, 1991; Grant, 1991). Penrose (1959) suggests a potential link between the understanding of decision makers concerning the firm's resources and a superior resource allocation decision. Agency problems in modern corporations can manipulate the efficiency of the resource allocation process (Penrose, 1995). There are many possible battle fields within a corporation to compete for those limited resources (Luss and Gupta, 1975; Morecroft, 1983).

Understanding the process of resource allocation as a competition within an internal market, the resources produced by one business unit are spent in another (Wulf, 2008; Stein, 1997). Lamont (1997) found evidence of an active reallocation of resources in multi-product companies. The costs and benefits of such cross-subsidization have been discussed intensively.[1] Matsusaka and Nanda (2002) suggest that the competition for internal capital resources creates value-destroying inefficiencies. As a result, managers of different projects, activities, or organizational units develop local objectives, which do not necessarily lead to maximum effectiveness on a corporate level (Laux, 2008; Scharfstein and Stein, 2000). Besides this rent-seeking by divisional managers, agency problems on the CEO level emerge as well. There may be a tendency to empire-building and power centralization by top managers (Rajan, Servaes and Zingales, 2000).

These agency problems as explanations for inefficiencies of internal capital markets focus on a more static and specific perspective. Considering a dynamic and changing environment, the reallocation and the competition for internal resources evolve into a continuous process. In the context of the contingency theory, organizational effectiveness results from a best fit of the characteristics of an organization with the contingencies of the environmental situation (Donaldson, 2001). This fit can be achieved through adjustments of the organization, which is defined as bundles of resources. A stream of research suggests that in times of a recession and financial constraints the competition for internal resources increases, resulting in higher internal market efficiency (Hovakimian, 2008). Those environmental changes are driven by factors outside the sphere of influence of decision makers. The reaction to these changes seems to be different with higher internal market efficiency in times of financial constraints. In this context, income volatility is a combination of the effect of exogenous and endogenous factors. To tackle the problems decision makers face in a changing environment and to better understand the phenomenon of fluctuating income, one has to look deeper into the dynamic mechanism of competition for internal resources.

[1] See Liebeskind (2000) and Stein (2003) for an overview of research that tackles costs and benefits of internal capital markets.

Analysis of income volatility in different industries

Before taking a detailed look at the mechanism of the competition for internal resources, income volatility of different industries is analyzed. The strength of income volatility may give an indication of the intensity of the competition for internal resources. Income volatility is calculated, as illustrated in Figure 1, by the relative change in operating income (ρ) from one year to the next year.

$$IncomeVolatility = \frac{\sum_{t=1}^{T} \left| \frac{\rho_t - \rho_{t-1}}{|\rho_{t-1}|} \right|}{T}$$

Figure 1: Calculation of income volatility

The basis for the following year has to be the prior year because t_{n-1} best reflects the need for fitting to the characteristics of the new environmental situation in t_n. Furthermore, there is no difference between a positive and a negative change in operating income from one year to another. The requirement that decision makers adjust internal resources applies in growth periods as well as during recessions.

The mentioned formula is applied to the data of the Top 200 listed companies[2], with regard to the operating income, over all sectors. Companies included in this data set fulfill the criteria of having multiple products and therefore an internal capital market to allocate their resources. Figure 2 illustrates a high spread between the volatilities of the different years. In the year 2007, income volatility was relatively low at about 37%. With 111% in 2000, the income volatility was nearly three times higher than in 2001.

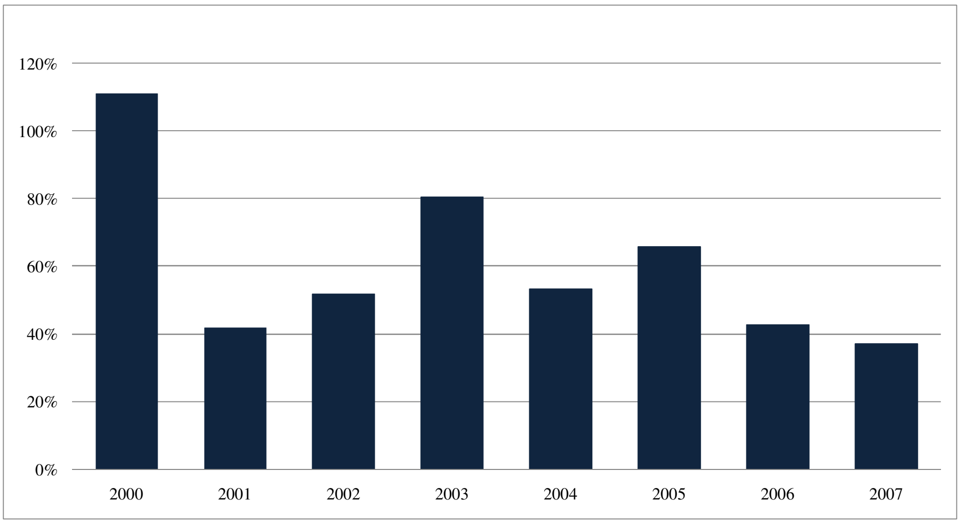

Figure 2: Volatility of Top 200 over 9 years

[2] Source: Amadeus Database.

Over time, operating incomes show strong oscillations, which can be interpreted as a strong need for companies to reallocate their resources. However, the data reveals some distortive influences. For example, the high volatility in the year 2000 can be at least partly explained by the significant M&A activity, which resulted in changes in the income simply from integrating or selling business units. Those activities are highly demanding for decision makers, as they are challenged to compose new bundles of resources. To gain a deeper insight into the genesis of income volatility, different industries are analyzed.

In Figure 3, the data is broken down into construction, manufacturing, trade, and banking. The volatilities of the construction and manufacturing industries show a related pathway during the observed period. The trade sector reflects relatively lower income volatility. Compared to these three industries, the banking sector has the lowest income volatility over this period.

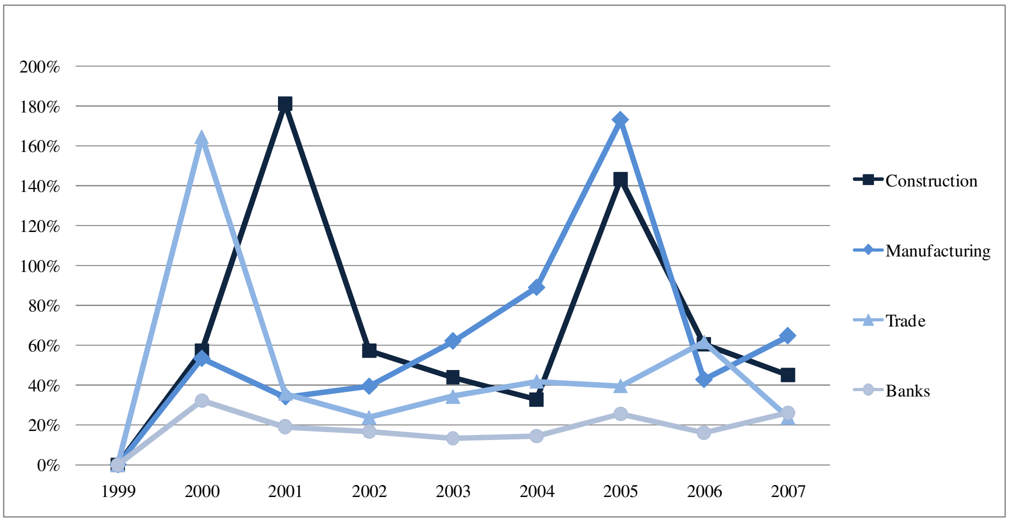

Figure 3: Volatility of selected industry segments

The mean volatility of the banks is 18% and thus clearly lower than the mean volatility of the construction (69%), manufacturing (62%), and trade (47%) sectors. This difference may be linked to the special situation of the accounting and regulation standards of financial institutions. The balance sheet structure of a bank is significantly different from that of a manufacturing company. Another reason might be the different nature of the delivered products: Banks provide services, whereas the other businesses produce physical products. As a next step, it seems promising to analyze one industry with more homogenous production characteristics by looking at its income volatilities.

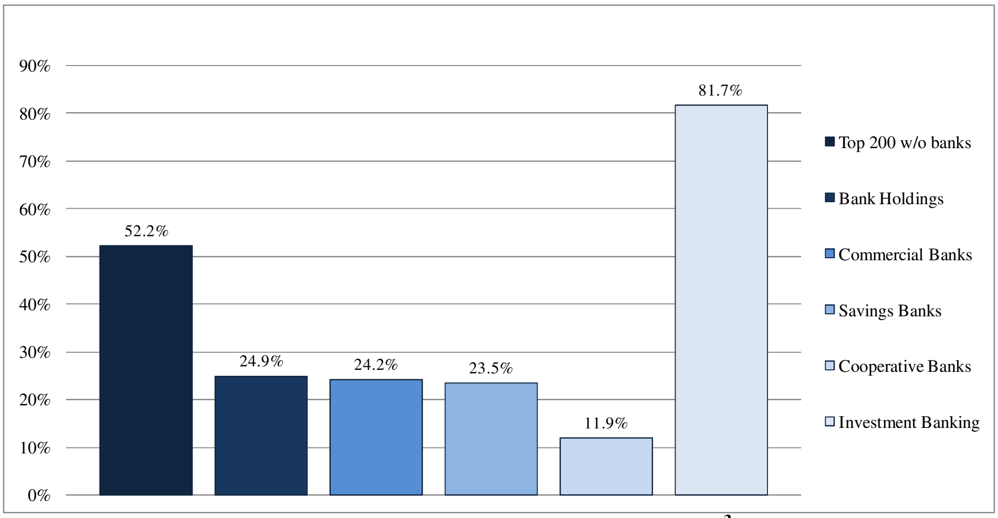

Figure 4: Average volatility over 9 years[3]

The Top 200 companies, excluding financial service institutions, had a mean income volatility of 52% over the last 9 years. The differentiated data, illustrated in Figure 4, shows a significant difference between the business models of banks. Bank holdings have a mean income volatility of 24.9%. Those diversified institutions can be characterized as having at least two different business units, for example, personal banking and wealth management. The fact that savings banks have a slightly lower income volatility of 23.5% may be related to their business model. By focusing on private savings and capital lending to small and midcap companies, this business model represents the traditional transformational process of banks. This process involves a lower potential of competition for resources because, in its pure form, the savings unit serves partly as the funding basis for the lending business. Similar to the savings banks, the cooperative banks are focused on the transformational process. The major difference is that the banks are owned by their members, who are customers and owners of the bank. A stronger focus on the customers' needs may be a reason for lower income volatility. The last group in this sample consists of the investment banks. The result of 81.7% income volatility from 1999 to 2007 stands in a stark contrast to the relatively low results of the other banks. This result is congruent to the problem discussed in many financial statements of bank holdings, namely that the investment banking division is characterized by high income volatility.[4] Given the research hypothesis of this paper, the investment banking industry seems to be a qualified research object to analyze the influence of competition for internal resources and the effect on income volatility. In the next section, the characteristics of service production in investment banking are discussed with respect to the potential for competition for internal resources. Afterwards, the income volatility is analyzed on an industry level for several products.

[3] Source: Bankscope Database.
[4] e.g. Interim Report 3rd quarter 2008 Deutsche Bank AG.

The focus on product classes in investment banks and the high income volatility

The main characteristics of services are their intangible nature, the co-production by the customer, their heterogeneity, and the non-existing possibility of storage. Those characteristics show differences to tangible products of the secondary sector (Meffert and Bruhn, 2000). The service production process is a combination of internal and external factors and has different service dimensions (Meffert and Bruhn, 2000). The potential dimension brings together all internal production factors and establishes the ability to fulfill the process. The process dimension combines internal production factors, external factors, and the willingness to produce the service. Finally, the output is produced and expresses the final combination of all factors. Applying this framework to the service production of investment banks, the potential dimension encompasses highly specialized teams and infrastructure, e.g. IT-systems (Eccles/Cranes, 1988). The process dimension brings together factors to solve a highly specific problem, making it difficult to standardize the process. As a result of this individualized process, the output is difficult to evaluate and to benchmark. Therefore the predominant compensation system is performance-based on the deal volume (Achleitner, 2002). In addition, often there is a shared sales force involved in the process dimension. This sales force places the products produced by several teams within an investment bank. For those sales teams it is not possible and practicable to promote all products equal in every point of time (Montgomery et al., 1971). To incentive the individual sales person promoting a product, the business units pay a commission (Srinivasan, 1981). A specific characteristic of the sales process in investment banks is that often the product (e.g. a bond) does not fit exclusive the need of a customer. There might be several bonds fulfilling the requirements placed by the customer. This strengthens the position of an individual sales person to optimize the invested time per volume sold and increases the pressure on the producing business units to motivate the sales person by higher incentives. Those factors, the specialization and the incentive system linked to the shared sales force structure, increase the potential for competition for internal resources in investment banks.

To test this hypothesis, a global advisory firm’s primary data on revenues of a panel of global investment banks is used. The objective is to compare the primary and secondary teams of one product group. Primary business covers all activities from the origination and placement of a bond. Secondary business is associated with all trading activities of listed securities. In this setting the produced and offered products can be identical to the customer and the sales person decides which business unit’s product to sell. This setting may have an inherent potential for competition since both units need the sales force to place their securities. Therefore the income volatility of two product groups separated by primary and secondary business is analyzed between 2005 and 2007.

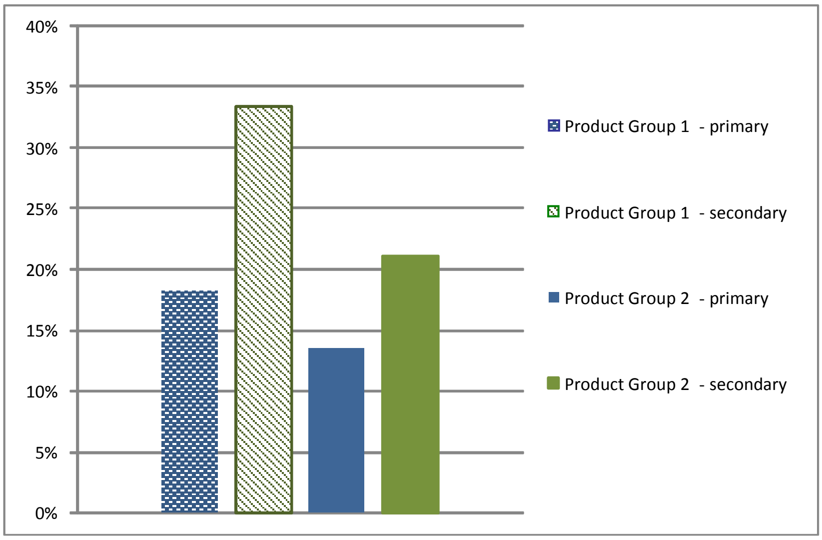

Figure 5: Income volatility from 2005-2007 for selected products

Both samples, illustrated in Figure 5, are rates-linked product groups in the fixed income segment. Given that both product groups are highly standardized and traditional financing vehicles, exogenous factors influencing the income volatility are highly similar. The income volatilities illustrated in Figure 5 show a difference in the secondary business from 33% to 21%. The product group with higher income volatility in the secondary business shows higher income volatility in the primary business as well. This could be driven by a higher level of competition for the shared resources, namely the joint sales force. To gain a deeper insight into this competitive situation, the two-shower model of Morecroft et al. is analyzed next.

Understanding and analyzing the two-shower model as a metaphor for competition for a given resource

Morecroft et al. (1995) clearly distinguish between the metaphorical and analogical value of the two-shower model. The analogical model is limited to the original shower problem and the related physical system. They argue that a translation into a company context is problematic because of the different time scales, the problem that many factors contribute to a company performance goal and that the rules behind the corporate policies are less precise than the physical rules of a shower system (Morecroft et al. 1995). Nevertheless Morecroft et al. (1995) mention "a strong similarity in feedback structure." In the following, the two-shower feedback structure is used in a metaphorical way as a bridge from an every-day phenomenon to organizational decision-making. Therefore, the shower model was reconfigured, as illustrated in Figure 6, and the system was manipulated to learn from its highly demonstrative feedback mechanisms.

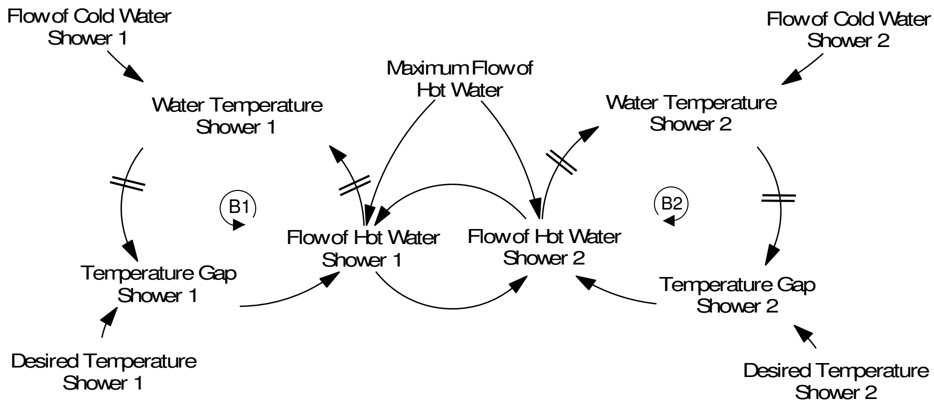

Figure 6 : The two-shower model (Morecroft ,2007)

First, the dynamic behavior of the system in a totally symmetrical situation is investigated. In this case, the person in shower 1 and the person in shower 2 start at the same moment with an identical desired temperature of 38° Celsius. Based on the potential dynamics the feedback structure shown in Figure 6 can generate, one can expect to find constant oscillations, diminishing oscillations, and exploding oscillations. In Figure 7, the base run with a time of 1.5 seconds to adjust the tap setting for both showers shows an identical constant oscillation of the temperature of both showers. The run changes to a goal seeking status through a symmetrical extension of the time which entails adjusting the tap setting to 5 seconds for each shower.

In the next step, an attempt is made to improve the policy by adjusting the pipeline delay and the time to adjust the tap setting. The sensitivity analysis in Figure 8 points at a minimum of the cumulative temperature gap for a pipeline delay of 0.125 seconds and a time to adjust the tap setting of 0.175 seconds. While minimizing the pipeline delay, it is surprising that the time to adjust the tap results in the best policy is not a peripheral solution. Running the model with the reduced adjustment times, the optimized run shows an improvement compared to the base run.

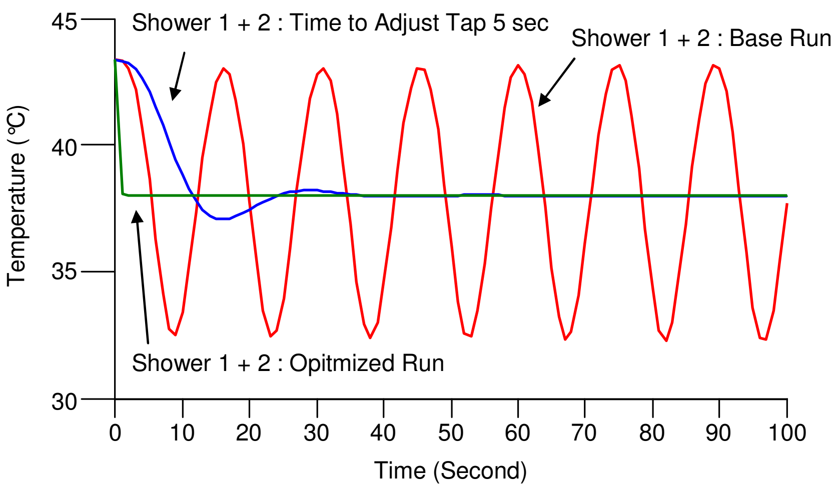

Figure 7 : Temperature in a symmetric situation

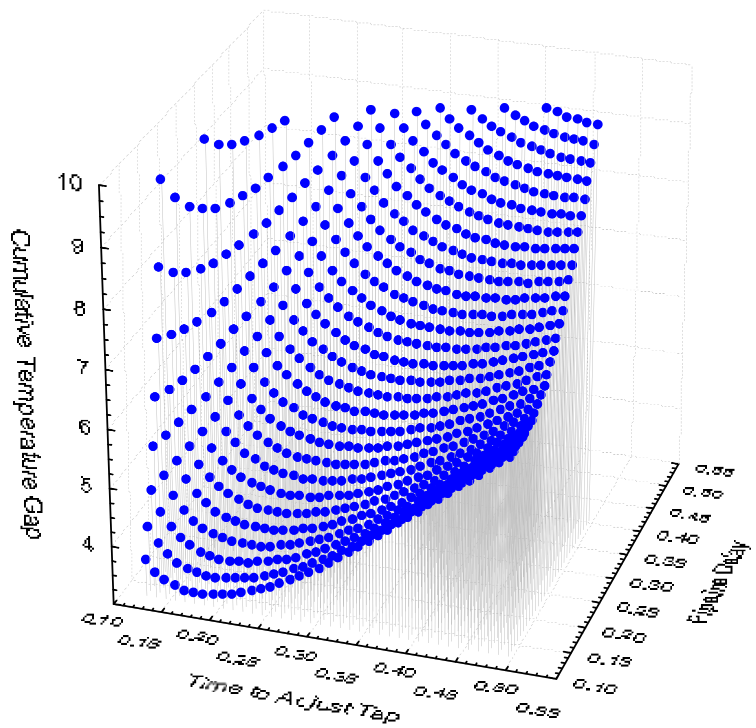

Figure 8 : Sensitivity analysis delays in a symmetric situation

The relation between the time to adjust the tap and the pipeline delay in the case of symmetry is analyzed by applying a stepwise increase of the pipeline delay from 0.1 seconds to 1 second and the corresponding optimal time to adjust the tap for the minimal cumulated temperature gap, keeping the other variables unchanged. This comparison exhibits a constant relationship between the two delays. As illustrated in Figure 9, the time to adjust the tap increases at higher rates than the pipeline delay does.

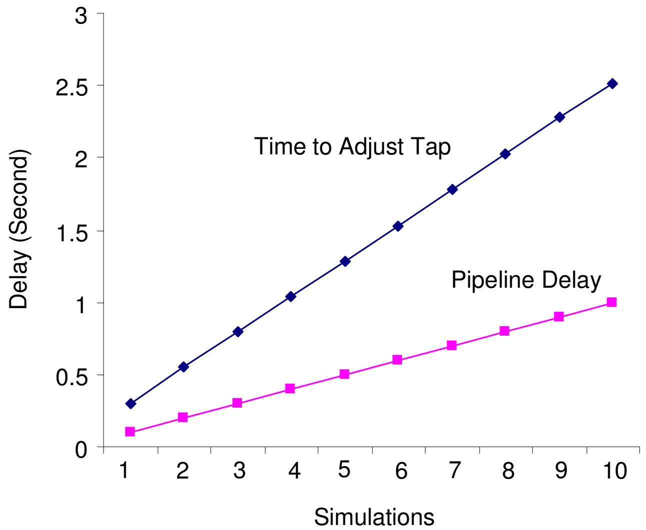

Figure 9 : Relation between pipeline delay and time to adjust the tap

Besides the variation of the delays, a second sensitivity analysis with the optimized delays is conducted by manipulating the temperature of hot water and the flow of cold water. The analysis arrives at a minimum cumulative temperature gap of 0.0075 with a temperature of hot water of 85° Celsius and a flow of cold water of 0.42 liters per second. This optimized configuration results from the improved ability of regulating the temperature through the higher temperature of hot water and a lower impact of the cold water through a slower flow of cold water. Following the discussion of these four possible adjustments, the behavior of the model resulting from an adjustment of the desired temperature, as an example for a change of the environment of the system, is investigated. In the context of this optimized run, the optimal desired temperature is 43° Celsius, which makes the temperature gap zero. This is due to a convergence of the desired temperature and the temperature from the initial tap setting. In this situation, there is no longer the need for an adjustment and consequently no potential for oscillations.

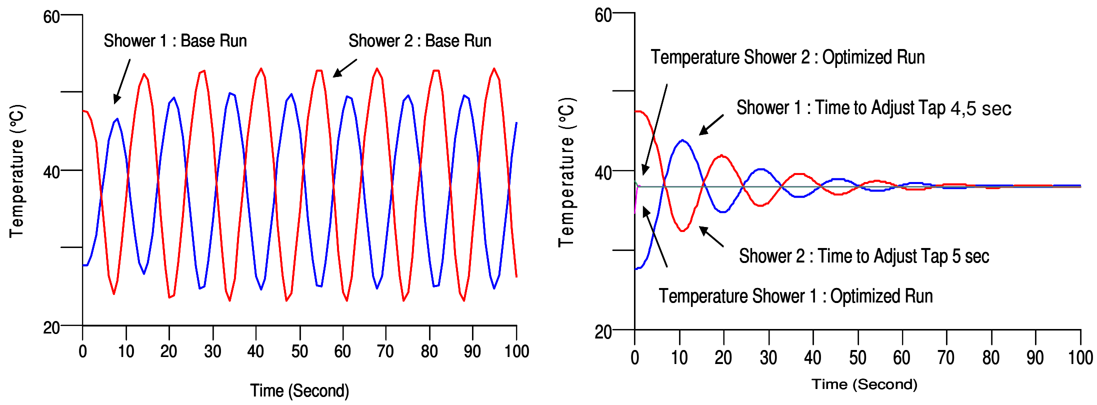

Figure 10 : Temperature in an asymmetric situation

In the next step, the symmetric situation is turned into an asymmetric initialization. Asymmetry in this context is defined as a different initial temperature gap in shower 1 and shower 2. This is induced by a differing initial tap setting in shower 1 of 0.25 instead of 0.5 and an increase in the time to adjust the tap setting in shower 1 from 1.5 seconds to 2.5 seconds in the symmetry case. Based on these initialization values, illustrated in Figure 11 one obtains a corresponding behavior to Moorcroft's results in an asymmetric situation (Morecroft, 2007). The temperature of shower 1 + 2 oscillates in a constant manner with some tendency to turn into an exploding process (Figure 10).

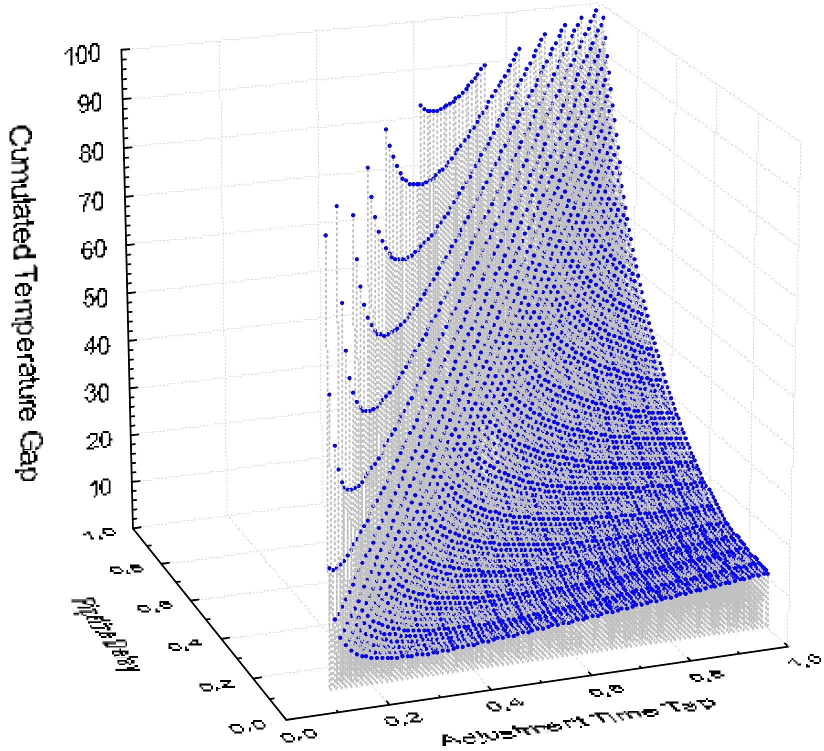

Figure 11 : Sensitivity analysis delays in an asymmetric situation

The optimization of this system shows the tendency of an assimilation of the different times to adjust the tap setting towards 0.3 seconds. This leads to the optimized run illustrated in Figure 11. Based on this finding, the sensitivity analysis from the symmetric case with the different initial tap settings is repeated, and one can find for both showers a new minimum for the time to adjust the tap setting of 0.3 seconds and a pipeline delay of 0.1 seconds. The minimum cumulative temperature gap is higher in the asymmetric context with 4.6 compared to 3.18 in the symmetric case. The increased gap in the asymmetric situation illustrates greater demands on the management of these kinds of asymmetric systems resulting from higher oscillations. Based on a deeper understanding of the dynamic behavior of the two-shower model, the model was then applied to the investment banking context.

Translation and application of the two-shower model in an investment banking context

The application of the two-shower model to an investment bank with a product group focus is guided by the segmentation of the structure derived from the single-shower model. This is divided into three parts: decision making, action, piping, and water flow (Morecroft et al., 1995). In the context of investment banking, the piping and water system is displayed as the service production process with its service dimensions, shown in Figure 12. The production potential is represented by the specialized teams working in a product group and the incentives of the sales force to make a sales effort.

The internal and external production factors are brought together through the sales force, functioning as an interface to the customer and production teams. The output dimension is illustrated by the earned revenues of the product group and serves as an indicator for the delivered quality and quantity. The invested sales incentives and the employed staff in service production result in the deployment of the sales force. Putting these factors together, the output is the measure for the success of the process.

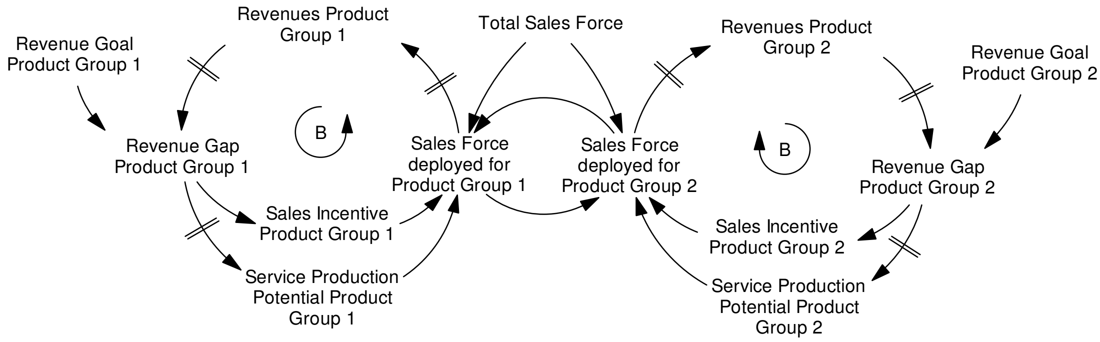

Figure 12: Stylized Investment Banking Model

The second part, decision making, is strongly related to the gap-adjustment structure from the shower model. An exogenous performance goal is set and leads to the gap between desired and realized revenue. The decision making leads to the third part of the model, including derived decisions from the revenue gap, on the sales incentives, and the service production potential.

The effect of the decision causes a delay in the adjustment of service production potential because of the time which is needed to train new employees or to lay off staff working in those teams. The effect of sales incentives is more immediate because the sales person will get the new sales credit from one minute to the other. This modification compared to the original two-shower model increases the complexity of the decision making process. The two different stocks, the potential dimension and the incentives provided, have different delays and are connected with the two stocks from the other product group. The deployment of sales force is influenced and determined by all of those four stocks. The resulting dynamic behaviour makes it worse to accomplish the given goals for every product group compared to the two stocks being involved in the two-shower model.

Furthermore, there is a time lag between the deployment of the sales force and the realized revenues because the sales person has to match the internal production factors with the external factor, the client. Finally, there is a delay between the revenues and the realization of the gap because of management reporting delays and the missing granularity of performance measurement.

On the basis of access data from an international investment bank, the proportion of production revenues and sales revenues of a functional unit can be analyzed. The data basis is generated out of the sales management system and the trading system of the bank. Both systems work with different hierarchy definitions and do not feed to a common database. The first hierarchy level to create a common and comparable dataset is on the functional unit level, which is equal to a product group. The revenues illustrated in Figure 13 are from the high grade trading segment.

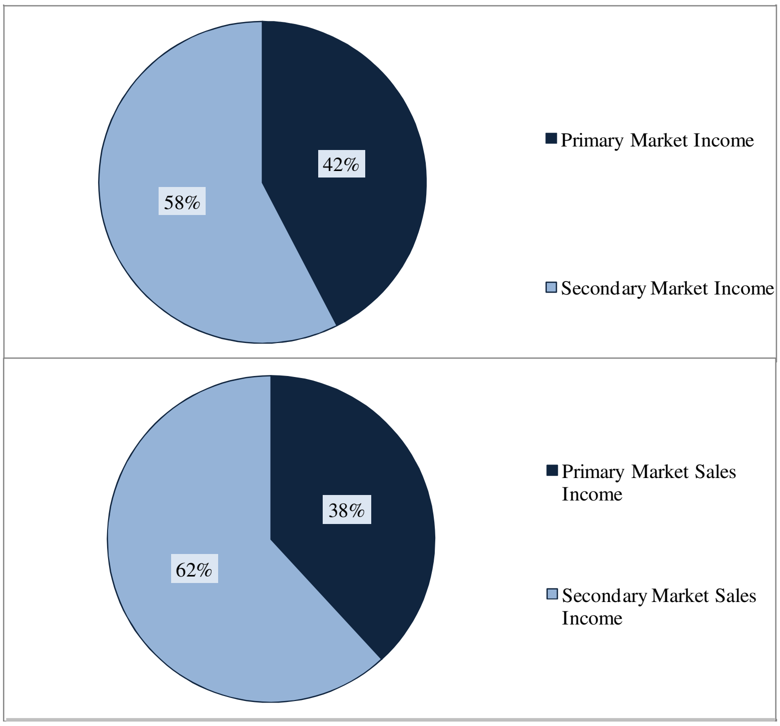

Figure 13: Revenues per product group vs. sales force

The composition of primary and secondary business revenues for the year 2006 shows a distribution of 58% produced by secondary business and the remaining 42% by primary business. The corresponding sales force incomes show for the identical period 62% paid by secondary business and only 38% paid by primary business. This imbalance serves as an indicator that the secondary business pays higher sales incentives than the primary business. The higher income volatility of the secondary business reinforces the need to compensate higher oscillations with higher sales incentives. The results show first indications of a competition between primary and secondary units for shared sales teams in investment banks.

Summary and outlook

In this paper, the effect of competition for internal resources on income volatility of investment banks was investigated. Compared to other industries, the banking industry shows relatively low income volatility. Within this data set, the investment banking industry takes an exceptional position with remarkable higher oscillations. After the specific characteristics of investment banks were illustrated within the framework of service production theory, income volatility of two product groups was analyzed on an industry-wide level. The results show higher income volatility in secondary business and a higher volatility in primary earnings given a higher volatility in the related secondary business. To get a deeper insight into the competitive situation for a shared resource, the two-shower model of Morecroft et al. was analyzed and adapted. After a discussion of the adaptations and a translation into an investment banking context, a stylized causal loop diagram was derived. In the investment banking context, the piping and water system was displayed as the service production process with its service dimensions related to the shared sales force resource. Finally, a product group was identified, and the real internal production data broken down into primary and secondary business units was analyzed. The results show first indications of a competition between primary and secondary units for shared sales teams.

For further research, the development of an investment banking model that rests on the preservation of the illustrated dynamic behavior from the shower model is suggested. The equilibrium model could be enhanced by turning it into a growth model with endogenous determination of sales force and revenue goals. This would better match with the real world processes of goal setting and adjustment in changing environments. The production data will allow for tests with other product groups with similar primary and secondary relations to strengthen the research hypothesis. Furthermore, it might be interesting to test the effect of competition for internal resources on income volatility in other industries in the production sector delivering physical goods.

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