Bi-weekly Random Bits from the Internet

2014-04-04

(STEVE JOBS WAS A NATIONAL TREASURE)

Kinky Treasurys

P2, Roubini Monitor April 1, 2015

Lessons from the East — China's Rapidly Evolving Health Care System

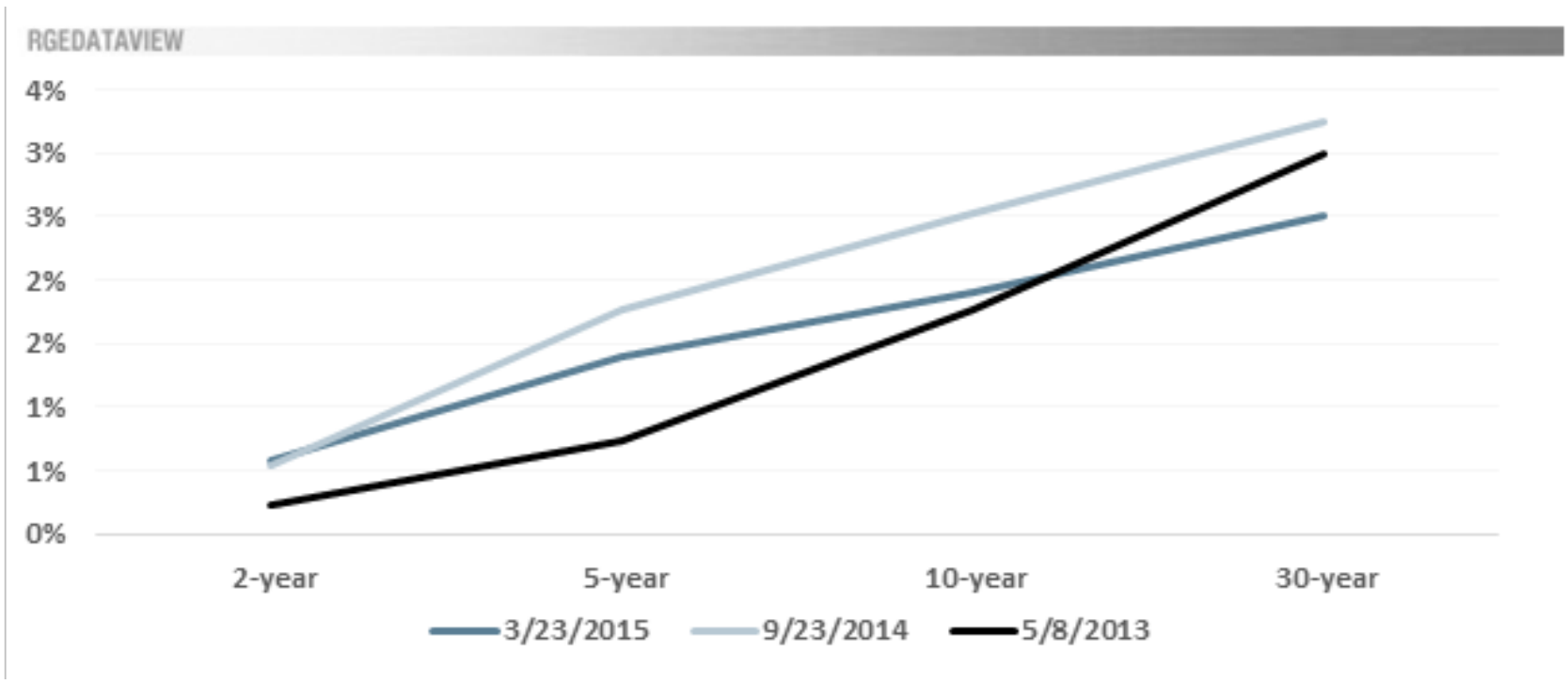
P4, David Blumenthal and William Hsiao, The New England Journal of Medicine Vol 372 No 14

Steve Jobs Gets His Show and Tell

P10, Michael Hiltzik, Dealers of Lighting Chapter 23

Kinky Treasurys

Roubini Monitor April 1, 2015



Kink at 5-Year Mark Reflects 'Stop-Go' Risk

The low level of the 10-year Treasury yield over the past year has puzzled Fed officials. Several theories have been put forward for why long-dated yields remain low despite the relatively strong growth of the past several quarters, which would normally signal the need for a higher policy rate.

Since each possible reason—flight to quality, deflation or Larry Summer's "secular stagnation"—requires a different policy response, it reinforces the view championed by Chicago Fed President Charles Evans that the "option value of waiting" is extremely high.

There is a kink in the Treasury yield curve—starting at the 5-year maturity—that sheds some light on the issue. Kinks are not new, but the unusual thing about this one is that the curve is quite flat beyond five years.

That is largely a reflection of the tame inflation outlook and the resulting tame expectations for the Fed funds rate. As long as the inflation outlook remains benign, we should expect changes in the economic outlook to be reflected most strongly in shorter Treasury maturities.

The Treasury 5-year note has been quite sensitive to rate-hike expectations, starting with the so-called "taper tantrum" in 2013. Shorter maturities have also become more sensitive of late, reflecting the expected timing of Fed tightening. This response has led to a kink in the coupon curve around the 5- and 7-year maturities and

a pronounced flattening in the 5- to 10-year portion of the Treasury curve.

The response of the 5-year note is largely a reflection of term structure; i.e., expectations of policy-rate "normalization." The stronger performance at the long end is a product of a low-inflation environment. As long as there are strong expectations of continued low inflation, future rate cycles will also likely produce a kink in the curve around the five- to seven-year maturities whenever the markets believe the Fed is shifting out of a period of increasing accommodation.

Longer maturities are still somewhat sensitive to changing assumptions about the course of Fed policy, but a low inflation environment builds in a sort of buffer. Low inflation is strongly associated with stable inflation. The range of values associated with inflation risk for 10-year Treasurys and bonds is not much wider than for the 5-year, when inflation and inflation expectations are both low.

The inflation premium for the 10-year and bonds need not be much higher than for the 5-year. An expectation of low inflation also implies a narrower range of values for likely future Fed policy rates. Interest rate risk for the 10-year and bonds is not much greater than for the 5-year, relative to past cycles. There is also a good chance that the current 10-year and bonds will go through another cycle of Fed easing before maturity.

The kink in the yield curve at the 5-year maturity is not a one-cycle thing. There was a similar kink in 2003-04, but with the curve far steeper beyond 5-year notes. As long as inflation expectations remain very tame, longer-dated Treasurys will always have the benefit of an inflation premium and a rate risk premium not much higher than for the 5-year. The kink will disappear as Fed policy is normalized, but reappear in the next cycle.

Moreover, if the relative flatness of the curve from the 5-year to bonds is indeed the result of lowered inflation expectations, then Fed officials' claim that inflation expectations are stable is open to question.

Lessons from the East — China's Rapidly Evolving Health Care System

David Blumenthal and William Hsiao, The New England Journal of Medicine Vol 372 No 14

At first glance, China might seem unlikely to offer useful health care lessons to many other countries. Its health system exists within a unique geopolitical context: a country of more than 1.3 billion people, occupying a huge, diverse landmass, living under authoritarian single-party rule, and making an extraordinarily rapid transition from a Third-World to a First-World economy.

But first impressions can be misleading. Since its birth in 1949, the People's Republic of China has undertaken a series of remarkable health system experiments that are instructive at many levels. One of the most interesting lessons from the Chinese experience concerns the value of an institution that many countries take for granted: medical professionalism.

Because the changes in China's health care system have been so rapid and profound, it is helpful to briefly review its recent history.1 What might be seen as the first of four phases began when the Chinese Communist Party took power in 1949. The new government created a health system similar to those of other communist states such as the Soviet Union and its Eastern European allies. The government owned and operated all health care facilities and employed the health care workforce. No health insurance was necessary, because services were nearly free. A distinctive accomplishment of this phase was the system's successful use of community health workers, so-called barefoot doctors, to provide basic public and personal health services at the village level. Between 1952 and 1982, China's infant mortality rate fell from 200 to 34 per 1000 live births, and age-old scourges such as schistosomiasis were largely eliminated.

In 1984, a second phase began: China turned its health system on its head, almost as an afterthought to dramatic free-market reforms in the rest of its economy. Led by Communist Party leader Deng Xiaoping, China converted to a market economy and reduced the role of government in all economic and social sectors, including health care. Government funding of hospitals dropped dramatically, and many health care professionals, including barefoot doctors, lost their public subsidy. The government continued to own hospitals but exerted little control over the behavior of health care organizations, which acted like for-profit entities in a mostly unregulated market. Many health care workers became private entrepreneurs. Physicians working for

hospitals received hefty bonuses for increasing hospital profits.

As they responded to these new economic imperatives, Chinese physicians had little history or tradition of professionalism or independent professional societies to draw on. China had transitioned from a society organized according to Confucian principles (which did not envision the existence of a modern, independent profession such as medicine) to a communist country (in which clinicians were state employees owing their primary allegiance to the Communist Party) to a quasi-market environment. At no point along this journey did physicians have the opportunity or support to develop the norms and standards of medical professionalism or the independent civic organizations that could promote and enforce them. Indeed, the Chinese language has no word for "professionalism" in the Western sense.

To make China's experiment with free-market health care even more dramatic, the Chinese reforms left the vast majority of the population uninsured, since the government did not provide coverage and no private insurance industry existed. As of 1999, a total of 49% of urban Chinese had health insurance, mostly through government and state enterprises, but only 7% of the 900 million rural Chinese had any coverage.2 Thus, a population largely unprotected against the cost of illness confronted a health care delivery system intent on economic survival and a health-professional workforce that had never had the opportunity to develop as independent professionals. Indeed, prevailing new economic rules and incentives strongly encouraged physicians to operate like entrepreneurs in a capitalist economy.

The government kept its hand in one major aspect of health care: pricing. Presumably to ensure access to basic care, it limited the prices charged for certain services, such as physicians' and nurses' time. However, it allowed much more generous prices for drugs and technical services, such as advanced imaging. The predictable result: hospitals and health care professionals greatly increased their use of drugs and high-end technical services, driving up costs of care, compromising quality, and reducing access for an uninsured citizenry.

By the late 1990s, this market-reform experiment had resulted in public anger and distrust toward health care institutions and professionals, and even in widespread physical attacks on physicians. Discontent with lack of access to health care fueled public protests, especially in less affluent rural areas, that threatened social stability and the political control of the Communist Party.

In 2003, a third phase began, when the Chinese government took a first step toward mitigating popular discontent with health care by introducing a modest health insurance scheme covering some hospital expenses for rural residents. The focus on

hospital care reflected the fact that hospital services were expensive and therefore drove many patients into poverty.

But this hospital orientation also reflected limitations in the leadership's understanding of the critical role that competent primary care plays in managing health and disease and controlling the costs of care. Chinese authorities were also preoccupied with relieving the financial burden created by much more expensive hospital services. Not surprisingly, the 2003 reforms proved insufficient to ameliorate China's deep-seated health care problems.

By 2008, China's leaders had concluded that major reforms in both insurance and the delivery system were necessary to shore up the system and ensure social stability. In a fourth and ongoing phase of evolution, they officially abandoned the experiment with a health care system based predominantly on market principles and committed to providing affordable basic health care for all Chinese people by 2020. By 2012, a government-subsidized insurance system provided 95% of the population with modest but comprehensive health coverage. China also launched an effort to create a primary care system, including an extensive nationwide network of clinics.

Though China's extensive 2008 reforms are still in process, a number of problems, mostly concerning tertiary hospital care, continue to challenge its leadership. First, many of the country's publicly owned but profit-driven tertiary hospitals successfully resisted the latest reform efforts — a reality that probably reflects the hospitals' power within China's political system. As a result, frustrated authorities sought to use market forces once again to bring the hospital sector into line. In 2012, the leadership announced that they would invite private investors to own up to 20% of China's hospitals by 2015, double the preexisting rate.

Second, major inequities continue between the health care available in poor rural areas and that in more affluent cities.5 Third, China continues to struggle with creating a high-quality, trusted, professionalized physician workforce. One legacy of China's market experiment is a widespread perception that physicians put their economic welfare ahead of patients' interests.

Though China's health care system is still rapidly evolving, several potentially useful lessons emerge from its recent history. The first is that in low-income countries, and perhaps high-income ones as well, community health workers such as China's barefoot doctors can significantly improve the health status of local populations.

Second, relying largely on markets to fund and distribute health services creates risks that need careful consideration. Though government price setting created

market distortions, these do not fully explain the problems with quality, access, and cost that China experienced in the second phase of its recent history. Health care is subject to serious market failures. Asymmetries in information between patients and health care providers make it difficult for patients to make sound choices in free health care markets, and patients' lesser knowledge may be exploited by clinicians. Patients' resulting vulnerability, resentment, and distrust can be socially destabilizing — and may intensify when patients are heavily exposed to the costs of care, as they were until recently in China.

Third, physician professionalism may be underappreciated as a foundation for effective modern health care systems. The inculcation of professional norms during and after training and the existence of professional institutions that reinforce these norms certainly do not guarantee that professionals will act only in the interest of their patients and the public. But there seems little question that the lack of a widely shared tradition of professionalism has complicated China's efforts to create a health care workforce that its leaders and the public trust to do the right thing.

Finally, China's health care experience shows that it may be easier to reform health insurance than delivery systems and that in creating effective delivery systems, primary care seems to play a vital role.

A review of China's health care journey reveals that its leadership has made significant errors but has also acted with flexibility and decisiveness in correcting its mistakes. China's willingness to undertake major health care experiments will make its system an interesting one to continue to observe in the future.

Pregnancy and Childbirth

A healthy 23-year-old woman is pregnant for the first time.

Ms. Wang lives in rural China. Her perinatal care, which is relatively uniform throughout China, relies on the country's three-tiered system for essential health services: village or neighborhood clinics provide preventive and basic primary care services, township or subdistrict health centers staffed by primary care physicians provide more advanced outpatient services and have beds for observing patients who are not very ill, and county hospitals provide basic specialty care and inpatient services.

Ms. Wang registers with the village clinic as required to receive the maternity services covered by China's rural insurance: five prenatal visits, various routine prenatal and postnatal tests, hospital delivery, and four postnatal visits. Though routine tests are free, she must pay the full charge for some services considered elective,

such as advanced three- or four-dimensional ultrasound. She has to pay a 10 to 20% copayment ($35 to $70) for her delivery in the 300-bed county hospital; she would pay 10 times as much at a tertiary care hospital.

At weeks 12 and 28 of her pregnancy, Ms. Wang visits the township health center 3 miles away for examinations by a physician with 3 to 4 years of medical training. She receives prenatal screening tests, a routine ultrasound, and counseling. Starting at week 29, Ms. Wang visits the township health center every 3 to 4 weeks for monitoring of blood pressure, weight, and fundal height. The village doctor does regular follow-up after these visits.

Ms. Wang would stay at the county hospital 3 days for a normal delivery. However, China has a high incidence of cesarean section, partly because it is more lucrative for physicians. When she's discharged, she will be visited by the village doctor three times in the first month. After 42 days, she'll return to the hospital for examination and tests.

Myocardial Infarction

A 55-year-old man with no serious health conditions has a moderately severe myocardial infarction.

Management of myocardial infarction in China varies considerably between rural and urban areas, and Mr. Li lives in a rural area, where he's covered by rural health insurance. He develops chest pain around midday. An hour later, he calls the village doctor, who arrives at his home about 30 minutes later and administers nitroglycerin tablets. When the pain is not alleviated, the doctor calls a senior internist at the county hospital, who advises the patient to call an ambulance to transport him to the hospital, which is 30 minutes away. As is customary in China, however, Mr. Li waits for his daughter to come home from work so she can accompany him. He arrives at the hospital around 7 p.m.

There, electrocardiography and myocardial-enzyme tests confirm that he's having a myocardial infarction. He has two treatment options: intravenous thrombolysis at the county hospital or cardiac catheterization at a tertiary care hospital. His doctor recommends the latter, since it's too late for thrombolysis to be effective.

Mr. Li hesitates because of the added expense of care at the tertiary facility: treatment at the county hospital requires a $300-to-$600 copayment, as compared with $2,000 to $2,500 at the tertiary facility. His family's annual income is only $6,000. Nevertheless, he opts for the tertiary hospital.

Mr. Li undergoes angiography and receives two stents. He stays in the hospital for 2 weeks, spending half that time in the cardiac intensive care unit. He is discharged on aspirin, clopidogrel, an angiotensin-converting–enzyme inhibitor, a beta-blocker, spironolactone, and a statin. His insurance pays 60% of the cost of these medicines up to a maximum of $800, leaving him with out-of-pocket medication expenses of $700 to $800 per year.

Mr. Li receives very little counseling about preventive measures such as smoking cessation or hypertension or lipid management. He returns to his village with no arrangements for primary care follow-up.

Steve Jobs Gets His Show and Tell

Michael Hiltzik, Dealers of Lighting Chapter 23

Thus we come to Steven P. Jobs.

The Apple Computer co-founder's visit to PARC, from which he reputedly spirited off the ideas that later made the Apple Macintosh famous, is one of the foundation legends of personal computing, as replete with drama and consequence as the story of David and Goliath or the fable of the mouse and the lion with an injured paw. It holds enough material to serve the mythmaking of not one corporation but two, Xerox and Apple. If one seeks proof of its importance, one need look no further than the fact that to this date no two people involved in the episode recollect it quite the same way.

For a chronicler of PARC this presents a unique difficulty. No anecdote from PARC's history is burdened by so much contradictory testimony. The collective memory of the Jobs visit and of its aftermath is so vivid that some former PARC scientists are no longer sure whether they were there themselves, or just heard about it later. PARC engineers and their guests from Apple disagree with each other (and among themselves) about who delivered which portions of the demonstration; on how many demos there were and when they took place; whether Jobs and his people saw an Alto or a Dorado; and whether Steve Jobs was desperate to get a look at PARC's technology, or so dubious about anything produced by a big corporation that he had to be wheedled into going in the first place.

Some of these discrepancies result from the demo's patchwork nature. "Nobody knows everything that happened, because there's nobody that was there all the time," says Larry Tesler, who was present for more of it than most.

Nobody, that is, except Adele Goldberg, who nevertheless agrees with Tesler that it is difficult for almost anyone to have a lock on the demo's ultimate truth. She thinks of the Jobs demo in terms of the story about the eight blind men and the elephant, each one stroking a different part of the same animal: "It's unbelievable to me the number of eyes on this elephant in people's memories. It just astounds me. Sometimes I just have to go, 'I'm right! Because I was the only one there all the time!"

Some inconsistencies are the product of Apple's mythmaking rather than PARC's. The idea that Steve Jobs and his troops saw in PARC a priceless, squandered gem aims to say as much about Jobs's peerless perspicacity as Xerox's obtuseness. The author who wrote, "You can have your Lufthansa Heist, your Great Train Robbery...

the slickest trick of all was Apple's daylight raid on the Xerox Palo Alto Research Center" perhaps desired more to promote a heroic vision of Apple than to get at what really happened.

Yet it is possible to resolve all these accounts and reconstruct a story that has never before been told in its entirety. To take the most obvious questions first: There were two separate demonstrations, not one, and the second covered all the most secret material. They occurred in December 1979. The computer was almost surely an Alto and the principal demonstrators were Goldberg, Tesler, Dan Ingalls, and Diana Merry. Steve Jobs was initially skeptical of what PARC might have to offer but allowed his engineers to convince him otherwise. As for Jobs's acuity, he later admitted that he was shown three mind-bending innovations at PARC, but the first one was so dazzling it blinded him to the significance of the second and third.

Perhaps most important, the Steve Jobs demo was not a random event or a stroke of luck for Apple, as it has sometimes been portrayed. Apple's engineers knew what they were after. They had taken great pains to plan for the moment, and they arrived at PARC fully prepared to ask the right questions and interpret the answers. The seed of the famous Jobs demo, in fact, had been carefully planted eight months earlier.

The occasion was a meeting on April 2, 1979, in an office building at 9200 Sunset Boulevard in West Hollywood. The host was Xerox Development Corporation, a unique little fiefdom that operated with great independence from the headquarters in Stamford.

Steve Jobs, the quintessential countercultural entrepreneur, was there to offer the corporate behemoth of Xerox a deal. He knew Xerox desired to invest in Apple, which would soon go public in one of the most eagerly anticipated stock offerings of the era. Jobs was willing to let the company in on the ground floor in return for access to Xerox technology—just what technology, he was not yet quite sure—and to Xerox's marketing knowledge.

This was the sort of pitch the principals of Xerox Development Corporation were used to hearing. Formed for the purpose of making strategic investments in small technology companies, XDC existed as a sort of personal playground for a brilliant but rather irksome executive named Abraham Zarem. Xerox had acquired Dr. Abe Zarem the same way it got Max Palevsky: by purchasing his company. In his case it was Pasadena-based Electro-Optical Systems, which, as its name implied, did research in leading-edge optical technologies, including lasers. When Xerox bought EOS in 1962, Joe Wilson predicted that within a decade most of the corporation's

profits would come from such new technologies. That never happened, but the acquisition did turn Zarem into Xerox's single largest shareholder, a distinction he held until dislodged by Palevsky seven years later. By then Xerox, disenchanted with Zarem's costly and fruitless attempts to transform EOS into a major government contractor, was searching for away to keep him happy but distracted. The answer was to create a venture unit and place him in charge. Thus was XDC born.

For all his faults, Zarem was an experienced hand at the difficult process of moving technology from the laboratory to the commercial marketplace; that was how he had made EOS into an attractive acquisition target in the first place. By 1979, seeing that the same familiar issues had sprung up around PARC's work, he resolved to stick his nose in. His idea was to turn the technology over to a young, hungry company with a modest cost structure—one that would not dither endlessly about whether a promising innovation would fit into its tradition-encrusted product line but would simply march ahead (while paying Xerox royalties). A company, say, like Apple.

The idea was not wholly implausible. Apple was coming on strong. Started in the proverbial Silicon Valley garage by Jobs and his high school classmate Steve Wozniak, Apple had successfully negotiated the transition in its product line from kit versions of Woz's little personal computer to a more versatile version, the Apple II. This machine was unique in the hobbyist market. It came already assembled, with a keyboard (although it required a separate monitor). Shortly after Jobs's appearance before Zarem's group, Apple started bundling it with VisiCalc, a unique software program known as a financial spreadsheet—a "killer app" that would single-handedly turn the Apple II into a popular businessman's tool.

With fewer than forty employees in 1978, Apple was already one of the most sought-after investments among the small community of speculative private investors known as venture capitalists. When the company raised $7 million in "mezzanine" financing during the summer of 1979, traditionally one of the last private offerings before a company sells stock to the public, the sixteen buyers included some of the most protuinent institutional investors in the country. Xerox would almost surely have been shut out, had not one of Jobs's advisors finally won a long-standing argument.

The advisor was Jef Raskin, a talented computer engineer and artist who had joined Apple to help design the Apple II. Raskin knew that the Apple founders' low opinion of big business was the product of Wozniak's experience as an engineer at Hewlett-Packard, where his proposal for a personal computer project had been rebuffed by his bosses. The incident "ever after remained part of their psychological motiva-

tion," Raskin recalled. "Jobs repeatedly told me (and anybody else he could get hold of) that a large corporation like Xerox couldn't do anything interesting."

But Raskin had friends working at PARC. At their invitation, he had watched dazzling new technologies take shape on Coyote Hill Road. Around the time the mezzanine financing was being assembled, he won Jobs over. When Xerox asked to be included in the deal, Jobs made his pitch: In exchange for an invitation to PARC, he would sell the corporation 100,000 private shares at $10.50 each. XDC agreed to fork over the $1.05 million, and one of the unlikeliest—if shortest-lived—alliances in high technology history was forged.

If Steve Jobs harbored an enduring mistrust of big companies, Apple Computer was scarcely a blip on the radar screen of most PARC engineers. They were Ph.D.s who had worked on some of the biggest computing projects the world had ever seen; Apple was a bunch of tinkers. The "personal computers" of the day were hobbyists' kits, contraptions with names like the Altair and the Commodore PET that arrived in pieces for sixteen-year-olds to drip solder on until something started to work, usually to their own amazement, so they could spend hours staring at the blinking red lights that served as output displays. What a joke! Blinking lights had gone out with the Whirlwind computer in the 1950s; they were as relevant to PARC's definition of computing — Altos with graphics programs and bitmapped displays—as were relics of the Flint Age. The general opinion on Coyote Hill was that Apple's customers were a waste of time. They were not very sharp, they were self-taught, and their machines were toys.

Such, at least, was the reaction of people who had never met Steve Jobs. Those who had made his acquaintance came away with a stronger, and often less favorable, impression.

The Jobs of this period—call it the "pre-Armani era"—wore scruffy like a badge of honor. He was perpetually clad in blue jeans, with a black beard that never seemed to grow in. His thin lips seemed locked in a knowing smirk. Ever since he was twenty years old and worth zero on paper he had worn his pride and contempt nakedly. Thwart him, and it scarcely mattered whether you were an eighth-grade dropout or a Ph.D. in electrical engineering; he would trash your arguments like they were so much chaff in the blades of a thresher.

Jobs's associates had a label for his unyielding confidence in his own vision and judgment. They called it his "reality distortion field." He lived securely within his worldview and seemed to exist chiefly for the purpose of imposing it on others. He had a way of seeming at once intolerably brash and older than his years. Those were

the qualities that enabled him to hold the experienced investors of XDC rapt by relating the story of how he had founded Apple. Those, and the fact that at the age of twenty-four he was the chairman of a company already worth $70 million.

A small handful of PARC engineers, like Larry Tesler, had not allowed their preconceptions about Apple's customers or Jobs's personality to cloud their perception of where these little computers might lead. Rather than shun the growing underground of youthful hackers, Tesler dove in. For a year or two he had been attending such cultural events as meetings of the Homebrew Computer Club, where young Altair and Commodore users met to trade their tiny software programs and swap lore. He was no stranger to Apple, having gone out with a woman who worked for the company. "I'd been to an Apple picnic as her date in 1978, when there were thirty employees," Tesler recalled. "It was at Marine-world in Redwood City and the entire staff, with kids, fit around four picnic tables."

Tesler thought PARC orthodoxy had blinded it to this alternative culture. He also thought he understood why. PETs and Apples were not the pedigreed offspring of the academic time-sharing tradition like the Alto and almost every other machine PARC had built. They had sprouted from an entirely different technology, that of the silicon microprocessor, the so-called "computer-on-a-chip" developed by Intel and Motorola (Apple would long be designed around the Motorola chip, while IBM-compatible PCs, which came later, would be based on the Intel version). As he had lectured Bob Metcalfe during the Notetaker's design phase, he believed PARC could learn from the kids. In fact, had to. If PARC did not change its attitude, he felt, it was going to look back one of these days and discover it had been passed by.

Tesler's opinion was well enough known on Coyote Hill that one day in late 1979 Harold Hall summoned him to a secret meeting in his office. Tesler arrived to find himself part of a tidy little gathering that included Bill Gunning and Roy Lahr, a Xerox functionary who had been dispatched by Abe Zarem to keep a solicitous eye on Jobs. They explained that they were seeking advice on how to manage an entry into the personal computer market and had heard Tesler might be an ideal source.

"You see," Lahr revealed, "we've invested in Apple."

"I said, 'That's great,'" Tesler recalled. "Lahr and Gunning explained that Xerox couldn't build computers cheaply enough to compete because its cost structures were very high. 'If we built a paper clip it would cost three thousand bucks,' they complained. I agreed."

Then they informed Tesler that their scheme was to get Apple to build computers

for Xerox.

“Under what kind of arrangement?” he asked.

“We don’t know yet,” Lahr replied. “But they took our money on condition they could see what was going on at Xerox PARC. They didn’t really need the money because everyone wanted in on Apple. But they let us invest.”

Tesler’s enthusiasm for giving Apple a look inside PARC placed him in a distinct minority on Coyote Hill, especially within the Systems Science Lab, where much of the Smalltalk software was still officially closely guarded.

The lab fragmented into opposite camps, their membership largely based on how one assessed the chances that Xerox might eventually get around to bringing out the technology on its own. Tesler, who had all but given up, saw no reason not to show Apple everything they had. Adele Goldberg, who still cherished the hope that they might yet bring Smalltalk to market under the Xerox banner—or at least that Xerox might let them keep some control over the work they had slaved over for so many years—had a different view. She felt adamantly that disclosing PARC’s intellectual property to a team of engineers capable of understanding it and, worse, exploiting it commercially would be a mortal error. “I wanted a deal to happen,” Tesler observed. “Adele was trying to kill one.”

It was not that Tesler wanted Smalltalk to be widely published and Goldberg wished it kept secret. The issue was the more complex one of who should see the technology and under what circumstances. Goldberg, for example, was happy to demonstrate Smalltalk to legitimate corporate clients who were prepared to help support the group’s research by paying for further development.

That had been the case about a year earlier, when she and Tesler ended up in opposing camps over a demo to another enterprise that expressed interest in Smalltalk. This was the Central Intelligence Agency. The CIA had sent a team of engineers to PARC under the auspices of Xerox’s Special Information Systems division, which sold customized systems to the federal government.

Goldberg was gratified by the CIA’s interest in her work. She viewed the agency as a traditional Xerox paying customer of the sort that routinely got Smalltalk demos over the years, and one whose representatives further seemed “remarkably interesting and innovative.” The agency’s manifest curiosity about Smalltalk and the Dynabook could not help but give those technologies and their inventors added credibility within Xerox, she figured—and at the very least, she said later, the CIA people

touring PARC had needs that fit perfectly with the Dynabook's capabilities for ordering and communicating information.

By contrast, the liberal-minded Tesler treated the CIA visit as a chance for Berkeley-style agitprop. The day of the agency demo he came to work wearing a trenchcoat, dark glasses, and a fedora pulled down over his brow. Then he spent the day hanging around the PARC commissary and conference rooms glowering at the visitors, much to the amusement of his own co-workers.

Tesler thought Apple was different because it was unlikely to put Smalltalk to nefarious use; Goldberg thought it was different because it was likely to become a Xerox competitor rather than a customer. In any case, one thing that became clear early in the debate was that the decision of what and how much to show Jobs's team did not rest with PARC. The engineers could decide how to stage the demo, but Xerox headquarters had decreed that one way or another, it was going happen.

Jobs later maintained that he harbored few expectations about what he would be shown at PARC when he arrived with his team one day early in December. "I thought it would be an interesting afternoon," he said. "But I had no real concept of what I'd see."

What he did see was as bowdlerized a show-and-tell as the Learning Research Group knew how to deliver. Jobs saw the Alto, mouse, Bravo, and several other CSL technologies, as well as a limited number of innocuous graphical applications in Smalltalk.

"It was very much a here's-a-word-processor-there's-a-drawing-tool demo of what was working at the time," Goldberg recalled years later. "No harm done, no problem. What they saw, everyone had seen. The conversation they had with us, everyone had. There was no reason not to do it, it was fine."

Jobs left, apparently content with his sanitized tour. He quickly discovered, however, how much information had been denied him. Two days later he and his entourage returned, primed for a second demonstration. Bemused, Hall ushered them into a conference room to get a better idea of what they hoped to learn. Goldberg had not yet arrived for work, so Tesler and Diana Merry from the Learning Research Group sat in. The parley was a rocky one. Jobs sat fidgeting while Apple's hard-nosed president, Mike Scott, engaged in a round of executive-speak with Hall.

"We were having this very beat-around-the-bush conversation that went on for about four or five minutes, which for Steve Jobs is like seven eternities," Tesler re-

called. Suddenly the hyperactive Jobs blew his top.

"Let's stop this bullshit!" he cried, leaping from his chair. "There's no point trying to keep all these secrets. We'll never accomplish anything if we don't talk to each other." Turning to Scott, he ordered, "Scotty, tell them what we want!"

Scott gave an exasperated gesture, as if he knew that any attempt now to settle Jobs down would be pointless. He took a deep breath, but before he could get a word out Jobs interrupted, "We need to tell them about the Lisa!"

The Apple group looked stricken. "Well, tell me why we can't!" Jobs exclaimed. "These guys think we're going to make the Xerox computer, which would cost ten thousand bucks to build. But we all know we want them to help us with the Lisa!"

The PARC team listened in astonishment. Lisa was a name that had never come up before. Even Lahr seemed perplexed. Finally someone asked, "What's Lisa?"

After an uncomfortable silence, an Apple engineer explained with resignation, "Lisa is an office computer we've designed with a bitmapped screen and a simple user interface. We think some of your technology would be useful in helping make the machine easier to use."

Tesler was fascinated, and not only because his own daughter's name was Lisa. Apple had obviously developed this project in great secrecy—so great that it had come as a bolt from the blue to its own babysitter, Roy Lahr. "It completely threw in the air Lahr's idea of what this meeting was all about," he recalled with great amusement. Tesler also knew the Apple team was correct: The Smalltalk interface, parts of which they had not yet seen, would make computers easier to use. He was even a little pleased that Apple had now forced the issue. Why not show them Smalltalk? If Xerox was not going to market a personal computer, why should all the Learning Research Group's work simply go to waste?

While this drama was still playing out, Adele Goldberg arrived for work, only to learn that Steve Jobs was back on the premises. She was neither amused nor intrigued, but incensed.

"I come in to work and there was Steve Jobs and the entire Lisa programming team, ten of them or so, in the conference room. No warning. Two days later. Then Harold Hall came out in the hallway with Roy Lahr to explain to me that I'm supposed to give them a second demo."

"Look, Adele, it's no sweat," Hall said. He reminded her that PARC could show Jobs more than he had already seen without necessarily showing him everything. There were two grades of Smalltalk demo at PARC—classified (for corporate bigwigs and other specially cleared VIPs) and unclassified. "Tell Tesler to just give Jobs the regular unclassified briefing," Hall said. "It'll dazzle him and he'll never know he didn't get the confidential disclosure."

Goldberg was mollified, but just barely. Begrudgingly, she admitted that if the demo kept to Hall's specifications, there would be little harm done—if. But who knew what else the savvy Apple engineers might pick up during another hour or two on the premises, and how much more they might insist on being shown? Deep down she was frustrated that Apple had been permitted to wheedle its way into the building in the first place. She blamed Hall and Lahr equally for lacking the technical savvy to understand the risks of showing Apple—especially its professional programmers—anything at all.

"We had never, ever given a private programming lesson to another company's engineering team," she said later. "And no one informed me of any reason to do so."

As she feared, however, the unclassified demo was still not enough. Almost as soon as Hall returned to his office, his phone rang. On the line directly from Stamford was a livid Bill Souders, the head of Xerox's business planning group. Souders informed Hall bluntly that Jobs was to be shown whatever he wanted to see, up to and including all of Smalltalk. "You will give Mr. Jobs the confidential briefing!" he barked.

Hall was mystified. Bill Souders, who knew even less than he did about software and programming environments, could not possibly understand the importance of PARC's proprietary technology. Hall could only assume that Jobs had somehow discovered on the spot that he had been conned—possibly Tesler or someone else on the team had unwisely let drop that he was receiving another subpar briefing—and taken a piece out of Roy Lahr. Lahr presumably blitzed his complaint directly to Abe Zarem, who fired up the big guns in Connecticut to shell PARC into capitulation. Whatever the process, it had occurred with lightning speed. Hall marveled at how high up in the Xerox hierarchy Apple's influence seemed to reach.

Still, Hall was nothing if not a faithful follower of the corporate chain of command, no matter how many of the links were time-servers and idiots. The important thing, he recalled, was that Souders's "authority was unmistakable and he used the military imperative language. It was exactly as in 1943 in basic training when I was told, 'You will pick up that cigarette butt!'"

Obligingly, he passed word to the demo team that they were to give Jobs and his engineers the full-dress treatment. Goldberg was stunned. Her worst nightmare was unfolding: The hard-won understanding about what Apple could and could not see was about to be breached. Turning red and teary with rage, she told Hall, "That's nuts! It's the stupidest thing I've ever heard."

That was for starters. Hall and Lahr escorted her into Hall's office to try to calm her down. It was an uphill struggle that lasted, by her estimation, about three hours. "

I finally said to Harold, 'You are making a really big mistake,'" she recalled. "'You are throwing away something that this company itself hasn't had a chance to even consider using. And you'll have to order me to do it, because I'm not walking in there voluntarily.' "

And that's what he did."

Merry and Tesler had spent the intervening time trying to keep Steve Jobs distracted with more of the plain-vanilla demonstration. They had just about had it with his constant wheedling when, suddenly, Adele Goldberg arrived back on the scene. "I can still see her," Merry recalled. "She was in pigtails and her face was red as a beet. And she was holding one of our yellow disk packs with Smalltalk on it."

The demo began. A full-dress Smalltalk show-and-tell was a sight to behold. There were educational applications Goldberg had written and software development tools by Tesler. Merry demonstrated her galley editor, a nifty program with animation capabilities built in so that a user could incorporate text and pictures into a single document. Almost every program had capabilities that had never been seen in a research prototype anywhere, much less in a commercial system. "There was lots to Smalltalk," Tesler remembered. "You could see it thirty times and see something new every time."

What was interesting—or to Goldberg, ominous—was the intensity with which the Apple engineers paid attention. Bill Atkinson, a brilliant programmer who would later put his distinctive stamp on the Macintosh, kept his eyes on the screen as though they were fixed there by a magnetic field. He was standing so close that as Tesler conducted his assigned portion of the demo he could feel Atkinson's breath on the back of his neck.

Atkinson had clearly come prepared. "He was asking extremely intelligent questions that he couldn't have thought of just by watching the screen," Tesler recalled.

“It turned out later that they had read every paper we’d published, and the demo was just reminding them of things they wanted to ask us. But I was very impressed. They asked all the right questions and understood all the answers. It was clear to me that they understood what we had a lot better than Xerox did.”

Given this rare psychic encouragement, the Learning Research Group warmed to their subject. They even indulged in some of their favorite legerdemain. At one point Jobs, watching some text scroll up the screen line by line in its normal fashion, remarked, “It would be nice if it moved smoothly, pixel by pixel, like paper.”

With Ingalls at the keyboard, that was like asking a New Orleans jazz band to play “Limehouse Blues.” He clicked the mouse on a window displaying several lines of Smalltalk code, made a minor edit, and returned to the text. Presto! The scrolling was now continuous.

The Apple engineers’ eyes bulged in astonishment. In any other system the programmer would have had to rewrite the code and recompile a huge block of the program, maybe even all of it. The process might take hours. Thanks to its object-oriented modularity, in Smalltalk such a modest change never required the recompiling of more than ten or twenty lines, which could be done in a second or two. “It was essentially instantaneous,” Ingalls recalled. Of course, it helped that as one of Smalltalk’s creators he was able to make the change as though by instinct. “We were ringers,” he confessed. “We knew that system from top to bottom.”

“They were totally blown away,” Tesler confirmed. “Jobs was waving his arms around, saying, ‘Why hasn’t this company brought this to market? What’s going on here? I don’t get it!’ Meantime the other guys were trying to ignore the shouting. They had to concentrate and learn as much as they could in the hour they were going to be there.”

The creation myth of the Lisa and Macintosh holds that Steve Jobs, in the grip of an epiphany brought on by PARC’s dazzling technology, headed straight back to Apple headquarters and ripped up a year’s worth of planning for the Lisa user interface. Jobs himself recalled how he returned to his office that afternoon “a raving maniac,” insisting the Lisa be reconfigured to replicate the Alto’s dynamic display. “It was one of those apocalyptic moments,” he said. “I remember within ten minutes of seeing the graphical user interface stuff, just knowing that every computer would work this way some day. It was so obvious.”

Something of the sort did happen, but without quite so much sturm und drang. The essential appearance and functionality of the Smalltalk interface—its “look and

feel," so to speak—did become reflected in that of the Lisa and Macintosh.

Lisa's architects, many of them transplants from the staid purlieus of Hewlett-Packard, had already designed a graphical user interface, but their version was far more static than the Alto's. Theirs lacked Smalltalk's dynamic overlapping windows, for example, but rather displayed one active application at a time, talking up the whole screen.

Nor did the Lisa originally place as much reliance on the mouse. This was the subject of heated disagreement within Apple. The main pointing device of the original Lisa interface was something called a "softkey," which appeared on the screen as a sort of menu listing the command options for the user at any given moment: If the active application was a text editor, for example, it might offer the choices of insert and delete. The user selected a softkey by using keyboard keys to move an arrow on the screens, then executed the command by striking "enter." The mouse was available, but it was scantily used and entirely optional.

Bill Atkinson, whose intense concentration during the demo left such a strong impression on Tesler, had spent months trying to design a more dynamic interface. But he had been unable to solve several programming problems, including how to write text into an irregularly shaped region of the screen—for example, the corner of one window peeking out from beneath another. This, of course, was a problem Dan Ingalls had long since solved via BitBlt (but had never published). Atkinson later maintained that seeing the overlapping windows on the Alto screen was for him more a confidence-builder than a solution to his quandary. He subsequently solved the same problem in his own way but, as he later remarked, "That whirlwind tour left an impression on me. Knowing it could be done empowered me to invent a way it could be done."

The demo also gave him the necessary ammunition to win the battle over the mouse. Atkinson thought the device needed to be standard equipment on every Lisa, rather than an option; only then would Apple be sure that software developers would always deploy it as an integral part of the system. After PARC he no longer got an argument from Steve Jobs, or anyone else.

On the other hand, Atkinson discerned in Smalltalk numerous shortcomings he resolved to correct. For one thing, it was painfully slow, an artifact of the Alto's lightweight memory and the language's "interpreted" structure, which loaded the central processing unit with more work than it could comfortably handle. "The system was crippled by a factor of ten, and it showed," he recalled. "It wasn't fast enough for a commercial application. You would watch characters appear on the screen one by

one, like on a agonizingly slow modem."

As for Jobs, he was so "saturated" by the power of the user interface he had seen that he ignored the other two phenomena he was being shown: object-oriented programming, which was the essence of Smalltalk, and networking. The fact that PARC had some 200 Altos connected to the Ethernet at the time of the Jobs demo made no impression on the Apple team. Neither the Lisa nor the first versions of the Macintosh were equipped with network ports. (A famous story had Jobs answering a question about how to network the Mac by flinging a floppy disk at the questioner and barking, "There's my fucking network!")

It may be that PARC's most important influence on the Lisa and Macintosh was a spiritual one. A design manifesto the Lisa designers produced with a month or so of their visit could have sprung full-blown from the mind of Alan Kay or Larry Tesler. "Lisa must be fun to use," it commanded. "It will not be a system that is used by someone 'because it is part of the job' or 'because the boss told them to.' Special attention must be paid to the friendliness of the user interaction and the subtleties that make using the Lisa rewarding and job-enriching."

And for all the impact that the PARC had on Apple, over the long run Apple's impact on the PARC scientists themselves may have been more pronounced. They had started out disparaging Jobs and his customers, but his fanatic enthusiasm for their work hit them like a lightning bolt. It was a powerful sign that the outside world would welcome all they had achieved within their moated palace while toiling for an indifferent Xerox. Steve Jobs did more than open the floodgates of ideas out of PARC. He started the exodus of human beings.

Among the first to go was Larry Tesler. During the summer preceding Jobs's visit, Tesler had traveled around Europe. In a rural French village he stopped to have his tarot read by a fortune teller. "She was just an interesting old French lady who made a bunch of predictions, all of which came true. Maybe they were self-fulfilling prophecies. She told me I'd leave my job within a year, and I left eleven months later. I couldn't believe her at the time. I said, 'But I have the very best job…' But maybe I was ready."

Early in 1980 Jobs asked Xerox for a license to use Smalltalk in the Lisa. In an unexpected burst of proprietary pride, Xerox turned him down. (The company had already divested its equity in Apple, thus missing out on the computer company's extraordinary run-up in value at the time of its 1980 initial public stock offering.) Steve Jobs made his offer instead to Tesler, one of Smalltalk's developers.

Heeding the mysterious tarot, Tesler accepted the job that April. He would go on to head the Lisa user interface team and to help design the Macintosh, eventually rising to the position of Apple's chief scientist. The sign he was waiting for had come. PARC's elitism had begun to seem threadbare, and even a little reactionary.

"I remember once I said to Bob Taylor, 'You know, I've been going to these Homebrew computer meetings and I've been talking to people at Apple and hanging out in the personal computer scene. There's a lot of smart people out there who are going to run way ahead of PARC in PCs. Xerox will never catch up, even with better stuff."

"And Taylor smoked his pipe and said, 'No, that's not going to happen, because we have the smartest people here. I believe if you have the smartest people you'll end up ahead.'

"I said, 'Bob, I've met people outside. They're very smart in this place, no question about it, but there are smart people who don't work for PARC. They do exist, and there are enough of them out there that they can do just fine.'

"He said, 'If you find someone as smart as the people here, just tell me who they are and we'll hire them!'

"I just told him, 'It's not going to work like that.'"