

Principle: Match the Market Design with the Environment

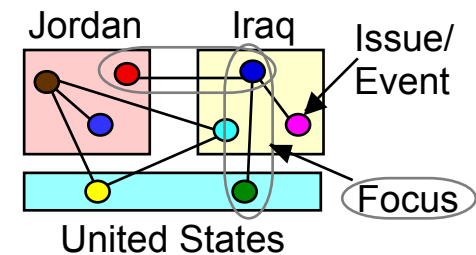
In the Iowa Market, a single specific event (the outcome of a presidential election) is traded. A double auction fits the trader and info. environments.

The future of the Middle East results from interactions in a network of many nodes of several classifications: country, issue (econ., pol., mil.), & time.

Many traders pay attention and know there is a network

Traders specialize – individuals focus on subsets of nodes

Predicting a future may require linking the insight of several traders – combining knowledge about different subsets.



Design Decision: PAM must coordinate dispersedly held & interconnected information; therefore, PAM should be a Combinatorial Market.

Example – Assume PAM existed in March 2003 at the start of hostilities:

Military expert believes $P(\underline{B})$ is low – he buys

NSC member believes $P(AB)$ is high – she sells

Expert in Jordanian politics thinks $P(A|\underline{B})$ is certain – buys hedge

Event **A**: Overthrow of Jordanian Monarchy

Event **B**: Iraqi Regime persists after One Month

	A	<u>A</u>	Price
B	AB 0.30	<u>AB</u> 0.20	\$0.50
<u>B</u>	<u>AB</u> 0.05	<u>AB</u> 0.45	\$0.50
Price	\$0.35	\$0.65	

Design Runoff of Two Combinatorial Mechanisms

Two combinatorial mechanisms were tested with the same order format:

A combined value call market based on established Net Exchange products (Emissions Trading & Bond Connect)

A combinatorial market maker with no application History (see <http://hanson.gmu.edu/combobet.pdf>)

Caltech's social science laboratory was used to run experiments using the same environment for both:

Binary Var. X,Y,Z, $2^3 = 8$ combinations

$P(X=0) = .3, P(X=Y) = .2, P(Z=1) = .5$

Random mapping of XYZ to ABC

3 people, see 10 cases of: AB, BC, AC

Goal is to trade information to figure out mapping

Actual Mapping

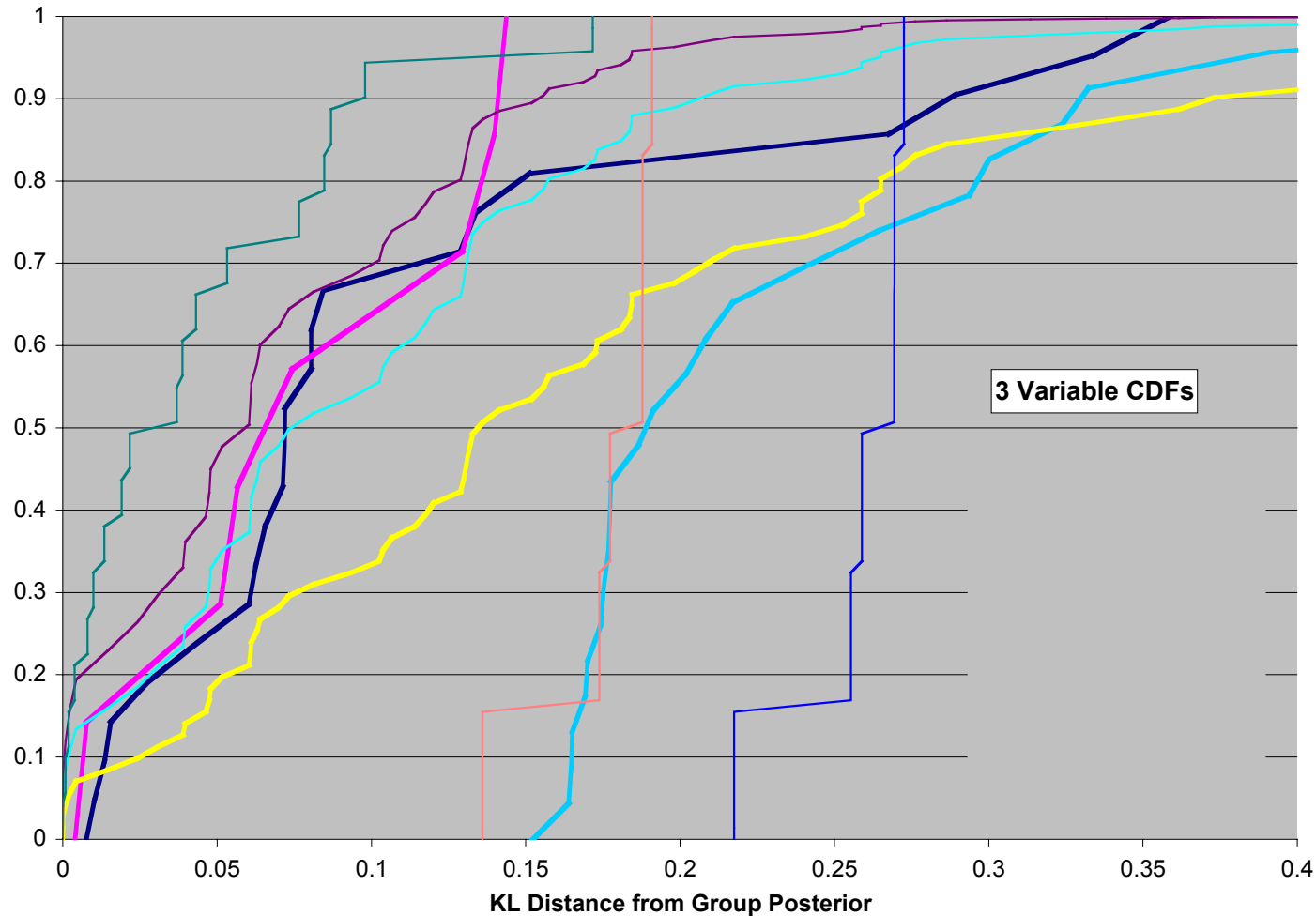
	X	Z	Y
Case	A	B	C
1	1	-	1
2	1	-	0
3	1	-	0
4	1	-	0
5	1	-	0
6	1	-	1
7	1	-	1
8	1	-	0
9	1	-	0
10	0	-	0
Sum:	9	-	3
Same	A	B	C
A	--	--	4
B	--	--	--
C	--	--	--

A non-combinatorial double auction was run for purposes of comparison.

(Similar experiments were run with an 8-variable environment.)

Runoff Results and PAM Product Decision

Both combinatorial processes exhibited superior info. aggregation to the DA



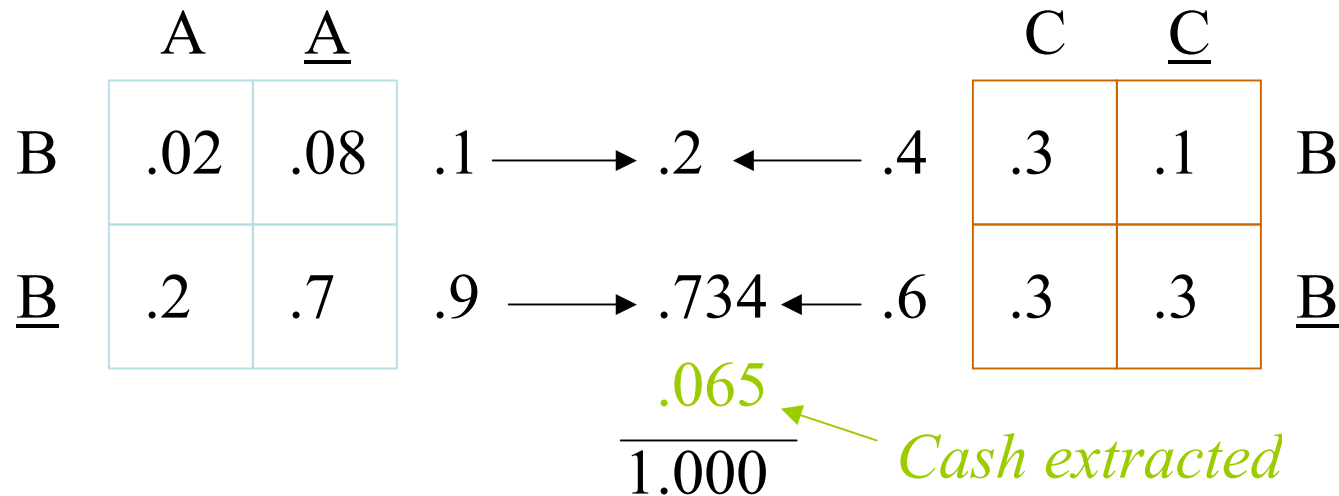
Market Maker outperformed the Combined Value Call and can function with any number of traders. Therefore, PAM will debut using the Market Maker.

Scaling: Overlapping Market Makers with Arbitrage

The current implementation of the Market Maker can practically handle 15 binary variables, but PAM will debut with a couple hundred. The solution is to distribute the variables across many overlapping market makers, allow trades composed of variables that are all in at least one market maker, and have the market makers arbitrage price differences among overlaps.

Example: Consider two market makers with an overlap 

Trading can cause prices for B & B to differ – MMs arbitrage away difference



Arbitrage will continue until the price of B is 0.21 in each (and B is 0.79)

Evolution of the *Information Trade*

A market performs the dual role of allocation and price discovery among parties that are interested in the items exchanged through the market. When the market in question is coordinating the exchange of something that cannot exist until some future point in time, then the forward exchanges among the traders are driven by their expectations of the future value of the items and their beliefs about what might affect the future value. Futures markets aggregate disperse information and refine the information through the feedback of price discovery.

Sample progression in the use of markets to refine information:

1. Futures markets based on an underlying commerce that has been standardized (key role of objective data)
2. Insurance against specific futures, supported by wholesale reinsurance to spread out the specific risks
3. OTC Derivatives (essentially, 2 making use of 1)
4. Iowa Political Market and other *pure* info. markets (see The Economist, 5/9/03)
5. *Economic Derivatives* (4 applied to economic issues) www.gs.com/econderivs/
6. PAM enhances (4) by standardizing a commerce (1) then provides a robust derivative capability (3+)

Organizations behind PAM



Net Exchange has a ten-year history of applying innovative market technologies to processes not traditionally handled with markets – PAM is the latest chapter in this history. Net Exchange is responsible for design, development, and operation of the PAM trading system.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

The Economist Intelligence Unit is the business information arm of The Economist Group, publisher of *The Economist*. Through a global network of over 500 analysts, it continuously assesses and forecasts political, economic and business conditions in 195 countries. As the world's leading provider of country intelligence, the Economist Intelligence Unit helps executives make better business decisions by providing timely, reliable and impartial analysis on worldwide market trends and business strategies. The Economist Intelligence Unit is working with Net Exchange to collect and process the data on which the securities in PAM are based, and then to assess the value of the securities when they mature.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

The Defense Advanced Research Projects Agency (DARPA) is interested in improving on existing techniques for predicting future events and for assessing the issues that underlie and influence what might happen. DARPA has funded the development and operations of PAM. U.S. government agencies will not be allowed to participate in PAM and DARPA will not have access to the identities or funds of PAM traders.

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Software Architecture and System Overview

Dedicated Linux servers hosted by remote provider.

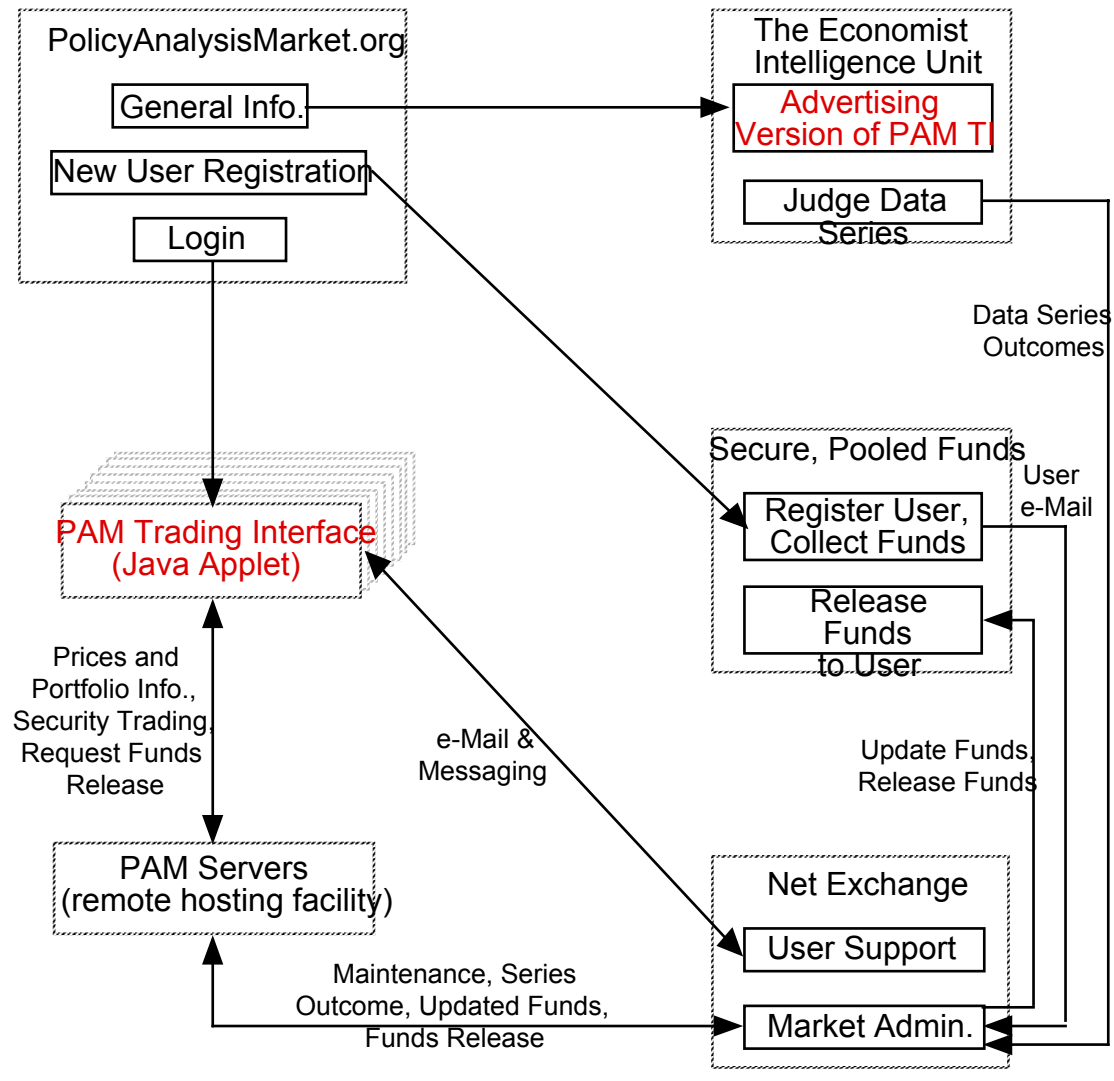
Home page (PolicyAnalysisMarket.org) shunts all non-trader inquiries to other Internet domains.

PAM trading interface is a Java applet.

All registered traders are members of a PAM bulletin board.

System scoped to handle 10,000 traders.

24/7 Operations



Note: Each dotted box represents a different Internet domain

Focus on a Security of Interest <input type="button" value="Clear"/>					
Security		Current Price	Recent Trading		Your Holding
Structure	Name	Price	Price Range	Volume	Holdings
Base	IQcd4 ₀₃ <85	0.624	0.602	1,800	100
Base	TYum3 ₀₃ 100-120		0.635		
Cond.					
Sort Transactions	Display in Portfolio	Transfer to Watch List	Transfer to Trading		

Special Event Securities					
#	Brief (click for Detail)	Price	B or C		
1.4.3	Jordan King Overthrown 4th 03	0.24	<input type="button" value="B"/>	<input type="button" value="C"/>	
2.4.3	N. Korea Missile Attack 4th 03	0.15	<input type="button" value="B"/>	<input type="button" value="C"/>	
1.1.4	U.S. Recog. Palestine 1st 04	0.32	<input type="button" value="B"/>	<input type="button" value="C"/>	
2.1.4	Arafat Assassinated 1st 04	0.17	<input type="button" value="B"/>	<input type="button" value="C"/>	
			<input type="button" value="B"/>	<input type="button" value="C"/>	

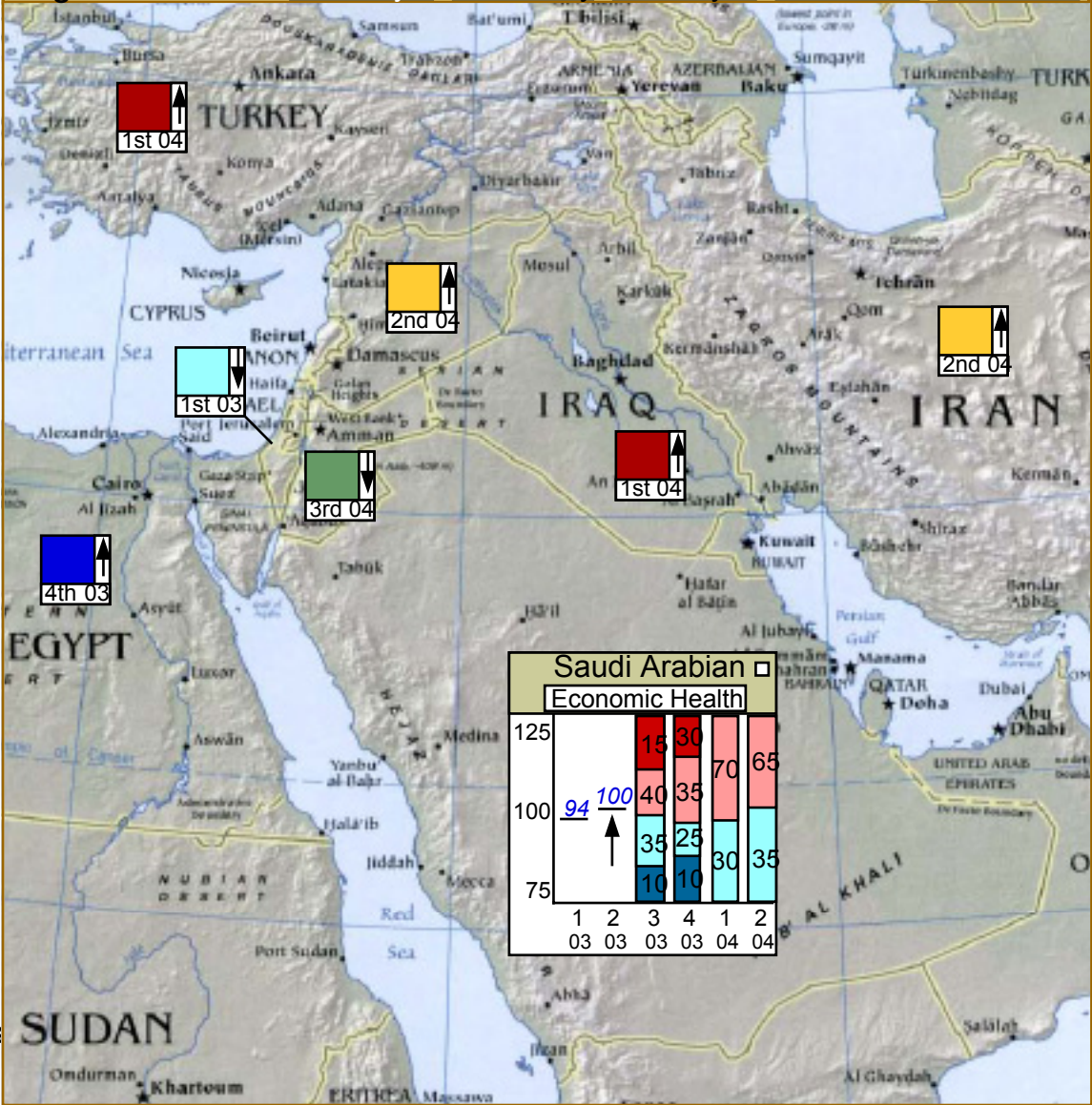
Global Securities						
	1 03	2 03	3 03	4 03	1 04	2 04
U.S. Equities	7.5	7.2	7.1	7.5	7.9	8.0
U.S. GDP	6.23	6.32	6.38	6.35	6.33	6.41
Global Trade	7.5	7.2	7.1	7.5	7.9	8.0
Terror Deaths	113	465	589	214	3654	334
U.S. Mil. Deaths	45	1274	1743	500	230	438

Market Information / Trades & Watch / Portfolio Views

Market Transactions					
Security	Current Price	Recent Trading		Transfer To Focus	
JNec4 ₀₃ 85-105	0.26	0.22	0.33	2,150	<input type="button" value=""/>
IQcd4 ₀₃ <85	0.17	0.15	0.29	1,800	<input type="button" value=""/>
TYum3 ₀₃ 100-120					
SAmP4 ₀₃ >110	0.35	0.32	0.40	1,050	<input type="button" value=""/>
ILu\$1 ₀₄ >100	0.55	0.52	0.61	850	<input type="button" value=""/>
ETu\$1 ₀₄ <110	0.40	0.35	0.40	700	<input type="button" value=""/>
INec3 ₀₃ 105-115	0.45	0.45	0.52	650	<input type="button" value=""/>
JNec4 ₀₃ 85-105	0.26	0.22	0.33	2,150	<input type="button" value=""/>
IQcd4 ₀₃ <85	0.17	0.15	0.29	1,800	<input type="button" value=""/>
TYum3 ₀₃ 100-120					
SAmP4 ₀₃ >110	0.35	0.32	0.40	1,050	<input type="button" value=""/>
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ETu\$1 ₀₄ <110	0.40	0.35	0.40	700	<input type="button" value=""/>
INec3 ₀₃ 105-115	0.45	0.45	0.52	650	<input type="button" value=""/>
JNec4 ₀₃ 85-105	0.26	0.22	0.33	2,150	<input type="button" value=""/>
IQcd4 ₀₃ <85	0.17	0.15	0.29	1,800	<input type="button" value=""/>
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SAmP4 ₀₃ >110	0.35	0.32	0.40	1,050	<input type="button" value=""/>
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ETu\$1 ₀₄ <110	0.40	0.35	0.40	700	<input type="button" value=""/>
INec3 ₀₃ 105-115	0.45	0.45	0.52	650	<input type="button" value=""/>

of Registered Traders = Total Funds Deposited =
 # of Recent Traders = Value of Recent Trades =

Regional Securities **Military** **Economy** **Civility** **U.S. Econ.** **U.S. Mil.**



Schedule through early Operations

June 27 – Alpha product demonstrated to DARPA

July 11 – Core PAM trader group finalized

July 25 – Beta product released to DARPA and core trader group for testing

August 1 – Open registration of traders begins

September 1 – On-line training begins (full version for registered traders with abbreviated version available as advertising)

October 1 – Start of live trading at midnight GMT, continuing 24/7 from then

January 1 – First group of PAM contracts mature at midnight (4th Quarter 03)

January 1 – 4th Quarter 04 securities issued, maintaining one-year horizon

Critical Policies

The **D**efense **A**dvanced **R**esearch **P**rojects **A**gency has funded PAM development and its operations through the 1st quarter of 2005.

Net Exchange does not have to, and will not, extract a *cut* from trading.

DARPA will be given the same access as a PAM trader, and no more.

Net Exchange and The Economist Intelligence Unit are responsible for all matters associated with PAM securities -- DARPA and the DOD do not get to ask *The Market* questions.

Employees of the U.S. government may register as private individuals. (No employee of Net Exchange or the EIU may be a PAM trader.)

All traders will remain anonymous from the U.S. government (and Net Exchange)

Trading statistics (prices and volumes) will be released publicly, but delayed.

Current understanding is that PAM will be an unregulated exchange (PAM securities do not fall under the legal definition of securities).

Goal of 50% non-U.S. participation

Intuition behind the PAM Security Structure

The classic Information Market (e.g., the Iowa Political Market) relies on specific events, the outcomes of which can be enumerated as a set of independent states that span all possible outcomes of the event. For example; the set of outcomes (Bush, Gore, Nader, Other) spanned the event known as the 2000 U.S. presidential election.

To support policy analysis, a market in the future of the Middle East must have a time horizon that is reasonably distant; e.g., one year.

Even if it were possible to list all potential events in the Middle East over the next year that might be of interest, such an approach would be a computational nightmare and require expensive periodic renewal of the list.

Net Exchange has chosen to standardize a futures commerce by establishing security series that track fundamental issues, such as economic health, civil stability, and military posture.

As with any standardized futures commerce, data indices must exist for each security series. Traders must view these indices as objective and unbiased. The Economist Intelligence Unit has defined the necessary data indices and will perform data collection and assessment for PAM.

Spanning Securities and Specific Event Securities

Fundamentals standardized into series of securities – *spanning* issue space:

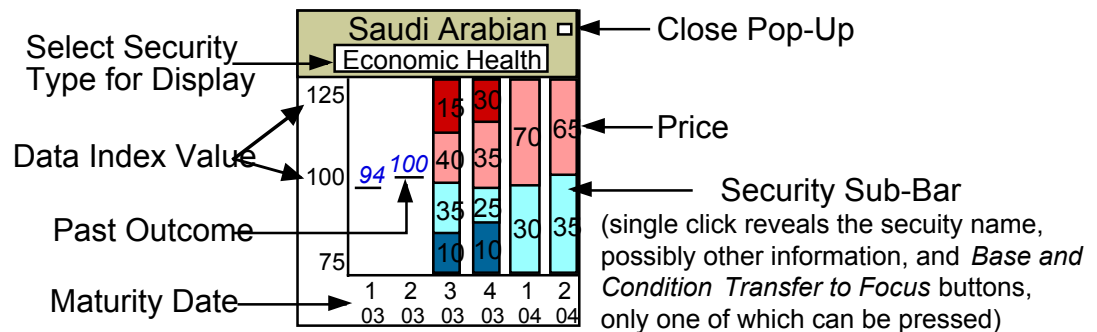
Regional: Economic, civil, military, and U.S. involvement for Egypt, Iran, Iraq, Israel, Jordan, Saudi Arabia, Syria, and Turkey

Global economic and conflict indicators (e.g., trade, terrorism deaths)

Regional Securities will be ranges relative to a data index:

As maturity nears, finer ranges are defined.

The prices for all securities of an issue that mature on the same date add up to \$1.00



Specific events that become of interest and can be stated as Yes or No will be issued into PAM. Examples of potential Specific Event Securities:

Provisional Palestinian State recognized by the U.S. government during the first quarter of 2004.

Fall of Iranian cleric-led regime in the fourth quarter of 2004.

Security Examples

The table below illustrates securities available for trade on 15 Dec. 2003

First row involves a Regional Security defined by an index range

Second row involves a Global Security defined directly from its index

Third row involves a Special Event Security

Fourth row involves a hedge derivative

Security listed on 15 Dec. 03	Posted Prediction	Example of a Trader and his/her Perception	Trader Action
Turkish econ. health in 2 nd 04 will be > 115	36¢ (%)	Bank officer charged with Turkey risk assessment considers this more likely.	Buy contracts in this security until prediction = 45¢
U.S. military deaths in 3 rd 04	500	Reporter with a Middle Eastern news agency considers this too high.	Sell contracts until prediction = 300
U.S. recognizes provisional Palestine 3 rd 04	55¢	Professor of Middle Eastern studies thinks this is too high.	Sell contracts until prediction = 40¢
If 2 nd 04 Iraqi econ. > 150, then 3 rd 04 Syrian civil stability < 100	42¢	Expert in Syrian domestic politics considers this far too low.	Buy contracts until the prediction = 60¢

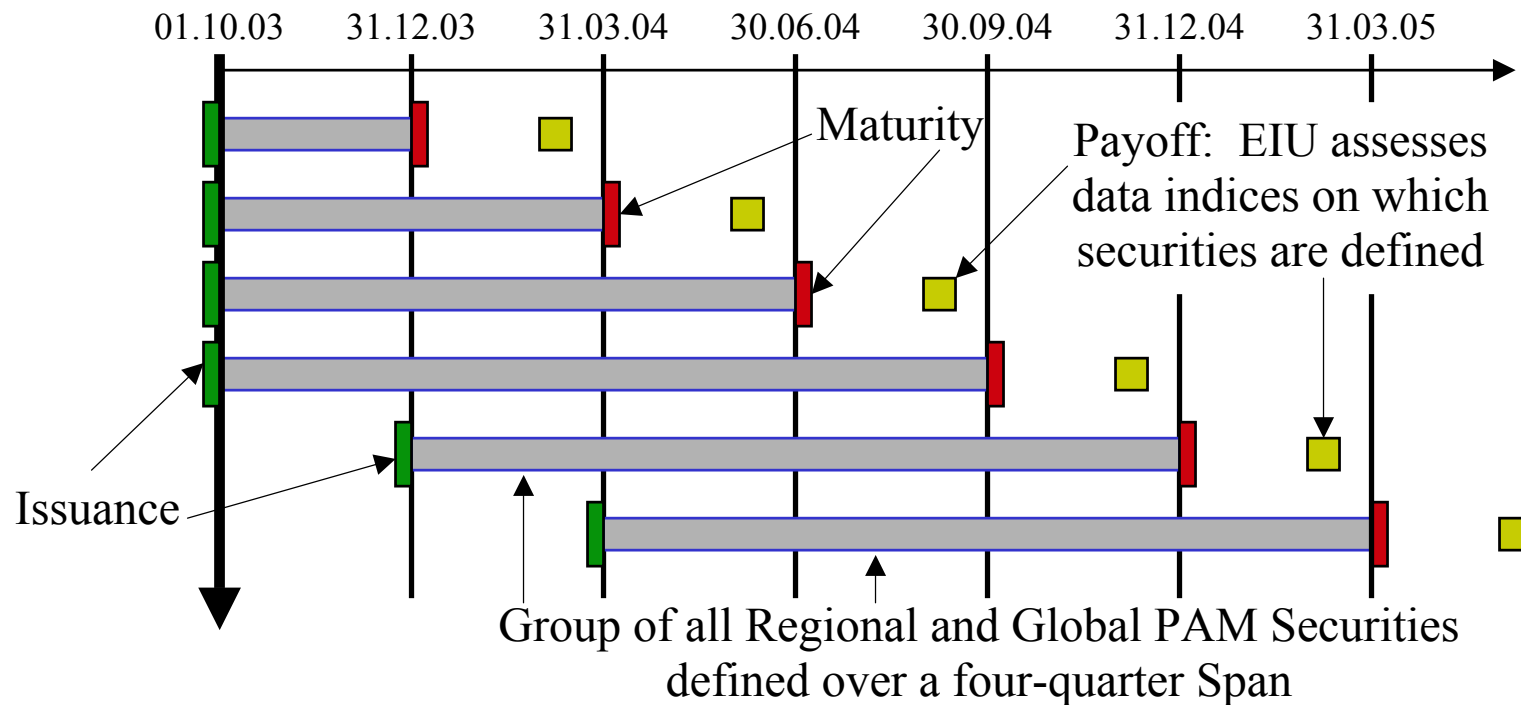
Security Structure

A standard futures structure is used for Regional and Global securities

A group of all security series will be issued at the start of each quarter.

Each security matures one year after issue, except for those in the 1st 3 groups.

A security of each series matures each quarter.



Special Event securities will be issued into PAM using the following process:

Net Exchange nominates a definition to the Economist Intelligence Unit, it accepts or rejects assessing the security. If accepted, Net Exchange issues the security.

