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## G.M.'s hopes are pinned on crowded China roads

SHANGHAI

For first time, carmaker sells more vehicles on the mainland than in U.S.

BY DAVID BARBOZA AND NICK BUNKLEY

A decade ago, this city had five Buick car dealerships, the top-selling General Motors brand in China. Today it has 27. And the crowds of shoppers that fill many of those dealerships are young, ready to pay cash and not inclined to haggle over the sticker price.

As G.M. prepares a public stock offering this year, China is emerging as a crucial piece of its appeal to potential investors and a surprising downpayment of sorts for U.S. taxpayers, who would begin shrinking their estimated 61 percent equity stake in the company, which is based in Detroit.

In the first half of this year, G.M.'s sales in China rose 48.5 percent from a year earlier, and for the first time ever, the automaker sold more vehicles in China than in the United States.

Just 13 years after entering China, G.M. now says the country accounts for a quarter of its global sales — blistering growth that even G.M. did not expect this soon.

"China's a big piece of the value of the company," said Stephen J. Girsky, G.M.'s vice chairman for corporate strategy and business development. "And since we pull cash out of China, it helps fund investments in other parts of the company as well."

Analysts estimate that G.M. is worth \$50 billion to \$60 billion, with China accounting for about \$15 billion of that total. The U.S. government converted about \$43 billion of aid to G.M. into its equity stake, which is expected to be sold over time once the company is publicly traded.

Through joint ventures with S.A.I.C. Motor, a unit of Shanghai Automotive Industry Corp., and other local manufacturers, G.M. is the largest new vehicle manufacturer in China, accounting for about 13 percent of the country's fragmented car market. Its product line aims to cover the broad spectrum of needs, ranging from the \$5,000 Wuling Sunshine, a bare-bones minivan, widely popular in rural areas, to luxurious Cadillac, that can be seen in the wealthy neighborhoods of Beijing.

This week, G.M. announced plans to create a seventh brand, Buqun, which means treasured horse, to sell small passenger cars. Meanwhile, in the United States, G.M. is down to four brands, after shuttering Pontiac, Saab, Saturn and Hummer during its bankruptcy.

"This is not some sort of flash in the pan investment strategy," said Michael Rubinov, an analyst with the research firm IHS Automotive. "During the bankruptcy process, G.M. China was the beacon in the night that G.M. always had in its back pocket, and China will be a vital cog in G.M.'s machine going forward."

G.M. officials say the taxpayer money has been used to expand in China, though... PAGE 15



**Korean observation post** A North Korean soldier kept an eye on Secretary of State Hillary Rodham Clinton and Defense Secretary Robert M. Gates during their visit to the demilitarized zone in Panmunjom on Wednesday. The Obama administration also announced additional economic sanctions against North Korea. PAGE 5

## Moving past the black box to track flights

FARNBOROUGH, ENGLAND

Failed hunts to recover data recorders lead to real-time tracking tools

BY NICOLA CLARK

In the year since the fatal Air France 447 jetliner crashed in the mid-Atlantic, interest has intensified in technologies to enhance the tracking of aircraft over remote areas

and enable real-time transmission of the information contained in a plane's "black box" flight recorders.

Until recently, the main obstacle has been not technological but financial: the high cost of transmitting so much data from so many planes, nonstop.

But the failure to locate the wreckage of Air France Flight 447 — which disappeared on June 1, 2009, en route to Paris from Rio de Janeiro with 228 passengers and crew members on board — has prompted a number of initiatives involving manufacturers and regulators to devise new systems. Several compa-

nies also are actively marketing products to stream black-box and other aircraft data using satellites and the Internet, but selectively, so as to reduce the expensive bandwidth required.

"The momentum for a real-time solution is significant and ramping up," said Dale Sparks, chief technology officer of Star Navigation, a startup based in Toronto that has patented what it calls a "next-generation black box" and recently signed a technology-sharing agreement with Astrium, the space and satellite division of European Aeronautics Defense & Space. Mr. Sparks said the

company's system could detect the earliest sign of potential problems while an aircraft was still in flight and automatically transmit an alert to staff members on the ground via an e-mail or text message.

Mr. Bradley, vice president of business development at AeroMechanics & Services, or AMS, based in Calgary, Canada, said the Air France crash "has clearly increased awareness of the vulnerability" of aircraft that fly over oceans or remote areas, including polar ice caps. BOX PAGE 16



At the Galileo Museum in Florence, visitors can view remains of the 17th-century scientist, including his fingers, above, which were cut from his corpse 90 years after his death.

## A scientific shrine to celebrate Galileo, with what's left of him

FLORENCE

BY RACHEL DONADIO

In 1633, the Roman Catholic Church convicted Galileo of heresy for having dared to embrace a heliocentric, sun-centered view of the cosmos.

In 1992, the church came around to an acknowledgment that the judges who had convicted him had erred — although it did not reverse the ruling and bid fast to the idea that Galileo had erred, too.

So it comes as something of a surprise to discover that Galileo has now become something of a saint — at least a saint-mimic. Only his statue is not a church

but a science museum, which has just put on display — in reliquaries, of course — one gnarly nose and three embalmers' fingers said to be from the scientist's own mortal hand.

He's a secular saint, and relics are an important symbol of his fight for freedom of thought," said Paolo Galuzzi, the director of the newly named Galileo Museum, which put the tooth, thumb and index finger on view in Florence last month, uniting them with another of the scientist's digits in its collection.

He's a hero and martyr to science," Mr. Galuzzi added.

The display is the latest twist in Galileo's... PAGE 17

## The battle of wills at Germany's state banks

FRANKFURT

Can E.U.'s stress tests overcome landesbanks' resistance to reordering?

BY JACK EWING

The debt crisis rattling Spain has finally allowed the central bank to override powerful local politicians and push through an overhaul of the very same institutions whose extravagant lending contributed to the country's woes.

In Germany, which also has a large, troubled banking sector with political patrons, forcing change has proven no more difficult.

But the release of the results of bank stress tests on Friday could finally be a catalyst for a reordering of the landesbanks, several of which have a history of scandal and have already required billions of euros in government aid to survive the financial crisis.

"Nearly all the landesbanks are in heavy trouble and have a lot of restructuring to do," said Dirk Schreck, a professor of banking at the Technical University of Darmstadt.

If the stress tests require the weakest landesbanks to seek European Union aid and loosen the grip of their state government shareholders, Mr. Schreck said, "this would indeed help to consolidate the sector."

Landesbanks account for nearly a quarter of lending to German business, and fixing them would be a major step on the road to recovery for the whole European banking system.

Many analysts — Mr. Schreck included — are waiting to see whether the stress tests, which regulators are conducting on 91 European banks, will be tough enough to provoke change. There are doubts.

"Maybe the stress tests are more to take pressure out of the system and out of the politicians in continental Europe, a short summer break," Mr. Schreck said.

For all their problems — which include hundreds of billions in losses from investments tied to the U.S. subprime mortgage market — the country's main landesbanks have so far proven remarkably resilient to attack.

"The scandals have been around the landesbanks for a long time," said Jörg Reichel, a professor at the European School of Management and Technology in Berlin. "Some have gotten into trouble repeatedly. It never really triggered a real reform. It was just dealt with and they moved on."

Highlights include a criminal investigation of the former management of Bayerische Landesbank in Munich, where bad investments cost Bavarian banks... PAGE 15

**HIGH U.S. UNEMPLOYMENT AROUND TO STAY** High jobless rates will haunt the United States through 2012, the Federal Reserve chairman said Wednesday. PAGE 16

**U.S. BACKS EURO ZONE BUDGET CUTS** The fund pulled away from previous calls for stimulus even as it warned of an uneven recovery. PAGE 16



## For scientific faithful, a shrine for Galileo

**CALILEO. FROM PAGE 1**

Galileo's complex afterlife, in which both science and religion have fought to claim him as their own.

A devout believer, Galileo was not the flame-thrower depicted by some of his defenders, and his conviction for heresy was so crushing a blow that he told his daughter that he felt as if his name had been struck from the book of the living.

But how the scientist's remnants wound up on display in the Galileo Museum here is a story worthy of Dan Brown, involving tough-minded cardinals, scientific-minded Medici and even disinterment by Masonic rite.

It was also helped along by a Florence antiquarian, who bought the reliquary at auction last autumn and took it home by taxi, unaware of its contents until his college-student daughter identified them. The family donated the reliquaries to the Galileo Museum, which reopened last month after a two-year renovation.

The mystery of the embalmed fingers begins in 1642, with Galileo's death. As a heretic, Galileo could not be given a church burial. But after his death, his followers in the circle of the grand dukes of Tuscany had been pushing to give him an honorable resting place.

Nearly a century later, in 1737, members of Florence's cultural and scientific elite unearthed the scientist's remains in a peculiar Masonic rite. Freemasonry was growing as a counterweight to church power in those years and even today looms large in the Italian popular imagination as an anti-clerical force.

According to a notary who recorded the strange proceedings, the historian and naturalist Giovanni Targioni Tozzetti used a knife to slice off several fingers, a tooth and a vertebra from Galileo's corpse as souvenirs, but refrained, it appears, from taking his brain. The scientist was then reburied in a ceremony, "symmetrical to a beatification," said Mr. Galluzzi, who turns out to be something of an expert in Galileo's afterlife.

After taking their macabre souvenirs, the group placed Galileo's remains in an elegant marble tomb here in Santa Croce church, long a shrine to humanism as much as to religion, where he still rests, and where his permanent neighbors include Niccolò Machiavelli and the composer Gioachino Rossini.

Galileo's vertebrae wound up at the University of Padua, famous for its med-



Besides body parts of the scientist, the Galileo Museum features a bust of him.

ical school, while his middle finger wound up in the collection that formed the basis for the Galileo Museum. But the thumb, index finger and tooth went missing in 1905, only to reemerge last October, in an auction of reliquaries in Florence.

Alberto Bruschi, a Florence collector, bought what turned out to be Galileo's digits at the urging of his daughter Candida, who collects reliquaries. She also happened to be writing her senior thesis on Galileo's tomb. After she observed that the figure on top of the reliquary resembled Galileo, the family called an expert who contacted Mr. Galluzzi, and the match was made.

A spokeswoman for the Pandolfini auction house, which sold the reliquaries, said it could not reveal their provenance, but said they had no idea they were Galileo's fingers.

Mr. Bruschi credits providence with the find. "More than by chance, things are also helped along a bit by the souls of the dead," he said in a telephone interview. "I think they could not have wound up in better hands."

A dentist who examined the tooth for the museum said it showed signs of gastric reflux and indicated that Galileo ground his teeth in his sleep.

But although the relics may be the museum's most popular draw, they are a small part of what was formerly Florence's history of science museum, which reopened last month after an elegant, high-tech renovation that transformed it into one of Italy's best boutique collections, a veritable Wunderkammer of beautifully wrought scientific instruments.

On a sunny recent morning, visitors glanced at the Galileo relics but seemed more captivated by other gems, including telescopes, painted globes, clocks,

and the pièce de résistance, a near-room-sized model of the universe according to the Ptolemaic geocentric system that Galileo rejected for the Copernican one, commissioned by Ferdinando de Medici in 1588.

Even today, centuries after Cardinal Robert Bellarmine, the pope's theological watchdog, told Galileo to stop preaching Copernicanism, the church has never quite managed to acknowledge that his heliocentric theory is correct. For his part, Cardinal Bellarmine was made a saint in 1930.

John Paul II reopened the Galileo case in 1981, and in 1992 issued his committee's findings: that the judges who condemned Galileo had erred but that the scientist had also erred in his arrogance in thinking that his theory would be accepted with no physical evidence.

"The fragility of this explanation is rather transparent," Mr. Galluzzi, the museum director, said dryly. He also dismissed as a "myth" the idea that Galileo uttered "eppur si muove" — "and yet it moves" — to his inquisitors after his conviction.

In 1992, the pope praised Galileo for inventing the scientific method and said that the theologians of the day had erred in thinking that they should read sacred scripture literally. He called the Galileo case one in which "a tragic, reciprocal incomprehension was interpreted as the reflex of an opposition between science and faith."

For centuries, the Vatican has operated a serious astronomical observatory in Castel Gandolfo, which is linked to the observatory at the University of Arizona and run by a Jesuit astronomer with no doubts about heliocentrism.

But as recently as last autumn, at a news conference introducing an exhibition of historic telescopic instruments at the Vatican Museums, the director of the Vatican's Pontifical Council for Culture, Msgr. Gianfranco Ravasi, referred without blinking to "the errors committed by both sides" — indicating both the church and Galileo.

Asked how he might explain the errors committed by Galileo, the monsignor, a former director of Biblioteca Ambrosiana who is widely seen as a rising star in the Vatican firmament, beamed, and with great gusto said only that he hoped one day to organize a conference on the didactic challenges presented by science. Case closed.