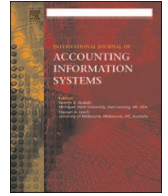


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## Breakdowns in internal controls in bank trading information systems: The case of the fraud at Société Générale

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### ABSTRACT

The purpose of this paper is to examine the failure to detect breakdowns in internal controls in a major bank's trading information systems related to a fraud perpetrated by a mid-level derivatives trader. Specifically, this paper examines the events uncovered at Société Générale, a large French bank, in January 2008. The paper addresses the question whether the apparent breakdowns in internal controls were caused by the fraudulent activities of a single trader acting alone or whether there may have been a certain level of acceptance of these activities on the part of the bank hierarchy as long as the trader was making a profit. The conclusion of the paper is that bank management may have overlooked overrides of internal controls over bank trading information systems during periods when risky trading practices resulted in profits, but that management quickly took action to correct the internal control overrides when the trading practices led to losses, thus re-emphasizing the crucial importance of tone at the top in the internal control environment. The paper will also address current and future potential research which may have prevented the fraud at Société Générale.

### 1. Introduction

The purpose of this paper is to examine failures to detect breakdowns in internal controls in bank trading information systems which led to a massive fraud at Société Générale in January 2008 and to provide research opportunities and directions based upon these findings. Until the public announcement of the fraud, Société Générale (henceforth known as the “Bank” in this paper) was known internationally for its expertise in trading equity derivatives, which had become a highly profitable line of business for the Bank. In fact, in January 2008, *Risk Magazine* awarded Société Générale its Equity Derivatives House of the Year award (John, 2008). The Bank's systems for trading were considered to be some of the most complex in all of banking for handling equity derivatives. In response to the revelations of the fraud, high level officials of the Bank claimed that a single trader, Jérôme Kerviel had used his intimate knowledge of the Bank's trading information system to circumvent controls that would have prevented him from taking unauthorized trading positions. In addition they claimed that he made changes to the Bank's trading information system that enabled him to eliminate credit and trade-size controls, so that the Bank's risk managers were not aware of the unauthorized trades (Gauthier-Villars et al. 2008).

After the announcement of the fraud, Jérôme Kerviel was arrested by the French police and charged with several counts of fraud under French law. He was convicted by a Paris court in October 2010 and sentenced to three years in prison and ordered to pay 4.9

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billion euros (\$5.5 billion) as a fine to cover the losses that the Bank had incurred. Subsequent court rulings have eliminated the fine, but sustained the fraud conviction and prison term (Reuters, 2016). In June 2016, a different type of French court related to labor law, awarded Kerviel 400,000 euros on the basis that the Bank had fired Kerviel in an unfair manner because it was aware of his trading activities (Huffington Post, 2016). Separately, the French prosecutor rejected Kerviel's argument that the bank was aware of his activities, while considering a reduction or elimination of his prison sentence. Therefore at the time of this writing the case remains unresolved (Reuters, 2016).

This raises the question whether the apparent breakdown in internal controls in Société Générale's trading information systems were caused by the fraudulent activities of Kerviel acting alone or whether there was a certain level of acceptance of his activities on the part of the Bank's hierarchy. The overall purpose of the paper is to investigate this question and to discuss implications for research and practice. The remainder of the paper is organized as follows. Section 1 outlines the basic elements of the fraud perpetrated by Jérôme Kerviel in January 2008. Section 2 reviews the conclusions of a report prepared by the General Investigative Division (Internal Audit) of the Bank which outlines the details of the fraud and the internal control weaknesses that caused a failure to detect the fraud for several years. Section 3 summarizes a report prepared by PricewaterhouseCoopers at the request of the Board of Directors of Société Générale. Section 4 discusses the question posed in this paper and Section 5 offers some lessons regarding the fraud. Section 6 concludes the paper.

## 2. The fraud at Société Générale

### 2.1. Background of Société Générale

Société Générale was founded in 1864 during the reign of Napoleon III, the nephew of Napoleon Bonaparte. The Bank became an important source of capital for the rapidly growing French economy during the 19th and early 20th centuries. Just prior to World War II, Société Générale had 1,500 branches, including several branches in the United States and other countries. Following World War II, the left-leaning French government nationalized Société Générale. In 1987, the government returned the Bank to the private sector and by the end of the 20th century Société Générale had reestablished itself as one of the world's largest and most important financial institutions. By 2007, the Bank operated in almost ninety countries, had total assets of 1.1 trillion Euros, and had more than 130,000 employees worldwide (General Inspection Department, 2008).

### 2.2. Background of the fraud<sup>1</sup>

In 2000, Jérôme Kerviel joined the back office (i.e. operations, compliance and internal audit) department of the *Global Equity and Securities Solutions* (GEDS) division of Société Générale after completing a master's degree in banking operations at a campus of the Université de Lyon (see Fig. 1 for an organizational chart of the bank). For four years, he was an internal auditor with the Bank where he reviewed trades in the GEDS division. In 2005, Kerviel transferred to the *Delta One Listed Products* (DLP) trading desk within the GEDS division where he became a junior trader (see Figs. 2 and 3). The DLP trading desk was only authorized to engage in low risk program trading. The primary purpose of the trading desk was to hedge the overall portfolio risk of the bank through managed trades. Kerviel's role was to take positions on major European stock indexes such as the Euro Stoxx 50, Germany's DAX Index and France's CAC-40 (Gauthier-Villars et al., 2008).

As of December 2007, GEDS had 1,365 employees divided into four main areas. The DLP trading desk, where Kerviel worked, was in the *Arbitrage trading* area, which means that the positions were intended to be fully hedged and therefore less risky (see Table 1 for list of the categories of products traded or sold by the GEDS division):

- *Structured product sales* (388 employees);
- *Financial engineering* (232 employees);
- *Cash equity sales and research* (360 employees)
- *Arbitrage trading* (385 employees); involving both proprietary trading (that is trading for the Bank's own account) and client related trading.

### 2.3. Elements of the fraud<sup>2</sup>

Beginning in 2005, Kerviel began making unauthorized trades and also exceeded the maximum transaction size that he had been assigned for individual trades. Because of his back office experience, Kerviel was familiar with the internal controls over the Bank's trading information systems and this familiarity allowed him to take unauthorized trading positions that were apparently not detected by the internal controls. The internal control system mainly relied upon supervision of the traders, which was lacking in the case of Kerviel, due to a failure to replace his supervisors. At one point, Kerviel created trading positions that exceeded the Bank's

<sup>1</sup> The section is derived from a Report prepared by the General Inspection Department (Internal Audit) of Société Générale issued in May 2008 (General Inspections Department, 2008).

<sup>2</sup> This section is based on contemporary accounts written just after the revelation of the Kerviel fraud and appearing in newspapers and blogs, including: Eyal (2008), Gatinois and Michel (2008), Gauthier-Villars et al. (2008), Hanes (2008), Jolly and Clark (2008), Kennedy (2008), Le Monde (2008), Peterson (2008), Routier (2008), Schwartz and Bennhold (2008a, b).

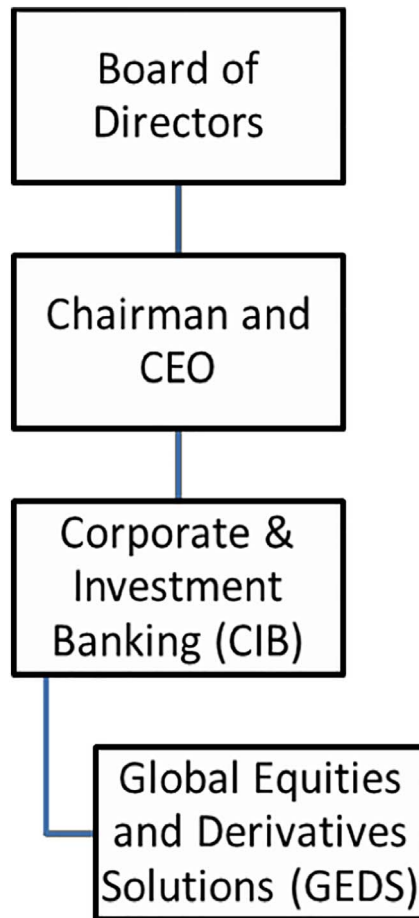


Fig. 1. Organization structure of Société Générale (source: [General Inspections Department, 2008](#)).

total shareholders' equity of 33 billion Euros. In late 2007, Kerviel made a one billion Euro trading gain on a series of unauthorized transactions. During the first few weeks of January 2008, he made several large trades based on his belief that European stock market indexes would move higher by late January. Those markets declined instead, resulting in an unrealized loss of one billion Euros. On Friday, 18 January 2008, the Bank's management decided that these positions had to be closed in order to avoid further losses. Between January 21 and 23 the open positions were closed. Unfortunately for Société Générale, European stock market prices fell sharply during that three-day period. The falling stock prices led to a loss of six billion Euros, or approximately 20% of the bank's equity capital. Within two days of the announcement, Kerviel was fired by Société Générale, arrested by the French police, interrogated and briefly imprisoned. In 2010 he was convicted of several fraudulent acts and sentenced to three years in prison and a large fine. These penalties were subsequently reduced in 2014 ([Durrand-Souffland, 2016](#)).

Prior to the Kerviel fraud, Société Générale's internal controls over trading information systems were considered to be among the most effective among major banks. Bank officials maintain that Kerviel overrode internal controls which would have normally produced red flags. These overrides allowed him to violate credit and size controls and the Bank's back office did not immediately notice the trades. Apparently, the unauthorized trades were not detected because Kerviel knew when checks would be conducted. He also used the computer log-in and password controls of colleagues both in the trading unit and the information technology section. Eventually, it was the decline of a counter-party to confirm large trading balances that led to the discovery of the fraud ([Gauthier-Villars et al., 2008](#)).

Shortly after the disclosure of the fraud, the Bank's Board of Directors authorized the Bank's General Inspections Department (Internal Audit) to investigate the fraud. The Board of Directors also retained PricewaterhouseCoopers to review the report of the General Inspections Department and to advise the Board on further steps to prevent future frauds. A summary of the Report of the General Inspections Department is included in [Appendix A](#) of this paper.

#### 2.4. Motivation and potential collusion

To conceal his fictitious trades, Kerviel typically cancelled them before they gave rise to confirmation, settlement or control. In order to do this, he exploited certain control weaknesses that allowed him sufficient time to cancel the trades and replace them by

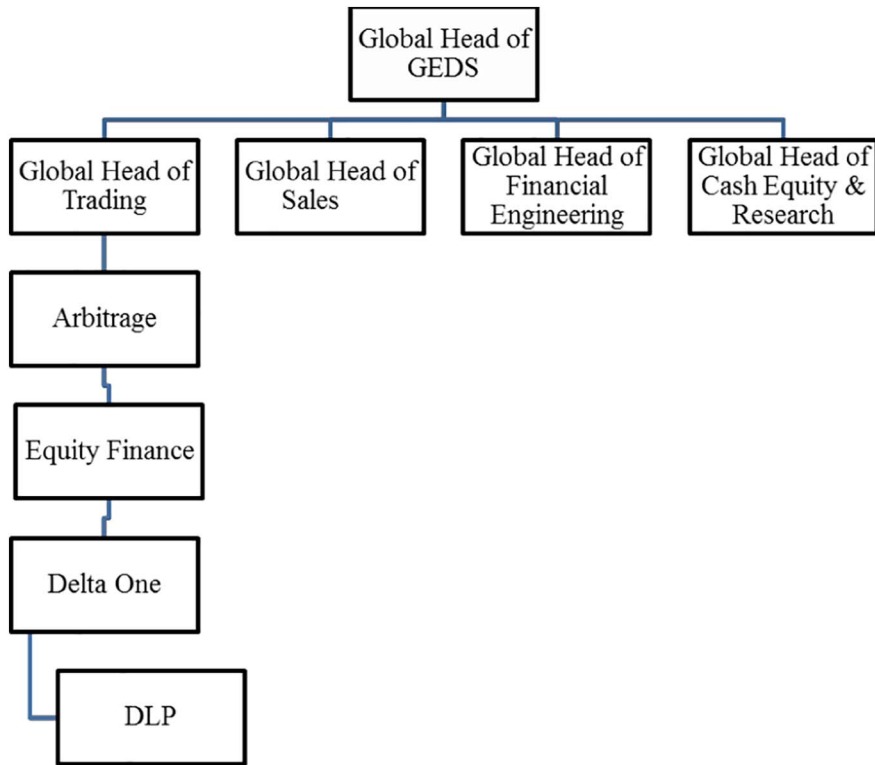


Fig. 2. Placement of DLP trading desk within GEDS (source: General Inspections Department, 2008).

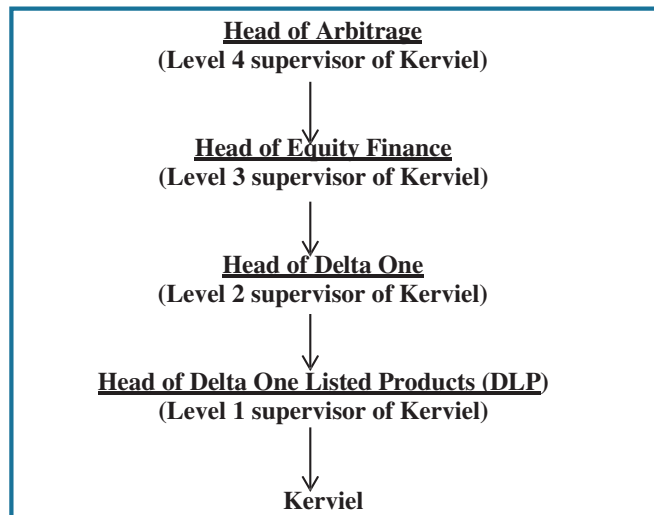


Fig. 3. Organizational structure within GEDS (source: General Inspections Department, 2008).

new false trades. In particular, he made use of trades with a deferred start date (i.e. with a value date later than the transaction date) which, in accordance with trading practices, would not be confirmed until a few days before the value date, thereby leaving time to cancel the trades. When faced with questioning from his hierarchical superiors or from Back Office compliance personnel, Kerviel gave false replies, using forged e-mails as support on several occasions (Department of General Inspection, 2008, p. 2).

The Report indicates that there is no evidence of embezzlement of funds. It nevertheless appears that Kerviel was able to take advantage of his fraudulent activities to significantly increase his recorded trading earnings and therefore to increase indirectly the amount of bonus that he could hope to receive. The General Inspection Department did discover indications of internal collusion involving a trading assistant (General Inspections Report, 2008). A large number of the fraudulent transactions were entered by a particular trading assistant who recorded several abnormally high intra-monthly trades without having obtained explanations as to their validity. This allowed Kerviel to conceal the earnings generated by his fraudulent positions. In total, almost 15% of the fictitious

**Table 1**  
Range of products traded or sold by GEDS.

Categories of products	Description of product
Structured products	Various investment products derived from different underlying assets (equities, indices, mutual funds) developed by teams of traders, financial engineers and salespersons. Clients are primarily retail and institutional investors.
Flow and listed products	Warrants, certificates of deposit, convertibles and index tracking instruments for private and professional clients.
Secondary equities, cash and research	Financial analysis and execution of equities transactions (brokerage).
Proprietary volatility trading	Flow trading (inter-bank counterparty and provision of liquidity in the Over the Counter and listed options markets). Quantitative trading (position taking on quantitative analysis criteria). "Special" trading (pricing of derivatives for corporate. Arbitrage trading (taking opposite positions in a company's debt and its listed equity).
Proprietary arbitrage trading	<i>Index arbitrage</i> (sale/purchase of a basket of equities in relation to an index (e.g. CAC-40, DAX), intended to replicate the sale/purchase of a futures contract on the same index). <i>Borrowing/lending equities. Arbitrage of relative values (risk arbitrage, fund arbitrage, hedge funds). The DLP trading desk was located in the Index Arbitrage sub-area of the Arbitrage Proprietary Trading area of GEDS.</i>

trades registered by Kerviel were registered by this trading assistant. The Report of the [General Inspections Department \(2008, p. 5\)](#) suggests that there may have been collusion between Kerviel and the trading assistant. Normally no trades should have been recorded by the trading assistant.

### 2.5. Breakdowns in internal controls

From September 2004 to January 2007, the management of the trading desk where Kerviel worked (DLP) did not identify either the initial fraudulent trades or their concealment and also overlooked his intraday positions unrelated to his assignment.

- Kerviel's immediate superior tolerated the fact that he regularly took intraday positions on index futures and on certain equities, which was unjustified given his assignment and his low level of seniority as trader. From November 2005 onwards, Kerviel received cautionary e-mails from his manager about these intraday trading activities.
- Supervision was not adequate to allow the detection of Kerviel's initial fraudulent trades (i.e. the taking of overnight positions concealed by fictitious opposite trades), which were infrequent in 2005 and 2006 (under Euro 100 million, essentially concerning equities). In July 2005, the manager identified a non-covered overnight position of around Euro 10 million on ALLIANZ shares, which led to a non-formal reprimand, but this manager failed to detect the fictitious trades used by Kerviel to conceal the position.
- In January 2007, the DLP trading desk lost its manager (Kerviel's direct supervisor), who had resigned. There was no immediate replacement, and during this period, the Delta One manager (Level 2 above Kerviel) did not implement any interim alternative for the monitoring of the DLP trading desk's activities.
- Throughout the two-and-a-half month period when there was no manager of the DLP desk, most of the trading activity and earnings of the DLP trading desk were validated by the desk's most senior trader without there being any effective control over the desk. Kerviel himself validated his own earnings in March. No use was made of either the position monitoring tool or the cash flow statements during this period. The reason for this lack of monitoring is not clear.
- Because of the lack of supervision, Kerviel was able to build-up his fraudulent positions and continue his intraday activity. By late March 2007, he had built up a position on futures on the DAX index of EUR 5.5 billion.

From April 2007, the day-to-day supervision by the new direct manager was weak, and other supervisors did not react in an appropriate manner to several alert signals.

- With respect to risks and the monitoring of day-to-day activities, the direct supervision of the trading desk was deficient. The new manager did not carry out any detailed analysis of the earnings generated by his traders or of their positions, thereby failing to fulfill one of the main tasks expected from a trading manager.
- The two principal tasks of a trading desk manager in relation to control measures consist of (i) checking that the desk's net position does not exceed the allocated risk limit (in this case, EUR 125 million), which the manager carried out satisfactorily; however, this did not enable him to detect the fraud because the positions were concealed by fictitious trades; (ii) consulting on a regular basis the tool explaining profits or losses made during a particular time period (BACARDI) and the database where all trades made during the day are registered (ELIOT) in order to monitor the activity of the traders, which was not done by the manager (this would have allowed him to detect the fraud).
- Under these conditions, the desk manager was not in a position to control the activity of his traders nor to detect the concealed positions taken in 2007 and 2008 or the increase in the volume of intraday activity. The manager indicated that he trusted his traders to provide answers to his questions or to those of the Back Office.

In addition, higher level supervisors did not respond appropriately in the face of several signals (i.e. red flags):

- *Level of earnings:* Despite the strong growth of Kerviel's declared earnings in 2007 (EUR 43 million, of which EUR 25 million was proprietary, i.e. 59% of the earnings of the desk and 27% of the earnings of DELTA ONE in 2007), no examination of his activity

was carried out or required by his supervisors.

- *EUREX questioning*: Correspondence from the EUREX Derivatives Exchange to Société Générale in November 2007 did not attract attention from the DLP manager.
- *Cash flow*: unusually high levels of cash flow (an excess of EUR 1.3 billion between December 28, 2007 and January 1, 2008) were not detected due to the lack of detailed analysis by the DLP manager.
- *Accounting*: On two occasions (in April 2007 and May 2007), the DELTA ONE manager and his superior were informed of anomalies uncovered during reviews where the explanations provided by Kerviel were not consistent, without any reaction from the managers.
- *Brokerage expense*: The DLP manager and, to a lesser extent, his two superiors failed to carry out an in-depth analysis of the high amounts of brokerage commissions at year end generated by Kerviel's fraudulent activity (EUR 6.2 million for Kerviel's desk, i.e. 28% of the DLP annual earnings).
- *Breach of limit*: The DLP manager failed to investigate the cause of the initial EUR 10 million breach of the desk's market risk limit (EUR 125 million) in 2005 which was caused by an overnight directional position taken by Kerviel on three equities.

### 3. Report prepared by PricewaterhouseCoopers

In a report prepared at the request of the Board of Directors of Société Générale issued in May 2008, PricewaterhouseCoopers (PwC) indicated that the breakdown in internal controls over the Bank's trading information systems was due to a mismatch between the resources allocated to internal controls and a lack of supervision which diminished the effectiveness of the controls. Despite a significant amount of investment in internal controls over the Bank's trading information systems, the information systems were unable to keep pace with the growing complexity of the trading environment or to process transactions correctly and efficiently. A heavy reliance on manual processing by back-office operating staff meant that some of the internal controls were not operating effectively. PwC further concluded that it was flaws in the control environment which led to ineffectiveness in the control activities. There were flaws in the design, implementation and supervision of controls which reduced their effectiveness. In terms of *design*, the shortcomings were apparent at several different levels:

- Several key controls that could have identified fraudulent activities were lacking. In particular, procedures did not appropriately reflect the requirement from the group headquarters directive to analyze risks, results and positions. This control would have enabled an overview of the operations of the Delta One Listed Products desk, but it was not carried out by the Desk Manager as intended. Additionally, there was no explicit reference to the monitoring of cash-flows as a component of the internal control system which could have represented an additional red flag regarding the true activity of this desk.
- Because controls were split between several different units within the same function or sometimes between several different functions, and because procedures were insufficiently explicit, this made it difficult to obtain an overview of the situation and to gain an appropriate insight into the exceptions identified. The lack of a systematic procedure for centralizing and escalating red flags to the appropriate level in the organization further exacerbated the problem.

In terms of *implementation*, there was a lack of awareness of the risk of fraud, with the focus being instead to ensure that transactions were properly executed from an operational standpoint. This led to confusion between: (i) the production of exception reports and resolution of discrepancies; and (ii) the performance of controls designed to validate the accuracy of the explanations given and corrections put in place.

In terms of *supervision*, the internal control system was slow to react in order to remediate the most sensitive issues, despite the fact that some weaknesses in internal control exploited by Kerviel had been identified by the General Inspection Department as an area in need of remediation.

In practice, the combination of these weaknesses in the operations processing chain (initiation, recording in the accounts, monitoring of limits and reconciliation) allowed Kerviel to conceal his speculative positions. The primary element in an effective internal control system is management supervision. It was this supervision that was found to be lacking with regard to the Delta One team, in terms of both trading activities and management of individuals. Kerviel's line managers and superiors did not perform the necessary analyses of schedules (detailing positions, valuations, earnings and cash flows) that would have revealed the true nature of his activities. Front office activities developed against the backdrop of a strong entrepreneurial culture based on trust. The surge in Delta One trading volumes and profits was accompanied by the emergence of unauthorized practices, with limits regularly exceeded and results smoothed or transferred between traders. The control environment did not encourage the development of a strong support function that was able to assume the full breadth of its responsibilities in terms of transaction security and operational risk management. An imbalance therefore emerged between the front office, focused on expanding its activities, and the control functions of the back office which were unable to develop the critical scrutiny necessary for their role.

### 4. Possible differences among countries with respect to views about internal control

One possible difference between concepts of internal control in France versus other countries, such as the United States or the United Kingdom, may be based on the idea of individual responsibility for fraudulent or illegal acts in the Anglo-American countries versus a greater sense of collective responsibility in France. Shortly after the revelation of the fraud at Société Générale, a survey of readers of the French newspaper *Le Monde* indicated that a majority of the respondents did not believe that it was possible that a

single trader could commit a fraud like that which took place at Société Générale (Gatinois and Michel, 2008). In contrast, in most Anglo-American countries, there would generally be little fault ascribed to the system as a whole. Typically, at least prior to the 2008 financial crisis, it would be assumed that the fraud was perpetuated by a particular individual or several individuals acting in concert. However, after the enactment of the Sarbanes Oxley Act in the United States, which occurred after several prominent frauds, there has been a greater recognition of the need for an effective system of internal control over both financial reporting and operating activities of companies.

The Chairman and Chief Executive Officer of Société Générale in January 2008 was Daniel Bouton, a graduate of the École Nationale d'Administration (ENA), one of the most prestigious *Grande Écoles* in France. Bouton began his career with the French Ministry of Finance in 1973, and he then worked at the Finance Ministry in various positions until 1991 when he was appointed to be Chief Executive Officer of Société Générale. He became Chairman of the Board of Directors of the bank in November 1997 (OECD, 2004). Société Générale had a tradition of selecting its officers from France's most elite schools and universities. For example, Jean-Pierre Mustier, head of trading and investment banking, was a former student at the École Polytechnique and the École du Mines, which are two of the most elite schools of higher education in France. In addition, many bankers and traders had doctorates in disciplines such as mathematics and statistics. They were known as 'quants' because of their mathematical trading skills (Gauthier-Villars and Meichtry, 2008).

The background and training of the officers of Société Générale corresponds generally with the French sociologist, Pierre Bourdieu's ideas about class distinctions (Bourdieu, 1977). According to Bourdieu, class distinctions are determined through a combination of social, economic, and cultural capital. Society incorporates "symbolic goods, especially those regarded as the attributes of excellence, as weapons in the strategies of distinction" (Bourdieu, 1977, p. 66). Attributes that are considered to be excellent or important are shaped by the interests of the dominant class. Bourdieu emphasized the significance of cultural capital by arguing that "differences in cultural capital mark the differences between the classes" (Bourdieu, 1977, p. 69). According to this view, it is difficult for higher level bank officers at Société Générale to understand how a mid-level trader without an educational background from a Grande École was able to perpetuate a massive fraud, apparently without the knowledge of his superiors.

Jérôme Kerviel was born in 1977, and grew up in a working class family in the Brittany region of France. His mother was a retired hairdresser and his late father, Louis, was a metal worker, taking after Kerviel's grandfather, who was a blacksmith. Kerviel obtained a bachelor degree in finance at the University of Nantes in 1999. He then completed a university diploma in financial back office operations from a second tier business school affiliated with the Université de Lyon.

#### 4.1. Views of proper behavior in the French business world

The French business world is based on a type of meritocracy achieved through education pursued in a Grand École or elite business schools. At least half of France's 40 largest companies are headed by graduates of the École Polytechnique, which focuses on mathematics and engineering, or ENA, the national school of administration. Interestingly, these two schools together produce only about 600 graduates a year, as compared with a graduating class of 1,700 at Harvard Business School. Being admitted into Harvard, which accepts 9 percent of its applicants, is relatively easy compared with getting into the École Polytechnique. Out of 130,000 students who focus on math and science in French high schools each year, roughly 15 percent do well enough on their exams to qualify for the two- to three-year preparation course required by the elite universities. Of those who enter the preparatory course, 5,000 apply to École Polytechnique, and 400 are admitted. Admission is based strictly on exam grades; there are no written essays, letters of recommendation or interviews (Schwartz and Bennhold, 2008a, b).

The French business establishment has been described as a close-knit "brotherhood" (it is nearly all male) which shares school ties, board memberships and rituals like hunting and wine-tasting (Schwartz and Bennhold, 2008a, b). Société Générale's chief executive, Daniel Bouton, was not only a former student at the ENA; he was a member of the *Club de Cent*, which is one of the most exclusive business clubs in France. The members of this club include leaders in business, politics and law and its admission procedures are notable in that it is only when an existing member dies that a space is made available for a new member. Officially, the club, founded nearly 100 years ago, is devoted to gastronomy. When the members gather for lunch at Paris restaurants, politics and business are not allowed. The fact that Mr. Bouton and other top managers of Société Générale retained their positions for more than a year after the fraud in January 2008, prompted some criticisms that the French business elite has its own rules which act to protect the members of the accepted group (Schwartz and Bennhold, 2008a,b; Bourdieu and Passeron, 1990). Daniel Bouton would have most likely been quickly relieved of his position or even pursued legally, if it was the case of a British or American bank (Schwartz and Bennhold, 2008a, b).

#### 4.2. Discussion of differences in views on internal control

In 2001, after the Enron and WorldCom scandals in the United States, the US Congress passed the Sarbanes-Oxley Act of 2002. This law required companies with publicly traded shares to strengthen their internal control systems over financial reporting. Many countries subsequently enacted legislation similar to the Sarbanes-Oxley Act. In the case of France, the leaders of the French business community commissioned a study to determine what measures were necessary to strengthen financial reporting, internal controls, and corporate governance among France's large companies. Many of France's most prominent business leaders were asked to serve on the committee that would carry out this study. Daniel Bouton was chosen to chair the committee, and the committee's report came to be referred to as the *Bouton Report*. According to the Bouton Report, many of the reforms included in the Sarbanes-Oxley Act were unnecessary in France because it was argued that French companies are generally better protected against the risks of fraudulent



practices due to their well-established internal control procedures and practices.

This argument might be supported by the fact that fewer scandals arising from ‘rogue’ traders have taken place in France, apart from the Kerviel case. On a worldwide basis, most cases of rogue trading have occurred in Anglo-American banks. As a result, it seems that the supposition that there may be differences among countries which might lead to breakdowns in internal controls over bank trading information systems, seems not be credible. However, the idea of class differences may be of some relevance. Because Kerviel came from a background which did not comply with the stereotype of the well-educated trader, he may have tried to impress his superiors by taking large unauthorized risks in order to make profits for the bank (Gauthier-Villars et al., 2008; Peterson, 2008). Whether there may have been other traders who also engaged in the same risky trading practices is unknown, but what can be said is that in a general sense the French banking system has experienced fewer episodes of rogue trading. On the other hand, it may be that in a close-knit environment other rogue traders were identified and stopped and nothing was presented in the press.

#### 4.3. Discussion of the possibility of willful blindness

Kerviel has consistently claimed throughout all the legal proceedings that have been brought against him, that his superiors' consciously overlooked his fraudulent activities because he was making profits. Evidence of the possibility of willful blindness can be found in the investigative report issued by PricewaterhouseCoopers in 2008, which revealed that Kerviel's activities raised red flags which were not addressed. In particular there were warnings from the Frankfurt-based derivatives exchange Eurex, which led to 75 internal alerts at Société Générale. Kerviel's immediate supervisor admitted that he had been contacted by the bank's compliance department in November 2007 following an inquiry from Eurex. Eurex sought explanations about Kerviel's trades. One trade in particular, a purchase on 19 October 2007, reportedly involved 6,000 DAX index futures contracts valued at over 1 billion Euros. However, nothing was done about this finding and ultimately, France's banking regulator fined the Bank 4 million Euros in July 2008 as a result of this trade for having deficient internal controls over trading information systems. The PwC report also indicated that Kerviel's supervisors overlooked unusually high levels of cash flow and other accounting anomalies such as high brokerage expenses, as well as a large jump in Kerviel's trading gains in 2007, in which he reported gains of 25 million Euros stemming from proprietary trading (Gauthier-Villars & Meichtry, 2008).

Proprietary trading for the Bank's own account appears to be at the root of the breakdown in internal controls. The Bank's percentage of revenue from market-making and proprietary trading rose to 35 percent in mid-2007 from 29 percent in 2004. Effectively the Bank was not reticent when taking proprietary trading risks. However, it seems that proprietary trading grew faster than the internal control systems were able to handle. In addition, it is possible that if Kerviel's unauthorized trading had been uncovered in November 2007, when he was making a significant profit, he would have been fired and there may have been no revelation of these activities. In essence, the fraud resulted from rapid growth in derivatives trading combined with an ineffective system of internal controls emanating principally from the control environment (Schwartz and Bennhold, 2008a).

#### 4.4. Discussion of the role of ambiguity and ambivalence in rogue trading

There are several factors which may have led to an environment where rogue trading emerged at Société Générale. Among these factors are: *ambivalence* (in other words, differences in the level of sanction applied for violations thus displaying ambivalence about the violation) and *ambiguity* (lack of the precision in definition of what constitutes a violation). Many white collar crimes receive an *ambivalent* amount of censure or punishment. In the case of the another rogue trader, Nick Leeson at Baring's Bank in the 1990s, there was *ambivalence* by the management of Barings towards Leeson's trading activities because of the profits that he generated for the bank (Nelken, 1994). This *ambivalence* towards the trader persisted because of the *ambiguity* that permeates financial trading. A certain level of *ambiguity* surrounds the definition, causes, regulation and handling of white collar crime in general, and these factors can be mutually reinforcing. Misconduct can therefore become endemic to trading activities, and *ambiguity* helps to provide a cloaking device that protects the trading practices from public scrutiny. Scandals in bank trading are usually portrayed as being exceptional rather than structural features of the industry. The *bad apple* metaphor is frequently applied, but ultimately such metaphors serve as a sort of camouflage regarding white collar crime which leads to high levels of *ambiguity*. *Ambiguity* is an inherent feature of banking regulation because the application of many regulatory rules is judgmental. For example, the calculation of bank regulatory capital, or the definition of a fully hedged position pursuant to accounting standards. This makes *ambiguity* inevitable because it is difficult to standardize regulations. This uncertainty is underlined in bank trading where innovation and performance are highly prized, and deviant behavior may not be viewed as criminal, but merely as a type of disequilibrium in the market which requires efficiency adjustments. These systemic tendencies put pressure on banking regulators to establish tolerable levels of deviance. However, the problem is that they then must develop a definition of what actually constitutes misconduct (i.e. what is a deviation from an internal control).

*Ambiguity* also surrounds the notion of intentionality, and while some white collar crimes are intentional it can be difficult to clearly distinguish between behaviors that are intentionally deceptive from those involving incompetence. Consequently, it is within an environment of *ambivalence* and *ambiguity* in which rogue trading can emerge. These problems are compounded by the increasing disintermediation of financial markets and the practical difficulties of identifying specific misconduct among the large number of transactions conducted daily, allied with the international nature of bank trading activities with its attendant problems of jurisdiction. These factors inevitably limit the effectiveness of internal controls. Moreover, the compliance and regulatory bodies do not ordinarily have as secure a mandate as other enforcement agencies such as the police or other institutional entities which might mitigate the potentially harmful effects of rogue trading. The culture of bank trading is a crucial factor regarding these issues, because



tolerance of business misconduct is a question of moral legitimacy and many financial professionals rationalize these activities as being relatively rare. Hence the question whether there may have been willful blindness in the case of the Kerviel fraud seems to be likely.

## 5. Some lessons learned and opportunities for further research

### 5.1. Lessons learned from this case

The findings of the Societe Générale case can be generalized and applied to financial institutions in general that have trading operations. The findings indicate that there were adequate controls in place to prevent and detect the fraud, but that it was a breakdown in such controls which allowed the fraud to take place. Some specific lessons that can be learned from this case are that there has been:

- An increasing level of complexity in traded financial instruments which can lead to increased risks for financial institutions.
- Rapid growth in trading operations which may lead to insufficient management supervision and a breakdown of internal controls.
- A potential for collusion in trading operations.
- Agency problems (unwarranted trust placed in traders).

As a result of these findings the following steps are recommended:

- Assign unambiguous lines of supervisory authority.
- Continually reassess and test the operation of internal controls.
- Correct internal control weaknesses promptly.
- Listen to regulators.

### 5.2. Lessons learned regarding Big Data and financial services

What are the potential implications of this case, which took place over eight years ago, given the emergence of new technologies which use “big data” from multiple sources to triangulate and identify potential fraud? While there were numerous regulatory agencies involved in the regulation of the trading activities at Société Générale in 2008, there have been significant developments in surveillance of trading activities in recent years as a result of advances in Big Data techniques. For example, [Turner et al. \(2013\)](#) point out that NYSE Euronext, which not only runs the New York and several European stock exchanges, but also responsible for the regulation of trading activity, has employed Big Data analytics to detect new patterns of illegal trading. NYSE Euronext implemented a new markets surveillance platform that both sped up and simplified the processes by which its experts analyzed patterns within billions of trades. They process approximately 10 petabytes a day. Therefore there must be appropriate technologies implemented to analyze huge volumes of data in near real time. New infrastructure has reduced the time required to run markets surveillance algorithms by more than 99% and decreased the number of IT resources required to support the solution by more than 35%, all while improving the ability of compliance personnel to detect suspicious patterns of trading activity and to take early investigative action. Had such systems been in place in 2008, the Kerviel fraud may have been more difficult to conceal. This area is open for future research into the use of data analytics, not only in the banking sector, but in all areas where financial trading occurs.

### 5.3. Lessons learned from rogue trading research

As [Kates \(2014\)](#), [Gilligan \(2011\)](#) and [Krawiec \(2000\)](#) point out, rogue trading has reoccurred on a regular basis throughout the world. [Kates \(2014\)](#) cites 17 instances of rogue trading between 1990 and 2002, but none in France. These authors also point out that there are some basic principles which can be effectively employed to reduce or eliminate rogue trading. [Table 2](#) compares the breakdowns in internal control identified by the General Inspections Department and Recommended Internal Controls which may have corrected these weaknesses. The controls listed are primarily supervision and person based. Unfortunately, person-based controls are inherently weaker than programmed controls. This type of control, as seen in the case, were not followed and allowed the “rogue trader” event to occur. To overcome this limitation, programmed AIS controls could be used along with the person-based controls. Embedded audit modules, intelligent agents, audit techniques based upon big data, real-time notification, and others are all options. Research is needed within this area, to determine what techniques are most appropriate for the financial institutions. The impact of technology in the financial services industry has been significant in recent years (see, for example, the 2016 report on leading global financial technology innovators ([H2 Ventures, 2016](#))). The impact of these technological changes and the appropriate AIS controls, and the validation of proposed controls is an area of future research.

### 5.4. Lessons learned with respect to cultural effects

While an initial research question was posed in [Section 5](#) of this paper as to whether certain aspects of French business culture may have contributed to the fraud at Societe Générale, the overall conclusion seems to be negative with respect to this question. However, a somewhat related question might be posed as to whether, given that the cultural of trading has been predominantly

**Table 2**  
Breakdowns in internal controls and recommended control improvements.

Weaknesses	Recommended controls
<ul style="list-style-type: none"> <li>- The entry and then cancellation of fictitious transactions.</li> <li>- The entry of pairs of fictitious reverse transactions (purchase/sale) involving equal quantities of the same underlying asset at different prices, with the aim of hiding realized earnings.</li> <li>- The booking of intra-monthly provisions that temporarily cancelled the earnings.</li> <li>- The weakness of the supervision by the direct manager, without which the fraud would probably have been detected more rapidly.</li> <li>- The lack of assistance and supervision by the trading desk manager of a new, inexperienced trading manager.</li> <li>- The tolerance of the taking of intraday directional positions within the trading desk, which created a context in which Kerviel operated more freely.</li> <li>- A lack of attention and reaction when faced with numerous alerts, which denotes a lack of sensitivity to the risk of fraud.</li> <li>- An operational context rendered difficult by strong, rapid growth in the division, with numerous signals revealing deterioration in the operational situation.</li> </ul>	<ul style="list-style-type: none"> <li>- Regularly reassess internal controls effectiveness.</li> <li>- Enforced credit and trading limits.</li> <li>- Trades must be matched to confirmations.</li> <li>- Counterparty sign-offs and recognition of trades.</li> <li>- Review of cash trades vs. paper gains.</li> <li>- Cash flow reviews.</li> <li>- Procedures to prevent collusion.</li> <li>- Adequate experienced supervision of trading activities.</li> <li>- Reassign or change responsibilities frequently.</li> <li>- Move quickly to make changes and improvements.</li> <li>- Reassess remuneration policies to reduce risk.</li> <li>- Listen to regulators.</li> <li>- Thorough investigation of all items identified by outside entities.</li> </ul>

formed by individuals who have been educated in prestigious institutions of higher education, if there is a deviation from this pattern of recruitment, can this potentially lead to risky trading practices. This appears to have been the case in the Kerviel fraud and certain other similar cases, such as the Nick Leeson case with Barings Bank.

### 5.5. How technologies could have prevented the fraud

In the years since the fraud perpetrated by Kerviel at Société Générale, there have been a number of advances in AIS technologies, the implementation of which may have prevented this type of fraud, e.g. programmed limits, embedded audit modules, real-time notification, etc. These types of AIS technologies may have worked in other rogue trading situations as well. In addition advances in data analytics may have been helpful as well.

However, the question remains whether, even with lax internal supervision, these techniques could have prevented or reduced the fraud potential. This is a question that is difficult to answer. Most experts in internal control, whether the controls are computer based or organizational, emphasize the “tone at the top”. There is reasonable evidence to conclude that the management of Société Générale were somewhat if not completely aware of the activities of Jerome Kerviel, and that they allowed these activities to continue until they resulted in losses for the bank. In such a circumstance, the most elaborate and sophisticated AIS technologies may be insufficient to prevent fraud.

## 6. Conclusion and future research

The purpose of this paper has been to examine breakdowns in controls over bank trading information systems through a case study of the fraud perpetrated by Kerviel, a mid-level derivatives trader at the large French bank, Société Générale, at the beginning of 2008. The paper has addressed the question whether the apparent breakdown in internal controls in the Bank's trading information systems was caused to the fraudulent actions of Kerviel acting alone or whether there may have been a certain level of acceptance of his activities on the part of the bank hierarchy as long as he was making a profit. This was initially discussed through a consideration of the possibility of differences in views of internal control among countries derived to a certain extent from specific characteristics of the French business world. Ultimately, this explanation appears to be less likely in that scandals from rogue trading in France have occurred less frequently as compared with Anglo-American countries; although it should be noted that instances of rogue trading may have been hidden in the French environment, thus leading to less visibility.

The second explanation focuses on the idea that there may be a sort of *willful blindness* in which bank management turned a blind eye to risky trading practices even when there were adequate controls in place to provide early warning signals about the risky practices. The evidence supports this second explanation because the management of Société Générale may have turned a blind eye to the misconduct of Kerviel even though there were adequate controls in place, or alternatively there may have been simply lax management due to turnover and the expectation that the oversight mechanisms were someone else's responsibility.

Interestingly, the legal procedures in France concerning the Kerviel fraud have not yet ended. In June 2016, a French court dealing with labor law awarded Kerviel 400,000 euros on the basis that the Bank had fired Kerviel in an unfair manner because it was aware of his trading activities (Huffington Post, 2016). However, in a separate legal judgment the French prosecutor rejected Kerviel's argument that the bank was aware of his activities (Reuters, 2016). Therefore at the time of this writing the answer is unclear from a legal perspective. What can be said, is that while both the General Inspection Department (Internal Audit) Report and the PwC Report clearly described the fraudulent activities perpetrated by Kerviel, both reports also severely criticized the breakdown in internal controls which allowed Kerviel to perpetuate his fraudulent activities. Neither report, however, was willing to indicate who might be responsible for the breakdown in internal controls, thus leaving it open to speculation.

More research is needed into how the use of embedded intelligent agents, business intelligence techniques, audit support systems

using knowledge-based components and data analytics can prevent fraudulent trading activities in the financial sector, as exemplified by this case. This research could be carried out initially by gaining a better understanding of the information systems and audit systems of a number of large financial institutions worldwide. Once that has been investigated, a case study approach into financial institutions would be helpful in revealing the specific systems that are used to combat fraudulent behavior. While this case has highlighted some of the failures in the case of Société Générale, much more research is required into how advanced information systems, audit systems and data analytic techniques can assist firms and regulators in ensuring compliance in the complicated area of derivative trading.

## Appendix A. Report of the General Inspection Department

On January 24, 2008, the General Inspection Department of Société Générale was instructed by the Executive Committee of the Bank to investigate the alleged fraud committed by Kerviel. The purpose of the assignment was (i) to describe the mechanism used to perpetrate the fraud, (ii) to search for Kerviel's motives and any potential accomplices, (iii) to identify the malfunctioning of control procedures and responsibility for the late detection of the fraud ([General Inspection Department, 2008](#), p. 1).

### A.1. The mechanisms used to perpetuate the fraud

The report indicates that the fraud began in 2005 and included the following events:

- *2005 and 2006*: Kerviel engaged in some fraudulent transactions (up to EUR 15 million on positions between June 2005 and February 2006, and then up to EUR 135 million from February 2006 onwards, primarily in equities).
- *2007*: From late January onwards Kerviel took short position on index futures reaching EUR 28 billion on June 30, 2007, which was unwound in August, then building up a new short position in September reaching EUR 30 billion on October 31, 2007, and unwound in November. At the same time, he took positions on equities which reached up to EUR 370 million, depending on the month. Total profits of EUR 1.5 billion realized.
- *2008*: Between January 2 and January 18 he took a EUR 49 billion long position on index futures, which was discovered on January 20 then unwound by Bank management between January 21 and January 23, leading to losses of EUR 6.4 billion (which, taking into account the EUR 1.5 billion profit at December 31, 2007, gave a global loss of EUR 4.9 billion).

The report indicates that the fraud was concealed through three primary techniques:

- The entry and then cancellation of fictitious transactions. Kerviel recorded false transactions in the Middle Office accounting systems so that they would be taken into account in the calculation of risks and valuations. He set the parameters of these transactions in such a manner so as to use them to cover the fraudulent positions actually taken elsewhere. There were 947 transactions of this type identified.
- The entry of pairs of fictitious reverse transactions (purchase/sale) involving equal quantities of the same underlying asset at different prices, with the aim of hiding realized earnings. There were 115 transactions of this type identified.
- The booking of intra-monthly provisions that temporarily cancelled the earnings. Kerviel made use of a computer function, normally limited to use by trading assistants (i.e. the Middle Office) for the purpose of correcting trades, which modified the valuations calculated by the Front Office (i.e. trader's system). Kerviel posted correcting entries in order to conceal the amount of earnings generated by his fraudulent positions during a given month (provisions were checked at month end only). Nine transactions of this type were identified.

The report indicates that five reasons can be put forward to explain why the Front Office hierarchy did not detect the fraud:

- the weakness of the supervision by Kerviel's direct manager, without which the fraud would probably have been detected more rapidly;
- the lack of assistance and supervision by the DELTA ONE manager of a new, inexperienced trading manager;
- the tolerance of the taking of intraday directional positions within the DLP desk, which created a context in which Kerviel operated more freely;
- a lack of attention and reaction when faced with numerous alerts, which denotes a lack of sensitivity to the risk of fraud at the Front Office level; the trading hierarchy lost sight of the scale of the orders and lacked knowledge of the details of the activities carried out by the traders.
- an operational context rendered difficult by strong, rapid growth in the division, with numerous signals revealing a deterioration in the operational situation, in particular in the Middle Office (doubling of volumes in twelve months, Front Office employee numbers growing from 4 to 23 in two years, multiplication of the number of products, Middle Office chronically under-staffed in 2007 following numerous departures). Several exchanges between the managers of DELTA ONE sub-divisions and their hierarchical superiors concerned the division's operational difficulties.

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