

H-RXUQDO RI 7D[ 5HVHDFK YRO QR SS

7KH WUDQVIRUPDWLRQ RI W  
IXQFWLRQV LQ WKH DXWRPD  
LQIRUPDWLRQ HUD ± D GHY  
SHUVSHFWLYH

6DODK \*~~0~~0GDDKPRXG 0 \$EGHOODWLI

\$EUVUDFW

\$XWRPDWLF ([FKDQJH RI ,QIRUPDWLRQ \$(2, UHVXOWV LQ WD[ DGPLQLVWUDWLRQ  
DXWRPDWLF EDVLV ZKLFK ZLOO KDYH D VXEVDQWLDO LPSDFW RQ WKHLU IXQF  
WD[SD\HUV \$(2, SXWV D JUHDWHU IRFXV RQ WD[ DGPLQLVWUDWLRQ IXQFWLRQV R  
EXUGHQ RQ WD[SD\HUV DQG HQIRUFHPHQW )URP WKH SHUVSHFWLYH RI WKH WD[

OHG WR WKH GHYHORSPHQW RI WKH \$(2, VWDQGDUG DQG IRFXV QRW RQO\ RQ ID  
HIIHFWLYHO\ XVLQJ WKH LQIRUPDWLRQ UHFHLYHG LQ LPSURYLQJ WKHLU IXQFWLRQ

.H\ ZRUGXWRPDWLF ([FKDQJH RI ,QIRUPDWLRQ WD[ DGPLQLVWUDWLRQ FRPPRQ U

DQG (FRQRPLFV 4DWDU 8QLYHUVLW\ 'RKD 4DWDU (PDLO P DEGHOOD



H-RXUQDO RI 7D[ 5HVHDFK

7KH WUDQVIRUPDWLRQ RI WD[ DGPLQLVWUDWLRQ IX

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7KH WUDQVIRUPDWLRQ RI WD[ DGPLQLVWUDWLRQ IX

FRPSO





H-RXUQDO RI 7D[ 5HVHDFK

7KH WUDQVIRUPDWLRQ RI WD[ DGPLQLVWUDWLRQ IX

SUDFWLFH WKH (URH) LHZ ORRNHG WR WKUHH PDLQ DUHDV  
LQIRUPDWLRQ LL DFFHVV WR LQIRUPDWLRQ DQG LLL H  
IXUWKHU GLYLGHG LQWR HVVHQWLDO HOHPHQWV 2YHUDO  
DOO DVSHFWV RI \$HIIHFWLYH XRXR,5 RI UHYLHZV WRRN SODF  
FRPSOHWHG LQ

6XEVHTXHQWO\ WKH 2(&' GHYHORSHG WKH LQWHUQDWLRQ  
WKH &RPPRQ 5HSRUWLQJ 6WDQGDUG &56 ZKLFK ZDV H  
0LQLVWHUV DQG \*RYHUQRUV RI &HQWUDO %DQNV DV SDUV  
LQ )HEUXDU\

7KH 86 RQ WKH RWKHU KDQG WDFNOHG WD[ HYDVLRQ W  
HQDFWLQJ WKH )RUHLQJ \$FFRXQW 7D[ &RPSOLDQFH \$FW

H-RXU







H-RXUQDO RI 7D[ 5HVHDFK

7KH WUDQVIRUPDWLRQ RI WD[ DGPLQLVWUDWLRQ IX

LPSOHPHQWDWLRQ RIRWKHDS\$(2, WLVHDFKDOOHQJHV DQG  
LPSDFW WKH\ PD\ KDYH RQ WKH IXQFWLRQV RI WD[ DG  
XQGHUVWDQG WKH FKDUDFWHULVWLFV RI \$(2, DQG WR  
WD[SD\HUV DQG WD[ DGPLQLVWUDWLRQV

&KDUDFWWHULVWLFV RI \$(2,

%DVHG RQ \$(2, VWDQGDUGV DQG WKH REMHFWLYHV WKH\  
\$(2, FDQ EH LGHQWLILHG LQFOXGLQJ VWDQGDUGLVD  
VFRSH RI GDWD DQG XVH RI WHFKQRORJ\ 7KHVH FKDU

6WDQGDUGVWKHDLRQW DQG SUREDEO\ PRVW LPSRUWDQ  
HIIHFWLYH \$(2, LV VXEMHFW WR DGKHULQJ WR VWDQGD  
LQ JDWKHULQJ UHYLHZLQJ SURFHVVQJ RU UHSRUWL  
VWDQGDUGLVDWLRQ ERWK FROOHFWLRQ DQG H[SORLV  
GLIILFXOW DQG FRVWO\ +HQFH WKH QHHG IRU VWDQ  
SURFHGXUHV DQG IRU D VFKHPD WR SXW WKH LQIRUPD  
RI &56 DQG )\$7&\$ DQG WKH QHHG IRU D FRPPRQ WHP  
UHSRUWV

6L]H RI VWDVHFRQG FKDUDFWHULVWLF RI \$(2, LV WKDW  
RI ODUJH YROXPHV RI GDWD 7KH H[FKDQJH LV QRW PD  
FDVH RI (R,5 EXW UDWKHU RQ D FROOHFWLYH EDVLV L  
VRPHWLPHV PRUH

6FRSH RI H[FKDQJH WR WKH SUHYLRXV FKDUDFWHULV  
RYHUDUFKLQJ QDWXUH RI WKH H[FKDQJH DV VKRZQ E\  
,Q WKH FDVH RI &56 DQG )\$7&\$ IRU LQVWDQFH WKH  
LQFOXGLQJ WKRVH WKDW DUH QRW QHFHVVDULO\ XQG  
UHJXODWRUV LQ UHVSHFW RI DOO W\SHV RI ILQDQFLD  
HQWLWLHV RU DUUDQJHPHQWV DQG FRYHUV DOO UHOH

8VH RI WHFKQRORJ\ RI WKH VL]H RI GDWD H[FKDQJH  
UHTXLUH LQWHQVLYH XVH RI WHFKQRORJ\ WR DOORZ WH  
DQG EUP !7Y•

LQIRUPDWLRQ WHFKQRORJ\ ,7 V\ VWHPV ZKLFK JHQHUD  
VLJQLILFDQW FKDQJHV LQ WKH RUJDQLVDWLRQ SURFHVV

7KH UROH RI WKH WD[ DGPLQLVWUDWLRQ LQ WKLV UHVS  
XQGHUVWDQGLQJ WKH REOLJDWLRQV DQG LPSOHPHQWLQJ  
WKH ORZHV SRVVLEOH FRVW ,Q WHUPV RI IXQFWLRQV  
DFWLYLWLHV

x /LDLVLQJ ZLWK RWKHU UHOHYDQW DXWKRULWLHV WR  
VWULNHV WKH ULJKW EDODQFH EHWZHHQ WKH QHHG  
DQG D UHDVRQDEOH FRVW RI VXFK FRPSOLDQFH ,Q V  
PRVW UHOHYDQW VWDNHKROGHUV DUH ILQDQFLDO VH

x 'UDIWLQJ FOHDU OHJLVODWLRQ DQG UHJXODWLRQV W

x 'UDIWLQJ JXLGDQFH QRWHV DQG SUHSDULQJ UHSRUW

x 2UJDQLVLQJ HYHQWV WR SUHVHQW DQG H[SODLQ WK  
TXHVWLRQV HWF

x 3URYLGLQJ DVVLVWDQFH LQFOXGLQJ WUDLQLQJ HW  
WRRO

)XUWKHU WD[ DGPLQLVWUDWLRQV QHHG DOVR WR PRQLW  
LQWHUYHQH DV DQG ZKHQ UHTXLUH WR HQIRUFH WKH RE  
LPSURYH WKH RYHUDOO OHYHO RI FRPSOLDQFH

,Q PRVW GHYHORSQJ FRXQWULHV IXOILoolQJ WKH IX  
GHVFULEHG DERYH ZLOO EH D PDMRU FKDOOHQJH FRQV  
UHTXLUH DQG WKH JHQHUDOO\ OLPLWHG UHVRXUFHV DY  
DQG 0HLQ]HU UHSRUWHG WKDW WKH FDSDFLW\ WR FRPSO  
WKH JUHDWHVW FRQFHUQ IRU GHYHORSQJ FRXQWULHV

&KDOOHQJHV UDLVHG E\ \$(2, DQG LPSDFW RQ WD[ DGPLQLVWU  
SHUVSHFWLYH

\$(2, JHQHUDOO\ LQYROYHV WD[ DGPLQLVWUDWLRQV UHFH  
KLJK YROXPHV WKDW LV YHU\ XVHIXO LQ YHULI\LQJ WKH  
UHODWLRQ WR WKHLU WD[ OLDELOLW\ 7KH NH\ FKDOO  
DGPLQLVWUDWLRQ WR HIIHFWLYHO\ XVH WKH UHFHLYHG  
FRQILUPHG WKLV LQ WKHLU UHSDUWLRQV

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'LUNLV DQG %RQGILHOG DERYH Q  
.HUULH 6DGLT DQG \$GULDQ 6DZ\HU μ'HYHORSQJ &RXQWULHV DQG V  
6WDQGDUG ± \$ 32QH 6L]H )LWV \$OWWBOOXDQW RQ RUXP  
2(&' 7KH &KDQJLQJ 7D[ &RPSOLDQFH (QYLURQHQW DQG WKH 5R  
KWS ZZZ RHFQ RUJ FWS WKH FKDQJLQJ WD[ FRPSOLDQFH HQYLURQ  
HQ KWP  
\$QGUHV .QREHO DQG μ'DUNXG RHLQON 6HFUHF\ " %ULGJLQJ WKH  
\$XWRPDWLF ,QIRUPDWLRQ ([FKDQJH \$Q (YDOXDWLRQ RI 2(&' V &RPPR  
\$OWHUQDLOOHV UHSRUW 7D[ -XVWLFH 1HWZRUN 1RYHPEHU  
KWSV SSSHUV VVUQ FRP VRO SSSHUV FIP"DEVWUDFWBLG

H-RXUQDO RI 7D[ 5HVHDFK

7KH WUDQVIRUPDWLRQ RI WD[ DGPLQLVWUDWLRQ IX

UHWKLQN WKHLU IXQFWLRQV DQG RSHUDWLRQV WR FRSH  
DEOH WR HIIHFWLYHO\ XVH LW ,Q WKLV FRQWH[W WKH IF

5LVN DVVHVVPHQW DQG DXGLW

7KH NH\ DUHD ZKHUH WKH UHFHLYHG GDWD FDQ EH XY  
SURILOHV 7KH GDWD ZLOO LGHQWLI\ KLJK ULVN WD[SD  
ZKLFK ZRXOG DOORZ D EHWWHU DOORFDWLRQ RI UHVR  
LQ WKH %(36 \$FWLRQ ILQDO UHSRUW RQ &E&5 ,W FO  
EH XVHG WR DVVHVV WUDQVIHU SULFLQJ ULNVV DQG KH  
PRVW HIIHFWLYH ZD\ DXGLW ~~SHORNFHO\ FDQRXGGRRQR~~  
RI WKH ZRUN IRUFH RI WD[ DGPLQLVWUDWLRQV ZRUN L  
7D[ \$GPLQLVWUDWLRQV ~~DGPLQLVWUDWLRQV~~ DUH YHU\ L  
WKHLU DXGLW FDSDFW\ HIIHFWLYHO\ 7KLV FRXOG H[S  
DXGLW IXQFWLRQ KDV EFRPH PRUH EDVHG RQ ULVN DO

%HWWHU DOORFDWLRQ RI DXGLW UHVRXUFHV OHDGV WR  
7KLV LV RQH RI WKH PDLQ LPSDFWV RI H[FKDQJH RI LQI  
IXQFWLRQV RI WD[ DGPLQLVWUDWLRQV %HFDXVH RI V  
DV\PPHWU\ EHWZHHQ WKH WD[SD\HU DQG WKH WD[ DGP  
RU HYHQ QHXWUDOLVHG 7KH LQIRUPDWLRQ RQ ILQDQFI  
,\*\$V RQ JURXS VWUXFWXUH DQG UHODWHG SDUWLHV  
5HSRUWV RQ DJJUHVVLYH WD[ SODQQHQJ UHFHLYHG  
'LVFORVXUH 5XOHV ZKHQ LPSOHPHQWHG DQG RQ DGY  
WKH %(36 SURMHFW SURYLGHV GHWDLOHG NQRZOHGJH  
DIIDLUV

0LWLJDWLQJ RU QHXWUDOLVQJ WKH LQIRUPDWLRQ DV  
UHODWLRQV KLS EHWZHHQ WKH WD[SD\HU DQG WKH  
DV\PPHWU\ KDV EHHQ RIWHQ SUHVHQWHG DV RQH RI  
DGPLQLVWUDWLRQV VKRXOG EH YHVWHG ZLWK LQTXLV  
PDWWH ~~6KR~~XOG WKLV LQIRUPDWLRQ DV\PPHWU\ UHGXFH  
LQYHVWLJDWLYH SRZHUV RI WD[ DGPLQLVWUDWLRQV VK

%HFDXVH RI LWV ELODWHUDO RU PXOWLODWHUDO QDWX  
PRUH WKDQ RQH MXULVGLFWLRQ 7KLV IDFLOLWDWHV  
PXOWLODWHUDO ULVN DVVHVVPHQW DQG MRLQW DXGLW  
2(&' 7D[ \$GPLQLVWUDWLRQ UHSRUW

)XUWKHUPRUH WKH VFRSH RI WKH DXGLW IXQFWLRQ  
&KHFNLQJ WKH DFFXUDF\ RI KLJK YROXPH GDWD LV JH  
PHWKRQ LV WR FKHFN WKDW WKH V\VWHPV WKDW JH  
\$FFRUGLQJO\ LQ DGGLWLRQ WR FKHFNLQJ DFFRXQWLQ

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2(&'7UDQVIHU 3ULFLQJ 'RFXPHQDWLRQ DQG &RXQWU\ E\ &RXQWU\ S  
5HSRUWRYH Q  
2(&'7D[ \$GPLQLVWUDWLRQV ~~UDEVRYHQ~~  
,E2 JPA JP H% D@ 0U €Q UH

H-RXUQDO RI 7D[ 5HVHDFK

7KH WUDQVIRUPDWLRQ RI WD[ DGPLQLVWUDWLRQ IX

WKH DXGLW IXQFWLRQ LV UHTXLUHG LQ WKH FRQWH[W  
JHQHUDWHG WKH GDWD WR EH VHQW WR H[FKDQJH SDU  
\$FKLHYLQJ DOO WKH DERYH LQ D GHYHORSLQJ FRXQWU  
PRELOLVLQJ WKH UHTXLUHG WHFKQLFDO H[SHUWLVI D  
IURQWV WR PDNH WKH EHVW XVH RI WKH UHFHLYHG G  
SUHVXSSRVHV WKH H[LVWHQFH RI D IDLUO\ VRSKLVWLF  
WD[ DGPLQLVWUDWLRQ DOORZLQJ WKH LQWHJUDWLRQ  
DQG LWV XVH WR GHWHFW FDUHV RI QRQ FRPSOLDQF  
SDWWH#KQW LV QRW 0 LV 0 pLRQ @ U`APRVW GYHORSLQJ



H-RXUQDO RI 7D[ 5HVHDFK

7KH WUDQVIRUPDWLRQ RI WD[ DGPLQLVWUDWLRQ IX

DXWRPDWLRQ RI PRVW RI LWV DFWLYLWLHV 7KH DXWKR  
WUDQVIRUPDWLRQ DLPLQJ DW LQFUHDVLQJ LWV UHVRXUF

· \$VVHVPHQW RI 4DWDU¶V SUDFWLFH LQ \$(2,

4DWDU VLJQHG D )\$7&\$ ,\*\$ ZLWK WKH 86 DQG LV DPRQJVV  
WR LPSOHPHQW DQG LPSOHPHQWHG &56 LQ )LUVW  
H[FKDQJH SDUWQHUV RQ 6HSWHPEHU ,Q WKLV FRQ  
DQG WKH 0&\$\$ RQ 1RYHPEHU DQG LVVXHG D &56 &L





H-RXUQDO RI 7D[ 5HVHDFK

7KH WUDQVIRUPDWLRQ RI WD[ DGPLQLVWUDWLRQ IX

DJUHHPHQW

H-RXUQDO RI 7D[ 5HVHDFK

7KH WUDQVIRUPDWLRQ RI WD[ DGPLQLVWUDWLRQ IX

)URP WKH 47' SHUVSHFWLYH VHH VHFWRQ DQG EHF  
IRU WKH SXUSRVHV RI ERWK )\$7&\$ ,\*\$ DQG &56 LV WDNLQJ  
WKH LPSOHPHQWDWLRQ RI \$(2, LQ WKHVH WZR DUHDV GLG  
WHUP KDYH D PDMRU LPSDFW RQ WKH ZD\ WKH 47' FRQG  
PDQDJHPHQW RU FROOHFWLRQ IXQFWLRQV 1RW UHFHLY  
DGDSW DQG XSJUDGH WKHVH IXQFWLRQV

)RU &E& UHSRUWLQJ KRZHYHU LQ WKH DEVHQFH RI LQGL  
WKH H[FKDQJH RI UHSRUWV ZLOO EH UHFLSURFDO +HQ  
VXEVLGLDULHV LQ 4DWDU ZLOO VHH WKHLU &E& UHSRUW  
VHQW WR 47' E\ WKH FRPSHWHQW DXWKRULW\ RI WKH 6WD  
SDUHQW FRPSDQ\ RU LWV VXUURJDWH +RZHYHU WKH LF



