The Right Stuff!
(But The Wrong National Statistics)

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The Move to Mass Customization

Henry Ford's first great contribution to the modern age was the Model T, which rolled off his Michigan assembly lines at the rate of one every 24 seconds. At the time, it was an amazing display of industrial efficiency. By streamlining automation in his factories, Ford advanced an era of mass production that built his fortune and brought the automobile within reach of an emerging middle class. But while the miracle of mass production delivered the goods, it didn't adapt easily, so all Model T's looked alike. Ford's approach can be summed up in what he said about the car's exterior: "The customer can have any colour he wants so long as it's black."

Ford's take-it-or-leave-it attitude wouldn't cut it in today's economy. We are blessed — some might say overwhelmed — by an ever-expanding variety of goods and services. Just since the early 1970s, there's been an explosion of choice in the marketplace. This is nowhere more true than in the United States, where the choice of new vehicle models has risen from 140 to 260, soft drinks from 20 to more than 87, TV channels from 5 to 185, over-the-counter pain relievers from 17 to 141. The US market offers 7,563 prescription drugs, 3,000 beers, 1,174 amusement parks, 340 kinds of breakfast cereal, 50 brands of bottled water. Whole milk sits on the supermarket shelf beside skimmed milk, half-percent, 1 percent, 2 percent, lactose-reduced, hormone-free, chocolate, buttermilk and milk with a shelf life of six months. Today's consumers have access to more book titles, more films and more magazines. Ford's company still makes black cars for buyers who want them, but it also offers a palette of 46 other colors — toreador red, jalapeño green, Atlantic blue, mocha frost, autumn orange, teal and more.

This proliferation of products, models and styles isn't capitalism run amok. Variety shouldn't be dismissed as a trivial extravagance. It's a wealthy, sophisticated society's way of improving the lot of consumers. The more choices, the better. A wide selection of goods and services increases the chance each of us will find, somewhere among all the shelves and showrooms, products that meet our requirements.

More choices than ever

Historical buying patterns show a preference for choice. To market closer and closer to the customer's individual tastes, business has increasingly eschewed the paradigm of mass production, in some cases virtually flooding the market with a profusion of choice. Today's athletes, for example, can choose from more than 285 kinds of running shoe, up from just 5 less than 30 years ago. It is simple, today's richer consumers seek to express themselves through more choice.

Over time, the Western economies have been giving us more of what we want. Just look at what's happened in car design since Ford made his declaration about the colour of cars. Until 1914, Model T's were available in red, blue, green, grey and black. The move to all black was a concession to mass production that made the car a commodity of sorts, but standardization wasn't a winning strategy in the long run. By 1927, competition forced Ford to rethink variety. The Model A came in several body styles and an array of colours. With each decade, Ford gave consumers more

ITEM	EARLY 70s	LATE 90s
Vehicle models	140	260
Vehicle styles	654	1,212
SUV models	8	38
SUV styles	18	192
Personal computers	0	400
Software titles	0	250,000
Web sites	0	4,757,394
Movie releases	267	458
Airports	11,261	18,292
Magazine titles	339	790
New book titles	40,530	77,446
Community colleges	886	1,742
Amusement parks	362	1,174
TV screen sizes	5	15
Houston TV channels	5	185
Radio broadcast stations	7,038	12,458
McDonalds menu items	13	43
KFC menu items	7	14
Frito-lay crisp varieties	10	78
Breakfast cereals	160	340
Pop-tarts	3	29
Soft drinks brands	20	87
Bottled water brands	16	50
Milk types	4	19
Colgate toothpastes	2	17
Mouthwashes	15	66
Dental flosses	12	64
Prescription medicines	6,131	7,563
Pain relievers	17	141
Levi's jeans styles	41	70
Running shoe styles	5	285
Women's hosiery styles	5	90
Contact lens types	1	36
Bicycle types	8	31

choices. By 1955, the company offered a five model series; buyers could select upholstery and optional equipment.

The possibilities for doing a better job of meeting consumers' wants still weren't exhausted. Ford and other car makers started designing products for market niches — sporty cars for younger drivers, and more luxurious cars for middle - income families, for example, as Ford prepares for the next millennium, it's introducing custom ordering, which allows buyers to specify what they want. Ford's Internet site offers six models of the Explorer — each with choices for exterior, interior, audio, wheels, tyres and other options. All told, there are more than 2.5 million possible combinations for the vehicle.

The trend toward customization isn't confined to the car industry. From clothing to computers, businesses are working to become more consumer-friendly. They do it to gain new sales and stay competitive. They do it because pleasing the customer isn't just about producing more stuff. It's about producing *the right stuff*.

Just what is the right stuff? It's more of what we do want and less of what we don't want. The economy provides more of what we do want by customizing products to our particular tastes. It eliminates what we don't want through preventive products. Vaccines, childproof caps, safety gear on cars and antipollution devices are valuable

Ever more choice: new product introductions of consumer packaged goods

Food Products	**1980**	**1998**	**Household Items**	**1980**	**1998**
Meals	159	671	Washing powder	12	48
Meat	42	234	Paper towels	11	126
Fish	32	118	Air fresheners	53	372
Poultry	13	168	Glues and tapes	8	18
Vegetables	68	329	***Total***	***400***	***1,001***
Pasta	79	561			
Sauces	26	156	**Beverages**	**1980**	**1998**
Salads	3	124	Fruit drinks	118	480
Soup	119	291	Health drinks	4	70
Bread products	95	324	Soft drinks	26	252
Cereals	34	192	Bottled water	12	125
Cheese	65	300	Coffee	11	384
Crisps	46	166	Tea	25	461
Cookies	127	396	Beer and ale	25	187
Ice cream	57	556	Wine	22	252
Sweets	159	1,684	***Total***	***393***	***2,944***
Chewing gum	47	167			
Snack bars	41	162			
Cooking oil	20	161	**Pet supplies**	**1980**	**1998**
Seasonings	61	403	Dog food	58	180
Total	***2,112***	***10,803***	***Total***	***138***	***439***

for the misfortunes they avert. Preventive goods and services are often taken for granted — until they're needed. They raise living standards by replacing treatment with immunity, repair with safer design, so helping to protect consumers from some of life's tragedies.

The rich have always enjoyed the luxury of custom-made products. Now, however, personalized goods and services are increasingly within the budgets of middle-class consumers. Computers, the Internet, DNA research and other technologies are forging a whole new paradigm that makes possible the delivery of custom-designed products to the masses — at ever lower prices. The descriptive phrase for the phenomenon is *mass customization*. "Once you know exactly what you want, you'll be able to get it just that way," says Bill Gates, founder of the software giant Microsoft. "Computers will enable goods that today are mass produced to be both mass produced and custom-made for particular customers."

The economy's progression to customization isn't a fad. It arises from the free market's relentless drive to bring what we buy closer to what we want. What we buy yields a lot more utility when it exactly matches our needs, and we are reaping enormous benefits as new tools help business cater to markets of one. We're getting more for less.

There's just one glitch in this otherwise serendipitous story: traditional measures of the economy may not reflect how much our living standards are improving. Conceived in an era of mass production, the nation's GDP and productivity statistics may ably count more stuff, but they give little credit for it being the right stuff. Mass customization and prevention — just like variety — deliver their gains in important but subtle ways, so GDP and productivity statistics fail to capture the extent of our progress.

For the Future, the Best of the Past

Just as mass production was the hallmark of yesterday's Industrial Age, mass customization promises to dominate the modern stage of our economic evolution — the Information Age. New eras, of course, don't arrive overnight. They emerge slowly and incrementally as they overlap with the old, taking years and even decades to transform the economy. Even so, we're already seeing noteworthy moves to mass customization.

COMPUTERS. Dell Computer, for example, has proven that complex manufactured products can be made to order. Using the telephone or the Internet, customers describe the computer they want, the shape of the cabinet and size of the monitor screen, the speed of the microprocessor, the capacity of the hard drive. Other choices involve keyboards, mouses, video cards, modems, speakers, data-storage systems and software. The number of possible combinations is staggering — almost 16 million for desktop models alone. Dell begins assembling a computer only after it receives an order, and then ships the finished product directly to the customer's home or business within a few days. Gateway 2000, Micron Technology and Compaq Computer also make computers to customers' exact specifications.

CLOTHING. Off-the-rack clothing has always come in many sizes, styles and colours, but mass customization promises a perfect match for each buyer's fit and taste. Thus InterActive Custom Clothes sells jeans over the Internet, allowing customers to specify hip size, leg and seat room, fabric, colour, thread accents, leg silhouette, fly design, pocket style, buttons, rivets and even label. The jeans are produced to exact specifications at the factory. Digitoe, a Washington company, uses a scanner to measure every millimetre of customers' feet for custom-made shoes. Using his computerized mobile fitting unit, Alan Zerobnick digitizes each foot's dimensions — no matter the size or shape — and builds a three-dimensional shoe last around which any style can be moulded for a perfect fit. Orders are shipped in three to four weeks. Reorders require only a phone call.

ENTERTAINMENT AND INFORMATION. Music buffs who wanted to hear their favourite songs once had to buy dozens of compact discs. Now, CDuctive maintains an Internet site with sound bites from about 10,000 titles. Customers select a dozen tracks to be written onto a CD and shipped to their door.

In the age of mass media, the goal was to create newspapers and television stations that reached a broad audience. The Internet changes all that. NewsEdge gathers a profile of each customer's interests, then scans almost 700 news sources to deliver regular reports on current events, sports, weather and finance, all geared to the individual reader. Broadcast.com operates a web site that transforms computers into the most powerful radio receivers ever, allowing listeners to pick up stations from Turkey, Argentina, South Africa, Sweden or anywhere else in the world.

HEALTH CARE. Advances in biotechnology — most importantly, the ongoing process of cracking the DNA code — now allow doctors to individualize drugs and other treatments. Affymetrix has produced the first biochip, a dense grid of molecular tweezers that extracts individuals' DNA. The biochip can analyze thousands of genes at once — in effect, speed-reading the cells' DNA codes. Although the Human Genome Project has been mapping genes since 1990, biochips make the process personal. They give doctors information on each patient's medical condition.

Acumin sells capsules customized with specific vitamins and dosages for each customer, cutting the number of pills some people swallow in a day. Advances in cloning technology are allowing doctors to take a skin sample and reproduce a patient's own collagen cells. Injections of the cells can smooth wrinkles and scars without risk of allergic reaction.

Technology and competition

In one industry after another, companies are customizing for the mass market. They're doing it because new technologies make it practical and competition makes it imperative. Futurist Alvin Toffler, who predicted the coming of mass customization in the 1970s, recently issued a stern warning to producers who aren't yet on board: "I'd say if you have a company and you're not moving toward automation on demand, you'll have a competitor one day soon who will put you out of business."

Whether companies are seeking to expand sales or just stay in business, mass customization enables producers to snare buyers by offering extra value. It's no surprise that consumer satisfaction lies at the core of this phenomenon; what consumers want always shapes market economies. Economists have taught this straightforward notion since Adam Smith published *The Wealth of Nations* in 1776. Markets serve as complex information machines that collect and communicate buyers' needs, tastes, desires and whims. Producers that do the best job of catering to consumers gain market share and make greater profits. Burger King got it right in its advertising slogan: *Have it your way!*

Companies prosper by delivering what customers want. This conventional view of consumer sovereignty is correct — as far as it goes. What's missing is a description of how meeting buyers' needs and wants evolves over time. People have always preferred customized products, but they couldn't always afford them. Now, companies are finding ways to deliver exactly what we want at prices competitive with those of mass production.

Until the Industrial Revolution, producers catered to consumers one at a time. Sophisticated machine tools hadn't been invented, so every product had to be handmade. A tailor, for example, would measure each customer and ask about style, fabric and fit, then stitch a suit or dress to the exact pattern. When shoes, furniture and all other goods were made to order, customers could always buy just what they wanted — if they could afford it. The drawback of production by artisans was high cost. The typical person was lucky to possess one suit of clothes and one pair of shoes.

Industrialization changed that. Machines began to make our clothes, shoes, furniture, kitchen utensils and an array of new products, sweeping us into an era of mass production. Producer and consumer rarely came into contact. Goods were made in factories, shipped over great distances and sold in department stores. Mass production dictated large runs of identical products. Consumers sacrificed the luxury of personal attention for affordability. Taking what came off the shelf, though it might not be a perfect fit, was the best choice because it was cheap. The Industrial Age brought lower prices. Just as important, each worker produced more, justifying higher earnings. Today, just about all British households possess washing machines, television sets, telephones and plenty of other everyday conveniences — all made possible by mass production.

What's increasingly shaping today's economy isn't the raw power of machines but the subtle power of knowledge. Information Age technology — primarily the computer — has erased yesterday's edict that customization must carry a high price. Mass customization offers consumers the best of both worlds. It embodies the good qualities from the era of hand production — custom design and individualized service. And it retains the most significant gain from the era of mass production — low cost.

Mass production was about producing more stuff. Mass customization is about producing the *right stuff.*

Customization for the mass market isn't just economists' jargon for variety. The difference lies in which side of the market calls the shots. Variety represents producers' best guess about what consumers will buy. Companies tweak their designs, hoping what they offer is close enough. Even when companies rely on market research, they're still aiming at broad groups of consumers. Variety has delivered great benefits in recent decades, but it is mass production's response to the fact that everybody's tastes differ. Even at its best, variety is an imperfect substitute for true customization, which eliminates the need for guesswork. Companies that customize don't make anything until they know precisely what the customer wants.

One size fits all? Not anymore. What served as a good slogan for mass production doesn't cut it in today's world.

Technology's Role: Driving Down Costs

Why have we had to wait until the tail end of the 20th Century for mass customization? The simplest answer is: until now, we didn't have the know-how to customize at low cost. Today's technology, though, makes it possible.

Mass customization and the microprocessor

If there's a key to mass customization, it's the microprocessor. This tiny device is indispensable to many of today's "smart" tools — most notably, powerful computers that process, store and send information. The Internet moves vast amounts of information at the click of a button — not just words and numbers but pictures and sound as well. Search engines — software that brings order to the Internet's chaos — are key to customizing because they find and organize information based on users' profiles and inquiries. Lasers are used in bar-code scanners, measurement devices and fibre-optic cables that can transmit whole libraries in seconds. Artificial intelligence programs simplify the design of new products. Computer-controlled manufacturing makes it faster and cheaper to modify designs and assemble one-of-a-kind items. Breakthroughs in biotechnology are unlocking the secrets of individual cells. The leap from analogue to digital greatly expands the capacity of all kinds of communications technologies to process and deliver that most precious of commodities — information.

The tools of the Information Age are indeed powerful. These technologies spawn mass customization by revolutionizing the calculus of production costs. Nearly all business expenses fall into two broad categories — fixed and marginal. Fixed costs include conceiving, designing and organizing the operation, setting up plants, installing equipment, bringing in utilities, hiring workers and slogging through the usual morass of red tape. These costs are incurred before the first sale is made. Marginal costs, on the other hand, aren't incurred until an enterprise is up and running. They cover expenses for producing additional units of output, including wages, raw materials, electricity, marketing and distribution.

The interplay of fixed and marginal costs explains both mass production and mass customization. In the Industrial Age, electric motors, engines, winches, conveyor belts, machine tools and other advances reshaped the economy. They were the high technology of the times. These innovations allowed companies to turn out identical products cheaply. The order of the day was standardization — from nuts and bolts to accounting procedures. The world of mass production usually involved high fixed costs and low marginal costs. Producers made money by cranking out as many units as possible, driving down the average production cost by spreading the huge fixed cost over more and more units. That's precisely what Henry Ford and his successors did. Customers paid lower prices for cars, appliances, clothing and household goods, but

companies could only bring a limited number of standardized models to the marketplace. With high fixed costs and low marginal costs, it's cheap to make the same product for everybody but expensive to produce a different product for each customer.

Industrial Age technology replaced muscle power with machine power, which ran the assembly lines. Information Age technology complements machine power with brain power, enabling us to recognize each consumer's preferences and deliver what they want at a reasonable price. Once again, the key is costs. Mass customization becomes optimal when both fixed and marginal costs — particularly fixed — are low. If producers can change designs quickly and inexpensively, they'll win customers by targeting individual tastes and preferences. Average costs decline even without long production runs, permitting low prices along with the bonus of getting exactly what we want.

Mass production was the by-product of Industrial Age tools. Mass customization is the dividend of Information Age tools. Modern technologies slash fixed costs in three areas: information, production and distribution. By making it easy to supply *information*, the Internet gives consumers a cheap and easy way to find out what goods and services

AS YOU LIKE IT

An internet search for the word *customized* turns up more than 866,000 web pages. Computer-based technology like this helps producer and consumer communicate directly so the goods and services offered more closely match the consumer's desires. In virtually all industries, housing, transport, finance, clothing and so on — modern technologies are shifting the ethos from producer-centered productivity to consumer-based customization.

Company & web site	Product and service
Ford *www.ford.com*	***Cars*** Equipped to your specification
CDuctive Music *www.cdcutive.com*	***CDs*** Custom made to your tastes
Dell *www.dell.com*	***Computers*** Configured to your requirements
Golf to Fit *www.golftofit.com*	***Golf clubs*** Customized to your body and style
CNN Custom News *www.customnews.cnn.com*	***News broadcasts*** Matched to your interests
Shirt Creations *www.shirtcreations.com*	***Shirts*** Tailored to your build and taste

are on the market. Companies can display immense amounts of product information on their web pages and take orders from anywhere in the world. More important, the Internet frees producers from the expensive proposition of paying firms to gather information on what buyers want. They now find out electronically, at negligible cost. Both InterActive Custom Clothes, the jeans maker, and CDuctive, the producer of custom compact discs, compile consumers' preferences through the Internet. Amazon.com, the Internet bookseller, keeps track of readers' purchases, allowing the online vendor to recommend specific books to individual customers.

If the shirt fits	**A step in the right direction**
Today's fashion-concious male can point and click his way to a custom made shirt. New York based ShirtCreations' web site gives shoppers their choice of collars, cuffs, pockets, monogram, style and fit. Tomorrow's shoppers may be able to go one better. $[TC]_2$ is working on a body scanner that replaces the tape measure with lasers, then stores the data on a smart card for future shopping trips.	Footmax uses computerised gait and pressure technologies to analyze an individuals unique walk and build custom footwear. A patients walk across, the Footmax forceplate, with 960 pressure points, is scanned 30 times a second. This and other personal data are used to produce a computer-generated analysis from which custom insoles are produced, exactly to the biomechanics of each customer's feet.

By making it cheaper to personalize during *production*, Information Age tools remove the last barriers to providing goods and services for individual customers. It's smart automation that allows CDuctive to personalize compact discs at the click of a button. Once an order arrives, computers retrieve the selections from a hard drive and write them directly onto blank discs. InterActive Custom Clothes uses computerized fabric cutters that are quick, precise and inexpensive. Even assembly lines are no longer limited to endless iterations of the same product. Computer-aided designs are replacing costly prototypes. Computer-guided machinery allows production to shift from one style to another with a few lines of computer code. At Motorola's pager factory in Florida, the specifications for each order arrive in a direct transmission from sales representatives' laptop computers. Within minutes, these specs are translated into bar-code instructions for the assembly process. In theory, the factory could produce 29 million different pagers on the same line, one right after another, without the time and expense of retooling.

Improvements in *distribution*, made possible by such technologies as lasers and computers, reduce the fixed costs of getting products to consumers. Bar-code scanners allow Federal Express and other overnight shippers to improve speed and accuracy while reducing outlays for a global system to pick up, sort, track and deliver packages. As the Internet spreads into more homes and businesses, it makes the delivery of information products relatively inexpensive. What does it cost NewsEdge Corp. to

personalize news reports? Next to nothing. Fidelity Investments and other brokerages offer web sites that allow investors to track their portfolios in real time. DirecTV, capitalizing on the increased capacity of satellite television systems, incurs no added expense by offering the entire American National Football League schedule every Sunday, so sports fans can choose which games they want to watch.

Michael Dell started his $16 billion computer business in a University of Texas student room in 1983 on the basis of low fixed cost. Dell's masterstroke: build to order and do it quickly. Customization would lose its value if customers had to wait months for their computers. The Internet allows Dell to find out what each customer wants, instantly and cheaply. Continuous-flow manufacturing cuts the cost of customizing, 35 cargo doors line both ends of Dell's new factory. On one side, suppliers deliver components throughout the day. On the other, workers load finished products onto trucks. Actual assembly takes five minutes. Even adding time for loading software and testing for quality, the whole process takes just four hours. By economizing on spare parts, product inventory, delivery and every other step of the process, the company provides a customized product at a competitive price. No wonder Michael Dell has been lauded as the Henry Ford of mass customization.

Information Age technology thrusts our economy toward mass customization, but other factors also contribute. The globalization of commerce, for example, makes goods and services more widely available, especially as cutting-edge electronic media reduce the time and expense involved in gathering information. Access to products from around the world also makes us more sophisticated consumers, so that even in the home market we demand the nuances of Italian suits or German beer.

Just as mass customization couldn't take root in an isolated society, it couldn't emerge in a poor one. Low-income countries are still dominated by mass production. That's to be expected, because producing quantity is the quickest way out of poverty. Once a nation becomes wealthy, most families' basic needs are satisfied. As they move up the economic ladder, consumers typically move down a list of wants from food, clothing and shelter to luxuries. All of us desire the luxury of goods and services that embody our own tastes and preferences. It's money in the pocket, though, that makes it possible. We're becoming a society of mass customization because we can now afford it.

First, we meet *basic needs* through mass production. Then we gratify *individual wants* through mass customization.

Right Stuff, Wrong Statistics

As mass customization becomes part of our everyday lives, most people will intuitively understand how it represents an improvement over mass production. Clothes will fit better. Entertainment will be more enjoyable. Doctors and hospitals will have individualized tools to make us healthier.

Yet it may be hard for many policymakers to assess how much better off we are. The problem lies in how we measure our economic progress. We tend to rely on a handful of well-publicized statistics — most notably, gross domestic product, the consumer price index and productivity figures. The benefits of mass customization, however, are hard to quantify, especially with the rudimentary economic yardsticks now available.

GDP statistics can't cut it today

GDP is a statistic designed for mass production. It's a simple counting — the number of units made. It falls short in measuring intangible benefits. Economic research demonstrates that GDP often fails to capture consumers' gains from better quality and new products. Mass customization introduces a similar bias, one tied to the fact that we can measure production but not consumers' satisfaction. They aren't the same, even though many commentators casually link them.

Nobody ever said quantity was the spice of life. GDP statistics tell the same tale whether a business executive owns 12 identical suits or if he possesses a dozen in an array of fabrics and styles. Is it really the same? No individual would think so; that's why our closets are filled with a variety of clothes. Will 100 copies of *The Catcher in the Rye* offer as much reading pleasure as one copy of 100 different novels? GDP says so. Most consumers would say not. And just as variety has produced gains for us that have eluded our GDP and productivity statistics, mass customization will produce even more.

Preventive production proves just as slippery for GDP accounting. If electronic sensors in roads and vehicles can prevent accidents, drivers will suffer less damage to their cars. So they spend less on repairs and insurance. But because we're spending less GDP accounting would suggest we're worse off, not better off. Similarly, scientists are developing vaccines that will eliminate tooth decay. We will benefit from improved dental health, but the holes not drilled in teeth are net losses to GDP. A stitch in time may indeed save nine, but it also generates one-ninth the GDP.

GDP may be entirely accurate as a tally of how much our farms, factories and offices produce, but it's increasingly inadequate as a measure of how well the economy provides what we want — the satisfaction produced. As we grow wealthier, we are

Three spoons are not a place setting	**An Ounce of Prevention**
Suppose that a knife, spoon and a fork all cost the same price and were of equal worth. All else being equal, an economy producing three spoons would have equal GDP to one making a knife, fork and spoon. Diners would, however prefer to eat in the country with the three-piece setting. This example shows how add-em up statistics like GDP and productivity often fall short. Business seeks the grander goal: pleasing customers.	Most countries spend billions every year on fighting illness. In 1997, the US government spent over 1 trillion dollars. Most of this money is spent on treatment and cures. Scientists aren't just looking for cures — they want to eradicate disease altogether. This would clearly be of great benefit to society yet GDP would not show the impact. If anything, GDP would fall because less money is spent on health care.

taking more of our progress in ways that aren't readily quantified. We're refining what we produce — making *the right stuff*, not just stuff.

If GDP can't detect the benefits of mass customization, it will also miss the mark on productivity, a number that derives straight from the GDP calculations. Some economists are disappointed that GDP has not grown faster at a time when computers have spread into nearly every business. They worry that Information Age advances aren't delivering the same economic punch as Industrial Age inventions. It just isn't so. Our statistics don't recognize how the economy is making us better off by producing for us individually rather than en masse.

Our statistics are a driving mirror, looking back at the past. We need to focus on the economy that's emerging rather than the one that has been. Tomorrow's progress can't be judged with yesterday's gauges. What's needed are analytical tools that can capture the benefits of mass customization and preventive products.

After all, output and productivity aren't the goals of the economy. Consumer satisfaction is.

Mass customization is already making consumers better off by providing just what we want. And the best is yet to come. What's likely to arrive in the coming years will be truly astounding. InterActive Custom Clothes produces jeans to order, but even more elaborate systems are reaching the prototype stage. A customer starts with a stroll through a body scanner, which uses lasers to take 50 measurements from head to toe, then saves the data on a wallet-sized smart card handy for shopping. When ready to buy a new suit, shirt or dress, the customer mixes and matches from among hundreds of fashion accents. At the touch of a button, the order will go to a factory, where computerized cutting and sewing machines will turn out clothing with the buyer's own label sewn inside.

The Paradox That Isn't

Robert Solow, an American economist, stated 'You can see the computer everywhere but in the productivity statistics'. Why productivity and GDP has risen as expected is known as the Solow Paradox. Many people have tried to explain this by saying one of two main theories: either, there is a glitch in the productivity statistics and the computers effect has not yet registered or that the productivity surge is on its way. Neither of these considers customization or preventative goods. The benefits of the computer are not just producing more stuff but the right stuff. In the end there is simply no Solow paradox.

In the field of medicine, Affymetrix already makes devices to decode individuals' DNA. The ability to quickly gather heretofore unknown information about patients is giving birth to a new discipline called pharmacogenomics. Using this distinct genetic portrait, pharmaceutical companies expect to offer drugs tailored to individuals' age, symptoms, condition and hereditary makeup. Personalized drugs will not only ensure correct dosage; they'll also curtail side effects.

Mass customization promises more marvels like these. Interactive television will give families the power, now held by network programme directors, to determine the nightly lineup. Carmakers are starting to design systems that will build cars to order. Textbooks, scents, electronic gadgets and just about everything else will someday bear our personal stamp.

We might not see faster growth rates or surges in productivity, but mass customization will pay off. Resources are wasted in guessing what customers want. When more products are customized, we won't squander money on clothing that sits in the draw because it doesn't fit or compact discs with only one or two songs we really like. And goods won't languish on dealers' shelves. Achieving a higher standard of living with fewer demands on natural and labour resources will help ease price pressures and keep inflation within bounds.

Two centuries of economic progress have brought the West a standard of living that's the envy of other regions. We wouldn't have it so good without the immense variety provided as companies move from standardization to custom-made. Our economy offers a veritable feast for consumers. Mass customization will make it even better. An economy that's delivering more of what we want and less of what we don't is doing its job in raising living standards. As we enter the 21st century, we are moving into a new economic era, one where consumers will be better off than ever before — because we'll live in a world of our own design. We'll have the *right stuff.*