

## **Electronic Commerce and Third Party Initiated Transactions: A Conceptual Exploration**

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For 500 years the model introduced by Pacioli has been the foundation for the work of accountants. This model dominates the universal language of organizations. Pacioli's double entry system has provided the fundamental structure for recording economic events of interest to an entity that can be expressed in monetary terms. In this article, the authors investigate whether this model is suboptimal in a world of electronic commerce.

### **Introduction**

This paper explores at the conceptual level a significantly different approach than Pacioli's to the recording process, as it relates to two interrelated sets of transactions between entities: sales/purchases, and cash receipts/cash payments. Its conclusion retains the duality found in current accounting model, but proposes that the duality be attained between entities with a single accounting entry. It further suggests that the intermediaries, who typically are the focal point of many economic exchanges, trigger the recognition of the accounting event. The conceptual framework proposed is built on the fundamental truth that between entities "one man's debit is another man's credit". In a sense it is an attempt to rationalize the diverse developments related to electronic commerce and the "virtual enterprise." The suggested model eliminates the very real and serious problem of information asymmetry and also enhances the reliability the information. Finally, the model provides a context within which the current financial reporting process can be re-evaluated.

This paper does not discuss the technology required to implement the concept. The authors assume that despite existing technological limitations the conceptual model can be operationalized in the future. The authors believe the most significant obstacle to full implementation is the inability or unwillingness of accountants and financial information users to accept the new paradigm.

The concepts and models are presented in the next section, followed by a discussion of the implications and significance.

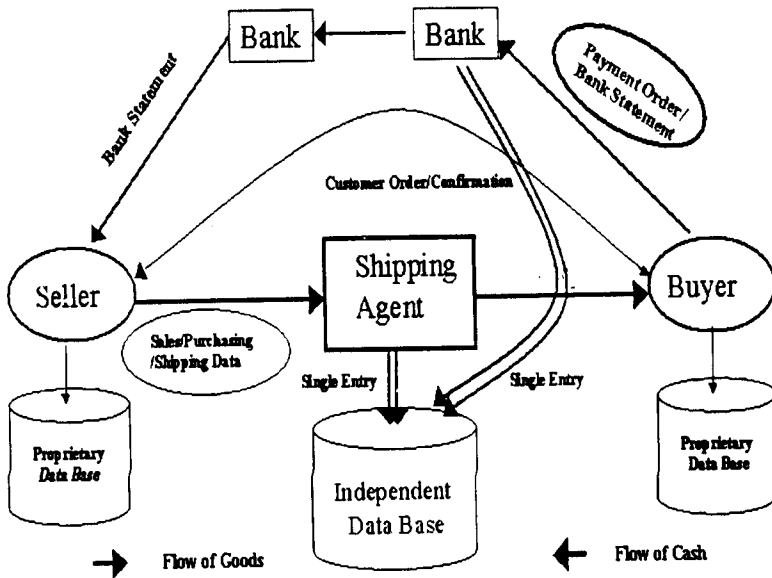
### **The Concept and Models**

The key to the proposed model is the role of third parties (that is, the economic exchange facilitators or intermediaries who effect the transfer of ownership of assets, including cash transfers, between sellers and buyers.) They will initiate the accounting for the economic event. For simplicity the model is limited to the buyer/seller relationship. However, as pointed out by Robert K. Elliot "...Other counterparties (employees, shareholders, tax authorities) [have] transactions [which] are mirrored and can contribute to the 'lock-down' of the enterprise in its entire transaction matrix." (1997, e-mail).

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**[Editor's note:** Electronic commerce is the theme of the American Accounting Association's 34th Western Regional Conference on April 29 - May 1, 1999 in Newport Beach, California. The conference will be hosted by Cal Poly Pomona's Department of Accounting; further information can be found on the home page of the President the Western Regional, John Karayan, at <http://www.csupomona.edu/~jekarayan.>]

Figure 1  
(Model 1) Independent Database



The “sales/purchases” transactions will be prepared by the seller, perhaps using direct computer input from the buyer, reflecting the details of the exchange events of interest to both parties and not just the direct financial data. In a recent interview on MS-NBC, Frederick W. Smith, Chief Executive Officer of FedEx, indicated his company’s desire to provide more and better information to their customers related to marketing and shipping. The data is recorded in machine-readable form, for example, on a microchip, which is the shipment documentation. The transaction data to be recorded, therefore, belongs to the exchange partners and not the intermediary.

The content of the transactions processed by the model is not limited to just the essential financial accounting elements. Theoretically, anything of interest to the buyer or seller can be included. Robert K. Elliott suggests that a much richer set of information about the buyer/seller relationship is required in the modern management environment (1992, p. 61-85).

Banks or other financial institutions will initiate the cash receipt/payment transactions, when they transfer funds from one entity to another based on instructions from the payor. The banks will not retain any data beyond their current requirements. They will merely signal recognition that the transfer occurred.

The intermediary’s role is only to trigger recognition of the actual, real event (*i.e.*, the transfer of ownership of the economic resources when the shipment is picked up or delivered, or the cash is transferred). In these cases, it is essential that the data about the transaction be placed in an environment accessible to both parties immediately and simultaneously.

The data storage and retrieval environment for the third party transaction may be separate and distinct from the proprietary database maintained by each entity. If so, it must be under the control of a third party, independent of the buyer/seller, and payer/payee.

Perhaps the initiating intermediary will provide the independent database management function. Figure 2 presents the data storage and extraction environment using an independently maintained database for the "Electronic Commerce" (EC) transactions.

**Figure 2**  
**Data Storage & Extraction**

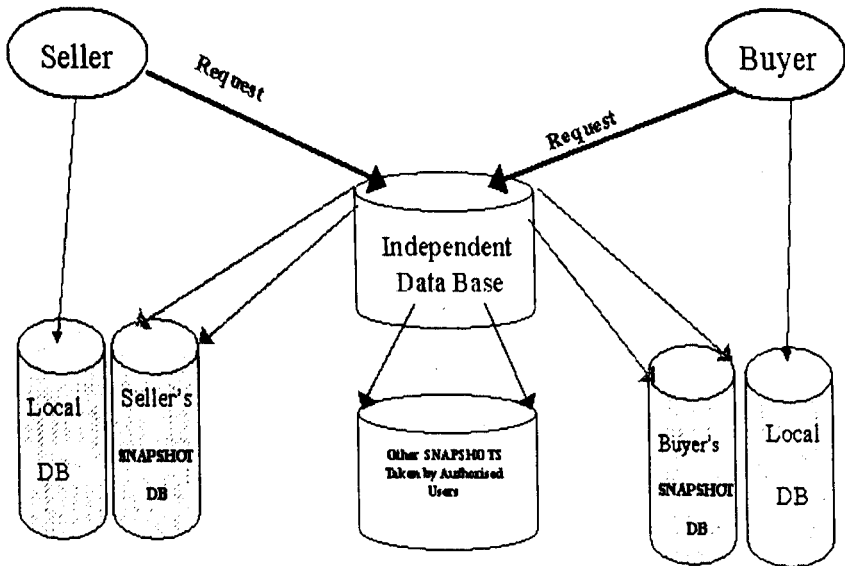
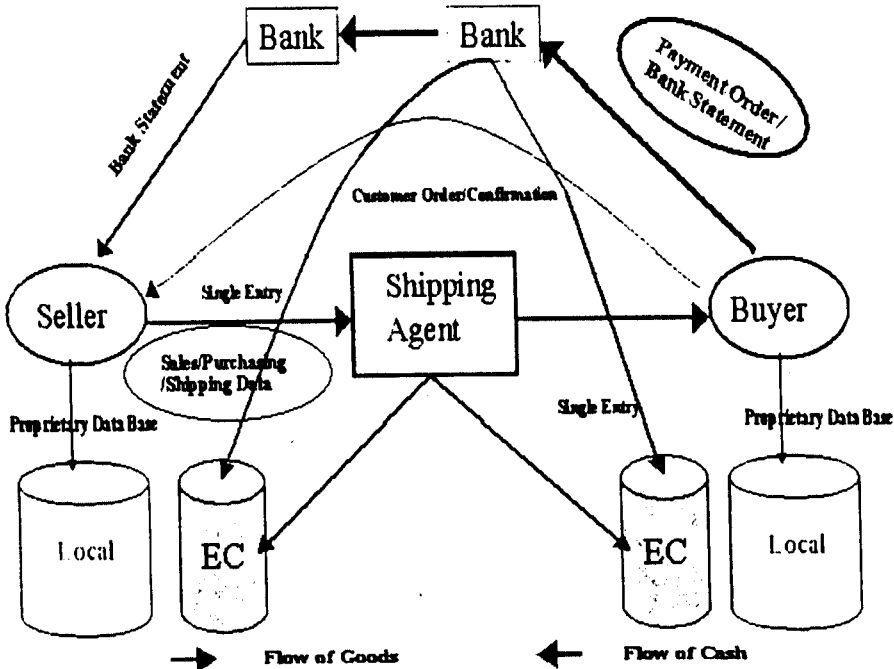


Figure 3 provides an alternative model. As a result of concerns expressed about the structure of wide area based networks and the problems of independent database models (Goldschmidt, 1998, e-mail), this alternative, may provide a viable solution. In this model each entity maintains a portion of its proprietary database exclusively for "independent" externally generated "EC" transactions. The bifurcation will allow for different levels of security to be imposed on the third party transactions, as opposed to internally generated maintenance transactions.

Under either model a separate company level "local" database will contain entity generated accounting transactions and records, e.g., adjustments and subsidiary ledgers, just as they do today. It may also contain copies of data records extracted from the independent database.

Figure 3  
(Model 2) Local Database



Regardless of which database environment is used to capture and store third-party initiated transactions, the control over the integrity of the original data in each transaction and determination of access rights to the data is the responsibility of those in direct relationship. The independent database operator is responsible for protecting the integrity of the data held, the authenticity of the data extracted, and the application of the access limitations set by the data owners. The same control issues are present if a bifurcated, proprietary database structure is used.

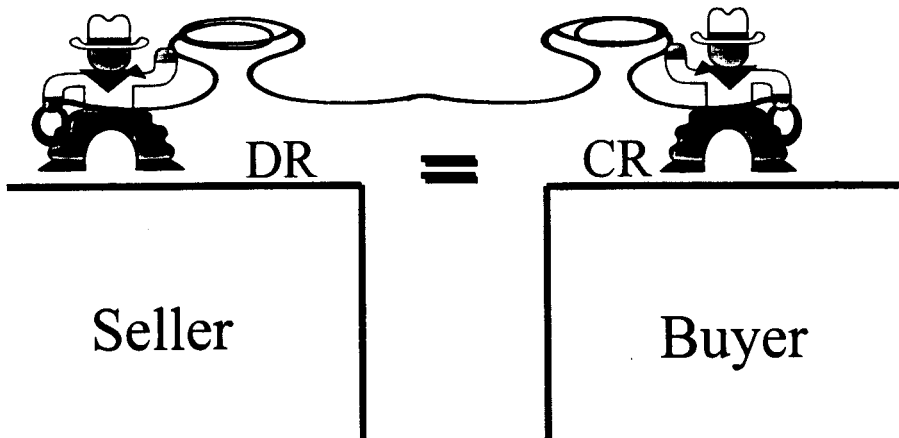
What is required by buyers, sellers, payors, and payees is knowledge about where the data record is and what descriptive and control tags are attached to it to provide for access to the details, security, and authentication. Thus with the appropriate authorization anyone can literally "take a picture of the data", but they cannot alter the contents.

### Discussion

The present accounting model has been in existence for over eight centuries. Double entry bookkeeping as it is now known emerged in the Thirteen Hundreds. Luca Pacioli's book, "Summa de Arithmetica Geometria Proportioni et Proportionalita" (review of Arithmetic, Geometry and Proportions), 1494, is the first book on the double entry bookkeeping known to be published. The terms employed today, 'debit' and 'credit', were mentioned by Pacioli as 'debito' (owed to) and 'credito' (owed by). In explaining double entry accounting, Pacioli said, "All entries ... have to be double entries, that is, if you make someone a creditor then you must make someone a debtor". (Kam, 1990).

It is this fundamental premise on which the proposed model is based. Moreover, the proposed model explicitly uses the idea that the creditor is in one entity and the debtor is in another. Figure 4 demonstrates the dynamic tension and equality existing between the parties. They share a mutual interest in the economic event and, therefore, the accounting transaction.

**Figure 4**  
**Mutuality of Interest**

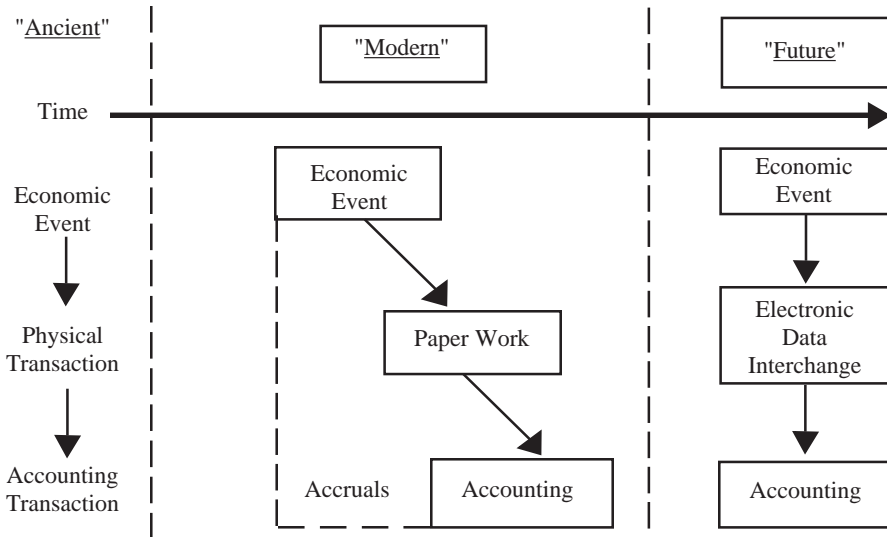


One of the advantages of the double entry accounting is that it provides a means by which errors – particularly human errors – can be found readily, because of the necessity for duality and equilibrium of accounts and classifications. It also imposes a requirement for systematic and orderly accounting transactions. In general this applies within the accounting entity, but it is not necessarily true between entities, because each entity does its own recording.

Usually the timing is different and in some cases the information is different—accidentally or intentionally. The “mutuality of interest” that exists between the two parties is assumed in the traditional model. However, because the accounting transactions are recorded independently by each party, the assumed equilibrium may not in fact exist. The proposed model overcomes this serious defect in the current accounting process, which results in information asymmetry.

The asymmetry problem is the result of the complexity of modern economic activity.

**Figure 5**  
**Historical Perspective: Economic Events and Accounting**



As seen in Figure 5, in ancient times (and to some degree today in cash basis and barter economies) economic events are settled immediately and simultaneously at the physical level. The mutuality of interest is immediately evident and effective. However, as economic activity increases in volume and variety, documents are used to capture the essential data about the physical events. Additionally, data about commitments to be settled in the future are also captured on documents (e.g., payables, receivables, and other accruals). The documents are the support for the accounting transactions. Invariably there is a timing difference between when the physical events occur or when the commitments are made and when the related accounting transactions are recorded based on the paperwork.

Timing, however, is only one part of the asymmetry problem. The more critical aspect is the risk that the parties will not record the events or commitments consistently between entities. This is the reliability problem. Accounting information is assumed to be reliable if it is objective and verifiable and accurately maps the real economic event it relates to. Under the current process accounting information between entities may not be “globally” reliable because of the independence in recording.

If the cause for the global unreliability is intentional misstatement (i.e., fraud), the mutuality of interest and the singularity of the information set in the proposed model will greatly reduce the likelihood of the misstatement being overlooked. Robert K. Elliot commented: “I foresee the day when, through massive redundancy of data collection, it will become extremely difficult to commit a fraud and virtually impossible to conceal it.” (1997, e-mail).

The proposed model facilitates accounting between entities and enhances the reliability of the data, because both entities simultaneously are given “credit” for their economic interest

in the exchange event. Since the economic events are discrete and quantitatively equal to both entities, a single transaction will be viewed from two perspectives accurately and completely. Any attempt to manipulate the subsequent reporting will be readily apparent in the "adjusting" entries found in the local database.

International trade transactions provide an example of possible improving reporting symmetry. They will be balanced automatically and National Current Account reporting will be improved. That is, the balance of payments statistics will be more accurate and complete. The International Monetary Fund (1997) estimated that world-wide the current account balances for 1996 were "out of balance" by at least \$100 billion. By anyone's standards this is a rather significant lack of information symmetry.

The attest function in financial audit, is intended to provide verification of the reliability of accounting information. However, the difficulty of providing high quality verification services is well understood. The historic audit problems of understanding the economic event and determining if the proper and most appropriate accounting rules were applied is now exacerbated by the use of increasingly sophisticated electronic data interchange (EDI) to record the event in the accounting record. Numerous observers, including Elliott (1994, 1995, 1996) and Wallman (1995, 1996 a&b, 1997) have addressed this problem. Technology, the demand for ever increasing speed in processing data, and a decline in interest in control over transaction accuracy by preparers has reduced the efficacy of the traditional audit to provide high quality assurance on the reliability of accounting information. The Report of the Special Committee on Assurance Services supports this contention (AICPA, 1997).

It is imperative, therefore, that the idea of mutuality of interest and the recording of a transaction as a way of increasing the reliability of accounting information be taken seriously. EDI essentially restores the direct relationship between the physical economic event and accounting that existed in ancient times. It provides an opportunity to overcome both aspects of the asymmetry problem. A single piece of data sent simultaneously to both parties, when the event occurs, virtually eliminates the problem and re-establishes the "mutuality of interest" in the events.

In the future, EDI transactions will dominate as the primary means by which economic events are communicated to accounting systems. Articles about new developments in EDI applications and related technology appear in the popular business press. For example, a recent article described a system under development to provide secure electronic checks, which if successful may be included in a European Union program to provide an electronic market place (Barnes, 1998). Another article describes the use of "extranets" to reduce the cost of business-to-business commerce using off-the-shelf technology that is being operated by General Electric's information services division (Nairn, 1998 (a)). Yet another article describes the development of multi-directional (omni-directional?) information environments which provide horizontal, as well as, vertical communication. Elizabeth Lank, director of knowledge management at ICL in the UK, has identified the critical factor determining the success of all information rich environments: "The technology is the easy bit; what is more difficult is motivating people to share knowledge (Nairn, 1998 (b)).

One of the most ambitious projects based on a model similar to the one proposed is TARGET, the new Pan-European clearing mechanism for high-value payments, which is similar to the system operated by the Federal Reserve Banks in the US. The system will provide for the immediate and irrevocable transfer of funds between banks and the execution will be completed within seconds (ABN AMRO, 1997).

The business information environment suggested by Elliott in 1992 is becoming a reality as the "virtual enterprise." A "virtual company", as suggested in a document published by

Andersen Consulting (AC), [is] “a company that relies to a great extent on third parties to conduct its business...” (Zuin and Kutz, 1997). AC suggests that “...As more enterprises conduct more business electronically, large numbers of providers, suppliers and customers will become more closely coupled. Soon, networks of complimentary enterprises will emerge, boasting global reach, reduced cost structures, rapid response times, and highly profitable knowledge assets.” ([http://ac.com/aboutus/ecom/au\\_main\\_1.html](http://ac.com/aboutus/ecom/au_main_1.html))

Elliott’s assertion that the world is facing a “third wave” of innovation (1992) is discussed by Steven J. Johnson, worldwide managing partner of Andersen Consulting’s Retail and Electronic Commerce practice, and Edward M. Schreck, worldwide managing partner of Andersen Consulting’s Technology practice. They suggest that:

At this point, the ‘transformation’ period becomes possible, when innovation begins shaping entire markets and, often, fundamental aspects of how we live.... Today, information technology has reached the point of critical mass required for transformation to occur—spurred by the convergence of computing, communications and knowledge, and manifested by electronic commerce.... Today’s implementations are transforming or even erasing those boundaries, by integrating business more closely with their suppliers, partners and customers. ([http://www.ac.com/outlook/o\\_frarchives\\_1.html](http://www.ac.com/outlook/o_frarchives_1.html)).

Thus the changes which have occurred and that are continuing to occur in technology create the need to transform the way the accounting process is conceptualized and modeled. The single entry, third party models suggested above are consistent with the emerging future.

EDI and the proposed model also provide an opportunity to revisit the decision alternatives that led to the current financial reporting model. Over the past several hundred years the way commercial activity is conducted has changed. The individual tradesmen or craftsmen have increasingly joined forces to form complex organizations. Some have remained owner-managers, but others have become employees.

Many organizations have required large infusions of capital obtained from investors and banks. As enterprises have become larger and more diverse and obtained investment capital from a large number of individuals, not directly involved in managing the entity, there has arisen a need to communicate with a variety of stakeholders and to provide them with information for monitoring the performance of management and the entity. Kam suggests that there are two alternative approaches to this requirement for information (1990):

- Provide access to the raw data necessary for an observer to understand the business. For example, permit appropriate individuals and parties (that is, stakeholders), access to ledgers and books of original entry of the entity; or
- Compile the information in a format transmittable to and usable by others using a standardized format and produced under the control of the entity.

As a practical matter, the second alternative was chosen by the authors and developed into a model to provide comparability and standardization, so that multiple parties could understand and work with the accounting information. However, since each nation has its own set of GAAP and there is an International set also, the proposed model does not deal with the issue of multiple standards for measuring and reporting economic events.

Information technology has brought us to a point where the earlier decision about how to provide needed information must be re-examined. The choice to develop a standardized set of financial statements prepared by the entity is based on practicality. It simply is not possible to provide raw data to all interested parties.

Corporate financial reporting and corporate disclosure exists in the context of a dynamic, constantly changing business world. Competitive challenge and business opportunities arise quickly. Firms have an advantage if they are agile in adapting corporate structure and developing or utilizing innovative and sophisticated financial instruments. In the middle of this evolving business world stands the accounting profession that needs to assure the continued utility and integrity of financial reporting.

As we approach the end of the 20th Century, financial accounting and disclosure is not keeping pace with the rapid change in the business world. Not only is accounting and disclosure increasingly at risk of failing to satisfy its promise to society, but also they are becoming deterrent to economic environment. "The value and worth of financial reporting lies, in almost exclusive way, in its usefulness to users" (FASB Concept Statement #1, para. 34, 1998).

Not all users have the same needs. For example, an analyst attempting to discern or predict earnings or cash flows needs different information than managers reviewing the allocation and utilization of deployed assets. Investors attempting to employ relatively new measures such as Economic Value Add (EVA) need still different information. The diversity of users complicates the task of peering into future. Thus it becomes important to develop both analytical systems for thinking about what the future might bring and the mechanisms and information structures to respond appropriately.

During the past 30 years, the information in financial statements has been aggregated and compressed to such a degree that the real information value is questionable. Furthermore, there is some evidence that the Financial Accounting Standards Board's efforts to enhance communication by requiring ever more complex disclosures has lead to an unwillingness or inability by some analysts to use the new information (Kang, 1997).

Timeliness (*i.e.*, the speed of delivery or accessibility of information), is another factor becoming increasingly important in the business environment today. Annual or even quarterly reports do not capture material developments in sufficient time to meet market informational needs. Product cycles have shortened and company strategies become obsolete much more quickly now than ever before. The current system of periodic reports has been in place for decades, but the business environment has changed dramatically. The financial reporting systems need to use technology to respond to these changes. The efficient market hypothesis should have a comparable expression in financial reporting.

Today the technology exists to enable anyone authorized to do so to obtain desired, authenticated accounting data at the transaction level and accumulate or manipulate it to meet their own needs, whenever they want to. Ultimately, accounting data will become a highly reliable consumer product, in contrast to the current financial statements which are a product of the producer and, perhaps not a very good one, who has a - "one size fits all, take it or leave it" attitude. The data storage and extraction component of the model provides the context for the development of a totally different paradigm for financial reporting.

## Conclusion

The proposed model is possible today because of information and telecommunications technology. Increasingly, electronic commerce is becoming a fact of life. In the short-term the proposed model will be of importance to large commercial entities, both domestic and multinational; government regulators; statisticians, and financial analysts. In the longer-term, some version of the model will be the way virtually all accounting between entities is done.

The ultimate issue is not whether this type of accounting can be done. The technology exists and solutions can be found to the problems of security and data integrity. The biggest problem is user acceptance of the concept. Regulatory authorities, management, and accountants, in particular, may not be overly eager to accept changes in the existing system and processes.

Theoretically, if all entities have to recognize all transactions when they happen, not when the entities choose to record them, the risk distortion of the original data will be minimized. The concept of "mutuality of interest" provides the equality currently provided by Pacioli's algebraic model.

Fraud and the manipulation of data in the form of misstatements will still occur, but it will be more visible and detectable. Massive collusion would be required to perpetrate a large-scale financial fraud.

Acceptance will be facilitated, if the intermediaries provide the transaction recognition environment as part of their normal servicing. Buyers, sellers, payors, and payees will be receptive, when they realize that significant cost savings can be achieved. The users of economic exchange based accounting data will have greater confidence in the data, since its information content is unadulterated and subject to convenient verification. Furthermore, single entry accounting will simplify data capture and the production of balanced, timely information about fundamental economic events.

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