



(YHQW 5HODWHG 3RWHQWLDQV LQ WKH &RQWL 6XLW UHFHQW *XLGHOLQHV IRU 3UHFOLQLFDO

6FDOO\#DOGHURS 33KLQDQ 3DUUD 0\$
6FKRRO RI 3V\FKRORJ\ 8QLYHUVLW\ RI /HHGV 8.
'HSDUWPHQW RI 1HXURORJ\ &KX %UXJPDQQ %UXVVHGV %HOLFLWV SIGFENFQVRU\ PRWRU RU FR
'HSDUWPHQW RI 1HXURORJ\ 8QLYHUVLW\ RI 6mR 3DXOR 0HGFR 6FKRRO 6mR 3DXOR %ULDQ P4' •DP
'HSDUWPHQW RI 3V\FKRORJ\ 8QLYHUVLW\ +HULRW :DWW 8. FRQWUROV > @ 3 SDUDPHWHU
6FRWWLVK 'HPHQWLD &OLQLFDO 5HVHDFK 1HWZRUN 1+6 6FRWWLVK 'HPHQWLD &OLQLFDO 5HVHDFK 1HWZRUN
&HQWUH IRU &RJQLWLYH \$JHLQJ DQG &RJQLWLYH (SLGHPLRORJ\ 8QLYHUVLW\ RI /HHGV 8. WKH 3
'LHJR 3RUWDOHV 8QLYHUVLW\ 3V\FKRORJ\ &KLOH
8QLYHUVLGDG \$XWYQRPD GHO &DULEH &RORPELD
&RUUHVSRRQLQJ DXWKRU %ULDQ 6FDOO\ 6FKRRO RI 3V\FKRORJ\ 8QLYHUVLW\ RI /HHGV 8. WKH 3
E VFDOO\#OHGVD F XN
5HFHLYHG 0DWH \$FFHSW\XQ 6DWH3XEOLVKHG 0DWH
&RSULJKW 6FDOO\ % HW DO 7KLW LV DQ RSHQ DFFHVV DUWLFOH GLVWULEXWHG XQGHU WKH WHUPV R
XVH GLVWULEXWHG IRU 6B-b12-b10 g Q r"œ Q#"RJA€2t SB 1Ts P,-e tM5 shu 7 DDCDD4 &p% Q 4-I q"r' E'aQ0 sA 7 P-6t...a6t7)vX)vj

VSHFLRFLWKHVH PHDVXUHV LV VWLOO WRR
ORZ WR SURPRWH WKHP DV D GLDJQRVWLF WRRO :H SURSRVH WKDW FD
WKHRU\ EDVHG VHOHFWLRQ RI DVVHVPPHQW PRGDOLW\ LV LPSHUDWLYH
PD[LPLVLW\ 6HJWKRPHLWV DQV GULYHQ ((* PHDVXUHPHQWV +HUH ZH
FRQVLGHUJ FVPH HYHQW UHODWHG SRWHQWLDQV (53 LQ WKH
DVVHVPPHQW PRQLWRULQJ DQG SUHGLFWLRQ RI \$' UHODWHG SDWKROR
DJHLQJ \$ UHFRQFHSWXDOLVDWLRQ RI (53 WDVN PRGDOLW\ LQ \$' PD\ EH
QHFHVVDU\ WR DOLJQ UHVHDFKHUV ZLWK FXUUHQW UHFRPPHQGDWLRQ
FOLQLFDO GLDJQRVWLFV > @

ZLWQHVVHG D GULYH WRZDUGV LGHQWLV\SWRSPHQLFWLSIGLYDQJNDHJW ZIKR S\$UHLVHQV
DW SUHFOLQLFDO DQG SURGURPDO VWHFRQRIL\$DOLDQRGU G MUK LW B OS FR RDVWJIDH QW
LGHQWLI\ LQGLYLGXDOV ZKR DUH OLNHR QW B DCS HWRXSG\$HDQGD YHR UFDQ L FGV R QW XHX
HyFDRI LQWHUYHQWLRQV > @ 3UHFOLQLFDOV \$H WLSHDDVOSURH LHWLWR B 6XEM
SUHV\PSWRPDWLF LQGLYLGXDOV NQRZQLV B FRJQLWLYH \$'LPSODVH QW R D W SURBHU RV
ELRPDUNHU IDPLOLDO \$' RU WKH SUH\$HGHQWZPSWR R H/FXCHUL VL B DGUH XORS
EHWD DP\ORLG DQG WDX SDWKRORJ>> @@ 3DURG KRPYBOKLSJKLWUWUW RV RFRQYHUV

6WXG\ 6DPSOH 7DVN (53 (IIFW 6HQV 6SHF ,QWHUSUHWDLRQ
3UHFOLQLFDO VWXGLHV
\$OO\ HW DO > @)+ Q \$XGLWRU\ RGGEDOO 3 5HGXFHG DPSOLW XGH XFBWLRQ LQ DWWHQWLRQDO
,QFUHDVHG ODWHQF\ 'HDD\HG DWWHQWLRQDO FRQW
*UHHQ DQG /HY\ > @ I\$' \$XGLWRU\ RGGEDOO 3 ,QFUHDVHG HOD\HG DWWHQWLRQDO FRQW
1 ,QFUHDVHG ODWHQF\ 'HDD\HG VWLPXOXV GHWHFW
VHOHFWLRQ
) + Q 3 ,QFUHDVHG ODWHQF\ 'HDD\HG DWWHQWLRQDO FRQW
*RORE HW DO > @UH I\$' \$XGLWRU\ RGGEDOO 1 ,QFUHDVHG HOD\HG YLVXDO SURFHVVLRQJ
1 ,QFUHDVHG ODWHQF\ 'HOD\HG VWLPXOXV
VHOHFWLRQ
3 ,QFUHDVHG ODWHQF\ 'HDD\HG DXGLWRU\ PPHRU\ SUR
3 ,QFUHDVHG ODWHQF\ 'HDD\HG DWWHQWLRQDO FRQW
6ORZ ZDYH 5HGXFHG DPSOLW XGH XFBWLRQ LQ DWWHQWLRQDO
%REHV HW DO > @UH I\$' 6HPDQWLF 1 5HGXFHG JHGHUDWRU/RQJ WHUP UHFRJQLWLRQ PPHR
FDWHJRULVDWLRQ VWUHQJWK
4XLURJ HW DO > @UH I\$' 5HFRJQLWLRQ PV ,QFUHDVHG DPSOLWXGH
PPHRU\ LQ RFFLSLWDO VLWHV

	Q						
		\$XGLWRU\	RGGEDOO	76 3	1RBHIIHFW	B	
3DSDOLDJNDV 7VRODNL DQG > @	LP,LVNLGLV \$QRJLDQDNLV Q	\$XGLWRU\	RGGEDOO	1	,QFUHDVHG	CHDDHQC\ VWL PXOXV VHOHFWLRQ	GHWHFW
			1	5HGXFHG DPSOLWXGH	5BGXFHG VWL PXOXV VHOHFWLRQ		GHWHFW
			6:	,QFUHDVHG ODWHQF\	'HDD\HG VWL PXOXV HYDOXDWL		
3DSDOLDJNDV HW DO > @	Q	\$XGLWRU\	RGGEDOO	1	,QFUHDVHG	5BGXFHG VWL PXOXV VHOHFWLRQ	GHWHFW
				,QFUHDVHG ODWHQF\	'HDD\HG VWL PXOXV VHOHFWLRQ		GHWHFW
			3	,QFUHDVHG ODWHQF\	'HDD\HG DWWHQWLRQDO		FRQW
			6:	,QFUHDVHG ODWHQF\	'HDD\HG VWL PXOXV HYDOXDWL		
/DL /LQ /LRX DQG /LX > @	Q	\$XGLWRU\	RGGEDOO	3	,QFUHDVHG	CHDDHQC\ DWVHQWLRQDO	FRQW
YDQ 'HXUVHQ HW DO > @	Q	\$XGLWRU\	RGGEDOO	3	,QFUHDVHG	CHDDHQC\ DWVHQWLRQDO	FRQW
				5HGXFHG DPSOLWXGH	5BGXFWLRQ LQ DWWHQWLRQDO		
*R]NH HW DO >	@,	9LVXDO 2	GGEDOO	1	,QFUHDVHG	CHDDHQC\ VWL PXOXV VHOHFWLRQ	GHWHFW
	Q			3	,QFUHDVHG ODWHQF\	'HDD\HG DWWHQWLRQDO	FRQW
2OLFKQH\ HW DO > @	Q	0&GHPDQWLF 1 FDWHJRULVDWLRQ		3	5HGXFHG HIIHFW	SBLPLQJ /RQJ WHUP UHFRJQLWLRQ	PHPR
				3	5HGXFHG HIIHFW	SBLPLQJ /RQJ WHUP UHFRJQLWLRQ	PHPR
*DOOL HW DO > @,	Q	5HFRJQLWLRQ PHPRU\			5HGXFHG HIIHFW	SBLPLQJ /RQJ WHUP UHFRJQLWLRQ	PHPR

WDVN 670%7 670%7 UHTXLUHV SDUWLFLSDQWV WR PPHRULVH
DQG UHWULHYH VKDSH FRORXU IHDWXUH FRQMXQFWLRQV LQ D FKDQJH GHWHFWL
SDUDGLJP 5HODWLYH WR GHPHQWLFHFRQROV 670%7
LGHQWLQHSUHV\PSWRPDWLF I\$' > @ PLUURULQJ WKH WLPOLQH RI
VLJQL}EHW DP\ORLG DFFXPXODWLRQ LQ WKLV JURXS > @ 670%7
GH}FDWH DOVR HYLGHQW LQ IXOO RQVHW VSRUDGLF \$' > @ 6&' DQG 0&,
> @)XUWKHUPRUH 670%7 GSHUHVVLV > @ DQG RWKHU GHPHQWLV > @ \$ UHFHQW VWXG\
DJHLQJ > @ GSHUHVVLV > @ DQG RWKHU GHPHQWLV > @ \$ UHFHQW VWXG\
GRFXPHQWHG UHGXFHG DPSOLWXGH LQ HDUO\ (53V 1 DQG 3 LQ
SUHV\PSWRPDWLF I\$' DQG 0&, LQGLYLGXDOV FRPSDUHG WR FRQWUROV > @
ZKLFK PD\ LQGGHFWLWYHXWDO YLVXDO SURFHVVULQJ OHDGLQJ
WR LPSDLUH PPHRU\ SHUIRUPDQFH 670%7 UHODWHG (53V KDYH
SRWHQWLD WR PDS WKH SURJUHVVLRQ RI \$' SDWKRORJ\ LQWR ODWHU VWDJHV
WKH WDVN FDQ EH WLWUDWHG ZLWK UHJDUGV WR WKH QXPEHU RI VWLPXOL XVHO
WKH WDVN 670%7 RU RWKHU FRQWH[W IUHH PPHRU\ WDVNV WKDW UHO\
VROHO\ RQ PPHRU\ IXQFWLRQV RI WKH (& 35& PD\ WKUHIRUH EH WKH PRVW
WKHRUHWLFDUO\ GULYHQ WDVNV DYDLODEOH WR UHVHDFKHUV ZKR ZLWK W
LQYHVWLJDWH (53V LQ SUHFOLQLFDO \$'

ORQLWRULQJ GLVHDVH SURJUHVVLRQ DQG UHVSQVH WR WUHDWPHQW
XVLQJ (53V

2GGEDOO (53dV KDYH EHHQ XVHG WR PHDVXUH ORQJLWXGLQDO FKDQJHV LQ
WKH EUDLQ ZKHQ WUDFNLQJ \$' SURJUHVVLRQ DQG HYDOXDWLQJ
SKDUPDFRORJLFDQ LQWHUYHQWLRQV 'XULQJ SURGURPDO VWDJHV FRPSRQHQW
SDUDPHWHUV WHQG WR PLUURU WKH WUDMHFWRU\ RI FRJQLWLYH GHFOLQH 2GG
1 DPSOLWXGH LV VHQVLWLYH WR ORQJLWXGLQDO FRJQLWLYH FKDQJHV DW HDU
SURGURPDO VWDJHV ZKHUHV 3 ODWHQF\ LV PRUH VHQVLWLYH DW ODWHU VWD
> @ 2YHU D \HDU SHULRG 0&, SDWLHQWV ZLWK 1 3
DEQRUPDOLWLHV ZHUH WKUHH WLPHV DV OLNHO\ WR FRQYHUW WR IXOO \$' WKD
SDWLHQWV ZLWK SUHVHUYHG FRPSRQHQWV > @ &KDQJHV LQ PRUSKRORJ\ RI
WKH 31:0 ZRUNLQJ PPHRU\ FRPSRQHQW ZHUH REVHUYHG LQ SURJUHVVLYH
FRPSDUHG WR VWDEOH 0&, SDWLHQWV RYHU D PRQW SHULRG > @ (53
SDUDPHWHUV KDYH EHHQ OLQNHG WR WKH GHSRVLWLRQ RI KDOOPDUN \$'
ELRPDUNHUV HQ3WKHFRSBOQW LQ FRQMXQFWLRQ ZLWK OHYHO
RI HGXFDWLRQ KDV VXFFHVVIXOO\ SUHGLFWHG WKH TXDQWLW\ RI EHWDP\ORL
\$• LQ WKH EUDLQV RI HDLQSOXWLRQV RI >3 @
DPSOLWXGH DQG ODWHQF\ ZLWK \$' VLVWJWUHQJWKHQHG WKH
RI 0&, \$' FRQYHUWHUV IURP QRQ FRQYHUWHUV > @ ,Q WKH VDPH
VDPH 1 ODWHQF\ FRUHHODWHG ZLWK \$• OHYHOV DQG ERWK PHDVXUHV
LQ FRPELQDWLRQ SUHGLFWHG 0&, \$' FRQYHUVLRQ ZLWK VHQVLWLYLW\
DQSHFL}FL@\ \$OWKRJK WKH QXPEHU RI 0&, \$' FRQYHUWHUV LQ
WKHVH VDPH ZDV ORZ WKH UHVXOWV VHP WR LQGLFDWH WKDW WKH (53dV P
LQFUHDVH WKH DFFXUDF\ RI PROHFXODU ELRPDUNHUV IRU WUDFNLQJ WKH
SURJUHVVLRQ IURP SURGURPDO WR JFDWLRQVHW \$' ,I WKLV
LV VWDEOH DFURVV ODUJHU VDPH WKH GXDO DSSURDFK FRXOG EH D EHW
LQGLFDWRU IRU 0&, \$' FRQYHUVLRQ WKDQ ZKDW LV W\SLFDOO\ UHSRUWHG IRU
PROHFXODU ELRPDUNHUV DORQH > @

(53V KDYH EHHQ XVHG DV QHXUJWFRPH PHDVXUHV WR WKH
SKDUPDFRORJLFDQ WUHDWPHQWV LQ \$' :KLOH D VKRUWHLQJ RI WKH 3
ODWHQF\ ZDV HYLGHQW LQ D

DV\PSWRPDWLF LQGLYLGXDLG HDWELJ HCNHRI \$' FDQ EH
FRQ}UPDRWLRLQWKHU DP\ORLGRSDWK\ \$ RU WDXRSDWK\ 7 ZKLOH
WKH SUHVHQFH RI ERWKFOEDV)FDRWLRQ SUHFOLQLFDO
GHWHFWRQ RI VXFK ELRPDUNHUV UHOLHV RQ 3RVLWURQ (PLVVLRQ 7RPRJUDSK\
3(7 LPDJLQJ RU &HUHEUR6SLQDO)OXLG &6) DQDO\VLV \$ QXPEHU RI
HFRQRPLF DQG HWKLFDO IDFWRUV VXFK DV H[SHQVH WKH QHHG IRU VSHFLDOLV
WUDLQLQJ DQG HTXLSPHQW DQG LQYDVLYHQHVV DUH LPSOLFDPHQW ZLWK
ELRPDUNHU DFTXLVLWLRQ DW HDUO\ VWDJHV RI \$' > @ 3(7 DQG 05,
PHWKRGRORJLHV LGHQWLI\ VHYHUDO PHFKDQLVPV UHODWHG WR \$' EXW WKHLU
XVH LV OLPLWHG E\ DYDLODELOLW\ RQO\ LQ VSHFLDOLVHG FOLQLFV GRUPDOO\ OR
LQ PDMRU FLWLHV FRVWV DQG LQYDVLYHQHVV GXH WR UDGLDWLRQ H[SRVXUH H
3(7 &7 VFDQHWHFKQLTXHV ZRXOG XQOLNHO\ EH DYDLODEOH IRU
VFUHHQLQJ SXUSRVHV 6LPLODUO\ &6) DQDO\VLV UHTXLUHV DQ LQYDVLYH OXPED
SXQFWXUH ZKLFK QHHGV WR EH FDUULHG RXW E\ D WUDLQHG SURIHVVLRQDO DQ
FDQ OHDG WR ~~HOSOND~~ DVHQW VLGH
&6) DQG 3(7 DQDO\VLV KDYH VHYHUDO OLPLWDWLRQV QRW PVH Le G G ` 0†p—X) D
IR &6) 'LRPDUNDQ_) V P

HF

MWSVd@pLVW@`MLV

6FKZDUWJ 7- .XWDV 0 %XWWHUV 1 3DXOVHQ -6 6DOPRQ '3
(OHFWURSK\VLRRJLFDQ LQVLJKWGH)EUMR WKH QDWXUH RI WKH VHPDQWLF
\$OJKHLPHU V GLVHVVH 1HXURSV\FKRORJLD
&DVWD³HGD 0 2VWURVN\ 6ROLV) 3«UH] 0 %REHV 0\$ 5DQJHO /((53 DVVHVVPHQW RI VHPDQWLF PPHRU\ LQ \$OJKHLPHU V GLVHVVH ,QW - 3V\FKRSK\VLRO
7HQGRONDU , 6FKRHQIHOG \$ *RO] *)HUQDQGH] * .XKO .3 HW DO
1HXUDO FRUOHODWHV RI UHFRJQLWLRQ PPHRU\ ZLWK DQG ZLWKRXW UHFROOHFWLRQ LQ
SDWLHQWV ZLWK \$OJKHLPHUdV GLVHVVH DQG KHDOWK\ FRQWUROV 1HXURVFLHQFH /HWWHUV a
2OLFQKH\ -0 5LJJLQV %5 0RUULV 6. 6DOPRQ '3 .XWDV 0
5HGXFHBFVZRUG UHSHWLWLRQ RQ WKH Q DQG OSF HYHQW UHODWHG
SRWHQWLDQV DUH FRPPRQ LQ PLOG \$OJKHLPHU V GLVHVVH DQG PLOG FRJQLWLYH
LPSDLUPHQW FRQYHUWHUV 1HXURORJ\ \$ a\$
6SHUOLQJ 5\$ \$LVHQ 36 %HEDVWW/DO%HQQHWW '\$
7RZDUG}QLWKH SUHFOLQLFDO VWDJHV RI \$OJKHLPHUdV GLVHVVH
5HFRPPHQGDWLRQV IURP WKH 1DWLRQDO ,QVWLWXWH RQ \$JLQJ \$OJKHLPHU V
\$VVRFLDWLRQ ZRUNJURXS RQ GLDJQRVWLF JXLGHOLQHV IRU \$OJKHLPHU V GLVHVVH
\$OJKHLPHU V 'HPHQW
6SHUOLQJ 5\$.DUODZLVK - -RKQVRQ . \$ 3UHFOLQLFDO \$OJKHLPHU
GLVHVVH WKH FKDOOHQJHV DKHDG 1DW 5HY 1HXURO
3HWHUVHQ 5& 6PLWK *(:DULQJ 6& ,YQLN 5- HW DO 0LOG FRJQLWLYH
LPSDLUPHQW FOLQLFDO FKDUFWHUL]DWLRQ DQG RXWFRPH \$UFK 1HXURO
\$OEHW 06 'H.RVN\ 67 'LFNVRQ ' 'XERLV %)HOGPDQ ++ HW DO
'H GLDJQRVLY RI PLOG FRJQLWLYH LPSDLUPHQW GXH WR \$OJKHLPHUdV GLVHVVH
5HFRPPHQGDWLRQV IURP WKH 1DWLRQDO ,QVWLWXWH RQ \$JLQJ \$OJKHLPHU V
\$VVRFLDWLRQ ZRUNJURXS RQ GLDJQRVWLF JXLGHOLQHV IRU \$OJKHLPHU V GLVHVVH
\$OJKHLPHUdV DQG 'HPHQWLD a
7DEHW 0+ 0DQO\ -- /LX ; 3HOWRQ *+ 5RVHQEEXP 6 HW DO
1HXURSV\FKRORJLFDQ SUHGLFWLRQ RI FRQYHUVLRQ WR \$OJKHLPHU GLVHVVH LQ

7DFKLEDQD + 0L\DWD < 7DNHGD 0 6XJLWD 0 2NLWD 7 (YHQW
UHODWHG SRWHQW &RJRUGLVHVDVH &RJQLWLYH
%UDLQ 5HVHDFK a
/RJLH 5+ 3DUUD 0\$ 'HOOD 66)URP &RJQLWLYH 6FLHQFH WR
'HPHQWLD \$VVHVPHQW 3ROLF\ ,QVLJKWV IURP WKH %HKDYLRUDO DQG %UDLQ
6FLHQFHV a
5HQW] '0 3DUUD 5RGULJXH] 0\$ \$PDULJOLR 5 6WHUQ < 6SHUOLQJ 5 HW DO
3URPLVLQJ GHYHORSRPHQWV LQ QHXURSV\FKRORJLFDQ DSSURDFKHV IRU WKH
GHWHFWRQ RI SUHFOLQLFDQ \$O]KHLPHUV GLVHVDVH D VHOHFWLYH UHYLHZ
\$O]KHLPHUV HHDVDFK
5HQW] '0 \$PDULJOLR 5(%HFNHU -\$)UH\ 0 2OVRQ /(HW DO
)DFH QDPH DVVRFLDWLYH PHPRU\ SHUIRUPDQFH LV UHODWHG WR DP\ORLG EXUGHQ
LQ QRUPDO HOGHUO\ 1HXURSV\FKRORJLD
0DF.HQ]LH * 'RQDOGVRQ ', ([DPLQLQJ WKH QHXUDO EDVLV RI
HSLVRGLF PHPRU\ (53 HYLGHQFH GLWKMQRVDFHV DUH UHFROOHFWHG
IURP QDPHV 1HXURSV\FKRORJLD a
*XR & 9RVV -/ 3DOOHU .\$ (OHFWURSK\VLORJLFDQ FRUHHODWHV RI
IRUPLQJ PHPRULHV IRU IDFHV QDPHV DQG IDFH QDPH DVVRFLDWLRQV
&RJQLWLYH %UDLQ 5HVHDFK a
6WDUN 60 <DVVD 0\$ 6WDUN &L\HUHQFMSDGLYDQXDO
SDWWHUQ VHSRUDWRQ SHUIRUPDQFH DVVRFLDWHG ZLWK KHDOWK\ DJLQJ LQ KXPDQV
/HUUQLQJ 0HPRU\ a
0RUFRP \$0 5HVLVWLQJ IDOVH UHFRJQLWRQ \$Q (53 VWXG\ RI OXUH
GLVFULPLQDWLRQ %UDLQ 5HV
'LGLF 0 %DUEHDX (-)HOLFLDQ 2 7UDPRQL (*XHGM (HW DO :KLFK
PHPRU\ V\VWHP}LVVPSO]KHLH " - \$O]KHLPHUV 'LV
I\ -I
<DQJ ; *RK \$ &KHQ 6+ 4LX \$ (YROXWRQ RI KLSSRFDPSDO VKDSHV
DFURVV WKH KXPDQ OLIVSDQ +XP %UDLQ 0DSS
4LQ 6 5LMSNHPD 0 7HQGRONDU , 3LHNHPD & +HUPDQV (- HW DO
'LVVHFWLQJ PHGLDO WHPSRUDO OREH FRQWULEXWRQV WR LWHP DQG DVVRFLDWLYH
PHPRU\ IRUPDWLRQ 1HXURLPDJH
6WDUHVLDQ %3 'DYDFKL / 2EMHFW XQLWL]DWLRQ DQG DVVRFLDWLYH
PHPRU\ IRUPDWLRQ DUH VXSSRUWHG E\ GLVWLQFW EUDLQ UHJLRQV - 1HXURVFL

0D\HV \$ 0RQWDOGL ' 0LJR (\$VVRFLDWLYH PHPRU\ DQG WKH PHGLDO
WHPSRUDO OREHV 7UHQQV &RJQ 6FL
GH -DJHU & \$ 0LOZDLQ (%XGJH 0 (DUO\ GHWHFWRQ RI LVRODWHG
PHPRU\}FLVQ WKH HOGHUO\ WKH QHHG IRU PRUH VHQVLWLYH
QHXURSV\FKRORJLFDQ WHVWV 3V\FKRORJLFDQ 0HGLFLQH a
'H -DJHU & %ODFNZHO \$' %XGJH 00 6DKDNLQ %- 3UHGLFWLQJ
FRJQLWLYH GHFOLQH LQ KHDOWK\ ROGHU DGXOWV \$P - *HULDWU 3V\FKLDWU\

1DYHK %HQMDPLQ 0 *XH] - .LDAh\$H 5HHG\ 6

VWDWH IXQFWLRQDO FRQQHFWLYLW\ LQ \$JKHLPHUdV GLVHDVH 1HXUR,PDJH
a