

Currency changeover effects on business management in the EU

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Abstract

The euro's introduction initially confronts a firm with a currency changeover problem affecting its accounting and reporting systems. The company's controller can solve this initial problem by means of an electronic data processing project. For the project's duration, it is crucial to maintain reporting transparency by providing for successive transition of accounting subsystems from the national currency to the euro. Yet, with barely six months remaining until national currencies cease to be legal tender, few firms have prepared their accounting systems for conversion to the euro. Moreover, switching currencies constitutes just a small part of a far larger, complex set of related problems. That is because the common currency's introduction also influences many business parameters of differing importance to management. Generalized checklists help managers little in dealing with the specific impacts such influences may have on an enterprise. Accordingly, the controller must identify the relative importance and sequence of changes necessary in each of the firm's functional areas. The euro's introduction furthermore represents an opportunity for management to modernize the company's IT structures and to start using both the Internet and data warehouses.

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Problems caused by the common currency's introduction

In the mid-1990s, the main questions discussed in connection with the common currency were whether and, if so, when its introduction would take place. The governments of 12 EU-member countries meanwhile have answered those questions definitively. On 1 March 2002, the euro will become their sole legal tender. Consequently, many managers in these countries now (August 2001) are asking themselves what preparations they need to undertake before then. This article gives them some practical answers based on the experience of 11 real companies in Belgium, France, and Germany. The article also should prove immediately useful to non-European multinational firms operating in the EU as well as to firms in countries aspiring to join both the EU and Euroland (in any event Cyprus and Malta, and perhaps the Czech Republic and Slovenia). In addition, it may prove helpful to businesses in Denmark, Sweden, and the UK should their governments eventually adopt the euro. The same holds true for enterprises in countries negotiating EU-membership, but which at the moment are unlikely candidates for admission to Euroland (Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, Rumania, the Slovak Republic and Turkey).

Two factors seem to have had a psychological impact on how business executives view the euro's introduction. First, the long, multifaceted debate preceding the governments' decision to adopt the euro has left them uncertain about how best to proceed. Second, because the so-called Y2K-problem ultimately had few serious consequences, they hope problems associated with the euro's introduction will prove to be molehills rather than mountains too. Thus, they are content to wait cautiously and see how well pioneering firms deal with the euro. Thereafter, so their logic goes, they can borrow the pioneers' best ideas and adapt them to their own companies.

Much of the current expert discussion suggests these cautious managers are pursuing a rational strategy. That discussion has a narrow focus on problems associated with an enterprise's accounting systems and supporting software. The pioneering firms' experience, however, shows that the currency changeover affects companies much more



broadly. Hence, the euro's impact on bookkeeping and software constitutes just a small part of a far larger, complex set of related problems. In fact, this problem set embraces all the functional areas of a firm's value chain from R&D and product/service/process design through production and marketing to distribution and customer service. It therefore involves pricing policy, assortment decisions, sourcing strategies, marketing and distribution structures, lot sizes, plant capacities, and so forth. As a result, the euro's introduction does not only require enterprises to manipulate information already in their databases. It also forces them to gather new information, analyze it, and modify existing company policies and structures accordingly.

In pioneering firms, management has recognized these related problems early and delegated them to the controller, who has tackled them systematically. Generally, the controller begins by resolving the narrow accounting and software problems and then takes on the broader set of related problems. Because researchers often ascribe different meanings to the terms "controller" and "controlling", it probably will be useful to define their use here before proceeding further.

Who is a "controller" and what is "controlling"?

A "controller" is the person in a firm who serves as top management's internal business consultant. Among the controller's everyday tasks are:

- preparation of supporting materials and analysis for decision making;
- organization of the company's planning and control processes;
- reporting and interpreting numbers contributing to management by objectives;
- initiating construction and continuous updating of appropriate business information systems; and
- ensuring that the enterprise is working toward its profit and liquidity goals.

Thus, "controlling" is a comprehensive, complex leadership function consisting of directing, steering, and regulating business processes. It involves identifying concrete goals and setting a course toward them. Along

the way, it provides navigational aids so that the firm attains those goals within the framework of its business philosophy. Ideally, controlling thereby enables a company to be self-regulating in the "biokybernetic" sense. By helping it to respond appropriately to impulses from its internal and external environments, biokybernetic controlling facilitates the enterprise's long-run survival (Hagen and Weber, 1996). The effects on a firm of changing over to the euro are good examples of such impulses.

The common currency's effects on accounting systems

If one views a firm's accounting systems in isolation, it is easy to overlook many bookkeeping and software problems arising from the euro's introduction. That is precisely what Euroland politicians did in establishing a time corridor for transition to the new currency that extends from 1 January 1999 until 1 January 2002. Within this corridor, the time point to switch currencies has been left for the enterprises to decide. Hence, each company has the option of waiting until its management thinks it is "ready" for the euro. The politicians, though, apparently overlooked the fact that enterprises are highly interconnected with one another rather than isolated entities.

For instance, firms exchange goods, services, and money. With the exception of cash purchases, the transaction process under certain circumstances can last several months or years. The process consists of a series of successive steps from initial inquiry to purchase order, to delivery and inspection, then to billing and payment. If the currency changeover interferes with one of these steps, the transaction can cease to proceed smoothly.

Suppose a supplying enterprise has denominated its bill in DM, but the buying company wants to pay with euros. What is the "right" amount for both firms? Alternatively, a buying company may have to compare its purchase order in DM with a supplying enterprise's bill in euros. What "right" amount signifies the two documents agree with one another? Such situations are not at all hypothetical, but reflect everyday practice within the transition time corridor. They pose major obstacles for many of the automated accounting systems currently in use because

not all their modules can handle transactions in multiple currencies simultaneously.

Furthermore, firms also have a close relationship with the public sector. A country's finance ministry in particular has a paramount interest in receiving accurate accounting information from them. Numerous national government agencies throughout Euroland therefore have announced they will switch to the euro at the latest date possible. In the meantime, the companies' required reports and monetary transfers to the public sector still have to be in the old currency. In Germany, for example, both §244 HGB and §140 AO explicitly require denomination of closing balances and tax reports in DM.

Companies' payments flow to banks too. They convert international payment flows within Euroland via the euro to national currencies. By doing so, the banks serve as a bridge between the old and the new monetary orders.

Besides the close external relations firms have with each other, the public sector, and banks, the internal relations within individual companies comprise an additional problem area. Modern management information systems operate in real time and are highly integrated. Consequently, a small change in one module can have an immediate, large impact on the entire system. For example, converting standard costs from the national currency to euros immediately alters the valuation of an enterprise's inventories and order backlog. Because there are so many such interdependencies of which to be mindful, changing all of a firm's accounting systems to the common currency in a "big bang" on a single, fixed date poses enormous risks.

On the other hand, the fixing of rates for conversion of national currencies into euros at the beginning of 1998 reduced the complexity of introducing the new money considerably. Nevertheless, given the intricacy of the technical accounting and software problems involved, many companies likely will be hard-pressed to solve them before the changeover becomes mandatory.

Modification of the firm's accounting systems

Modifying accounting systems to accommodate the common currency's

introduction involves numerous tasks. To begin with, one must identify all the accounting areas in which currency conversion is necessary. These areas include account balances, open accounts, long-term delivery and production contracts as well as foreign currency swaps, outright forwards, options, futures contracts, interest-rate derivatives, and so forth.

Next, one has to deal with rounding differences resulting from the currency conversion process. Such differences arise in part because, as shown in Table I, none of the national currencies in Euroland converts evenly into euros. Moreover, every transaction involves entries in at least two different accounts. Conversion of these split-entries' values into euros, though, does not occur collectively and simultaneously. Instead, it takes place individually and sequentially as part of the overall conversion of line-items in a given account. Of course, the effect of that rounding cumulates in summing all of the account's individual line-items to yield its balance. In turn, the balance itself may require additional rounding. Because even medium-sized companies nowadays may have thousands of accounts with tens of thousands of individual line-items, the effects of rounding can be quite substantial. Hence, in modifying accounting systems, pioneering firms have found it necessary to check for rounding differences and make appropriate bookkeeping adjustments to minimize their impact (Rickards, 2001).

The EU-Commission has provided clear rules (Art. 335 EGV) for converting amounts denominated in foreign currencies. As

Table I Conversion rates of national currency units into euros

Country	€ conversion rate
Austria	13.7603
Belgium	40.3399
Finland	5.94573
France	6.55957
Germany	1.95583
Greece	340.75
Ireland	0.787564
Italy	1,936.27
Luxemburg	40.3399
Portugal	200.482
Spain	166.386
The Netherlands	2.20371

previously mentioned, the Commission adopted these rules in 1998. They became effective on 1 January 1999, and require that conversions into a national currency be made via the euro. Although the rules thus remove any ambiguity about how enterprises should carry out such conversions, it is unclear to what extent firms are complying with them. That is because many companies still use software incapable of executing the requisite conversions in every accounting module.

In any event, firms also must decide the point(s) in time at which to convert both foreign currency amounts into their national currency and their bookkeeping systems into euros. The pioneering companies studied chose the end of the business year as the appropriate time point. They then closed out their old business year in their national currency (say, DM) and opened their balances for the new year in euros. Adjusting entries made after year-end to correct amounts in the old business year for reporting purposes necessarily affects opening account balances on the new year's balance sheet. So pioneering firms have found software capable of maintaining records in two currencies simultaneously to be particularly useful.

Modifying accounting systems to accommodate the euro's introduction furthermore requires decisions about how to treat unrealized currency exchange profits and currency changeover expenses. Because rates for converting the national currency of Euroland-countries into the new money are fixed, there no longer exists any exchange rate risk. So simply revaluing stocks of these foreign currencies at the respective established fixed rate, as some pioneering firms have done, seems to be a reasonable procedure.

How to handle expenses associated with the common currency's introduction is another question with major implications for companies in Euroland. For instance, how should the costs of complying with mandatory reporting in two currencies (the national money and the euro during the transition period) be recorded? In most of the larger countries (e.g. France and Germany) the pioneering firms are establishing reserves to cover changeover costs and to provide for unforeseen contingencies associated with them (Nobes and Parker, 2000; Tischbierek, 1997).

A last major accounting question pertains to the consequences of the fractional amounts, limits on depreciation, and so forth still embodied in many national laws. Whether one rounds fractional amounts up or down when converting to the euro can have a substantial impact both on the amounts involved and, hence, on legal reporting requirements. Unfortunately, enactment of requisite national legislation has lagged far behind the need of enterprises to answer this question with certainty.

Modification of the firm's management information systems

The common currency's introduction and the Y2K problem have little in common except that both illustrate how troublesome older management information systems can be. Pioneering firms therefore often have treated them as opportunities to replace older systems, many of which had been developed in-house. Naturally, not every company can replace all its information systems at once. The pioneering firms, though, have been inclined to switch to new, "off-the-shelf" software applications, particularly for those systems handling highly standardized processes. Especially for external accounting and reporting purposes (e.g. balance sheets, income statements, cash-flow statements, and so forth) there is today little reason to develop and maintain an enterprise-specific system. In choosing a modern system, however, the company's controller must bear several important points in mind (Fröhling and Cehler, 1996).

First, has the software supplier from the outset conceived the system to handle multiple currencies, or has the vendor merely appended a few conversion functions to a previously existing system? As discussed further below, *ex post facto* attempts to "bore upward" from single-currency bookkeeping systems can cause considerable problems.

Second, does the software allow users to make adjustments in accounts involving interconnected transactions and several currencies? Such a capability is desirable because it substantially reduces the need to intervene manually in automated accounting processes.

Third, does the software generate a migration path together with a clear protocol

of the procedures executed to modify the accounting systems? Software with this documentation capability supplies useful references in the event of future questions about the exact steps taken during the currency changeover.

Fourth, is the software sufficiently flexible? Flexibility is important because within the transition corridor firms still have a timing problem. A firm must decide at what specific point(s) in time its accounting systems will switch from the national currency to the euro. There are two possibilities: first, changing all systems on a single date (the so-called “big-bang” alternative); and second, changing individual systems and subsystems successively within some interval of time.

The first alternative places enormous demands on the currency conversion project team. That is because, however brief the specific time point may be, during the changeover all accounting systems are unavailable for their usual processing tasks. Unfortunately, there is no other way to modify “over-integrated” systems. A system is over-integrated when newly entered information automatically updates databases for all its subordinated modules. So, for example, a withdrawal of lubricant from the supplies inventory immediately affects both the monetary value of the supplies account balance shown in the ledger and the manufacturing overhead expense recorded in the internal cost accounting subsystem. Overlooking over-integrated systems thus easily can lead to mistakes calling the software’s overall integrity into question.

A further problem can arise if the applications in use are from different software suppliers. Such applications may prove difficult to integrate with one another. Moreover, after switching to the euro, reporting systems typically cannot access readily stored information denominated in the national currency. For all these reasons, the “big-bang” alternative is unlikely to prove to be an optimal solution.

In contrast, a successive changeover in software subsystems is advantageous precisely because it affords a high degree of flexibility. Proceeding in this fashion, though, demands a lot from the standard software employed. Each functional module must be independent of the currency changeover undertaken in the ledger. This condition, in turn, is met only when all modules are capable of handling

multiple currencies simultaneously. At any given point in time, the firm then can begin euro-accounting. From the chosen time point onward, the software will process all transactions in the currency used and convert the amounts into both euro- and, say, DM-values. These transaction-level data constitute the basis for dual-currency accounting reports. Subsequently, the firm can switch off its old accounting system (in DM) whenever it wants. The ideal time point to do so is when all the system’s functional modules report in euros and users are confident of the results. Duplication of the information involved is unnecessary because intelligent use of data bank layers makes it possible to store just the essential value fields (Muksch, 2001).

This application clearly is the better option. In contrast to the “big-bang” alternative, solving the transition problem in a series of successive steps leaves the reporting system completely functional all the time. Hence, all module reports are available in both currencies throughout the dual-currency phase of the transition process.

The transition period’s relatively long time corridor notwithstanding, a huge need for technical assistance near its conclusion is foreseeable. That need arises from the cautious approach to the common currency’s introduction most managers are taking. Although it allows them to utilize the pioneering firms’ transition process know-how, it also could produce a run on consulting companies’ limited capacity. For example, with just six months remaining until the national currency ceases to be legal tender, just 1.2 percent of small- and medium-size German firms have prepared their accounting systems for conversion from the DM to the euro (*Frankfurter Allgemeine Zeitung*, 2001). Thus, the risk-adverse enterprises’ caution well may prove costly.

Related problems

Having examined the specific effects of switching currencies on accounting systems and software, it now is time to investigate the euro’s further implications for a firm. One can divide these implications into two groups. The first has to do with overarching, value-related aspects of controlling, which are associated closely with accounting systems. They include, for instance, both balance sheet

and finance controlling. Here, questions about price conversion stand in the foreground, together with its consequences for the enterprise's optimal middle- to long-run financing and capital structures.

In contrast, the second group of implications pertains to price formulation, which of course affects the subordinated functional-area controlling for each link in a company's value chain. In this case, the questions have to do with setting new selling, purchasing, and internal transfer prices (e.g. between subsidiaries in different Euroland-countries). Consequently, the pioneering firms have found they must consider the likely effects of alternative prices on the controlling system's object structures and numerical indicators (e.g. sales territories, classes of customers, minimum job/order size) (Giersberg, 2001; Rickards, 2001).

Balance sheet and finance controlling covers all those tasks involving short-term optimization decisions both during and after the euro-transition phase. These decisions include: revaluing inventory and depreciation accounts as necessary; simulation of the effects interest rate changes would have on accounts receivable, accounts payable, and other liabilities; and restructuring the company's cash management (e.g. new bank contacts, reduction of the number of banking relationships, selection of a new payments clearing house).

In preparing these decisions, the pioneering firms often have discovered a need to update and expand the information in their accounting systems' databases (Muksch, 2000). Take, for example, a decision to optimize bank financing. Given the greater transparency resulting from using the euro instead of various national currencies, a German firm now may consider borrowing from a French bank. In order to make valid comparisons with regard to rates, though, the database must contain the number of interest days in the loan period. Thus, it must reflect such distinctions as the fact that, while both German and French banks previously had calculated 360 interest days per year, only the German ones had distributed them equally over all 12 months. However, beginning in the euro transition period, German banks have started to operate on the basis of 365 interest days per year, like UK financial institutions do. The importance of such differences in computing effective interest

rates to optimize an enterprise's financing is obvious.

Most of the pioneering firms studied are using such updated and expanded databases to re-examine critical threshold values in their balance sheet and finance controlling, while developing new strategic options. For instance, take the area of cash management. As companies begin operating elsewhere in Euroland, international cash transfers among an enterprise's subsidiaries become an alternative to bank financing. Yet overly large withdrawals from cash-generating subsidiaries also could create a liquidity crisis for them. That is precisely why both the headquarters' and subsidiaries' information systems must report current threshold values.

Or take the example of revaluing the depreciation accounts. Given capital-intensive production and a significant volume of depreciation, it may prove advantageous to relocate production to another European region. But to determine whether that is the case, a firm first needs the appropriate current depreciation schedules in its database.

With regard to price formulation as opposed to price conversion, all the pioneering firms examined have found it worthwhile to check for euro-effects on their revenue potential (sales controlling), customer base (marketing controlling), suppliers (purchasing controlling), plant capacity and worker productivity (production controlling), and the efficacy of distribution systems (logistics controlling). Mindful that interdependencies are likely, the controller conducts various analyses to answer the following kinds of questions:

- (1) How should the company change the objects of its controlling reports? For example, should it redraw sales districts to increase or decrease their size? Should it try to gain new groups of customers or eliminate old ones (Rickards, 1999)?
- (2) What consequences do these changes have for the enterprise's structures and policies? For example, should new sales districts straddle borders? Do new customer groups require different treatment?
- (3) What benchmarks and threshold values need to be re-calculated in keeping with the firm's new production, sales or marketing structures? For example, what run-length or re-order quantity is optimal?

Systematically solving problems related to price formulation

Mindful of the abovementioned interdependencies, the controller next must prioritize the requisite analyses and allocate the necessary resources to concrete project tasks. But with which functional area should one begin? And in what sequence should one subsequently proceed to the others?

To be of assistance in this regard, various institutes and industry associations have developed checklists (DIHT, 1997). These checklists differ according to their degree of tailoring to specific industries' needs. Generally, though, they have a major shortcoming in common. They intermix activities aimed at modifying accounting systems and software with measures intended to solve euro-related controlling problems. As a result, neither an appropriate starting point nor a sequential order of steps is clear. So while such checklists contain some helpful ideas, the pioneering firms studied have not relied on them.

Instead, each company has conceived its own "euro-information-path" or master plan for the currency-changeover project. The following description pertains to a euro-information-path that is typical for a manufacturing firm. It specifies a starting point clearly, prioritizes project tasks, and identifies interdependencies among the functional controlling areas.

The information path's starting point is the functional area with the greatest need for change. It has the highest priority for the controller to analyze. Following the euro's introduction that usually is the sales controlling area. As noted earlier, the main tasks in this area include the formulation of new product prices. Their importance derives from their immediate impact on the enterprise's profit. However, price formulation turns out to be a particularly difficult task because of the rounding involved in converting to euros.

If the price of an item is DM 1.56 (71 US cents), that would be €0.7876 or 78.76 euro cents. By rounding it up to 80 cents, as the law permits, a producer can increase the price, at least initially, at the retailer's expense (*Markt und Mittelstand*, 1997). So the producing company can be pleased with itself. It is in the more fortunate position because it can round up five digits (5 to 9) and only has to round down four (1 to 4).

Yet simply converting and rounding up or down is not enough. One also has to bear in mind psychologically important prices. They are the ones ending in 99 pfennigs. An exact conversion of DM5.99 is €3.06, which is not psychologically satisfying. Consequently, reformulated prices tend to end in 4, 5, or 9 euro cents. If demand is inelastic, rounding up to those figures leads to more sales revenue. On the other hand, with elastic demand, higher prices reduce sales revenue.

In any event, the new money's introduction greatly facilitates price comparisons across the 12 euro-countries. On one hand, that suggests heightened importance for other product/service advantages (e.g. product quality and customer service) to attract international shoppers (Sander, 1997; Rickards, 2001). Indeed, consumers already are demonstrating a new preference for buying certain items in neighboring countries. Affected pioneering firms therefore have hastened to redraw their sales districts accordingly, especially when changes in demand patterns appear likely to persist (Skiera and Albers, 1994).

On the other hand, switching to the euro also presents an opportunity to introduce new products and services. For example, due to the disappearance of exchange rate risk, international leasing now may prove to be an attractive product option within Euroland.

Such decisions in the sales area directly affect both the marketing and production functions. In the marketing area, the controller consequently may recommend changes in existing distribution channels (e.g. a shift in emphasis between the in- and out-of-house sales forces) (Bunk, 1996). Additionally, the controller may consider possible improvements in the company's communications about its products and services. In this regard, a transition from traditional print media to digital printing could prove worthwhile. In fact, the adjustments needed often are small relative to the circulation base.

Alternatively, when information about products or services requires frequent updating (e.g. prices), an electronic catalogue (either as a CD-ROM or an Internet application) may make more sense. Then the controller would bring not only the costs and savings, but also the enterprise's communications goals (e.g. a high dispersion effect) into the decision calculus. The costs would include, for instance, initial project expenses and subsequent outlays for

CD-ROM or Internet updating. The CD-ROMs, moreover, would incur copying and distribution charges too. Offsetting those costs would be savings from eliminating the printing, storage, and delivery activities associated with paper catalogues.

In the production area, the controller conducts capacity and productivity analyses across facilities. Together with changes in product mix and planned sales, their outcomes lead to adjustments in job sizes and series run-lengths as well as to new manufacturing cost structures.

From the production area, the controller next turns to the purchasing function. As explained earlier, the common currency's introduction also leads to changes in the prices and conditions suppliers offer. Therefore, the controller will want to modify the firm's purchasing strategy. That involves ABC-analyses as bases for comparing inputs and evaluating individual suppliers.

The last major area for the controller is the company's logistics. Given the changes made in its other functions, both the inventory/warehousing strategy and the (delivery) trip planning likely will have some optimization potential.

Naturally, the euro-information-path just described is not generally applicable. In contrast to manufacturing, enterprises engaged in wholesaling or retail trade among dealers have minimal marketing and no production structures. For such firms, the next most important questions after prices (the sales functional area) pertain to inventories, warehousing, and space management (the logistics function). This caveat notwithstanding, a master plan like the one just described is essential to focus managers' attention on major topics in a logical sequence. That focus limits distractions caused by side-issues and thus helps to contain project costs stemming from the euro-changeover.

Modification of the firm's information technology

The changeover to the euro has an impact on the firm's information technology structures too. As a simple example, consider the requirement to display prices in both euros and the national currency during the transition phase. This "dual price-marking" can increase exponentially during sales when

prices change frequently. Of course, every such change necessarily leads to alterations in numerous sales and marketing documents. Hence, it may make sense to use the currency changeover as an occasion to develop an electronic product catalogue that communicates with the article and price stem in the company's databank. The advantage is obvious: one can update price lists together with the appropriate sales and marketing documents continuously and efficiently. As a result, the sales force always can work on the basis of current information. The enterprise furthermore can issue its product catalogue either off-line as a CD-ROM application or directly as an Internet or intranet solution. One can expand the latter successively to cover both computer-aided selling (e.g. customer contact management, sales administration, advertising videos) and the firm's controlling requirements (e.g. analysis of results, automatic determination of sales commissions, computation of area- and customer-related standard/target sales volumes, variable costs, and contribution margins).

The transition to the euro also presents a good opportunity for firms to begin using "data warehouses". A data warehouse is a consistent data pool into which flow both internal data about the company's operations as well as external data (e.g. downloaded from the Web). All these data are available to in-house analysts in an optimized format (Muksch, 2000). Because data warehouses usually contain information from multiple functional areas of a business, they tend to be large and to have a high degree of complexity.

Recently, though, a growing demand for smaller, less complex data warehouse solutions has emerged, especially in decentralized enterprises (Müller, 2001). Such solutions require tailoring to the data-mining needs of the specific departments involved. Called "data marts", these mini-data-warehouses contain data sets created to meet those departments' analytic requirements. Several of the pioneering firms observed furthermore have found it useful to develop "independent data marts". Based on a data warehouse solution, they are isolated systems for supporting decision making in temporary projects.

One can conceive of both data warehouse and data mart solutions as either relational or multidimensional analytic systems. The expression online analytical processing

(OLAP) pertains to analyses based on the latter system type. The fundamental ideas of OLAP are as follow.

Employing the same database, different users in a company can analyze variables along dimensions of particular interest to them simultaneously. For instance, a sales manager may want to analyze how well the firm's various products have sold in a given region across time. Meanwhile, a product manager may want to know how many units of a given product customers have bought in all the enterprise's sales regions during the past several months. For his part, the chief financial officer may want to compare cash discounts taken across all products and regions in a particular month. At the same time, the chief operating officer may want to juxtapose the contribution margins of some subset of products in certain regions and months. On-line analytical processing of a data cube with the dimensions product, region, and month would allow all four managers to pursue answers to their questions concurrently.

The analytic instruments available within a multidimensional OLAP-framework therefore have great versatility. In addition, they permit modelling of individual user algorithms (Fröhling and Oehler, 1996). This feature has proved quite helpful to some of the pioneering firms studied in overhauling their functional controlling as they began their changeover to the euro.

Conclusions

On closer examination, the supposedly simple tasks of switching to the euro and temporarily administering a dual currency accounting system turn out to be real challenges. That is because the common currency's introduction also directly influences a firm's prices and costs. It thus has a major impact on a company's controlling. Besides modifying their accounting systems and software, enterprises therefore must grapple with a large number of related problems. To solve them successfully, managers have to proceed in a logical sequence, starting with the functional area having the highest priority for the respective firm. Consequently, the currency changeover problem constitutes just a small part of a complex problem set. This problem set, though, need not overwhelm any company's management – if it prepares itself

systematically and well in advance of the currency changeover. Because most small- and medium-size firms in Euroland have failed to make such preparations, they likely will experience considerable administrative turmoil and incur substantial additional costs in 2002.

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